



## Project Summary

# Proceedings: National Workshop on Pesticide Waste Disposal Denver, Colorado, January 27-29, 1986

The National Workshop on Pesticide Waste Disposal - 1986 was held in Denver, Colorado, on January 27-29, 1986. This workshop was jointly sponsored by the American Chemical Society's Division of Agrochemicals, the American Farm Bureau Federation, the American Society of Agricultural Engineers, the Association of American Pesticide Control Officials, Inc., the National Agricultural Aviation Association, the National Agricultural Chemicals Association, the National Alliance of Independent Crop Consultants, the National Barrel and Drum Association, the National Forest Products Association, the National Pest Control Association, the U.S. Department of Agriculture, and the U.S. Environmental Protection Agency's Office of Pesticide Programs, Office of Solid Waste, and Office of Research and Development. The primary purpose of this workshop was to work with government, pesticide user groups, pesticide producers, farm organizations, and academia to define and offer practical solutions to pesticide users' disposal problems. The proceedings of the workshop are a compilation of the speakers' papers and transcripts of the summary panels. Topics included industry's role in users' waste disposal, on-site demonstration projects, regulatory update, the pesticide research workshop summary, users' waste minimization/reuse, users' waste treatment/storage/disposal, and summary panels on technology, regulations, and application of pesticide wastes. The 1986 workshop was an outgrowth of the workshop held in 1985 which was

developed to provide a national forum that assembled pesticide users, pesticide producers, researchers, and regulators to collectively address the complex issues of pesticide waste disposal and serve as a basis for continued dialogue and interaction. The workshop committee continued to meet through 1985 to develop this 1986 solution-oriented workshop. These proceedings contain nineteen papers and three summary panel transcripts that provide practical information on the issues and solutions of pesticide waste treatment, storage, and disposal.

Specific treatment, storage, disposal and waste minimization technologies were addressed during the workshop. On-site demonstration projects included: carbon adsorption treatment of rinsewater, treatment of pesticide-containing soils, biological treatment, biological/physical process for the elimination of cattle-dip pesticide wastes, and biological and chemical disposal systems for waste pesticide solutions. Waste minimization/reuse technology included: direct injection, wastewater recycling, rinsewater recycling, and engineering considerations. Container management technologies were addressed for reconditioning containers, recycling metal containers, disposal of 55-gallon plastic drums, and off-site disposal of pesticide wastes.

*This Project Summary was developed by EPA's Hazardous Waste Engineering Research Laboratory, Cincinnati, OH, to announce key information concerning this research project that is fully documented in a separate report*

*of the same title (see Project Report ordering information at back).*

After opening remarks and a welcome from John G. Welles, the U.S. Environmental Protection Agency (EPA) Regional Administrator for Region VIII, Robert Wayland who is a special Assistant to the EPA Administrator in Washington, D.C. delivered the Keynote Address. Mr. Wayland discussed the joint efforts of the Office of Pesticide Programs and the Office of Solid Waste, the RCRA activities largely mandated by the 1984 amendments, and specific challenges and opportunities for pesticide producers and users to work with state and federal agencies. Also recognized was the essential role of research in deriving future solutions that will transcend any of the regulatory structures put into place. Mr. Wayland applauded the workshop as a valuable opportunity for the private and public sector to work together on a cooperative venture that signals the positive aspects of the new ways EPA hopes to conduct its business.

To bring the 1986 workshop into focus, Dr. James N. Seiber of the University of California at Davis gave a review of the 1985 National Workshop, which provided a forum for exchanging ideas, determining needs, and identifying potential solutions. Dr. Seiber indicated the most tangible result of the 1985 workshop was that it led directly to a Research Workshop held in Cincinnati, Ohio, only 6 months after Denver, where many decisions were reached on what technologies should be pursued. Less tangible, however positive, was the sense of urgency, expectations of progress, and hope for solutions. Over 400 attendees with a wide diversity of backgrounds came to the 1985 workshop looking for direction and seeking solutions to the pesticide waste problems.

The National Agricultural Chemicals Association (NACA) has for the past 4 years directed a great deal of attention to the needs of pesticide users concerning pesticide waste disposal. Dr. Jack D. Early of NACA defined industry's role to assist pesticide users in finding waste disposal options that are environmentally sound, cost-effective and realistic in meeting their legal responsibilities. NACA has funded five verification studies to further enhance technology. Dr. Early identifies a regulatory scheme that recognizes the types of wastes associated with pesticide use and is re-

sponsive to the economic and operating restrictions of both private and commercial applicators.

The first morning session included on-site demonstration project reports. Dr. John C. Nye of Louisiana State University described the operation of a carbon adsorption treatment unit that was constructed and tested during the fall and winter of 1985 to 1986. The objectives of the test were to identify the critical factors that affect the flocculation of pesticide-contaminated wastewater and to provide the data for use by applicators and regulatory agencies to adopt this technology. The criteria for selecting flocculant aids are described in detail within the report, and the tests prove this treatment process was effective in removing pesticides from wastewaters.

Dr. Ian L. Pepper, a University of Arizona professor, presented a study report on the treatment of pesticide-containing soils where pesticides have accumulated in soils adjacent to aerial applicator landing strips. The objective of the project was to identify a time- and cost-effective detoxifying treatment. The treatment technology identified is ultraviolet (UV) photo decomposition and microbial degradation. The project was initiated in November 1985, and preliminary data of the project are encouraging in finding a reduction to toxaphene concentrations at these landing strips.

Researchers at the University of California-Davis are evaluating two different pesticide waste disposal sites for in situ decontamination using biological methods. Dr. Authur Craigmill discussed the two field trials used to test the biological methods. One of these trials was the continuation of the cleanup of the Sutter County Airport and the other field study was located at the Glenn County Airport. Both of these sites are associated with aerial applicator operations using toxaphene at the Sutter County Airport and using diuron, atrazine, dursban, trifluralin, Me parathion, and diazinon as the major pesticides at the Glenn County Airport. These studies will provide background data needed to implement full-scale decontamination of pesticide waste ponds and airport strips with decontaminated waste pesticide ditches.

Extensive cattle-dipping operations are continuously carried out along the U.S./Mexican border as part of an effort to eradicate the cattle fever tick prob-

lem. These operations generate large volumes of aqueous pesticide wastes. Dr. Jeffrey Karns described a biological/physical process for the elimination of cattle-dip pesticide wastes using UV-ozonolysis after natural degradation by microorganisms in soil. This combined treatment of microbial hydrolysis followed by UV-Ozonolysis proved that a safe and effective disposal of coumaphos-containing cattedip wastes can be achieved in the laboratory. This process has also been field tested and was shown to be an effective waste treatment method. Research is underway to simplify the process for field personnel utilization.

The final report of the on-site demonstration projects was presented by Dr. Brian Klubek of Southern Illinois University. Acidic and alkaline trickling filter systems were assessed for biological and chemical decomposition of waste pesticide solutions. This was performed by using a disposal pit filled with coarse-grade limestone to promote alkaline hydrolysis and by using another pit filled with acid-waste material gathered from a strip mine operation to promote acid hydrolysis. The treatment systems enhanced degradation by including indigenous pesticide-decomposing bacteria. Degradation rates of up to 30% per day were observed in the acid system compared to about 2.5% per day rates for the alkaline disposal system. These systems appear to be comparatively inexpensive and simple to construct, operate and maintain and work on most pesticides used in Illinois. The downside of such pit systems is the overwhelming resistance to using in-ground disposal systems, therefore this technology should be considered for above ground usage.

A regulatory update panel consisting of Raymond F. Krueger who discussed FIFRA, Matthew Straus who discussed RCRA, and Marvin Frye who presented EPA regional perspectives to pesticide waste disposal began the afternoon presentations. These EPA speakers fielded questions from the attendees and were available for discussions during the workshop.

A research workshop on the treatment/disposal of pesticide wastewater generated by the agricultural application of pesticides was held at the USEPA's A.W. Breidenbach Environmental Research Center in Cincinnati, Ohio, on July 30-31, 1985. The participants were divided the second day into

two workgroups. One workgroup was entitled "Physical/Chemical Treatment and Recycling" and the second workgroup was entitled "Biological Treatment and Land Application." The proceedings of this research workshop are a compilation of sixteen speakers' abstracts, both work group results, and a conclusion with recommendations. Francis T. Mayo of EPA and Dr. Philip C. Kearney of USDA presented a summary of the research workshop and briefly described the twelve technologies discussed. A consensus of opinion addressed immediate research needs.

Concurrent sessions on the second day of the Denver Workshop provided participants with an opportunity to select Session A - "Users' Waste Minimization/Reuse" or Session B - "Users' Waste Treatment/Storage/Disposal." Both sessions were repeated to assure that all participants had an opportunity to attend each presentation and enjoy smaller groups for more effective interaction among speakers and attendees.

Session A - "Users' Waste Minimization/Reuse" began with a presentation by Lawrence Roth, Oklahoma State University, entitled "Direct Injection As a Rinsewater Minimization Technology." This state-of-the-art injection technology was reviewed along with an examination to reduce or eliminate the waste of expensive materials. The idea is that nothing would be premixed and whatever is introduced into the system would be metered, measured, introduced, mixed, and controlled by an on-board control unit. The direct injection system would release the pesticide directly from a container into the sprayer pressure system, on demand, just before the mixture is discharged from spray nozzles. This technology will enhance application safety, sprayer system reliability, and proper application management.

The second presentation in the area of rinsewater management was by Darryl Rester of Louisiana State University. Wastewater recycling involves the collection and storage of aircraft wastewater for later use as aqueous dilution for future applications. Pesticide waste can be disposed of by rinsing the aircraft over the treated field or by recycling the washwater. Mr. Rester reported no illegal crop residues or crop damage as a result of these practices. It was also stressed that the large cement wash area was ideal for mixing and loading pesticides as well as for servicing

the aircraft. The cost of such collection systems must be included in evaluating the cost of any pesticide waste disposal system.

The final rinsewater management speaker, A.G. Taylor with the Illinois Environmental Protection Agency, presented a paper entitled "Recycling Pesticide Rinsewater." During the 1984 cropping season, wastewater management systems at thirteen agrichemical outlets in Illinois were studied to determine the feasibility of recycling pesticide rinsewaters by using them as a diluent in corn and soybean herbicide spray solutions. Pesticide rinsewater recycling systems appear to be a practical and feasible means of managing large volumes of dilute pesticide solutions. The two basic system components are a concrete wash pad and a receptacle for rinsewater containment. A management scheme is required to budget the use of rinsewater generated.

The topic of product storage and handling equipment was discussed by David Callahan who represented the equipment industry with the presentation on "Tanks and Fittings for Fluid Fertilizers, Pesticides and Other Liquid Products Related to Agriculture." Mr. Callahan also stressed the importance of knowing the rules and regulations, as the manufacturers' rules are sometimes different from EPA and state regulations.

Session A was completed with a presentation by C. Alvin Yorke of the U.S. EPA entitled "Dealing With Emergencies." Adequate contingency planning, training, and adequate preparation were discussed as the requirements needed to handle emergencies involving pesticides. Responsible parties and government agencies must be prepared for a variety of possible spill situations. Coordination, team work and being aware of limitations are important factors in any emergency. Responding parties must be aware of pesticide-related regulations and know how to contact government personnel who can provide appropriate information to deal with notification, clean-up, and treatment/disposal requirements.

Between and after Sessions A & B, a room was available for participants to further discuss presentations using posters and exhibits. This was extremely helpful because it allowed more time for the first day on-site demonstration presenters to better explain their projects.

Session B, entitled "Users' Waste Treatment/Storage/Disposal," provided the other half of the day's technical presentations featuring container management, on-site options, off-site options, and storage and transportation regulations. Lawrence Bierlein with the National Barrel and Drum Association (NABADA) began this session's discussion on container management with a presentation entitled "Reconditioning Containers." A major problem for the container reconditioner is knowing which drums may contain hazardous waste residues. The user and reconditioner are often running the risk of unknowingly handling a contaminated drum. The NABADA has developed an Empty Container Certification Form to be signed by the emptier which assures compliance with the U.S. Department of Transportation (DOT) and EPA regulations. Drum reconditioners are working with the Association to develop a practical, easy-to-use mechanism for emptiers, transporters, disposers, and/or reconditioners to comply with federal regulations.

Herschel Cutler, Executive Director of the Institute of Scrap Iron and Steel, presented a paper entitled "Recycling Metal Containers." Recycling of metals is vital to metal manufacturing and also provides important environmental benefits. The lack of demand, however, is causing a rather large involuntary inventory of recyclable scrap. When the threat of potential hazardous waste contamination is added to the already increasing problem, the weak and over-supplied market problem increases. Residues of pesticide wastes add to these problems since legally "empty" is difficult to determine by the scrap processing industry. Because of liability associated with processing such containers, scrap processors have totally banned the acceptance of barrels, drums, or containers where they "might have" contained hazardous wastes or other hazardous substances. The charge of the Institute is to design recyclability into the products at the start and the problems of hazardous waste contamination threats will lessen markedly. Changes are necessary where recyclability is researched for solutions to the problems that exist today. The scrap processing industry supports environmentally sound metal recycling.

The Plastic Drum Institute (PDI) was represented by Daniel Barber who presented a talk entitled "Disposal of 55-

Gallon All-Plastic Drums." The Plastic Drum Institute is a division of the Society of the Plastics Industry and is comprised of member companies which manufacture industrial plastic shipping containers with a liquid capacity of 3 U.S. gallons and above, as well as manufacturers of raw materials for such containers. The major objective of PDI is the integrity of container performance which extends beyond the first-time shipment to secondary service and finally to the disposal of the spent container. A great deal of interest has been expressed in reusing all-plastic drums because they are a valuable resource utility and reduce packaging costs. Research by the new Plastic Recycling Institute is being conducted to improve recycling system efficiencies, to improve the quality of recycled materials, to develop the recycling processes for various materials, and to share the technology with the recycling industry. This presentation rounded out an excellent discussion on container management by the container industry.

"RCRA Permitting of On-Site Pesticide Waste Storage and Treatment" was presented by Felix Flechas who is with the EPA in Region VIII. Mr. Flechas discussed the on-site disposal options associated with pesticide use. These options were analyzed along with corresponding RCRA requirements. Option groups included on-site treatment and on-site storage with off-site disposal. RCRA requirements included discussions of the Hazardous and Solid Waste Amendments of 1984 and small quantity generator treatment, storage and disposal facilities. It was concluded that on-site options for storage and treatment of pesticide residues where a RCRA permit is required can result in an extensive investment of time and resources by a pesticide waste generator while securing a permit. For a user who is a small quantity hazardous waste generator, the economics of acquiring such a system may not be worth the benefits, and off-site disposal options should be explored.

Mr. H. Clayton Ervine, who represented the Governmental Refuse Collection and Disposal Association (GRDA), presented "Off-Site Disposal of Pesticides and Pesticide Containers." Because of a combination of factors including past abuses of the systems, new regulations, and public attitudes concerning waste management, the management of waste pesticides and waste

pesticide containers is becoming increasingly more difficult for the generator. It does seem reasonable to dispose of empty pesticide containers using local systems if certain conditions can be met. These conditions must permit the ready verification that the containers are truly empty and must provide the ability to pay for any additional costs incurred. Such arrangements can be accomplished through discussions with disposal site owners and the generators and/or their representative trade associations.

The storage and transportation aspects of proper waste pesticide management under RCRA was presented by Rolf Hill, EPA, in his discussion entitled "Storage, Handling and Shipment of Pesticide Waste Regulatory Requirements." Discussion topics included the identification and classification of waste pesticides; notification requirements; the pretransport requirements of storage, packaging, labeling, marking, and placarding; the Uniform Hazardous Waste Manifest; recordkeeping; reporting; and the farmer exemption. Special focus was made on compliance with the new Uniform Manifest requirements and the impact of state laws on completion of this manifest. Another area of focus was the RCRA reauthorization requirements for small quantity generators. The presentation was aimed at pesticide users who generate or transport a hazardous waste and who must comply with federal hazardous waste management standards.

After 2 full days of presentations concerned with research and solutions to proper pesticide wastes disposal, the last session on the third day encouraged participation by using three panel groups of experts who represented technology, regulatory, and user groups. Questions and comments were gathered from attendees at all of the previous presentations for these panel discussions. Roy Detweiler, Workshop Chairman, provided pertinent remarks regarding the assessment of the workshop and where we must go from here before acting as the moderator for all three panels.

The Technology Summary Panel consisted of Dr. James N. Seiber as Chairman, Dr. Philip C. Kearney, Francis T. Mayo, and George P. Nassus. Each Panel member (well-known to most of the attendees) spent a few minutes summarizing the technology aspects of the workshop. Questions and answers followed the panel's comments.

The Regulatory Summary Panel was chaired by Raymond F. Krueger and other distinguished panelists included Orlo Robert Ehart and H. F. "Butch" Calhoun, III. Each panelist summarized state, regional, and federal regulatory issues. The entire workshop attendance was impressed with the efforts of the researchers, associations, users, regulators, and producers in communicating with each other in working toward solutions that will benefit the whole group. It was noted that workshops such as the ones held in 1985 and 1986 are a result of people working together for a common environmental goal.

At the 1985 workshop, a user group began the workshop by describing the problems and at this 1986 workshop, the Users' Summary Panel concluded the program with a discussion of what had been accomplished by the first and second workshops. Harold M. Collins chaired the panel, which included Richard Byer, Robert M. Russell, and Dr. William T. Keane. The consensus of this group was that whereas we have come a long way from the first workshop, we still have a long way to go. The workshop ended with a good exchange of questions and answers. The transcripts of all three panel interactions are part of the proceedings.

The full report was submitted in fulfillment of Contract 68-03-3252 by JACA Corporation under the sponsorship of the U.S. Environmental Protection Agency.



*This Project Summary was prepared by staff of JACA Corporation, Fort Washington, PA 19034.*

*James Bridges is the EPA Project Officer (see below).*

*The complete report, entitled "Proceedings: National Workshop on Pesticide Waste Disposal - 1986," (Order No. PB 87-153 318/AS; Cost: \$18.95, subject to change) will be available only from:*

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