INTERNAL CORRESPONDENCE

GA 1076

FROM R. T. Cheng

IN REPLY REFER TO RTC:80-17

TO R. L. Gibson, M.D./H. E. Runion

DATE Feb. 22, 1980

SUBJECT PRESENTATION RE: INDUSTRIAL HYGIENE CONCERNS OF GOCHEM ASIA OPERATIONS

Attached is a rough draft of the Presentation To Mr. Roher on the Industrial Hygiene Concerns Of GOCHEM Asia Operations.

Mr. John Strausser requested me to mail him two copies of all viewgraphs and handouts before the actual presentation. I think we should discuss this package Tuesday or Wednesday (February 26th or 27th) before mailing it in the final form to Mr. Strausser.

The major uncertainties in this presentation is our (Medical Department) recommendation on VCM standard, cost estimates, and our future involvement in GOCHEM ASIA.

R. T. Cheng

RTC:vic

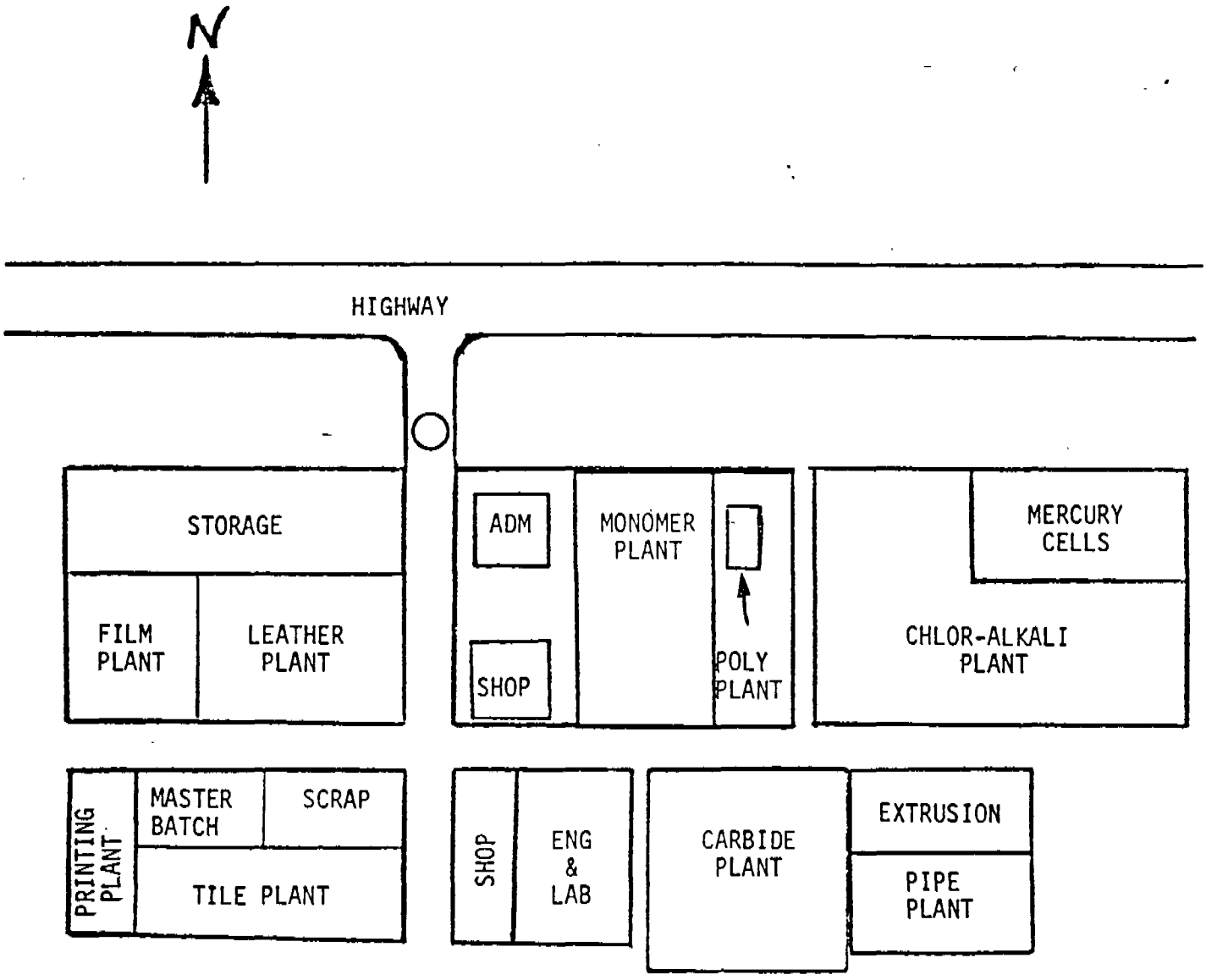
Attachment

PRESENTATION

TO

MR. W. C. ROHER

INDUSTRIAL HYGIENE CONCERNS OF GOCHEM ASIA OPERATIONS



CHINA GULF PLASTICS CORPORATION

TOUFEN PLANT

VCM EXPOSURES STANDARDS

1.	U. S. OSHA STANDARD	1 PPM
2.	SWEDEN STANDARD:	1 PPM
3.	JAPANESE STANDARD:	2 PPM
4.	TAIWAN STANDARD:	500 PPM in 1977 50 PPM NOW
5.	CGPC INTERNAL STANDARD:	10 PPM
6.	GULF RECOMMENDED:	(——)

ODOR THRESHOLD: 2,000 PPM

HISTORICAL REVIEW OF VCM EXPOSURES AT CGPC

February 1974:	1. VCM ODOR READILY SENSED
	2. 200 PPM TO 500 PPM TWA EXPOSURE
	3. SHORT-TERM EXPOSURES >10,000 PPM
August 1976:	1. VCM ODOR STILL DETECTABLE
	2. >50 PPM TWA EXPOSURE
November 1977:	1. VCM ODOR ESSENTIALLY ELIMINATED
	2. REACTOR CLEANER'S EXPOSURE 15 - 50 PPM
	3. OTHER POLYMER PLANT WORKER <10 PPM
October 1979:	1. VCM ODOR ELIMINATED
	2. REACTOR CLEANER'S EXPOSURE 18 PPM
	3. OTHER POLYMER PLANT WORKER 1 - 33 PPM

TABLE II

REACTOR CLEANERS' VINYL CHLORIDE EXPOSURE

CHINA GULF PLASTICS CORPORATION

REACTOR CLEANER	EMPLOYEE NUMBER	SAMPLE DATE	SAMPLE DURATION (MINUTES)	AVERAGE VCM EXPOSURE PPM	REMARKS
Chen, C. S.	64114	10-16-79	423	12	Cleaned 6 Reactors
Chuang, C. C.	60117	10-16-79	415	16	Cleaned 6 Reactors
Tan, C. K.	66124	10-16-79	405	23	Cleaned 6 Reactors
Chuang, C. C.	60117	10-17-79	442	20	Cleaned 6 Reactors
Tan, C. K.	66124	10-17-79	442	23	Cleaned 6 Reactors
Lai, T. Z.	67217	10-17-79	442	18	Cleaned 6 Reactors
Chen, C. S.	6414	10-18-79	46	16	Cleaned 1 Reactor
Lai, T. Z.	67217	10-18-79	44	22	Cleaned 1 Reactor
Chuang, C. C.	60117	10-18-79	43	17	Cleaned 1 Reactor
Chuang, C. C.	60117	10-18-79	45	18	Cleaned 1 Reactor
Lai, T. Z.	67217	10-18-79	45	17	Cleaned 1 Reactor
Chen, C. S.	64114	10-18-79	45	18	Cleaned 1 Reactor

Sample Matrix = Charcoal Tube and 3M Brand Organic Vapor Monitoring Badge.

Analytical Method = GC & FID

CGPC VCM AIR POLLUTION

EPA VCM EMISION STANDARD	10 PPM IN STACK OR EMISSION SOURCES
TAIWAN EMISSION STANDARD:	NONE
CGPC IN-PLANT POLLUTION:	0 TO 2 PPM
CGPC HOUSING COMPOUNDS:	0 TO 0.5 PPM VCM
SURROUNDING COMMUNITY:	0 TO 0.5 PPM

TABLE IV

ENVIRONMENTAL AND WORKPLACE VINYL CHLORIDE CONCENTRATIONS AT TOUFEN PLANT

CHINA GULF PLASTICS CORPORATION

October 19, 1979

SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE DURATION (MINUTES)	AVERAGE VCM CONCENTRATION PPM
AG7492	Office, Engineering and Development Building	457	2.6
AG7072	South of Administration Building	436	0.44
AG7289	South of HCL Plant	448	0.41
AG9331	South of Maintenance Shop	423	0.94
AH5605	West of Printing Plant	420	0.53
AH5149	2nd Power Station	417	15
AG7313	Office Room, Chemical Plant	412	2.1
AH5128	Booth at Monomer Plant	408	2.2
AG7370	Office Room, Polymer Plant	402	2.7
AG7055	PVC Package, Drying Plant	394	0.87
AG7112	Control Room, Drying Plant	392	1.4
AG7407	Polymerization Pilot Plant	397	5.0

Sample Matrix = 3M Brand Organic Vapor Monitoring Badges.

Analytical Method = GC & FID.

TABLE V

VINYL CHLORIDE EXPOSURES OF FABRICATION COMPLEX WORKERS
DUE TO INPLANT VCM AIR POLLUTION

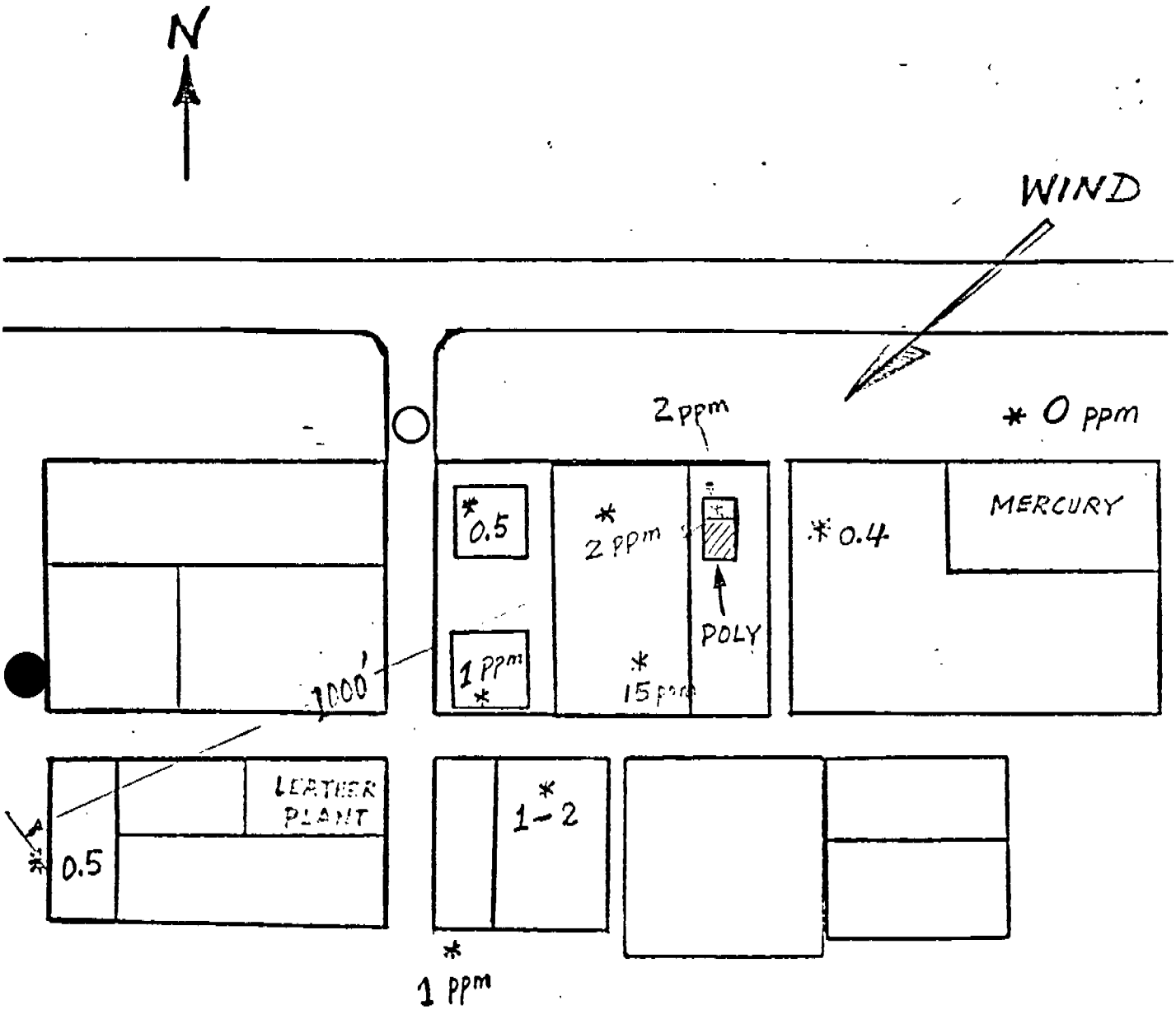
CHINA GULF PLASTICS CORPORATION

SAMPLE DATE	WORKER	JOB LOCATION	AVERAGE VCM EXPOSURE PPM
10-16-79	Liu, S. L.	Leather Plant - Toufen	0.54
10-16-79	Chen, Y. K.	Leather Plant - Toufen	0.49
10-16-79	Chai, C. S.	Leather Plant - Toufen	0.49
10-16-79	Chen, J. S.	Film Plant - Toufen	0.53
10-16-79	Lin, Z. S.	Printing Plant - Toufen	0.54
10-16-79	Chang, S. S.	Printing Plant - Toufen	
10-17-79	Chen, Y. K.	Leather Plant - Toufen	ND
10-17-79	Peng, W. C.	Leather Plant - Toufen	ND
10-17-79	Chai, C. S.	Leather Plant - Toufen	ND
10-17-79	Huang, W. H.	Leather Plant - Toufen	ND
10-17-79	Wu, C. Y.	Leather Plant - Toufen	ND
10-17-79	Liu, S. L.	Leather Plant - Toufen	0.03
10-17-79	Lee, K. J.	Leather Plant - Toufen	0.20
10-18-79	Chuang, M. L.	Printing Plant - Toufen	0.12
10-18-79	Chang, Y. H.	Printing Plant - Toufen	0.12
10-18-79	Chang, S. S.	Printing Plant - Toufen	0.15
10-18-79	Lien, Y. C.	Printing Plant - Toufen	0.15
10-18-79	Liao, W. H.	Printing Plant - Toufen	0.12
10-18-79	Tong, S. L.	Printing Plant - Toufen	0.15
10-18-79	Ko, C. F.	Printing Plant - Toufen	0.18
10-18-79	Chai, F. L.	Printing Plant - Toufen	0.15
10-18-79	Lin, Z. S.	Printing Plant - Toufen	0.15
10-18-79	Chen, J. S.	Printing Plant - Toufen	0.18
10-18-79	Hsu, Y. K.	Printing Plant - Toufen	0.12
10-11-79	Lee	Printing Plant - Taoyuan	ND
10-11-79	Tzung	Printing Plant - Taoyuan	ND
10-11-79	Feng	Printing Plant - Taoyuan	ND
10-11-79	Liu	Printing Plant - Taoyuan	ND

Sample Matrix = 3M Brand Organic Vapor Monitoring Badge.

Analytical Method = GC & FID.

ND = Not Detected; Less Than 0.01 ppm.



IN-PLANT VCM AIR POLLUTION
AT CGPC TOUFEN PLANT

CGPC

VCM CONTROL RECOMMENDATIONS

1. A THREE-STEP VCM EXPOSURE CONTROL PROGRAM WAS RECOMMENDED IN 1976 (SEE HANDOUT). STEP ONE: < 2,000 PPM, STEP TWO: 10 PPM, STEP THREE: 1 PPM.

2. STEP ONE ACHIEVED.

3. STEP TWO CAN BE ACHIEVED WITH REDUCTION OF REACTOR CLEANING FREQUENCY.

4. STEP THREE CAN BE ACHIEVED BY ADOPTING AN AUTOMATED REACTOR CLEANING SYSTEM TO ELIMINATE ROUTINE REACTOR ENTRY.

5. IN-PLANT VCM AIR POLLUTION PROBLEM WILL BE MORE OR LESS UNDER CONTROL WHEN STEP THREE IS ACHIEVED.

6. COSTS:

CGPC

MERCURY EXPOSURE

EXPOSURE STANDARD	0.05 $^{mg}/_{m^3}$
FEBRUARY 1974 LEVEL	0.25 $^{mg}/_{m^3}$
AUGUST 1976 LEVEL	0.05 $^{mg}/_{m^3}$
NOVEMBER 1979 LEVEL	0.02 $^{mg}/_{m^3}$

ALL CHLOR-ALKALI PLANT WORKERS WERE WITHIN MERCURY EXPOSURE STANDARD EXCEPT THE TWO DOWNSTAIRS OPERATIONS:

1. FLAKE CAUSTIC-SODA MACHINE OPERATOR: 0.13 $^{mg}/_{m^3}$
2. MERCURY RECOVERY OPERATOR: 0.10 $^{mg}/_{m^3}$

RECOMMENDATIONS

1. MOVE THE CAUSTIC-SODA MACHINE OUT OF DOWNSTAIRS.
2. RESPIRATORY PROTECTION FOR UN-ROUTINE OPERATION.

COSTS: $5,000

CGPC

SOLVENTS EXPOSURE

SOLVENTS USED:	MEK, TOLUENE, (BENZENE), MIBK, CYCLOHEXANONE, DMF, THF, etc.
SOLVENT USERS:	SURFACE TREATING MACHINES COLOR PRINTERS
EXPOSURE STANDARD:	MEK - 200 PPM TOLUENE - 100 PPM BENZENE - 10 OR 1 PPM

EXPOSURES OF SURFACE TREATING MACHINE OPERATORS

1974:	1,000 PPM
1976:	200 - 500 PPM
1979:	50 - 200 PPM
CONCLUSION:	NEEDS SOME IMPROVEMENT

EXPOSURES OF COLOR PRINTER OPERATORS

1974:	500 - 1,500 PPM
1976:	200 - 500 PPM
1979:	<50 PPM
CONCLUSION:	PROBLEM UNDER CONTROL

CGPC

DUST EXPOSURES

STABILIZERS: LEAD, CADMIUM, BARIUM STEARATES

PIGMENTS: LEAD, CHROMIUM, CADMIUM, ORGANIC DYES

PVC DUST: NEW TOXICOLOGIC STATUS
EXCESSIVE PNEUMOCONIOSIS
FED REGISTER NOTICE (December 18, 1979)

EXPOSURE STANDARDS

LEAD: 0.05 $^{mg}/_{m^3}$

CADMIUM: 0.05 $^{mg}/_{m^3}$

BARIUM: 0.5 $^{mg}/_{m^3}$

CHROMIUM: 0.05 $^{mg}/_{m^3}$

PVC DUST: Now - 10 $^{mg}/_{m^3}$
Future - 2 $^{mg}/_{m^3}$ (?)

CGPC EXPOSURES

MANY OVEREXPOSURES TO PVC DUST

SOME OVEREXPOSURES TO LEAD

ONE OR TWO OVEREXPOSURES TO CHROMIUM

RECOMMENDATION: ENCLOSURE, VENTILATION, HOUSEKEEPING

COSTS: $100,000

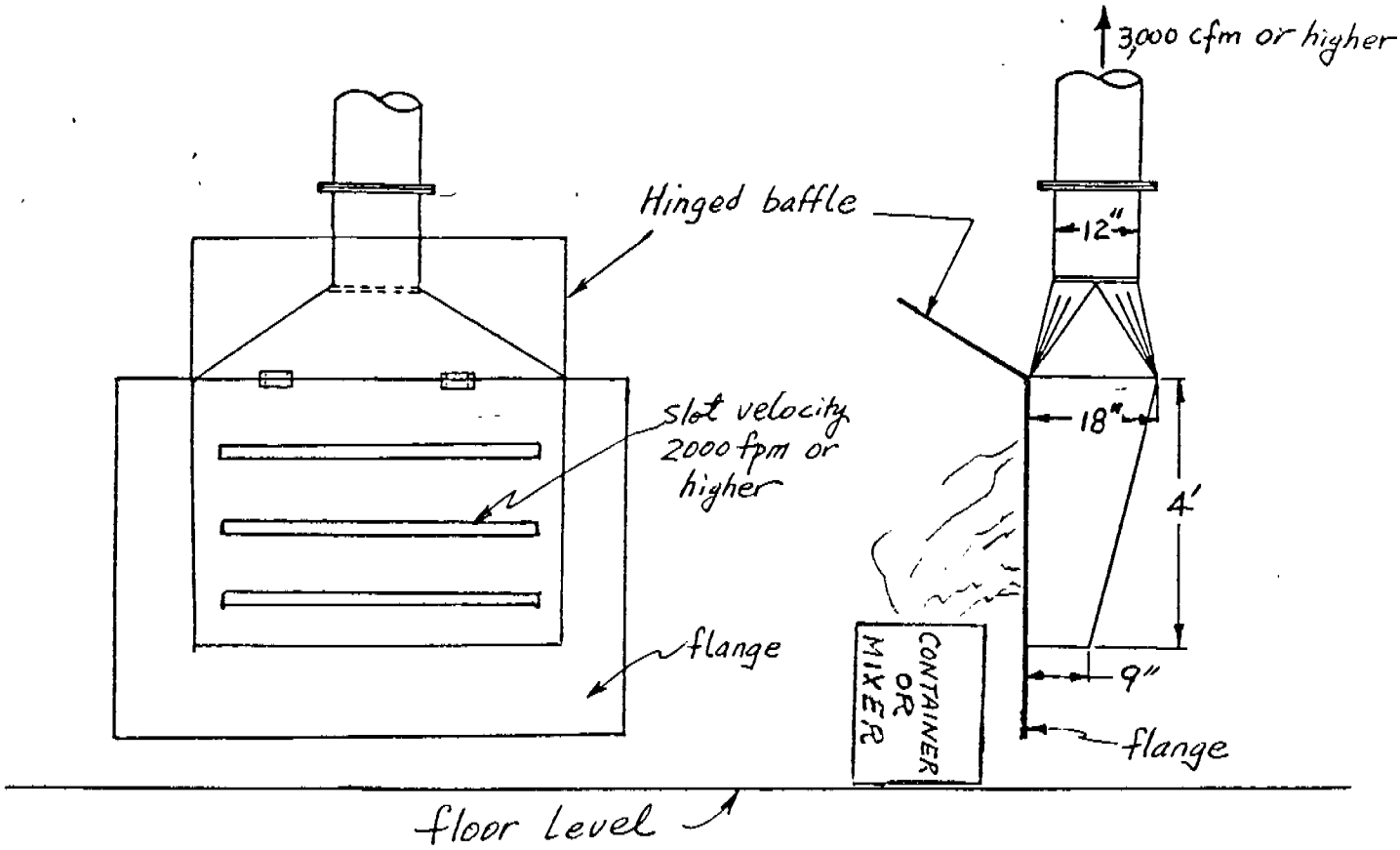


Figure 12 Suggested Side-Draft Hood for Control of Lead, Cadmium & Barium Dusts.

ASIA POLYMER CORPORATION

BRAND NEW PLANT

MANUFACTURING: LOW DENSITY POLYETHYLENE

MAJOR HEALTH HAZARD: N-HEXANE

MINOR PROBLEMS: LAB VENTILATION, NOISE

N-HEXANE: NEUROPATHY

OLD STANDARD	500 PPM (1972)
EXISTING STANDARD	100 PPM
CHANGE INTENDED	25 PPM

APC CATALYST WORKER'S EXPOSURE: 43 AND 240 PPM

RECOMMENDATION

VENTILATION IMPROVEMENT OF CATALYST MIXING BUILDING AND LABORATORY.

COSTS

$1,000 - $5,000

TAITA CHEMICAL COMPANY, LTD.

FORMALDEHYDE

EXISTING OSHA STANDARD: 3 PPM

NIOSH 1974 RECOMMENDATION: 1 PPM

CIIT REPORT: NASAL SQUAMOUS CELL CARCINOMAS IN RATS AT 15 PPM. A FEW AT 6 PPM AND 2 PPM LEVEL.

FUTURE STANDARD: 0.1 PPM - 1 PPM (?)

ODOR THRESHOLD: 0.1 PPM - 1 PPM

EXPOSURE LEVEL (EXAMPLE)

LANDSDALE PLANT 0.3 PPM - 2.5 PPM

RECOMMENDATIONS

- ENGINEERING INPUT AT ABS PLANT DURING CONSTRUCTION STAGE FOR AN CONTROL.
- SPI ESTIMATE $2.56 MILLION CAPITAL COSTS FOR A TYPICAL 62.5 MILLION LB/YR ABS PLANT TO MEET 2 PPM STANDARD.
- TAITA ABS PLANT 15,000 Mta, OR APPROXIMATELY 33 MILLION LB/YR, NEED $1.6 MILLION FOR CAPITAL COSTS BASED ON SPI FORMULA.
- INDUSTRIAL HYGIENE SURVEY OF ABS PLANT, FORMALDEHYDE PLANT, POLYSTYRENE PLANT, ETC.

TAITA CHEMICAL COMPANY, LTD.

NO INDUSTRIAL HYGIENE VISIT

MANUFACTURING: POLYSTYRENE, FORMALDEHYDE, GLUES
PHENOLIC COMPOUNDS, ABS (1980)

ACRYLONITILE (AN): CARCINOGEN, TERATOGEN

- OSHA STANDARD (OCTOBER 1978): 2 PPM TWA
  10 PPM CEILING
- DU PONT, GOODYEAR, MONSANTO, DOW INDICATED THE STANDARD IS ACHIEVEABLE, WITH FEW EXCEPTIONS, THROUGH EXHAUST VENTILATION, PROCESS CONTAINMENT AND CHANGES IN JOB PROCEDURES
- AN EXPOSURES DURING ABS MANUFACTURING

  1. CONVEYANCE OF AN MONOMER TO AND FROM STORAGE TANK.
  2. LEAKS FROM VALVES, GASKETS, PIPES AND SAMPLING POINTS.
  3. BLENDING, FLOCCULATION, DRYING.
  4. RESIDUAL AN DURING POLYMER PROCESSING.
  5. REPORTED TYPICAL HIGH EXPOSURES: 20 PPM AT FLOCCULATION.

CHINHAE CHEMICAL COMPANY

MANUFACTURING: UREA, COMPLEX FERTILIZER, GYPSUM, SULFURIC ACID

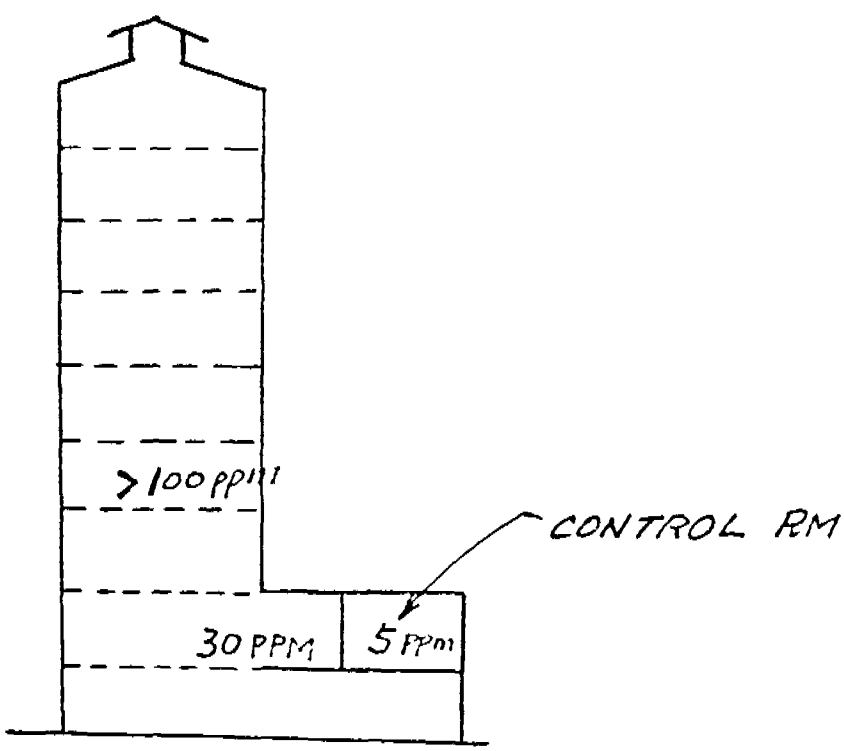
MAJOR HEALTH HAZARDS: AMMONIA, FLUORIDES, FREE SILICA

MINOR PROBLEMS: HYDROGEN FLUORIDE, WELDING FUMES

AMONIA EXPOSURE

EXPOSURE STANDARD: 25 PPM TWA, 35 PPM CEILING

MEASURED LEVELS: 5 PPM IN GRANULATION CONTROL ROOM
>100 PPM AT GRANULATION TOWER



CHINHAE CHEMICAL COMPANY

DUST EXPOSURE

FREE SILICA CONTENT OF DUST ~ 4%

DUST EXPOSURE STANDARD ~ 4.3 $mg/_m3$

DUST OVEREXPOSURE: 6 OUT OF 13 SAMPLES

RESPIRATORS WORN BY WORKERS IN DUSTY OPERATIONS.

FLUORIDE EXPOSURE

- USE OF RESPIRATOR PREVENTS MOST OVEREXPOSURE
- URINE FLUORIDE LEVEL AS INDICATION OF FLUORIDE EXPOSURE
- 4 OUT OF 46 WORKERS SHOWED POSSIBLE WORK-RELATED FLUORIDE OVEREXPOSURE

RECOMMENDATIONS

- COMPREHENSIVE VENTILATION ENGINEERING STUDY
- SEARCH AND SECURE LEAKS
- INDUSTRIAL HYGIENE TRAINING

GOCHEM ASIA OPERATION

INDUSTRIAL HYGIENE PERSONNEL TRAINING

TRAINING PROGRAM

- NIOSH TRAINING COURSES
- GULF IN-HOUSE TRAINING
- ON-THE-JOB TRAINING

TRAINEES

- TWO FROM KOREA OIL CORPORATION
  (SEE SCHOEBERLEIN'S LETTER OF ACCEPTANCE)
- ONE FROM CHINHAE CHEMICAL COMPANY, LTD.
- ONE OR TWO FROM TAIWAN OPERATION
  (SEE MR. GAMBRILL'S LETTER)