

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
CENTER FOR DISEASE CONTROL  
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION  
REPORT HE 78-24-525

UNITED PARCEL SERVICE  
LATHAM, NEW YORK

September 1978

I. TOXICITY DETERMINATION

The National Institute for Occupational Safety and Health (NIOSH) conducted an environmental evaluation on February 22-23, 1978, for employees working on the red (PD-4 train) and pink (PD-6 train) conveyor belts in the hub area of the main building. Employee exposures to both total and respirable airborne concentrations of nuisance dust were evaluated. It has been determined that during the period of this evaluation, occupational exposures to airborne concentrations of nuisance particulates did not constitute a health hazard. This determination is based on environmental measurements of airborne nuisance particulates, confidential employee interviews, observations of work practices and engineering controls, and a review of the relevant literature.

## II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Personnel Safety Supervisor, United Parcel Service, Latham, New York.
2. Chief Steward, International Brotherhood of Teamsters Local 294, Latham, New York.
3. Director, Occupational Safety and Health, International Brotherhood of Teamsters, Washington, D.C.
4. U.S. Department of Labor-Region II.
5. NIOSH-Region II.

For the purpose of informing the approximately 8 "affected employees," the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place(s) near where the exposed employees work.

## III. INTRODUCTION

Section 20 (a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669 (a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health received such a request from the Chief Steward, International Brotherhood of Teamsters Local 294. As the authorized employee representative for United Parcel Service, Latham, New York, the Chief Steward submitted the request on behalf of several employees who work on the red (PD-4 train) and pink (PD-6 train) conveyor belts in the hub area of the main building. The affected employees were reportedly exposed to an irritant dust which evoked the following subjective symptoms: irritation of the eyes, nose and throat. The requestor also stated that on occasion, irritation was severe enough to cause coughing, sneezing, and redness and watering of the eyes.

#### IV. HEALTH HAZARD EVALUATION

##### A. Process Description

The facility operated by United Parcel Service in Latham, New York is a conveyORIZED hub distribution center. The hub distribution center has been operational since November 1973 and employs approximately 200 persons. Of the total work force, approximately 85 persons are located in the general area of the request; however, only 8 employees are directly affected by the alleged hazard.

The hub distribution facility handles approximately 60,000 parcels per day over the 5:45 pm to 2:30 am work shift. The red and pink conveyor belts each handle approximately 8500 parcels per shift and both are outbound with parcels directed for intrastate, as well as, interstate transportation.

The employees who are directly affected by the alleged hazard are the pullers and loaders. Each conveyor belt has one puller who directs the parcels down the appropriate distribution chute. This individual is stationed on a steel tower which is adjacent to the conveyor belt. After the parcels have been directed down the proper distribution chute they are stacked within a tractor-trailer rig by the loaders. These personnel are normally stationed on the loading dock or in the trailer. The number of loaders is dependent on the parcel flow and normally varies between one and four persons.

##### B. Evaluation Design

In response to this request, an environmental survey was conducted on February 22-23, 1978, in the general vicinity of the red and pink conveyor belts. An opening conference was conducted and was attended by representatives of both management and labor. Following the opening conference, a walk-through survey was performed in the hub area of the main building. On the following day, environmental sampling was conducted during the 5:45 pm to 2:30 am shift at both the red and pink conveyor belts. A previous environmental evaluation at this facility by the Occupational Safety and Health Administration, indicated the possibility of a static electrical charge build-up on some of the air sampling equipment. Therefore, in order to avoid this potential problem, multiple dust collection techniques were utilized and included a direct reading electronic dust monitor, as well as, personal and area air samples.

A confidential non-directive medical questionnaire was also administered to several workers on the red and pink belts.

### C. Evaluation Methods

Environmental sampling was conducted in the hub area of the main building on February 23, 1978. Employee exposure to nuisance dust was evaluated via personal, area and grab air samples which were collected during the 5:45 pm to 2:30 am shift in the vicinity of the red and pink conveyor belts.

The analysis for inert or nuisance dust utilized a NIOSH gravimetric method. Employee exposure to airborne concentrations of total and respirable nuisance dust was evaluated by drawing air through hydrophobic VM-1 (37 millimeter diameter, 5.0 micron average pore size - polyvinylchloride) filters. The amount of particulate collected on each filter is determined by filter weight gain. Before sampling, the filters were desiccated and pre-weighed to the nearest 0.01 milligram. After sampling the filters were reweighed. The difference in the filters weight is assumed to be the mass of the particulate collected.

Employee exposure to "total" nuisance dust was evaluated by drawing air through a 37 millimeter (mm) three-piece filter cassette with a vacuum sampling pump at a flow rate of 1.5 liters per minute (lpm) for both personal and area air samples. Exposure to "respirable" nuisance dust was evaluated by drawing air through a 10 mm nylon cyclone assembly and two-piece 37 mm filter cassette with a vacuum sampling pump at a flow rate of 1.7 lpm for both personal and area air samples. Personal air samples were taken in the breathing zone of the exposed employees, while area air samples were taken in the general vicinity of the conveyor belts. These filter samples were transmitted to a NIOSH contract laboratory in Salt Lake City and were analyzed gravimetrically.

The Andersen Non-Viable Sampler<sup>®\*</sup>, a cascade impaction device, was utilized to determine the particle size distribution of the dust(s) in the employees work environment. This air sampling device utilizes eight DM-6 (81 mm diameter, 0.8 micron average pore size-vinyl metrical membrane filter) impaction discs in a cascade arrangement to simulate the particle retention capability of the human respiratory system. The air sampler was placed adjacent to the puller on the red conveyor belt. A high volume vacuum pump was utilized to draw air through this device at a flow rate of 28.3 lpm. The impaction discs were transmitted to the NIOSH laboratory in Cincinnati and analyzed by a gravimetric method.

\*Mention of a commercial product does not constitute endorsement by the National Institute for Occupational Safety and Health.

The GCA Respirable Dust Monitor<sup>®</sup>, a portable electronic-beta attenuation particulate monitor, was utilized for screening purposes to evaluate both the red and pink conveyer belt areas. Although this device can be operated in either the respirable or total dust mode, it was used to measure total dust only. The dust monitor was operated in the automatic mode and each grab air sample was taken over a one minute period at a flow rate of 2.0 lpm.

D. Evaluation Criteria

The concept that there are concentrations of air contaminants to which most employees may be exposed on a day-to-day basis, without discomfort or adverse health effects, is fundamental to the practice of industrial hygiene. Airborne exposure limits for many chemical substances encountered occupationally have been recommended or promulgated by several organizations. These limits are normally expressed as a time-weighted average (TWA) exposure for a normal 8 to 10 hour workday, or a 40 hour workweek, and are presumed to be valid throughout a normal working lifetime. However it should be noted, that due to a wide variation in individual susceptibility, a small percentage of employees may experience discomfort from exposure to some substances at concentrations at or below the recommended level; a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness.

For this investigation, environmental evaluation criteria were considered from the following sources: (1) American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) with their supporting documentation, and (2) U.S. Department of Labor - Occupational Safety and Health Administration (OSHA) standards. For the substance evaluated during this investigation, the primary environmental criteria selected were:

<u>Chemical Substance</u>	<u>Environmental Criteria mg/M<sup>3</sup>**</u>	<u>Reference Source***</u>
Nuisance		
Particulates:		
(A) Total Fraction*	10	(1)
(B) Respirable Fraction	5	(1,2)

\*Total dust containing less than 1.0 percent quartz.

\*\*Approximate milligrams of substance per cubic meter of air.

\*\*\*Reference numbers in parenthesis refer to the source(s) from the above discussion from which the environmental standard was obtained.

Environmental air sampling during the 5:45 pm to 2:30 am shift has identified the presence of total and respirable nuisance dust in the work area. The following discussion is provided so that the employees may better understand the potential health hazards associated with excessive occupational exposure to this substance.

Nuisance Particulates - refer to a number of non-fibrogenic dusts or particulates which are common air contaminants and as such, are normally found in the occupational environment. The potential for eliciting adverse health effects is primarily dependent on the diameter of the inhaled dust particle. The human respirable range for particulate matter is generally considered to extend from 0.5 to 5.0 microns; only a few dust particles greater than 5.0 microns in diameter will be deposited in the respiratory tract while particles less than 0.5 microns leave the lung without producing local adverse health effects. Inhalation of excessive amounts of nuisance particulates normally will not cause adverse effects in the lung; however, excessive airborne concentrations may reduce visibility in the work environment and may also promote irritation of the eyes, nose, throat and lungs.<sup>2,3,4</sup>

The ACGIH (1977) recommended TLV is  $10 \text{ mg/M}^3$  for "total dust" of less than 1.0 percent quartz, or,  $5 \text{ mg/M}^3$  for "respirable dust" and is expressed as an 8-hour TWA exposure. The present Federal standard as promulgated by OSHA is  $15 \text{ mg/M}^3$  for "total dust", or  $5 \text{ mg/M}^3$  for "respirable dust" and is also expressed as an 8-hour TWA exposure.<sup>5,6</sup>

#### E. Evaluation Results and Discussion

Results from personal and area samples for both respirable and total nuisance dust are given in Table I. The results indicate airborne concentrations of less than 7.0 percent of the environment criteria and are thus, not considered to constitute a health hazard during the period of this evaluation. A physical inspection of the areas under evaluation did not reveal the presence of any unusual or excessive dust deposits and/or build-up. This finding is consistent with the laboratory results previously reported.

The results from the screening survey in the red and pink conveyor belt areas with the GCA Respirable Dust Monitor<sup>®</sup> are reported in Tables II and III. The results from this survey, as reported to management and labor representatives at the closing conference, indicate very low environment dust concentrations which are not indicative of a dust problem.

The results from the particle size and weight distribution analysis with the Anderson Non-Viable Sampler<sup>®</sup> are reported in Table IV and shown in Figure I. The results indicate that the majority of particulate matter (approximately 96.5 percent) does not fall within the so-called human "respirable range".

The NIOSH industrial hygienists did not experience eye or upper respiratory irritation while performing the survey in the vicinity of the pink conveyor belt. However, while in the vicinity of the red belt, some adverse symptoms were experienced by both NIOSH personnel. While interviewing the puller on the red belt, Mr. Taft noticed slight upper respiratory irritation while Mr. Belanger experienced eye and upper respiratory irritation. It should be noted that the puller stands on an elevated platform which is adjacent to the conveyor belt and is approximately twelve feet above the floor level. One of the three Johnson Air Heaters<sup>®</sup> is located opposite this position and provides warm dry air which ultimately reaches the pullers work station.

#### F. Conclusion and Recommendations

Thorough analysis of the data obtained from environmental sampling and worker interviews indicate that a health hazard from inert or nuisance dusts to employees on the pink and red conveyor belts did not exist during the period of this evaluation.

The adverse symptoms reported by the puller on the red conveyor belt, and the NIOSH industrial hygienists, are consistent with exposure to some irritant agent(s) in the work environment. It is theorized that this irritant agent may be sulfur dioxide - a colorless, irritant gas. Sulfur dioxide is suspected because the adverse symptoms which have been reported are consistent with exposures to low concentrations of this gas. Most fuel oils contain sulfur. During combustion, the sulfur is converted to sulfur dioxide and a small amount of sulfur trioxide.<sup>7,8</sup> Therefore, the fuel oil used for the Johnson Air Heaters<sup>®</sup> may have produced irritating levels of sulfur dioxide during combustion.

It is recommended that the management of United Parcel Service, Latham, New York, determine the sulfur content of the fuel oil used for the Johnson Air Heaters<sup>®</sup>. If the employees experience eye or upper respiratory irritation when heating of the work area is necessary, then an Industrial Hygienist should be consulted to determine if the sulfur dioxide concentration in the vicinity of the red conveyor belt is the primary source of the irritation.

The NIOSH staff would like to thank both management and labor for their cooperation and assistance during this evaluation.

V. REFERENCES

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2. Sax, N., Dangerous Properties of Industrial Materials, Fourth Edition, Van Nostrand Reinhold Company, New York, New York, 1975.
3. Hamilton, A. and H. Hardy, Industrial Toxicology, Third Edition, Publishing Sciences Group, Inc., Acton, Massachusetts.
4. American Conference of Governmental Industrial Hygienists: Documentation of the Threshold Limit Values for Substances in Workroom Air, Third Edition, Cincinnati, Ohio, 1971.
5. Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Charges for 1977, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1977.
6. Title 29 of the Federal Code of Regulations Part 1910.1000, Revised January 1976, DOL/OSHA, 1976.
7. Faith, W.L. and A. Atkisson, Jr., Air Pollution, Second Edition, Wiley-Interscience, New York, New York, 1972.
8. Air Pollution Engineering Manual Second Edition, Environmental Protection Agency, Publication No. AP-40, 1973.

VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

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Table I

## RESULTS OF PERSONAL AND AREA AIR SAMPLING FOR EXPOSURE TO NUISANCE PARTICULATES

United Parcel Service  
10 Avis Drive  
Latham, New York

February 23, 1978

Time Weighted Average Exposure in  $\text{mg}/\text{M}^3$ <sup>1</sup>

Sample Number	Description/Location <sup>3</sup>	Time	Volume (Liters)	Total Dust	Respirable Dust
T1	Personal-Pink Belt, Puller	1802-2015	199.5	0.25	
R1	Personal-Pink Belt, Puller	1802-2015	226.1		0.04 <sup>2</sup>
T2	Area-Pink Belt, Between doors 44/45	1816-0151	682.5	0.21	
R2	Area-Pink Belt, Between doors 44/45	1816-0151	773.5		0.08
T3	Area-Pink Belt, Between doors 48/47	1821-0151	675.0	0.21	
R3	Area-Pink Belt, Between doors 46/47	1821-0151	765.0		0.10
T4	Area-Pink Belt, Between doors 45/46	1828-0151	664.5	0.69	
R4	Area-Pink Belt, Between doors 45/46	1838-0151	753.1		0.12
T5	Area-Red Belt, Between doors 55/56	1841-0130	613.5	0.03	
R5	Area-Red Belt, Between doors 55/56	1841-0130	695.3		0.06
T6	Area-Red Belt, Between doors 57/58	1846-0130	606.0	0.10	
R6	Area-Red Belt, Between doors 57/58	1846-0130	686.8		0.06
T7	Area-Red Belt, Between doors 59/60	1849-0130	601.5	0.12	
R7	Area-Red Belt, Between doors 59/60	1849-0130	681.7		0.06
T8	Personal-Red Belt, Puller	2010-0130	480.0	0.48	
R8	Personal-Red Belt, Puller	2010-0130	544.0		0.17
T9	Blank Filter	∅	∅	0.00	
R9	Blank Filter	∅	∅		-0.01

Environmental Criteria

10.0

5.0

1.  $\text{mg}/\text{M}^3$  - approximate milligrams of substance per cubic meter of air; lower limit of detection for gravimetric analysis is 0.01 milligrams per sample.
2. Filter torn - results suspect.
3. Active leading doors: 44, 45, 46 (Pink Belt) and 56, 57, 60 (Red Belt).

Table II

## RESULTS OF AREA AIR SAMPLING FOR EXPOSURE TO NUISANCE PARTICULATES

United Parcel Service  
10 Avis Drive  
Latham, New York

February 23, 1978

Sample Number	Location - Pink Belt	Time	Total Dust Concentration in $\mu\text{g}/\text{M}^3$ <sup>1</sup>
1	P-46 Employees Loading Truck	1915	0.5
2	P-46 Employees Loading Truck	1920	0.5
3	P-46 Employees Loading Truck	1921	0.0
4	P-45 No Employees Present	1925	0.0
5	P-45 No Employees Present	1925	0.6
6	P-45 No Employees Present	1926	0.4
7	P-44 Employees Loading Truck	1930	0.6
8	P-44 Employees Loading Truck	1931	0.2
9	P-44 Employees Loading Truck	1932	0.1
10	P-44 Employees Loading Truck	1935	0.7
11	P-44 Employees Loading Truck	1936	0.5
12	P-42/44 Pick-off man	1940	0.2
13	P-42/44 Pick-off man	1941	0.2
14	P-42/44 Pick-off man	1942	0.3

Environmental Criteria

5.0

1.  $\text{mg}/\text{M}^3$  - approximate milligrams of substance per cubic meter of air;  
lower limit of detection for a 1 minute air sample is  $0.1 \text{ mg}/\text{M}^3$ .

Table III

## RESULTS OF AREA AIR SAMPLING FOR EXPOSURE TO NUISANCE PARTICULATES

United Parcel Service  
10 Avis Drive  
Latham, New York

February 23, 1978

Sample Number	Location - Red Belt and Doors 9/10	Time	Total Dust Concentration in mg/M <sup>3</sup>
15	R-56 Employees Loading Truck	2245	0.7
16	R-56 Employees Loading Truck	2246	0.0
17	R-56 Employees Loading Truck	2247	0.1
18	R-56 Employees Loading Truck	2250	0.2
19	R-56 Employees Loading Truck	2251	0.0
20	R-60/61 Pick-off Man	2255	0.0
21	R-60/61 Pick-off Man	2256	0.1
22	R-60/61 Pick-off Man	2300	0.0
23	R-60/61 Pick-off Man	2301	0.0
24	R-60/61 Pick-off Man	2302	0.4
25	Overlook Employees unloading Door 9/10	2345	0.6
26	Overlook Employees unloading Door 9/10	2345	0.0
27	Overlook Employees unloading Door 9/10	2350	0.4
28	Overlook Employees unloading Door 9/10	2351	0.2
29	Overlook Employees unloading Door 9/10	2352	0.5
30	Door 10 Employees unloading Truck	2355	0.0
31	Door 10 Employees unloading Truck	2356	0.4
32	Door 10 Employees unloading Truck	2357	0.6
33	Overlook Area	2400	0.0

1. mg/M<sup>3</sup> - approximate milligrams of substance per cubic meter of air<sup>1</sup>  
lower limit of detection for a 1 minute air sample is 0.1 mg/M<sup>3</sup>.

Table IV

## PARTICLE SIZE AND WEIGHT DISTRIBUTION RESULTS FOR NUISANCE DUST-RED BELT

United Parcel Service  
 10 Avis Drive  
 Latham, New York  
 February 23, 1978

Sample Number	Time	Anderson Section	Stage ECD( $\mu\text{m}$ ) <sup>1</sup>	Stage Weight Gain(mg) <sup>2</sup>	Percent of Sample Weight on Stage	Cumulative Percent Less than ECD
8	21:10-23:10	Stage No. 0	11.0	1.68	94.38	5.62
7	21:10-23:10	Stage No. 1	7.0	0.00	0.00	5.62
6	21:10-23:10	Stage No. 2	4.7	0.04	2.25	3.37
5	21:10-23:10	Stage No. 3	3.3	0.00	0.00	3.37
4	21:10-23:10	Stage No. 4	2.1	0.04	2.25	1.12
3	21:10-23:10	Stage No. 5	1.1	0.01	0.56	0.56
2	21:10-23:10	Stage No. 6	0.65	0.01	0.56	0.00
1	21:10-23:10	Stage No. 7	0.43	0.00	0.00	0.00
9	-	Blank	-	-0.03	-	-
10	-	Blank	-	0.01	-	-
18	23:30-01:30	Stage No. 0	11.0	0.03	3.23	96.77 <sup>3</sup>
17	23:30-01:30	Stage No. 1	7.0	0.24	25.80	70.97 <sup>3</sup>
16	23:30-01:30	Stage No. 2	4.7	0.09	9.68	61.29 <sup>3</sup>
15	23:30-01:30	Stage No. 3	3.3	0.00	0.00	61.29 <sup>3</sup>
14	23:30-01:30	Stage No. 4	2.1	0.00	0.00	61.29 <sup>3</sup>
13	23:30-01:30	Stage No. 5	1.1	0.11	11.83	49.46 <sup>3</sup>
12	23:30-01:30	Stage No. 6	0.65	0.38	40.86	8.60 <sup>3</sup>
11	23:30-01:30	Stage No. 7	0.43	0.08	8.60	0.00
19	-	Blank	-	0.01	-	-
20	-	Blank	-	0.02	-	-

1. EDC - effective cutoff diameter in microns; aerodynamic diameter for an impaction efficiency of 50 percent for a flow rate of 28.3 liters per minute.
2. mg - milligrams of substance
3. The results shown for sample number 11-18 are believed to be invalid due to a reduction in air flow from a pinched vacuum line.

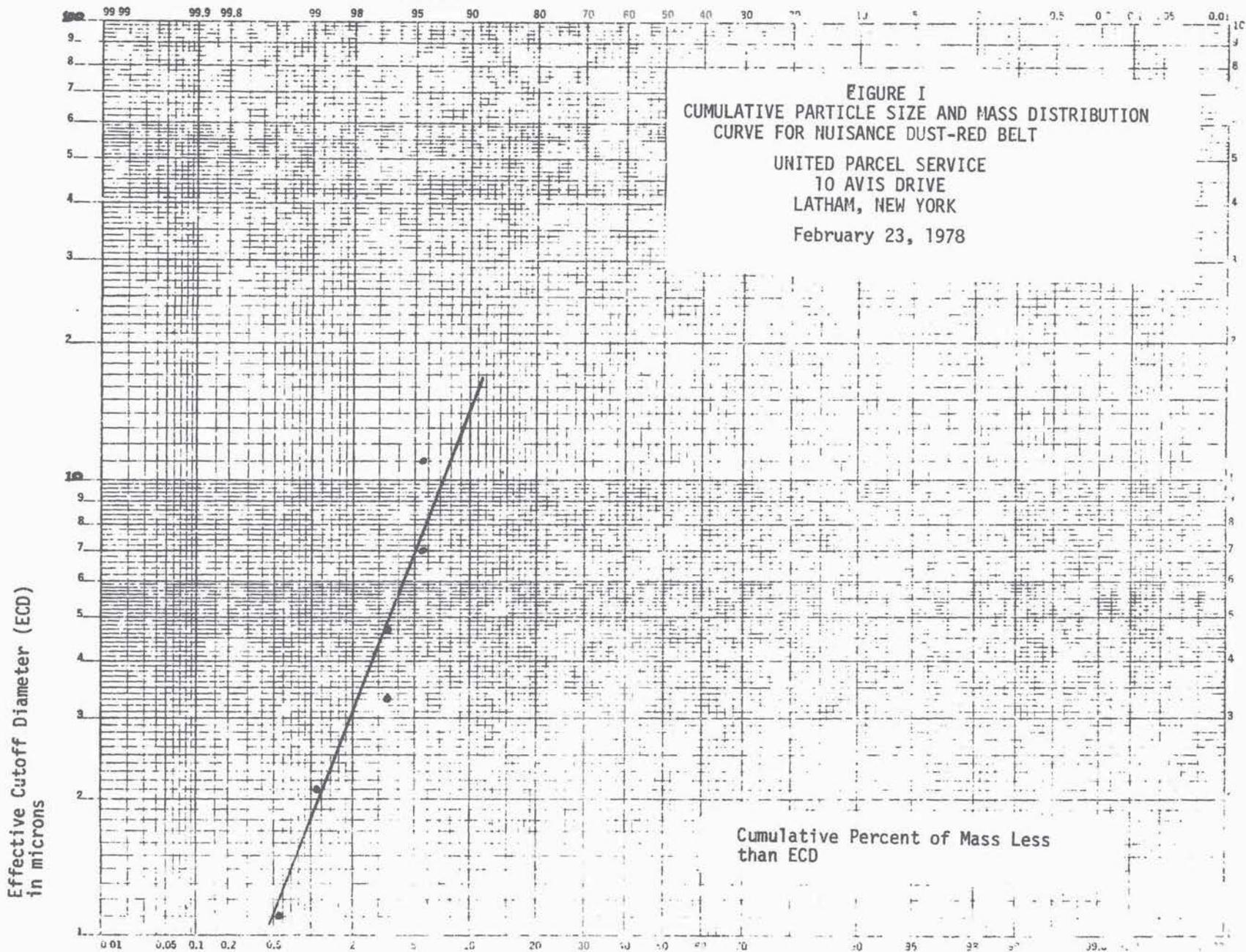


FIGURE I  
CUMULATIVE PARTICLE SIZE AND MASS DISTRIBUTION  
CURVE FOR NUISANCE DUST-RED BELT

UNITED PARCEL SERVICE  
10 AVIS DRIVE  
LATHAM, NEW YORK  
February 23, 1978