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Report/Article Title Memorandum: From John W. Ord, USAF, to Robert N. Bond, Eglin AFB with attached Briefing Slides regarding Test Area C-52A Grid 1 erosion, dated March 31, 1981

Journal/Book Title

Year 1981

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AEROSPACE MEDICAL DIVISION (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235



31 Mar 81

AD/CC (Maj Gen Robert N. Bond)
Eglin AFB FL 32542

Dear Gen Bond

Needless to say we all appreciated the fine hospitality that you and your staff provided the AMD visitors last Friday. In order to provide you with something for the "record," I asked Lt Col Thalken to annotate a copy of his briefing slides with the text of his presentation (Atch 1). Although it is clearly pointed out in the actual text, I think it is worth emphasizing a few points.

Published articles describe a "threshold effect" or "no effect" level of dioxin which does indeed occur in laboratory rats at approximately 2000 parts per trillion (ppt) dioxin, fed daily in the diet over a period of one year.

The briefing contained the following recommendations:

- a. The northern one-half of Test Area C-52A can be used in an unrestricted fashion for mission support activities.
- b. The southern one-half of Test Area C-52A can be used to support mission activities with the only restriction being that of limiting off-road vehicular traffic.
- c. All efforts should be extended to prevent erosion-causing activities on Grid I.

These recommendations take into account: (1) the fact that the last known, highest concentrations of dioxin on Test Area C-52A/Grid I were well below the known "no-effect" level of dioxin in laboratory rodents, and (2) that man appears to be much more resistant to the toxic effects of dioxin than are lower animals.

The primary concern, therefore, deals with disturbing the fragile vegetative environment of these two regions. Since Grid I is closer to existing streams than is TA-C52A, Lt Col Thalken recommends that every effort be made to "protect" Grid I from erosion-causing activities. Although of lesser concern, the southern portion of TA-C52A is very subject to wind and water erosion. Heavy equipment operations off the roads on TA-C52A would severely damage existing plant life and further increase the problems with erosion and movement of TCDD-contaminated soil.

In my discussions with you we agreed that the Air Force must demonstrate a positive concern for the protection of the environment. I feel that when these minimal recommendations are placed into effect, the Air Force will have made a significant and prudent move toward preventing the unwanted future movement of TCDD-contaminated soil, particularly the movement toward Choctowhatchee Bay.

Sincerely

JOHN W. ORD
Major General, USAF, MC
Commander

1 Atch
Briefing Slides w/Text

USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)



MARCH 1981

BROOKS AFB, TEXAS

A one-square mile instrumented test plot known as Test Area C52-A and a 92-acre test plot known as Grid I were used for the development of herbicide aerial delivery equipment from 1962 to 1970. Approximately 161,000 pounds of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) herbicide was placed in the Test Area. The highest possible contamination of the herbicide with dioxin could have resulted in up to eight pounds of dioxin being placed on the Test Area.

Early environmental studies (1967-1973) were conducted by Eglin AFB personnel and published as AFATL-TR-72-31 and AFATL-TR-72-72. More detailed environmental studies (1974-1975) were conducted by Eglin AFB personnel and published as AFATL-TRs 74-12, 75-49, and 75-142.

HERBICIDE ORANGE - TEST AREA C52 - A

HISTORICAL REVIEW

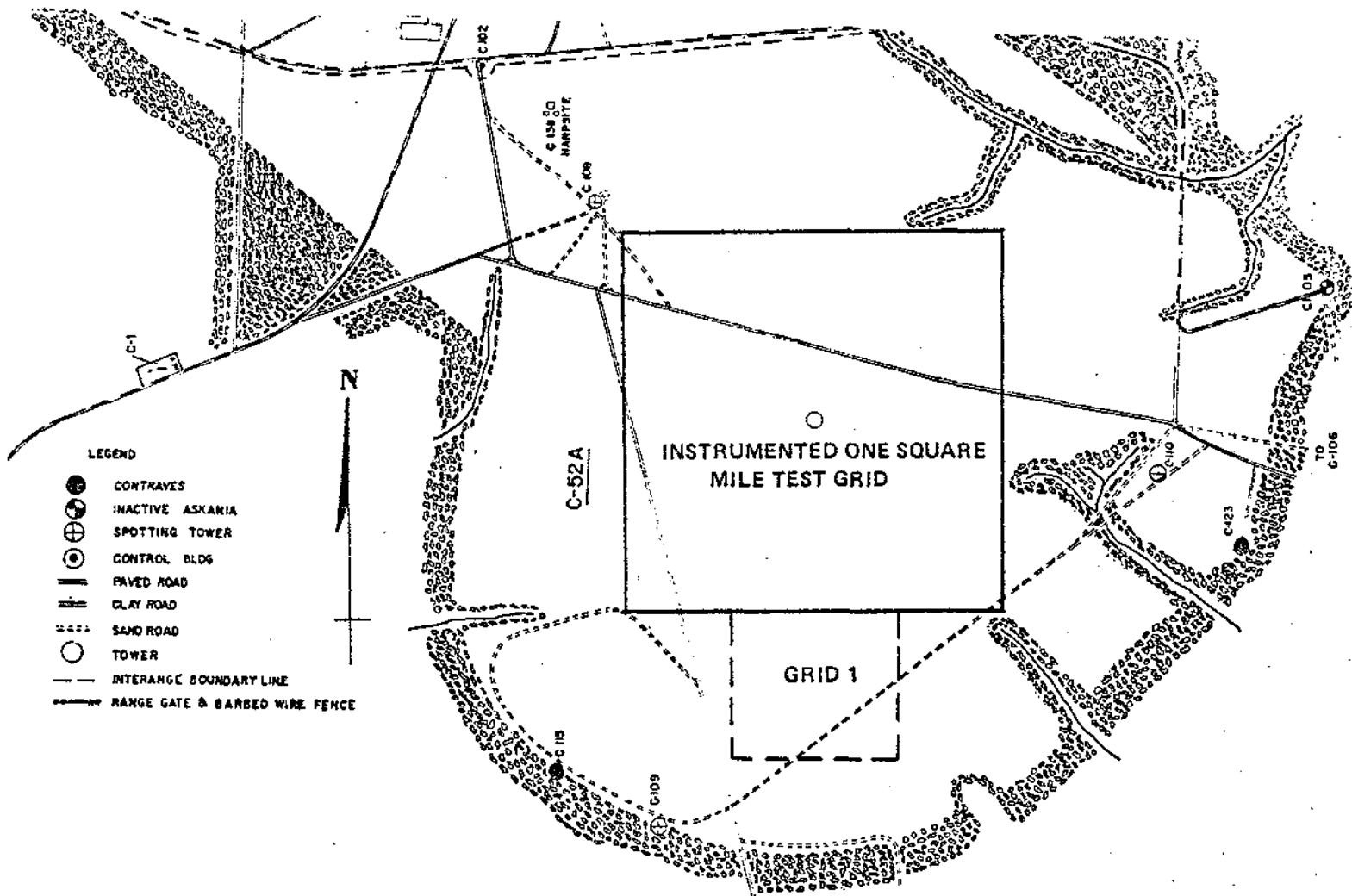
- **HERBICIDE AERIAL DELIVERY EQUIPMENT TESTING SITE**
 - 1962 TO 1970
 - 160,948 LBS 2,4,5,-T
 - UP TO 8 LBS OF TCDD (DIOXIN)

- **INITIAL ENVIRONMENTAL STUDIES 1967 - 1973**
 - AFATL-TR-72-31 1972
 - AFATL -TR-72-72 1972

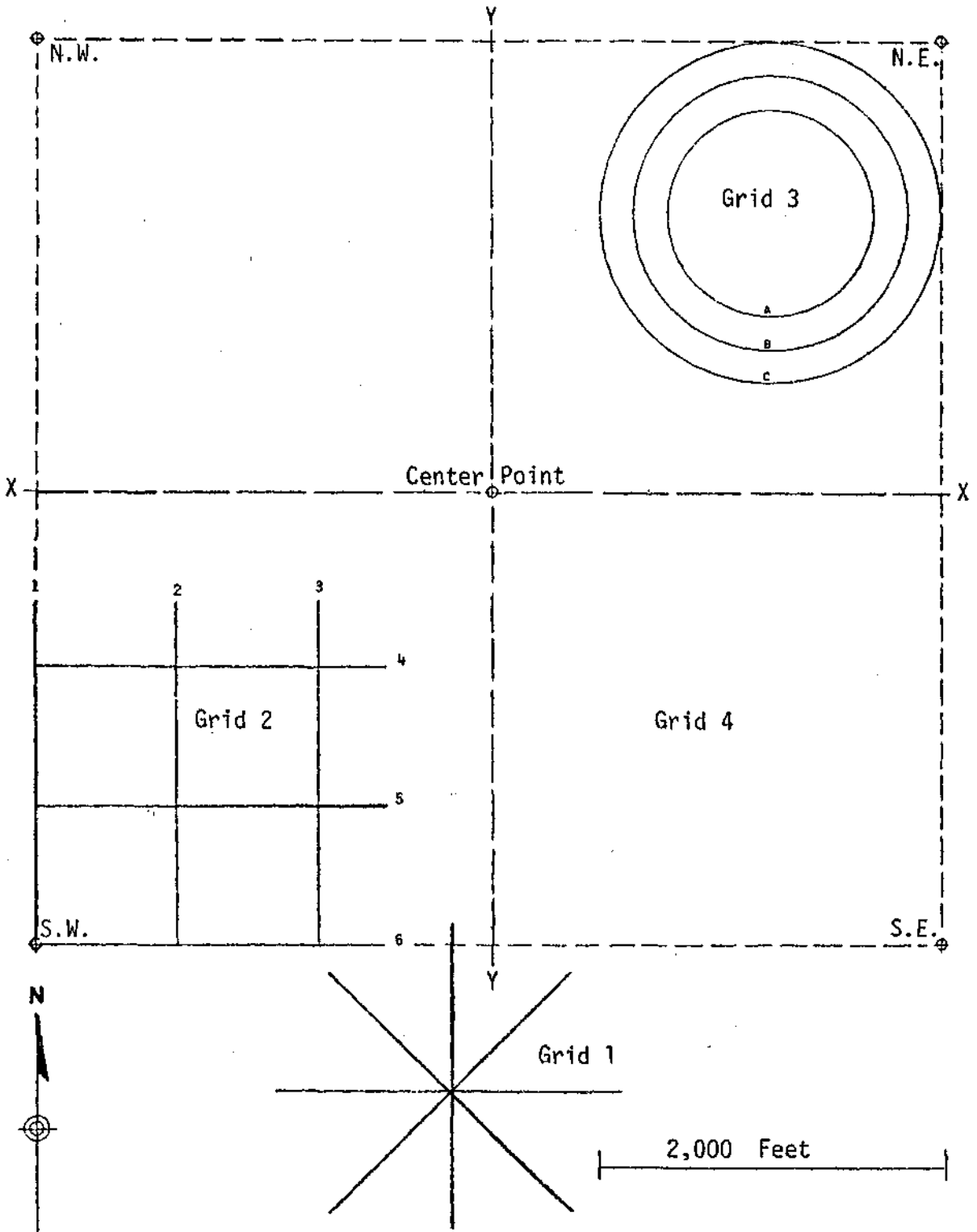
- **DETAILED ENVIRONMENTAL STUDIES 1974 - 1975**
 - AFATL-TR-74-12 1974
 - AFATL-TR-75-49 1975
 - AFATL-TR-75-142 1975

This map of Test Area C52-A and Grid I shows the relationship of the Test Area to Grid I and the proximity of drain streams. Three major streams drain the areas in discussion. To the West--Mullet Creek, to the Southeast--Trout Creek, and to the Northeast and Southeast--Basin Creek.

There is a ridge of land running from the Southwest portion of Test Area C52-A across the Southern border of the Test Area and the North Central portion of Grid I. This ridge is particularly subject to wind and water erosion due to its elevated topography.



This map shows the portions of Test Area C52-A and Grid I used to test the 15 different herbicide aerial delivery equipment systems. Both helicopter and fixed wing aircraft were used to test these systems. Grid 1 was used from 1962 to 1964 using a highly contaminated product known as Herbicide Purple. Herbicide Purple could have contained up to 46 parts per million (ppm) dioxin. Grid 2 was used from 1964-1966. Herbicide Orange was used on this Grid. It was "relatively" clean. Grid 3 was used to test Herbicide Blue delivery equipment during the 1967-1969 time period. Herbicide Blue is an arsenic based product. Grid 4 was used during the latter part of the test program to study the improved Herbicide Orange delivery equipment. The last mission on Grid 4 was in 1970.



From the AFATL publications and the data presented, it was determined that the highest level of dioxin contamination on TA-C52-A in 1974 was 470 parts per trillion (ppt), while Grid I had a maximum level of 1500 ppt. Animals in close contact with the contaminated soil were found to contain levels of dioxin in some of their body tissues similar to that found in the contaminated soil.

HERBICIDE ORANGE - TEST AREA C52-A

SOIL LEVELS OF TCDD

- ONE SQUARE MILE " NONE DETECTED " TO 470 ppt
- GRID NUMBER ONE " NONE DETECTED " TO 1,500 ppt

ANIMAL TISSUE LEVELS OF TCDD

- ONE SQUARE MILE " NONE DETECTED " TO 1,020 ppt
- GRID NUMBER ONE " NONE DETECTED " TO 1,500 ppt

In summary, it can be stated that in 1974, "relatively high" levels of dioxin were present in the soil of Grid I. It is known that the dioxin adheres strongly to the soil and does not move via percolation through the soil. Movement of dioxin can and does occur via wind and surface water erosion. Animals living in close and direct contact with dioxin-contaminated soil do accumulate body tissue levels of dioxin equal to those levels found in the soil. This suggests that dioxin does bioaccumulate, but there does not appear to be biomagnification of dioxin in the food chain.

In more recent published research, it is stated that the "threshold effect" or "no effect" level of dioxin in laboratory rats is approximately 2000 ppt dioxin, fed daily in the diet over a period of one year.

HERBICIDE ORANGE - TEST AREA C52-A

SUMMARY - ENVIRONMENTAL STUDIES/TCDD

- HIGH LEVELS (1500 ppt) FOUND IN SOIL
- ADHERES TO SOIL PARTICLES
- MOVES VIA WIND AND WATER EROSION
- ANIMAL TISSUE LEVELS SIMILAR TO SOIL LEVELS
- NO LONG TERM ADVERSE EFFECTS ANTICIPATED

Based upon a review of the data collected from the environmental studies conducted on Test Area C52-A/Grid I and a worldwide literature review of "The Toxicology, Environmental Fate, and Human Risk of Herbicide Orange and its Associated Dioxin," presented in USAF OEHL-TR-78-92, the following recommendations are proposed:

- a. The northern one-half of Test Area C52-A can be used in an unrestricted fashion for mission support activities.
- b. The southern one-half of Test Area C52-A can be used to support mission activities with the only restriction being that of limiting off-road vehicular traffic.
- c. All efforts should be extended to prevent erosion-causing activities on Grid I.

These recommendations take into account the fact that the last known, highest concentrations of dioxin on Test Area C52-A/Grid I were well below the known "no-effect" level of dioxin in laboratory rodents. The published fact that man appears to be much more resistant to the toxic effects of dioxin than are lower animals, and that the primary concern deals with disturbing the fragile vegetative environment of these two regions. Since Grid I is closer to existing streams than is TA-C52-A, I recommend that every effort be made to "protect" Grid I from erosion-causing activities. Although of lesser concern, the southern portion of TA-C52A is very subject to wind and water erosion. Heavy equipment operations off the roads on TA-C52-A would severely damage existing plant life and further increase the problems with erosion and movement of TCDD-contaminated soil.

In my opinion, the Air Force must demonstrate a concern for the protection of the environment, particularly for Choctawatchee Bay. These minimal efforts will make a significant impact toward preventing the unwanted movement of TCDD-contaminated soil.

HERBICIDE ORANGE—TEST AREA C52-A

RECOMMENDATIONS

- **UNRESTRICTED USE OF NORTHERN ONE-HALF**
- **LIMIT OFF-ROAD ACTIVITIES ON SOUTHERN ONE-HALF**
- **PREVENT EROSION CAUSING ACTIVITIES ON GRID ONE**

COMPARISON OF 2,4,5-T/TCDD APPLICATION RATES TO RANGELANDS (NORMAL USE) VERSUS RATES APPLIED TO GRID 1, TEST AREA C-52A, EGLIN AIR FORCE BASE, FLORIDA (MILITARY AERIAL SPRAY EQUIPMENT TEST PROGRAM)

This Hip Pocket Slide was used - copies were handed out to members present at Brief

SUBJECT	NORMAL RANGELAND USE	GRID 1 APPLICATIONS (1962-1964)
Pounds 2,4,5-T Active Ingredient Per Acre	2	947
Total For 92 Acre Area	184	87,186
TCDD Concentration of 2,4,5-T Formulation	≤ 0.1 ppm (Current Production Standards)	≤ 0.1 - 47 ppm ^a
Concentration of TCDD in Soil Profile (parts per trillion):		
0-1 inch	0.8 ppt ^b	150 ppt ^c
1-2 inches	Not Detectable	160 ppt
2-4 inches	Not Detectable	700 ppt
4-6 inches	Not Detectable	44 ppt
Below	Not Detectable	Not Detectable

^aRange of TCDD Contamination in Herbicide Stocks Returned from Southeast Asia in 1971 and stored on Johnston Island, Pacific Ocean. (In Disposition of Orange Herbicide by Incineration, November 1974, Department of the Air Force Final Environmental Statement.)

^bAssuming no TCDD degradation and the application of 2,4,5-T to bare soil. If 2 pounds 2,4,5-T, containing 0.1 ppm TCDD, are applied and uniformly mixed into top 1 inch of an acre of soil, then $2 \times 0.1 \times 10^{-6}$ pound TCDD per acre in 1 inch of soil weighing 3×10^6 pound per acre-foot or about 0.25×10^6 pound per inch per acre equals $0.2 \times 10^{-6} / 0.25 \times 10^6$ or 0.8×10^{-12} .

^cSoil profile samples collected in 1974.

Hip-pocket slide
not used

COMPARISON OF TCDD LEVELS

- HERBICIDE PURPLE 46 ppm MAXIMUM
- HERBICIDE ORANGE 1.98 ppm AVERAGE
- SOIL LEVELS C-52A .0015 ppm MAXIMUM