ENVIRONMENTAL PROTECTION AGENCY

HEARING ON U. S. AIR FORCE OCEAN INCINERATION

OF HERBICIDAL ORANGE

WASHINGTON, D.C.

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14 GSA Building
18th & F Streets
15 (Main Auditorium)
Washington, D.C.
16 9:00 A.M.

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KENNETH E. BIGLANE -- Chairman
Director of Oil and Special
Materials Control,
Division of EPA

Panelists:

Dr. Henry Enos, Director,
Equipment Techniques Division
Office of Monitoring Systems
Office of Research and Development

COL CHARLES E. SELL,
Assistant to the Director
Office of Federal Activities

MR. EDWIN L. JOHNSON
Acting Deputy Assistant Administrator
For Pesticide Programs

Mr. James Rogers,
Attorney
Office of General Counsel

Mr. T. A. Wastler, Chief,
Marine Protection Branch
Oil and Special Materials Control Civision

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1 P R O C E E D I N G S

2 CHAIRMAN BIGLANE: It is at least 9:30. We
3 will expect one more panel member to arrive shortly. I
4 think we should get started.
5 Good morning, ladies and gentlemen. I am Kenneth
6 E. Biglane, Director of the Oil and Special Materials Control
7 Division of EPA. It is my pleasure to welcome you to this
8 public meeting concerning the application of the U.S. Air
9 Force to dispose of Herbicide Orange by ocean incineration.
10 EPA panelists sitting with me are, from my right,
11 Dr. Henry Enos, Director, Equipment and Techniques Division,
12 Office of Monitoring Systems, Office of Research and
13 Development; Colonel Charles E. Sell, Assistant to the
14 Director, Office of Federal Activities; Mr. Edwin L.
15 Johnson, Acting Deputy Assistant Administrator for Pesticide
16 Programs; Mr. James Rogers, Attorney, Office of General
17 Counsel, who will be with us shortly; and Mr. T. A. Wastler,
18 Chief, Marine Protection Branch, Oil and Special Materials
19 Control Division.
20 This meeting has been called to solicit public
21 participation and input at the earliest stage into a decision
22 which EPA must make concerning the ultimate disposal of
23 Herbicide Orange stocks now being stored by the U.S. Air
24 Force at Gulfport, Mississippi, and on Johnston Island in
25 the Pacific Ocean. A record is being made of these

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proceedings and all comments made here will be carefully considered in reaching a decision on this matter.

The U.S. Air Force has approximately 2,300,000 gallons of Herbicide Orange stored at Gulfport, and on Johnston Island. Herbicide Orange is a mixture of equal parts 2, 4-D and 2,4,5-T with approximately 2 ppm of dioxin, a very toxic organic compound as a contaminant. The material is presently stored in drums which deteriorate over long periods of time, thus necessitating re-drumming to prevent leakage to the environment. This is a costly procedure and the risk of leakage increases as the average age of the drums becomes greater. Some means of ultimate disposal in the near future is highly desirable.

The U.S. Air Force has prepared an environmental impact statement on the disposal of Herbicide Orange, in which a number of disposal alternatives were explored. Based on the results stated in the environmental impact statement, the Air Force has filed with the EPA an application for an ocean dumping permit to allow disposal by ocean incineration; at the same time, however, the feasibility of ultimate disposal by reformulation or reprocessing to obtain a commercially usable product is still being explored, and the Air Force has asked EPA to assist in evaluating the feasibility of this alternative to ocean incineration.

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This public meeting is intended to be a forum in which the public can both receive and provide information relative to the ultimate disposition of Herbicide Orange. As outlined in the announcement in the Federal Register of February 4, 1975, the Agency invites comments from the public on the following:

1. Whether feasible alternative methods of disposal exist.

2. Whether Herbicide Orange is a "chemical" or "biological warfare agent" within the meaning of the Act, and whether it retains this character following incineration.

3. Whether incineration of Herbicide Orange at high combustion efficiency is compatible with the Act, assuming the compound is a warfare agent.

4. Whether adequate techniques exist with which to monitor the incineration of Herbicide Orange

5. Whether incineration is a feasible and environmentally safe means of disposal of Herbicide Orange.

6. Whether the disposal site requested by the Air Force is an appropriate location for incineration of this waste.

The request by the Air Force tq EPA to dispose of Herbicide Orange impacts two major program areas of

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1 EPA: the Office of Pesticides Programs, which is responsi-
2 ble for the regulation of pesticides for commercial use,
3 and the Office of Water Program Operations, which is
4 responsible for the Ocean Dumping Permit Program. Today
5 you will hear representatives of both of these offices
6 present program positions on this subject. You will also
7 hear the Air Force present its position on ultimate dis-
8 posal of Herbicide Orange. After these presentations
9 statements will be invited from those who have indicated
10 on the registration cards that they wish to make statements.
11 This meeting will then be open to clarifying ques-
12 tions from the floor to EPA, the Air Force, or anyone who
13 has made a formal statement.
14 We would like to have presentations from elected
15 officials or their representatives, from other Federal
16 agencies, from State agencies, from groups, and then from
17 individuals. This is the order we would prefer.
18 I would like to emphasize that no decision,
19 tentative or otherwise, has been made by EPA on this matter.
20 EPA has responsibilities for protection of the entire
21 environment and the final decision on how to dispose of
22 Herbicide Orange will be made in recognition of the EPA
23 commitment to the protection of the total environment.
24 We believe that this public meeting at an early
25 state in our evaluation of this permit application for

ocean incineration of the Herbicide, will foster full consideration of all aspects of the proposal that affect the public interest and allow us to explore fully the consequences of the alternative means of disposal being considered.

We expect the product from this meeting to be a record which will reflect the public concern about the disposal of Herbicide Orange. The areas of concern stated in the meeting will be brought to the Administrator's attnetion to assist him in making future decisions on the disposal of Herbicide Orange.

At this point, I would like to make a few general announcements:

1. Comfort Break at 10:45 - the court reporter is uppermost in mind. Reassemble at 11:00 a.m.

2. Assuming that the meeting will go into the afternoon, we will recess at 12:00 p.m. and reassemble at 1:15 p.m.

3. Public eating facilities are listed on the sheet which you received when you registered. If you did not receive such a sheet, they are available at the registration desk.

4. The rules of this building prohibit smoking in the auditorium.

5. We have not reserved the building for tomorrow

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if the meeting runs to late in the evening, I will announce 15 minute comfort breaks about every hour and one-half, a one-hour dinner break at 5:15 p.m., and we will go on into the night if necessary.

6. In any event, the record will be held open until March 5, 1975 and your submissions should be sent to EPA in care of Mr. T. A. Wastler, Marine Protection Branch, 401 M Street, S.W., Washington, D.C. 20460.

7. There is a microphone and lectern in the auditorium aisle to my right. Those from the audience wishing to make statements should do so at this lectern, and please state your name clearly so that the court reporter can list it correctly.

8. All those present should have filled out a registration card and indicated whether or not they wish to make a statement. If you have not filled out a card, please do so at the registration table in the rear of the room.

Now, I will ask Mr. Johnson, to outline the program area of the Office of the Pesticides Programs with regard to the feasibility of reprocessing or formulating Herbicide Orange.

MR. JOHNSON: The Federal function aside - the Insecticide and Rodenticide At, as amended in 1972, which

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1 is administered by the Environmental Protection Agency,
2 requires EPA to regulate the distribution, sale, and use
3 of pesticies, in the disposal of pesticies and containers.
4 The composition, intended purpose, and other
5 characteristics of Herbicide Orange clearly bring it within
6 the definition of a pesticide under the Act, and thereby
7 subject to regulation.
8 Specifically, Section 19-A of the amended Act
9 requires the Administrator of EPA to establish procedures
10 and regulations for the disposal or storage of insecticides
11 and excess amounts of such pesticides. Initial regulations
12 under Section 19 were published in the Federal Register on
13 May 1, 1974, and additional rule making is now under final
14 deliberation within the Agency.
15 In promulgating these regulations, consistent with
16 the need to conserve and reuse our natural resources, a
17 policy with respect to disposal was established: "In
18 considering diposal techniques the first preference should
19 be given to procedures designed to recover some useful
20 value from excess pesticides and containers. Where large
21 quantities are involved, one of the first recommendations
22 is the excess material be used for the purpose intended,
23 provided the use is legal. Another alternative is to return
24 the material to the manufacturer for potential reuse or
25 processing. A third alternative in some cases may be the

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export of the material to countries where its use is desired and legal.

"Should these alternatives be inapplicable, the ultimate disposal method should be determined by the type of material."

The preamble then goes on to discuss various methods of ultimate disposal. It is clear methods of disposal which are environmentally sound are preferred to simply throwing resources away. This consideration is particularly germane during this time of shortages and projected shortages of many materials, particularly those products derived from petroleum feedstocks; included among materials predicted to be in short supply are usual herbicides, which are used in growing our grain crops.

There are chemical methods and procedures which will degrade and modify the chemical characteristics of some pesticides. The forms which are not hazardous to the environment. However, practical methods are not available for all groups of pesticides.

In this case, however, the Office of Pesticides Programs has general information available to indicate the potential for chemically reprocessing Herbicide Orange into commercial products such as 2,4-D, chlorine, hydrochloric acid, or into such commercial products, including dioxin containing wastes.

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Informal discussions have also indicated an economic as well as a physical feasibility. Our general counsel has advised that Herbicide Orange reprocessing can be considered a form of disposal under Section 18 of the FIFRA. However, to exercise the Section 19 rule, EPA must be satisfied that the dioxin content of the Herbicide Orange can be safely removed and dealt with.

In order to fully and properly consider any reformlation processes, EPA would need to know and to consider:

1. The potential processing firm and its location;

2. The physical facilities available to reformulate the herbicide;

3. The exact chemical process to be utilized in removing the dioxin content or in other ways modifying the chemical structure;

4. The chemical makeup and the probably level of dioxin in the reformulated substances;

5. The probably level of dioxin refuse and other wasts from the reformulation process, including possible aerial emissions from smokestacks, for instance, and the liquid or solid refuse resulting from the process;

6. Additionally, if the reformulation compound

is intended for pesticidal use, then either a registration-application would need to be submitted to the EPA by the processor or the name and registration numbers of products already registered in which the material would be used must be supplied.

Quality control would also be of prime importance and testing would be necessary to assure this.

In addition, should a specific method look promising, and when a processor has expressed interest, it would be most likely that one or perhaps more trial batches would have to be processed under carefully monitored conditions to assure performance before proceeding with a major undertaking.

The Air Force was advised of these agency views on chemical reprocessing in a January 21, 1975 letter, responding to an inquiry made by the Air Force on this subject in November of 1974. A copy of this letter will be provided as part of the record of this meeting.

In addition, the assistance of EPA scientists has been offered to the Air Force in evaluating proposed processes for chemical reformulation. In short, the Office of Pesticide programs believes that the option of chemical reprocessing of Herbicide Orange into usable products is worthy of additional serious consideration and if feasible

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1 it may be well be preferred to ultimate disposal.

2 In his opening remarks, EPA, however, has made

3 no decision as yet in this matter. To make an intelligent

4 one, the EPA needs full information on all alternatives

5 potentially available.

6 Thank you.

7 CHAIRMAN BIGLANE: Thank you, Mr. Johnson.

8 Now, I will ask Mr. Rogers to outline the

9 statutory requirements as such requirements govern the

10 position of EPA's Ocean Dumping Permit Program with regard

11 to the issuance of a permit for the ocean incineration.

12 Rogers.

13 MR. ROGERS: The law that this hearing is held

14 under and the further provisions under this application that

15 are contemplated, is the Marine Protection Research and

16 Sanctuaries Act of 1972, Public Law 92-532. The basic

17 outline of the statutory requirements that we have to

18 operate under, the EPA, are as follows: We have to start

19 with the presumption that the dumping of materials without

20 a permit from the Environmental Protection Agency is pro-

21 hibited.

22 The Act then states several criteria which the

23 Agency must consider in acting upon applications to dispose

24 of materials in the oceans.

25 One of the unique features about this application,

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Conincident with that tentative determination we will issue -- if the determination is to issue a license or to deny a license, we will issue notice of opportunity for hearing, public hearing. We will then hold a public hearing if people request that hearing in a timely fashion. Based on the complete record the Agency will render a final decision on the permanent application.

CHAIRMAN BIGLANE: Thank you, Mr. Rogers.

Now, at this point I would ask the Air Force to present their position and findings on the alternative means of disposal. I see Dr. Welsh in the audience. I presume he is going to lead the discussion.

DR. WELSH: Mr. Biglane, members of the Panel, ladies and gentlemen, I would like just very briefly to recound some history for you, if I might.

I am Dr. B. E. Welsh, Specialist Assistant for Environmental Quality, Office of the Secretary of the Air Force.

I would like to briefly recount some of the history that has led us to where we currently are, and to see if we can put this problem into the right type of perspective.

First, starting roughly in April of 1970, the U.S. Department of Agriculture, HEW, Department of Interior, at that time, suspended certain use of 2,4,5-T. As a

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1 consequence of the suspension of the uses of 2,4,5-T,
2 the U.S. Air Force, acting as the agent for the Department
3 of Defense, was left with 1.5 million gallons of Herbicide
4 Ordane in Vietnam and 0.8 million gallons of Herbicide
5 Orange at Gulport.

6 Following that suspension in April of 1970, on
7 September of '71, the DOD elected we return this material
8 from Vietnam and we dispose of it in a safe, efficient
9 manner. Following that particular direction the Air Force
10 published a draft environmental statement in January of
11 1972, stating that incineration appeared to be the best
12 way of resolving the problem, and that we had numerous
13 types of studies underway. Due to the fact that these
14 studies were underway and have not yet been completed,
15 it was felt that discretion was the better part of valor
16 and the studies should be completed prior to the time we
17 moved forward.

18 As a result of that, the material that was stored
19 in Vietnam then in April of 1972 was moved to Johnston
20 Island for storage and pending a final disposal decision.

21 Since that point in time the Air Force has
22 conducted or caused to have conducted or assisted in
23 conducting many studies to look at the various means for
24 disposing of this particular material. We conducted
25 incineration tests ranging from static tests in the

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1 laboratory, to small scale tests to be studied in the
2 laboratory, to drum size tests conducted by the Air Force
3 at a facility on the West Coast.
4 The results of these studies indicated that the
5 D and T acids are destroyed somewhere around 330 to 360
6 degrees Centigrade, and the dioxin or the CDD destroyed
7 somewhere around 980 and 1000 degrees Centigrade.
8 In addition to the incineration studies, we
9 looked at the potential for use. As pointed out, this
10 particular material is not a registered herbicide and for
11 it to be utilized it would have to be registered or re-
12 formulated into some other material that would be useful.
13 At this point, somewhere in mid 1973 to early
14 1974, when we were looking at this particular problem,
15 2,4,5-T was considered to be a material that had perhaps
16 a limited lifetime in terms of acceptibility for use, and
17 indeed the EPA had planned to hold public hearings in June
18 of 1974 to evaluate the overall use of 2,4,5-T in this
19 country. These public hearings were subsequently cancelled
20 with no decision being reached due to the lack of suf-
21 ficient information on which to base decisions.
22 We looked at the deep well disposal. We looked
23 at the prospect of putting the material in nuclear test
24 cavities, we looked at the prospect of buying it, and
25 molecular reduction, subsequent destruction of the dioxin,

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1 we looked at the concept of chlorinolisis, complete
2 chlorinization of the molecule and phosgene, carbon
3 tetrochloride and hydrochloric acid.
4 We looked extensively at the concept of soil
5 biodegradation. This particular concept relates to putting
6 the material into the soil and allowing the soil micro-
7 organisms to handle the biodegradation of the material
8 and breaking it down.
9 We also looked at the question of return to the
10 manufacturer.
11 In March of 1972 we contacted the original manu-
12 facturers of the material and inquired if they had any
13 interest in the material. Whether they could reprocess it
14 to remove impurities and reuse it. This created what might
15 be known as a wide wave of dissent aat that particular
16 point in time.
17 Subsequently, in August of 1974, following EPA's
18 decision in June of 1974, we contacted the manufacturers
19 again with the same type of results. They do not have
20 the capability nor the interest to reprocess this material.
21 In May of 1974 we published a draft environmental
22 impact statement in which we said something like this:
23 that incineration appeared to be the best way of destroying
24 the material. If we were going to incinerate it it appeared
25 that incineration at a remote site was preferable to

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1 incineration in the continental United States.

2 Accordingly, we said that incineration on or west
3 of Johnston Island would be preferable. We looked at the
4 incineration at sea west of Johnston Island as having the
5 least prospect of causing environmental damage. Incinera-
6 tion on Johnston Island, handled by building a facility
7 there that would be environmentally acceptable, but had
8 the opportunity for potential greater impact than incinera-
9 tion on the high seas

10 At the time that we filed the draft environmental
11 impact statement, the EPA position was that incineration
12 on the high seas was not covered by the Ocean Dumping Act.
13 The draft environmental impact statement was sent out to
14 something like over 400 people, or over 400 copies
15 were distributed, and was given and LO-2 rating by the
16 EPA.

17 Subsequently, in December of 1974, we published
18 the final environmental impact statement. Again we said
19 that our primary option was incineration on the high seas
20 west of Johnston Island. I guess for the benefit of those
21 that may not know where Johnston Island is, it is something
22 on the order of 800 miles west of Hawaii. From the proposed
23 site of incineration downwind it is something like 1,000
24 miles to the next land mass, and that land mass consists of
25 a chain of fairly small islands.

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1 As I said in December of 1974, we published the
2 final environmental impact statement, again saying incinera-
3 tion was our primary choice of the destruction of the
4 material, again saying incineration on the high seas, the
5 primary option if we destroyed it, and incineration on
6 Johnston Island was the second method, assuming incineration
7 on the high seas was not a feasible thing to accomplish.
8 We distributed something like 200 copies of the
9 final environmental impact statement. We have had one set
10 of written comments from the Environmental Protection
11 Agency. We have had one verbal comment from the Center
12 for Law and Social Policy.
13 My point in mentioning this is to indicate to
14 you that this particular public meeting we are having today
15 is not to discuss a problem that just surfaced, not to
16 discuss something that the public has not had an opportunity
17 to be interested in or had an opportunity to comment on. It
18 is our contention that we have documented the environmental
19 problems relating to this particular situation and that
20 these environmental problems are the same whether a permit
21 is required or whether one is not.
22 I might say regarding the problem of permit or
23 the question of permit, the fact that we have applied for an
24 ocean dumping permit does not necessarily mean we agree
25 completely with the EPA position that an ocean dumping

permit is required. We are, however, complying by applying for a permit.

As Mr. Biglane said, we do have a problem in storage of this material. I does cost money to maintain it. The material that is stored on Johnston Island is stored as it got there in 55 gallon drums, but it is open storage. Johnston Island is roughly 600 to 650 acres in total area, and I would suspect that the elevation is something on the order of six to eight feet above sea level. So it is a fairly corrosive environment, and we have a major effort to maintain the integrity of the drums due to the fairly corrosive environment that is there.

In order to preclude continued redrumming, continued utilization of money for the redrumming efforts, it is our desire and our charter, we think, to dispose of the problem in one way or the other: either by reformulation into products that can be used or by destroying the material in terms of incineration, either on the high seas or on Johnston Island. Our position has been laid out in the Environmental Impact Statement. It is there for anyone to study, if they so care, and we think that the solutions are fairly self-evident.

I think, Mr. Biglane, that is all we would care to say on that at this particular point in time.

CHAIRMAN BIGLANE: Thank you, Dr. Welsh, for that statement to the record.

At this point, following our formula that we laid out earlier, this meeting will be open to clarifying questions from the floor to EPA, the Air Force or anyone who wants to make a formal statement. We then gave our order we would like to see such presentations.

I have just been informed, and you might correct this if this is wrong, there are no federal or state elected officials present herein. Do we have comments from other federal agencies at this time?

Do we have comments from state agencies?

I have received notice that we have from groups, three individuals who want to make statements. Mr. Ken Kamlet, counsel for the National Wildlife Federation. At this time, Ken?

STATEMENT OF KENNETH E. KAMLET, ON BEHALF OF THE NATIONAL WILDLIFE FEDERATION

MR. KAMLET: Thank you. My name is Kenneth E. Kamlet. I appear at this meeting on behalf of the National Wildlife Federation as an attorney and a biologist. The National Wildlife Federation, headquartered in Washington, D. C., is the world's largest non-governmental conservation organization with 3.5 million members and supporters throughout the United States, Guam, the Virgin Islands, and Puerto Rico.

I would ask at this time that my prepared statement and two attachments be entered into the record.

We are assembled here today to consider a proposal by the United States Air Force to dispose of 2.3 million gallons of Agent Orange herbicide by ocean incineration on board a specially designed incinerator ship. The incineration would take place during three seven- to nine-day periods in a designated area 50-60 miles clear of normal shipping lanes and on the open tropical sea downwind (west) of Johnston Island. The proposed disposal location is 120 miles from the nearest land.

The disposal of Agent Orange is a matter of great environmental significance, because a contaminant present in the Orange -- 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin, otherwise known as "TCOD" or simply, "dioxin" -- has been shown to cause birth defects in experimental animals. It has also been implicated in the increased incidence of human birth deformities in Vietnam in the late 1960s, as a result of the widespread military use of Agent Orange during the Vietnam War. It is unclear to what, if any, extent the individual herbicide components of Agent Orange -- 2, 4, -D and 2, 4, 5, -T -- may themselves be teratogenic or otherwise toxic to man and beast. But see footnote 1a and Appendix I, although both these effects have been demonstrated in laboratory animals for purified forms of both these herbicides.

In the interest of prudence, the Secretaries of Agriculture, HEW and Interior jointly announced in mid-April 1970, the suspension of the registration of 2,4,5,-T for most uses. In September 1971, the Secretary of Defense directed the Joint Chiefs of Staff to dispose of both U.S. and Vietnam stocks of Agent Orange. The Air Force, which was assigned this responsibility, favors ocean incineration as the preferred method of disposal, although it would presumably not be averse to reformulation and resale of the Orange if the necessary FIFRA certification were forthcoming, and I take it, assuming there were not significant delays in allowing that to occur.

The National Wildlife Federation feels a responsibility to participate in the deliberations over the Air Force's ocean disposal proposal, both because of our concern for the marine environment and because of our role in establishing EPA's regulatory jurisdiction over ocean incineration activities. Thus, in large part, as a result of the Federation's efforts, the Shell Chemical Company was required several months ago to secure EPA ocean dumping permits for the ocean incineration of four shiploads of organochlorine wastes. Based on a review of available European studies which showed the efficiency of organochlorine destruction to be great and the environmental impact of the resultant exhaust vapors to be negligible, we gave our qualified support to

Shell's ocean dumping permit request. This support was expressly conditioned by our insistence that "every aspect of the incineration process and its aftermath be followed, measured, supervised, and evaluated, and that the operation be aborted at the first sign of anything untoward." It would almost be understatement to describe as "exhaustive" the research and monitoring effort that accompanied the first two Shell incinerator runs -- carried out under a circumscribed "research permit." The results of these studies unequivocally confirmed the complete safety of an appropriately conditioned and executed high-temperature ocean incineration operation when applied to organochlorine wastes of the Shell type.

Ocean incineration is no panacea, however. In the view of the National Wildlife Federation its use is appropriate only under the following three circumstances:

(1) The waste to be disposed of must be susceptible to essentially complete combustion. Wastes containing significant quantities of heavy metals and other inherently non-degradable materials are not suitable candidates for incineration absent adequate pre-treatment or stack scrubbing to remove materials refractory to thermal destruction.

(2) There must be available no environmentally more acceptable treatment, disposal, or recycling alternative. If a valuable resource can be salvaged without environmental risk, this option should be pursued in preference to disposal

or destruction.

(3) Each waste for which incineration at sea is being considered must be evaluated on its own merits. Waste combustion efficiencies and exhaust gas toxicities will vary from waste to waste and must be determined and monitored on a case by case basis.

Thus, the mere fact that the Shell operation was successful should not alone allow the unqualified approval of the Air Force proposal. Appropriate disposal locations must also be selected in each individual case.

In consideration of the above principles, the National Wildlife Federation does not object, from a strictly technical and environmental standpoint, to the Air Force's properly-conditioned ocean incineration of Agent Orange. Extensive Air Force tests, employing land-based incinerators, justify the expectation of shipboard destruction efficiencies of well over 99 percent. And, although reformulation or reprocessing of the Orange with recovery of herbicide for sale and reuse may be technically feasible, in our opinion there are twoo many uncertainties surrounding the herbicides involved to justify the environmental and health risks of their further dissemination without careful deliberation and study. From the standpoint of the environment, destruction by incineration on the open ocean may be the best course of action for the remaining stores of Agent Orange.

This technical analysis does not end the inquiry, however. Under the Marine Protection, Research, and Sanctuaries Act -- the ocean dumping law -- there may be no ocean dumping of even trace amounts of any chemical warfare agent. Since Agent Orange is indisputably a chemical warfare agent, long used as a defoliant in the Vietnam War, it may be disposed of at sea only if no detectable traces enter ocean waters. The Air Force's proposal must be weighed against this legal criterion.

The results of two laboratory, two full-scale, and one industrial prototype scale, incineration studies on Agent Orange are summarized in the Air Force's environmental impact statement.

A Mississippi State/USDA laboratory study incinerated 5-6 grams of Agent Orange at temperatures in the 700° to 1000° C range. No herbicide was detected in benzene impingers through which combustion gases were passed. However, 2,4,-D and 2,4,5,-T free acids in the 2.0-200 ppb range and 2,4,5,-T isoocytyl ester in the 0.70 to 370 ppb range were found in extracts of particulates in a pyrex wool particulate trap. These results indicate that, at 1000° C, traces of herbicides may be volatilized and carried out of the burning range of the furnace. Complete combustion of the Agent Orange starting material appears nevertheless to have been achieved. We have reviewed these studies.

Although the Marguardt Company's General Manager has stated, and the Air Force has agreed, that "data from one type of combustion system cannot be assumed to apply to a different type or size combustion system without extensive testing to validate the assumption" (EIS, pp. 0-64, 0-68), we believe the data available to us make it probable that full-scale incineration of Agent Orange can be carried out to below detectable limits when the following conditions are met:

(1) Combustion temperatures exceed 2280° F (1246°C);

(2) Dwell time exceeds 0.14 secs.;

(3) Fuel-to-air ratio is approximately 0.1;

(4) Excess air exceeds 30 percent;

(5) Agent Orange is preheated to at least 90° (and preferably to 175° F); and

(6) Agent Orange is injected into the combustion chamber by a radial slot-type, rather than a central poppet-type, nozzle. (EIS, pp. 17, 0-11, E-33, E-54).

If EPA determines that these conditions can be met by the "Vulcanus" -- and on the basis of evidence available to us there appears to be no reason why they cannot -- we believe that the proposed ocean incineration activity can be reconciled with the letter and spirit of the ocean dumping law and carried out with safety to human health and the marine environment.

We believe, however, that prudence requires that at

1 least the first shipload of Agent Orange be incinerated under
2 a narrowly circumscribed research permit and with close
3 monitoring of combustion efficiencies, Agent Orange destruc-
4 tion completeness, TCDD release, and phytotoxicity to marine
5 plankton.
6 The National Wildlife Federation would support the
7 Air Force proposal under the indicated circumstances as
8 environmentally sound, consistent with the law, and compatible
9 with the best interests of the public.
10 Thank you.
11 (The prepared statement and attachments follow:)
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National Wildlife Federation

1412 16TH ST., N.W., WASHINGTON, D.C. 20036 Phone: 202-483-1550

STATEMENT OF KENNETH S. KAMLET
ON BEHALF OF THE NATIONAL WILDLIFE
FEDERATION AT EPA TECHNICAL MEETING
ON OCEAN INCINERATION, WASHINGTON, D.C.
FEBRUARY 19, 1975

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My name is Kenneth S. Kamlet. I appear at this meeting on behalf of the National Wildlife Federation as an attorney and a biologist. The National Wildlife Federation, headquartered in Washington, D.C., is the world's largest non-governmental conservation organization with 3.5 million members and supporters throughout the United States, Guam, the Virgin Islands, and Puerto Rico. 1 ~~The~~ Federation is dedicated to the perpetuation and wise use of the natural resources of the North American Continent. We have followed closely the Federal ocean dumping program over the past year and-a-half and have repeatedly spoken out against the dumping of harmful waste materials and in favor of recycling of useful materials and other less damaging alternatives.

Start again

We are assembled here today to consider a proposal by the United States Air Force to dispose of 2.3 million gallons of Agent Orange herbicide by ocean incineration on board a specially designed incinerator ship. The incineration would take place during three 7- to 9-day periods in a designated area 50-60 miles clear of normal shipping lanes and on the open tropical sea downwind (west) of Johnston Island. ~~(GI:, pp. i, 2, 16)~~. The proposed disposal location is 120 miles from the nearest land.

The disposal of Agent Orange is a matter of great environmental significance, because a contaminant present in the Orange—2,3,7,8-tetrachlorodibenzo-p-dioxin, otherwise known as "TCDD" or simply, "dioxin" — has been shown to cause birth defects in experimental animals. It has also been implicated in the increased incidence of human birth deformities in Vietnam in the late 1960's, as a result of the widespread military use of Agent Orange during the Vietnam war. ~~(EIS, pp. 4-7)~~. It is unclear to what, if any, extent the individual herbicide components of Agent Orange -- 2,4,-D and 2,4,5,-T -- may themselves be teratogenic or otherwise toxic to man and beast. But see footnote 1a. and Appendix I. ② In the interest of prudence, the Secretaries of Agriculture, HEW and Interior jointly announced in mid-April 1970 the suspension of the registration of 2,4,5,-T for most uses. In September 1971, the Secretary of Defense directed the Joint Chiefs of Staff to dispose of both U.S. and Vietnam stocks of Agent Orange. The Air Force, which was assigned this responsibility, favors ocean incineration as the preferred method of disposal, although it would presumably not be averse to reformulation and resale of the Orange if the necessary FIFRA certification were forthcoming. ③ Insert

Insert ②

The National Wildlife Federation feels a responsibility to participate in the deliberations over the Air Force's ocean disposal proposal, both because of our concern for the marine environment and because of our role in establishing EPA's regulatory jurisdiction over ocean incineration activities. Thus, in large part, as a result of the Federation's efforts the Shell Chemical Company was required

several months ago to secure EPA ocean dumping permits for the ocean incineration of 4 ship loads of organochlorine wastes. Based on a review of available European studies which showed the efficiency of organochlorine destruction to be great and the environmental impact of the resultant exhaust vapors to be negligible, we gave our qualified support to Shell's ocean dumping permit request. This support was expressly conditioned by our insistence that "every aspect of the incineration process and its aftermath be followed, measured, supervised, and evaluated, and that the operation be aborted at the first sign of anything untoward." It would almost be understatement to describe as "exhaustive" the research and monitoring effort that accompanied the first 2 Shell incinerator runs -- carried out under a circumscribed "research permit". The results of these studies unequivocally confirmed the complete safety of an appropriately conditioned and executed high-temperature ocean incineration operation when applied to organochlorine wastes of the Shell type.

Ocean incineration is no panacea, however. In the view of the National Wildlife Federation its use is appropriate only under the following three circumstances: (1) The waste to be disposed of must be susceptible to essentially complete combustion. Wastes containing significant quantities of heavy metals and other inherently non-degradable materials are not suitable candidates for incineration absent adequate pre-treatment or stack scrubbing to remove materials refractory to thermal destruction. (2) There must be available no environmentally more acceptable treatment, disposal, or recycling

alternative. If a valuable resource can be salvaged without environmental risk, this option should be pursued in preference to disposal or destruction. (3) Each waste for which incineration at sea is being considered must be evaluated on its own merits. Waste combustion efficiencies and exhaust gas toxicities will vary from waste to waste and must be determined and monitored on a case by case basis. (4) Appropriate disposal locations must also be selected in each individual case.

In consideration of the above principles, the National Wildlife Federation does not object, from a strictly technical and environmental standpoint, to the Air Force's properly-conditioned ocean incineration of Agent Orange. Extensive Air Force tests, employing land-based incinerators, justify the expectation of shipboard destruction efficiencies of well over 99%. And, although reformulation or reprocessing of the Orange with recovery of herbicide for sale and reuse may be technically feasible, in our opinion there are too many uncertainties surrounding the herbicides involved to justify the environmental and health risks of their further dissemination without careful deliberation and study. From the standpoint of the environment, destruction by incineration on the open ocean may be the best course of action for the remaining stores of Agent Orange.

This technical analysis does not end the inquiry, however. Under the Marine Protection, Research, and Sanctuaries Act -- the

ocean dumping law -- there may be no ocean dumping of even trace amounts of any chemical warfare agent. Since Agent Orange is indisputably a chemical warfare agent, long used as a defoliant in the Vietnam war, it may be disposed of at sea only if no detectable traces enter ocean waters. The Air Force's proposal must be weighed against this legal criterion.

The results of 2 laboratory, 2 full-scale, and 1 industrial prototype scale, incineration studies on Agent Orange are summarized in the Air Force's environmental impact statement.

A Mississippi State/USDA laboratory study incinerated 5-6 grams of Agent Orange at temperatures in the 700° to 1000° C range. No heroicide was detected in benzene impingers through which combustion gases were passed. However, 2,4,-D and 2,4,5,-T free acids in the 2.0-200 ppb range and 2,4,5,-T isoocytyl ester in the 0.70 to 370 ppb range were found in extracts of particulates in a pyrex wool particulate trap. These results indicate that, at 1000° C, traces of herbicides may be volatilized and carried out of the burning range of the furnace. Complete combustion of the Agent Orange starting material appears nevertheless to have been achieved. 3/ ~~(EIS, p.~~ D-3).

5

Another laboratory study, this time conducted at Kelly Air Force Base, incinerated a total of 14.12 ml of Agent Orange at combustion temperatures of 740 to 950° C. At 920° C, total discharges of 2,4,-D and 2,4,5,-T were in the 8.0-50.0 ppb range. It is unclear

from the summarized results whether any identifiable Agent Orange was present in the discharges. (EIS, p. D-6).

A full-scale study, carried out by the Marquardt Company, incinerated 37 gallons of Orange (during Phase II testing) at temperatures ranging from 1730° to 2360° F (943° to 1293° C). Combustion gas analyses of condensible products in ten 14-liter samples yielded no detectable herbicide components. For one run using a sample volume of 140 liters a total herbicide concentration of 19 ppm was detected in the combustion products. It is unclear from the summarized results whether any identifiable Agent Orange was present in the exhaust gases even with this large sample volume. (EIS, p. D-8).

A second full-scale study was carried out by the Marquardt Company in conjunction with the Air Force on 28 drums (1540 gals.) of Orange incinerated at temperatures ranging from 2273° to 2772° F (1245° to 1522° C). In this study, which appears to be most directly comparable to incineration conditions on the incinerator ship "Vulcanus", no herbicide constituent was detected in any system effluent when operating with slot type injection nozzles. (EIS, pp. D-10 - D-11; Appendix E).

Finally, an industrial prototype scale study was conducted by Combustion Power Company on a total of 39 gallons of Orange incinerated at fluidized bed temperatures ranging from 1490° to 1530° F (810° to 832° C). Maximum herbicide concentrations in the exhaust

gases were 0.3196 to 4.068 ppb for 2,4,-D and 0.5418 to 10.96 ppb for 2,4,5,-T. In no case did relative 2,4,-D and 2,4,5,-T levels correspond to those of raw Agent Orange (EIS, pp. D-15, E-(I-1)).

Start Although the Marquardt Company's General Manager has stated, and the Air Force has agreed, that "[d]ata from one type of combustion system cannot be assumed to apply to a different type or size combustion system without extensive testing to validate the assumption" (EIS, pp. 0-64, 0-68), we believe the data available to us make it probable that full-scale incineration of Agent Orange can be carried out to below detectable limits when the following conditions are met:

(1) Combustion temperatures exceed 2280° F (1246° C);

(2) Dwell time exceeds 0.14 secs.;

(3) Fuel-to-air ratio is approximately 0.1;

(4) Excess air exceeds 30%;

(5) Agent Orange is preheated to at least 90° (and preferably to 175° F); 4 / and

(6) Agent Orange is injected into the combustion chamber by a radial slot-type, rather than a central poppet-type, nozzle. (EIS, pp. 17, D-11, E-33, E-54).

If EPA determines that these conditions can be met by the "Vulcanus" -- and on the basis of evidence available to us there appears to be no reason why they cannot 5 / -- we believe that the proposed ocean incineration activity can be reconciled with the letter and spirit of the ocean dumping law and carried out with safety to human health and the marine environment.

We believe, however, that prudence requires that at least the first shipload of Agent Orange be incinerated under a narrowly circumscribed research permit and with close monitoring of combustion efficiencies, Agent Orange destruction completeness, TCDD release, and phytotoxicity to marine plankton. 6 /

The National Wildlife Federation would support the Air Force proposal under the indicated circumstances as environmentally sound, consistent with the law, and compatible with the best interests of the public.

Insert 6

Stop

Footnotes

1 / By legal memorandum of January 23, 1974, EPA took the position that the on-ship disposal of wastes at sea by incineration was not "ocean dumping" within the meaning of the Marine Protection, Research, and Sanctuaries Act of 1972. It therefore disclaimed regulatory jurisdiction over an ocean incineration plan of the Shell Chemical Company. Subsequently, in September 1974, after the National Wildlife Federation challenged this position, EPA reversed itself and assumed jurisdiction over the Shell disposal operation.

1a/ One promising reprocessing alternative, which recovers 2,4-D ester and other marketable materials, has recently been called to our attention by Paul E. Des Rosiers, EPA Office of Research and Development. According to Mr. Des Rosiers, this technique would allow 2,4-D ester to be distilled out of the Agent Orange mixture free of dioxin contaminant (within limits of detection). The dioxin and 2,4,5-T residues would then be subjected to exhaustive chlorination, permitting the recovery of marketable carbon tetrachloride, hydrochloric acid, and carbonyl chloride (phosgene). In the view of the National Wildlife Federation, consideration of this alternative by EPA as a means of disposition for the Air Force's present Agent Orange stores must, in addition to technological considerations, take into account: (1) The length of additional storage time required before processing facilities are on line and the risks of spillage, etc. during this interval; and (2) The environmental risks associated with the dissemination of large amounts of even totally "pure" 2,4-D herbicide.

With regard to environmental risks, laboratory studies have shown that purified 2,4-D can cause birth defects in hamsters, mice, and chick embryos. I attach as Appendix I to this statement an unpublished research report by Dr. Jacqueline Verrett of the Food and Drug Administration. Dr. Verrett's studies demonstrated the induction of abnormalities in chick embryos when 1.46 milligrams of purified 2,4-D was injected into eggs (approx. 30 ppm). On the other hand, it is doubtless true that "most chemicals under suitable laboratory conditions could probably be demonstrated to have teratogenic effects . . . if dosage were raised high enough . . . ." (EIS, p. 61).

If EPA chooses the reprocessing route, it should do so on the basis of a careful weighing of associated risks and benefits.

2 / The ocean dumping law, in section 101(b), unqualifiedly prohibits the dumping of any radiological, chemical, or biological warfare agent. Unlike "The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter," the U.S. statute contains no exemption for warfare agents that are "rapidly rendered harmless" when dissolved in seawater, or are present merely as "trace contaminants". Nevertheless, it would be unreasonable to extend the ban on dumping of warfare agents to levels of these materials below the best state-of-the-art limits of detection (for Agent Orange, the detection limit is in the part-per-trillion/part-per-billion range).

3 / Agent Orange is a mixture of two herbicides, 2,4,-D and 2,4,5,-T, present in an average initial ratio of 50.9 to 43.78 (by weight). (EIS, pp. E-(G-9), E-(I-1)). Since only the parent mixture has a known history of chemical warfare use, the presence of traces of 2,4,-D and 2,4,5,-T in incinerator exhaust gases invokes the warfare agent prohibition only when these components are discharged in a proportion characteristic of Agent Orange. The different heats of formation (EIS, pp. 39, E(A-1)) and chlorine content of 2,4,-D and 2,4,5,-T almost insures that thermal dechlorination and pyrolytic cleavage of these two compounds will occur at different rates and to different degrees, resulting in a progressively greater divergence from the starting ratio of uncombusted herbicide. Volatilization without combustion of the two herbicides without altering their starting ratio would also appear unlikely. It should be noted that the ocean dumping criteria (section 227.31(b)(5)) require strict regulation of herbicide dumping in whatever levels or proportions. The necessity of close regulation is not at issue; only the necessity of total prohibition.

4 / "Preheat of 'Orange' Herbicide fuel prior to injection in the combustion chamber [is] an important combustion efficiency parameter. The RPE [Relative Pyrolysis Efficiency] [is] improved significantly where the 'Orange' Herbicide fuel was preheated to 175° F. Preheat of 'Orange' Herbicide fuel to at least 90° F [is] required to accomplish acceptable fuel injection characteristics." (EIS, p. D-11). The high viscosity of Agent Orange necessitates preheating "to obtain the fluid properties necessary to achieve rated fuel mass flow rates." (EIS, pp. E-29, E-1). See also EIS, pp. E-10, E-36, E-37, E-41, E-48, E-52, E(B-12), E(B-13), E-54. If ambient temperatures in the disposal area during incineration runs by the "Vulcanus" are insufficient to maintain the Agent Orange at 90° F, a "fuel tank preheater" (EIS, p. E-10) may have to be installed.

5 / For Shell-type organochlorine wastes, the "Vulcanus" is capable of flame temperatures of at least 1360 to 1560° C, and of excess air levels of 25-100%.

6 / The most obvious environmental impact parameter to monitor for a herbicide as potent as Agent Orange is toxicity to marine phytoplankton. Thus, data presented at EIS, pp. 55, 56, indicate that phenoxy herbicide concentrations of 50 to 300 ppm caused a 50% reduction in growth of unicellular marine algae, and certain 2,4,-D derivatives caused up to a 49% decrease in CO_2 fixation by phytoplankton. Radioactive carbon (C^{14}) uptake studies would be expected to afford te greatest measurement sensitivity. We recommend that monitoring of the incineration operation include studies of impact on photosynthetic productivity by the C^{14} uptake method.

Appendix I.

The Effects of 2,4-D, 2,4,5-T and Their Contaminants on the Developing Chicken Embryo.

M. Jacqueline Verrett, Ph.D.
Reproductive Physiology Branch
Division of Toxicology/ADS
Bureau of Foods
Food and Drug Administration

TABLE 1

Effects of 2,4-D and 2,4,5-T

on Developing Chicken Embryos

	LD-50 (mg/egg)		LD-50 (mg/egg)	LD-50 (mg/egg)
	Mortality vs Dose		One or More Abnormalities vs Dose	Two or More Abnormalities vs Dose
	Treatment at		Treatment at	Treatment at
Compound	0 Hours	96 Hours	0 Hours	0 Hours
2,4-D (Impure)	*	0.189	2.83	793.5
2,4-D (Purified)	**	0.593	1.46	3.992
2,4,5-T (Impure)	0.113	0.0488	**	234.2
2,4,5-T (Regular)	11.37	0.403	5.25	6661.2
2,4,5-T (Purified)	*	0.467	2.50	**

* Slope of line is negative

**Slope of line is not significantly different from zero p=0.05

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

February 18, 1975

Dear Mr. Kamlet:

In our conversation last week, I mentioned that I would address your three questions in writing. I have attempted to answer these questions in a straight-forward manner; however, as you know from reading our impact statement, much more technical data is available.

We expect to have our technical personnel in town this week; and should you want further explanation, I am sure a meeting can be arranged.

Sincerely,

William E. Mahoney, Lt Col.
for BILLY E. WELCH, Ph.D.
Special Assistant for
Environmental Quality

Enclosures-3

Mr. Kenneth Kamlet
Resources for Defense
National Wildlife Federation
Room 220
1412 16th Street, N. W.
Washington, D. C. 20036

In the development of effective herbicides for tactical purposes, research was conducted over a period of many years. As an example, over 26,000 chemical compounds, including every herbicide that had been marketed up to about 1969 in the U. S., as well as many from foreign sources, were evaluated. These evaluations did include various forms of 2,4-D and 2,4,5-T. However, we can find no evidence that 2,4-D and 2,4,5-T were separately used in operational systems for tactical purposes.

ATTACHMENT #1

Incineration or combustion, in the sense we are discussing it, is a form of rapid oxidation. When we burn common fuels consisting of carbon and hydrogen in various combinations, we can, in theory, obtain complete combustion, producing combustion products consisting of carbon dioxide (CO_2) and water (H_2O). Usually, however, the combustion is not 100% complete. In this case, a breakdown of the fuel will occur, and a partial chemical reaction takes place; i.e., the carbon was released from the fuel to combine with oxygen to form carbon monoxide or pyrolyzates of the original material. It is thus often confusing to refer to a combustion process in terms of efficiency, though it is useful to do so for calculation purposes.

In the case of Herbicide Orange, the hydrocarbon has had chlorine added. The products of combustion will, in theory, be CO_2, H_2O and HCL. Here, too, the combustion will be less than 100% complete, even though we do expect the molecules of Orange to be broken down. Some CO will be formed; and, when the molecule is not completely broken down, various forms of the basic constituents will result. In our case, something other than Herbicide Orange will result, as evidenced by the data reported in the environmental impact statement.

Although Herbicide Orange is a 50/50 mixture of 2,4-D and 2,4,5-T, it is not likely that the same type of breakdown will

occur in the molecules of both the 2,4-D and the 2,4,5-T. We really cannot comment further on this, since our results did not show either 2,4-D or 2,4,5-T in the combustion gas.

Even if some form of 2,4-D and 2,4,5-T were to emerge from the stack, they would not be, in all probability, in a one to one ratio nor could one call the gaseous effluent of these products Herbicide Orange.

There were two studies conducted by the Marquardt Company. The first study in 1972 determined that use of the SUE burner to destroy Herbicide Orange was feasible, but the proper operating parameters to insure efficient combustion were not determined. In the follow-on study (reported in Appendix E), it was determined that Herbicide Orange can be effectively and safely destroyed. Acceptable operating parameters were selected as: measured combustion chamber temperatures of 2400°-2800°F; dwell time equal to or greater than 0.14 seconds; fuel-to-air mass ratio of about 0.1; and excess air greater than 30%. For a system operating within these parameters, it was determined in the test program that the combustion gas is free of Herbicide esters, acids and TCDD at the detection limit for each compound.

The amount of material in the combustion gas stream that can be detected depends on the ability of the analytical instrumentation to see a certain amount of the material and the length of time a sample of the combustion gas is collected.

The amount of material which would have to be injected into the analytical instrumentation was determined (see Page E-G-2). It was found in the case of dioxin that the injected sample must contain at least 22 nanograms in order to be detected. If one liter of combustion gas was collected and if

it contained 22 nanograms, the instrumentation would detect the dioxin, and we would report the concentration in the combustion gas as 22 nanograms per liter. If the concentration in the gas stream was only 11 nanograms per liter, then two liters of the combustion gas would have to be sampled to collect 22 nanograms and so on. Since we do not know in advance what the concentration is likely to be, we draw the combustion air through our sampler for a long enough period of time to hopefully accumulate enough material for it to be detectable. The actual concentration per liter of combustion air which would have to be present to be detected can then be calculated.

As an example, from Table D-4, Page E-(D-23) select Run IV for the Combustion Gas and find that a sample was collected for 60 minutes at a rate of 4.17 liters per minute (column headed STP). Thus a total of 250.2 liters of combustion gas was passed through our sampler. Our detectable level in the analytical instrumentation is 22 nanograms. By dividing the analytical detectable limit (22) by the total number of liters collected (250.2), we can determine that the concentration of TCDD in the combustion gas would have to be 0.087 nanogram/liter to be detected. This is the lower detectable limit shown for dioxin in Table G-2, Page E-(G-13), but rounded to 0.09. This means that, if the concentration of TCDD in the combustion gas was

0.09 nanograms per liter, by collecting 250.2 liters, we can accumulate 22 nanograms for injection into our instruments, and it would be detected.

CHAIRMAN BIGLANE: Ken, thank you for your usual well researched statement.

Mrs. Nancy Shower (phonetic) of the Center for Law and Social Policy has indicated her intention to make a formal statement.

STATEMENT OF MRS. NANCY SHOWER, CENTER FOR LAW AND SOCIAL POLICY

MRS. SHOWER: I am Nancy Shower from the Center for Law and Social Policy. As Dr. Welsh mentioned earlier, he has heard comments from our Center, from Dick Frank, who unfortunately is unable to be here today. I would like to make a brief statement.

It is our considered opinion that the concerns of the Ocean Dumping Law should be focused on what comes out of the incinerator, rather than what goes into the incinerator. It is our position that Herbicide Orange, after incineration, does not retain the chemical or biologic warfare characteristic. With that regard we support the Air Force's environmental impact statement.

Thank you.

CHAIRMAN BIGLANE: Mr. Donald D. Carruth, representing the American Eagle Foundation, has indicated he wishes to make a statement.

STATEMENT OF DONALD D. CARRUTH, PRESIDENT, AMERICAN EAGLE FOUNDATION

MR. CARRUTH: Mr. Chairman, ladies and gentlemen, my name is Donald D. Carruth, President of the American Eagle Foundation in Rosslyn, Virginia. I do not have by intention a written, prepared statement for presentation today. Our statement will come to you prior to March 5.

I would like to say, however, in support of the two witnesses, Mr. Kamlet and Miss Nancy Shower, that we feel and have reason, good reason to feel, that incineration of Herbicide Orange should be given reasonable consideration by EPA as it relates to the issuance of the required type permit for the destruction of Herbicide Orange.

We say this on the basis that after careful review of both the April 1974 publication of the revised draft of the environmental impact statement relating to the destruction of Herbicide Orange by incineration and also the formal EIS statement that went to the Council on Environmental Quality, that there appears to us to be a justifiable basis for the destruction of this Herbicide Orange, particularly if it is found that reformulation does not produce the results that are intended to be reached through the reformulation process.

It is also my understanding that the chemical companies, four chemical companies, have some degree of

1 reluctance to attempt the reformulation on their own, or the
2 recycling of Agent Orange, per se.
3 I would also like to state that there was a real
4 degree of concern on a large number of people, by a large
5 number of people, as it related to the monitoring of the first
6 two shiploads of Shell chemical Company's waste produced at
7 the Deer Park facility of the Shell Chemical complex. Exten-
8 sive monitoring under the jurisdiction of the EPA, which was
9 supported by at least seven major areas of interest as to the
10 determination as to what really was coming out of the stacks
11 and what potentially was the environmental degradation on the
12 marine environment, was of extreme interest to an awful lot
13 of people, particularly those in the Gulf area.
14 Further, I would like to say that EPA has done a
15 very fine job of overseeing and coordinating the monitoring
16 of these first two shiploads of Shell Chemical Company waste
17 by the motor vessel "Volcanus."
18 Some of you have attended the conference that was
19 held on February 3, 4, and 5, at the Mayflower Hotel here in
20 the city, having to do with the general subject relating to
21 the treatment or disposal of various types of chemical waste
22 waters. I will include a copy of that presentation that I
23 made along with our formal comments to be submitted to you
24 prior to March 5.
25 Thank you.

CHAIRMAN BIGLANE: Thank you, Mr. Carruth.

Now, are there individuals or other groups who would like to make a formal statement at this time? If so, I would like to see your hands.

Seeing no other person, then, are there those who wish to ask clarifying questions at this time?

Ken Kamlet.

MR. KAMLET: The environmental impact statement indicated that there are viscosity problems with the Agent Orange. At low temperatures, below 90° F. there are problems injecting this material into the incinerator, and as you increase the pre-heat temperature prior to injection, you improve both the efficiency of injection and also the efficiency of incineration.

I would like to ask the Air Force people, representatives of the corporations, or EPA, anyone who is familiar with the situation, whether ambient air temperatures off Johnston Island at the time the disposal operation would take place are such that one would anticipate that the temperature of the fuel, the herbicide fuel prior to injection, would be expected to exceed 90°, and whether pre-heaters could be installed to further elevate that temperature to say 175°, if that were determined to be desirable?

CHAIRMAN BIGLANE: Fine. Dr. Welsh, would you like to answer that?

1 DR. WELSH: I can start that. No. 1, you have to
2 keep in mind that in the work we were doing in the impact
3 statement, the ambient air temperature in Los Angeles was
4 about 56 or 55 degrees F. as I recall. We would not antici-
5 pate the ambient air temperature or the ocean temperature at
6 Johnston Island would exceed 90°. It would be in the range
7 of 82 to 84, something like that, at that particular point in
8 time.
9 Now, I can't answer whether or not had the tempera-
10 ture in LA been 82, we would have felt the need to heat this
11 stuff. This stuff solidifies something on the order of 45°F.
12 MR. KAMLET: Could a pre-heater be installed, were
13 one considered necessary?
14 DR. WELSH: I can't answer a particular question
15 like that.
16 MR. KAMLET: Do you know what type of injection
17 nozzle is present on the ship, and whether the nozzle compares
18 favorably with the type of nozzle that was found to give the
19 best results in the studies reported in the impact statements?
20 DR. WELSH: Our people would look at the type of
21 system they had for introducing the contaminant. We had
22 people that would drive out and take care of these details.
23 It was their professional opinion this would handle the type
24 of material we are talking about, the type of viscosity
25 involved.

CHAIRMAN BIGLANE: Could you speak up, Doctor?

DR. WELSH: My apologies.

MR. KAMLET: I would suggest, Mr. Biglane, you look into those questions further before making the final decision.

CHAIRMAN BIGLANE: Thank you.

Yes? Could you step to the lectern and give your name?

MR. MITCHELL: My name is William Mitchell. I am President of a chemical company in Newark, New Jersey, being formally owned by Diamond Shamrock, one of the original producers of the defoliant Orange.

My question is, does this application and the intent or purpose of this meeting preclude any future or further interest in the recycling of the product?

My company at its own expense has developed a process for the reclamation of the product, reformulating it into usable and much needed raw materials to go back into the production of food for this country and other countries.

In summary my question is, is the current consideration precluding further consideration of recycling?

MR. JOHNSON: I believe the points in my opening remarks were we at EPA would like to consider further recycling. We cannot evaluate recycling without additional information over and above what we currently have. We cannot

order the Air Force to go into a recycling mode. The initiative to do it would have to come from the Air Force.

MR. MITCHELL: Thank you very much. I did not get your opening remarks, due to being tardy.

MR. ROGERS: Would you take a few questions?

MR. MITCHELL: If I could.

MR. ROGERS: Would you mind telling us the name of your company?

MR. MITCHELL: The name of the company is Chemicland Corporation, 80 Lister Avenue, Newark, New Jersey. I am President and owner of that company.

MR. ROGERS: Your company was one of the original manufacturers of what exact chemical?

MR. MITCHELL: This plant was owned by Diamond Alkali. I acquired this facility in 1971. I converted a portion of the facility to the manufacture of alcohol. We have a distillation unit which lends itself to this conversion. The plant is still basically 2,4,-D producing unit, which has been reactivated.

MR. ROGERS: When you said you have a process for reformulating the product, what would be the product of the reformulation process?

MR. MITCHELL: The end product would be a formulation utilizing the sodium salts of 2,4,-D and 2,4,5,-T, which would come from the reclamation. This would be used

1 primarily as a brush killer.

2 Now, this would be normally decontaminated of

3 dioxin due to our process.

4 MR. ROGERS: Would you have a dioxin residue?

5 MR. MITCHELL: No, sir.

6 Based on our research, which started prior to July

7 of 1974, has fairly well established to our satisfaction

8 that the dioxin content can be reduced, certainly to accept-

9 able standards, established by the EPA or the Air Force.

10 MR. ROGERS: Would you be able to reprocess in

11 quantity terms the entire amount of herbicide Orange?

12 MR. MITCHELL: Yes. We would expect it would take

13 us two years to carry out this reprocessing, in addition to

14 our normal production of 2,4,-D.

15 MR. ROGERS: You would have no waste product from

16 that reprocessing?

17 MR. MITCHELL: No, sir.

18 MR. ROGERS: I take it there is a market for your

19 end product, or you would not be interested in it?

20 MR. MITCHELL: There is an extreme shortage in the

21 world today of 2,4,-D, particularly, and 2,4,5,-T products.

22 In the United States today, Dow Chemical Company is

23 the major producer of 2,4,-D. My plant has the capacity, we

24 aren't up to full capacity; my plant has the capacity of

25 being the second largest producer of 2,4,-D in the United

States. Transvalve, in Jacksonville, Arkansas, has a capacity of eight million pounds, which would make them No. 3. And Chipman is in the business. I am not aware of their capacity. That is the extent of the capacity, to my knowledge, in the country.

Now, the overseas demand is dire. The demand is such that our production is sold out for 1975. Now, the industry last year experienced critical shortages of raw material going into the make-up of 2,4,-D. Basically, it is chlorine, caustic, and acetic acid. There has been some relief in these raw materials this year. We don't know how long the raw materials will be available. We feel very strongly against the destruction of approximately 23 million pounds of raw materials which could be reprocessed into a usable product which would go towards the production of food.

MR. ROGERS: Mr. Mitchell, just one or two final questions, if I may.

In your end product, would it be possible to segregate the usable chemicals into products containing 2,4,-D and products containing 2,4,5,-T?

MR. MITCHELL: It is possible. We have accomplished this, but this is not economically feasible, frankly. It is possible, to answer your question. Further, a study on our part and the markets might change the economic feasibility of breaking the ingredients down.

MR. ROGERS: Thank you.

MR. JOHNSON: Have you made known to the Air Force the details of your process and what your expectations would be with respect to the composition of the final materials?

MR. MITCHELL: We have had the cooperation of Dr. Welsh, as well as his staff. We have been in communications with them as recently as last Wednesday. We have not disclosed to Dr. Welsh or his staff the details of our process which we consider proprietary. We would expect at some point in time, if our interest could be brought to fruition, that we would make full disclosures. But bear in mind that all of this development work has been done essentially by a small business with its own resources.

I would compliment Dr. Welsh and his staff on the cooperation they have given us, and we hope to continue to work with and towards a positive goal rather than a negative goal of the destruction of the material.

Now, I would like to again go on record and repeat what was stated to Dr. Welsh last week as to my company's position, and that is that we are confident that we can recycle the material. We are not so confident as many other small businesses are or are not today that we could be restricted by severe regulations unduly imposed.

We have to operate for a profit. Our proposition would return a profit to the Air Force so that there would be

a recovery to them, but the monitoring and the amount of public meetings and so forth and red tape involved could preclude our interest in this project which could cost the government the loss of considerable amounts of money, as well as loss of valuable raw materials going into an incinerator.

MR. KAMLET: May I ask Mr. Mitchell one question: You indicated that the dioxin levels would be reduced to what you felt were acceptable levels. Could you indicate for us more specifically what those levels would be?

MR. MITCHELL: I believe the impact statement refers to a safe level of 1/10 part per million. We are quite confident that we can totally eliminate that. I only want to leave myself a little margin for human error. It is possible by our process -- as a matter of fact, there are references in the impact study, which would support our findings. I am not going to give you those particular references, because I might have a competitor in the audience, but it is possible to completely destroy the dioxin content in the material. It would leave no residue.

CHAIRMAN BIGLANE: We have one question from the floor. Stephany Harris from the Health Research Group.

MS. HARRIS: I would like to know from Mr. Mitchell is it economically feasible to completely destroy the dioxin content?

And secondly, what will happen to it? Will it be

converted, and will it be a waste product? If it is a waste product, what will be done to it?

I would like to ask Mr. Johnson, he said the dioxin could be removed and dealt with. Could he explain that? To what levels and what does he mean by "dealt with."

CHAIRMAN BIGLANE: The young lady had three questions. Did you get the first two?

MR. MITCHELL: I will try to answer it with one answer. It is economically feasible to elaborate without the restrictions and red tape, just from a manufacturing point of view, it is quite feasible.

Secondly, the dioxin is totally decomposed. There is no residual using our process. And here again, there are references in the impact statement which would verify what I am telling you.

CHAIRMAN BIGLANE: Are there further questions for Mr. Mitchell before he leaves the lectern? We will get to Mr. Johnson later.

VOICE: You mentioned who the leading companies were --

CHAIRMAN BIGLANE: Would you give your name?

MS. HINGLE: Maureen Hingle from the Environment Defense Fund. You mentioned the capacities of Dow, and you have the capacity to be No. 2. Could you tell me what your current capacity is in production of the 2,4,-D?

MR. MITCHELL: The capacity of the plant is 12 million pounds. We have not reached our full output capacity. We have a capability to expand to 20 million pounds which is being studied at this time.

MS. HINGLE: How long would it take you to reprocess the amount that is now stored?

MR. MITCHELL: I think I mentioned a time element of two years. Now, we have such warehouse space in Newark, that if it would assist in the program, we could store or transfer the storage at Gulfport to our location. We would have to -- we also are on the Snake River. I have half a million gallons of bulk storage. We could accommodate some of the bulk material from Johnston Island, but only to the extent of half a million gallons at one time.

This is something that we only touched on with Dr. Welsh. We could program this and that was our least consideration. The time element would be about two years.

MS. HINGLE: Does the economic feasibility also take into account the fact that Agent Orange has to be debarreled and transported from Johnston Island to your facility?

MR. MITCHELL: As I mentioned, we have bulk handling capabilities, up to half a million gallons. I think in the final impact report it seemed feasible due to deterioration of the drums on Johnston Island to dedrum at that point and ship it in bulk, or even take it to sea by the ship in bulk.

Now, the end products which we would produce from the active ingredients would namely be sold in bulk, so we would not have the redrumming problem. But that is really tactical and one of the lesser problems. We felt that we had -- that is by "we," I have a staff of three Ph.D.'s who have done the work. I am in marketing myself. I can take no credit for this development. But in being able to totally eliminate the TCDD we think is a significant accomplishment.

MS. HINGLE: I am not clear about how much of the material is there on Johnston Island and Gulfport, Mississippi, you would be able to handle immediately. I understand one of the problems in the disposal of all of this is the immediacy of action.

MR. MITCHELL: This is something that would require further discussion with Dr. Welsh and his staff on my part. We have not reached that point in our discussions.

CHAIRMAN BIGLANE: Now we still have a question outstanding for Mr. Johnson. Could you repeat the question?

Thank you, Mr. Mitchell, thank you very much.

MR. JOHNSON: The question as I understand it, I used the terminology regarding dioxin removed or otherwise dealt with.

We currently register pesticide products which contain less than 0.1 parts per million TCDD in the technical material. And by reducing, or removed, I would mean down to

that level or below by the process. By "dealt with, this actually means a couple of things. One is if you end up at the end of the process with a pot full of TCDD, what kind of method is available for handling this in an environmentally satisfactory manner. "Dealt with" means actually changing the molecular structures. So the TCDD no longer exists but is converted into other materials.

CHAIRMAN BIGLANE: I think we ought to take a break at about this point. Could I see the hands of those who would want to ask questions after the break?

There are half a dozen. So, why don't we take a break at this point and reassemble at 11:00.

end #2

(Short recess)

#3 BC/eh

CHAIRMAN BIGLANE: Ladies and gentlemen, if we could reassemble, please? 11:00 o'clock.

Continuing now with our clarifying question session, Mr. Kamlet has raised his hand. Ken, would you come to the lectern, please?

MR. KAMLET: I have a couple of questions for Mr. Johnson, whom I can no longer see.

The first is, can you clarify for the record what, if any, restrictions presently exist on the domestic use of 2,4,-D?

And secondly, you indicated in your introductory remarks that EPA is familiar in a general way with processes

for the reformulation and reprocessing of Agent Orange. Could you indicate for the record in somewhat greater detail what types of processes you are thinking about?

MR. JOHNSON: With respect to special restrictions on the 2,4,-D, I am not aware of any. It is registered for fairly general herbicide use. It is registered for weed control on ditch banks. The one use which has been sought and so far there is not a registration on that use, but there has been Section 18 emergency use control, is control of the water hyacinth in navigable waters. I don't know of any restrictions put on 2,4,-D because of environmental reasons.

I am not a chemist and I would be hard pressed to try to describe these processes, but they are basically processes that would change the molecular structure and would either separate out various components or transform them into products as much as the ones I mentioned, such as chlorine or phosgene or carbontetrachloride.

There are three processes that end up with different byproducts. One ends up with 2,4,-D, and a dioxin containing waste residue which would have to be disposed of. We would be concerned with that. The other two processes do not end up with TCDD as an end product in any of the streams.

MR. KAMLET: I wonder if it might not be helpful if Paul DesRosiers could describe a process he ran through for me that sounded very interesting for the benefit

of people in the audience who might have helpful comments to make on it.

CHAIRMAN BIGLANE: Mr. DesRosiers, would you care to step to the lectern?

MR. DES ROSIERS: Yes, I have been nominated. I am not prepared for this statement, but I will see if I can do a good job so that everybody can understand what I am about to say.

To recap a little history, the Air Force through an interagency agreement with EPA, the Office of Research and Development, transferred $45,000 in 1972, to allow us to mutually investigate the possibilities of converting Orange to useful products. This technology at that time was bench scale and entailed the use of high temperature-high pressure chlorination to chemically convert via an oxidated means Orange to useful and marketable products: Namely, carbon-tetrachloride, carbonyl chloride, or phosgene, and hydrogen chloride.

The studies were performed by Diamond Shamrock Corporation in Painesville, Ohio. A final report was issued and submitted to the Air Force, the title being "Study of Feasibility of Herbicide Orange Chlorinalysis."

Now, bear in mind that the date is July of '74. The work was done in late '72 and early '73. A marketing study was also done at this time based on a 1972 value of

those products. And at that time the conclusion was reached that it would be a high risk for the Air Force in conjunction with a company, a selected company, to go about and convert this into useful products, mainly because of the prices for these commodities.

However, since then, the marketing possibilities have changed substantially. For example, carbontetrachloride in 1972 had a value of $90 a ton. It now is worth $320 a ton. Carbonylchloride had a market value in those days of zero to $200 a ton, zero being if there was no market and it had to be neutralized, $200 a ton if it was favorable. It is now in short supply and is worth $400 a ton. Hydrogen chloride had an even more unusual valuation in the 1972 period, being worth minus $30 a ton through zero, to plus $30 a ton. The minus $30 a ton would be a cost of neutralizing HCl. The zero would be the cost of giving it to somebody free, and the $30 a ton would be the value if it were marketable.

Now, the two options presented in the report were:

(1) Total chlorinalysis, the term used by Diamond Shamrock for this technique. This was the most expensive option which would have converted all of the 2,4,-D, 2,4,5,-T and dioxin into useful products with total destruction below the detectable limit in the products of dioxin.

Detectable limit for this material at that time was 10 parts per trillion. The analyses were performed by

1 Dr. Kearny and Associates in Beltsville, Maryland. The toxi-
2 cological studies on carbontetrachloride were conducted by
3 the EPA at our Georgia lab.
4 The carbontet in this case was found to contain no
5 detectable dioxin from a toxicological point of view.
6 Now, that was one of the options. The second option
7 was even a more preferred option because it entailed the
8 distillation, simple distillation, with off-the-shelf tech-
9 nology of 2,4,-D ester. Let me see if I can give an indica-
10 tion. We have a distillation column and 2,4,-D weighs less
11 than 2,4,5,-T or dioxin. Therefore, it will come off as an
12 overhead and be condensed out. It contained no dioxin down
13 to the detectable limit of one part per billion. This is
14 substantially less than the 0.1 parts per million that the
15 EPA has set as the limit for dioxin.
16 Now, the bottoms contained 2,4,-D ester that was
17 not totally sent to the top of the still, all of the 2,4,5,-T
18 and all of the dioxin. Now, the idea behind this was to
19 market the 2,4,-D ester, which has a market value of $950 to
20 $1000 a ton. The remaining mix, the bottoms, would then be
21 chlorylized into useful products.
22 Again, I have to emphasize the 1972 figures for
23 these products made it a high risk situation for a company to
24 go this route. However, again, as I mentioned, the prices
25 have gone up. Let me just state a few numbers for you to

1 masticate in your mind.

2 If we take 2.26 million gallons of Orange, the
3 entire stockpile, distill it, we will essentially get 40
4 percent of the 2,4,-D off as an overhead. This is approxi-
5 mately 9-1/2 million pounds of 2,4,-D ester. That $950 a
6 ton, we are talking of roughly $4.5 million of material that
7 is ready for the market place. It won't be deposited in one
8 day, obviously.

9 Now, we will then have 60 percent of the material
10 or 14.3 million pounds of a mixture of all of the 2,4,5,-T,
11 some of the 2,4,-D, and all of the dioxin. This 14.3 million
12 pounds is equivalent to 7,200 tons. To this 7,200 tons of
13 mixture containing the dioxin we then must add 46,000 tons
14 of chlorine at a cost of $120 per ton, or a cost of $5.5 mil-
15 lion.

16 Now, we produce through this chlorinalysis 34,000
17 tons of carbontetrachloride at $300 a ton, is $10.2 million.
18 We produce 12,000 tons of HCl, at $60 a ton, or $724,000.
19 We produce carbonylchloride at 7250 tons times $400 per ton,
20 or $2.9 million.

21 Now, summing up the plusses, including the 2,4,-D
22 ester, we have approximately $18.3 million worth of material
23 that is available into the market place. Subtract from that
24 the cost of chlorine, and again I am talking about only
25 materials here, chemicals. We have a net available credit of

1 $12.8 million.

2 Now, what size plant are we talking about? For

3 purposes of discussion, I have come up with a 12-1/2 ton per

4 day plant based on feed stock Orange. This will take approxi-

5 mately two years to chloralyze the material.

6 That is my presentation. Any questions, please?

7 MISS HARRIS: As far as you know, is there enough

8 chlorine available today for total chlorinalysis, and is

9 there enough chlorine available for the partial chlorinalysis?

10 MR. DES ROSIERS: As far as I am concerned, we

11 should put aside the total chlorinalysis. This is my personal

12 opinion only.

13 There are 10 chlorine plants coming into production

14 between last November and say this time next year. Right now

15 I would say the market is very close to being fulfilled with

16 chlorine and it will be a glut on the market by some five or

17 six percent this time next year.

18 Therefore, that $120 per ton figure I quoted you

19 will go down. Therefore, we will have more credit. Again,

20 remember this plant isn't going to be put on the spot in a

21 week. It is going to take maybe a year or two to build,

22 probably two years knowing the way things are going in the

23 construction field today.

24 I have to emphasize the prelimination investigations

25 were done by -- I think personally the top dioxin expert in

the world, Dr. Kearny and Dr. Wilson and Associates at USDA.

They were done by a third party, not EPA.

MISS HARRIS: I would like to know about the marketability of the 2,4,-D ester. As far as you know, is the market fulfilled in the United States right now? Would there be a market for 2,4,-D in the United States, or would it have to be exported?

MR. DES ROSIERS: I leave that to the expert. I think he stated there was a market for 2,4,-D in this country. The market will change slightly next year with another plant coming on stream, but this is again not going to appear instantaneously on the market.

CHAIRMAN BIGLANE: Any further questions?

If not, thank you very much, Paul.

Are there additional questions?

DR. WELSH: I am Dr. Welsh, I feel that by way of clarification regarding Mr. DesRosiers' comments on chlorinalysis, I should state this: As he indicated, the Air Force did fund the studies carried out by Diamond Shamrock and we indeed were very much interested in the potential that this would hold. And we would agree with the EPA in a recent press release they put out that speaks of this as an "emerging technology." We think it is an emerging technology, but it is easy to say we will build a plant for 12-1/2 tons or 25 tons or 50 tons or what have you and we get all these grand, glorious sums of money coming back out of it. We had

Dr. Porter, a consulting engineer with us, who visited the Diamond Shamrock facility, went over the cost figures, and granted that the price of raw materials has gone up and the price of the output has gone up, the cost of construction has also gone up. At that particular point in time, which was some year and a half or so ago, you get uncertainties that say that if you do this, you might make a couple of million bucks, or it might cost you $10 million.

It seems to me that is sort of a rather broad swing of uncertainty to utilize when you are trying to solve a problem. My experience has been with that type of uncertainty you create a problem quicker than you solve it.

So that is where we currently think we are relative to the chlorinalysis question.

CHAIRMAN BIGLANE: Dr. Welsh, would you entertain a question?

MR. JOHNSON: I got the impression, Dr. Welsh, there was still some interest last November perhaps in commercial chemical reprocessing of the Herbicide Orange, based on some of the correspondence between EPA and the Air Force. We responded in January to that particular request with an indication that we would consider chemical reprocessing to be disposed under Section 19, providing certain conditions were met and so forth. It was indicated that you might go out to companies other than the manufacturers. You indicated earlier

you had gone to the original manufacturers and they expressed no interest in taking the material back. But there was, several months ago at least, some interest in going out and asking other companies if they would be interested in undertaking this on a commercial basis.

I understand perhaps there are some companies that have equipment in place which could be used for this. That is an understanding I have which is not founded in first-hand information.

Would you care to comment on your intentions to go forward with asking for expressions of interest from commercial companies and any evidence you might have about the presence or absence of existing facilities vis-a-vis a new plant type operation?

end #3
end eh

rd-23

1 DR. WELSH: I would be pleased to comment, before
2 I start, I would like to get something cleared in my mind
3 regarding your last point vis-a-vis facilities in place.
4 MR. JOHNSON: I have heard and I admit it is
5 hearsay evidence that there are facilities currently being
6 opened by some chemical companies who might be interested
7 in chemichally reprocessing this material, whereas your
8 earlier comments were directed to the need for constructing
9 an absolutely new facility. I was wondering if there were
10 facilities to your knowledge that were available, or if
11 it would require the construction of a new facility/
12 DR. WELSH: I think it depends on how you define
13 chemical reformulation. If you define it in terms of the
14 complete chlorinization of the molecule, I don't know of
15 any facilities in this country that exist. If, as documented
16 in the statement, we provided material to EPA to evaluate
17 and determine plant. It is my understanding from the
18 informal conversations of the results back to us that due
19 to the presence of the oxygen in the Herbicide Orange
20 molecule, they got end production containing carbon dioxide
21 as well as the carbon tetrochloride, and they also had
22 problems with potentially increased corrosion inside the
23 facility. We have not seen the final results on that.
24 As far as concerns of having equipment in place
25 or under construction right now, to my knowledge no one does.

rd-24

1 If you speak of reformulation in terms of perhaps converting
2 the material from its ester form to acid form, perhaps
3 separating the "D" and the "T" from each other, I would say
4 probably there are facilities in being to do that.
5 Our intent, as we have indicated for some time,
6 is to dispose of the Herbicide Orange either by destruction
7 or by use. We went to the EPA sometime back, and time gets
8 away from one, but some time longer than a year ago, about
9 the potential of registration. At that point in time it
10 seemed that was not a logical thing to pursue, due to the
11 concern that was being expressed over 2,4,5-T.
12 Following the cancellation of the public hearings
13 last summer, we came back to you people to discuss this
14 matter further and arrived at a position that it seemed
15 that reformulation offered the best opportunity of a use
16 option, reformulation or reprocessing.
17 So, we currently are still in that particular
18 mode, that reformulation is, in our minds, a potentially
19 viable option. But I must say that we do not feel that
20 we have the luxury nor should we have the requirement to
21 study the problem for another two years. We think we have
22 studied it to the extent that a reasonable man would study
23 the problem, and that we have, we feel, reasonable solutions
24 that are available to us now.
25 MR. ROGERS: I have one question. Do your

rd-25

1 general remarks apply equally well to the comments of Mr.
2 Mitchell this morning, or do you have any specific com-
3 ments you would like to make as to his presentation?
4 DR. WELSH: We have had comments with Mr. Mitchell,
5 as well as other members of the chemical industry about
6 their potential interest and capabilities in handling this
7 problem. Our general approach to this is that, number 1,
8 it is a free country and anybody that has a way that he
9 thinks he can solve the problem and make a buck in the
10 process of doing it is welcome to talk with us, is welcome
11 to take whatever action they choose to take on a unilateral
12 basis. One of the great things about our particular
13 country is this. We have not, I stress, seen Mr. Mitchell's
14 detailed proposals, nor anyone else's detailed proporsals.
15 We have not seen sufficient data from anyone at this point
16 in time that we would say that what they can do, they
17 indeed can prove that they can do. I am not casting doubts
18 on the integrity of Mr. Mitchell at all. I don't mean it
19 that way.
20 It is just that I think before one can reach a
21 conclusion that that mystic process is a good one or John
22 Doe Chemical Company's process is a good one, you have to
23 look at the numbers in black and white, what came in, where
24 it went, how you act for it. We have not felt it appropri-
25 ate to ask Mr. Mitchell to tell us that yet.

rd-26

1 MR. ROGERS: Why?

2 DR. WELSH: Very simply, we have not from a pro-
3 curement point of view gone out to the industry and said,
4 "Hey, the EPA has taken a position thus and so. Now we
5 would like you to tell us what you, if anything, could do
6 with the particular product." We have not gone through
7 the tortuous path yet of implementing results of your
8 January 21 response to our November 18, or whatever it was,
9 letter.

10 MR. JOHNSON: Do you have any plans to implement
11 that response?

12 DR. WELSH: Well, yes, very definitely. It is
13 our desire to find out if there is interest, if it is tech-
14 nically and scientifically valid interest, and that if we
15 can arrive at this being one of the potential solutions to
16 the problem.

17 MR. ROGERS: That being the case, do you foresee
18 or would you anticipate that EPA would actively further
19 process your ocean disposal application, or would you
20 suggest that we defer that for a moment while you review
21 possible alternatives?

22 DR. WELSH: Let me just say that based upon past
23 experience and history, I would sincerely hope you would
24 actively pursue the ocean dumping permit incineration
25 question simultaneously with pursuing the question of

rd-27

1 potential use.

2 CHAIRMAN: BIGLANE: Are there further inquiries

3 of Dr. Welsh?

4 DR. ENOS: You have indicated that you would like

5 the Environmental Protection Agency to pursue the possibility

6 of issuance of a license for at sea incineration. I wonder

7 since you heard earlier today some concern expressed about

8 the monitoring for various effluents from the stackgases

9 on the Vulcanis, if you would tell us something about your

10 evaluation of the incineration process albeit at the

11 laboratory level, for the determination of residues of 2,4-D

12 and 2,4,5-T, with specific reference to the efficiency of

13 such monitoring systems?

14 DR. WELSH: Well, number one, I don't think I

15 ought to try to answer that myself, Dr. Enos. We have some

16 people in the audience that might want to take it on. They

17 have been working on the problem. I am looking for one of

18 them to volunteer by raising their hand. They are all

19 sitting on them at the present time.

20 Let me start and when I get it sort of bollixed

21 up, they will be emabarassed and come to my rescue.

22 As you recall from reading the Impact Statement,

23 we developed a monitoring train to apply in the studies we

24 carried out in conjunction with the Marguardt Company.

25 This particular monitoring train used benzine as I recall

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1 and it consisted of maybe three sequential traps, four --

2 I found a guy to help. John Kogelman.

3 MR. KOGELMAN: We developed a sampling train

4 based on the standard EPA train because you go into a

5 stack using four sequential impingers containing 250

6 milimeters of benzine. We tested this in the laboratory

7 for 2,4-D and 2,4,5-T and found we had essentially 100

8 percent collection efficiencies. In fact, we collected

9 most of it in the first two impingers. We modified the

10 impingers to be bubblers, because we found out with the

11 standard impingers our efficiencies dropped. We did not

12 evaluate our train for the CDD because our chemists felt

13 the similarity of the CDD to the other two constituents,

14 because the similarities to antizene, which was soluble in

15 benzine, would insure that the CDD was trapped in the train

16 along with the two major constituents of Orange.

17 In the lab, like I said, we found essentially

18 100 percent collection efficiency with the train. When

19 used in the field we found no problems with it at all. This

20 is the monitoring train we developed based on the work done

21 at the Kelly Lab using benzine as the collection media.

22 DR. ENOS: What would be the difficulty to

23 adapting that particular train to a monitoring problem

24 on board the Vulcanis?

25 MR. KOGELMAN: Problems on the ship, we think we

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could use the benzine train as a train. The obvious problem on the ship is getting from the train to the stacks. The excessive heat, the hot stacks, the acid environment existing inside the stack itelf, has an effect on the problems we would have to use. We would have to go to a water-cooled process.

Talking to the Shell people, and looking at the ship itself, we have a 50 foot run of line. You have to go from the stack to the first suitable environment before you could set up the train, so that you could actively watch the train and keep your instruments from coming apart. We would have a 40 foot line to be heated because of the possibilities of losing condensation in the line. We have an acid environment that would have to be scrubbed out. The biggest problem would be the measurement of the flow coming out of the stack because of the unusual angle of the porthole, plus the cruel and vicious environment that exists inside the stack. The problems are getting from the train to the stack itself more than environmental.

CHAIRMAN BIGLANE: Thank you very much.

Are there other questions?

Yes, would you please come to the lectern?

MR. BROWN: My name is Manfred Brown, owner of the Vulcanus. I would like to try to answer some of the questions that Mr. Kamlet asked about the technical details

rd-30

1 on the vessel.

2 For instance, about the injection system that is
3 being used on the ship, what we have on the ship is a
4 rotating large diameter cup system which is highly suitable,
5 as you mentioned in your paper, which disperses the waste
6 in a large area in the combustion chamber.

7 As far as the temperature, I think Dr. Welsh
8 said that the dioxin is destroyed at 1000 degrees Centi-
9 grade. And the way we work it on the ship is the incin-
10 erators are preheated with regular gas oil that we use for
11 the engine to a level of 1100 before any waste is injected.
12 That can even be higher.

13 The dwell time you mentioned should be in excess
14 of 14 seconds, and if I recall correctly, the dwell time
15 is even in excess of 20 seconds. That is because of the way
16 the additional air is blown into the incinerators which
17 creates a turbulence in the belly of the incinerator. The
18 gas is circulated in there, in other words, for a period
19 of 20 seconds and more.

20 As far as fuel to air ratio and excess air, we
21 burn about 25 tons an hour, and have an additional air
22 intake in order to reach that temperature of about 180,000
23 cubic meters per hour. That should be well in excess of
24 what you are shooting for.

25 As for as preheating, the ship is not equipped
with any heating coils to preheat cargo. We don't think that

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it will be necessary because there should not be any problem with combustion efficiency. The ship has so far, in about two and a half years, burned, I would say, close to 100,000 of clorinated hydrocarbons, both in Europe and here, which is similar to the Orange, except the chlorine content is much higher, about double, and the BTU is accordingly less. So, in other words, it is twice as difficult to burn. We do not expect there would be any problem with this material in that respect, or that any preheating is necessary.

Thank you.

DR. ENOS: I have a question. As I recall from our previous work with the Vulcanus, you discussed dwell times that averaged around 1.7 seconds. But you quoted or cited a figure much, much larger than that. Could you explain why?

MR. SHIPMAN: I am not an engineer myself, but I remember this thing was brought up before, and this is the figure that, as I recall, I was given by them when we asked it.

DR. ENOS: I don't believe that figure is correct.

MR. GALLAY; My name is Gallay. I would suggest to take from the record the number Mr. Brown gave, because, certainly, it is an error that is about 20 times what

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could be possible. There is no such thing in an industrial furnace as 20 seconds dwell time. It is an understandable mistake. I think for the record it looks more eloquent to put something which is absolutely impossible in.

CHAIRMAN BIGLANE: Thank you for that clarification, sir.

Are there further questions?

MR. WILLIAMS: I would like to get a clarification on which waste was 66 percent chlorine, the Shell or the Orange, and which was 10,000 BTS's?

My name is Carlton Williams, and there were some comments relevant to the BTU and the chlorine content. I am not sure of the exact figures, but the Orange Herbicide has a BTU content about twice as much as the Shell waste and a chlorine content of about half as much, which caused Mr. Brown to indicate there should be no problems in combusting it. I was only going to make sure there was no confusion on that point.

CHAIRMAN BIGLANE: Thank you for that clarification.

DR. ENOS: I think you originally asked a question. I believe the Shell waste ran between 66 and 72 percent chlorine content, and I believe that the BTU rating was somewhere around 6,000, as I recall.

MR. WILLIAMS: Five to six was what I was told

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1 informally. Ours is 10,000. Thank you.

2 CHAIRMAN BIGLANE: Thank you.

3 MR. DERORNY (phonetic): I just want to put the

4 numbers correctly into the record for everybody's purpose.

5 The Shell waste contained 63 to 66 percent by

6 weight chlorine. It had a BTU value per pound of 5900 to

7 6100. The chlorine content of Orange is 29.7 percent and

8 has a BTU content of slightly over 10,000 BTU's per pound.

9 So it will incinerate itself and sustain combustion. The

10 5800 to 6100 per pound of the Shell waste just about

11 contained combustion. At 5700 it would have been a

12 little difficult to burn.

13 CHAIRMAN BIGLANE: Are there further questions,

14 now?

15 MS. SHOWER: I would like to address the point

16 that was made in the environment impact draft that there

17 is a problem with leaving the Orange on Johnston Island

18 with respect to typhoons and hurricanes. I am concerned

19 as to when the final disposition of this material is

20 going to occur.

21 DR. WELSH: I don't believe we can say. Let

22 me just say we are interested in proceeding ahead with all

23 reasonable haste.

24 CHAIRMAN BIGLANE: Thank you, Doctor.

25 Are there further questions?

1 Hearing none, seeing none -- hearing one more.

2 MR. HUGHES: I would like to ask Dr. Johnson

3 if you would just sort of give us an explanation as to the

4 situation of 2,4,5-T butal and octal esters as far as

5 there future use in our environment and why is it or has

6 there been a decision made in the event that the hearings

7 last year were called off on 2,4,5-T, has there been or

8 is there an impending decision on excluding the use of

9 2.4.5-T, for instance, and why should the butal ester in

10 Organge be any different than other commercial formulations?

11 MR. JOHNSON: I can answer the first part of

12 your question. The seond part I will defer to someone else.

13 The Agency withdrew its action on the basis of

14 insufficiant analytical methodology to find dioxin in the

15 environment. Therefore, since the hazard requires a

16 toxicological agent, plus an exposure, we felt we could

17 not aprove hazard sufficiently to go forward with the

18 hearing. We have instituted some special monitoring pro-

19 grams which are taking advantage of some new dioxin

20 methodology which is sensitive. We are down to the 10

21 parts per trillion level. We are shooting for a lower

22 level. A sequential decision basis has been set up whereby

23 we will review the evidence at six month intervals and de-

24 termine whether we should renew the hearings or not.

25 I honestly, as I said, am not enough of a

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1 chemist -- I am not a chemist at all -- to answer your
2 question about the difference in the various types of
3 esters in the products. If anyone would care to take a
4 crack at it, that is fine.
5 MR. HUGHES: The esters are in formulations
6 that are registered. And there seems to be a tendency to
7 exclude the possible reformulation of the Orange as removing
8 the dioxin and still use the Orange 50-50 2,4,5-T and
9 2,4-D as possible reformulation. That has been excluded.
10 I am concerned, why should it be excluded?
11 MR. JOHNSON: I am not sure the option has been
12 excluded. We do in fact, as you correctly point out, have
13 products registered now that are mixtures of 2,4,5-T and
14 2,4-D. They are different mistures. The basic problem
15 has been with who the registrant might happen to be, and,
16 more particularly, the dioxin content of the materials and
17 how that problem would be taken care of.
18 CHAIRMAN BIGLANE: Any further questions from
19 the audience?
20 Questions from the panels, or statements?
21 Hearing none, let me say we certainly appreciate
22 your coming here today.
23 I declare this public meeting in adjournment.
24 (Whereby at 11:40 a.m., the hearing was
25 adjourned.)