N62604.AR.000116
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HERBICIDE ORANGE STORAGE SITE MONITORING PROJECT NCBC GULFPORT MS
1/1/1978
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NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT MS

HERBICIDE ORANGE STORAGE SITE

MONITORING PROJECT

USAF OEHL/EC
BROOKS AFB TX
JANUARY 1978

CONCEPT

The soil of the 2 hectare storage site (used for the storage of Herbicide Orange from June 1970 - July 1977) is of Lakeland Sand Association with a 15 cm thick stabilized concrete pad underlying 15 cm of loose sand and gravel. The banks of all drainage ditches within the state are stabilized with asphalt. Although the soil 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 soil 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 soil samples collected (11 Jan 77 and 28 Jul 77) at sites within the inventory area where herbicide spills had occurred indicated that 95% of all herbicides and TCDD residues were found within the top 8 cm of soil profile. Thus, the soil monitoring program was confined to a single depth (0-8 cm). 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 0/0, 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 28 Jul 77 with the remaining 30 located and marked on 16 Jan 78. (The first complete set of soil samples were collected 17 Jan 78.)

CHEMICAL ANALYSES

Soil samples will be collected and placed into new glass jars (400 ml) 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 actinomyctes, 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 16-17 Jan 78 and Their Respective Characterizations. Samples Collected from NCBC, Gulfport MS, in Support of Site Monitoring Project.

SAMPLE NUMBER	CHARACTERIZATION	SAMPLE NUMBER	CHARACTERIZATION
1	H/H	22	L/L
2	0/0	23	0/0
3	L/L	24	H/H
4	0/0	25	0/0
5	H/H	26	L/L
6	0/0	27	H/H
7	L/L	28	0/0
8	L/L	29	L/L
9	L/L	30	H/H
10	H/H	31	0/0
11	H/H	32	L/L
12	0/0	33	H/H
13	L/L	34	L/L
14	H/H	35	H/H
15	0/0	36	0/0
16	L/L	37	L/L
17	H/H	38	H/H
18	0/0	39	L/L
19	L/L	40	0/0
20	H/H	41	H/H
21	0/0	42	0/0