

Recreation Area will be adversely affected, with seven of its 10 campgrounds being lost. (51 pages) Comments made by: (ELR Order No. 04754) (NTIS Order No. EIS 72 4754F)

Final, June 20

U.S. 75 Kansas, county: Shawnee. The statement refers to the proposed construction of 2.1 miles of 4-lane highway, including a bridge over the Kansas River, in urban Topeka. Three residences and an unspecified amount of land will be required for right-of-way. (36 pages) Comments made by: USDA, USCG, COE, EPA, HUD, and OEO. (ELR Order No. 04744) (NTIS Order No. EIS 72 4744F)

U.S. 6 Nebraska, counties: Chase, Hayes, and Hitchcock. The statement refers to the proposed reconstruction of 14.5 miles of highway, between the villages of Wauneta and Fallsade. Channel works will be required upon the Frenchman River because of the project, with possible adverse effects upon riparian wildlife resulting. One residence and an unspecified amount of land will be taken for right-of-way. (42 pages) Comments made by: USDA, COE, EPA, and DOI. (ELR Order No. 04745) (NTIS Order No. EIS 72 4745F)

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[FE Doc.72-10313 Filed 7-6-72;8:45 am]

ENVIRONMENTAL PROTECTION AGENCY

[I. F. & R. Dockets Nos. 63, etc.]

CONSOLIDATED DDT HEARINGS

Opinion and Order of the Administrator

Published herewith is my opinion and order issued June 14, 1972, concerning the registrations of products containing the insecticide DDT.

Done this 30th day of June 1972.

WILLIAM D. RUCKELSHAUS,
Administrator.

STEVENS INDUSTRIES, INC., ET AL.

OPINION OF THE ADMINISTRATOR

Before the Environmental Protection Agency: In re: Stevens Industries, Inc., et al. (Consolidated DDT Hearings), I.F. & R. Docket No. 63 et al.

This hearing represents the culmination of approximately 3 years of intensive administrative inquiry into the uses of DDT. Part I sets forth the background of these proceedings and Part II contains a discussion of the evidence and law and my factual conclusions. I am persuaded for reasons set forth in Part III of this opinion that the long-range risks of continued use of DDT for use on cotton and most other crops is unacceptable and outweighs any benefits. Cancellation for all uses of DDT for crop production and nonhealth purposes is hereby reaffirmed and will become effective December 31, 1972, in accordance with Part V of this opinion and the accompanying order, except that certain uses, for green peppers, onions, and sweet potatoes in storage may continue on terms and conditions set forth in Part V of this opinion and the accompanying order.

I—A. *Background.* DDT is the familiar abbreviation for the chemical (1,1,1-trichlorophenyl ethane), which was for many years the most widely used chemical pesticide in this country. DDT's insecticidal properties were originally discovered, apparently by accident, in 1939, and during World War II it

was used extensively for typhus control. Since 1945, DDT has been used for general control of mosquitoes, boll weevil infestation in cotton-growing areas, and a variety of other uses. Peak use of DDT occurred at the end of the 1950's and present domestic use of DDT in various formulations has been estimated at 6,000 tons per year.¹ According to Admission 7 of the record, approximately 86 percent or 10,277,258 pounds of domestically used DDT is applied to cotton crops. The same admission indicates that 603,053 pounds and 937,901 pounds, or approximately 5 percent and 9 percent of the total formulated by 27 of the petitioners in these hearings are used respectively on soybean and peanut crops. All other uses of the 11,966,196 pounds amount to 158,833 of the total, or little over 1 percent.²

Counsel for the Agency has called to our attention publication of the Department of Agriculture, "The Pesticide Review of 1971, which estimates "a domestic disappearance" rate of 25,457,000 pounds for DDT in 1970. See p. 28. The motion to incorporate this publication is granted, as is the motion by registrants to supplement the record, see *infra*. I do not believe, however, that the Pesticide Review figure can be accepted, on its face, without further explanation. Since the result I reach today would, if anything, only be reinforced by the higher figure, I see no need to remand.

For the above uses it appears that DDT is sold in four different formulations: Emulsifiable sprays; dust; wettable powder; and granular form.

Public concern over the widespread use of pesticides was stirred by Rachel Carson's book, "Silent Spring," and a natural outgrowth was the investigation of this popular and widely sprayed chemical, DDT, which for many years had been used with apparent safety, was, the critics alleged, a highly dangerous substance which killed beneficial insects, upset the natural ecological balance, and collected in the food chain, thus posing a hazard to man, and other forms of advanced aquatic and avian life. In 1969, the U.S. Department of Agriculture commenced a review of the health and environmental hazards attendant to the use of DDT.

Certain uses of DDT were canceled by the Department of Agriculture in 1969 and informal review of remaining uses continued through 1970.³ In early 1971, this Agency commenced formal administrative review of DDT registrations by the cancellation of all registrations for DDT products and uses pursuant to section 4(c) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 7 U.S.C. section 135 (1972).⁴

¹ Admission 6 shows that domestic shipments of DDT by its sole manufacturer, Montross Chemical Co., totaled 8,627,900 pounds between January 1 and August 1, 1971. Total domestic sales in 1970 were 11,966,196, as stipulated in Admission No. 7. The Examiner found, apparently based on Admission 7, that domestic use in 1970 "was just under 12 million pounds." Exam. Report at 92.

² Some discrepancy in the figures exists since the figures given in breakdown of use categories total 11,977,065 pounds, slightly more than the total sold by the 27 formulators who supplied figures.

³ PR Notice 69-17. Among the canceled uses were applications to trees for control of Dutch Elm disease, tobacco, home uses, and aquatic uses. 34 F.R. 18827 (1969).

⁴ In *Environmental Defence Fund v. Ruckelshaus*, 439 F. 2d 584 (D.C. Cir. 1971), the court of appeals held that cancellation proceedings should be commenced whenever a registration of a pesticide raises a "substantial question of safety" which warrants further study. On Jan. 15, 1971, all uses of

B. *Statement of the case.* This hearing is the final stage of formal administrative review.⁵ Thirty-one registrants have challenged 16 of the canceled uses of DDT and its metabolite, TDE.⁶ These uses of DDT include applications to cotton fields to control the boll weevil and bollworm applications to various vegetable crops, and a variety of lesser uses in public programs. The case for cancellation has been presented by counsel for the Pesticides Office of the Environmental Protection Agency and attorneys for the Environmental Defense Fund which is an intervenor. Other parties include E.I. Lilly & Co., which held a DDT registration for "topocide," a prescription drug;⁷ H. P. Cannon & Son, a user of DDT;⁸ and representatives of the chemical manufacturing industry and various wildlife groups.⁹

The testimony and exhibits cover in exhaustive fashion all aspects of DDT's chemical and toxicological properties. The evidence of record, however, is not so extensive concerning the benefits from using DDT, and most of it has been directed to the major use, which is on cotton crops.¹⁰

DDT not canceled in 1969 were canceled. PR Notice 71-1. And on Mar. 18, 1971, notices of cancellation were issued for all registered uses of TDE, a DDT metabolite. PR Notice 71-5.

⁵ Under FIFRA a registrant is entitled to either a public hearing or a scientific advisory committee or both to review his registration. Pending completion of that review, a registrant is allowed to continue shipment of his product.

⁶ Unless specified, discussion of DDT in this opinion applies to TDE. DDT has three major breakdown products, DDA, DDE, and DDD; separate registrations exist for TDE (DDEE).

⁷ There has been some controversy over E.I. Lilly's status because it failed to appeal cancellation of its registration within 30 days as required by section 4(c) of FIFRA. For the purposes of this case I believe they should be accorded status as parties.

⁸ There has been some question as to whether or not a "user" has standing to appeal a cancellation and thus seek reinstatement of a canceled use even though no registrant has stepped forward to appeal. The same reasoning employed by the court in *Environmental Defence Fund v. Ruckelshaus*, supra, and *Environmental Defence Fund v. Hardin*, 428 F. 2d 1093 (D.C. Cir. 1970), which accords standing to "public interest" groups gives "users" a right to appeal a cancellation.

⁹ The groups are: National Agricultural Chemicals Association; National Audubon Society; The Sierra Club; and West Michigan Environmental Action Council. As already noted, the Secretary of Agriculture, in addition to being a party-registrant by virtue of registrations held by its Plant Regulation Division, has appeared as an intervenor.

¹⁰ The following uses are involved: For cotton; for military use on clothing; for peppers and pimentos; for fresh market corn; for peanuts; for cabbage, cauliflower, and brussel sprouts; for tomatoes; for lettuce; for potatoes; for sweet potatoes in storage (Southern States only); for use in commercial greenhouses and nurseries; for beans (dry, lima, snap); for hat and rodent control; for emergency use for agriculture, health or quarantine purposes; and for onions and garlic; and for lice control. There has been considerable controversy as to what uses were at issue during the hearing. Admission No. 2 sets forth those uses which the Department of Agriculture considers essential. Many of those uses have been canceled and no appeal was taken. The uses at issue in this hearing are only those noted in Admission 11.

The Pesticides Office and Environmental Defense Fund (EDF), in presenting their cases against continued registration for DDT, lean most heavily on evidence which, they contend, establishes: (1) That DDT and its metabolites are toxicants which persist in soil and the aquasphere; (2) that once released, DDT is an uncontrollable chemical which can be transported by leaching, erosion, runoff, and volatilization; (3) that DDT is not water soluble and collects in fat tissue; (4) that organisms tend to collect and concentrate DDT; (5) that these qualities result in accumulations of DDT in wildlife and humans; that once stored or consumed, DDT can be toxic to both animals and humans, and in the case of fish and wildlife inhibit regeneration of species; and (7) that the benefits accruing from DDT usage are marginal, given the availability of alternative insecticides and pest management programs, and also the fact that crops produced with DDT are in ample supply. The testimony and exhibits include numerous reports of expert scientists who have described observed effects of DDT in the environment and the laboratory.

Group Petitioners and the U.S. Department of Agriculture (USDA) seek to discredit the Agency's case by citing the record of safety DDT has compiled throughout the years, and point to the negative findings of epidemiological and human feeding studies carried out over the years on industrial workers and volunteers exposed to concentrated levels of DDT far in excess of that to which the average individual is exposed. Proponents of continued registration have also introduced expert testimony to the effect that DDT's chronic toxicity to man or animals has not been established by adequate proof. The registrants have attacked the assumption that laboratory data, as to effects of exaggerated doses of DDT, can provide a meaningful basis for extrapolating effects on man or the environment. In the alternative, Group Petitioners contend that whatever harm to the environment might be attributed to DDT, it results from misuse and overdosing that occurred in years past. Lastly, Group Petitioners and USDA have attempted to prove that DDT is effective and that its use is more desirable than the organophosphates which are more acutely toxic and costly than DDT.

On April 25, the Hearing Examiner issued an opinion with proposed findings, conclusions and orders recommending that all "essential" uses of DDT be retained and that cancellation be lifted.¹¹ The Examiner's report which has findings, conclusions, and an opinion, is attached below. The Examiner apparently accepted in his report the Agency's proof that DDT is a hazard to aquatic and terrestrial wildlife and substitutes exist. He found, as a "matter of fact," DDT can have adverse effects on beneficial animals; that it is transferred through the food chain; that DDT is fat soluble. He concluded, however, as a "matter of law," that DDT is neither a carcinogen nor terato-

¹¹ There is some confusion as to what the term "essential" means. By Admission No. 2 the parties stipulated that certain uses were "essential" in the view of USDA. No stipulation exists that these uses are, in fact, essential in that no alternatives exist or that a shortage of a crop would result without DDT.

gen, that the particular uses at issue do not adversely affect wildlife, that DDT use has rapidly declined. (Examiner's Rept. p. 93.)

The Pesticides Office of this Agency and intervenor Environmental Defense Fund (EDF) filed exceptions to the Examiner's report,¹² challenging his application of the burden of proof to this case, his findings of fact, conclusions of law, and numerous evidentiary rulings. Exception was also taken to the Examiner's application of the so-called "risk and benefit" standard of FIFRA.

On May 2, 1972, the Judicial Officer pronounced by order, at my direction, a series of questions for briefing and discussion at oral argument, and oral argument was held on May 16. That argument was transcribed and is part of this record. Group Petitioners, USDA, Eli Lilly, and H. P. Cannon & Sons have also responded to the briefs on exceptions.

II.—A. *Applicable law.* The basic FIFRA scheme has been outlined in court opinions and Agency decisions (see EDF v. EPA, D.C. Cir. Slip. Op. 71-1365, ----- F. 2d -----, May 5, 1972 (opinion of Judge Leventhal); Stearns Elec. Paste Co. v. EPA, 7th Cir. Slip Op. No. 71-1112, ----- F. 2d -----, May 11, 1972; Continental Chemiste Co. v. EPA, 7th Cir. Slip Op. No. 71-1828, ----- F. 2d -----, May 11, 1972; EDF v. Ruckelshaus (opinion of Judge Bazelon), supra; Statement of Reasons Concerning the Registration of Products Containing DDT, 2,4,5-T, and Aldrin/Dieldrin, March 18, 1972; In re Hari-Kari Lindane Pellets, et al., I.F.&R. No. 6 (1971)). While there is no need to trace in detail once again the statutory scheme, a brief summary provides a useful prism for filtering the evidence.

1. FIFRA. The Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. section 135 (1972), establishes a strict standard for the registration of pesticides. Any "economic poison" which cannot be used without injury to "man or other vertebrate animals, vegetation, and useful invertebrate animals" is "misbranded,"¹³ and is therefore subject to cancellation.¹⁴

¹² Exceptions have also been received in Docket 106, In Re Wallerstein, Stark Bros. Nurseries held a registration for use of DDT on nursery plants. The Examiner recommended cancellation on the grounds that this was not an "essential" use according to USDA.

¹³ Secs. 2(z)(2) (c), (d), and (g), respectively provide:

"The term 'misbranded' shall apply—

(a) To any economic poison—

(c) If the labeling accompanying it does not contain directions for use which are necessary and if complied with adequate for the protection of the public;

(d) If the label does not contain a warning or caution statement which may be necessary and if complied with adequate to prevent injury to living man and other vertebrate animals, vegetation, and useful invertebrate animals;

(g) If in the case of an insecticide, nematocide, fungicide, or herbicide when used as directed or in accordance with commonly recognized practice it shall be injurious to living man or other vertebrate animals, or vegetation, except weeds, to which it is applied, or to the person applying such economic poison;

¹⁴ Sec. 4 permits the Administrator to cancel a registration "if it appears that the article and its labeling * * * do not comply with [the Act]." Since the Act prohibits distribution of a "misbranded" pesticide, sec. 3 (a) (5), the registration for a "misbranded" product may be canceled.

While the language of the statute, taken literally, requires only a finding of injury to nontarget species, the inquiry cannot, however, end with a simplistic application of this plain statutory language. Both judicial and administrative precedent recognize that Congress intended the application of a balancing test, that would measure the risks of using a particular chemical against its benefits.¹⁵ If a product is "misbranded" within the meaning of the Act, i.e., if it bears a label for use that does not meet the criteria of section 2, it may no longer be shipped in interstate commerce and stocks in hand in the original package may be seized, 7 U.S.C. section 135(g) (1972).

2. *Risks and benefits.* It follows from the statutory scheme and this Agency's decisions that evidence of each alleged risk must be reviewed and a conclusion reached as to whether or not, and in what degree, such risk is incident to the directed use of a particular product. The task, however, is complicated in the case of a "persistent" pesticide by its possible chronic effects. The degree of persistence, extent of overall usage and mobility all bear on the amplitude or indeed the existence of the risk curve.¹⁶ I believe, however, it is useful to isolate the alleged risks and evaluate each on the assumption that they are unaffected by overall levels of use, and defer to Part IV the discussion of the significance of the relationship between risk and overall use.

III.—A. *Analysis of evidence.*—1. *Risks*—a. *Health effects and environmental properties.* There is no dispute on this record that DDT is a nonspecific chemical that kills both target and nontarget species in the immediate area of application. Few chemicals, however, are so selective that they can be used without causing some injury to "nontarget" species. We must therefore proceed to the evidence bearing on other "risks" and the "benefits" from using DDT.

I am convinced by a preponderance of the evidence that, once dispersed, DDT is an uncontrollable, durable chemical that persists in the aquatic and terrestrial environments. Given its insolubility in water and its propensity to be stored in tissues, it collects in the food chain and is passed up to higher forms of aquatic and terrestrial life. There is ample evidence to show that under certain conditions DDT or its metabolites can persist in soil for many years,¹⁷ that it will volatilize or move along with eroding soil.¹⁸ While the degree of transportability is unknown, evidence of record shows that it is

¹⁵ See EDF v. EPA (opinion of Judge Leventhal), supra; EDF v. Ruckelshaus (opinion of Judge Bazelon), supra; DDT Statement of Reasons, supra; see also Statement of Reasons Underlying Suspension and Cancellation of Products Containing Mercury, 37 F.R. 6410 (Mar. 29, 1972).

¹⁶ Other factors bearing on risk may include the geographical location of application, see, e.g., Statement of Reasons Underlying Registrations for Strychnine, 1080, and Sodium Cyanide, 37 F.R. 5718 (1972), although this may not be as significant where the chemical is highly volatile as is the case with DDT. See also Statement of Reasons Underlying the Cancellation of Mirox, Determination and Order of the Administrator at 7 (37 F.R. 10987, June 1, 1972).

¹⁷ Method of application and type of soil and climate can affect persistence in soil and likewise runoff into aquatic areas.

¹⁸ Registrants have made much of the fact that aquatic contamination and the spread of DDT have resulted from drift during aerial application. While the Examiner's report dwells at some length on improved methods of application, it recognizes runoff as a significant source of aquatic contamination, even with improved aerial spraying techniques.

occasionally found in remote areas or in ocean species, such as whales, far from any known area of application.

Persistence and biomagnification in the food chain are, of themselves, a cause for concern, given the unknown and possibly forever undeterminable long-range effects of DDT in man, and the environment.²⁰ Laboratory tests have, however, produced tumorigenic effects on mice when DDT was fed to them at high levels.²¹ Most of the cancer research experts who testified at this hearing indicated that it was their opinion that the tumorigenic results of tests thus far conducted are an indicator of carcinogenicity and that DDT should be considered a potential carcinogen.²²

Group Petitioners argue that the testimony is in conflict and fasten on to the testimony of the Surgeon General that of Drs. Loomis and Butler. The Surgeon General's statement was, however, cautious and, by no means, carries the burden that the Group Petitioners seek to place on it. In very general terms the Surgeon General stated: "We have no information on which to indict DDT either as a tumorigen or as a carcinogen for man and on the basis now available, I cannot conclude DDT represents an imminent health hazard." (Tr. 1350.) This testimony, however, does not bear on the long-term effects of DDT, nor did the Surgeon General express a view on what uses, apart from health uses, would justify continued use of DDT. Indeed, the entire thrust of the Surgeon General's testimony was only that use for immediate health needs outweighs the possible long-range effects of DDT on human health. Group Petitioners' other witnesses, Drs. Loomis and Butler, while men of stature in their fields—toxicology and pathology—and knowledgeable about cancer treatment and diagnosis, are not specialists in cancer research as is Dr. Saffioti. Indeed, Dr. Butler disclaimed such expertise.

Group Petitioners also take refuge under a broad canopy of data—human feeding studies and epidemiological studies—and

²⁰ It is particularly difficult to anticipate the long-range effects of exposure to a low dose of a chemical. It may take many years before adverse effects would take place. Diseases like cancer have an extended latency period. Mutagenic effects will be apparent only in future generations. Lastly, it may be impossible to relate observed pathology in man to a particular chemical because of the inability to isolate control groups which are not exposed in the same degree as the rest of the population.

²¹ Tumorigenic effects have been noted in a number of laboratory experiments. The most positive results were developed by the Bionetics Study and the Lyons and Milan tests. The Bionetics Study of the National Cancer Institute fed 120 compounds to two strains of mice. DDT was one of 11 compounds to produce an elevated incidence of tumors. The Lyons and Milan Studies of the International Agency for Research of the World Health Organization is a multigenerational study (still in progress) of 6,000 mice of in- and out-bred strains. Increased hepatomas were noted in male and female mice fed DDT at 250 p.p.m. Metastasis to the lungs or kidneys has been recorded in five instances.

²² Witnesses testifying to the positive correlation between tumorigens and carcinogens were Dr. Umberto Saffioti, Associate Scientific Director for Carcinogenesis, Etiology Area, National Cancer Institute; Dr. Marvin Schneiderman, Associate Chief, Biometry Branch and Associated Director for Demography, National Cancer Institute; Dr. Samuel Epstein, Senior Research Associate in Pathology, Children's Cancer Research Foundation, Inc., Boston.

support it with the increasingly familiar argument that exposure to any substance in sufficient quantities may cause cancer.

None of the feeding studies carried out with DDT have been designed adequately to detect carcinogenicity, and given the latency period of cancer, these studies would have to be carried out for a much longer period. Statistical population samples for epidemiological studies are also virtually impossible given the latency period for cancer and the long-term exposure of the general population. Since there is no sharp distinction between population groups exposed to low doses and higher doses of DDT, adequate control groups cannot be established. The "everything is cancerous argument" falls because it ignores the fact that not all chemicals fed to animals in equally concentrated doses have produced the same tumorigenic results.

b. *Environmental effects.* The case against DDT involves more, however, than a long-range hazard to man's health. The evidence presented by the Agency's Pesticides Office and the intervenors, EDF, compellingly demonstrates the adverse impact of DDT on fish and birdlife. Several witnesses testified to first-hand observed effects of DDT on fish and birdlife, reporting lethal or sub-acute effects on aquatic and avian life exposed in DDT-treated areas. Laboratory evidence is also impressively abundant to show the acute and chronic effects of DDT on avian animal species and suggest that DDT impairs their reproductive capabilities.²³

The petitioner-registrants' assertion that there is no evidence of declining aquatic or avian populations, even if actually true, is an attempt at confession and avoidance. It does not refute the basic proposition that DDT causes damage to wildlife species. Group petitioners' argument that DDT is only one toxic substance in a polluted environment, and thus, whatever its laboratory effects, it cannot be shown to be the causative agent of damage in nature, does not redeem DDT, but only underscores the magnitude of effort that will be necessary for cleaning up the environment. Were we forced to isolate in nature, rather than in the laboratory, the effects of various toxic substances, it would be difficult if not impossible to make a judgment as to the chronic effects of any chemical. As our DDT statement of March 1971 has noted: "Development of adequate testing protocols and facilities is a priority undertaking. But in the short term, extrapolation from small-scale laboratory analyses must err on the side of safety." See DDT Statement of Reasons, at 11.

Finally, I am persuaded that a preponderance of the evidence shows that DDE causes thinning of eggshells in certain bird species. The evidence presented included both laboratory data and observational data. Thus, results of feeding experiments were introduced to show that birds in the laboratory, when fed DDT, produced abnormally thin eggshells. In addition, researchers have also correlated thinning of shells by comparing the thickness of eggs found in nature with that of eggs taken from museums. The museum eggs show little thinning, whereas eggs taken from the wild after DDT use had become extensive reveal reduced thickness.

²³ See the testimony of Drs. Tazewell, Nicholson, Philip Butler, Duke, Burdick, Dimond, Risebrough, Hickey, and Cade.

While the Examiner erroneously excluded testimony as to economic losses caused by DDT's contamination of the aquatic environment—losses to commercial fishermen caused by inability to market contaminated fish—this risk is significant, even if it could not be economically quantified. Not all risks can be translated into dollars and cents, nor can all benefits be assessed in cash terms.

Group Petitioners and USDA argue that the laboratory feeding studies, conducted with exaggerated doses of DDE and under stress conditions, provide no basis for extrapolating to nature. They suggest that the study results are contradictory and place particular emphasis on documents which were not part of the original record and the inconsistencies in Dr. Heath's testimony as brought out during cross-examination. Group Petitioners also contend that the observed phenomenon of eggshell thinning and DDE residue data are tied by a statistical thread too slender to connect the two in any meaningful way.

Viewing the evidence as a total picture, a preponderance supports the conclusion that DDE does cause eggshell thinning. Whether or not the laboratory data above would sustain this conclusion is beside the point. For here there is laboratory data and observational data, and in addition, a scientific hypothesis, which might explain the phenomenon.²⁴

B. *Benefits*—1. *Cotton.* I am convinced by the evidence that continued use of DDT is not necessary to insure an adequate supply of cotton at a reasonable cost. Only 38 percent of cotton-producing acreage is treated with DDT, although the approximately 10,277,258 pounds used in cotton production is a substantial volume of DDT and accounts for most of its use. The record contains testimony by witnesses called by registrants and USDA attesting to the efficacy of organophosphate chemicals as substitutes for DDT and, long-range, the viability of pest management methods, such as the diapause program. At present most areas that use DDT combine it with an organophosphate and toxaphene in a 4-2-1 mixture (4 lbs. toxaphene, 2 DDT, 1 methyl parathion). Some areas, however, according to the testimony, which normally use DDT occasionally apply concentrated methyl parathion in a 4-pound mixture.

There is evidence that organophosphates would not raise costs to the farmer and might, indeed, be cheaper. Any suggestion that the organophosphates are not economically viable cannot be maintained in face of the undisputed evidence that cotton continues to be tenable crop in Arkansas and Texas where DDT use has declined.²⁵ There is

²⁴ The chief witness introduced to rebut Drs. Risebrough, Hickey, and Cade was a graduate student with limited training in statistical analysis. In view of the credentials of EDF's witnesses—Dr. Hickey, Professor of Wildlife Ecology at College of Agriculture, University of Wisconsin; Dr. Risebrough, Associate Ecologist, University of California at Berkeley; and Dr. Cade, Professor of Zoology at Cornell and Research Director of Cornell Ornithology Laboratory—I cannot credit this attempt at rebuttal.

The Hearing Examiner apparently resolved the conflict in the evidence by concluding that "there was no evidence that DDT was the only factor in a decline of bird populations . . ." and that no evidence "focused its direct thrust on damage to birds by the uses of DDT that are permitted under the registrations in question." Examiner's Report, 70-71. In view of DDT's persistence and mobility, evidence as to the causal effect of these uses was not required.

At argument and by motion Group Petitioners have offered additional evidence, some of which bears on the issue of eggshell thinning. I have granted that motion and considered all that data.

²⁵ The parties have referred neither in briefs nor argument to testimony or exhibits describing in detail the economics of cotton production or substitutes. There is general testimony that cotton producers receive a per bushel subsidy and that this

(Footnote 24 continued on next page)

also testimony in the record to the effect that methyl parathion costs less per application than the DDT-toxaphene formula. Nor are the testimony and exhibits that show cotton insects develop resistance to organophosphate chemicals to the point. The very same exhibits make clear that DDT is also subject to resistance.²⁵

Group Petitioners and USDA, while not disputing the lesser persistence of organophosphates, have stressed their demonstrated acute toxicity. While they are toxic to beneficial soil insects and non-target species, particularly birds alighting on treated fields, these organophosphates break down more readily than DDT. They apparently are not transported in their toxic state to remote areas, unlike DDT which has been found far from treated areas, and consequently do not pose the same magnitude of risk to the aquasphere. Both testimony and exhibits also demonstrate that organophosphates are less acutely toxic to aquatic life, although different compounds have different toxicities. The effect of organophosphates on non-target terrestrial life can, unlike the effects of DDT, also be minimized by prudent use. Application in known nesting areas for rare or extinct birds can be avoided.

2. *Other crop and produce uses.* The testimony of record, while sparse, shows that registered alternatives, primarily organophosphates, exist for all other crop and ornamental uses of DDT, except for storage use on sweet potatoes to control weevils, on heavy corn borer infestations of green peppers, and perhaps onions.²⁶

3. *Noncrop uses.* In addition to the registrations for use on crops and in nurseries, several registrations for noncrop uses are also in issue. Admission 11 lists "public health pests—bats and rodents," "Agricultural,

Health and Quarantine Treatments in Emergencies as Recommended by and Under Direction of State-Federal Officials" and "fabric treatment" by the military.

The record is not, unfortunately, well developed as to the scope or method of application for these uses nor as to the overall volume applied for these purposes. While use for bat and mice control is characterized in Admission 11 as a "public health use," application for these purposes is not supervised by public health officials. The briefs suggest that use for control of bats and mice is a proprietary use by the military, even though a private pest control operator testified that use for bats was considered essential by private operators.²⁷ With respect to "Agricultural and Quarantine" uses it is difficult to determine to what extent applications are for health purposes or for nuisance prevention.

With respect to all of these uses, both for public health programs and proprietary use, alternatives do exist. The Public Health Service testified that DDT is no longer the chemical of choice for controlling disease vectors. As for mice, warfarin is used effectively, and fumigation and nonchemical means are available for use on bats. Colonel Fowler testified that the military has not used DDT in this country for 2 years for mothproofing purposes and stated that he was aware of alternatives.

C. *Weight to be accorded the examiner's opinion.* In reaching the factual conclusions set forth in the preceding sections, I have been mindful of Group Petitioners' argument, stressed in their briefs and at oral argument, that the Hearing Examiner's findings deserve particular deference in view of his opportunity to resolve contradictions in testimony based on demeanor evidence.

Nowhere does the Examiner state that his conclusions were based on credibility choices.²⁸ Whatever extra weight, then, that might be due findings based expressly on a credibility judgment is not appropriate in the case before me. See, e.g., *NLRB v. Dinion Coll Co.*, 201 F. 2d 484 (2d Cir. 1952) where the Examiner's report set forth his assessment of the witnesses' credibility.²⁹

IV. The application of the risk-benefit test to the facts of record is, by no means, simple. We have noted in our statement of March 18, 1971, that the variables are numerous. It should also be borne in mind that the variables are not static in point of time. As build-up of a chemical occurs or is detected in the environment, risk increases. Indeed, it may be that the same tendency of a chemical to persist or build up in the food chain is present but not known about substitute chemicals. It may also be that circumspect

²⁵ The only evidence as to the amount of DDT used for these purposes was given by Col. Fowler, who said the total used by the military for bat and mouse control is approximately 800-900 pounds.

²⁶ During oral argument counsel admitted that the Examiner's report did not purport to make findings based on credibility of witnesses, nor could he point to findings which might be explained in light of a credibility contest. (Transcript of Argument, p. 96-98.) The basic questions of fact in this case, the hazard to man and the environment, were cast and resolved by the Examiner as "conclusions of law."

²⁷ The precedents, moreover, make clear that the Agency is free to make its own findings and that the Examiner's findings and report only comprise part of the record which a court will then evaluate. *FCC v. Allentown Broadcasting Corp.*, 349 U.S. 358 (1955); *Universal Camera Corp. v. NLRB*, 340 U.S. 474 (1951). Even where an Examiner's findings are based on credibility, the Agency may reach a contrary conclusion. See *FCC v. Allentown Broadcasting Corp.*, supra.

application of a chemical in limited quantities for those uses most necessary changes the benefit-risk coefficients so as to tilt the scales differently than when we weigh aggregate use for all purposes against aggregate benefits. See generally *EDF v. EPA* (opinion of Judge Leventhal), supra.

A. *Burden of proof.* The crux of a cancellation proceeding is the safety of the product when used as directed or in accordance with "commonly recognized practice." *Stearns Phosphorus Paste Co. v. EPA*, supra. This, simply stated, means that this Agency has the burden of going forward to establish those risks which it believes to require cancellation.³⁰ In addition, an affirmative aspect of the Agency's case should be the availability of preferable substitute means of controlling the pests that are controlled by the canceled chemical where the Agency is relying on this fact to establish that risks outweigh benefits.³¹ Evidence showing the availability of a registered chemical or other means of control which this Agency's Pesticides Office is prepared to recommend as a substitute at that point in time, coupled with the Agency's proof on risk, makes out an affirmative case.³²

The burden of rebuttal then falls on registrants or users. They may either seek to negate the proof on risks either by rebutting the basic scientific data or by showing that a particular use is so limited as not to en-

³⁰ The legislative history of FIFRA, judicial decisions and Agency pronouncements all state that the "burden of proof" remains on the registrant to demonstrate that his product satisfies the requirements for registration under the Act. See S. Rept. 573 at 5 (88th Cong., first sess., 1963); H. Rept. 1125 at 4 (88th Cong., first sess., 1963); *EDF v. EPA*, supra; *EDF v. Ruckelshaus*, supra; Statement of Reasons, Mar. 18, 1971. There has, unfortunately, been a great deal of misunderstanding concerning these statements. Simply stated, the burden of proof referred to by the legislative history is the burden of persuasion which requires a party to establish the existence of primary facts. It should not be confused with the burden of going forward which is generally a rule to establish the order for the presentation of evidence. The burden of going forward may, however, have substantive consequences. Where a party which has the burden of going forward fails to satisfy that burden, the facts will be decided against him, even though the other party may have been responsible for the burden of persuasion.

While in most legal proceedings the party which has the burden of going forward bears the burden of persuasion, this is not necessarily the case. On some issues, like contributory negligence in some jurisdictions, it may be that once one party has introduced evidence to put the issue in the case, the other party bears the burden of persuasion on that point. In a FIFRA cancellation hearing the proponent of cancellation bears the burden of going forward, but does not bear the burden of persuasion.

³¹ While a mere showing of a high degree of risk would make out a prima facie case for cancellation, where the Agency is relying on the existence of an alternative rather than simply a showing of risk, it should, as here, present its own witnesses.

³² This hearing was conducted under rules which have since been amended. (See 37 F.R. 9476 (May 11, 1972)). Under the Agency's former rules registrants proceeded first at the hearing. This order of presentation, which is now changed, was not prejudicial in this case. The Agency more than discharged its burden to put on a prima facie case. Registrants had an ample opportunity for rebuttal. At worst this inverted presentation unnecessarily protracted the hearing.

²⁵—Continued.

subsidy is the difference between profit and break-even. It is not clear whether or not break-even includes a return to the farm owner in terms of salary or return on his investment. While some evidence suggests that organophosphates are more costly, because of higher price and the need for repeated applications in concentrated quantities, there is little to suggest that the possible increased variable cost from use of organophosphates would be a disincentive to producers. Indeed, with subsidies it is not clear what rate of return a cotton producer receives for invested capital. There was a reference made to an unidentified study showing that the cost of using substitutes would involve \$15 million. This figure alone has no meaning. While later testimony suggests that elimination of DDT would increase variable costs per acre by 5 percent, this, too, is of limited significance since the record does not relate it to the support program and the study looked at only a limited area.

²⁶ I cannot accept the suggestion that we should continue to use DDT until it is good to the very last drop. Whatever the long-term efficacy of the organophosphates the fact remains that they generally work. While the fact of insect resistance is important and underscores the need for retaining a variety of chemicals or methods to manage the same pest problem, this fact does not justify an avoidable use of a harmful chemical.

²⁷ Toxaphene and diazinon are registered for control of cutworms but it is not clear from the record as to whether or not these chemicals are registered or effective to control cutworm infestations on onions. While none of the parties have pointed to helpful evidence in connection with use for controlling cutworms on onions and weevils on stored sweet potatoes, I have taken judicial notice of the nonexistence of registered alternatives.

gender the risks from widespread use of the chemical. They can also seek to establish aggregate benefits. Where, as here, the existence of alternatives bears on the benefit of the chemical under review they may choose to show nonviability of alternatives, either for general substitution or in a particular geographical region.³³ They may also seek to show the nondesirability (or risks) of the alternative if they disagree with the staff judgment of this Agency.

B. Application of risk-benefit to crop uses of DDT. The Agency and EDF have established that DDT is toxic to nontarget insects and animals, persistent, mobile, and transferable and that it builds up in the food chain. No label directions for use can completely prevent these hazards. In short, they have established at the very least the risk of the unknown. That risk is compounded where, as is the case with DDT, man and animals tend to accumulate and store the chemical.³⁴ These facts alone constitute risks that are unjustified where apparently safer alternatives exist to achieve the same benefit. Where, however, there is a demonstrated laboratory relationship between the chemical and toxic effects in man or animals, this risk is, generally speaking, rendered even more unacceptable, if alternatives exist. In the case before us the risk to human health from using DDT cannot be discounted. While these risks might be acceptable were we forced to use DDT, they are not so trivial that we can be indifferent to assuming them unnecessarily.

The evidence of record showing storage in man and magnification in the food chain is a warning to the prudent that man may be exposing himself to a substance that may ultimately have a serious effect on his health.

As Judge Leventhal recently pointed out, cancer is a "sensitive and fright-laden" matter and noted earlier in his opinion that carcinogenic effects are "generally cumulative and irreversible when discovered." EDF v. EPA, Slip Op. at 12 and 16. The possibility that DDT is a carcinogen is at present remote and unquantifiable; but if it is not a siren to panic, it is a semaphore which suggests that an identifiable public benefit is required to justify continued use of DDT. Where one chemical tests tumorigenic in a laboratory and one does not, and both accomplish the same task, the latter is to be preferred, absent some extenuating circumstances.

The risks to the environment from continued use of DDT are more clearly established. There is no doubt that DDT runoff can cause contamination of waters and given its propensity to volatilize and disperse during application, there is no assurance that curtailed usage on the order of 12 million pounds per year will not continue to affect widespread areas beyond the location of application. The Agency staff established, as well, the existence of acceptable substitutes for all crop uses of DDT except on onions and sweet potatoes in storage and green peppers.

Registrants attempted but failed to surmount the evidence of established risks and the existence of substitutes by arguing that

³³ Where there is a generally viable substitute, which will insure an adequate crop supply, the nonviability of the alternative in a particular area will bear on the advisability of a transition period. See part IV, *infra*.

³⁴ In enacting the present law one of the greatest concerns expressed to Congress was the risk of the unknown. See statement of Congressman Dingell. Hearings before the Subcommittee on Departmental Oversight and Consumer Relations of the House Committee on Agriculture, at 39 (88th Cong., first sess., 1963).

the buildup of DDT in the environment and its migration to remote areas has resulted from past uses and misuses. There is, however, no persuasive evidence of record to show that the aggregate volume of use of DDT for all uses in question, given the method of application, will not result in continuing dispersal and buildup in the environment and thus add to or maintain the stress on the environment resulting from past use. The Department of Agriculture has, for its part, emphasized DDT's low acute toxicity in comparison to that of alternative chemicals and thus tried to make the risk and benefit equation balance out favorably for the continued use of DDT. While the acute toxicity of methyl parathion must, in the short run, be taken into account, see *infra*, it does not justify continued use of DDT on a long-term basis. Where a chemical can be safely used if label directions are followed, a producer cannot avoid the risk of his own negligence by exposing third parties and the environment to a long-term hazard.

Accordingly, all crop uses of DDT are hereby canceled except for application to onions for control of cutworm, weevils on stored sweet potatoes, and sweet peppers. Shipments of DDT labeled for these uses may continue on terms set forth in Part V-A. We defer to Part V-B, *infra*, consideration of the proper timing of cancellation of other uses in light of the short-run dangers of switching to the use of organophosphates without providing training.³⁵

C. Application of risk-benefit to noncrop uses. There remains the question of the disposition on the registered health and Government uses and other noncrop uses of DDT. It should be emphasized that these hearings have never involved the use of DDT by other nations in their health control programs. As we said in our DDT statement of March 1971, "this Agency will not presume to regulate the felt necessities of other countries." Statement, at 8. Indeed, the FIFRA does not apply to exports. Section 7, 7 U.S.C. section 135 (1972).

Given the alternatives for mothproofing and control of bats and mice—proprietary governmental uses of DDT—I am persuaded that the benefits are even more de minimis than the risks. On the other hand, public health and quarantine programs fall into a wholly separate category. See EDF v. Ruckelshaus, 439 F. 2d at 594; DDT Statement of Reasons at 11.

While alternatives also exist for use in public health quarantine programs and, in most instances, DDT is no longer the yeoman chemical, I believe that it would be unwise to restrict knowledgeable public officials to the choice of one or two chemicals. Like a physician, the public official must have an

³⁵ Registrants adduced considerable testimony on the effects of organophosphates on nontarget species. Sevin, it appears, is highly toxic to bees and most witnesses agreed that the organophosphates were toxic to nontarget animals, usually birds and insect life, present when a field is sprayed. The present evidence demonstrates, however, that these organophosphate compounds are less "persistent," and thus do not leach or erode into waters or collect in the human food chain. While it may be that in time the familiar phrase "familiarity breeds contempt" will apply, as we learn more about these compounds, they appear not to present a long-range hazard to man or aquatic areas. Where registrants have scored, is by demonstrating the acute toxicity of methyl parathion which is the primary alternative chemical for many of the crop uses in question. That fact does not, however, alter the long-term balance between the risks and benefits, in view of the nonpersistence of the organophosphates.

ample arsenal for the combat of disease and infestation.

I cannot, however, be indifferent to the fact that the record suggests that "health and quarantine" uses have, in the past, apparently included proprietary uses by government. Nor can I be complacent about nonsupervised use for these purposes by private citizens. I am, accordingly, requiring a label which will restrain indiscriminate use of DDT for a wide variety of purposes under the rubric of official use. That label language is set forth in the order accompanying this opinion, and is designed to restrict shipment of DDT only to U.S. Government officials and State health departments who will be knowledgeable as to the most effective means for control and mindful of the risks of using DDT. Thus, on an application-by-application basis for necessary health and quarantine purposes, the benefits will be maximized and outweigh the risks.³⁶ Cf. 42 U.S.C. section 4332 (1971) which requires an environmental impact statement on ongoing official programs.

V. I turn now to the disposition of these dockets in light of the foregoing principles. At the outset it should be noted that recent judicial decisions have urged this Agency to use its "flexibility, in both final decisions and suspension orders, to differentiate between uses of the product." (See EDF v. EPA (opinion of Judge Leventhal), *supra*, at 20), and reminded us that creative adaptability is the keystone of a workable regulatory process. Cf. SEC v. National Securities, Inc., 393 U.S. 453, 463 (1969). EDF v. EPA, while discussing suspension, serves as a beacon in this regard, suggesting that registration be continued selectively, taking into account "restrictions on kinds and extent of use." *Id.* at 23. Bearing these principles in mind, I turn first to the form and shape our orders should take.

A. Disposition as to onions, stored sweet potatoes, and sweet peppers. There is evidence that DDT is the only useful chemical for controlling heavy corn borer infestations which attack green peppers in the Del Marva Peninsula. The record shows that about 13,500 pounds of DDT are used regularly as a ground application for prophylactic purposes. Sevin, Guthlon, and phosphanidon can, however, be used at less than 30 percent infestation. Del Marva produces less than 5 percent of the nation's sweet peppers and other crops can be profitably produced. The Agency staff has conceded in its April 15 brief in support of proposed findings, conclusions, and order that this use of DDT "comes closest—of all the uses in issue—to being necessary in the sense that no real alternative insect control method exists under certain conditions." (Brief, at 93.)

The evidence concerning use of DDT to control cutworms is less clear cut. Apparently cutworm infestations in the Northwest are sporadic and localized. While it would appear that other chemicals could be used to control cutworm infestations on

³⁶ The use of DDT in Topocide, a prescription drug, is regulated by both the Food and Drug Administration and this Agency. The alternative, Kwell, is a lindane product. I am, however, taking judicial notice of the fact that lindane registrations are presently under review by this Agency's Pesticides Office and several uses of lindane have, in the past, been the subject of cancellation proceedings. See *In Re Hari Kari Lindane*, *supra*. I am not prepared to judge on this record whether or not the risk to the environment and the public at large from DDT shampoo is greater than from lindane shampoo. As for the direct effects on the user of the drug, this matter is for FDA and the prescribing physician.

onions as with peanuts, none are apparently registered. No party has cited evidence of record showing what percent of the onion-producing acreage would be affected by a cancellation of DDT.

The evidence with respect to use of DDT as a "dip" to protect stored sweet potatoes against weevil infestation is even spottier. Neither counsel for the parties nor our research has pointed us to evidence of record showing the precise volume of DDT use for this purpose, its likely effect on the environment, or the degree of loss that might be sustained by producers.

While it would be far easier simply to cancel or not cancel the registrations for these uses, I believe that environmental problems should be parsed with a scalpel, not a hacksaw. While EDF and my own staff urge cancellation, on the ground that producers can easily shift to producing different crops, there is no evidence as to how long such transition might require. Moreover, it may be that continued use of a limited volume of DDT in these few areas, taken in conjunction with aggregate volume of use for other purposes, like health, present no risk to the environment. Obviously much of the stress on the "global" environment is reduced by curtailing overall volume of usage and we must then estimate the impact of use, both on the environment as a whole, and the local surroundings. Lastly, it may well be relevant to examine the impact on overall supply of a commodity. Even though peppers, onions, and sweet potatoes may not be food "staples," it may be that the other acreage is not suited for producing these crops. In that event, it will be necessary to determine whether or not supplies will satisfy demand, and whether or not a transition period should be fixed to permit a market adjustment.⁵⁷

It follows that additional evidence is required to determine the answers to these questions. In the interim the cancellation orders will remain in effect, subject to registrants or users petitioning to present additional evidence. In that event, a stay order will issue pending the determination on remand. If these users or registrants can demonstrate that a produce shortage will result and their particular use of DDT, taken with other uses, does not create undue stress on the general or local environment, particularly the aquasphere, cancellation should be lifted. If no produce shortage will result because other acreage is suitable for these crops, it shall still be open to demonstrate that a transitional period is required for switching to new crops. If the interim use of DDT does not constitute an environmental risk, final orders of cancellation for these uses will be deferred until the transition can be accomplished, provided assurances are received at the hearing that formulators and users will not permit bootlegging.

B. *The switch to methyl parathion.* The need for a transition period arises also in connection with those uses that are being canceled based on the existence of methyl parathion.

The record before me leaves no doubt that the chief substitute for most uses of DDT, methyl parathion, is a highly toxic chemical and, if misused, is dangerous to applicators.⁵⁸

⁵⁷ It is a recognized policy of common law nuisance and also of Federal environmental legislation to afford affected producers a transitional period for implementing new requirements.

⁵⁸ Not all of the possible substitutes for DDT are equally potent. For example, trichlorofen, monocrotophos, malathion, and carbaryl, among others, are available to control many cotton pests; carbaryl is an all-purpose chemical for most cotton pests. It is, however, abundantly clear that methyl parathion will be widely used.

This was the virtually unanimous opinion of all the witnesses. The introduction into use of organophosphates has, in the past, caused deaths among users who are untrained in their application and the testimony and exhibits of record point to the unhappy experience of several years ago where four deaths occurred at the time methyl parathion began to be used on tobacco crops. Other testimony noted the increase in non-fatal accidents and attributed almost one-half reported pesticide poisonings to the organophosphate group. A survey conducted after the organophosphates began to replace chlorinated hydrocarbons in Texas suggests a significantly increased incidence of poisonings.

That the skilled and trained user may apply organophosphates with complete safety is of comfort only if there is an orderly transition from DDT to methyl parathion so as to train workers now untrained in the ways of proper use.

I am accordingly making this order effective as of December 31, 1972, insofar as the cancellations of any particular use is predicated on the availability of methyl parathion as a substitute. In the months that follow the Department of Agriculture and State extension services and representatives of EPA will have time to begin educating those workers who will have to use methyl parathion in future growing seasons. Such a program can also introduce farmers to the less acutely toxic organophosphates, like carbaryl, which may be satisfactory for many uses.

VI. Far from being inconsistent with the general congressional mandate of FIFRA, a period of adjustment to train users of methyl parathion or permit a needed transition where no substitutes exist is a logical outgrowth of a sensible application of risk-benefit analysis. While the legislative history does not address the specific problem before me—the timing of cancellation orders—the hearings that preceded the enactment of FIFRA indicate that congressional concern for safety of the farmer-user of pesticides was no less than Congress' solicitude for the environment. While Congress ultimately struck a balance that generally places the risk of negligence on the applicator, see *Stearns v. EPA*, supra, it did so in light of assurances that farmers are for their own safety as well as that of the environment being trained in proper methods of application. See Hearings before the Subcommittee on Departmental Oversight and Consumer Relations of the House Committee on Agriculture, supra, at 54, 68.⁵⁹

The risk-benefit equation is a dynamic one. Timing is a variable in that equation. What may, in the long run, be necessary to protect the environment could be a short-term threat to human health. This is exactly the case before me now. The benefits of using organophosphates are a long-range benefit

⁵⁹ At least two courts have given express recognition to the similarity between the regulatory schemes in FIFRA and the Food, Drug, and Cosmetic Act. See *Welford v. Ruckelshaus*, 439 F. 2d 598 (D.C. Cir. 1971); *Nor-Am v. Hardin*, 435 F. 2d 1133 (7th Cir. 1970) (en banc). I believe that the trail Congress intended me to follow is marked by its directive in section 348 of the Food, Drug, and Cosmetic Act, 21 U.S.C. section 348(f) (3) (1971), which permits the Secretary to set an effective date for his orders. While similar language has not been expressly included in FIFRA, its omission can hardly be considered advertent in view of the legislative history. See S. Rept. No. 573 (88th Cong., first session 1963); H. Rept. No. 1125 (88th Cong., second session 1964). The purpose of the 1964 amendments was to eliminate registration under protest.

and the risks of DDT result from continued long-term use. In the very short run, however, the equation balances out very differently.⁶⁰ Likewise, the prospect of dislocation which might ensue were the use of DDT immediately halted where no alternatives exist is a factor we must reckon with. The major environmental regulatory statutes, enacted and pending, provide "leadtime" for an adjustment to new requirements.⁶¹

While impatience is understandable in view of the past history of delay, we must not be lulled into the belief that longstanding problems can be corrected by overnight solutions. Today's decision provides a definitive answer to the status of DDT registrations and all concerned: to this Agency, farmers, manufacturers, the Department of Agriculture, and extension services; all must proceed with alacrity toward the implementation of this order.

FACTUAL FINDINGS

I. SCOPE OF CASE

A. PR Notices 71-1, 71-3, 71-5 canceled all registered uses of DDT and TDE.

B. Appeals have been received by 31 formulators who held registrations for formulating DDT or TDE. These formulators appeared at this proceeding by a single counsel.

C. Wyco, Inc. and the Wallerstein Co. and Stark Bro's Nurseries have also appeared by separate counsel.

D. The Plant Regulation Division of the Department of Agriculture was a party to this hearing as a registrant and the Department was an intervenor as to all uses.

E. Eli Lilly & Co. and H. P. Cannon & Sons were parties to this hearing.

F. National Agricultural Chemicals Association; Environmental Defense Fund; the Sierra Club; West Michigan Environmental Action Council; and National Audubon Society are intervenor parties.

G. The following canceled uses were appealed and at issue in this hearing:

Crop Uses

1. Cotton.
2. Beans (dry, lima, snap).
3. Sweet potatoes.
4. Peanuts.
5. Cabbage, cauliflower, and brussels sprouts.
6. Tomatoes.
7. Fresh market corn.
8. Sweet peppers and pimentoes.
9. Onions.
10. Garlic.
11. Commercial greenhouses.

⁶⁰ I do not believe that the Seventh Circuit's decision in *Stearns Phosphorous Paste Co. v. EPA*, supra, precludes me from taking into account the short-term dangers that could result from increased use of methyl parathion by untrained users. *Stearns* holds that a product is not "misbranded" simply because it can be highly dangerous if the user is careless. This reasoning does not, however, compel me to ignore the tendency of human beings to be negligent where we are dealing with the implementation of an order that will increase use of a highly dangerous substance. Even negligence can be minimized by training.

⁶¹ While the Examiner excluded from evidence a study of the DDT problem for this Agency undertaken by a Committee of the National Academy of Sciences, it is appropriate to note that Committee recommended a phase-out period for the same reasons outlined in this opinion. While I reach my conclusions without relying on that report's factual findings and recommendations, and base them on the record as compiled below, I believe the report was erroneously excluded from the record, particularly in view of the offer by counsel for the Agency to produce a committee member for cross-examination.

Noncrop Uses

1. Control of house mice and bats (military only).
2. Fabric treatment (military only).
3. Disease vectors.
4. Quarantine.
5. Control of body lice in prescription drugs.

II. CHEMICAL PROPERTIES OF DDT

A. Basic findings:

1. DDT can persist in soils for years and even decades.
2. DDT can persist in aquatic ecosystems.
3. Because of persistence, DDT is subject to transport from sites of application.
 - a. DDT can be transported by drift during aerial application.
 - b. DDT can vaporize from crops and soils.
 - c. DDT can be attached to eroding soil particles.
4. DDT is a contaminant of freshwaters, estuaries and the open ocean, and it is difficult or impossible to prevent DDT from reaching aquatic areas and topography non-adjacent and remote from the site of application.

B. Ultimate finding:

The above factors constitute a risk to the environment.

III. ACTIVITY IN FOOD CHAIN AND IMPACT ON ORGANISMS

A. Basic findings:

1. DDT is concentrated in organisms and transferred through food webs.
 - a. DDT can be concentrated in and transferred through terrestrial invertebrates, mammals, amphibians, reptiles, and birds.
 - b. DDT can be concentrated and transferred in freshwater and marine plankton, insects, molluscs, other invertebrates, and fish.
2. The accumulation in the food chain and crop residues results in human exposure.
3. Human beings store DDT.

B. Ultimate finding:

The above factors constitute an unknown, unquantifiable risk to man and lower organisms.

IV. TOXICOLOGICAL EFFECTS

A. Basic findings:

1. DDT affects phytoplankton species' composition and the natural balance in aquatic ecosystems.
2. DDT is lethal to many beneficial agricultural insects.
3. DDT can have lethal and sublethal effects on useful aquatic freshwater invertebrates, including arthropods and molluscs.
4. DDT is toxic to fish.
5. DDT can affect the reproductive success of fish.
6. DDT can have a variety of sublethal physiological and behavioral effects on fish.
7. Birds can mobilize lethal amounts of DDT residues.
8. DDT can cause thinning of bird eggshells and thus impair reproductive success.
9. DDT is a potential human carcinogen.
 - a. Experiments demonstrate that DDT causes tumors in laboratory animals.
 - b. There is some indication of metastasis of tumors attributed to exposure of animals to DDT in the laboratory.
 - c. Responsible scientists believe tumor induction in mice is a valid warning of possible carcinogenic properties.
 - d. There are no adequate negative experimental studies in other mammalian species.
 - e. There is no adequate human epidemiological data on the carcinogenicity of DDT, nor is it likely that it can be obtained.
 - f. Not all chemicals show the same tumorigenic properties in laboratory tests on animals.

B. Ultimate finding:
DDT presents a carcinogenic risk.

V. BENEFITS

A. Basic findings:

1. DDT is useful for the control of certain cotton insect pests.
2. Cotton pests are becoming resistant to DDT.
3. Methyl parathion and other organophosphate chemicals are effective for the control of cotton pests.
 - a. Methyl parathion and organophosphates are less toxic to aquatic life than DDT.
 - b. Methyl parathion and organophosphates appear to be less "persistent" and do not build up in the food chain.
 - c. Methyl parathion is acutely toxic by dermal, respiratory exposure and oral ingestion.
4. By using methyl parathion or other means of pest control cotton producers can generally produce satisfactory yields at acceptable cost.
5. DDT is considered useful to have in reserve for public health purposes in disease vector control.
6. DDT is considered useful as a moth-proofing agent.
 - a. DDT is not presently used by the military for treatment of fabric.
 - b. Alternatives exist.
7. DDT is useful for public quarantine programs.
8. Quarantine programs are administered by public officials and are a nonproprietary use of DDT.
 - a. This is of little use in controlling the overall gypsy moth problem.
9. DDT is useful for controlling certain insects that attack the crops listed in finding number (I) G.
10. Adequate substitute chemicals, namely, methyl parathion and other organophosphates—for the most part—exist for controlling the diseases that attack the crops listed in finding number (I) G except:
 - a. Sweet potatoes;
 - b. Heavy infestations of corn borer attacking sweet peppers grown on the Delmarva Peninsula;
 - c. Onions attacked by cutworms.

11. DDT is effective for controlling body lice:

- a. Kwell, a Lindane product, is a substitute.
- b. Lindane registrations are being reviewed.

12. DDT is used for exterminating bats and mice by the military.

a. Fumigation and nonchemical methods can guard against bat infestation.

b. Warfarin is effective for exterminating house mice.

B. Ultimate findings:

1. The use of DDT is not necessary for the production of crops listed in finding (I) 7 except that it may be necessary to produce those crops listed in finding VI 0 (a), (b), and (c).
2. Noncrop uses of DDT for mothproofing and to control bats and mice are proprietary uses for which DDT is not necessary.

VI. MATTERS RELATING TO METHYL PARATHION:

A. Basic findings:

1. Many poisonings have been attributed to the use of methyl parathion.
2. Untrained users of methyl parathion are frequently not sufficiently careful in its use despite label directions.
3. Methyl parathion can be used safely.
4. Training programs are useful in averting the negligent use of methyl parathion.
5. Methyl parathion is a substitute for most crop uses of DDT.

B. Ultimate finding:

1. Methyl parathion is dangerous to users and presents a risk to them.

2. An opportunity to train users will minimize the risks and keep down the number of accidents.

VII. GENERAL FINDINGS

A. No directions for use of DDT, even if followed, can over the long run completely eliminate DDT's injury to man or other vertebrate animals.

B. No warning or caution for use of DDT, even if followed, can over the long run prevent injury to living man and other vertebrate animals and useful invertebrate animals.

C. The present total volume of use of DDT in this country for all purposes is an unacceptable risk to man and his environment.

D. The use of DDT in controlled situations in limited amounts may present less risk than usage in greater amounts, but still contaminates the environment.

E. The public health program and quarantine uses of DDT by officials, when deemed necessary, can be judged on an application-by-application basis by professionals.

F. A particular official use, in an isolated instance, may be important.

CONCLUSIONS OF LAW

1. DDT formulations when labeled with directions for use in the production of those crops named in finding (I) G and for use on bats, mice, and fabric are "misbranded," within the meaning of section 2(z) (2) (c), (d), and (e) of FIFRA, 7 U.S.C. section 135.

2. DDT when labeled with directions "for use by and distribution to only U.S. Public Health Service officials or for distribution by or on approval by the U.S. Public Health Service to other health service officials for control of vector diseases, for use by and distribution to the Public Health Service, USDA, and military for quarantine use; for use in prescription drugs to be dispensed only on authorization by a certified medical doctor" along with the caution printed in bold type "use for any purpose not specified or not in accordance with directions and use by unauthorized persons is disapproved by the Federal Government: This substance is harmful to the environment," is not "misbranded."

ADMINISTRATOR'S ORDER REGARDING DDT

Order. Before the Environmental Protection Agency. In regard: Stevens Industries, Inc., et al. (Consolidated DDT Hearings), I.E. & R. Docket No. 63 et al.

In accordance with the foregoing opinion, findings and conclusions of law, use of DDT on cotton, beans (snap, lima, and dry), peanuts, cabbage, cauliflower, brussel sprouts, tomatoes, fresh market corn, garlic, pimientos, in commercial greenhouses, for moth-proofing and control of bats and rodents are hereby canceled as of December 31, 1972.

Use of DDT for control of weevils on stored sweet potatoes, green peppers in the Del Marva Peninsula and cutworms on onions are canceled unless within 30 days users or registrants move to supplement the record in accordance with Part V of my opinion of today. In such event the order shall be stayed, pending the completion of the record, on terms and conditions set by the Hearing Examiner: *Provided*, That this stay may be dissolved if interested users or registrants do not present the required evidence in an expeditious fashion. At the conclusion of such proceedings, the issue of cancellation shall be resolved in accordance with my opinion today.

Cancellation for uses of DDT by public health officials in disease control programs and by USDA and the military for health quarantine and use in prescription drugs is lifted.

In order to implement this decision no DDT shall be shipped in interstate com-

merce or within the District of Columbia or any American territory after December 31, 1972, unless its label bears in a prominent fashion in bold type and capital letters, in a manner satisfactory to the Pesticides Regulation Division, the following language:

(1) For use by and distribution to only U.S. Public Health Service Officials or for distribution by or on approval by the U.S. Public Health Service to other Health Service Officials for control of vector diseases; (2) For use by and distribution to the USDA or Military for Health Quarantine Use; (3) For use in the formulation for prescription drugs for controlling body lice; (4) or in drug; for use in controlling body lice—to be dispensed only by physicians.

Use by or distribution to unauthorized users or use for a purpose not specified hereon or not in accordance with directions is disapproved by the Federal Government: This substance is harmful to the environment.

The Pesticides Regulation Division may require such other language as it considers appropriate.

This label may be adjusted to reflect the terms and conditions for shipment for use on green peppers in Del Marva, cutworms on onions, and weevils on stored sweet potatoes if a stay is in effect.

Dated: June 2, 1972.

WILLIAM D. RUCKELSHAUS.

[FR Doc. 72-10340 Filed 7-6-72; 8:50 am]

FEDERAL POWER COMMISSION

[Docket No. G-10181 etc.]

HNG OIL CO.

Finding and Order After Statutory Hearing

JUNE 26, 1972.

Findings and order after statutory hearing issuing certificate of public convenience and necessity, amending orders issuing certificates, vacating order in part and reinstating certificate and rate schedule, redesignating rate schedules and proceedings, and substituting successor as respondent.

On January 17, 1972, HNG Oil Co. (applicant) pursuant to section 7(c) of the Natural Gas Act filed in Docket No. G-10181 et al., an application requesting authorization to continue sales of natural gas in interstate commerce previously made by Roden Oil Co. (Roden) under a small producer certificate and by Houston Natural Gas Production Co. (Houston) under certificate authorizations listed in Appendix A, all as more fully set forth in the application in this proceeding.

Effective November 1, 1971, Roden, holder of a small producer certificate in Docket No. CS69-33, was merged by Houston which changed its name to HNG Oil Co. concurrently with the merger.

Applicant requests that the certificates listed in Appendix A hereto issued under

its former name be amended to reflect the new corporate name, that the related rate schedules be redesignated accordingly, that it be granted a certificate of public convenience and necessity authorizing a sale of natural gas to Northern Natural Gas Co. previously made by Roden under its small producer certificate, and that a certificate and rate schedule formerly authorizing a sale of natural gas to Natural Gas Pipeline Company of America by Roden be reinstated in the name of applicant by vacating in part the order terminating such certificate and rate schedule when Roden was issued a small producer certificate.

At the time of merger, Roden Oil Co. was respondent in the proceeding pending in Docket No. RI70-1774. Accordingly, applicant, as successor, will be substituted as respondent in Docket No. RI70-1774 and said proceeding will be redesignated.

The Commission's staff has reviewed the application and recommends each action ordered as consistent with all substantive Commission policies and required by the public convenience and necessity.

After due notice by publication in the FEDERAL REGISTER, no petition to intervene, notice of intervention, or protest to the granting of the application has been filed.

At a hearing held on June 21, 1972, the Commission on its own motion received and made a part of the record in this proceeding all evidence including the application and exhibits thereto, submitted in support of the authorizations sought herein, and upon consideration of the record,

The Commission finds:

(1) HNG Oil Co. is engaged in the sale of natural gas in interstate commerce for resale for ultimate public consumption subject to the jurisdiction of the Commission, and is, therefore, a "natural gas company" within the meaning of the Natural Gas Act as heretofore found by the Commission.

(2) The sales of natural gas made by Roden, as hereinbefore described and as more fully described in the applications in this proceeding, are made in interstate commerce subject to the jurisdiction of the Commission; and such sales by applicant, together with the construction and operation of any facilities subject to the jurisdiction of the Commission necessary therefor, are subject to the requirements of subsections (c) and (e) of section 7 of the Natural Gas Act.

(3) Applicant is able and willing properly to do the acts and to perform the service proposed and to conform to the provisions of the Natural Gas Act and the requirements, rules and regulations of the Commission thereunder.

(4) The proposed sales of natural gas are required by the public convenience and necessity, and certificates therefor should be issued as hereinafter ordered and conditioned.

(5) It is necessary and appropriate in carrying out the provisions of the Nat-

ural Gas Act and the public convenience and necessity require that the orders issuing certificates of public convenience and necessity to Houston Natural Gas Producing Co. as listed in Appendix A hereto should be amended as hereinafter ordered.

(6) It is necessary and appropriate in carrying out the provisions of the Natural Gas Act that the rate proceedings, listed in Appendix A hereto should be redesignated to reflect the new corporate name.

(7) It is necessary and appropriate in carrying out the provisions of the Natural Gas Act and the public convenience and necessity require that the order issued in Docket No. CS69-28 et al., on April 15, 1969, should be vacated insofar as it pertains to the termination of the certificate of public convenience and necessity in Docket No. CI68-1199 and the cancellation of the related rate schedule. Applicant should be substituted as the certificate holder in Docket No. CI68-1199 and the related rate schedule should be redesignated accordingly.

(8) It is necessary and appropriate in carrying out the provisions of the Natural Gas Act and the public convenience and necessity require that applicant should be substituted as respondent in the proceeding pending in Docket No. RI70-1774.

(9) It is necessary and appropriate in carrying out the provisions of the Natural Gas Act that the FPC gas rate schedules and supplements related to the authorizations hereinafter granted should be accepted for filing.

(10) It is necessary and appropriate in carrying out the provisions of the Natural Gas Act that the small producer certificate of public convenience and necessity issued to Roden in Docket No. CS69-33 should be terminated.

The Commission orders:

(A) A certificate of public convenience and necessity is issued in Docket No. CI72-468 upon the terms and conditions of this order authorizing sales by applicant of natural gas in interstate commerce for resale, together with the construction and operation of any facilities subject to the jurisdiction of the Commission necessary therefor, all as hereinbefore described and as more fully described in the applications and in the tabulation herein.

(B) The certificate granted in paragraph (A) above is not transferable and shall be effective only so long as applicant continues the acts or operations hereby authorized in accordance with the provisions of the Natural Gas Act and the applicable rules, regulations, and orders of the Commission.

(C) The grant of the certificate issued in paragraph (A) above shall not be construed as a waiver of the requirements of section 7 of the Natural Gas Act or of Part 154 or Part 157 of the Commission's regulations thereunder and is without prejudice to any findings or orders which have been or which