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DPG D/A ltr, 14 Sep 1979; DPG D/A ltr, 14 Sep 1979	

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DOD 5270.1-R, DEC 78

REVIEW OF 28 AUG 79

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TRIAL RECORD/DFOTH-273
FIELD EVALUATION OF THE
NDO SPRAY SYSTEM
PHASE A, TRIALS 1 - 4

BW Branch
Test Design and Analysis Office
Technical Operations Directorate
August 1959

11 Aug 59

12 8p.

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(U) The authority for this test is contained in Letter, CMLRD-D, dated 30 March 1959, subject: "Navy Spray Trials" Confidential.

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U.S. Army
Chemical Corps Research and Development Command
U.S. Army Chemical Corps Proving Ground
Dugway Proving Ground
Dugway, Utah

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(U) The data reported herein are, in many cases, provisional in nature and are subject to change based upon re-evaluation of the original data. The general test data (Table 1) and the vertical tower impinger recoveries (Table 2) are given in tabular form, while the downwind impinger (Fig. 1) and Andersen sampler (Fig. 2) recoveries are presented in graphic form. A single Aero 14-B spray tank was used in these four trials; the discharge tube was equipped with an especially developed BW spider and the standard 90-degree diffuser.

(U) As shown in Table 1, the disseminator efficiencies for pre-impinger and impinger obtained in Trial A-4 are over-estimations which may be attributed, in part, to shifts in the wind direction at different heights that occurred shortly after the time of release. Meteorological instrumentation indicated that portions of the aerosol released both east and west of the vertical sampling tower converged with that portion of the aerosol released in the immediate vicinity of the tower, causing the samplers to collect a greater amount of material than otherwise would have been obtained.

(C) It should also be noted that the peripheral sampling data for Trial A-4, obtained over a 6-hour sampling period on U. S. Highway 40 at Clive, Utah, are unrealistic in relation to the calculated rate of travel for the aerosol cloud as a whole. The southerly wind pattern utilized for the dissemination was confined principally to the Aerial Spray Grid proper and to a narrow channel extending northward along the western edge of the Cedar Mountains toward Clive; elsewhere the winds were from the west or from the north. An analysis of the meteorological data indicates that the aerosol cloud crossed U. S. Highway 40 at the Clive station sometime between 0300 and 0430 MST on 10 July 1959. With the exception of Clive, the peripheral sampling stations had light westerly or

*See Figure 2, page 8, DPG Test Plan 446, Dugway Proving Ground, Utah, 19 June 1959. Confidential.

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northerly winds throughout the entire sampling period. At Clive, the winds shifted from the north to the south at 0300 hours, then back to the north after 0400 hours. From 0430 until 0830, low wind speeds and variable wind directions were recorded at this station. It is believed that the onset of these light and variable wind conditions caused a portion of the aerosol cloud to oscillate or stagnate in the vicinity of the Clive station, with the result that the Andersen sampler collected particles during three consecutive 2-hour sampling periods.

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TABLE 1: Provisional Test Data, BW 446, Phase A, Trials A-1 - 4 (CONFIDENTIAL)

ITEM	TRIAL NUMBER			
	A-1	A-2	A-3	A-4
Date (1959)	7 July	8 July	8 July	9 July
Time (MST)	0018	2043	2233	2319
Ground Speed of Aircraft (mph)	350	480	490*	600
Flight Height at Tower (Feet)	232	125	150*	180
Wind Speed at Function Time (Tower)				
2 Meters (mph)	10.0	3.6	4.1	3.0
150 Feet (mph)	19.0	13.0	10.5	4.0
300 Feet (mph)	20.5	ND**	ND	6.0
Wind Direction at Function Time (Tower)				
2 Meters (°)	320	306	324	225
150 Feet (°)	310	342	342	135
300 Feet (°)	300	343	355	080
Length of Dissemination (Feet)	12,000*	12,000*	12,000*	76,000*
Dissemination Time (Seconds)	23.4	17.1	16.7*	88.0
Amount Disseminated (Gallons)	11.73	6.02	6.47	36.02
Flow Rate (Gallons per minute)	30	21	23	24.5
Agent Concentration ($\times 10^{10}$)	4.2	4.5	4.5	4.5
Disseminator Efficiency				
Pre-impinger (%)	82	66	61	143
Impinger (%)	11	6	9	26
Peripheral (U. S. Highway 40) Sampling Data for Trial A-4 ³				
Total Number of Particles per Sampling Period (MST)				
0230/0430	— ⁴	—	—	328
0430/0630	—	—	—	551
0630/0830	—	—	—	160

*Estimated.

**No data.

³Collected at Clive, Utah, 42 miles downwind from the vertex of the grid. The other five peripheral stations showed only background count.

⁴Not applicable (tower-fly-by).

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TABLE 2: Semi-pictorial Summary of **CONFIDENTIAL** Sampling Data, Trials A-1 through A-4, BW 446 (CONFIDENTIAL)

HEIGHT ABOVE TERRAIN (Feet)	A-1		A-2		A-3		A-4	
	NO*	WS/ ΔT **	NO	WS/ ΔT	NO	WS/ ΔT	NO	WS/ ΔT
-300-		20.1/ +9.9		ND/ ³ +11.3		ND/ +12.2		4.8 +2.9
298	0		0		0		825	
293	0		0		0		330	
288	0		0		0		888	
283	0		0		0		447	
278	0		0		0		547	
273	0		0		0		435	
268	0		0		0		1,975	
263	0		0		0		444	
258	0		0		0		1,789	
253	0		0		0		1,628	
248	0		0		0		1,087	
243	0		0		0		4,228	
238	0		0		0		3,330	
233	0		0		0		3,725	
228	0		0		0		5,135	
223	0		0		0		6,258	
218	0		0		0		12,948	
213	102		0		0		8,828	
208	1,895		0		0		15,900	
203	1,976		0		0		22,722	
-200-		19.6/ +9.8		14.7/ +11.3		9.6/ +11.7		1.5 +11.3
198	51,375		0		0		17,805	
193	235,950		0		0		35,862	
188	35,438		0		0		47,188	
183	4,588		0		0		59,288	
178	5,600		0		0		42,280	
173	46,440		0		0		72,348	
168	43,690		0		0		40,700	
163	24		0		0		33,420	
158	0		0		0		50,100	
153	0		0		0		70,878	
-150-		19.0/ +10.0		13.1/ +10.7		11.8/ +10.6		3.6 +10.0
148	0		0		1,193		139,998	
143	0		0		741		78,500	
138	0		0		3,130		111,000	
133	0		39		5,000		179,778	
128	0		45		7,000		98,048	
123	0		1,874		47,000		50,490	
118	0		28,470		2,000		430,000	
113	0		3,600		19,000		119,100	
108	0		8,000		7,000		81,800	
103	0		26,700		23,000		33,040	
-100-		19.3/ +9.6		10.7/ +9.0		11.1/ +11.0		4.0 +9.0
98	0		4,400		1,000		40,000	
93	0		14,118		2,000		4,700	
88	0		18,890		14,000		18,700	
83	0		25,410		24,400		18,700	
78	0		27,470		19,000		22,000	
73	0		30,000		24,000		3,000	
68	0		22,000		0		10,000	
63	0		18,000		0		10,000	
58	0		4,440		0		10,000	
53	0		1,300		0		10,000	
48	0		0		0		10,000	
43	0		0		0		10,000	
38	0		0		0		10,000	
33	0		0		0		10,000	
28	0		0		0		10,000	
23	0		0		0		10,000	
18	0		0		0		10,000	
13	0		0		0		10,000	
8	0		0		0		10,000	
-6-		11.2/ +1.1		3.4/ +1.8		3.6/ +1.4		4.0 +1.0
3	0		0		0		0	
-14-		6.9/ +0.6		2.0/ +0.5		1.7/ +0.5		1.8 +2.3

*Estimated number of NO organisms per impinger.
 **WS - Wind speed (mph); ΔT - Temperature gradient (0.5 m to indicated height, F°).
 3) No data.
 4) Boxed recoveries denote sampling level immediately above release altitude.
 5) Values in parentheses are interpolated.

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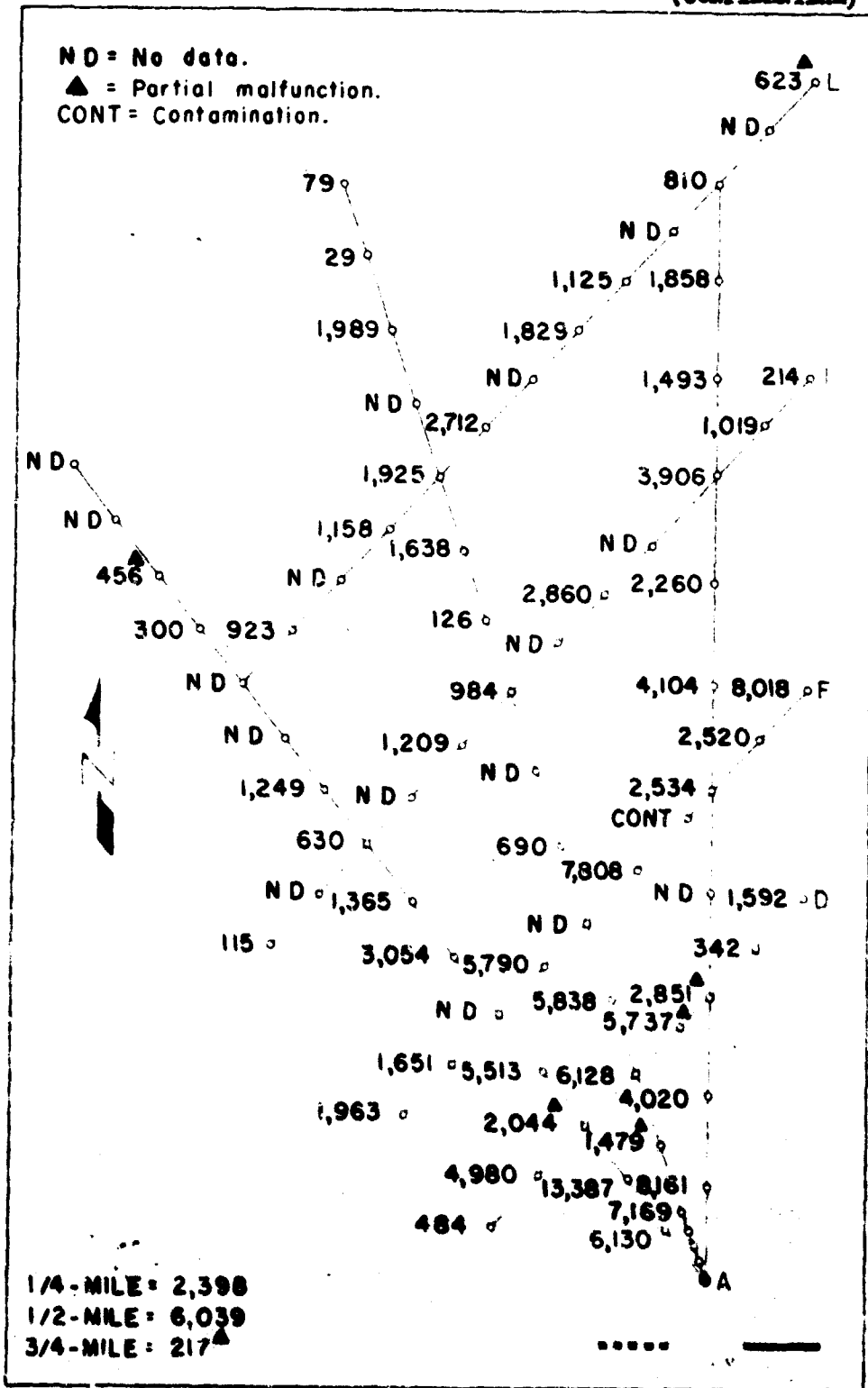


Fig. 1.- Provisional impinger recovery of BG organisms, downwind array, Trial A-4, BW 446. Each figure indicates total number of organisms collected by a 6-liter-per-minute impinger in series with a pre-impinger.

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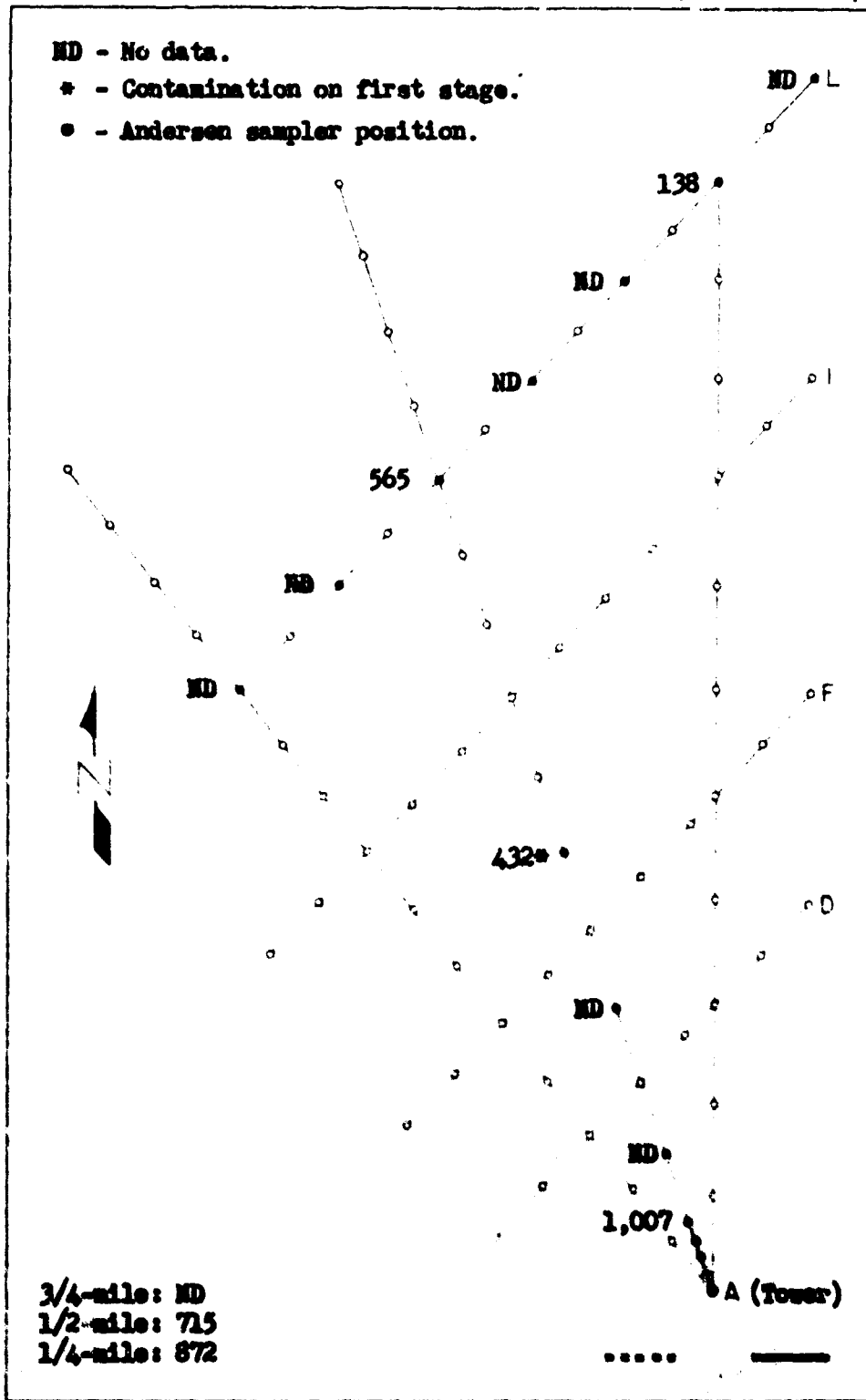


Fig. 2.- Provisional Andersen sampler recovery of BG organisms, downwind array, Trial A-4, HW 446. Each figure indicates total number of particles collected by an Andersen sampler operated at a flow rate of 1 cubic foot of air per minute.

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