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 79-42-685

MOTION PICTURE SCREEN CARTOONISTS, LOCAL 841 25 WEST 43RD STREET NEW YORK, NEW YORK 10036

April 1980

I. SUMMARY

On January 2, 1979, NIOSH received a request for a Health Hazard Evaluation from Local 841 of the Motion Picture Screen Cartoonists (International Alliance of Theatical Stage Employees and Moving Picture Machine Operators/AFL-CIO;SIC code 7820). The request alleged employee exposure to film cleaning fluid (methyl chloroform) and liquid gate fluid (50% methyl chloroform/50% perchloroethylene) causing dizziness, blurred vision, nausea, sore throat and dermatitis.

To evaluate the causes of these complaints an industrial hygiene air sampling survey and a review of work practices and facilities were made in 14 of 16 optical studios in the mid-town Manhattan area. A total of 52 employees from the 14 establishments were monitored for solvent exposure.

It was determined that nine employees were exposed to concentrations of perchloroethylene (range of 487 to 1606 mg/M³) and one employee was exposed to concentrations of methyl chloroform (>7195 mg/M³) exceeding the NIOSH recommended criteria of 340 mg/M³ (680-15 minute ceiling) and 670 mg/M³ respectively. Eight of the nine personal overexposures were found in one establishment - Film Opticals.

Recommendations are presented in this report (Section VIII, pages 5 and 6) to help minimize employee exposure to solvent vapors.

Information available from the National Cancer Institute has led NIOSH to conclude that perchloroethylene is a potential human carcinogen. Therefore, exposure to perchloroethylene, which was demonstrated in all 14 optical shops surveyed, should be minimized and preferably eliminated altogether by use of a less hazardous substitute. Page 2 - Health Hazard Evaluation Determination Report HE 79-42

II. INTRODUCTION

A request for a health hazard evaluation, submitted by Local 841 of the Motion Picture Screen Cartoonists (International Alliance of Theatical Stage Employees and Moving Picture Machine Operators/AFL-CIO), was submitted to the Hazard Evaluation and Technical Assistance Branch of NIOSH on January 2, 1979. The purpose of the study was to evaluate motion picture machine operators' complaints of dizziness, blurred vision, nausea, sore throat, and dermatitis attributed to their work with solvents.

The request indicated 16 optical shops in the mid-town Manhattan area were represented by Local 841. These 16 shops were originally included in the scope of the evaluation. However, due to the small number of employees and remote location relative to the others, two shops were not included in the evaluation. These two shops are included in the distribution of the final evaluation report.

An interim report, dated June 1979, containing preliminary environmental data and recommendations to reduce solvent exposure, was provided to the subject establishments.

III. PROCESS DESCRIPTION

Optical shops are responsible for the production of finished 16 mm and 35 mm films. Animation, titles, and all other optical effects are filmed in the studios from optical negatives or feature films. These originals are first processed through a film cleaning unit which immerses film in a temperature-controlled bath of solvent (methyl chloroform) then winds it through a series of pressure sensitive rollers to dry. This operation removes dirt from the negatives, eliminating unwanted exposure during filming. Special effects can then be added. The optical negative, however, is fragile, and to prevent scratching while filming it is passed through a device on the camera which allows it to come in contact with liquid gate. This "shuttle" is connected to a circulating system which pumps liquid gate through it and permits contact between the film and liquid gate prior to exposure. Occasionally, two shuttles will be used in line. This process is known as "double gating".

IV. METHODS AND MATERIALS

In order to evaluate worker exposure to methyl chloroform and perchloroethylene, personal breathing zone air samples - long term (4-8 hours duration) and short term (15-30 minutes duration) - were obtained. In addition, area (process) air samples were taken in selected areas of the individual workshops in order to obtain an understanding of the general levels of organic solvent contamination. These samples were obtained according to standard NIOSH sampling and analytical methods.¹ Page 3 - Health Hazard Evaluation Determination Report HE 79-42

V. EVALUATION CRITERIA

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Exposure criteria have been developed to evaluate a worker's exposure to toxic substances in an occupational setting. Based on available human and animal studies, and industrial experience, these values represent levels to which it is believed that nearly all workers may be exposed for an 8-hour day, day after day, throughout a working lifetime, without adverse effect.

A. Perchloroethylene

In July 1976, NIOSH recommended² that exposures to perchloroethylene be limited to 340 milligrams perchloroethylene per cubic meter of air (340 mg/M³) for a workday. This recommendation was based on reported health effects including irritation of the eyes and upper respiratory tract, dizziness, drowsiness, confusion, irritability, loss of appetite, nausea, and vomiting. Constant skin contact will defat the skin and cause dermatitis.

In a Current Intelligence Bulletin³ issued on January 20, 1978, NIOSH recommended that perchloroethylene be handled as if it were a human carcinogen, meaning, in essence, that exposure should be controlled to the greatest extent and eliminated if possible until further evaluation of its carcinogenic potential was made. This revision was based on a study by the National Cancer Institute (NCI) indicating that perchloroethylene caused liver cancer in laboratory mice.⁴ Substances that cause cancer in experimental animals must be considered to pose a potential cancer risk in man.

The OSHA⁵ exposure standard for perchloroethylene is a time-weighted average of 670 mg/M³ for an 8-hour workday.

B. Methyl Chloroform

NIOSH recommends⁶ that exposure to methyl chloroform be no greater than 1910 mg/M^3 during any 15-minute period during the workday. Methyl chloroform is similar to perchloroethylene in effect, causing dermatitis, eye and throat irritation, dizziness, nausea, vomiting, headache, and confusion. Methyl chloroform has also been demonstrated to cause decreased blood pressure and cardiac arrhythmia. Constant skin contact will defat the skin and cause dermatitis.

The OSHA exposure standard⁵ for methyl chloroform is a time-weighted average of 1900 mg/M³ for an 8-hour workday.

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VI. RESULTS

The results of the environmental sampling are presented in Table I. The samples which exceed recommended exposure criteria are marked with an asterisk.

One employee was exposed to concentrations of methyl chloroform in excess of the recommended criteria of 1900 mg/M³ for any 15 minute period during the workday. In fact, the employee was exposed to concentrations in excess of the 8-hour Federal Regulatory Standard of 1900 mg/M³ by a factor of over 2.5. The exact value cannot be determined due to overloading of the sample.

Nine employees (all cameramen) were exposed to concentrations of perchloroethylene in excess of the recommended criteria. Four employees were exposed in excess of the 8-hour criteria of 340 mg/ M^3 and four were exposed in excess of the 8-hour exposure limit of 680 mg/ M^3 .

Area samples are not used to determine worker exposure levels (except in some instances where workers remain in a fixed location) but are used to indicate general levels of contamination in selected areas of a workplace.

VII. DISCUSSION

It is important to note that seven of nine overexposures to perchloroethylene occurred in one optical shop - Film Opticals. This is probably due to the exclusive use of the "double gate" procedure by this establishment. This "double gating" procedure should be evaluated in terms of its effectiveness in cleaning the film. If it is not absolutely necessary for film quality then it should be eliminated. At the minimum, the housing containing the solvent should be further sealed to prevent leaks.

The extremely high value reported for methyl chloroform exposure to the film cleaner (sample number CT 155) is cause for serious concern. Another sample (sample number CT 157) taken concurrently on the same employee was also fairly high (although not excessive), indicating that there may have been a period of time during the sampling period, or some facet of his work routine, which may have allowed high exposures.

The health complaints reported are consistent with health effects from solvent exposure documented in the literature. While no medical evaluations were conducted to verify these health complaints, it is believed that they are correlated with the solvent exposures documented by the air sampling.

NIOSH's position on exposure to carcinogens or potential carcinogens is that exposure should be minimized and preferably eliminated altogether. The most effective way to protect workers from harmful substance is to eliminate that substance from the workplace and replace that substance with a less hazardous substitute. Page 5 - Health Hazard Evaluation Determination Report HE 79-42

VIII. RECOMMENDATIONS

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- Eliminate the double gate process at Film Opticals if it is not necessary for film quality. If the process must be maintained, then further enclosure and exhaust ventilation may be necessary in order to contain solvent vapors.
 - Evaluate the work procedure of the film cleaner at Film Opticals in order to pinpoint the source of his high solvent exposure. Eliminate or otherwise modify his procedure so that he is not exposed to excessive solvent concentrations.
 - 3. All shops that use perchloroethylene are advised that perchloroethylene is a potential human carcinogen. Airborne concentrations of perchloroethylene should be minimized. A substitute for perchloroethylene should be found until further data more clearly define its carcinogen potential. Proper precautions should be taken to insure that a more hazardous substitute is not chosen.
 - Properly maintain the liquid gate pumping and filtering systems, as well as the camera shuttles, to insure minimum leakage. The practice of using cardboard scraps to soak up leaks should be discontinued.
 - 5. Waste solvent should never be disposed of in trash barrels. Collect solvent in closed cans or drums prior to disposal. In addition, storage of liquid gate or film cleaning fluid in open containers (such as those used to refill the units) should be prohibited. Provide solvent containers for this purpose, as necessary.
 - 6. Clean contaminated areas immediately after a spill to minimize evaporation. If towels are used to absorb the solvent, discard them into a covered trash receptacle. In the event of a major spill or spills requiring lengthy clean up, the use of chemical cartridge, half face respirators should be considered. (A number of manufacturers supply MSHA/NIOSH certified and approved respirators.)
 - 7. Insure that the fresh air make-up systems are functioning continuously during the working hours. Adequate room ventilation and/or local exhaust should be supplied to the optical bench camera rooms and film cleaning rooms. (The use of open windows does not constitute "adequate" ventilation.)
 - 8. Avoid direct skin contact. Wear neoprene gloves or other suitably impervious gloves, while handling the solvents.

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9. The doors on the film cleaning units should only be opened as necessary. After cleaning, delay removal of the film from the units for several minutes. This will allow the local exhaust supplied in the units to evacuate most of the vapors. Keep the doors closed particularly during the cleaning process and whenever the units are not in use.

IX. REFERENCES

- NIOSH Manual of Analytical Methods, Second Edition, Vol. 1, P&CAM #127. DHEW (NIOSH) Pub. No. 77-157A, April 1977.
- "Criteria for a Recommended Standard . . . Occupational Exposure to Tetrachloroethylene (Perchloroethylene)", DHEW (NIOSH) Pub. No. 76-185, July 1976.
- Current Intelligence Bulletin #20 "Tetrachloroethylene". DHEW (NIOSH) Pub. No. 78-112, January 20, 1978.
- 4. "Bioassay of Tetrachloroethylene for Possible Carcinogenicity". DHEW (NIH) Pub. No. 77-813, October 1977.
- Occupational Safety and Health Standards for General Industry. 29 CFR 1910.1000. U.S. DOL-OSHA, January 1, 1978.
- Criteria for a Recommended Standard . . . Occupational Exposure to 1,1,1-Trichloroethane (Methyl Chloroform)", DHEW (NIOSH) Pub. No. 76-184, July 1976.

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XI. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this report are currently available upon request from NIOSH, Division of Technical Services, Publications Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia 22161.

Copies of this report have been sent to:

- 1. Motion Picture Screen Cartoonists, Local 841
- 2. B & B Opticals

Originating Office:

Report Typed By:

- 3. Cineffect Visuals
- 4. Computer Opticals
- 5. E.F.X. Unlimited
- 6. E.U.E./Screen Gems
- 7. Exceptional Opticals
- 8. Film Opticals
- 9. Mini Effects
- 10. The Optical House
- 11. Optimum
- 12. Cinopticals, Inc.
- 13. Professional Opticals
- 14. Select Effects
- 15. Tri-Pix
- 16. Videart Opticals
- 17. World Effects
- 18. NIOSH, Region II
- 19. U.S. DOL OSHA, Region II
- 20. International Alliance of Theatical Stage Employees and Moving Picture Machine Operators/AFL-CIO)

For the purpose of informing the approximately 185 affected employees, the employers shall promptly "post" the determination report for a period of 30 days in a prominent place near where exposed employees work.

MOTION PICTURE SCREEN CARTOONISTS HE 79-42 April 30 - May 4, 1979

A. A 1040 (*				SAMPLE TYPE A=Area P=Personal	: ST=	VOLUME	. METHYL CHLOROFORM CONCENTRA-	PERCHLORO- ETHYLENE CONCENTRA-
UATE	LOCATION	JOB	SAMPLE #	Short Term	TIME	(liters)	(mg/M ³)	(mq/M^3)
5/3/79	B&B Opticals Optimum	Cameraman	CT-112	Р	1747-2200	4.7	10.5	823
5/3/79		Camera Room	CT-113	A	1750-2200	250.0	>10.0	100.0
5/3/79	22	Cleaning Room	CT-114	A	1757-2200	243 0	-10.0	108.0
5/4/79	14	н	CT-136	A	1015-1600	345 0	41.2	34.0
5/4/79	*	Film Cleaner	CT-137	Р	1017-1525	5 7	249.5	9.0
5/4/79		Cameraman	CT-138	P	1230-1550	4 3	/3.4	8.7
5/4/79	78	Camera Room	CT-139	A	1020-1550	75 1	9.4	46.9
5/4/79	5	Cameraman	CT-140	P	1022-1600	71	11.2	53.2
5/4/79		H	CT-153	P-ST	1249-1303	3 1	15.4	11.2
5/1/79	Cineffects	Cameraman/	CT-5	P	1000-1200	5.9	25.9	48.5
E /1 /70	VISUAIS	Cleaner		2	1310-1515			21.44
5/1//9			CT-6	P	1005-1600	6.4	35.0	07 2
5/1//9		Camera Room	CT-9	A	1000-1600	360.0	>29 4	01 7
5/1//9		Cleaner	CT-13	P-ST	1317-1332	3.2	38.0	183.5
5/1/79	26	H	CT-14	P_ST	1516 1521			
5/2/79	36	R	CT-15	0	1012-1240	3.2	15.8	66.5
-, -, - , - , - , - , - , - , - , - , -			01-10	r	1400-1545	5.5	66.8	293.6
5/2/79	.	N	CT-16	Р	1013-1200,	4.5	62.5	334 8
E /0 /70		A			1315-1515			334.0
5/2/79	Computers	Camera Room	01-17	A	1010-1615	365.0	. 5.2	>211 0
5/1//9	Opticals	Cleaner	61-6/	P	0933-1735	10.5	68.3	2.8
5/1/79	я	Camera Room	CT-84	Δ	1025-1725	100 0	10002020000	
5/2/79	(1) N	Cameraman/	CT-37	6	1736-2345	402.0	>49.8	3.2
		Cleaner	0	r	1/33-2343	1.4	99.9	56.7
5/2/79			CT-38	D	1724-2055	- 2	122211	4.0 (2012) (24)
5/2/79		Camera Room	CT-93	Δ.	1720-2245	5.5	72.4	36.2
				<u>A</u>	1730-2343	3/5.0	>40.0	45.3
			11.120120	54 V 123		à-		*3
5/1/79	E.F.X. Unlimited	Film Cleaner	CT-1	P	0925-1600	3.74	72.8	8.1
5/1/79		Cameraman	CT-2	P	0935-1314	4.6	13.1	17 5
5/1/79	15	2	CT-3	P	0940-1335.	6.6	10 6	24 3
					1435-1600		10.00	24.5
5/1/79	*		CT-4	P	0935-1335,	6.6	10.6	21.1
5/1/70	*	Cleaning Doom	CT-7	۵	1433-1600	205 0	10.1	3.2
5/1/70	8	Camera Poom	CT-9	2	0925-1600	395.0	>08.4	9.6.
5/1/79	16	Cameranan	CT-10	P_ST	1227-1222	385.0	13.53	24.1
5/1/79		Camera Room	CT-11	A_ST	1140-1200	0.7	N.U.	27.04
5/1/79	78	Camera Room	CT-12	P-ST	1204-1225	5.1	118	158.85
5/2/79	10	Cameraman	CT-22	p	1710-2310	7 7	1404.80	5.9
5/2/79	*	N	CT-23	P	1711-2310	5.0	18.3	14.4
5/2/79	×	Film Cleaner	CT-24	p	1805-2310	6.6	18./	13.0
5/2/79		Camera Room	CT-87	Δ	1712-2310	295 0	10.0	3.1.
5/2/79		Cleaning Room	CT-88	Â	1720-2310	365.0	19,0	22.9
5/3/79	E.U.E./Screen	Cameraman	CT-95	P	1036-1715	8.8	62.3	328.4
5/3/70	X X	Cameraman 42	AP-T1	P	1039-1715	2.4	100 0	
5/3/70	18	Film Classon	CT_97	P	1030-1/15	3.4	102.0	466.5*
5/3/70	et	Campage 4	CT-09	P	103/-1/15	3.8	59.0	92.5
6/3/70	M	Camera Boom	CT_00	6	1033-1715	8.0	/5.4	188.0
5/3/70	18	Classing Port	CT-100		1045-1715	392.0	>17.1	135.2
5/4/79	*	Camaraman 42	CT_165	6	1045-1/15	390.0	38.5	100.0
5/4/70	а	Cameralian #3	CT-166	6	1020-1600	7.0	58.3	108.1
5/6/70	10	Cameraman #2	CT-167	0	1020-1000	r.0	53.1	91.8
5/4/70	и	Printar	CT-168	p	1025-1600	5.5	69.7	88.4
5/4/70	м	Film Classon	CT-160	6	1020-1600	2.0	40.2	56.0
5/4/79	26	Camera Room	CT-170	A	1030-1600	220.0	392.4	52./
5/4/79	20	Cleaning Room	CT-171	A	1030-1600	220.0	51.5	112.1
5/4/79	16	Campraman #2	CT-172	P-ST	1405-1420	330.0	103.0	69.7
41 1111		Contract satisfies 1 / S	A		100-1460		10.0	150.0

MOTION PICTURE SCREEN CARTOONISTS HE 79-42 - April 30 - May 4, 1979 (continued)

DATE	LOCATION	108		SAMPLE TYPE A=Area P=Personal,	ST =	VOLUME	METHYL CHLOROFORM CONCENTRA- TION	PERCHLORO- ETHYLENE CONCENTRA- TION (mg/M3)
5/4/79	E.U.E./Screen	Cameraman #3	CT-173	Short lerm	1443-1458	3.1	<u>9.6</u>	169.9
	Gems				1445-1450			100 5
5/4/79		" #4	CT-174	P-ST	1520-1535	3.1	99.4	163.5
5/4/79	11	Film Cleaner	CT-175	P-ST	1500-1515	3.1	99.0	168.9
5/3/79	Exceptional	Camaraman	CT-101	P-ST	1540-1555	407 0	1020.5	41.8
	Opticals	Caner andri	01-101	^	1817-0104	407.0	-41.9	
5/3/79	54	Cleaning Room	CT-102	A	1814-0104	410.0	46.3	26.8
5/3/79	15	Cameraman #2	CT-103	ρ	1818-2210	4.9	369.6	39.0
5/3/79		Film Cleaner	CT-104	P	1813-2210	5.1	415.8	21.0
5/3//9	38	Cameraman #4	CT-121	P	2210-0104	7.5	94.0	40.0
5/3/79	19	44 14	CI-122	P-ST	2229-2244	3.0	146.0	59.8
5/3/79	26	Cameraman #1	CT-125	P-SI	2320-2335	3.9	100.8	49.1
5/4/79		Cleaning Room	CT-131	A	1037-1607	330.0	>90.9	22.11
5/4/79		Camera Room	CT-132	A	1033-1607	334.0	>77.8	32.9
5/4/79		Cameraman #2	CT-133	Р	1026-1608	4.8	251.0	50.2
5/4/79	11	Cameraman #4	CT-134	P	1027-1608	5.0	261.0	22.2
5/4/79	36	famoraman 2	CT-135	P	1029-1608	3.5	393.4	38.9
5/4/79	*		CT-145	P-ST	1125-1140	3.5	22 9	60.0
5/4/79	*	Film Cleaner	CT-146	P-ST	1127-1143	4.2	433.7	38.6
5/4/79	10	Cleaning Room	CT-147	A-ST	1131-1146	3.2	401.2	27.8
5/4/79		Cameraman #2	CT-148	P-ST	1142-1156	3.7	193.5	35.4
5/4/79		Cameraman #4	CT-149	P-ST	1142-1157	3.5	245.0	37.9
5/3/79	Film Onticals	Cameraman	CT-150	P-ST	1145-1200	10 3	030.9	486.9*
5/3/79	"	undit	CT-105	0	1745-0015	7.5	54	387.2*
5/3/79	14	Camera Room	CT-107	A	1757-0016	379.0	0.6	>208.4
5/3/79	4	и	CT-108	A	1805-0018	373.0.	0.9	>217.2
5/3/79		Cameraman	CT-126	P-ST	1901-1916	3.5	78.4.	1596.67
5/3/79		Camera Room	CT-127	A	2240-0018	2.1	18.7	654.2
5/3//9		Cameraman	CT-128	P-ST	2240-2255	3.5	20.2	727 3/*
5/3/79	10		CT-129	P-ST	2255-2310	3.9	18.2	879 17*
5/8/70		10 22	61=130	P-51	2345-0001	3.0	19.2	
3/4/19		* #3	CT-154	Р	1007-1240, 1354-1607	5.8	53.5	879.3 ~
5/4/79	٠	Film Cleaner	CT-155	р	1011-1307,	6.8	>7195.3*	101.3
5/4/79	н	Cleaning Room	Ct-155	A	1014-1613	359.0	>72.4	55.7
5/4/79		Film Cleaner	CT-157	P-ST	1025-1040	3.8	971.1	84.0
5/4/79		Camera Room	CT-158	A	1021-1240	3.1	57.9	964.5
5/4//9		Cameraman #3	CT-159	P-ST	1048-1108	3.4	64.1	525 3
5/4/79		Campraman #1	CT-160	P-ST	1113-1128	41	59.8	321.0
5/4/79		u H	CT-162	PACT	1148-1608	3.7	52 1	183.6.
5/4/79		Cameraman #3	CT-163	P-ST	1224-1239	3.5	45.2	452.0
5/4/79	*	Cameraman #1	CT-164	P-ST	1514-1529	3.4	76.7	203.5
5/1/79	Mini Effects	Cameraman	CT-60	Р	1121-1355,	6.12	36.1	16.4
5/1/79		Film Cleaner	CT-65	р	1515-1704 1123-1359,	5.5	115.7	18.1
5/1/79		Cameraman	CT-86	A	1146-1704	318.0	34.6	21.1
5/2/79	*	Camera Room	CT-91	A	1716-2403	407.0	>21.1	34.4
5/2/79		Cameraman	CT-29	P-ST	2152-2207	4.1	2.4	31.6
5/2/79	The O-641	a 5 er	CT-35	Р	1714-2403	8.5	27.1	30.6
5/1//9	Ine Uptical	Film Cleaner	CT-50	Ρ	0950-1325,	8.0	280.7	57.5
5/1/79	nouse		CT-61	P	1420-1657	77	260 8	56.3
6, 1, 7, 5			61-01	r	1533-1700	/./	200.0	
5/1/79	ы	Cameraman #5	CT-63	р	1013-1347	7.7	3.5.0	207.2
	112-1			(1) 	1437-1720	1221	28.50 B	A12 -
5/1/79	м	Cameraman #2	CT-66	P	0943-1314,	10.5	31.4	218.2
5/1/79		" #4	CT-68	p	1347-1050	9.2	37.0	250.0
5/1/79		Film Cleaner	CT-70	P-ST	0953-1008	3.5	172.4	40.2
5/1/79	18	Cleaning Room	CT-80	A	0934-1720	466.0	>47.2	42.9
5/1/79		Camera Room	CT-81	A	0941-1721	454.0	2.4	>143.2
5/2/79 >		Cameraman #5	CT-26	P	1716-2400	7.8	39.7	141.0
5/2/19		#2	CT-27	P	1727-2350	7.0	39.8	152.5
5/2/79		Film Cleaner	CE-30	P	1709 2400	9.0	44.4 0	33.3
5/2/79		Cameraman #5	CT-36	P-ST	2219-2227	4.0	32.5	75.0
5/2/79	н	Film Cleaner	CT-39	P-ST	2219-2234	3.6	261.7	30.3
5/2/79	44	Cleaning Room	CT-89	A	1714-2400	406.0	>51.7	27.1
5/2/79		Camera Room	CT-90	A	1721-2400	399.0	>21.3	107.8

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			And her they addressed a	SAMPLE TYPE A=Area P=Personal.	ST=	VOLUME	METHYL CHLOROFORM CONCENTRA- TION	PERCHLORO- ETHYLENE CONCENTRA- TION
DAT	E LOCATION		SAMPLE #	Short Term	TIME	(liters)	(mg/M3)	(ma/M->)
5/1/	79 Select Effects	Cameraman	Ct-62	P	1029-1409,	5.9	56.2	54.8
5/1/	79 *	Cameraman	CT-25	P-ST	2050-2105	3.9	19.0	92.1
5/2/	79 *	×	CT-33	P	1757-2320	5.0	31.8	119.3
5/2/	79 *	Cameraman	CT-92	A	1716-2403	407 0	>15.2	71.3
5/1/	79 Trt-Pix	Cameraman	CF-58	P	1042-1416,	8.1	17.2	6.1
5/1/	79 *	Film Cleaner	CT-64	P	1047-1418, 1516-1729	5.3	41.5	5.2
5/1/	79 *	Camera Room	CT-83	A	1045-1730	405.0	14.1	5.7
5/2/	79 *	Film Cleaner	CT-20	P	1420-1640, 1815-2035	6.4	47.1	- 3.1
5/2/	79 *	Cleaning Room	CT-21	A	1409-2350	581.0	>34.4	2.2
5/2/	79 *	Cameraman	CT-34	P	1745-2350	8.8	21.5	2.7
5/2/	79 *	Camera Room	CT-94	A	1727-2350	383.0	17.8	5.2
5/1/	79 Videart Opticals	Cameraman & Film Cleaner	CT-69	P	1102-1722	9.3	.6.5	140.5
5/1/	79 •	Cleaning Room	CT-85	A	1105-1721	318.0	>84.9	22.3.
5/2/	79 • .	Cameraman	CT-18	P	1400-1700	9.3	3.2	300.4
5/2/	79 •	Camera Room	CT-19	A	1402-1702	180.0	> 2.8	372.2
5/3/	79 World Effects	Cameraman #2	CT-109	P	1918-0003	5.7	12.2	1605.5
5/3/	79 *	Cameraman #1	CT-110	P	1918-0003	6.0	13.3.	249.6
5/3/	79 *	Film Cleaner	CT-111	p	1920-2234	4.2	98.1	93.3
5/3/	79 *	Camera Room	CT-115	A	1955-0003	248.0	1.2	>298.4
5/3/	79 *	Cleaning Room	CT-116	A	1935-2337	224 0	23.7	89.3
5/3/	79 *	Cameraman #2	CT-117	P-57	2200-2215	3.2	9.4	471.7
5/3/	79 *	Cameraman #1	CT-118	P-ST	2202-2217	3.0	17.0	578.0
- 5/3/	79 *	Cameraman #1	CT-119	P-ST	2218-2235	2.5	12.0	637.7
5/3/	79 *	Cameraman #1	CT-120	0_57	2245 2200	5.5	11 0	560.6
5/4	79 *	Cleaning Room	CT-141	\$	1027-1655	222 0	9.2	4.9
5/4	79 *	Film Cleaner	CT-143	P	1215-1555	349.0	41.3	13.8
5/8	/79 *	Cameraman	CT-151	P_ST	1503-1519	2 7	10.9	5.5
5/4/	/79 *	Film Cleaner	CT-152	P-ST	1237-1252	3.6	57.7	16.5

NIOSH Criteria

OSHA Standard

8-Hour Time Weighted Average Ceiling (15 minute)

S llour Time Heighted Average 1900 Cailing (5 minute)

1900

340 680

677 2037

201310

Yalues preceded by ">" indicate that saturation limit of sampling media was exceeded. Values presented are minimum values. Malfunctioned pump Not detected Sample taken while adding to liquid gate resevoir Sample taken after liquid gate emptied into garbage container Sample taken while emptying film cleaning resevoir Double gate used. 1.

2.3.4.5.

6. 7.

Double gate used.

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