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Author

Corporate Author

Report/Article Title Notes, memranda, reports: Johnston Island Studies

Journal/Book Title

Year 0000

Month/Day

Color

Number of Images 127

Description Notes Items were filed together in a binder labelled, "78-8D JI Studies"

ROUTING SLIP

DATE

21 Jul 80

ACTION

INFORMATION

MAJ YOUNG
 USAF SAM/EKO STOP 34

ROUTING	OFFICE	INITIALS	COMMENTS
	CC		ARTHUR P. CALDWELL, COL USAF BSC CHIEF, CONSULTANT SERVICES DIV
	CV		
	SU		
	EC		
	QE		
	SA		
	RZ		
	JAG		

Subject: Telephone Inquiry From HQ DNA, Kirtland AFB, NM

TO: Col Caldwell

AV 221-7132

I was called by Mr. Stevens (AV 221-7132) concerning what type of environmental monitoring the AF had done at JI since 1977 when H.O. was removed. I explained our environmental monitoring program and stated that a report of that monitoring was forth coming.

The main question asked, Is it safe for radiation monitoring people to go into the old storage area to collect soil samples for back ground radiation monitoring? If so do they need protective clothing?

I said it was no problem to go into the area. The only reason it is blocked off now is prevent vehicular tracking of H.O. & Dioxin

People should wear protective disposable coveralls and rubber gloves when they are in contact with the soil.

Other questions

Is H.O. Degrading? slowly

Is Dioxin Degrading? very very slowly we think

Is there Dioxin in the water (ocean)? NO

Has there been a safe level established for Dioxin in drinking water? NO

How much of the area is contaminated?

Approximately 1 acre of 12.5 acres

No mention was made of any other
Topics or the material stored in the Bunker.

C. E. Thalken

CHARLES E. THALKEN LtCol, USAF BSC
Chief, Environmental Assessment Branch

Questions

1. Do you want any more samples run?
Nebraska has 34 slots remaining

7 Samples are Eglin soils

12 Samples are Eglin plant uptake study

14 Samples are NCBC biologicals

1 Sample is a mouse Tissue sample from Eglin

The 14 biologicals from NCBC are the samples that Major Bill Carney hand carried up to USAFA.

They are 7 biologicals from the site collected in Jun 1979 and seven are from these sites and locations

B-1 - Turtle Fat site

B-2 - Turtle Fat 1600'

B-13 - Turtle Fat 5000'

B-4 - Crayfish/Fish 9000'

B-5 - Frog/Fish 12000'

2. Should we go with what we have?

Publish The TR ASAP with The data on hand?

3. Commander Bob Peterson

Entomologist at Navy Surgeons office

Asking questions about NCBC

Claims local newspapers stirring pot

Capt M'Hue NCBC

Asking questions

4. JI Samples contaminated to 24 cm

Any resampling?

HERBICIDE ORANGE SITE MONITORING PROJECT

STATUS: 1 November 1979

CONTRACTUAL STATUS

Department of Agronomy and Soils, Washington State University,
Pullman WA (Dr. H.H. Cheng, 9.925K). Final Report submitted
in technical report format 31 Oct 79 (Receipt Pending).

Flammability Research Center, University of UT (Mr. William
McClennen, 82K). Final Report submitted 1 Nov 79 (Receipt
Pending).

Department of Chemistry, University of Nebraska, Lincoln NE
(Dr. Michael Gross, 41.25K). Interim Report submitted
on 41 samples 6 Sep 79). Report on the remaining 34
samples due NLT 31 Dec 79.

IN-HOUSE STUDIES STATUS

USAFSAM/NG (Lt Col Eugene Arnold). Final Report submitted in draft
1 Oct 79, on "Analysis of Herbicide Orange Components
in Selected Soil Samples".

USAF/DFCBS (Maj William C. Cairney, 19K). Final Report submitted
in draft 1 Oct 79 on "Results of Environmental Monitoring
of Sites Previously Used for Long-term Storage of Phenoxy
Herbicides: Summary of Microbiological Findings".

TECHNICAL REPORTS STATUS

Outline submitted 1 Sep 79
Draft in Progress
Draft to be completed & typed NLT 15 Nov 79
Final Technical Report for Review -- Dec 79
Submission to AFSC/SG and AFLC/LO ---- Jan 80

1980 FUNDING

Statement of Work for Project Order to USAF Academy Prepared 26 Oct 79

HO Sample and Analytical Residue Waste Materials To Be Disposed

1. USAFSAM /NGP - Lt. Col. Arnold - None
2. Washington State University - Dr. Cheng - None
3. University of Nebraska - Dr. Gross - 1 - Sealed 5 gal can; of
Soil Samples and $\frac{1}{2}$ gal of
liquid extract
No gloves, glassware, bench top material
4. University of Utah - Mr. McClellan - 4 - sealed 5 gal cans; of
Soil samples, glassware, gloves, bench
top materials and 5 gal of
liquid extract
5. USAF Academy - Major Coirney - 1 - sealed 5 gal can; of soil
samples from U of Utah last
years contract.

* U of Nebraska and Utah have written into their contracts the statement that all unused samples and laboratory extracts and laboratory support materials (ie glassware, gloves, wipes, etc) will be held until further direction by USAF OEHL or returned to USAF OEHL for final disposal.

Tentative Conclusions

1. No TCDD degradation over 2 yrs
2. 2,4-D & 2,4,5-T acid and n-butyl esters rapidly degraded
3. Iso and normal octyl esters of 2,4-D and 2,4,5-T very persistent
4. Evidence of silt/TCDD movement at NCBC
 up to 1000 FT from storage site
 Utah has examined Jun 79 NCBC sediments
 2.0 to 3.6 ppb (at a DL of 0.5-2.0 ppb)
 Nebraska has examined Jan 79 NCBC sediments
 20 ppt at 5000 FT the Base Fence (DL of 10 ppt)
 ND at 9000 FT off Base (DL of 10 ppt)
5. Nebraska has looked at Crayfish at 5000 FT
 45 ppt (DL 10 ppt)
 (Formerly 18 ppt at a DL of 15 ppt)
 Crayfish at 9000 FT
 20 ppt (DL 10 ppt)

HERBICIDE ORANGE SITE TREATMENT AND ENVIRONMENTAL MONITORING

REPORT AND RECOMMENDATIONS

FOR

FIELD COMMAND DEFENSE NUCLEAR AGENCY
JOHNSTON ISLAND, PACIFIC OCEAN

PREPARED FOR

AIR FORCE LOGISTICS COMMAND
WRIGHT -PATTERSON AFB OH

PROGRAMMING PLAN 75-19, ANNEX 8 FOR THE
DISPOSAL OF HERBICIDE ORANGE

UNITED STATES AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
BROOKS AFB TX 78235

TECHNICAL REPORT OUTLINE

I. INTRODUCTION

LIST OF OBJECTIVES

II. PROTOCOL

SAMPLING SCHEME AND ANALYTICAL PROGRAM

III. RESULTS

A. MAGNITUDE OF CONTAMINATION

B. SOIL PERSISTENCE

C. FATE OF RESIDUE ON STORAGE SITE

D. FATE OF RESIDUE OFF STORAGE SITE

E. MICROBIAL DATA

IV. DISCUSSION OF DATA

A. CONCLUSIONS FROM DATA

B. PROPOSED MANAGEMENT TECHNIQUES FOR STORAGE SITES

C. RECOMMENDATIONS FOR USE OF SITE

VI. RECOMMENDATION FOR FUTURE STUDIES

PHOTOGRAPHS OF THE SITE AND A MAP SHOULD BE INCLUDED

OBJECTIVES OF THE HERBICIDE ORANGE SITE MONITORING STUDY

1. To determine the magnitude of contamination of the storage site.
2. To determine the soil persistence of phenoxy herbicides, degradation products and TCDD,
3. To determine the fate of Herbicide Orange and TCDD in the storage area.
4. To monitor movement of residues from the site into water, sediments and biological organisms.
5. To determine the effects of residues on biological organisms,
6. To recommend managerial techniques for minimizing the impact of herbicides and TCDD residues on the ecology and human population adjacent or near the storage site.
7. To recommend options for use(s) of the storage area.

DATA SOURCE FOR MEETING OBJECTIVES:

- Objective 1. University of Utah and USAF SAM/NGP (Sample analyses)
- Objective 2. University of Utah and USAF SAM/NGP (Sample analyses)
- Objective 3. University of Utah, USAF SAM/NGP, University of Hawaii, Washington State University (Soil Core and Laboratory Data)
- Objective 4. University of Nebraska, University of Utah, Wright-State University and USAF OEHL/SA data
- Objective 5. Department of Chemistry and Biological Sciences, USAF Academy

Johnston Island
FIRST

T. 1st 42 0/0.

5	0.019	0.041
9	0.029	0.053
#10	0.235	0.119
12	0.111	0.081
24	0.024	0.064
26	0.003	0.011
30	0.036	0.040
34	0.152	0.150
36	0.019	0.140
39	0.041	0.050
40	0.053	0.074
41	0.127	0.120
42	0.020	0.021

(+)

14 66.85

14 74.9

JOHNSTON ISLAND SAMPLING PROTOCOL
AUGUST 1979

OBJECTIVE: To collect water, sediment and coral samples in selected locations at Johnston Island in support of the Herbicide Orange Site Monitoring Project.

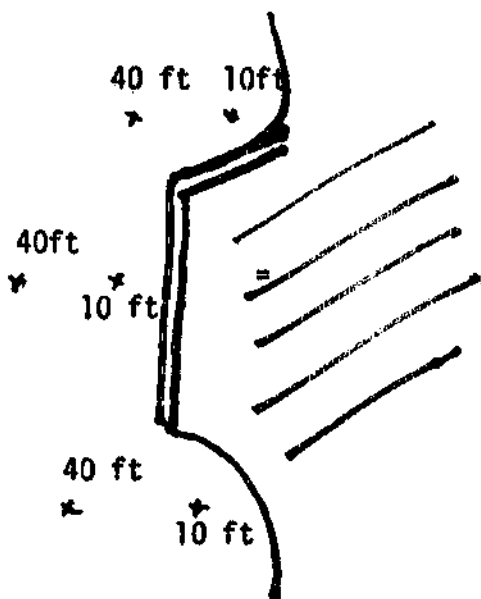
Total Number of Samples to be collected = 35

SAMPLE COMPOSITION AND PROTOCOL

Water: Five (5) 1 liter water samples should be collected at key sites on and around the Island. At least one sample should come from an area adjacent to the storage site. The location previously sampled by the Base Medical Staff should suffice. The samples should be collected in a 1 liter dark bottle with tight cap (aluminum insert). The bottle should be Number (by location), dated as follows:

JI-100	Water Sample: Location : Ten feet Off shore line Near drainage pipe adjacent HO Storage Date: 7 Aug 1979 Johnston Island USAF OEHL/ECE
--------	--

SEDIMENT: Two (2) sediment samples should be collected adjacent (off-shore) of Herbicide Storage area. The samples should represent at least three subsamples and should be approximately the top 8 cm (8 x 8 x 8cm) of sediment.



The three samples collected 10 feet from shore should be composited, dried, thoroughly mixed, crushed, and sieved so as to pass through a #14 sieve. It should be subsampled into two 2 oz jars, appropriately labelled. One jar is to be sent to the FRC, University of Utah, and one jar to the USAF ACADEMY.

The three samples collected 40 feet from shore should be handled in the same manner.

Soil Cores: Two soil cores should be collected from selected sites on the Herbicide Storage area. The two sites selected are JI-10 and JI-37. Samples should be taken 15 cm from the Nail and Metal Label indicating site. Samples are to be collected in the following increments:

0 - 2 cm	8 - 12 cm
2 - 4 cm	12 - 16 cm
4 - 6 cm	16 - 20 cm
6 - 8 cm	20 - 24 cm

Each sample should be collected from an area of approximately 2 x 12 x 12 cm (D x L x W) and should be removed by sampling from the side of a ditch (See Figure 1). The ditch must be on the side away from the stake.

After carefully removing the increments, they should be dried, thoroughly crushed, and mixed. The sample should be sieved through a # 14 sieve. The sample should be subsampled into two 2 oz jars, appropriately labelled, and a sniff test conducted on it prior to sealing and preparation for shipment.

The sniff test should be conducted by at least two people in the following manner:

- 0 = no odor detectable
- 1 = Trace
- 2 = Mildly irritating
- 3 = Strong & irritating

The samples should be shipped to FRC & USAFA.

JI-10	Soil Sample
	Depth: 0 - 2 cm
	Date: 7 August 1979
	Johnston Island
	USAF OEHL/ECE



FIGURE 1. TECHNIQUE FOR OBTAINING SOIL INCREMENTS FOR PENETRATION STUDIES.

PHOTOGRAPHS OF ALL SITES AND AN OVERALL PHOTO OF THE AREA SHOULD BE TAKEN!

SOIL SAMPLES: Twelve (12) samples should be obtained from areas where spills occurred. The selected sites are:

J1-5 L/A
J1-9 H/H
J1-12 H/H
J1-24 L/L
J1-26 L/L
J1-30 L/L
J1-34 L/L
J1-36 H/H
J1-39 H/H
J1-40 H/H
J1-41 H/L
J1-42 H/H

Each Sample should be collected 15 cm from the appropriate stake, and should be a 8 x 8 x 8 cm increment. It should not be in a depression which has been previously sampled. The old sampling sites are visible !

Each sample should be dried, crushed, mixed, ^{sieved,} evaluated with a sniff test, and subsampled into two 2 oz jars.

SHIPMENT OF SAMPLES:

The 5 water samples, one set of sediment samples (2), a set of the core samples (16), and a set of the soil samples (12) should be sent to:

FLAMMABILITY RESEARCH CENTER
ATTN: MR. W. H. McCLENNEN
UNIVERSITY OF UTAH
391 SOUTH CHIPETA WAY
P.O. Box 8089
SALT LAKE CITY, UTAH 84108

(801)
581-8431

One set of sediment samples (2), a set of core samples (16), and a set of soil samples (12) should be sent to:

MAJOR WILLIAM J. CAIRNEY
USAFA/DFCBS-R
USAF ACADEMY COLORADO 80840

(303) 472-2720

IF THE SAMPLES CAN BE SHIPPED IMMEDIATELY UPON ARRIVAL AT HICKHAM AFB, THEY NEED NOT BE REFRIGERATED, HOWEVER, THEY SHOULD (especially the water samples) be kept under refrigeration until shipment can be made. SHIP SAMPLES AIR EXPRESS. DO NOT FREEZE.

HO STORAGE SITE TREATMENT AND ENVIRONMENTAL MONITORING

Report and Recommendations

FOR NCBC Gulfport MS

Prepared For

Air Force Logistics Command

Programming Plan 75-19, ANNEX 8

FOR THE

DISPOSAL OF ORANGE HERBICIDE

Introduction

list of Objectives

Protocol

Sampling Scheme

Results

1. Magnitude of Contamination -
2. Soil Persistence
3. Fate of Residue on Site
Movement
4. ~~Site~~ Movement off-site
5. Microbial Data

Discussion

Conclusions from data

Proposed Managerial techniques

Recommend for use

Recommendations for Future Studies

OBJECTIVES

HAP/
Nasau

1. to determine the magnitude of contamination of the storage site.

HAP/
Nasau

2. to determine the soil persistence of herbicides, degradation products and TCDD.

Coel
Coel/
Mika

3. to determine the fate of H₀/TCDD in the storage area.

Coel
Coel/
Mika

4. to monitor movement of residues from the site -
water, soil (sediment & biodegradation)

Coel
Coel/
Mika

5. to ~~assess~~ determine the effects of residues on biological organisms.

6. to recommend management techniques for minimizing the impact of residues.

7. to recommend options for use of the storage area.

AIR FORCE LOGISTICS COMMAND



PROGRAMMING PLAN 75-19 FOR THE DISPOSAL OF ORANGE HERBICIDE

PREPARED BY
SAN ANTONIO ALC
APRIL 1977

ATCH 2⁵

ANNEX 8

STORAGE SITE TREATMENT

AND MONITORING

INTRODUCTION

1. INFORMATION REGARDING THE STORAGE SITES AND ENVIRONMENTAL CONDITIONS OF THE SURROUNDING AREA AT NAVAL CONSTRUCTION BATTALION CENTER (NCBC) GULFPORT MS AND JOHNSTON ISLAND (JI) WAS PRESENTED IN FIVE TRIP REPORTS AS FOLLOWS: EHL(K) LETTER 30 OCT 73, "INITIAL TRIP REPORT JOHNSTON ISLAND WATER POLLUTION SURVEY (30 SEP-4 OCT)"; USAF ACADEMY HANDOUTS TO HERBICIDE ORANGE CONFERENCE ON 21-22 AUG 74, "TRIP REPORT - GULFPORT, MISSISSIPPI/ HOUSTON, TEXAS, 1-2 JULY 1974" AND "TRIP REPORT, UNIVERSITY OF HAWAII AND JOHNSTON ISLAND" 30 JUL - 6 AUG 74; EHL(K) LETTER 1 OCT 74, "TRIP REPORT - NCBC, GULFPORT MS - MAJ INMAN" AND EHL(K) LETTER, 4 AUG 75, "MEETING WITH REGION IV, EPA REPRESENTATIVES, 23 JUNE 1975, REGARDING STORAGE/MAINTENANCE OF ORANGE HERBICIDE AT NCBC, GULFPORT MS." THE LATTER INCLUDED REPRESENTATIVES OF EPA REGION IV, EPA PESTICIDE LAB, ATHENS GA AND EHL(K). THESE REPORTS REVEALED THAT THERE IS HERBICIDE CONTAMINATION THROUGHOUT THE STORAGE AREAS, BUT NO ADVERSE ENVIRONMENTAL EFFECTS WERE NOTED IN THE SURROUNDING AREAS. ALTHOUGH LEAKAGE FROM DRUMS OF HERBICIDE IN STORAGE DOES OCCUR THERE IS NO CONTINUOUS RUNOFF OF HERBICIDE INTO THE DRAINAGE DITCHES WHICH DRAIN THE STORAGE AREA. WHEN THE LEAKED HERBICIDE BECOMES ABSORBED INTO THE SOIL IN THE LEAKED AREA, IT IS DIFFICULT, DUE TO LOW SOLUBILITY AND DENSITY OF THE HERBICIDE FOR NORMAL RAIN WATER RUNOFF TO TRANSPORT THE HERBICIDE TO THE DRAINAGE DITCHES. UNFORTUNATELY, IF A LEAK OCCURS DURING A RAIN STORM OR THERE IS UNABSORBED HERBICIDE ON THE GROUND DURING A RAIN STORM, THE TRANSPORT OF HERBICIDE TO DRAINAGE DITCHES CAN OCCUR. BOTH THE NCBC AND JI STORAGE AREAS ARE UNDER CONSTANT SURVEILLANCE.

2. THE DE-DRUMMING AND TRANSFER OPERATIONS DESIGNED FOR INCORPORATION AT BOTH STORAGE SITES SHOULD NOT CAUSE FURTHER CONTAMINATION OF THE STORAGE AREAS BECAUSE THESE OPERATIONS HAVE BEEN PLANNED TO MINIMIZE THE SPILLAGE OF ORANGE HERBICIDE. IN ADDITION, PROCEDURES AND MATERIALS ARE READY TO INSURE CONTAINMENT AND/OR COLLECTION OF THE HERBICIDE IF A SPILL SHOULD OCCUR.

STORAGE SITE CLEAN-UP

STORAGE SITE CLEAN-UP CAN BE MINIMAL IN UNDISTURBED AREAS BECAUSE BIODEGRADATION OF HERBICIDE WILL OCCUR IN THE SOIL. AT JOHNSTON ISLAND THE CORAL SOIL OF THE ISLAND READILY ABSORBS ORANGE HERBICIDE. THIS ABSORPTIVE CAPACITY OF THE COMPACTED CORAL WITHIN THE STORAGE SITE HAS CONFINED SPILLED HERBICIDE TO THE UPPER 12 - 18 INCHES OF SOIL AND WITHIN THE IMMEDIATE AREA OF THE SPILL. CLEAN-UP OF THE STORAGE SITE CAN BE ACCOMPLISHED BY COVERING THE AREA WITH CLEAN CORAL AND COMPACTING TO CONTROL ANY POSSIBILITY OF HERBICIDE RUNOFF OR RESUSPENSION DURING IN SITU BIODEGRADATION. AT NCBC, THE SOIL AT THE STORAGE SITE HAS BEEN TREATED WITH CEMENT AND COMPACTED. THIS TREATMENT HAS CREATED A 12 - 18 INCH LAYER OF CEMENT/SOIL WHICH IS RELATIVELY IMPERVIOUS TO WATER AND HERBICIDE; HOWEVER, THE LAYER IS ABOUT THREE INCHES BELOW THE GROUND SURFACE. THE UPPER THREE INCH LAYER IS SIMILAR TO THE NORMAL SOIL OF THE AREA WHICH APPEARS TO BE A SANDY CLAY. THIS SITE SHOULD BE COVERED WITH A MATERIAL SUCH AS OYSTER SHELLS AT THE COMPLETION OF THE DE-DRUMMING AND TRANSFER OPERATION. ADDITIONAL CLEAN-UP PROCEDURES AT BOTH NCBC AND JI MAY BE NECESSARY IF A FACILITY IS TO BE CONSTRUCTED ON EITHER STORAGE SITE. THE EXACT NATURE OF THE CONSTRUCTION, I.E., DINING HALL, WAREHOUSE, OFFICE BUILDING, ETC., WILL DETERMINE THE EXTENT OF ADDITIONAL CLEAN-UP PROCEDURES REQUIRED. PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION, SOIL SAMPLES WILL BE COLLECTED AND ANALYZED FOR ORANGE HERBICIDE CONSTITUENTS. IF HERBICIDE IS DETECTED, IT MAY BE NECESSARY TO REMOVE THE SOIL AND DISPOSE OF IT IN AN APPROVED SANITARY

LANDFILL. BEFORE REMOVAL OF ANY SOIL, IT WILL BE TREATED WITH OIL TO PREVENT AIRBORNE SUSPENSION OF DUST PARTICLES WHICH MAY CONTAIN ABSORBED HERBICIDE OR ITS CONSTITUENTS. THE PROCEDURES WILL BE DEVELOPED WITH THE CONCURRENCE OF CONCERNED AGENCIES.

SITE MONITORING

SOIL SAMPLES FROM THE STORAGE SITES AT BOTH NCBC AND JI WILL BE COLLECTED AND ANALYZED FOR ORANGE HERBICIDE AFTER THE COMPLETION OF TRANSFER OPERATION. THESE ANALYSES WILL AID IN THE ESTABLISHMENT OF A SCHEDULE FOR FUTURE MONITORING. THE SITE MONITORING PROGRAM WILL BE CONCLUDED UPON MUTUAL AGREEMENT OF ALL AGENCIES INVOLVED. AS INDICATED ABOVE, THE MONITORING PROGRAM WILL BE FLEXIBLE TO REQUIREMENTS GENERATED BY CONSTRUCTION OF ANY FACILITY ON THE STORAGE SITE. THE CURRENT "ORANGE HERBICIDE" WATER MONITORING PROGRAM AT JI WILL BE CONTINUED UNTIL ALL AGENCIES CONCERNED DETERMINE THAT IT CAN BE CONCLUDED.

22 JUN 79

Johnston Island Project

1. SEARCH RECORDS OF ANALYTICAL DIVISION (SA) for data on Herbicide concentrations in WATER of JI
2. Plot data over time, NOTE EARLIER data prepared by May Tremblay and Statistical comparisons.
3. Reanalyzed data per method in (2.).
4. PREPARE brief REPORT FOR FC DNA.

ALY

ALVIN L. YOUNG, Major, USAF
Consultant, Environmental Sciences

22 JUNE 79

Discussed above project with May Fishburn and Mark Willis. MR Willis will immediately initiate project in response to attached memo. He will coordinate his search & methods with May Tremblay.

ALY

EC Memo

ECE Oct 14/79

Moj Young dy

20.11.1979

Coordinated
with Fisherman

Talked \bar{c} Dr. Bramlet FCDNA,
(AV 964-6487) today. He asked
about

- 1) TCDD Carbon cylinders @ VI
- 2) Site monitoring results
- 3) Env. water sampling program

1) Told him we (OEIII) have not been
tasked to look into cylinders &
disposition — gave him AFCC/Ron
Wholce's tel. no. Did mention to
him that Hughes had run
irradiation test.

2) Told him the analyses of site
monitoring samples were incomplete
and that we expected to have to
take yet another set of samples.

3) Mentioned to him that we'd look
into results of quarterly ambient
water sampling and when we draw
a bottom line on site reclamation

work, we'd also have something
to offer on the future need of
ambient water sampling

⊕

Mr. George Meisner
J.I. Power Plant
manager

For Large Color
Enlargement of
J.I. Aerial Photo.

Can we order some of
them? Would like to send
~~some~~ money for 10-15
enlargements? Will George
get the copies for us and
send them to this Lab.

Chuck Thullen

Phil Roseberry
Bill Sonoby

Please contact Mr. George Meisner
at Power Plant

Ask about J.A. Color
Photo

Anteven Numbers OP Assist.

259-3111 USAF Academy CO
240-1110 Brooks AFB TX
471-1110 FT Sam Houston TX
487-1110 Randolph AFB TX

Dial operator at J.A. - at a time other than 1600-1800 hrs
Ask for moral & welfare call to be placed to AV number
in states - Be sure to identify to state side operator
This is a moral & welfare call from J.A.

Dial 99 From class A phone at J.A. To get Honolulu

Major Gibaux 449-9433 Duty
422-1523 Home

Hickam Ops 422-0531

Tropic Isle Hotel 923-3141

Washington Switch 937-1550

AC 202-245-3048

Weather J.A. 2310

Colony Surf Travel - Diane Hamilton - Travel Consultant
2895 Kalakaua Ave.
Honolulu, Hawaii
808-922-2311

TELECOPY AUTOVON 363-2495

OCTOBER 13, 1981

FOR: PUBLIC AFFAIRS OFFICER
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI
AUTOVON 363-2393

FROM: OFFICE OF PUBLIC AFFAIRS
HEADQUARTERS AIR FORCE ENGINEERING AND SERVICES CENTER
TYNDALL AIR FORCE BASE, FLORIDA 32403
AUTOVON 970-6476

FOR TRANSMITTAL TO MR. JIMMIE BELL, BILOXI DAILY HERALD:

WE APPRECIATE YOUR DESIRE TO PREPARE AN ACCURATE NEWS STORY ON THE HERBICIDE ORANGE MONITORING PROGRAM AT GULFPORT. WE UNDERSTAND THAT IN THE INTEREST OF ACCURACY YOU MAY ASK US TO REVIEW YOUR ARTICLE---WE WILL BE HAPPY TO ASSIST IN ANY WAY WE CAN.

YOUR POINT OF CONTACT ON ALL MATTERS REGARDING THIS SUBJECT IS THE PUBLIC AFFAIRS OFFICER AT THE NAVAL CONSTRUCTION BATTALION CENTER, MS. JACKIE DEVINE. WE WILL WORK CLOSELY WITH HER TO RESPOND PROMPTLY TO ANY ADDITIONAL QUERIES YOU MAY HAVE.

WE ARE SENDING YOU BY MAIL COPIES OF HERBICIDE ORANGE STUDIES DONE BY THE AIR FORCE OCCUPATIONAL AND ENVIRONMENTAL HEALTH LAB AT BROOKS AIR FORCE BASE, TEXAS. WE FEEL THESE STUDIES MAY BE HELPFUL AS YOU PREPARE YOUR ARTICLE.

THE FOLLOWING ARE RESPONSES TO YOUR QUESTIONS OF SEPTEMBER 30, 1981:

QUESTION: WHEN WAS THE MONITORING FIRST ORDERED FOR THE GULFPORT CENTER AS IT RELATES TO THE STORAGE OF AGENT ORANGE AT THE CENTER?

RESPONSE: VARIOUS AIR FORCE AND CONTRACT LABORATORIES HAVE BEEN CONDUCTING ENVIRONMENTAL SURVEYS AND ANALYSES OF THE SOILS, PLANTS, AND THE AQUATIC SYSTEMS IN AND AROUND THE HERBICIDE ORANGE STORAGE AREA SINCE 1970. THE OBJECTIVES OF THIS MONITORING ARE TO ASSURE THAT CONTAMINATION IS CONTAINED AND POSES NO HEALTH RISK, AND TO DETERMINE IF NATURAL DEGRADATION IS OCCURRING AND AT WHAT RATE. (SEE OEHL TR-79-169, PAGES 7-16 AND 24-30)

COORDINATION: RDV *[Signature]*
RD *[Signature]*
DEVP *[Signature]*
DEV *[Signature]*
JA *[Signature]*

PAM *[Signature]*
PAX *[Signature]*

Cv to SAF/PAM (Capt Stetson-Mannix)
Keesler AFB/PA

HQ AFESC/CC RF
HQ AF/LEE RF
HQ AFESC/RDV FILE
HQ AFESC/PA FILE

QUESTION: HOW WAS THE MONITORING FUNDED? THROUGH WHAT FEDERAL PROGRAM? COST?

RESPONSE: THE DEPARTMENT OF DEFENSE HAS FUNDED VARIOUS PROGRAMS AT THE CENTER INCLUDING INITIAL SITE MONITORING, REDRUMMING OF THE ENTIRE INVENTORY IN 1972, THE AT-SEA INCINERATION OF HERBICIDE ORANGE IN 1977, AND THE PRESENT SITE MONITORING. CURRENT COST FOR THE SITE MONITORING AND EVALUATION AT GULFPORT IS APPROXIMATELY \$20,000 YEARLY. (SEE OEHL TR-79-169, PAGES I-II AND 7-16)

QUESTION: HOW IS IT PHYSICALLY CARRIED OUT, SPECIFICALLY AS TO EQUIPMENT, PERSONNEL, AND TIME REQUIRED?

RESPONSE: SOIL SAMPLES ARE OBTAINED BY REMOVING A 12 X 12 X 3 INCH DEEP SAMPLE USING A HAMMER AND CHISEL, SIEVING THE SOIL TO REMOVE ROCKS, AND PLACING THE SOIL IN AN ALL-GLASS CONTAINER WITH AN ALUMINUM-LINED LID. SEDIMENT SAMPLES ARE TAKEN FROM DRAINAGE DITCHES, AND BIOLOGICAL SAMPLES---SUCH AS MINNOWS, TADPOLES, ETC.--- ARE TAKEN WITH A DIP NET. SEDIMENT SAMPLES AND BIOLOGICAL SAMPLES ARE SIMILARLY PLACED IN ALL-GLASS JARS WITH ALUMINUM-LINED LIDS. IT TAKES TWO DAYS FOR ONE PERSON TO COLLECT THE SAMPLES NEEDED.

QUESTION: WHAT TYPE SAMPLES ARE OBTAINED?

RESPONSE: SOIL SAMPLES ARE TAKEN FROM THE STORAGE SITE. SEDIMENT AND BIOLOGICAL SAMPLES ARE TAKEN FROM THE DRAINAGE DITCH SYSTEM.

QUESTION: HOW OFTEN ARE SAMPLES OBTAINED?

RESPONSE: SEMIANNUALLY. THE NEXT SAMPLING IS NOVEMBER-- DECEMBER 1981.

QUESTION: DOES THE MONITORING EXTEND BEYOND THE CONFINES OF THE CENTER? DOES IT GO INTO NEIGHBORHOODS IN SURROUNDING AREAS?

RESPONSE: SAMPLING POINTS IV AND V EXTEND BEYOND THE CONFINES OF THE CENTER. SAMPLING SITE IV IS 9,000 FEET FROM THE STORAGE AREA WHERE THE DRAINAGE DITCH ENTERS CANAL NUMBER ONE. SAMPLING SITE V IS 12,000 FEET FROM THE STORAGE AREA WHERE CANAL NUMBER ONE ENTERS TURKEY CREEK. (SEE OEHL TR-79-169, PAGE 26)

QUESTION: PLEASE PUT IN WRITING THAT VEGETATION GROWS WHERE THE AGENT ORANGE WAS LOCATED. ALSO PLEASE CONFIRM IF TOMATO PLANTS TO THE SOUTH OF THE CENTER HAVE EVER BEEN KNOWN TO WILT OR DIE AS A RESULT OF THE STORAGE OF THE DEFOLIANT AT THE CENTER.

RESPONSE: TOMATO PLANTS ARE AMONG THE MOST SENSITIVE PLANTS TO THE CHEMICALS IN HERBICIDE ORANGE. DURING THE DEDRUMMING OPERATION IN 1977, TEST TOMATO PLANTS AROUND THE SITE AT 1,000 FEET SHOWED SLIGHT TO MODERATE DAMAGE. PLANTS AT A GREATER DISTANCE SHOWED ONLY MINIMAL DAMAGE. NO INSTANCES OF TOMATO PLANT DAMAGE FROM HERBICIDE ORANGE SOUTH OF THE CENTER, OFF THE INSTALLATION, ARE KNOWN. YES, VEGETATION IS GROWING WELL ON THE FORMER HERBICIDE ORANGE STORAGE SITE AND IN THE ASSOCIATED DRAINAGE SYSTEM.

QUESTION: PLEASE PUT IN WRITING THAT AGENT ORANGE WAS NAMED FOR THE STRIPE ON THE CAN IN WHICH IT WAS STORED, AND IS ACTUALLY A DARK, REDDISH BROWN.

RESPONSE: HERBICIDE ORANGE IS A REDDISH-BROWN TO TAN COLORED LIQUID. IT WAS FORMULATED TO CONTAIN A 50:50 MIXTURE OF THE N-BUTYL ESTERS OF 2,4-DICHLOROPHENOXYACETIC ACID (2,4-D) AND 2,4,5-TRICHLOROPHENOXYACETIC ACID (2,4,5-T). BECAUSE OF THIS COMPLEX NOMENCLATURE, IT WAS IDENTIFIED WITH AN ORANGE STRIPE ON DRUM CONTAINERS. OTHER HERBICIDES WERE IDENTIFIED WITH DIFFERENT COLOR STRIPES.

QUESTION: PLEASE EXPLAIN WHAT IS ACTUALLY BEING SOUGHT IN THE STUDIES AS IT RELATES TO IMPURITIES. YOUR TECHNICAL JARGON (REFERRING TO CONVERSATION WITH AIR FORCE CAPTAIN CHANNELL) IS MORE ACCURATE SOUNDING THAN MY INTERPRETATION OF WHAT YOU SAID.

RESPONSE: THE EFFECTIVENESS OF PHENOXY HERBICIDES (2,4-D AND 2,4,5-T) AS PLANT GROWTH REGULATORS WAS DETERMINED IN 1944. THE OUTSTANDING EFFECTIVENESS OF THESE TWO HERBICIDES IN CONTROLLING THE GROWTH OF BROAD-LEAVED PLANTS AND WEEDS, COUPLED WITH THEIR LOW MAMMALIAN TOXICITY AND LOW APPLICATION RATES, RESULTED IN THEIR RAPID ACCEPTANCE IN WORLD AGRICULTURE AND BY UTILITY COMPANIES IN MAINTAINING RIGHTS-OF-WAY.

THE FIRST MILITARY SHIPMENTS OF HERBICIDES (PURPLE AND BLUE) WERE RECEIVED IN VIETNAM IN JANUARY 1962. IN APRIL 1970 THE SECRETARIES OF INTERIOR AND HEALTH, EDUCATION AND WELFARE JOINTLY ANNOUNCED THE SUSPENSION OF CERTAIN USES OF 2,4,5-T SINCE STUDIES INDICATED 2,4,5-T WAS A TERATOGEN. SUBSEQUENT STUDIES SHOWED THE TERATOGENIC EFFECTS CAME FROM A TOXIC CONTAMINANT IN 2,4,5-T IDENTIFIED AS 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD OR DIOXIN).

AS A RESULT, THE DEFENSE DEPARTMENT SUSPENDED THE USE OF HERBICIDE ORANGE. AT THE TIME OF SUSPENSION, THE AIR FORCE HAD AN INVENTORY OF 0.85 MILLION GALLONS AT THE GULFPORT NCBC. THIS MATERIAL REMAINED IN STORAGE UNTIL 1977, AWAITING AN ENVIRONMENTALLY SAFE AND EFFICIENT MANNER OF DISPOSAL.

DURING THIS TIME SOME LEAKAGE OCCURRED, RESULTING IN SOIL CONTAMINATION AT THE STORAGE SITE. WE ARE CONCERNED ABOUT THE TCDD,

PAGE 4

AND ARE MONITORING THE SITE TO ASSURE OURSELVES AND THE PUBLIC THAT IT IS INDEED CONTAINED AND CONTROLLED, AND THAT IT IS DEGRADING NATURALLY.

ONLY ABOUT ONE TO TWO ACRES OF THE TWELVE ACRE STORAGE SITE WAS FOUND TO BE CONTAMINATED IN THE 1979 STUDY. (SEE OEHL-TR-79-169, PAGE 31) ACCORDING TO THE REPORT, TCDD LEVELS AT THAT TIME WERE DECREASING.

SINCE THAT REPORT, WE HAVE STABILIZED THE DRAINAGE DITCHES WITH GRAVEL TO PREVENT SOIL EROSION, AND WE HAVE INSTALLED SILT TRAPS.

ACTIONS WE HAVE TAKEN BASED ON RECOMMENDATIONS IN THE 1979 STUDY (SEE OEHL TR-79-169, PAGES 32 AND 33) APPEAR TO BE WORKING.

-30-

FOR PUBLIC AFFAIRS OFFICER, NCBC GULFPORT: THANKS FOR YOUR HELP. WE WILL WORK WITH YOU SHOULD ADDITIONAL QUERIES DEVELOP. ACTION OFFICERS HERE AT THIS HEADQUARTERS ARE LT MATTHEW DURHAM, CHIEF OF MEDIA RELATIONS, AND CAPTAIN DAVID L. GEARY, DIRECTOR OF PUBLIC AFFAIRS.

END OF TELECOPY

Media Relations Department
Tyndall Air Force Base
Tyndall, Fla.

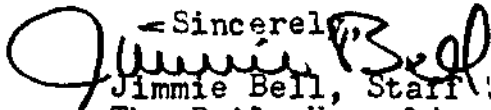
Sirs: Capt. Ronald J. Channell, in response to our request for information on the monitoring program at Gulfport (Miss.) Naval Seabee Center, has requested that I submit the following questions through your office.

If you will submit these to Capt. Channell for his answers and submit the answers to us in writing, it will be ~~your~~ most helpful in preparing an accurate news story ~~for our newspaper~~ for our newspaper.

1. When was monitoring first ordered for the Gulfport center as it relates to the storage of agent orange at the center?
2. How was the monitoring funded? Through what federal program? ~~cost?~~
3. How is it physically carried out, specifically as to equipment, personnel and time required?
4. What type samples are obtained?
5. How often are samples obtained?
6. Does the monitoring extend beyond the confines of the center? Does it go into neighborhoods in surrounding areas?
7. Please put in writing that vegetation grows where the agent orange was located. Also please confirm if tomato plants to the south of the center have ever been known to wilt or die as a result of the storage of the defoliant at the center.
8. Please put in writing that agent orange was named for the ~~orange~~ stripe on the can in which it was stored and is actually a dark, rusty reddish brown.
9. Please explain what is actually being sought in the studies as relates to the impurities. Your technical jargon is more accurate ~~than~~ sounding than my interpretation of what you said.

These questions follow a phone conversation with Capt. Channell.

We would appreciate a reply as quickly as possible as the matter is of growing interest in our area and we need to get an accurate story across.

Sincerely,

Jimmie Bell, Staff Writer
The Daily Herald
Box 4567, N. Biloxi Sta.
Biloxi, Miss. 39531

1-601-896-2312

JOHNSTON ISLAND SAMPLING PROTOCOL
AUGUST 1979

OBJECTIVE: To collect water, sediment and coral samples in selected locations at Johnston Island in support of the Herbicide Orange Site Monitoring Project.

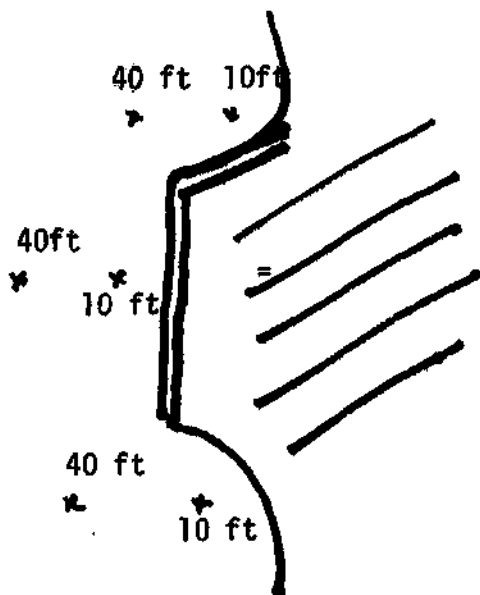
Total Number of Samples to be collected = 35

SAMPLE COMPOSITION AND PROTOCOL

Water: Five (5) 1 liter water samples should be collected at key sites on and around the Island. At least one sample should come from an area adjacent to the storage site. The location previously sampled by the Base Medical Staff should suffice. The samples should be collected in a 1 liter dark bottle with tight cap (aluminum insert). The bottle should be Number (by location), dated as follows:

JI-100	Water Sample: Location : Ten feet Off shore line Near drainage pipe adjacent HO Storage Date: 7 Aug 1979 Johnston Island USAF OEHL/ECE
--------	---

SEDIMENT: Two (2) sediment samples should be collected adjacent (off-shore) of Herbicide Storage area. The samples should represent at least three subsamples and should be approximately the top 8 cm (8 x 8 x 8cm) of sediment.



HERBICIDE
ORANGE
STORAGE
AREA

The three samples collected 10 feet from shore should be composited, dried, thoroughly mixed, crushed, and sieved so as to pass through a #14 sieve. It should be subsampled into two 2 oz jars, appropriately labelled. One jar is to be sent to the FRC, University of Utah, and one jar to the USAF ACADEMY.

The three samples collected 40 feet from shore should be handled in the same manner.

Soil Cores: Two soil cores should be collected from selected sites on the Herbicide Storage area. The two sites selected are JI-10 and JI-37. Samples should be taken 15 cm from the Nail and Metal Label indicating site. Samples are to be collected in the following increments:

0 - 2 cm	8 - 12 cm
2 - 4 cm	12 - 16 cm
4 - 6 cm	16 - 20 cm
6 - 8 cm	20 - 24 cm

Each sample should be collected from an area of approximately 2 x 12 x 12 cm (D x L x W) and should be removed by sampling from the side of a ditch (See Figure 1). The ditch must be on the side away from the stake.

After carefully removing the increments, they should be dried, thoroughly crushed, and mixed. The sample should be sieved through a # 14 sieve. The sample should be subsampled into two 2 oz jars, appropriately labelled, and a sniff test conducted on it prior to sealing and preparation for shipment.

The sniff test should be conducted by at least two people in the following manner:

- 0 = no odor detectable
- 1 = Trace
- 2 = Mildly irritating
- 3 = Strong & irritating

The samples should be shipped to FRC & USAFA.

JI-10	Soil Sample
	Depth: 0 - 2 cm
	Date: 7 August 1979
	Johnston Island
	USAF OEHL/ECE



FIGURE 1. TECHNIQUE FOR OBTAINING SOIL INCREMENTS FOR PENETRATION STUDIES.

PHOTOGRAPHS OF ALL SITES AND AN OVERALL PHOTO OF THE AREA SHOULD BE TAKEN!!

SOIL SAMPLES: Twelve (12) samples should be obtained from areas where spills occurred. The selected sites are:

JI-5
JI-9
JI-12
JI-24
JI-26
JI-30
JI-34
JI-36
[REDACTED]
JI-39
JI-40
JI-41
JI-42

Each Sample should be collected 15 cm from the appropriate stake, and should be a 8 x 8 x 8 cm increment. It should not be in a depression which has been previously sampled. The old sampling sites are visible !

Each sample should be dried, crushed, mixed, ^{sieved,} evaluated with a sniff test, and subsampled into two 2 oz jars.

SHIPMENT OF SAMPLES:

The 5 water samples, one set of sediment samples (2), a set of the core samples (16), and a set of the soil samples (12) should be sent to:

FLAMMABILITY RESEARCH CENTER
ATTN: MR. W. H. McCLENNEN
UNIVERSITY OF UTAH
391 SOUTH CHIPETA WAY
P.O. Box 8089
SALT LAKE CITY, UTAH 84108

One set of sediment samples (2), a set of core samples (16), and a set of soil samples (12) should be sent to:

MAJOR WILLIAM J. CAIRNEY
USAFA/DFCBS-R
USAF ACADEMY COLORADO 80840

IF THE SAMPLES CAN BE SHIPPED IMMEDIATELY UPON ARRIVAL AT HICKHAM AFB, THEY NEED NOT BE REFRIGERATED, HOWEVER, THEY SHOULD (especially the water samples) be kept under refrigeration until shipment can be made. SHIP SAMPLES AIR EXPRESS. DO NOT FREEZE.

PROTOCOL DEVELOPMENT FOR ENVIRONMENTAL MONITORING OF STORAGE SITES
PREVIOUSLY CONTAMINATED WITH ORANGE HERBICIDE

Following the at-sea incineration of surplus Herbicide Orange in the fall of 1977, an environmental monitoring study was developed for the former storage sites. Approximately 0.85 million gallons of this phenoxy herbicide had been stored for eight years on the Naval Construction Battalion Center (NCBC), Gulfport MS, with the remaining 1.37 million gallons stored for five years on Johnston Island, South Pacific. Although soils of both 12-acre storage sites were relatively homogenous, contamination due to drum leakage was heterogenous since neither the dates of spills nor the amount of herbicides or areas involved were recorded. The expected variability in the concentrations of herbicides, degradation products or other contaminants through-out the storage site dictated that a monitoring program: (a) provide inferences as to the range of residue levels in the soil for any area on the site, (b) be sufficiently replicated to be statistically valid, (c) be continued over a sufficiently long period of time for trends in residue degradation to be evidenced, and (d) be accomplished within budgetary limitations. In addition, the "ideal" monitoring program should have some method of determining a minimum level of residue that could be considered biologically and ecologically acceptable, i.e. a "no significant effect" residue level.

A preliminary study of soil penetration indicated that 95 percent of residues were within the top 8 cm of soil profile. Forty-two sampling sites were selected within each storage area on the basis of history, and discernible herbicide stain and odor. Three sets of soil samples, extending over a 20-month period have been collected and have been (or are being) analyzed for the esters and acids of 2,4-D and 2,4,5-T, di- and trichlorophenol and TCDD. The same samples have also been qualitatively and quantitatively analyzed for actino-myctes, fungi and bacteria.

HERBICIDE ORANGE SITE TREATMENT AND ENVIRONMENTAL MONITORING

REPORT AND RECOMMENDATIONS

FOR

FIELD COMMAND DEFENSE NUCLEAR AGENCY
JOHNSTON ISLAND, PACIFIC OCEAN

PREPARED FOR

AIR FORCE LOGISTICS COMMAND
WRIGHT -PATTERSON AFB OH

PROGRAMMING PLAN 75-19, ANNEX 8 FOR THE
DISPOSAL OF HERBICIDE ORANGE

UNITED STATES AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY
BROOKS AFB TX 78235

TECHNICAL REPORT OUTLINE

I. INTRODUCTION

LIST OF OBJECTIVES

II. PROTOCOL

SAMPLING SCHEME AND ANALYTICAL PROGRAM

III. RESULTS

A. MAGNITUDE OF CONTAMINATION

B. SOIL PERSISTENCE

C. FATE OF RESIDUE ON STORAGE SITE

D. FATE OF RESIDUE OFF STORAGE SITE

E. MICROBIAL DATA

IV. DISCUSSION OF DATA

A. CONCLUSIONS FROM DATA

B? PROPOSED MANAGEMENT TECHNIQUES FOR STORAGE SITES

C. RECOMMENDATIONS FOR USE OF SITE

VI. RECOMMENDATION FOR FUTURE STUDIES

PHOTOGRAPHS OF THE SITE AND A MAP SHOULD BE INCLUDED

OBJECTIVES OF THE HERBICIDE ORANGE SITE MONITORING STUDY

1. To determine the magnitude of contamination of the storage site.
2. To determine the soil persistence of phenoxy herbicides, degradation products and TCDD.
3. To determine the fate of Herbicide Orange and TCDD in the storage area.
4. To monitor movement of residues from the site into water, sediments and biological organisms.
5. To determine the effects of residues on biological organisms.
6. To recommend managerial techniques for minimizing the impact of herbicides and TCDD residues on the ecology and human population adjacent or near the storage site.
7. To recommend options for use(s) of the storage area.

DATA SOURCE FOR MEETING OBJECTIVES:

- Objective 1. University of Utah and USAF SAM/NGP (Sample analyses)
- Objective 2. University of Utah and USAF SAM/NGP (Sample analyses)
- Objective 3. University of Utah, USAF SAM/NGP, University of Hawaii, Washington State University (Soil Core and Laboratory Data)
- Objective 4. University of Nebraska, University of Utah, Wright-State University and USAF OEHL/SA data
- Objective 5. Department of Chemistry and Biological Sciences, USAF Academy

- The Objectives:

- Description of Site & Historical review

- Previous studies

- METHODS

Results — TABLE of Summary values for Herbicides & TKOD

— TABLE of Soil Core # 17

— TABLE of Biological Values

- Discussion — Figure showing Biological sediments sampling

- Recommendations

— Stabilized Ditch bank
— Construct Cement

Data from Utah on
Herbicide levels in 4/L o/p sites
TKOD levels in sites
5, 10, 20, 22, 24, 37

Data from Nebraska

3 Oct 78

TCDD IN H/H SOILS

LOCATION

mg TCDD/gm Soil (ppm)

NCBC

MEAN

0.152

RANGE

0.001 - 0.510

Median

0.130

J.I

Mean

0.046

Range

0.0002 - 0.230

Median

0.025

SAMPLES SENT MASON HUGHES
 UNIVERSITY OF UTAH
 19 JUN 79

DATA RECEIVED
 1200 HR
 22 JUN 79

SOIL CORE, SITE #17, NCBC

DESCRIPTION	ACTUAL DEPTH	NUMBER ASSIGNED TO FRC	TCDD CONCENTRATION (PPM)
# 17/1	0-2 cm	WATER SHELL	0.480
# 17/2	2-4		0.510
# 17/3	4-6	GRAVEL / SANDY LOAM SOIL	0.150
# 17/4	6-8		0.160
# 17/5	8-12		0.300
# 17/6	12-16		0.380
# 17/7	16-20		0.0302
# 17/8	20-24	HARDPAN	0.0116
# 17/9	24-39	SAND	0.00048
# 17/10	39-55		0.00148
# 17/11	55-70		0.00078

only one mass ion being measured → 50% uncertainty

two mass ions in next 6 values 10-15% error at upper levels

WATER


W-1	N.D.	
W-2	N.D.	AT 25 PPT
BLANK	N.D.	

DATE DATA RECEIVED
 1000 HR
 25 JUN 79

Sitts 1	ND < 2.0	S-6	< 37 ppb	S-12	ND
S-2	3.6 ppb	S-7	< 20		0.5 ppb
3	ND < 2.00	S-8	2.8 ppb	S-13	ND
4	ND < 2.0	S-9	ND < 0.5 ppb		0.5 ppb
5	NA < 2.0	S-10	ND < 0.0 ppb		
		S-11	ND < 2.0		

No. 336156

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	2. Shows to whom, date and where delivered With restricted delivery	
RESTRICTED DELIVERY		
SPECIAL DELIVERY (extra fee required)		

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P.O., STATE AND ZIP CODE		
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		With restricted delivery
		2. Shows to whom, date and where delivered
		With restricted delivery
RESTRICTED DELIVERY		CONSULT POSTMASTER FOR FEES
SPECIAL DELIVERY (extra fee required)		

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Jan. 1976 3800

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5. Save this receipt and present it if you make inquiry.

7 MAY 79

SPIKED SAMPLE

Dr Mason Hughes
Flammability Research Center
391 South Chipeta way
Post OFFICE Box 8089
UNIVERSITY OF UTAH
SALT LAKE City, UT 84108
801-581-5843

UTAH
AFLC_X SOIL
SPIKED WITH
HERBICIDE
ORANGE
USAF OEHL
Brooks AFB TX
7 MAY 79

Dr Michael Gross
Professor of Chemistry
Department of Chemistry
Hamilton Hall
UNIVERSITY of Nebraska
Lincoln NE 68588
402-472-2794

W-1 DCP ND TCP .001 D_{acid} .008 T_{acid} ^{mg/g} .002 Deter <.007 Tester <.001

DR AUGER
27 Jul 79
1630 HR

Sediments

Sample	DCP	TCP	D _{acid}	T _{acid} (mg/g)	Deter	Tester
S-1	ND	.1	.1	1.1	ND	ND
S-2	ND	.1	.1	1.9	ND	<.03
S-3	ND	.1	.1	1.9	ND	0.4
S-4	.1	.1	.3	0.5	.03	.1
S-5	ND	.03	.5	.4	.07	.4
S-6	.1	.05	.3	.3	.05	.02
S-7	ND	.01	.2	.2	ND	.03
S-8	ND	.06	.2	.5	ND	.04
S-9	ND	ND	.2	.1	ND	ND
S-10	ND	.01	.1	.03	ND	ND
S-11	ND	.03	.1	.04	ND	ND
S-12	ND	.02	.1	.02	ND	ND
S-13	ND	.02	.2	.1	ND	ND

NCBC
Samples
Collected
13-14 JUN 79

MAJ Young

#	DCP	TCP	D _{acid}	T _{acid} (mg/g)	Deter	Tester	Other
1	ND	221	13,700	40,900	ND	67	.48
2	ND	92	7,500	8,800	ND	240	.16
3	ND	100	16,100	14,300	600	500	.30
4	ND	90	10,800	10,800	<1000	200	.15

5	170	750	54,800	55,300	215	4700	.51
6	.4	.6	32	42	.4	2	.00148
7	.4	.2	7	9	.2	.3	.00078
8	3	6	200	40	.1	.7	<u>.00048</u>
9	16	20	810	820	2	10	.0302
10	ND	48	14,100	12,400	ND	8	.38
11	15	20	480	395	<10	4	.0116

206 ± 117.9

167 ± 140.2

D
50
6
df

100.00	***
150.00	***
200.00	***
250.00	***
300.00	***
350.00	***
400.00	***
450.00	***
500.00	***
550.00	***
600.00	***
650.00	***
700.00	***
750.00	***
800.00	***
850.00	***
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950.00	***
1000.00	***

7 .75
1.8946
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1.715

D
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JF

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900.00	***
950.00	***
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JAN 78

NOV 78

SITE	JAN 78	NOV 78
1	0.328 0.328	0.198
5	< 0.002	≤ 0.0387 ?
10	0.042	.0242 ?
16	0.442	0.198
17	0.510	0.508
19	0.130	0.119
20	0.001	- .0037 ?
22	≤ 0.002	≥ .0128 ?
24	0.002	0.0128 ?
26	0.011	0.014
27	0.130	0.029
30	0.240	0.222
37	≤ 0.008	.0218 ?
41	<u>0.230</u>	0.251

0.148

± 0.176

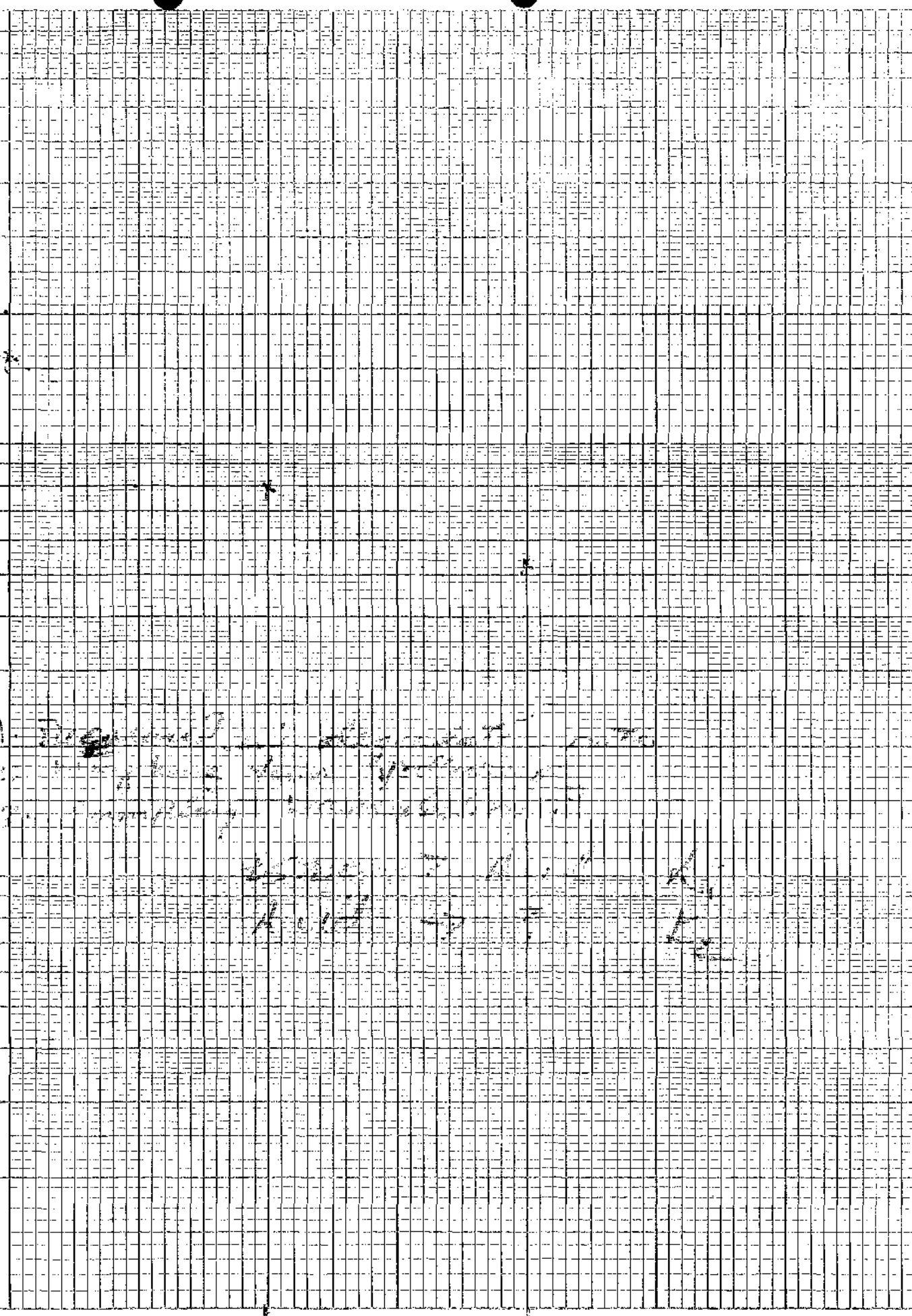
5 .033	.019	.039
.042	.029	.022
.196	.235	.230
.178	.111	.080
	.024	.025
	.003	.010
	.036	.038
	.152	.029
	.019	.015
	.099	.079
	.091	.029
	.053	.055
	.127	.085
	.020	.025

4	3
328	198
442	198
510	508
130	119
11	19
130	29
240	222
230	251

Kenneth J. Howard
Vertac Inc.
Box 69
Jacksonville
ARK
72076

1983
MAY 11 11:58 AM

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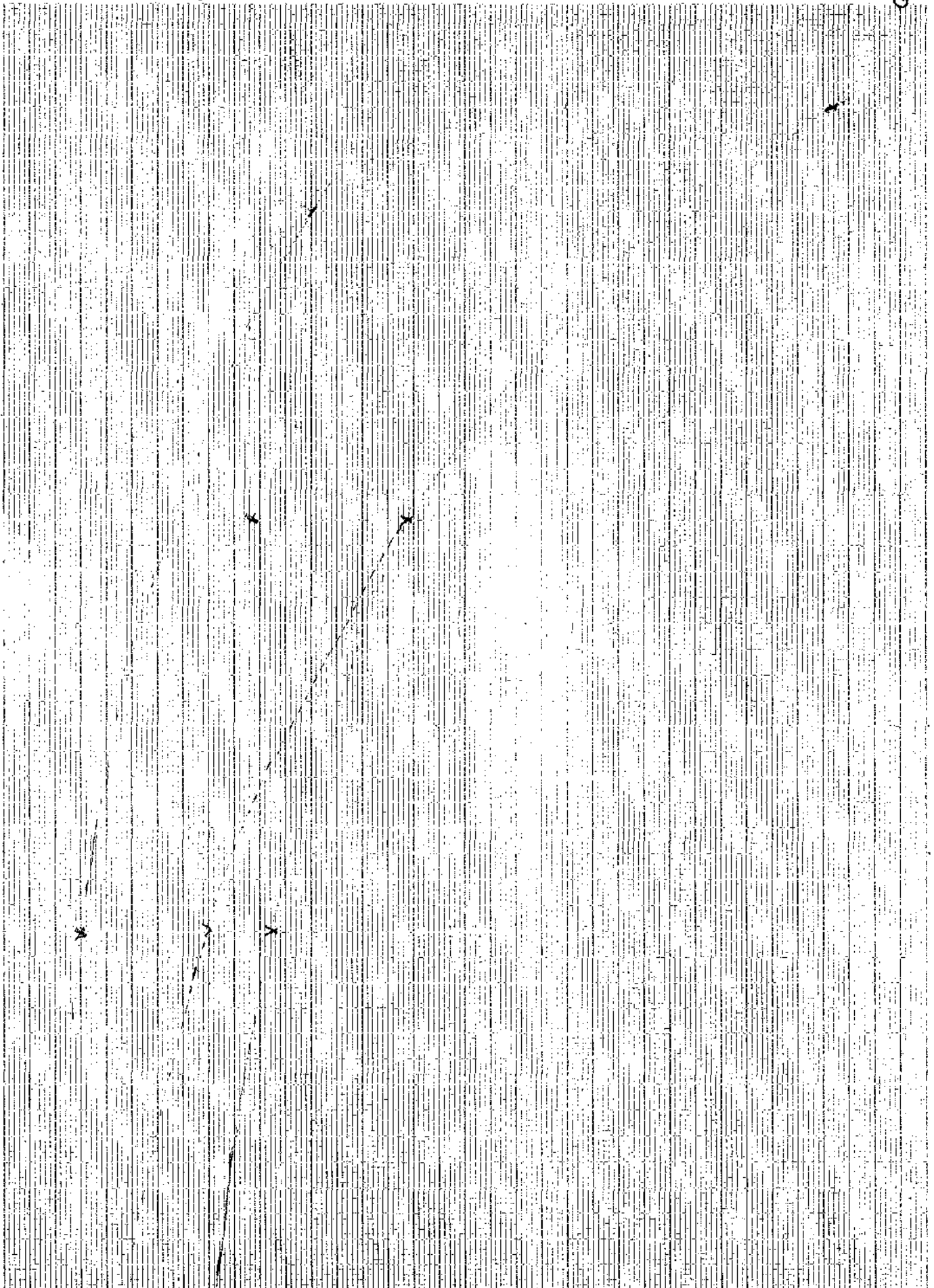
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78
Time → (mo.)

79



JOHNSTON (ATOLL) ISLAND SAMPLES

<u>Sample #</u>	<u>Type</u>	<u>Location</u>	<u>Amount</u>	<u>Date</u>
JI-1/7879	Water	Composite of 3 locations adjacent to HO storage site 10' offshore and 3' below surface	1250 ml	7 AUG 79
JI-2/7879	Water	Intake of desalination plant at orange buoy 5' below surface	1250 ml	7 AUG 79
JI-3/7879	Water	~ 200' offshore of North Island and 5' below surface	1250 ml	7 AUG 79
JI-4/7879	Water	Potable water from desalinization unit	1250 ml	7 AUG 79
JI-5/7879	Water	Dining hall (lavatory)	1250 ml	7 AUG 79

JI-6/7879	Sediment (ocean floor)	Composite of 3 locations adjacent to HO storage site 40' offshore	1250 ml	7 AUG 79
JI-7/7879	Sediment (ocean floor)	Composite of 3 locations adjacent to HO storage site 10' offshore	1250 ml	7 AUG 79

JI-8/8879	Coral	Site #5	8 cm cube (8x8x8)	8 AUG 79
JI-9/8879	"	" #9	"	"
JI-10/8879	"	" #12	"	"
JI-11/8879	"	" #24	"	"
JI-12/8879	"	" #26	"	"
JI-13/8879	"	" #30	"	"
JI-14/8879	"	" #34	"	"
JI-15/8879	"	" #36	"	"
JI-16/8879	"	" #39	"	"
JI-17/8879	"	" #40	"	"
JI-18/8879	"	" #41	"	"
JI-19/8879	"	" #42	"	"

			<u>Incremental</u>	
JI-20/8879	Coral	Site #10	0 - 2 cm	8 AUG 79
JI-21/8879	"	"	2 - 4 "	"
JI-22/8879	"	"	4 - 6 "	"
JI-23/8879	"	"	6 - 8 "	"
JI-24/8879	"	"	8 -12 "	"
JI-25/8879	"	"	12 -16 "	"
JI-26/8879	"	"	16 -20 "	"
JI-27/8879	"	"	20 -24 "	"
JI-28/8879	"	Site #37	0 - 2 "	8 AUG 79
JI-29/8879	"	"	2 - 4 "	"
JI-30/8879	"	"	4 - 6 "	"
JI-31/8879	"	"	6 - 8 "	"
JI-32/8879	"	"	8 -12 "	"
JI-33/8879	"	"	12 -16 "	"
JI-34/8879	"	"	16 -20 "	"
JI-35/8879	"	"	20 -24 "	"

REQUISITION AND INVOICE/SHIPPING DOCUMENT

SHEET NO. 1	NO. OF SHEETS 1	5. REQUISITION DATE 14 Aug 1979	6. REQUISITION NO. <i>FR 215722e X 026</i>
7. DATE MATERIEL REQUIRED 15 Aug 1979		8. PRIORITY <i>03</i>	
9. AUTHORITY OR PURPOSE Samples for analysis			
10. SIGNATURE <i>MAJ</i>		11a. VOUCHER NUMBER AND DATE	
12. DATE SHIPPED		b. VOUCHER NUMBER AND DATE	
13. MODE OF SHIPMENT Air		14. BILL OF LADING NUMBER	
15. AIR MOVEMENT DESIGNATOR OR PORT REFERENCE NUMBER			

1. FROM USAF OEHL/ECE BROOKS AFB, TEXAS 78235

2. TO Major William J. Cairney, USAFA ~~ANDERSON~~ DFCBS-R
Fairchild Hall RM 2A29, Bldg 2354
USAF Academy, Co. 80840

3. SHIP TO - MARK FOR MAJOR WILLIAM J. CAIRNEY
USAF ACADEMY COLORADO 80840 Tele:(303) 472-2720

4. ACCOUNTING AND FUNDING DATA
5793400-309-47BQ-125660-B8-463S528500 *CD labels*

ITEM NO.	FEDERAL STOCK NUMBER, DESCRIPTION, AND CODING OF MATERIEL AND/OR SERVICES <i>b</i>	UNIT OF ISSUE <i>c</i>	QUANTITY REQUESTED <i>d</i>	SUPPLY ACTION <i>e</i>	ISSUE TO CONTAINER NOS. <i>f, g</i>	UNIT PRICE <i>h</i>	TOTAL COST <i>i</i>
	SPECIMENS FOR LABORATORY ANALYSIS <i>PRE PACK (DO NOT FREEZE)</i>	BX	1				

16. TRANSPORTATION VIA MATS OR MSTs CHARGEABLE TO					17. SPECIAL HANDLING					
18. RECAPITULATION OF SHIPMENT	ISSUED BY	TOTAL CONTAINERS	TYPE CONTAINER	DESCRIPTION	TOTAL WEIGHT	TOTAL CUBE	19. CONTAINERS RECEIVED EXCEPT AS NOTED	DATE	BY	SHEET TOTAL
	CHECKED BY <i>MAJ 7221</i>						QUANTITIES RECEIVED EXCEPT AS NOTED	DATE	BY	GRAND TOTAL
	PACKED BY						POSTED	DATE	BY	20. RECEIVER'S VOUCHER NO.
	← TOTAL →									

REQUISITION AND INVOICE/SHIPPING DOCUMENT

SHEET NO. 1	NO. OF SHEETS 1	5. REQUISITION DATE 14 Aug 1979	6. REQUISITION NO. FB2857922exodf
7. DATE MATERIEL REQUIRED 15 Aug 1979		8. PRIORITY 03	
9. AUTHORITY OR PURPOSE Samples for analysis			
10. SIGNATURE <i>[Signature]</i>		11a. VOUCHER NUMBER AND DATE	
12. DATE SHIPPED		b. VOUCHER NUMBER AND DATE	
13. MODE OF SHIPMENT AIR EXPRESS		14. BILL OF LADING NUMBER	
15. AIR MOVEMENT DESIGNATOR OR PORT REFERENCE NUMBER			

1. FROM USAF OEHL/ ECE BROOKS AFB, TEXAS 78235

2. TO Mr. W. H. McClennen, Flammability Research Center
391 South Chipeta Way
P.O. Box 8098
University of Utah, Salt Lake City, UT 84108

3. SHIP TO - MARK FOR HOLD FOR PICKUP
Mr. W. H. McClennen
Flammability Research Center Tele: (801) 581-8431

4. ACCOUNTING AND FUNDING DATA
5793400-309-47BQ-125660-B8-463S528500 *Cole Vega*

ITEM NO.	FEDERAL STOCK NUMBER, DESCRIPTION, AND CODING OF MATERIEL AND/OR SERVICES <i>b</i>	UNIT OF ISSUE <i>c</i>	QUANTITY REQUESTED <i>d</i>	SUPPLY ACTION <i>e</i>	TYPE OF CONTAINER <i>f</i>	CONTAINER NOS. <i>g</i>	UNIT PRICE <i>h</i>	TOTAL COST <i>i</i>
	SPECIMENS FOR LABORATORY ANALYSIS (DO NOT FREEZE) Pre Pack <i>JF + GP.</i>	BX	3					

16. TRANSPORTATION VIA MATS OR MATS CHARGEABLE TO					17. SPECIAL HANDLING					
18. RECAPITULATION OF SHIPMENT	ISSUED BY	TOTAL CONTAINERS	TYPE CONTAINER	DESCRIPTION	TOTAL WEIGHT	TOTAL CUBE	19. CONTAINERS RECEIVED EXCEPT AS NOTED	DATE	BY	SHEET TOTAL
	CHECKED BY <i>PHEW 9221</i>						QUANTITIES RECEIVED EXCEPT AS NOTED	DATE	BY	GRAND TOTAL
	PACKED BY						POSTED	DATE	BY	20. RECEIVER'S VOUCHER NO.
	← TOTAL →									

18 JUL 1979

Mr Ed Bramlitt
Field Command DNA

Needs one more copy of
J.I. Report From Battelle

FCDNA/FCLS

Kirtland AFB NM 87115

AV 964-9566 or 9186

LT. Col. Sfameni Commander Johnston Atoll // FCJ //

AV 315-441-3005

Major Steve Phillippi Engineer

Air Micronesia M, W, Th, S 0730 → 0818 Hono → JI
T F 2330 → 0113 JI → Hono

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235



FILED TO
ATTN OF: ECE

SUBJECT Request Support for Johnston Atoll TDY

18 JUL 1979

TO SU/Mr Buffin

1. Request your assistance in preparing and coordinating the required documentation for a USAF OEHL/CC directed TDY to Johnston Atoll.

a. A message requesting theater clearance is attached.

b. The short notice explanation is included in the message.

c. TDY orders request is attached.

d. To meet required sampling procedure and have island personnel available to support the sampling program, travel needs to take place as follows:

7 Aug 79 - San Antonio to Honolulu

8 Aug 79 - Air Micronesia 0730-0918 hrs to JA

10 Aug 79 - Air Micronesia 2330-0113 hrs to Honolulu

It may be possible to take the MAC flight back to Honolulu at about 1300 hours on Friday, saving that portion of the airfare.

e. Since Air Micronesia flights leave Honolulu at 0730 hours on Monday, Wednesday, Thursday, and Saturday and return at 2330 hours on Tuesday and Friday, it is necessary to travel to Honolulu the day before departure to Johnston Atoll.

2. Telephone coordination with Field Command, Defense Nuclear Agency and Johnston Atoll Commander will be accomplished today.

CHARLES E. THALKEN, LtCol, USAF, VC
Chief, Environmental Assessment Branch

2 Atch
1. Msg, USAF OEHL/ECE
2. TDY Orders Request

JOINT MESSAGE FORM

SECURITY CLASSIFICATION

UNCLASSIFIED

201/100

PAGE	DRAFTER OR RELEASER TIME	PRECEDENCE		LMF	CLASS	CIC	FOR MESSAGE CENTER/COMMUNICATIONS CENTER ONLY		
		ACT	INFO				DATE - TIME	MONTH	YR
01 of 02		RR	RR		UUUU		Z	JUL	79

BOOK NO. MESSAGE HANDLING INSTRUCTIONS

FROM: USAF OEHL BROOKS AFB TX//ECE//

TO: CMDR JOHNSTON ATOLL//FCJ//

INFO: FCDNA KIRTLAND AFB NM//CC//

UNCLAS

SUBJ: REQUEST FOR THEATER CLEARANCES

- REQUEST ENTRY AUTHORIZATION FOR THE FOLLOWING USAF OEHL/ECE PERSONNEL LISTED BY RANK, NAME, AFSN, SECURITY CLEARANCE, DATE OF CLEARANCE AND CITIZENSHIP: A. LTCOL CHARLES E. THALKEN, 505-54-7466, SECRET, NAC AUG 1964, US. B. CAPTAIN ROBERT J. SARVAIDEO, 075-38-0549FV, SECRET, NAC MAR 1979, US.
- OFFICERS PLAN TO ARRIVE JA 8 AUG 79 AND TO DEPART 10 AUG 79. PURPOSE OF TRIP IS TO COLLECT ADDITIONAL CORAL SAMPLES FROM HO STORAGE SITE AND WATER SAMPLES FROM ADJACENT AREAS IN SUPPORT OF SITE RECLAMATION/MONITORING PROGRAM.
- SUPPORT REQUIRED INCLUDES SURVEYING TEAM FROM CE TO LOCATE FORTY-TWO PREVIOUS TEST HOLES ESTABLISHED 25 AUG 77 AND 9 JAN 78.
- SHORT NOTICE APPROVAL IS REQUESTED DUE TO RECENT CONTRACT CHANGES WITH SUPPORT LABORATORY REQUIRING EARLIER SUBMISSION OF SAMPLES THAN

DISTR:

CY TO: CV

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE & DATE CHARLES E. THALKEN, CH ENVIRON ASSESS BR ECE, 3667, 18 JUL 79		SPECIAL INSTRUCTIONS
TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE J.E.BUFFIN, CH ADM & DOC BR, 3421		
RELEASER SIGNATURE	SECURITY CLASSIFICATION UNCLASSIFIED	

JOINT MESSAGE FORM

SECURITY CLASSIFICATION

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		ACT	INFO				DATE - TIME	MONTH	YR	
01 OF 02		RR	RR		UUUU			7	JUL	79

BOOK NO	MESSAGE HANDLING INSTRUCTIONS
---------	-------------------------------

FROM:

TO:

ORIGINALLY PLANNED SO THAT ALL PHASES OF THE CONTRACT ARE TO BE COMPLETED 1 OCT 1979.

DISTR:

CY TO: CV

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE & DATE
 CHARLES E. THALKEN, CH ENVIRON ASSESS BR
 ECE, 3667, 18 JUL 79

SPECIAL INSTRUCTIONS

TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE
 J.E.BUFFIN, CH ADM & DOC BR, 3421

SIGNATURE

SECURITY CLASSIFICATION

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Capt Young File!

ECE COT 20/78
B64-①
ROUTINE

TOR-2621 945Z

MLN-002270

RAAUZYUW RUMTRFA0255 2621830-UUUU-RUVKAAB.

ZNR UUUUU

R 191650Z SEP 78

FM HQ USAF ACADEMY CO/DFCRS
TO RUMHJIA/CHDR JOHNSTON ATOLL /FCJX
INFO RUEAHQA/HQ WASH DC/SBP
RUVAAAA/HQ AFLC WPAFB OH/LOS
RUEBDBA/HQ DNA WASH DC/DALG
RUMTFBF/FCDNA KIRTLAND AFB NM/FCLG
RUVKAAB/USAF OEHL BROOKS AFB TX/CC

OEHL/CC
RR

BT
UNCLAS

SUBJ: REQUEST FOR THEATER CLEARANCES

1. REQUEST ENTRY AUTHORIZATION FOR THE FOLLOWING USAF ACADEMY PERSONNEL LISTED BY RANK, NAME, AFSN, SECURITY CLEARANCE, DATE OF CLEARANCE AND CITIZENSHIP.

- A. MAJ WILLIAM J. CAIRNEY, 153-34-3903R, SECRET, APR 64, US.
- B. 2ND LT JEFFREY E. FELLMETH, 136-42-3930, SECRET, FEB 74, US.

2. OFFICERS PLAN TO ARRIVE JA 17 OCT 78 AND DEPART 21 OCT 78. PURPOSE OF TRIP IS TO COLLECT ADDITIONAL CORAL SAMPLES FROM HQ STORAGE SITE IN SUPPORT OF SITE RECLAMATION/MONITORING PROGRAM.

PAGE 2 RUMTRFA0255 UNCLAS

3. SUPPORT REQUIRED INCLUDES SURVEYING TEAM FROM CE TO LOCATE 42 PREVIOUS TEST HOLDS ESTABLISHED 25 AUG 77 AND 9 JAN 78.

BT
0255

NNNN

USAF OEHL	Action	Coord	Info	File
CC			✓	OK
CV			✓	OK
QE				
SU				
TS				
EC	✓	OK		
SA				

TOR-2621 945Z

MLN-002270

ROUTINE

1 1

RR RR

UUUU

161850 Z

²⁻⁰¹
file JH
5A
FEB 78

USAF OEHL BROOKS AFB TX/EC

COMMANDER JOHNSTON ATOLL/FCJ

INFO: FCDNA KIRTLAND AFB NM/FCL

UNCLAS

SUBJ: HERBICIDE ORANGE DISPOSAL PROGRAM YOUR MSG 142325Z FEB 78.

1. REFERENCE IS MADE TO ITEMS DISCUSSED DURING CAPT YOUNG'S TDY IN JAN 78. ITEM 2A, YOUR MSG, THE FREQUENCY OF WATER SAMPLING AND MODIFICATION OF THE WATER SAMPLING PROGRAM WERE CONTAINED IN USAF OEHL/CC LTR DTD 3 FEB 78. ITEM 2B, YOUR MSG, PURPOSES OF EXCLUDING VEHICULAR TRAFFIC OVER OR ON THE FORMER STORAGE SITE IS TO REDUCE UNNECESSARY SPREADING OF KNOWN CONTAMINATION FROM THE SITE, PRECLUDING ANALYTICAL INTERFERENCES IN SAMPLES COLLECTED DURING THE MONITORING PROGRAM.

2. AS DISCUSSED WITH JOHNSTON ISLAND STAFF DURING JAN TDY, TEMPORARY BARRICADES FOR EXCLUDING TRAFFIC WILL BE SUFFICIENT. ESTIMATE MAXIMUM EXCLUSION APPROXIMATELY 18 MONTHS.

JAMES R. TREMBLAY, Major, USAF, BSC
Acting Chief, Consultants Division/EC
X2891, 15 Feb 78

Imp

CURTIS/MICHAEL, SU, 3422
ADMIN ASST

UNCLASSIFIED

Capt Young ALM
File!

ECE COT 20/18
B64-①
ROUTINE

TOR-2621 945Z

MLN-002270

RAAUZYUW RUMTRFA0255 2621830-UUUU-RUVKAAB.

ZNR-UUUUU

R 191650Z SEP 78

FM HQ USAF ACADEMY CO/DFCRS
TO RUMNJA/CHDR JOHNSTON ATOLL /FCJN
INFO RUEANQA/HQ WASH DC/SGP
RUVAAAA/HQ AFPC WPAFB OH/LOS
RUEBDBA/HQ DNA WASH DC/DALG
RUMTFBF/FCDNA KIRTLAND AFB NM/FCLG
RUVNABB/USAF OEHL BROOKS AFB TX/CC

OEHL/ce
RR

BT
UNCLAS

SUBJ: REQUEST FOR THEATER CLEARANCES

1. REQUEST ENTRY AUTHORIZATION FOR THE FOLLOWING USAF ACADEMY PERSONNEL LISTED BY RANK, NAME, AFSN, SECURITY CLEARANCE, DATE OF CLEARANCE AND CITIZENSHIP.

- A. MAJ WILLIAM J. CAIRNEY, 153-34-3903FR, SECRET, APR 64, US.
- B. 2ND LT JEFFREY E. FELLMETH, 136-42-3930, SECRET, FEB 74, US.

2. OFFICERS PLAN TO ARRIVE JA 17 OCT 78 AND DEPART 21 OCT 78. PURPOSE OF TRIP IS TO COLLECT ADDITIONAL CORAL SAMPLES FROM HQ STORAGE SITE IN SUPPORT OF SITE RECLAMATION/MONITORING PROGRAM.

PAGE 2 RUMTRFA0255 UNCLAS

3. SUPPORT REQUIRED INCLUDES SURVEYING TEAM FROM CE TO LOCATE 42 PREVIOUS TEST HOLES ESTABLISHED 25 AUG 77 AND 9 JAN 78.

BT
#0255

NNNN

USAF OEHL	Action	Coord	Info	File
CC			✓	OK
CC ✓			✓	OK
QE				
SU				
TS				
EC	✓	OK		
SA				

TOR-2621 945Z

MLN-002270

ROUTINE

JOINT MESSAGE FORM

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01 OF 02		PP	RR		UUUU		21 1645Z	DEC	77

BOOK MESSAGE HANDLING INSTRUCTIONS

FROM: USAF OEHL BROOKS AFB TX/CC

TO: CMDR JOHNSTON ATOLL/FCJN

INFO: HQ USAF WASH DC/SGP
 HQ AFLC WPAFB OH/LOS
 HQ DNA WASH DC/DALG
 FCDNA KIRTLAND AFB NM/FCLG
 USAF ACADEMY CO/DFCBS-R

UNCLAS

SUBJ: REQUEST FOR THEATER CLEARANCES

- THIS MSG COORDINATED WITH HQ AFLC/LOS VIA TELECON 21 DEC 77.
- REQUEST ENTRY AUTHORIZATION FOR THE FOLLOWING USAF OEHL AND USAF ACADEMY PERSONNEL LISTED BY RANK, NAME, AFSN, SECURITY CLEARANCE, DATE OF CLEARANCE, AND CITIZENSHIP.
 - CPT ALVIN L. YOUNG, 520-44-1612FR, SECRET, FEB 69, US.
 - ^{HAT} ~~CPT~~ WILLIAM J. CAIRNEY, ³⁴⁻³⁹⁰³ 153-44-1612FR, SECRET, APR 64, US.
- OFFICERS PLAN TO ARRIVE JA 9 JAN 78 AND DEPART 12 JAN 78. PURPOSE OF TRIP IS TO CONDUCT VEGETATIVE SURVEY AND COLLECT ADDITIONAL CORAL SAMPLES FROM HO STORAGE SITE IN SUPPORT OF THE SITE

DISTR:

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE & DATE		SPECIAL INSTRUCTIONS	
TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE JOHN E. BUFFIN/ADM MGR/SU/X3422			
RELEASER SIGNATURE	SECURITY CLASSIFICATION		
<i>J. Buffin</i>		UNCLASSIFIED	

JOINT MESSAGE FORM

SECURITY CLASSIFICATION

UNCLASSIFIED

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		ACT	INFO				DATE - TIME	MONTH	YR
02 OF 02		PP	RR		UUUU		21 1645Z	DEC	77

BOOK MESSAGE HANDLING INSTRUCTIONS


FROM:

TO:

RECLAMATION/MONITORING PROGRAM.

4. SUPPORT REQUIRED INCLUDES A SURVEYING TEAM FROM CE TO LOCATE 12 (TWELVE) PREVIOUS TEST HOLES (HO PROJECT, 25 AUG 77) AND ESTABLISH/ MAP 30 (THIRTY) ADDITIONAL SITES AT THE HO STORAGE SITE.

DISTR:

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE & DATE		SPECIAL INSTRUCTIONS	
RELEASER	TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE		
	SIGNATURE 	SECURITY CLASSIFICATION UNCLASSIFIED	

0/2

Capt Young

00A A O E H L

TOR-3052052Z

* UNCLASSIFIED E F T O *

ROUTINE

MLN-003131

NOV 77 21 48

~~BTTEZYUW RUHHJIA0011 3052028-EEEE - RUVKAAAL~~

ZNY EEEEE

R 011815Z NOV 77

FM COMMANDER JOHNSTON ATOLL/FCJ

~~TO RUVKAAA/ZOL AA USAF OEHL KELLY AFB TX/CC~~

~~INFO RUWTFB/FCDNA KIRTLAND AFB NM/PCSS~~

BT

UNCLAS E F T O

SUBJ: ENTRY AUTHORIZATION. REF YOUR MSG P 311400Z OCT 77 FOR CPT ALVIN L. YOUNG AND CPT WILLIAM J. CAIRNEY

1. ENTRY APPROVED AS REQUESTED.
2. ONE COPY OF TRAVEL ORDERS IS REQUIRED FOR IN-PROCESSING AT JOHNSTON ATOLL TERMINAL.
3. THE CHARGE FOR SUBSISTENCE AND QUARTERS FOR ALL TDY PERSONNEL IS \$12.00 PER DAY.
4. ATR MIC WILL BE ADVISED OF ISLAND CLEARANCE.

BT

0011

NNNN

USAF ENVIRONMENTAL HEALTH LABORATORY

NOV 77 20 8 33

RECEIVED

TOR-3052052Z

* UNCLASSIFIED E F T O *

ROUTINE

MLN-003131

STATUS OF SOIL SAMPLES SUBMITTED TO FRC

29 Mar 79

FY 79 Contract to University of Utah

<u>SITE LOCATION</u>	<u>Date Samples Collected</u>	<u>Date Samples Evaluated for Oder Rating</u>	<u>Dates Samples Shipped to FRC</u>	<u>Number of Samples</u>
Johnston Island	17 Oct 78	15 Feb 79	30 Oct 78	42
NCEC	6 Nov 78	21 Nov 78	22 Nov 78	44
Johnston Island	25 Aug 77	29 Mar 79	29 Mar 79	12
NCEC	28 Jul 77	29 Mar 79	29 Mar 79	11
Total Number of Samples for Routine Analysis				109

Samples sent for GC/MS Component Study

Hill Sample # 21 Collect Nov 78

NCEC Sample # GP 24 Collected Jan 78

JI Sample # JI 6 Collected Jan 78

GC/MS

Alvin L. Young
ALVIN L. YOUNG, Major, USAF
Consultant, Environmental Sciences

89 MAR 1979

USAF OEH/EC
BROOKS AFB TX 78235

-1, 1 JOHNSTON ISLAND
25 AUGUST 77

-1, 9 Johnston Island
25 Aug 77

-1, 2 JOHNSTON ISLAND
25 Aug 77

-1, 10 Johnston Island
25 Aug 77

-1, 3 JOHNSTON ISLAND
25 Aug 77

-1, 11 Johnston Island
25 Aug 77

-1, 4 JOHNSTON ISLAND
25 Aug 77

-1, 12 Johnston Island
25 Aug 77

-1, 5 Johnston Island
25 Aug 77

-1, 6 Johnston Island
25 Aug 77

-1, 7 Johnston Island
25 Aug 77

-1, 8 Johnston Island

SU

4 October 1978

Request For Travel Outside CONUS, RE: Capt Alvin L. Young

AMD/DAAO

1. The requirement to travel to Johnston Atoll by Captain Alvin L. Young effective on/about 15 Oct 78 has been cancelled.
2. Arrangements have been made with personnel assigned to the USAF Academy, who have been successful in obtaining a theater clearance, to conduct the survey and make necessary coral sample collections.
3. Request all action to obtain a theater clearance be terminated.

SIGNED

JOHN E. BUFFIN
Chief, Administration & Documentation Branch

Cy to: EC

26 Aug 77

Major Bill Cairney
USAF/DFCBS-R
USAF Academy CO 80840

Dear Bill,

Enclosed are 15 coral samples from the storage site and area here at J.I., marked:

Sample	#1	-	Control Sample	-	0"-6"	Coral Sample	O/O*
"	#2	-	Site Sample	-	0"-6"	Coral Sample	O/O
"	#3	-	"	"	0"-6"	"	O/O
"	#4	-	"	"	0"-6"	"	O/O
"	#5	-	"	"	0"-6"	"	L/L**
"	#6	-	"	"	0"-6"	"	L/L
"	#7	-	"	"	0"-6"	"	L/L
"	#8	-	"	"	0"-6"	"	L/L
"	#9	-	"	"	0"-6"	"	H/H***
"	#9A	-	"	"	6"-12"	"	H/H
"	#9B	-	"	"	12"-24"	"	H/H
"	#9C	-	"	"	18"-24"	"	H/H
"	#9D	-	"	"	0"-6"	"	H/H
"	#10	-	"	"	0"-6"	"	H/H
"	#11	-	"	"	0"-6"	"	H/H
"	#12	-	"	"	0"-6"	"	H/H

* - From site with no visible signs of spill and no H.O. odor

** From site with some light H.O., stain and slight odor of H.O.

*** - From site with heavy H.O., stain and strong odor of H.O.

Please run all of these samples for soil microorganisms.

Charles E. Thalken

Charles E. Thalken, Major USAF VC
Project Pacer HO,
Consultant Environmentalist

DEPARTMENT OF THE AIR FORCE
 USAF SCHOOL OF AEROSPACE MEDICINE (C)
 BROOKS AIR FORCE BASE, TEXAS 78235



REPLY TO
 ATTN OF: NGP

28 January 1977

SUBJECT: Report of Herbicide Analysis

TO: USAFOEHL (Maj Tremblay)
 Kelly AFB TX 78241

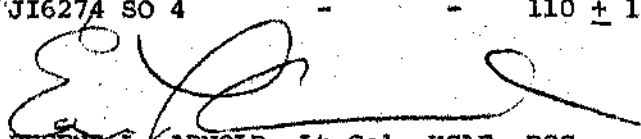
1. Six samples from Johnson Island were analyzed for the presence of the herbicides, 2, 4-D and 2, 4, 5-T free acid forms and 2, 4, D and 2, 4, 5-T n-butyl ester forms. Samples were analyzed by both flame ionization and electron capture gas-liquid chromatography. All four herbicide forms were determined in one set of samples using the method of Arnold and Young, FJSRL(NC) TM, 76-5, Dec 76. A second set of samples were analyzed for total 2, 4-D and 2, 4, 5-T using a modification of this method involving electron capture detection for increased sensitivity. Results of the analysis are given in tabular form below.

FID Analysis in ppm

Sample #	2,4,D			2,4,5-T			Total Herbicide
	Acid	Ester	Total	Acid	Ester	Total	
0-6" Control JI6274 SE 1	<20	<20	<20	<20	<20	<20	<20
6-12" Control JI6274 SE 2	<20	<20	<20	<20	<20	<20	<20
0-6" JI6274 SO 1	<20	<20	<20	<65	<20	65	65
6-12" JI6274 SO 2	<20	<20	<20	<20	<20	<20	<20
0-6" JI6274 SO 3	220 + 60	340 + 10	560	<20	710 + 45	710	1270
6-12" JI6274 SO 4	<20	135 + 27	135	240 + 60	340 + 83	580	715

EC Analysis in ppm

0-6" Control JI6274 SE 1	-	-	<1	-	-	<2	<2
6-12" Control JI6274 SE 2	-	-	<1	-	-	<1	<1
0-6" JI6274 SO 1	-	-	<1	-	-	<1	<1
6-12" JI6274 SO 2	-	-	<1	-	-	<2	<2
0-6" JI6274 SO 3	-	-	475 + 30	-	-	700 + 45	1175
6-12" JI6274 SO 4	-	-	110 + 10	-	-	680 + 55	790


 EUGENE L. ARNOLD, Lt Col, USAF, BSC
 Chief, Analytic Chemistry Function
 Clinical Pathology Branch

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS
FEDERAL CENTER BUILDING
HYATTSVILLE, MARYLAND 20782

IX
①

October 18, 1976

Colonel Walter W. Melvin, Jr.
United States Air Force Environmental
Health Laboratory
Kelly Air Force Base, TX 78241

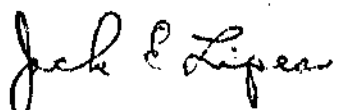
Dear Colonel Melvin:

In response to your recent request, we have issued Permit No. S-1805 for the importation of untreated soil samples. Please note from the permit itself the safeguards which must be followed when importing such material.

The permit has been made valid through Oct. 31, 1978 and may be revalidated upon receipt of a written request. We are enclosing 50 PPQ Form 550 labels. One of these labels should be attached to the outside of each container of soil as evidence that entry has been authorized. Only one label is required for each container of soil regardless of the number of samples contained therein. Additional labels will be supplied upon receipt of a written request.

Soil samples offered for entry without a valid PPQ Form 550 label attached will be held at the port of arrival until the existence of a valid permit has been determined.

Sincerely,



Jack E. Lipes
Head, Permit Unit
National Program Planning Staff

Enclosures

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS
FEDERAL CENTER BUILDING
HYATTSVILLE, MARYLAND 20782

IX
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October 18, 1976

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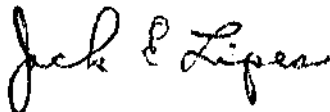
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Sincerely,



Jack E. Lipes
Head, Permit Unit
National Program Planning Staff

Enclosures

U. S. DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE PROGRAMS APPLICATION FOR PERMIT TO MOVE SOIL	INSTRUCTIONS: Applicant please complete Items 1 thru 21. Use reverse for continuation or additional remarks.	DO NOT USE S-1805
---	--	----------------------

FORWARD THIS APPLICATION TO: U. S. Department of Agriculture Animal and Plant Health Inspection Service Plant Protection and Quarantine Programs Federal Building Hyattsville, Maryland 20782	1. NAME AND ADDRESS OF APPLICANT (Include Zip Code) United States Air Force Environmental Health Laboratory Kelly Air Force Base, Texas 78241 Attn: Colonel Walter W. Melvin, Jr.
--	---

2. TYPE OF SOIL	3. COUNTRY OF ORIGIN	4. DEPTH TAKEN FROM SURFACE	5. NUMBER OF SAMPLES	6. APPROX. WEIGHT OF EACH	7. WILL HEAT STERILIZATION OF SOIL (before its release to you) INTERFERE WITH ITS INTENDED USE?
A. Coral Soil	Johnston Atoll, USA	0-2 ft.	100	2 lb.	<input type="checkbox"/> NO (If NO, check preferred treatment) <input type="checkbox"/> Dry Heat <input type="checkbox"/> Steam Heat <input checked="" type="checkbox"/> YES (If YES, item 19 must be signed by the Head of the Laboratory receiving the soil.)
B. Beach Sediment	Johnston Atoll, USA	0-2 ft.	100	2 lb.	
C.					
D.					

8. NUMBER OF SHIPPING CONTAINERS 50	9. METHOD OF PACKAGING SOIL Sturdy, leakproof containers within a shipping container.
--	--

10. METHOD OF SHIPMENT <input checked="" type="checkbox"/> Mail <input type="checkbox"/> Cargo <input type="checkbox"/> Baggage	11. SHIPPED BY <input checked="" type="checkbox"/> Air <input type="checkbox"/> Surface	12. PORT OF ARRIVAL Honolulu, HI	13. DATE OF ARRIVAL Approx Oct. 31, 1976
--	--	-------------------------------------	---

14. DESTINATION WHERE SOIL WILL BE USED (City and State) San Antonio, Texas	15. ARE OTHER IMPORTATIONS CONTEMPLATED WITHIN THE NEXT TWO YEARS? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
--	---

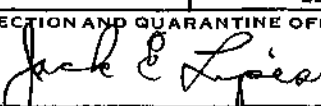
16. IS SOIL TO BE USED AS GROWING MEDIUM?
 Yes No if NO, state intended use Analyses for herbicide components.

17. PRECAUTIONS TO BE USED TO PREVENT PLANT PEST DISSEMINATION
 Samples to be used only for analytical purposes. Purified extracts may be sent to other labs for analyses, but original sample will be processed only by permittee.

18. METHOD OF FINAL DISPOSITION (Autoclaving, incineration, or other)
 Unconsumed samples and containers will be sterilized by permittee at Kelly Air Force Base, Texas.

19. SIGNATURE OF APPLICANT OR AGENT (Laboratory Head must sign if you checked YES in item 7.) /s/ Walter W. Melvin, Jr., Colonel USAF, MC Commander	20. TELEPHONE NUMBER	21. DATE September 30, 1976
---	----------------------	--------------------------------

TO BE COMPLETED BY STATE REGULATORY OFFICIAL		
COMMENTS Accept USDA's decision.		
SIGNATURE /s/ David A. Ivie	TITLE	DATE October 12, 1976

TO BE COMPLETED BY PLANT PROTECTION AND QUARANTINE PROGRAMS		
PERMIT		
Under authority of the Federal Plant Pest Act of May 23, 1957, permission is hereby granted to the applicant named above to move the soil described, subject to the following conditions:		
1. To be shipped in sturdy, leak-proof containers. 2. To be released without treatment at the port of entry. 3. To be used only for herbicide analyses and only in the laboratory of the permittee at Kelly Air Force Base, Texas. 4. All unconsumed soil, containers, and effluent to be incinerated or autoclaved by permittee at conclusion of project. 5. Purified extracts may be moved to other laboratories without further restrictions.		
PERMIT NO. S-1805	VALID THROUGH THROUGH OCTOBER 31, 1978	NO. LABELS ISSUED 50 PPQ Form 550
SIGNATURE OF PLANT PROTECTION AND QUARANTINE OFFICIAL 		DATE October 18, 1976

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS
FEDERAL CENTER BUILDING
HYATTSVILLE, MARYLAND 20782

IV
①

October 18, 1976

Colonel Walter W. Melvin, Jr.
United States Air Force Environmental
Health Laboratory
Kelly Air Force Base, TX 78241

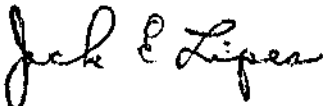
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Sincerely,



Jack E. Lipes
Head, Permit Unit
National Program Planning Staff

Enclosures

**HOLMES &
NARVER, INC.**

TECHNOLOGY & CONSTRUCTION

A RESOURCE SCIENCES COMPANY

PACIFIC TEST DIVISION
AEC CONTRACT AT(20-2)-20

P. O. BOX 200

APO SAN FRANCISCO, CALIFORNIA 96308

31 July 1974

SUBJECT: DISPOSAL OF HERBICIDE ORANGE

DATE: 31 July 1974, 1300 Hours

PLACE: JOC Bldg., Room 226
Johnston Atoll

CONFEREES: Major Eugene L. Arnold, USAF Academy
Captain Alvin L. Young, USAF Academy

Mr. R. L. Murphy, Resident Manager, H&N, Inc.
Dr. L. C. Spillman, Jr., Chief Medical Officer
Mr. D. J. Kinslow, Supervisor, Medical Services

A brief meeting was held in the Resident Manager's office to discuss an alternate means of disposing of Herbicide Orange.

A change in the Environmental Protection Agency's stand on Herbicide Orange may permit sale of the product rather than destruction. The product must be sampled for dioxin to determine if the product meets EPA standards.

Two alternatives of sampling the product were considered:

1. Sample each drum individually
2. Sample small lots of twenty drums

The chemical analysis necessary to determine dioxin levels must be done in a mainland laboratory (Dow Chemical, Midland, Michigan).

Referencing the Conference Report of 22 February 1974, Subject: Herbicide Orange Survey, and updating certain elements for recent and anticipated inflation, some approximate costs were calculated.

	<u>Individual Sample</u>	<u>Lot Sample</u>
Labor to redrum	\$ 15	\$15
New drum from West Coast	50	50
Analysis Cost	70	4
Transportation to West Coast	<u>22</u>	<u>22</u>
Cost per drum	\$157	\$91

HOLMES & NARVER, INC., JA
CONFERENCE REPORT - DISPOSAL OF HERBICIDE ORANGE
31 JULY 1974

Page 2 of 3

Labor costs include restoring and movement to dockside.

New drum includes transportation from West Coast.

Analysis cost is \$70 per sample. A "lot sample" consists of 20 drums.

Transportation to West Coast includes port handling. Costs are based on shipping pallets of four (4) drums each.

The "lot sample" of 20 drums is based upon the capacity of the sump at the new redrumming facility. It is estimated that approximately 1140 "lot samples" would be generated.

The individual sample would require individual drum identification and handling. The drum would require a second handling when cleared for redrumming. This approach appears too expensive.

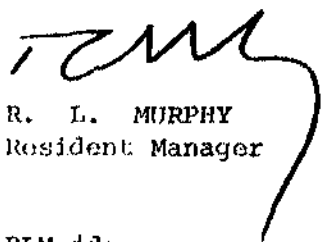
"Lot sampling" would reduce the cost per drum, could possibly increase the total saleable product by the random diluting of drums containing unacceptable levels of dioxin with quantities of drums containing acceptable levels, and would reduce total handling time.

The present market value of Herbicide Orange is estimated at a minimum of \$2,000 per drum. The government's investment is considerably less than that amount, and even adding the higher costs of redrumming "individual samples," significant costs could be recouped through sale of the product.

Empty drum disposal would be the same as that planned if the product is destroyed.

Unacceptable lots would have to be burned, probably on-site with an incinerator constructed for that purpose.

HOLMES & NARVER, INC.
Pacific Test Division - JA



R. L. MURPHY
Resident Manager

RLM:jds

HOLMES & NARVER, INC., JA
CONFERENCE REPORT - DISPOSAL OF HERBICIDE ORANGE
31 JULY 1974

Page 3 of 3

DISTRIBUTION

Conferees

Commander, Johnston Atoll, FCDNA
Director of Logistics, JA, FCDNA
Base Engineer, JA, FCDNA
Director, PASO, Honolulu
General Manager, PTD, Honolulu
USAEC Site Representative, JA
Subject File



UTAH STATE UNIVERSITY · LOGAN, UTAH 84322

AGRICULTURAL EXPERIMENT STATION

OFFICE OF THE DIRECTOR
UMC 48

Jan 14-17, 1975

May 13, 1974

MEMORANDUM

TO: W-82 Committee, "Dissipation and Degradation of Herbicides and Related Compounds in Soil and Water Systems."

FROM: Wynne Thorne

The project revision for W-82 was approved in April by the Committee of Nine. All CRIS forms and budget arrangements for participating projects should be completed soon so the program can move forward effectively after July 1.

The Committee, along with some others in the Soil and Water area, plans to hold its next meeting in Hawaii during the week of January 13, 1975.

WT/ch
CC: Directors

Wynne Thorne

*Richard E. Green
Prof. Soil Sci.*

*Dr. George A. O'Connor
Department of Agronomy
New Mexico State University
Las Cruces, New Mexico 88003*

FTS 8-505-766-5511
646-2219

or (505) 646-3405

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

file 9/10
18-B


REPLY TO
ATTN OF:

EC

10 APR 1978

SUBJECT: Trip Report - Johnston Island, 6-10 Jan 78:

TO: EC *Meades*
SU *hagan 10 9 78*
QE *Robinson 11/9/78*
CV *Jay 11 9 78*
CC *Wolym 12 Apr 78*
IN TURN

1. Place: Johnston Island, Pacific Ocean
2. Inclusive Dates of Travel: 6-10 Jan 78
3. Person Making Trip: Captain Alvin L. Young
4. Primary Mode of Transportation: Commercial Air
5. Purpose of Trip: To collect soil samples on Johnston Island from the site previously used for the storage of Herbicide Orange.

6. Persons Contacted:

a. Capt William J. Cairney, Dept of Chemistry and Biological Sciences, USAF Academy CO. Provided assistance in conducting site selection and in collecting samples.

b. Maj Marshall W. Nay, BCE, FCDNA/FCJ. Deputy Base Commander; Johnston Atoll.

c. Mr. John Merle, Holmes and Narver Resident Manager, Johnston Atoll.


d. Mr. James Hashimoto, Civil Engineer, Johnston Atoll.

7. Comments and Observations:

a. The concept, site selection criteria and proposed analyses schemes are presented in Attachment 1. A total of 42 sampling sites were located, tagged with aluminum caps, charted on a base map, and sampled to a depth of 8 cm. Per the proposed scheme, 14 samples of each treatment were collected (Attachment 2). The coral from each hole was crushed, uniformly mixed and placed into 200 ml bottles for transport to the respective laboratories (University of Utah for chemical analyses, and USAF Academy for microbial analyses).

b. To facilitate future sampling, all samples collected on 8-9 Jan 78, were collected 15 cm directly west of locator tag. Thus, four complete sets of samples can be collected without the problem of sampling in a previously disturbed site. Furthermore, all four samples will be collected within an area of 0.1 m² and should thus reasonably represent the same treatment.

c. In the outbriefing to Maj Nay and Mr Merle, I emphasized the importance of minimizing traffic or human activity in the sampling area. Such activity could potentially a) disturb or destroy the location of the 42 sampling sites, b) further contaminate the sites with additional extraneous hydrocarbons (fuel, motor oil, tire residue, etc.), and c) extend the present area of herbicide and TCDD contamination to non-contaminated areas. I recommended that the entire area should be closed pending analyses of data for at least 3 sampling dates (a total period of approximately 18 months). This action has been officially requested and confirmed (Attachments 3 and 4).


ALVIN L. YOUNG, Captain, USAF, Ph.D
Consultant, Environmental
Sciences

- 4 Atch
1. JI Project Description
 2. Table 1
 3. Msg, 14Z325Z Feb 78
 4. Msg, 161850Z Feb 78

JOHNSTON ISLAND HERBICIDE ORANGE
STORAGE SITE MONITORING PROJECT

USAF OEHL/EC
BROOKS AFB TX
JANUARY 1978

CONCEPT

The soil of the 1.5 hectare storage site (used for the storage of Herbicide Orange from Apr 1971 - Sep 1977) consists of highly compacted coral dredged from a surrounding lagoon. Although the coral is relatively homogeneous, the contamination by Herbicide Orange is heterogeneous: dates of spills or the amounts of herbicide or areas involved were not recorded. Thus, the expected variability in herbicides and TCDD concentration throughout the storage site dictated that the monitoring program: (a) provide inferences as to the range of residue levels in the coral for any point on the site; (b) be sufficiently replicated to be statistically valid; (c) be continued over a sufficiently long period of time so that trends in residue degradation are evidenced; and (d) be accomplished within USAF budgetary limitations. In addition, the "ideal" monitoring program should have some method of determining a minimum level of residue that can be considered as biologically and ecologically acceptable, i.e., a "no" significant effect residue level.

SITE SELECTION

Previous analyses of coral samples collected (24 Aug 1974 and 25 Aug 1977) at sites within the inventory area where herbicide spills had occurred indicated that 98% of all herbicides and TCDD residues were found within the top 8cm of soil profile. Thus, the soil monitoring program was confined to a single depth (0-8cm). The sites selected within the storage area for monitoring of residue were determined by whether a spill had occurred or not occurred at that specific location. The basis for determining a spill was whether a herbicide stain was discernible (heavy, light, absent) and whether a herbicide odor was detectable (strong, mild, absent). Thus, within the storage area numerous locations were found that had a heavy stain and strong odor (labeled H/H, presumably representing a recent spill); a light stain and mild odor (labeled L/L, presumably representing an older spill); and no stain and no odor (labeled O/O, presumably representing an uncontaminated area). Fourteen replications of each treatment were then randomly selected to represent the storage area (thus, a total of 42 permanently marked sampling locations). Twelve of these locations (four of each of the treatments) were located and marked on 25 Aug 1977 with the remaining 30 located and marked on 8 Jan 1978. [The first complete set of soil samples were collected 9 Jan 1978.]

CHEMICAL ANALYSES

Soil samples will be collected and placed into new glass jars (400ml) appropriately labeled and transported to the laboratory where they will be uniformly mixed and subsampled. One subsample will be used for chemical analysis and will be immediately frozen. The remaining sample will be used for microbial studies (see microbial analyses). Each soil sample will be analyzed for the esters and acids of 2, 4-dichlorophenoxyacetic acid (2, 4-D) and 2, 4, 5-trichlorophenoxyacetic acid (2, 4, 5-T). In addition, each sample will be analyzed for di and trichlorophenols (immediate degradation products of 2, 4-D and 2, 4, 5-T) and TCDD (2, 3, 7, 8-tetrachlorodibenzo-p-dioxin).

MICROBIAL ANALYSES

To determine an ecologically acceptable "no effect" residue level, all samples will be analyzed for total populations of actinomycetes, fungi and bacteria. In addition, key species responding to the presence of herbicides, phenols, or TCDD residues will be monitored. Quantitative and qualitative studies of the microorganisms from each of the treatment classes used in association with residue data should permit an establishment of a no effect level.

TABLE 1

Soil Samples Collected 8-9 Jan 78
and their Respective Characterizations. Samples Collected
from Johnston Island in Support of Site Monitoring Project.

<u>Sample Number</u>	<u>Characterization</u>	<u>Sample Number</u>	<u>Characterization</u>
1	O/O	22	O/O
2	L/L (O/O)	23	O/O
3	O/O	24	L/L
4	O/O	25	L/L
5	H/H	26	L/L
6	H/H	27	L/L
7	L/L	28	L/L (H/H)
8	L/L	29	L/L
9	H/H	30	L/L
10	H/H	31	L/L
11	H/H (L/L)	32	L/L (H/A)
12	H/H	33	L/L
13	O/O	34	L/L
14	O/O	35	H/H
15	O/O	36	H/H
16	O/O	37	H/H
17	O/O	38	H/H
18	O/O (L/L)	39	H/H (L/L)
19	O/O	40	H/H
20	O/O	41	H/H
21	O/O	42	H/H

D34

TOP-0260092

MLN-026377

15 FEB 78 02 27

REC-1
A-1/53
A-1/11
ROUTE
A-1/PP ✓

RTTUZYU RUMH ATAD113 0260017-0000 -- RUYKAAA.

ZNR 00000

0 142 2557 FEB 78 ZNY

FM COMMANDER JOHNSON ATOLL/FCJ

TO RUYKAAA/DEMI KELLY OPS TX/OLAA

INFO RUMTFBZEDNA HIRFLAND AFB NM/FCJ

BT

UNCLAS

SUBJECT: HERRICIDE ORANGE DISPOSAL PROGRAM

1. FOR THE PERIOD 10-12 JAN 78 CAPT A. L. YOUNG OF YOUR ORGANIZATION AND CAPT W. J. CARNEY OF USAFABDCBS VISITED JAI FOR A STAFF ASSISTANCE VISIT RELATIVE TO THE ABOVE SUBJECT.

2. AMONG THE ITEMS DISCUSSED WERE:

A. CHANGE THE FREQUENCY OF WATER SAMPLING FROM ONCE EVERY TWO WEEKS TO ONCE PER QUARTER.

B. FENCE OFF THE OLD HERRICIDE STORAGE AREA ON THE NW CORNER OF JI.

3. WE HAVE NOT YET RECEIVED FINAL WRITTEN GUIDANCE ON THESE ITEMS.

4. YOU PROVIDE SAME AT YOUR EARLIEST CONVENIENCE. FOR YOUR INFORMATION WE ERECTED TEMPORARY BARRICADES AROUND THE STORAGE AREA AS AN INTERIM MEASURE.

BT

BT

NNNN

TOP-0260092

MLN-026377

ROUTE

ATCH 3

1 1

RR RR

UUUU

161850 Z

901
file 8/1
3A

FEB 78

USAF OEHL BROOKS AFB TX/EC
COMMANDER JOHNSTON ATOLL/FCJ
INFO: FCDNA KIRTLAND AFB NM/FCL

UNCLAS

SUBJ: HERBICIDE ORANGE DISPOSAL PROGRAM YOUR MSG 142325Z FEB 78.

1. REFERENCE IS MADE TO ITEMS DISCUSSED DURING CAPT YOUNG'S TDY IN JAN 78. ITEM 2A, YOUR MSG, THE FREQUENCY OF WATER SAMPLING AND MODIFICATION OF THE WATER SAMPLING PROGRAM WERE CONTAINED IN USAF OEHL/CC LTR DTD 3 FEB 78. ITEM 2B, YOUR MSG, PURPOSE OF EXCLUDING VEHICULAR TRAFFIC OVER OR ON THE FORMER STORAGE SITE IS TO REDUCE UNNECESSARY SPREADING OF KNOWN CONTAMINATION FROM THE SITE, PRECLUDING ANALYTICAL INTERFERENCES IN SAMPLES COLLECTED DURING THE MONITORING PROGRAM.

2. AS DISCUSSED WITH JOHNSTON ISLAND STAFF DURING JAN TDY, TEMPORARY BARRICADES FOR EXCLUDING TRAFFIC WILL BE SUFFICIENT. ESTIMATE MAXIMUM EXCLUSION APPROXIMATELY 18 MONTHS.

JAMES R. TREMBLAY, Major, USAF, BSC
Acting Chief, Consultants Division/EC
X2891, 15 Feb 78

Imp

CURTIS/MICHAEL, SU, 3422
ADMIN ASST

UNCLASSIFIED

ATON 4

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

21 file



20 JUN 1979

REF ID: A7900001
ATTN OF: CC

SUBJECT: Final Report OEHL TR-78-87, Sept 1978, "Land Based Environmental Monitoring at Johnston Island - Disposal of Herbicide Orange"

TO: See Distribution

1. The subject report is provided for your information. This report, prepared under contract by Battelle Columbus Laboratories, Columbus, Ohio, documents the results of occupational and environmental monitoring of the Herbicide Orange land-based dedrumming and transfer operations conducted at Johnston Island during July and August 1977. This report concludes that the Herbicide Orange disposal operations of dedrumming, hauling, and transferring the herbicide to the incinerator ship, M/T Vulcanus, had negligible impact on the local marine and surface terrestrial environment of Johnston Island. In addition, the results of industrial hygiene observations revealed that personnel exposures to herbicide vapors were well below permissible levels.
2. A report covering the Herbicide Orange land-based operations at the Naval Construction Battalion Center (NCBC), Gulfport, Mississippi, in June 1977 is currently in press and will be distributed in the near future. No significant adverse environmental or occupational impact was noted during the NCBC operations.
3. A technical report covering the shipboard incineration operations has been published ("At-Sea Incineration of Herbicide Orange Onboard the M/T Vulcanus," EPA-600/2-78-08-6, April 1978). This report, prepared under contract by TRW, Inc., Redondo Beach, California, documented full compliance with all Environmental Protection Agency (EPA) permit requirements for the shipboard incineration operations. A copy of the EPA report may be obtained through the National Technical Information Service, Springfield, Virginia 22161.

William E. Mabson

WILLIAM E. MABSON, Colonel, USAF, BSC
Commander

1 Atch
OEHL TR-78-87, Sept 1978

Distribution:

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OL AD USAF OEHL	1	HQ AFILC/LOT ✓	1
USU RE (EGLS) ✓	2	HQ AFILC/LOI ✓	1
SAF/HIQ ✓	2	HQ AFESC/SGPA ✓	1
SAF/ALG ✓	2	HQ ATC/SGPA ✓	1
SAF/OIP ✓	3	HQ PACAF/SGPA ✓	1
HQ USAF/SGES ✓	2	HQ PACAF/LG ✓	1
HQ USAF/LG ✓	1	HQ PACAF/OIP ✓	3
HQ USAF/SGI ✓	1	HQ DNA/OALC ✓	1
HQ AFMSC/SGPA ✓	1		
HQ AMD/CC ✓	1		
HQ AMD/RD ✓	1		
HQ AMD/OI ✓	3		
HQ FEONA/FCLS ✓	5		
CINCPAC/J 423 ✓	2		
US EPA (WH-548) ✓	3		
EPA Region IX ✓	1		
SA-ALC/SF ✓	1		
SA-ALC/AC ✓	1		
SA-ALC/OI ✓	2		
Naval Ordnance Station/NOL ✓	1		
HQ AFILC/CC ✓	1		
HQ AFILC/SGPA ✓	1		

27 JUL 1979

ECW

Sampling Frequency for Johnston Island Herbicide Orange Monitoring Sites

Defense Nuclear Agency
Johnston Atoll Field Command
APO San Francisco 96305

1. A review of analytical results for environmental ocean samples for the period of April 1972 through March 1979 indicates there is no significant contamination of ocean waters surrounding Johnston Island by 2,4-D or 2,4,5-T.

2. We recommend a reduction in the frequency of routine sampling from quarterly to semiannually for the following ocean sites:

- Off the main pier
- Off North Island
- Off the LOX plant
- Off the east end of the runway
- Off the salt water intake
- Off the west end of the runway

3. We recommend maintenance of the current quarterly sampling schedule for the following ocean site:

Shoreline, herbicide area

4. If we can be of further assistance to you, please contact us at AUTOVON 240-3305.

SIGNED

GARY A. FISHBURN, Major, USAF, BSC
Chief, Water Quality Branch

Cy to: DNA, Kirtland Field Command

1. SUBMITTED BY: *[Signature]* 2. DATE REC'D: *[Date]* 3. SAMPLE NUMBER: **77PE03059-70**

4. ANALYSIS REQUESTED: **Herbicides** 5. ANALYST: **MR. VAN**

6. SAMPLE DESCRIPTION:

7. METHODOLOGY: **Gas Chromatography**

SAMPLE ANALYZED FOR	Quantitative Detection Limit (1 Liter sample) Nanograms/Liter (parts per trillion)	LAB CONTROL NUMBER - BASE CONTROL NUMBER																				
		CONCENTRATION in 1 LITER SAMPLE - NANOGRAMS/LITER*																				
		77PE03059	77-267	77PE03060	77-268	77-269	77PE03062	77-270	77PE03063	77-271	77PE03064	77-272	77PE03065	77PE03066	77-274	77PE03067	77-275	77PE03068	77-276	77PE03069	77PE03070	77-278
Butyl ester of 2,4-D	60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Butyl ester of 2,4,5-T	60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2,4-Dichloro-phenoxyacetic acid (2,4-D)	60	X	X	X	X	X	X	X	X	~600	X	X	X	X	X	X	X	X	X	X	X	X
2,4,5-Trichloro-phenoxyacetic acid (2,4,5-T)	60	X	X	X	X	X	X	X	X	~550	X	X	X	X	X	X	X	X	X	X	X	X
iso-Octyl ester of 2,4-D	60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
iso-Octyl ester of 2,4,5-T	60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A compound similar to Aroclor 1248	400	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

LOG OUT AND FILE. SEND COPY OF BOTH TO CAPT. PONTIER AT Kelly AFB.

[Signature] YOSHIMI A. NISHIOKA, Chemist

DATE: **T.T. 30 NOV 77**

SACRAMENTO FORM 444APKS APR 69 597

DATA SHEET FOR SAMPLE ANALYSIS

TO: U S A F ENVIRONMENTAL HEALTH LAB., MC CLELLAN AFB, CA 95652 Date 25 Oct. 1977
Submitted

FROM: FIELD COMMAND, JOHNSTON ATOLL, DEFENSE NUCLEAR AGENCY APO SAN FRAN., 96309

Base Sample Control Number: 77-267 thru 77-278 **Lab Sample Control Number:**

TYPE SAMPLE: SEA AND FRESH WATER SAMPLES

AREA SAMPLED (Complete): JOHNSTON ISLAND LAGOON AND FRESH WATER DISTRIBUTION.

DATE COLLECTED: 24 Oct 1977 **HOUR COLLECTED:** 0900 hrs & 1300 hrs.

ANALYSIS DESIRED: QUANTITATIVE AND QUALITATIVE FOR 2,4-D & 2,4,5,-T (HERBICIDES)

METHOD OF SAMPLING (Composite, Grab, Etc) GRAB METHOD

- REMARKS:**
- 77-267 OCEAN, OFF MAIN PIER
 - 77-268 OCEAN, OFF LOX PLANT
 - 77-269 OCEAN, OFF WEST END RUNWAY
 - 77-270 OCEAN, OFF NORTH ISLAND
 - 77-271 OCEAN, OFF EAST END RUNWAY
 - 77-272 OCEAN, at SALT WATER INTAKE
 - 77-273 OCEAN, SHORELINE, HERBICIDE AREA
 - 77-274 FRESH WATER STORAGE TANK, DIST. PLANT
 - 77-275 FRESH WATER TAP, JOC BLDG.
 - 77-276 FRESH WATER TAP, DISPENSARY
 - 77-277 FRESH WATER TAP, MESSHALL
 - 77-278 FRESH WATER RESERVOIR, 200,000 ^{Gallons} Tank.

NOTE: PLEASE SHIP TO THIS JOB-SITE ADDITIONAL SAMPLE BOTTLES.

Coral Samples
 Tahiti Island
 25 Aug 1977

1	25 Aug 77	III	Control, Loc. # 1, 0-6"
152	25 Aug 77	III	O/O, Storage Site, Loc. # 2, 0-6"
163	25 Aug 77	III	O/O, Storage Site, Loc. # 3, 0-6"
174 029	25 Aug 77	III	O/O, Storage Site, Loc. # 4, 0-6"
185	25 Aug 77	III	L/L, Storage Site, Loc. # 5, 0-6"
196	"	"	L/L, " " " 6 0-6"
207	"	"	" " " 7 "
218	"	"	" " " 8 "
220 D	"	"	H/H " " " 9d 18-24"
9C	"	"	H/H " " " 9c 12-18"
9B	"	"	" " " 9b 6-12"
9A	"	"	" " " 9a 0-6"
2410	"	"	" " " 10 "
2711	"	"	" " " 11 "
2812	"	"	" " " 12 "

Soil Breakdown Laboratory

Johannesburg

Description

Core No.	Depth (ft)	Soil Description	Soil Type
1	0-6	Control, Coral Sand	#1 F
2	6-12		#1 E
3	12-18		#1 D
4	18-24		#1 C
5	24-30		#1 B
6	30-36		#1 A
7	0-6	Storage Site	#10 F
8	6-12		10 E
9	12-18		10 D
10	18-24		10 C
11	24-30		10 B
12	30-36		10 A
13	0-6	Storage site	#11 F
14	6-12		11 E
15	12-18		11 D
16	18-24		11 C
17	24-30		11 B
18	30-36		11 A
19	0-6		12 F
20	6-12		12 E
21	12-18		12 D
22	18-24		12 C
23	24-30		12 B
24	30-36		12 A

030
031

027
028

034
035

036
037

SUBJECT: MEMO FOR THE RECORD - Coral Samples from Herbicide Orange Site, Johnston Island 29 August 1977

1. On 25 Aug 77, 15 coral samples were collected from twelve separate sites in the Herbicide Orange storage area at Johnston Island. These sites were located and marked by the base civil engineer using surveying equipment. A bench mark is located in the northwest corner of the storage site and all bearings, distances and coordinates were recorded from that bench mark.

2. All samples were collected from the 0-6 inch level except sample site number nine which was sampled at 0-6, 6-12, 12-18 and 18-24 inch levels. Sample number 1 represents the control sample taken just over 100 feet up wind of the herbicide storage site. This sample was taken between the existing road and drainage ditch and should be well outside any area of traffic and accidental contamination. The elevation at site 1 is higher than the storage site which would preclude drainage from the storage site to the control area. Samples 2, 3, and 4 represent areas with no visible signs of H.O. spill and no H.O. odor in the field. However, when these samples were brought into the laboratory a slight H.O. odor could be detected. Samples 5, 6, 7, and 8 were collected from areas with light H.O. stain and slight H.O. odor. These sample holes were typically stained with H.O. in the top 1/8 - 1/4 inch of the sample. This top material was composed of compacted H.O. stained coral. A light stain could then be seen for 1/8 - 1/2 inch below this heavy compacted layer. The odor of herbicide could be detected throughout the sample. Sites 9, 10, 11, 12 represented large, long standing, heavy, H.O. stains and had a very strong H.O. odor. The compacted layer on these sites were typically 1/4 - 3/4 inches thick with visible stain carrying down 1/4 - 1 inch below that. A strong H.O. odor was detected in all 0-6 inch samples. At site number 9, H.O. odor was detected at 0-6, 6-12 and slight odor at 12-18 inches. No odor at 18-24 inch level.

3. All sites were photographed while collecting the sample. Each sample was mixed but the large pieces of material were not broken up. The sample was collected in 1 Qt wide mouth jars with a 2 oz jar being filled with several subsamples during the filling of the 1 Qt jar. These subsamples were labeled and sent by priority mail to Major Cairney USAFA/DFCBS, USAF Academy CO 80840 on 26 Aug 77, for soil microorganism studies. The 1 Qt jars were labeled and placed in a deep freeze pending shipment to OL AA USAF OEHL, Kelly AFB TX 78241. The expected date of shipment for these 15 Coral

samples is Friday 2 Sep 77.

4. No samples were taken from the center of the storage site due to the heavy traffic pattern created during the dedrumming operation. It was felt this particular area would possible have a significant amount of cross contamination. The sampling sites selected in less heavily traveled parts of the storage area are representative of the spills seen throughout.

Charles E. Thalken

CHARLES E. THALKEN

Major, USAF VC

Project PACER HO, Environmental Consultant

1 ATCH

1. Survey coordinates

TEST HOLE	BEARING	DISTANCE	COORDINATES	
			NORTH	EAST
TH-1	S 76° 20' E	692.00	197,644.74	193,884.15
TH-2	S 89° 19' E	450.88	197,785.41	193,701.29
TH-3	S 68° 14' E	117.61	197,755.18	193,359.84
TH-4	S 4° 16' W	224.85	197,574.56	193,233.88
TH-5	N 87° 52' E	386.69	197,813.19	193,637.03
TH-6	N 38° 29' E	131.49	197,901.72	193,332.34
TH-7	S 30° 02' E	236.09	197,594.40	193,363.77
TH-8	S 79° 44' E	511.85	197,707.56	193,754.27
TH-9	S 77° 07' E	381.14	197,713.81	193,622.16
TH-10	S 60° 12' E	343.19	197,628.23	193,548.42
TH-11	S 17° 48' 30" E	282.88	197,529.46	193,337.12
TH-12	S 20° 20' E	55.10	197,749.00	193,269.06

TCDD ANALYSIS, LIQUID ORANGE SAMPLES

Analysis Performed by ARL/LJ, WPAFB, Ohio

Samples submitted: 1 February 1975

Data Received: 11 March 1975

<u>Sample Source</u>	<u>Sample Number</u>	<u>Date Sampled</u>	<u>TCDD PPM</u>	
*Johnston Island	1	1 Aug 74	< 0.25	(a)
" "	2	"	1.3	(a)
" "	3	"	0.3	(a)
" "	4	"	< 0.07	
" "	5	"	< 0.07	
" "	6	"	0.07	
" "	7	"	4.6	
" "	8	"	4.6	
" "	9	"	5.3	
" "	10	"	0.28	
**Eglin AFB	1	1 Jan 70	< 0.04	
***Eglin AFB	2	"	< 0.04	

(a) TCDD peak appeared on top of large interference peak.

* Samples collected from Drums that were to be re-barrelled.

** Sample routinely used at USAFA for laboratory experiments.

*** Samples used in Biodegradation Plots, Eglin AFB, Florida, April, 1972.

AN ECOLOGICAL AND HERBICIDE-RESIDUE STUDY
OF THE ORANGE HERBICIDE STORAGE
SITE, JOHNSTON ISLAND, AUGUST 1974

DECEMBER 1974

CAPTAIN ALVIN L. YOUNG, Ph.D.

MAJOR EUGENE L. ARNOLD, Ph.D.

DEPARTMENT OF LIFE AND BEHAVIORAL SCIENCES
UNITED STATES AIR FORCE ACADEMY

INTRODUCTION

Since April 1972 Johnston Island (Atoll) has been the storage site of approximately 25,000 drums (1.4 million gallons) of Orange Herbicide. The herbicide was part of a 2.3 million gallon inventory remaining from the termination of the defoliation program in Southeast Asia. The storage on Johnston Island was to be short term while the Department of the Air Force determined final disposition of the herbicide is still forthcoming. ^{of the inventory. To date however, ~~the~~ the solution to the disposal}

In the interim period continual monitoring of the condition of the drums, and subsequent re-drumming when required, has been a necessity for the Air Force. Furthermore, periodic environmental surveys of the storage areas have been conducted to insure that any herbicide spillage and/or leakage was not adversely effecting the surrounding biota.

The present survey was undertaken at the request of Headquarters AFLC and was designed to (a) determine the extent of lateral and vertical movements of herbicides in the coral of the storage site, and (b) conduct a cursory ecological survey of the surrounding flora.

METHODS AND MATERIALS

A survey of the Herbicide Storage Site on Johnston Island was conducted 30 July - 1 August 1974. Prior to sample collection, the entire storage site and surrounding area were examined. Notes were taken on areas within the storage site that appeared contaminated with herbicides. These sites were then checked by interviewing two employees of Holmes and Narver Incorporated, the civilian contracting firm having responsibility for maintaining the inventory. The two employees interviewed were engaged in a continual screening and re-drumming operation. (The entire inventory of 24,788 drums was screened daily and "leakers" were identified and removed to the re-drumming area. Re-drumming occurred on Saturday mornings for all drums identified as leakers during the week.

RESULTS AND DISCUSSIONS

← Environmental Summary of The Physical Environment

Johnston Atoll is located at latitude 16 degrees 45 minutes north and longitude 169 degrees 30 minutes west. It is one of the most isolated atolls in the Pacific Ocean. Johnston Atoll consists of a pair of low sand and coral islands, Johnston and Sand Islands, with a combined area of approximately 648 acres. The herbicide storage site is located on the northwest corner of Johnston Island. Winds are dominant from the east to the west and as a result any vapors from spillage or leakage of the Orange herbicide would be ^{normally} carried away from the personnel area and out to sea. Concurrently, ocean currents immediately off-shore from the storage site, predominantly move from the east to the west. Thus, water transport of any herbicide which may be accidentally spilled would ^{generally} be away from the island. Ocean currents in the vicinity of Johnston Island run at a speed of about 1/2 knot or from 10 to 15 miles per day.

The climate of Johnston Atoll is marine and tropical. The mean annual temperature is 79.3 F with the daily maximum and minimum temperatures varying only a few degrees throughout the year. The mean annual precipitation is 26.11 inches, but year-to-year variation is great. The annual mean relative humidity is 75 percent, being highest at 0100 hours (78 percent) and lowest at 1300 hours (69 percent). The mean annual wind speed is 15.1 miles per hour with very little variation throughout the year.

The condition of the storage area provided evidence of rapid identification of leakers since only a few spillage areas were observed.) The two employees confirmed two sites that had been contaminated with significant quantities of herbicide. The first sample (U-2) came from a site identified as location U-2 (drums in the storage are arranged in columns, alphabetized, and in rows, numbered sequentently) and was the site where a 55 gallon drum of herbicide had ruptured in May 1974, (two month earlier). The second sample (sample N-2) came from a site identified as location N-7 and was the site where a 55 gallon drum of herbicide had ruptured in late February 1974 (five months earlier).

Since the entire site was established upon crushed and packed coral, samples U-2 and N-2 were obtained by ~~use~~ use of pick, shovel, and trowell. A hole twelve inches deep was excavated by use of the pick and shovel. Once the initial hole was dug, the trowell was used to carefully clean excess debri from one wall. Following measurement, two ^{-inch increments} ~~inches~~ of coral ~~increment~~ were removed to a depth of ten inches. Each two-inch increment was transferred to a 6 ~~oz~~ ounce new class jar and capped with aluminum foil and the lid. Coral samples were then taken back to the Air Force Academy, where they were analyzed for 2,4-D and 2,4,5-T herbicide. Selected samples were shipped to the Aerospace Research Laboratory, Wright-Patterson AFB, Ohio, for analysis of TCDD, 2,3,7,8-tetrachlorodibenzo-p-dioxin.

The following is a report on the analysis for residual herbicide on twelve soil (coral) samples obtained on 30 July 1974 from the Herbicide Orange storage and redrumming area on Johnston Island.

Description of samples: Samples 1-5 were obtained from an area of the storage yard designated by the quadrants U,2. They consist of depth increments of 0-2", 2-4", 4-6", 6-8 and 8-10" taken from an area where a drum of Orange had previously ruptured, spilling the contents on the surface of the coral. It was determined from conversations with workers in the area (redrumming crew) that this spill had occurred in late May 1974 or approximately 2 months prior to sampling. Discoloration of the surface was still much in evidence and a slight herbicide odor could be detected.

Samples 6-9 were obtained from an area of the storage yard designated N,7 where a drum had ruptured approximately 5 months prior to sampling. They consist of depth increments of 0-2", 2-4", 4-6". In this area discoloration was less evident and little odor could be detected.

Sample 10 was taken directly below the redrumming apparatus, in an area where considerable spillage had taken place. It consisted of a 0-4" increment

Sample 11-12 represent control samples taken outside the storage and redrumming area. The former was obtained approximately 5 yards from the shoreline in the vicinity of storage yard while the latter was obtained from an area approximately 1/2 mile north of the storage area. Both were 0-4" depth increments.

Discussion:

Several conclusions can be drawn from the above data. First, it appears likely that the coral of the island degrades herbicide orange at a relatively rapid rate. This is evident from the higher concentrations determined in the area of the more recent spill and from the predominance of acid forms (1st step in the degradation) in the "soil from the area of the spill which occurred 5 months prior to the sampling. Secondly, the hard packed nature of the coral and the insolubility of the ester prevents penetration much in excess of 6-8". In addition, herbicide contamination was not detected outside of the storage yard except in close proximity to the redrumming operation.

Ongoing Efforts:

In addition to the above analyses, the following efforts are presently ongoing.

- (a) A number of the coral samples are being sent to ARL WPAFB for TCDD analysis.
- (b) The U-2, 0-2" sample and the control coral sample have been forwarded to Dr. Burton Koch, University of Hawaii for his use in detecting breakdown rates in coral employing radio tracers.
- (c) Ten drums of Orange were sampled at random and have been analyzed for 2,4-D, 2,4,5-T composition. Seven of these samples indicate a 50/50 mixture of butyl esters of approximately 95-97% purity. One sample contained considerable amounts of water and an unknown volatile material

Results:

Sample #	Description	2,4-D Acid (ppm)	2,4,5-T (ppm)	2,4-D Butyl ester (ppm)	2,4,5-T ester (ppm)	Total Herbicide (ppm)
1	U-2, 0-2"	4,000	3,320	4,800	7,400	19,520
2	U-2, 2-4"	920	710	1,050	1,800	4,480
3	U-2, 4-6"	132	150	188	300	882
4	U-2, 6-8"	60	56	20	86	202
5*	U-2, 8-10	90	86	208	360	744
	U-2 total	5,202	4,322	6,246	9,946	25,716
6	N-7 0-2"	2,400	2,220	900	1,280	6,780
7	N-7 2-4"	500	270	320	320	1,410
8	N-7 4-6"	60	40	<20	<20	100
9	N-7 6-8"	34	42	<20	<20	76
	N-7 total	2,994	2,572	1,220	1,600	8,386
10	Redrum Area	3,800	4,300	3,200	4,900	16,200
11	Offshore Control	<10	<10	<10	<10	<10
12	1/2mi. Control	<10	<10	<10	<10	<10

* It appears that this sample was contaminated by material from an upper depth increment.

Discussion: Several conclusions can be drawn from the above data. First, it appears likely that the coral of the island degrades herbicide orange at a relatively rapid rate. This is evident from the higher concentrations determined in the

(low boiling). Two other drums contained numerous high boiling impurities, possibly other herbicide esters. Identification of these unknown contaminants by GC/MS is presently underway. In addition a TCDD analysis for each sample is being sought.

Results of the above investigations will be forthcoming prior to 1 February 1975.

THE UNIVERSITY OF UTAH

FLAMMABILITY RESEARCH CENTER
391 SOUTH CHIPETA WAY
RESEARCH PARK
POST OFFICE BOX 8069
(801) 581-8431

November 7, 1979

Major Alvin Young
USAFSAM/EK
Brooks AFB, TX 78235

Dear Al,

Listed in the enclosed tables are the final pesticide analytical results for the soil samples from the Gulfport, Mississippi and Johnston Island Herbicide Orange storage facilities. These results along with the water sample analysis results discussed below represent completion of the chemical analysis for this contract. A formal final report will be forthcoming to summarize some of our observations of data trends and to augment the first year final report with any analytical procedure changes from last year.

The six enclosed tables contain results from three different types of soil samples for each of the two storage facilities. In Tables 1 and 2 are summarized the results from all the samples taken between July 1977 and August 1979 from Herbicide Orange spill sites at the Gulfport (GP) and Johnston Island (JI) facilities respectively. The sample date code is defined as follows: date code 9 for samples collected 28 July 1977 and 25 August 1977 from GP and JI sites respectively; date code 0 for samples collected in January 1978 from both sites; date code 1 for samples collected 6 November 1978 and 18 October 1978 from GP and JI sites respectively; and a date code of 2 for samples collected 14 June 1979 from a GP site and 8 August from JI sites. Given in Tables 3 and 4 are the results for soil penetration studies done at one GP and two JI sites respectively. The presence of pesticide components is here shown to extend more than 20 centimeters below that soil surface. The analytical results for non-spill sites for GP and JI are listed in Tables 5 and 6 respectively. The samples in these last two tables are primarily water drainage or ocean sediment samples but also include samples from two non-storage site islands in the Johnston Island area and two laboratory blanks. The two laboratory blanks reported were run on Fisher Scientific Co. Washed and Ignited Sea Sand and give some indication of the lower detection limits for the analytical methods. The exact source of these small blank contaminations is uncertain but they appear to possibly come from previous sample carry over. Thus the stated pesticide values for all of the sediment or other low concentration samples represent upper limits of actual contamination.

The twelve water samples from the two storage facilities were analyzed for TCDD only. These included five JI samples labelled JI-1/7879 through JI-5/7879 collected on 7 August 1979. The GP water samples consisted of two labelled simply W-1 and W-2 which were collected on 14 June 1979 and five (out of seven) potable water samples collected on 31 July 1979 which were labelled D331Y9, D431Y9, D131Y9, D231Y9 and D531Y9. Each of these samples were extracted by adding sodium chloride to an aliquot of the water to make a five percent salt solution and then extracting with pesticide grade hexane. The hexane extract was then reduced in volume to 50 microliters and analyzed by GC/MS the same as the soil extracts. The two GP samples from 14 June 1979 labelled W-1 and W-2 were analyzed as 100 milliliter (ml) aliquots and were found to contain <25 parts per trillion (1 ppt = 1×10^{-9} gram/liter) of TCDD. The five JI and the other five GP water samples were each analyzed as 200 ml aliquots and were found to contain <20 ppt of TCDD.

I believe these results fully satisfy the analytical requirements of the FRC on this contract and understand that their receipt will begin procedures for completion of payment to the University of Utah. I am still awaiting contact from Lt. Colonel Falcon concerning disposal of our contaminated wastes and samples. As mentioned earlier, the formal final report on this project will be in preparation during the next month. If you have any suggestions for the final report or any other questions or comments please feel free to contact either myself or Mason Hughes.

Sincerely,



William H. McClennen

WHM/mv

Enclosures

cc: B. M. Hughes

TABLE 1

SUMMARY OF ANALYTICAL RESULTS FOR HERBICIDE ORANGE, ITS HYDROLYSIS PRODUCTS AND TCDD
IN THE GULFPORT, MISSISSIPPI STORAGE FACILITIES

µg/g

Sample Date ^a Code	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				TCDD
		Dichloro- phenol	Trichloro- phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	
9	01	ND3 ^b	87.3	10500	6120	9483	25500	ND3	ND3	.109
0	01	ND3	628	5920	6460	14300	37300	4000	3100	.328
1	01	ND3	404	4050	19600	930	64.5	140	1650	.198
9	02	0.1	0.6	8.2	20.3	0.6	1.0	1.3	2.9	N/A ^c
0	02	0.6	0.9	0.8	0.4	ND1	0.1	ND2	ND2	N/A
1	02	ND1	0.1	1.4	2.8	ND1	ND1	1.6	0.4	N/A
9	03	ND3	109	13100	13900	41900	63500	ND3	ND3	.631
0	03	0.2	0.5	ND1	0.6	ND1	0.1	ND2	ND2	.0048
1	03	ND1	0.1	1.5	0.3	ND1	ND1	ND2	ND2	.0022
9	04	ND2	0.2	7.4	6.6	ND2	1.2	ND2	ND2	N/A
0	04	0.3	0.7	0.1	0.8	ND1	0.3	ND2	ND2	N/A
1	04	ND1	0.2	1.2	4.8	ND1	ND1	ND2	ND2	N/A
9	05	ND3	166	7810	3600	7240	18700	ND3	ND3	≤.008
0	05	ND3	402	6120	18500	192	1120	ND3	ND3	≤.002
1	05	ND3	162	805	2340	219	17.7	ND3	ND3	≤.0387
9	06	ND1	0.1	0.3	0.4	0.1	0.1	ND2	ND2	N/A
0	06	1.2	1.9	2.7	3.4	0.4	4.3	ND2	0.5	N/A
1	06	ND1	0.2	3.6	1.4	ND1	0.1	ND2	ND2	N/A
9	07	ND2	0.6	9.0	11.5	0.4	1.1	ND2	ND2	N/A
0	07	3.3	486	570	1110	11.2	73.1	ND2	ND2	<.005
1	07	ND2	0.4	3.2	4.8	ND2	0.3	ND2	ND2	N/A

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Gulfport, Mississippi Storage Facilities (Continued)

PAGE TWO

Sample Date Code ^a	Site No.	$\mu\text{g/g}$										
		IMPURITIES		HYDROLYSIS PRODUCTS			HERBICIDE ORANGE COMPONENTS				TCDD	
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T			
9	08	ND3	95.9	674	369	14800	19000	ND3	ND3		.190	
0	08	0.2	0.4	0.2	0.5	ND1	0.1	ND2	ND2		.0046	
1	08	ND1	0.1	0.6	0.4	ND1	ND1	ND2	ND2		<.0052	
9	09	ND2	0.2	2.9	5.4	ND1	0.1	ND2	ND2		N/A	
0	09	1.4	1.0	0.3	0.2	0.1	0.1	ND2	ND2		N/A	
1	09	0.2	ND1	0.4	0.4	ND1	ND1	ND2	ND2		N/A	
9	10	68.3	235	2140	1420	49900	63600	ND3	ND3		.0185	
0	10	ND3	354	4370	1730	11800	11500	8200	26000		.042	
1	10	ND3	100	719	2860	ND1	48.5	ND3	17000		.0242	
0	11	0.7	1.0	8.8	19.6	0.9	5.3	ND2	ND2		N/A	
1	11	ND1	0.2	0.9	2.6	0.2	ND1	ND2	ND2		N/A	
9	12	ND1	0.2	2.0	2.2	0.2	ND1	ND2	ND2		N/A	
0	12	2.2	1.8	0.6	0.4	0.1	ND1	ND2	ND2		<.0002	
1	12	2.1	ND1	0.2	0.6	ND1	ND1	ND2	ND2		N/A	
0	13	1.9	3.1	7.2	6.4	0.2	2.2	ND2	ND2		N/A	
1	13	0.1	0.6	2.6	4.2	9.9	0.3	ND2	ND2		N/A	
0	14	ND3	121	1420	3790	13.0	95.6	ND3	ND3		.10	
1	14	ND2	2.9	29.6	40.2	ND2	2.9	ND2	ND2		.105	
0	15	2.8	1.6	0.9	1.2	ND1	4.3	ND2	ND2		N/A	
1	15	0.5	ND1	0.2	0.3	ND1	ND1	ND2	ND2		N/A	
0	16	ND3	648	6950	11800	10300	28200	ND3	ND3		.442	
1	16	ND3	316	7920	20300	ND3	2010	ND3	ND3		.198	
0	17	384	850	31000	22500	34700	73600	ND3	ND3		.51	
1	17	ND3	483	29100	50300	ND3	3050	ND3	ND3		.508	
1	17	ND3	ND3	27000	22000	ND3	1650	ND3	ND3		.325	

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Gulfport, Mississippi Storage Facilities (Continued)

PAGE THREE

µg/g

Sample Date Code ^a	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				TCDD
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	
0	18	2.9	1.2	112	0.5	0.1	0.1	ND2	ND2	≤.0002
1	18	ND1	ND1	1.8	2.6	ND1	ND1	ND2	ND2	N/A
0	19	ND3	110	7530	14400	13.0	73.0	ND3	ND3	.13
1	19	ND3	83.0	6760	13000	ND2	ND2	ND3	ND3	.119
0	20	ND3	82.0	21000	53000	1620	11600	ND3	ND3	.001
1	20	ND3	52.4	20500	45200	ND2	ND2	ND3	ND3	.0037
0	21	1.1	0.6	0.8	2.7	0.4	4.4	ND2	ND2	N/A
1	21	ND1	ND1	1.0	2.6	ND1	0.1	ND2	ND2	N/A
0	22	ND3	86.3	2680	10300	464	4720	ND3	ND3	≤.002
1	22	ND3	443	6690	33700	ND2	157	ND3	ND3	≤.018
0	23	1.6	1.1	0.3	0.1	ND1	0.03	ND2	ND2	N/A
1	23	ND1	ND1	0.4	1.0	ND1	ND1	ND2	ND2	N/A
0	24	ND3	485	4010	1300	18400	5210	10000	36000	≤.002
1	24	ND3	156	1690	1840	ND3	152	3400	31800	≤.0128
0	25	1.9	1.5	0.7	0.5	12.8	0.1	ND2	ND2	N/A
1	25	ND1	0.3	1.1	3.6	ND1	0.3	ND2	ND2	N/A
0	26	ND3	955	11400	30500	1960	11000	ND3	ND3	.011
1	26	ND3	757	8840	29700	ND3	6960	ND3	ND3	.014
0	27	ND3	56.6	871	660	3520	3960	ND3	ND3	.13
1	27	ND2	ND2	359	266	ND2	ND2	ND3	ND3	.029
0	28	2.2	1.4	0.5	0.6	ND1	0.02	ND1	ND1	N/A
1	28	ND1	ND1	0.3	0.6	ND1	ND1	ND2	ND2	N/A
0	29	0.5	3.1	46.4	79.8	5.9	11.3	≤11.1	36.5	≤.004
1	29	ND1	0.2	0.7	2.0	ND1	0.1	ND2	ND2	N/A

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Gulfport, Mississippi Storage Facilities (Continued)

PAGE FOUR

µg/g

Sample Date Code	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
0	30	ND3	170	3530	8790	3190	7180	ND3	ND3	.24
1	30	ND3	119	2610	8770	1080	3480	ND3	ND3	.222
0	31	14.3	19.5	200	698	77.5	18.7	ND2	1.8	<.002
1	31	2.7	28.6	384	504	10.9	789	ND3	ND3	N/A
0	32	1.0	1.7	1.3	6.2	1.4	8.0	ND2	1.5	N/A
1	32	ND1	0.5	6.7	34.9	ND1	0.2	ND2	ND2	N/A
0	33	1.0	1.3	5.7	3.4	0.4	1.7	ND2	ND2	N/A
1	33	ND1	0.1	0.3	0.7	ND1	0.1	ND2	ND2	N/A
0	34	ND2	21.8	117	494	22.5	34.1	ND2	34.6	<.008
1	34	1.4	0.4	3.3	6.0	ND2	0.1	ND2	ND2	N/A
0	35	ND2	5.8	50.6	175	9.8	29.3	ND2	20.2	<.34
1	35	ND2	1.0	5.0	15.6	0.5	0.2	ND2	ND2	N/A
0	36	1.3	2.7	23.1	55.8	2.2	2.3	ND2	2.0	<.010
1	36	ND1	0.3	1.1	3.9	0.1	0.1	ND2	ND2	N/A
0	37	ND3	353	1490	7850	2160	3010	ND3	ND3	<.008
1	37 ^d	ND3	276	1470	5820	ND2	ND2	ND3	ND3	.0218
0	38	ND3	511	1320	6120	36.0	13.2	ND3	ND3	<.011
1	38	ND3	275	859	4160	ND2	ND2	ND3	ND3	.0242
0	39	1.2	7.8	6.1	15.6	29.0	43.2	8.0	18.5	<.040
1	39	ND1	0.1	0.5	2.2	0.1	0.1	ND2	2.5	N/A
0	40	3.6	6.1	40.8	128	7.8	22.0	ND2	ND2	<.003
1	40	ND1	0.1	0.3	0.7	ND1	ND1	ND2	ND2	N/A

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Gulfport, Mississippi Storage Facilities (Continued)

PAGE FIVE

µg/g

Sample Date Code ^a	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
0	41	259	354	5030	6800	10200	11500	<600	<800	.23
1	41	ND3	185	5790	13900	2130	868	ND3	ND3	.251
0	42	2.1	1.1	0.6	2.5	0.2	ND1	ND2	ND2	N/A
1	42	ND1	ND1	0.1	0.3	ND1	ND1	ND2	ND2	N/A
0	43	ND1	1.4	9.2	15.7	0.5	2.6	≤2.0	2.5	≤.043
1	43 ^d	ND3	70.1	2270	6860	ND2	ND2	ND3	ND3	.0059
0	44	ND1	0.8	12.0	30.5	0.5	5.0	ND2	ND2	N/A
1	44 ^d	ND3	29.2	3510	7470	ND2	ND2	ND3	ND3	.0091

^a Sample Date Code: 9 - 28 July 1977
 0 - January 1978
 1 - 6 November 1978
 2 - 14 June 1979

^b ND - none detected: ND1 - lower limit of detectability of 0.1 µg/g
 ND2 - lower limit of detectability of 1.0 µg/g
 ND3 - lower limit of detectability of 100 µg/g

^e not analyzed

^d Soil depth study - samples from Gulfport site 37 on November 6, 1978:
 1-37 from 0"- 1" soil depth layer
 1-43 from 1"- 2" soil depth layer
 1-44 from 2"- 3" soil depth layer

TABLE 2

SUMMARY OF ANALYTICAL RESULTS FOR HERBICIDE ORANGE, ITS HYDROLYSIS PRODUCTS AND TCDD
IN THE JOHNSTON ISLAND STORAGE FACILITIES

µg/g

Sample Date ^a Code	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro- phenol	Trichloro- phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
9	01	ND1 ^b	0.4	10.1	10.8	ND1	ND1	ND2	ND2	N/A ^c
0	01	ND1	1.3	0.8	0.1	ND1	ND1	ND2	ND2	N/A
1	01	ND1	0.1	3.0	4.0	0.1	0.3	2.2	6.4	N/A
9	02	5.4	0.3	12.0	18.0	ND1	0.1	ND2	ND2	N/A
0	02	ND1	0.8	2.8	0.7	0.2	1.8	ND2	0.5	N/A
1	02	ND1	0.1	1.0	2.0	ND1	0.1	0.9	2.5	N/A
9	03	ND1	ND1	0.7	7.6	ND1	ND1	ND2	ND2	N/A
0	03	ND1	0.7	3.3	0.6	0.1	0.3	ND2	ND2	N/A
1	03	ND1	0.1	0.2	0.4	ND1	0.03	0.1	0.5	N/A
9	04	ND1	0.3	14.4	29.3	ND1	0.2	ND2	ND2	N/A
0	04	ND1	1.7	5.6	0.1	0.5	1.3	ND2	ND2	N/A
1	04	ND1	ND1	0.2	0.4	0.2	ND1	0.1	0.5	N/A
9	05	ND3	93.0	12600	8750	4230	12500	ND3	ND3	.0330
0	05	ND3	123	11800	10200	1980	13800	<600	~600	.0340
1	05	ND3	34.2	7930	22000	ND3	1510	ND3	ND3	.0191
2	05	ND3	ND2	971	2590	ND3	ND3	ND3	ND3	.041
9	06	ND3	63.5	4720	638	31200	10300	7900	30600	<.065
0	06	ND3	255	6050	1720	10400	7630	~15000	32000	<.006
1	06	ND3	136	17600	10900	ND3	143	1800	11300	.0076
9	07	ND2	32.7	1980	1250	6600	6790	520	424	.0113
0	07	6.8	14.1	1970	1670	25.2	197	910	340	.007
1	07	1.6	7.2	944	628	8.0	29.9	23.2	121	.0082

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Johnston Island Storage Facilities (Continued)

PAGE TWO

µg/g

IMPURITIES

HYDROLYSIS PRODUCTS

HERBICIDE ORANGE COMPONENTS

Sample Date ^a Code	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
9	08	ND2	13.2	1520	525	ND1	211	ND3	1270	.0046
0	08	ND1	2.3	1.7	2.0	ND1	0.5	2.0	7.8	N/A
1	08	ND1	ND1	0.1	0.2	0.1	0.1	0.1	0.4	N/A
9	09	ND3	205	1370	1390	22100	19100	5140	3170	.0417
0	09	ND3	181	7800	5790	21400	21100	9000	5000	.022
1	09	ND3	111	15700	11500	14700	12300	3900	2430	.0286
2	09	ND3	149	15500	15600	2240	4440	3480	2970	.053
9	10	ND3	460	42600	45600	24600	19800	<1600	1050	.196
0	10	ND3	477	31100	46600	23300	27300	~9000	~4000	.230
1	10	ND3	456	38700	61000	27100	25900	~4000	~3000	.235
2	10	ND3	136	21200	26400	100	83.8	~520	~360	.13
9	11	ND3	34.9	4080	3650	24400	24500	<560	330	.0534
0	11	ND1	1.9	2.1	3.6	0.9	6.2	7.2	9.4	<.0025
1	11	0.1	0.6	5.0	38.5	0.8	4.3	6.3	10.1	<.0038
9	12	ND3	172	1560	1370	32800	33500	ND3	~300	.178
0	12	ND3	110	2300	1200	26200	27300	ND3	ND3	.080
1	12	ND3	46.6	13200	18200	7150	4290	ND3	ND3	.111
2	12	ND3	53.6	6530	8680	817	1900	≤400	100	.081
0	13	ND2	11.2	23.9	23.7	ND2	1.0	ND2	ND2	<.0003
1	13	ND1	ND1	ND1	0.1	ND1	ND1	ND1	0.2	N/A
0	14	ND1	0.8	4.4	0.6	0.2	1.0	ND2	1.2	N/A
1	14	ND1	ND1	0.1	0.3	0.1	0.2	0.4	0.6	N/A
0	15	ND1	1.5	3.8	ND1	ND1	ND1	ND1	ND1	N/A
1	15	ND1	ND1	0.1	0.3	ND1	ND1	0.1	0.2	N/A

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Johnston Island Storage Facilities (Continued)

PAGE THREE

ug/g

Sample Date Code ^a	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
0	16	ND1	1.5	1.2	0.1	ND1	0.1	ND1	ND1	N/A
1	16	ND1	ND1	0.1	0.1	ND1	ND1	0.1	0.2	N/A
0	17	ND2	12.5	5.8	6.8	ND2	ND1	ND2	ND2	N/A
1	17	ND1	0.1	0.1	0.3	ND1	0.1	0.1	0.2	N/A
0	18	ND2	11.1	691	2920	28.8	57.2	13.1	46.0	.001
1	18	ND2	0.4	2.0	4.9	0.7	1.5	ND2	ND2	<.0014
0	19	ND1	1.4	1.3	0.2	0.1	0.2	ND2	ND2	N/A
1	19	ND1	ND1	ND1	0.2	ND1	ND1	0.1	0.1	N/A
0	20	ND1	1.3	4.7	0.1	ND1	ND1	ND1	0.1	N/A
1	20	ND1	ND1	ND1	0.1	ND1	ND1	0.1	0.1	N/A
0	21	ND1	1.4	1.0	0.3	ND1	ND1	ND1	ND1	N/A
1	21	ND1	ND1	ND1	0.1	ND1	0.1	0.1	0.2	N/A
0	22	ND1	0.1	0.6	0.2	ND1	ND1	ND1	ND1	N/A
1	22	ND1	0.2	3.9	8.8	1.9	2.4	1.6	1.5	N/A
0	23	ND2	9.0	47.6	23.4	ND2	3.4	ND2	ND2	≤.0006
1	23	ND1	0.1	0.9	2.4	0.4	3.7	0.4	0.4	N/A
0	24	ND3	206	3440	2130	24500	22000	-9000	8000	.025
1	24	ND3	81.3	9690	12100	ND3	646	-500	-2000	.024
2	24	ND3	125	19500	20600	ND3	341	2900	3100	.064
0	25	ND2	4.2	6.0	4.6	ND2	1.2	ND2	2.7	N/A
1	25	0.1	1.8	20.6	38.1	11.0	36.9	34.3	27.2	N/A

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Johnston Island Storage Facilities (Continued)

PAGE FOUR

µg/g

Sample Date Code ^a	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
0	26	ND2	3.8	45.3	88.6	2.2	18.6	≤10	≤20	.010
1	26	ND2	0.2	1.0	6.1	0.2	0.4	1.4	1.4	.003
2	26	ND3	8.0	245	256	ND3	ND3	ND3	ND3	.011
0	27	ND2	3.2	3.1	1.5	0.5	0.5	ND2	ND2	≤.0002
1	27	ND1	0.1	0.5	5.0	0.1	1.1	0.8	0.6	N/A
0	28	ND3	31.8	26800	38800	ND3	316	ND3	ND3	.0002
1	28	ND3	14.3	9010	13200	ND3	461	ND3	ND3	<.0009
0	29	0.7	4.0	13.6	62.8	18.1	69.7	6.2	11.7	.0008
1	29	ND2	0.1	0.2	0.6	ND2	ND1	ND2	1.0	N/A
0	30	ND3	45.1	4480	2600	6980	11800	1400	500	.038
1	30	ND3	22.2	3170	4760	2400	2250	ND3	ND3	.036
2	30	ND3	20.0	708	3270	193	563	340	97	.040
0	31	ND2	4.5	71.8	303	2.3	21.3	≤17	19.9	.002
1	31	ND2	0.3	0.9	6.6	0.5	0.4	1.2	0.5	<.0014
0	32	ND3	138	18800	17700	3590	7680	ND3	ND3	.0007
1	32	ND3	18.8	10100	20100	ND2	ND2	ND3	ND3	≤.0023
0	33	ND1	0.6	13.8	0.4	0.3	1.3	1.1	0.4	N/A
1	33	1.4	27.1	197	151	60.7	4.9	1.3	1.4	N/A
0	34	ND3	23.9	2280	2080	81.5	583	ND3	ND3	.029
1	34	ND3	27.7	3240	7770	ND3	133	ND3	ND3	.152
2	34	ND3	32.0	2970	9130	ND3	10.1	ND3	ND3	.15
0	35	ND3	99.0	16500	14700	350	350	-6000	12000	.008
1	35	ND3	82.5	23400	26100	ND3	444	-4000	-28000	≤.0056

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Johnston Island Storage Facilities (Continued)

PAGE FIVE

		µg/g								
		<i>IMPURITIES</i>		<i>HYDROLYSIS PRODUCTS</i>		<i>HERBICIDE ORANGE COMPONENTS</i>				
Sample Date Code [±]	Site No.	Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
0	36	ND3	150	15300	10500	37100	44800	ND3	ND3	.015
1	36	ND3	61.1	14200	29900	ND3	841	ND3	ND3	.019
2	36	ND3	179	29200	36600	1040	8570	ND3	ND3	.074
0	37	ND3	223	10800	10800	21000	30200	ND3	ND3	.074
1	37	ND3	113	19900	20600	12300	11900	ND3	ND3	.094
2	37	ND3	81.7	10900	11000	402	1170	≤200	≤500	.14
0	38	ND3	169	2780	1230	8630	7350	22000	14000	.006
1	38	ND3	134	12900	7840	ND3	1640	~10000	10000	≤.0018
0	39	ND3	38.8	1740	1370	6380	10200	ND3	ND3	.029
1	39	ND3	30.4	1640	2290	1960	2250	ND3	ND3	.041
2	39	ND3	7.9	492	1530	ND3	24.7	ND3	ND3	.050
0	40	ND3	236	11400	9350	31700	29700	13000	5000	.055
1	40	ND3	120	21900	21900	10100	6330	~1000	~2000	.053
2	40	ND3	116	13000	12900	635	1940	2700	2700	.084
0	41	ND3	280	11900	10600	25100	32600	5000	~2200	.085
1	41	ND3	143	26900	29700	10200	5850	~300	~800	.127
2	41	ND3	183	36300	38700	1990	5840	~1000	900	.12
0	42 ^d	ND3	274	2470	5050	16700	17600	~13000	~5000	.025
1	42	ND3	98.7	5460	3930	4430	4390	~1500	~1500	.020
2	42	ND3	108	2650	3330	1060	2600	~2000	~1900	.021
0	43 ^d	ND1	0.1	0.5	0.5	ND1	ND1	ND2	ND2	≤.0001
0	44	ND1	0.4	2.4	23.9	0.4	1.6	ND2	ND2	N/A

Summary of Analytical Results for Herbicide Orange, Its Hydrolysis Products and TCDD in the Johnston Island Storage Facilities (Continued)

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µg/g

Sample Date Code ^a	Site No.	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
0	45	ND1	0.1	0.5	2.5	0.1	0.6	ND2	ND2	N/A
0	46 ^d	ND3	203	2830	2170	17800	16100	6000	4000	.024
0	47 ^d	5.8	10.6	574	25.9	10.2	ND1	ND2	ND2	≤.0002
0	48 ^d	ND1	0.3	1.2	0.4	ND1	ND1	ND2	ND2	≤.0002

^a Sample Date Code: 9 - 25 August 1977
 0 - January 1978
 1 - 18 October 1978
 2 - 8 August 1979

^b ND - none detected: ND1 - lower limit of detectability of 0.1 µg/g
 ND2 - lower limit of detectability of 1.0 µg/g
 ND3 - lower limit of detectability of 100 µg/g

^c N/A - not analyzed

^d Soil depth studies done on Johnston Island sites 42 and 46 in January 1978:

0-42 from 0-8 cm depth at site 42
 0-43 from 8-16 cm depth at site 4
 0-46 from 0-15 cm depth at site 4
 0-47 from 15-30 cm depth at site
 0-48 from 30-45 cm depth at site

TABLE 3

PESTICIDE ANALYSIS RESULTS OF PENETRATION STUDY SOIL SAMPLES TAKEN FROM GULFPORT,
MISSISSIPPI SITE NO. 17 ON 14 JUNE 1979

Sample No. ^a	Sample Depth (cm)	IMPURITIES		HYDROLYSIS PRODUCTS		HERBICIDE ORANGE COMPONENTS				
		Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
1	0-2	ND3 ^b	282	17300	46900	ND3	86.2	ND3	ND3	.48
5	2-4	199	945	67800	62300	268	5940	ND3	ND3	.51
4	4-6	ND3	114	13500	12200	ND3	260	ND3	ND3	.15
2	6-8	ND3	118	9540	10200	ND3	319	ND3	ND3	.16
3	8-12	ND3	129	20500	16500	494	668	ND3	ND3	.30
10	12-16	ND3	59.6	17400	13800	ND3	9.5	ND3	ND3	.38
9	16-20	19.7	29.4	1070	1020	2.2	10.2	ND2	ND2	.0302
11	20-24	18.0	28.0	640	493	0.8	5.1	ND2	ND2	.0116
8	24-39	3.3	8.0	273	49.4	0.2	0.9	ND2	ND2	<.00048
6	39-55	0.8	1.1	61.3	71.9	1.6	3.6	ND2	ND2	.00148
7	55-70	1.0	0.8	39.9	39.3	0.4	1.0	ND2	ND2	.00078

^a The sample numbers refer to labelling as originally sent to the FRC for "blind" analysis. The actual sample depths were obtained from Major Young for preparation of this table after the completion of the analysis.

^b ND - none detected:

ND1 - lower limit of detectability of 0.1 µg/g

ND2 - lower limit of detectability of 1.0 µg/g

ND3 - lower limit of detectability of 100 µg/g

TABLE 4

PESTICIDE ANALYSIS RESULTS OF PENETRATION STUDY CORAL SAMPLES TAKEN FROM JOHNSTON ISLAND SITES
NO. 10 AND NO. 37 ON 8 AUGUST 1979.

Sample Depth (cm)	$\mu\text{g/g}$								
	Dichloro- phenol	Trichloro- phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
Site #10									
0-2	ND3 ^a	120	29200	30200	65.1	257	590	500	.067
2-4	ND3	243	24900	31400	57.9	38.0	630	680	.14
4-6	ND3	115	15200	24100	36.5	19.4	630	220	.17
6-8	ND3	68.0	15600	20100	239	21.4	<240	50	.10
8-12	ND3	44.3	7220	9800	119	37.2	64	22	.042
12-16	ND3	43.6	9930	13600	182	131	60	12	.045
16-20	ND3	52.8	10100	12900	240	398	57	47	.055
20-24	ND3	60.1	9410	10500	364	1020	51	84	.042
Site #37									
0-2	ND3	133	17700	22300	681	2530	280	640	.14
2-4	ND3	108	13500	11500	355	1310	290	840	.14
4-6	ND3	75.5	9570	7290	210	826	300	430	.135
6-8	ND3	10.5	2670	2990	360	17.6	64	210	.049
8-12	ND3	7.9	638	646	ND3	ND2	ND3	ND3	.015
12-16	ND3	7.0	130	230	ND3	ND2	ND3	ND3	.006
16-20	ND3	7.2	286	695	ND3	11.0	ND3	ND3	.011
20-24	ND3	7.9	66.2	138	ND3	ND2	ND3	ND3	.005

^a ND - none detected

ND1 - lower limit of detectability of 0.1 $\mu\text{g/g}$

ND2 - lower limit of detectability of 1.0 $\mu\text{g/g}$

ND3 - lower limit of detectability of 100 $\mu\text{g/g}$

TABLE 5

PESTICIDE ANALYSIS RESULTS OF SEDIMENT SAMPLES TAKEN FROM GULFPORT,
MISSISSIPPI STORAGE FACILITIES 14 JUNE 1979

µg/g

Sediment Sample No.	Dichloro- phenol	Trichloro- phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD (ppb)
1	ND1 ^a	0.01	1.2	0.9	ND1	ND1	ND1	ND1	<2
2	ND1	0.2	1.0	2.1	ND1	0.03	ND1	ND1	3.6
3	ND1	0.1	1.2	2.7	ND1	0.2	ND1	ND1	<2
4	0.2	0.07	0.4	0.7	ND1	0.1	ND1	ND1	<2
5	ND1	0.04	0.6	0.5	0.1	0.5	ND1	ND1	<2
6	0.1	0.05	0.4	0.4	ND1	0.02	ND1	ND1	<37
7	ND1	0.02	0.2	0.2	ND1	0.04	ND1	ND1	<2
8	ND1	0.08	0.3	0.6	ND1	0.06	ND1	ND1	2.7
9	ND1	ND1	0.2	0.1	ND1	ND1	ND1	ND1	<0.5
10	ND1	0.01	0.1	0.03	ND1	ND1	ND1	ND1	<2
11	ND1	0.04	0.2	0.05	ND1	ND1	ND1	ND1	<2
12	ND1	0.03	0.1	0.02	ND1	ND1	ND1	ND1	<0.5
13	ND1	0.03	0.2	0.1	ND1	ND1	ND1	ND1	<0.5

^a ND1 - none detected, lower limit of detectability of 0.1 µg/g.

TABLE 6

PESTICIDE ANALYSIS RESULTS OF OCEAN FLOOR SEDIMENT SAMPLES AND CONTROL SOIL SAMPLES FROM JOHNSTON ISLAND AND LABORATORY BLANKS. THE SEDIMENT SAMPLES WERE TAKEN ON 7 AUGUST 1979 AND THE CONTROL SAMPLES FROM SAND ISLAND AND NORTH ISLAND WERE TAKEN IN OCTOBER 1978.

Sample	$\mu\text{g/g}$								
	Dichloro-phenol	Trichloro-phenol	2,4-D	2,4,5-T	Butyl Ester 2,4-D	Butyl Ester 2,4,5-T	Octyl Ester 2,4-D	Octyl Ester 2,4,5-T	TCDD
JISED-1	0.13	0.03	1.4	2.1	ND1 ^a	ND1	<0.02	<0.04	$\leq .0005$
JISED-2	0.07	0.03	0.2	0.2	ND1	0.01	<0.01	<0.1	$\leq .001$
SAND IS.	ND1	0.02	0.11	0.06	ND1	0.01	ND1	ND1	N/A ^b
NORTH IS.	ND1	0.09	ND1	0.09	ND1	0.02	ND1	ND1	N/A
BLANK-1	ND1	ND1	0.2	0.02	ND1	ND1	ND1	ND1	
BLANK-2	ND1	ND1	0.3	0.07	ND1	0.02	ND1	ND1	

^a ND1 - none detected, lower limit of detectability of 0.1 $\mu\text{g/g}$.

^b N/A - not analyzed.