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GENERAL DYNAMICS | CONVAIR

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Report No. 8926-110

Material - Atmospheric Dust
Constitution

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Abstract

The weight of dust per unit volume of air, the number of particles of dust per unit volume of air, and dust particle size in the atmosphere at Lindberg Field, San Diego, California, during the April 21 - 30, 1959 period was determined with a Staplex Hi-Vol Sampler (The Staplex Co., Brooklyn, N.Y.), a Bausch and Lomb Dust Counter, and a Millipore Aerosol Filter Apparatus (Millipore Filter Corporation, Watertown, Mass.). A dust concentration of 4.12×10^{-3} mg per cu. ft. was found at 3 PM, April 23, 1959, when the temperature was 68°F, the humidity, 64 per cent; and the wind, SW at 9 knots. At 3 PM, April 30, 1959, from 22.2 to 33.4 million particles of dust per cubic foot of air were found when the temperature was 69°F; the humidity, 68 per cent; and the wind WNW at 6 knots. A dust particle analysis made at 1 PM, April 28, 1959, when the temperature was 67°F; the humidity, 61 per cent; and the wind NW at 8 knots showed that the majority of the dust particles (74 per cent) were under one micron in size. A complete analysis of dust particle size is reported.

Reference: McGowan, M. A., Kruse, G. N., Keller, E. E.,
"Analysis of Atmospheric Dust," General Dynamics/
Convair Report MP 59-199, San Diego, California,
10 June 1959 (Reference attached.)

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Title: MATERIAL - ATMOSPHERIC DUST. CONSTITUTION

Authors: McGowan, M. A., Kruse, G. N., Keller, E. E.

Report No: 8926-110

Contract: A.R.P.A., Commercial

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Date: 10 June 1959

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4 pages, 1 figure.

SAN DIEGO

STRUCTURES & MATERIAL LABORATORIES

REPORT MP 59-199

DATE 10 June 1959

MODEL A.R.P.A.

TITLE

REPORT NO. MP 59-199

ANALYSIS OF ATMOSPHERIC DUST

MODEL: A.R.P.A.

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NO. OF PAGES 4

NO. OF DIAGRAMS 1

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REVISIONS

NO.	DATE	BY	CHANGE	PAGES AFFECTED
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ANALYSIS**PREPARED BY** McGowan**CHECKED BY** Kruse/Keller/Sutherland**REVISED BY****CONVAIR**

A DIVISION OF CENTRAL STUDIES CORPORATION

SAN DIEGO

PAGE 1**REPORT NO.** MP 59-199**MODEL** A.R.P.1.**DATE** 10 June 1959**OBJECT:**

These tests were run to analyze the atmospheric dust content with respect to concentration and the size of the particles at a location specified as 3 ft. south of Column 4-T 110, Building 51, Convair, San Diego.

The tests were to be run on the dustiest day anticipated between April 6 - 20, 1959 and the Weather Bureau data for humidity, temperature, wind direction and velocity at the time of the test were to be reported.

The results were to be reported as total number of particles per cubic foot in each of the three ranges: 0-5 μ , 5 - 10 μ , and over 10 μ size.

APPARATUS:**Test No. 1:**

Weight of Dust per Unit Volume of Air

Staplex Hi-Vol Sampler

Type TFIA

Filter TFA Type "3"

Manufacturer: The Staplex Company (Air Sampler Division)
777 5th Avenue
Brooklyn 32, New York

Test No. 2:

Particles of Dust per Unit Volume of Air

Bausch and Lomb Dust Counter

Cat. No. 31-29-50-01

Manufacturer: Bausch and Lomb Optical Company
Rochester 2, New York

Test No. 3:

Dust Particle Size

Millipore Aerosol Open Type

Filter Holder with Vacuum Pump

Sampling Rate: 10 liters/min.

Filter Type AA Millipore 47 mm. diameter.

Manufacturer: Millipore Filter Corporation
36 Pleasant Street
Watertown 72, Mass.

ANALYSIS

PREPARED BY McGowan

CHECKED BY Krose/Keller/Sutherland

REVISED BY

CONVAIN

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REPORT NO. WP 59-109

MODEL 4.R.1.1.

DATE 10 June 1950

PROCEDURE:

In order to obtain the best description of the dust conditions in the specified area, three types of dust sampling were carried out:

1. A Determination of Weight of Dust per Unit Volume of Air. The air was pumped through a pleated Staplex paper filter for a measured period of time at a determined flow rate. The concentration of dust was computed from the increase in the weight of the filter and the volume of air filtered.
2. A Determination of the Number of Particles per Unit Volume of Air. This test was carried out with a commercial Bausch and Lomb Dust Counter in which the dust particles from a known volume of air are sprayed upon a slide. The number of particles in the field was estimated by averaging random counts and converting the value to number of particles per cubic foot of air.
3. A Determination of Dust Particles Size. The range of the sizes of the dust particles was determined by collecting a dust sample on a millipore filter, mounting the filter on a slide, and measuring the diameters of a large number of the particles under the microscope.

RESULTS:1. Dust Concentration:

Weight per unit volume of air (April 21 - 27)

Total Running Time:	17.25 Hours
Flow Rate:	65 cubic ft./min
Volume of Air Filtered:	6.37×10^4 cu. ft.
Weight of Dust Collected:	.2772 grams
Concentration:	4.12×10^{-3} mg/cu. ft.

Typical weather conditions during run: (April 23 - 3:00 P.M.)

Temperature	=	68°F
Humidity	=	64%
Wind:	=	SW at 9 knots

2. Dust Concentration:

Millions of Particles per Unit Volume of Air, Bausch & Lomb Dust Counter
April 30, 1959

Average Value:	Sample 1	22.2 million particles / cu. ft.
	Sample 2	33.4 million particles / cu. ft.
	Sample 3	26.7 million particles / cu. ft.

ANALYSIS
PREPARED BY McGowan
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SAN DIEGO

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MODEL A.R.P.A.
DATE 10 June 1959

RESULTS: (Cont'd)

2. Dust Concentration: (Cont'd)

Weather Conditions - April 30th - 3:00 P.M.

Temperature = 69°F
Humidity = 58%
Wind = WNW 6 knots

3. Dust Particle Size (See Also Figure 1) - April 28 - Total Count: 300 Particles

<u>SIZE</u>	<u>NUMBER OF PARTICLES</u>	<u>% OF TOTAL</u>
Less than 1 Micron	222	74.00
1 - 2 Micron	36	12.00
2 - 3 Micron	15	5.00
3 - 4 Micron	9	3.00
4 - 5 Micron	6	2.00
5 - 6 Micron	4	1.33
6 - 7 Micron	4	1.33
7 - 8 Micron	3	1.00
12 Micron	1	.33

Weather Conditions - April 28 - 1:00 P.M.

Temperature = 67°F
Humidity = 61%
Wind = NW 8 knots

NOTE: The results of the above tests should not be related to one another mathematically because each test is a unique and relative measurement of a particular feature of the dust concentration present and may only be compared significantly to another measurement of the same type.

REFERENCE:

Drinker and Hatch, Industrial Dust, McGraw - Hill Book Company, 1936.

NOTE: The data from which this report was prepared are recorded in Materials and Processes Laboratory Data Book Number 3022.

SIZE-FREQUENCY DISTRIBUTION FOR DUST PARTICLES



FIGURE 1