

SUMMARY OF INDUSTRIAL HYGIENE
EVALUATIONS DURING CAT CRACKER TURNAROUNDS

SUMMARY

Because of a concern for personnel exposure to air contaminants, the working atmosphere was monitored at six Manufacturing locations during major catalytic cracker turnarounds in 1978, 1979, and 1980.

The results of these surveys indicate that personnel exposure to catalyst dust, metal fumes, refractory dust, asbestos, silica, sulfur dioxide, and noise should be considered during future CCU shutdowns and in the design of new CC units.

DISCUSSION

During the surveys, all sampling was done external to any respirator or welding helmet. Respiratory protective devices were used during much of the monitoring and welding faceshields were in place during welding and cutting operations. Some investigators have reported significant protection to the welder from the faceshield diverting the smoke stream away from the breathing zone. For these reasons, the following comments, based on the monitoring results, would be applicable to unprotected workers.

- Air arc gouging may generate total particulates, iron oxide, copper, nickel, total chromium and hexavalent chromium in excess of existing standards while cutting in vessels such as cyclones, plenum chambers, spent catalyst risers and even in larger vessels with ventilation "dead" spots.
- Coated electrode welding may result in excessive levels of dusts and hexavalent chromium in enclosed spaces with poor ventilation.
- Refractory removal may generate refractory and trapped catalyst dust in excess of the nuisance particulate limit.
- Chipping coke deposits in the reactor may generate dust levels in excess of the TLV for Particulate Polycyclic Aromatic Hydrocarbon.
- Removing asbestos containing insulation releases asbestos fibers into the atmosphere and appropriate precautions must be taken.
- Residual sand from sandblasting may result in excessive levels of crystalline silica during subsequent maintenance operations.
- Chipping, grinding, and air arc gouging may result in excessive levels of noise.

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HEALTH/SAFETY CONSIDERATIONS FOR CCU SHUTDOWNS

1. Include industrial hygiene considerations early in shutdown planning.
2. Provide adequate and properly located manways for fan mounting to supply general ventilation.
 - a. provide for proper mounting of fans
 - b. provide for movement of fans as required by the work location
 - c. provide for bulk heading and air supply openings in lines as required to avoid dead spots.
3. Provide means of gathering and routing utility lines to
 - a. reduce tripping hazards
 - b. provide for easier entry and egress from manways
 - c. avoid interference with ventilation.
4. Develop respiratory protection requirements
 - a. provide air line respirators for areas where concentration of air contaminants may be high and ventilation is poor
 - b. provide dust and fume respirators
 - c. provide training
5. Develop hearing protection requirements
 - a. air arc gouging
 - b. grinding/chipping operations
 - c. breathing air compressors
 - d. fans/eductors
6. Provide periodic inspections during shutdown to assure
 - a. proper use of ventilation fans, bulkheads, air supply openings
 - b. proper use of respiratory protection
 - c. proper use of hearing protection

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7. Provide facilities and equipment to facilitate cleanup of dust.
 - a. initial cleanout of catalyst dust
 - b. as required to control refractory, coke, and sandblast dust during shutdown
8. Develop hygiene requirements for
 - a. asbestos (if present)
 - b. silica or substitute blasting material
 - c. PNA's (from slurry oil and coke deposits)
9. Use materials free of asbestos and crystalline silica when feasible.
10. Provide for removal of coke and other deposits prior to cutting or welding to minimize generation of SO₂.
11. Consider reliability, capacity, mounting ease, and noise levels when selecting fans.
12. Investigate methods of minimizing or controlling particulates during maintenance operations (chipping, grinding, arc gouging, welding).
13. Investigate feasibility of providing tempered makeup air for cold weather operations.
14. Consider safety when sizing and locating accessways and workplatforms.

PRELIMINARY REPORT
OF
TASK FORCE ON HEALTH ASPECTS OF CCU SHUTDOWNS

Summary

During the past two years, investigations have been conducted at several manufacturing locations to ascertain potential personnel exposures to dust and fumes above the permissible levels during CCU shutdowns for maintenance and repair. The objectives of this work have been twofold: 1) To better understand the potential health affecting exposures that may exist, and 2) to evaluate procedures, techniques, and equipment utilized to minimize or manage such personnel exposures.

The results of these efforts indicate that specific precautions must be taken to reduce personnel exposure to catalyst dust, coke dust, certain other particulate matter, and metal fumes from welding and air-arc gouging. The results also indicate that these precautions generally can be accomplished through adequate and proper ventilation and use of disposable respiratory protective devices. Use of air-line respirators is necessary, however, for some work in very confined spaces.

Listed below are pertinent health/safety considerations which have been developed from the investigative work. They have application both to CCU maintenance shutdown activities and to future cat cracker revamps and design changes.

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Health/Safety Considerations For CCU Work

I. Plant Design

- 1) Provide sufficient and properly located manways for fan mounting to supply general ventilation.
- 2) Include safety considerations when locating and sizing accessways and work platforms.
- 3) Provide means for gathering and routing utility lines and hoses to reduce tripping hazards and avoid interference with ventilation facilities.
- 4) Avoid use of asbestos and cystalline - silica materials whenever feasible.

II. Shutdown Planning

- 1) Include industrial hygiene considerations early in the shutdown planning activity.
- 2) Develop respiratory protection requirements:
 - a) Provide dust and fume respirators in adequate humbers.

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- b) Provide air-line respirators for areas with poor ventilation and potentially high levels of air contamination.
 - c) Provide training in use and care of respirators.
- 3) Develop hygiene requirements for:
- a) Abestos (if present)
 - b) Sand blasting material (use substitute for silica if feasible)
 - c) PNA's (from slurry oil and coke deposits)
- 4) Develop hearing protection requirements considering:
- a) Air-arc gouging
 - b) Grinding/chipping operations
 - c) Breathing air compressors
 - d) Fans/eductors
- 5) Develop general ventilation plans and strategies:
- a) Provide for proper mounting of fans.

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- b) Use electric powered tank blowers in lieu of steam or air powered eductors whenever feasible.
 - c) Provide for movement of fans if required as the work progresses.
 - d) Provide for bulkheads and air supply openings in lines and vessels if effective in avoiding ventilation dead spots.
 - e) Consider reliability, capacity, mounting ease and noise levels when selecting fans.
- 6) Develop procedures and provide for equipment and facilities for adequate cleanup of dust.
- a) Initial cleanout of catalyst dust.
 - b) During shutdown as required to control refractory, coke and sandblast dust.

III. Shutdown Execution

- 1) Provide monitoring during course of shutdown to assure.
 - a) Proper operation and use of ventilation fans, bulkheads and air supply openings.

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- b) Proper use of respiratory protective equipment.
 - c) Proper use of hearing protection.
 - d) Control of excessive dust generation.
- 2) Provide for removal of coke and other deposits prior to cutting or welding to minimize generation of SO₂.

IV. Miscellaneous

- 1) Evaluate feasibility of providing tempered air makeup for ventilation during cold weather operations.
- 2) Consider innovative methods of minimizing or controlling particulates during maintenance operations (chipping, grinding, arc gouging, welding).
- 3) Consider operating procedures and equipment and facility designs which minimize catalyst hang-up and retention in vessels and lines upon unit shutdown.

1980 DPMC CAT CRACKER SHUTDOWN

SUMMARY

A significant reduction in actual employee exposure from past DPMC Cat Cracker turnarounds was accomplished by the use of respirators, Industrial Hygiene workpractices and general dilution ventilation. No respiratory inhalation incidents associated with welding fume exposure were reported.

An in-depth study of ventilation rates was performed and the results compared to measured exposure levels. While minimized, exposures associated with coated electrode welding in enclosed spaces and air arc gouging continue to be potentially excessive.

Personnel dosimetry for noise exposure identified excessive exposure levels and the need to specify the use of hearing protection on future CCU turnarounds.

The continued planning for and use of health workpractices, controlled ventilation, and respiratory protection during future CCU turnarounds is recommended.

INTRODUCTION

Since 1978, several studies of employee exposure potential during Catalytic Cracking Unit (CCU) shutdowns have been performed at various Shell manufacturing locations. These investigations have identified certain exposures which may represent an occupational health hazard including:

Air arc gouging may generate total particulates, iron oxide copper, nickel, total chromium and hexavalent chromium in excess of existing standards while cutting in vessels such as cyclones, plenum chambers, spent catalyst risers and even in larger vessels with ventilation "dead" spots.

Coated electrode welding may result in excessive levels of dusts and hexavalent chromium in enclosed spaces with poor ventilation.

Refractory removal may generate refractory and trapped catalyst dust in excess of the nuisance particulate limit.

Chipping coke deposits in the reactor may generate dust levels in excess of the TLV for particulate polycyclic aromatic hydrocarbon.

Removing asbestos containing insulation can potentially release asbestos fibers into the atmosphere and appropriate precautions must be taken.

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Residual sand from sandblasting may result in excessive levels of crystalline silica during subsequent maintenance operations.

Chipping, grinding, and air arc gouging may result in excessive levels of noise.

As a continuation of Shell's effort to understand the potential health hazards associated with major shutdowns, an Industrial Hygiene study was conducted during the September 1980 CCU shutdown. The objectives of this work were to:

- (1) further develop information on employee exposure potential including exposure to specific metals,
- (2) evaluate the effectiveness of general ventilation and its relationship to employee exposure, and
- (3) implement specific controls to minimize employee exposure to previously recognized hazards.

The results and findings of this study are summarized by this report.

EXPOSURE MONITORING

GENERAL

During the CCU shutdown, employee exposure monitoring was conducted in the Regenerator, Reactor, Third Stage Separator and Fractionator. Air samples were collected during air arc gouging, and manual coated electrode welding. The metal being cut or ionized varied from carbon steels to high alloy stainless steels. Other samples were collected to assess exposure potential to employees not directly involved in the above welding processes.

All personnel "breathing zone" samples were collected on the outside of any respirator or welding hood in use, therefore actual exposures were less than those reported.

All air sampling was conducted using either matched weight mixed cellulose ester filters (MCE) or polyvinyl chloride (PVC) filters. All filters were

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NOISE EXPOSURE

Approximately 60% of all personnel eight-hour monitoring exceeded the 90 dB(a) permissible limit (Table V). Area sound level measurements further identified work area sound levels as potentially excessive. For example:

- . All work areas on the Reactor exceeded 85 dB(a); most areas above the 7th level exceeded 90 dB(a).
- . Sound levels inside manway access "penthouses" ranged from 98 dB(a) to 115 dB(a). Air driven Coppus blowers are associated with the higher sound levels.
- . Sound levels in the proximity of arc welding machines (ground level) were 95 - 96 dB(a).
- . The rest area at the Regenerator 10th level was 95 dB(a). All levels on the 6th and 11th levels exceeded 90 dB(a).

Sources of noise exposure included air arc cutting, grinding, chipping, ventilators and welding machines.

The need to use hearing protection should be better communicated to contract employees on future CCU turnarounds. Beginning with the first day and weekly thereafter sound level surveys need to be conducted and high noise level areas (floors) posted with temporary signs.

Specific tasks inside vessels such as air arc cutting should be continued to be identified as mandatory hearing protection jobs.

HEALTH AND SAFETY CONSIDERATIONS: WORKPRACTICES

PRE-SHUTDOWN PLANNING

Input to the CCU shutdown health workpractices was received from a Head Office team representing Health and Safety - Operations, Maintenance Support - Manufacturing and Engineering Services - Products. Experiences acquired at prior CCU shutdowns at other locations were reviewed and recommendations discussed with the DPMC shutdown team. Prior to the shutdown, health and safety requirements were outlined for maintenance in written form (Attachment I).

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RESPIRATORY PROTECTION

To protect against fume and dust exposure in the Third Stage Separator, Reactor and Regenerator, air-purifying respirators were required to be worn by all personnel upon entry. Based on the incidence of eye injury during earlier CCU turnarounds, full-face masks or half-face with goggles were required.

Air-supplied respirators were specified for all welding work in all vessels. Welders were afforded an opportunity to select between the MSA full-face, constant flow mask with lens adapter and the MSA half-face, constant flow welders mask. Breathing quality air was supplied by a leased Sullair compressor and Deltech air purification unit purchased specifically for the CCU shutdown. This option was selected over purchasing air based on economic considerations. A single trailer containing breathing air was used as a backup system, however, it was not used. Air was piped to the various vessel levels where work was planned. In total, 56 respirator connections were available, many of these being located at the manway entrances.

The primary contractor was responsible for cleaning, inspecting and issuing respirators on each of the two shifts. For control purposes each mask was numbered and a record made of its use. The average number of respirators issued each day (2 shifts) were:

Full-face Airline	5
Half-face Airline	60
Full-face Filter	100
Half-face Filter	42

Respirator filter cartridges were initially replaced daily and later on a weekly basis. Respirators were returned to Shell at the completion of the shutdown. Assuring that contractor workers and Shell Staff, e.g., Inspectors followed the above requirements and used respirators at all times required extensive auditing by Industrial Hygiene personnel. Among the considerations which impacted on respirator acceptability was the periodic fogging of air-purifying full-facepiece respirators. This was minimized by the use of a defogging agent.

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In general, less problems were encountered with welders who found the MSA half-facepiece welder's mask an acceptable protective device. Welders reported that although they were somewhat inconvenienced, they could work for longer periods of time and more comfortably.

VENTILATION

General ventilation levels which were achieved were determined to be significantly improved over past DPMC CCU shutdowns. Both air driven portable ventilators and electrically driven air movers were used. Electrically driven air movers were determined to be quieter and capable of a higher cfm. Placement of ventilators was made according to pre-shutdown planning. Several "access penthouses" were constructed and placed at manways so as to allow vessel entry without removing the ventilator.

A thorough study of airflow was completed during the shutdown and showed the maximum air changes per hour to be greatest for the Third Stage Separator (65 - 72 changes/hour). The Reactor was found to have 37 - 49 changes/hour and the Regenerator 17 - 22 changes/hour. The ventilation study conducted did not include the Fractionator. Maximum ventilation rates obtained were comparable to initial target levels. The use of general ventilation contributed to overall lower welding fume air concentrations. Directed airflow created by general ventilation reduced static accumulations of fume and assisted in lowering welder exposure where fumes moved away from the breathing zone, e.g., when the welder was in a vertical position. However, personnel working in other areas of vessels could be exposed to such fumes although in a somewhat lower concentration. Given the same number and location of ventilators it is unlikely that general ventilation alone is sufficient to meet current permissible exposure limits for total welding fume and total metals.

The practicality of using portable local exhaust ventilators should be reviewed.

A more thorough discussion of the ventilation study conducted is included in a separate report, "1980 Cat Cracker Shutdown - Ventilation Study".

WASH FACILITIES AND PROTECTIVE CLOTHING

Protective clothing (including slicker suits and boots) and showering at the end of the shift was specified for personnel who had anticipated exposure potential to polycyclic aromatic (PCA) containing materials, e.g., slurry oil and coke deposits. Outer street clothing was not permitted to be worn under slicker suits. Typically 140 cloth coveralls were issued and laundered each day by the contractor. A single 34' x 10' shower trailer with 12 shower heads was rented at a cost of \$700.00 a month. Disposable towels were provided by the contractor on each shift. Daily, an average of 15 employees showered indicating less than 100% participation. A separate outside wash facility supplied with soap and hot and cold water was made available to all shutdown workers.

PARTICULATE CONTROL

The contractor was required to use vacuum trucks to clean off internal vessel horizontal surfaces on a daily basis. The purpose of this was to minimize re-entrainment of particulate matter into the work air. This practice was useful in all areas except the lower vessel areas. It should be noted that vacuum lines left in manways interfered with the use of ventilation access houses. Future access penthouses should be designed to better accommodate this need.

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DPMC-06864



Shell Oil Company • Shell Chemical Company
Interoffice Memorandum

JULY 23, 1980

FROM: INDUSTRIAL HYGIENIST

TO: SUPERINTENDENT - MAINTENANCE - NORTH

SUBJECT: SEPTEMBER, 1980 CCU SHUTDOWN - INDUSTRIAL HYGIENE REQUIREMENTS

Supplemental Safety and Industrial Hygiene requirements for personnel who will be involved in the September, 1980 Catalytic Cracker Shutdown have been outlined in the attached guideline. The precautionary measures to be required during the shutdown are based on good industrial hygiene practice and address potential problem areas which have been associated with cat cracker shutdowns. Recognized potential health hazards which have been taken into consideration include airborne catalyst dust, welding fume, noise exposure from grinding and chipping, and exposure to polycyclic aromatic containing materials such as slurry oil and residual coke deposits. Additional requirements or modifications to the prepared guideline will be specified as experience is developed in this area.

Individuals involved in the CCU Shutdown should be reminded to wear the appropriate type of respiratory protection and protective clothing. Air-supplied respirators are to be worn by personnel performing welding and arc cutting; other personnel are to use air-purifying masks as specified. Efforts should be made in so far as practical to minimize skin contact with slurry oil during the initial stages of opening lines in the fractionator slurry system. Crafts should be informed of the hazardous properties of slurry oil as covered by the attached material safety data sheet.

Vacuuming of clothing and adequate washing by personnel is recommended before eating and leaving work. Other precautionary measures not specifically included in the attached guideline which will aid in minimizing exposure potential include improved ventilation, and the periodic vacuuming of settled particulate.

Questions concerning the required precautionary measures should be directed to the Safety and Industrial Hygiene Department.

P. J. Snyder

P. J. Snyder

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Industrial Hygiene Guideline

1. Respiratory Protection Requirements

A. Available Equipment

1. Scott full-face air-purifying mask with high efficiency dust cartridges (Part No. 652L)
2. MSA full-face constant flow airline mask with attached protective welding lens (Part No. 461-699 and Part No. 449-646)
3. MSA half-face constant flow welder's airline mask (Part No. 460-862)

B.

Contaminant or Activity	Minimum Respiratory Protection
<u>Vessel Entry</u> 3rd Stage Separator, Regenerator Reactor at all times including - cleaning - preparation work - inspection - observation Fractionator & furnace during dust generating activities	Cartridge Dust Mask (No. 1 above)
<u>Fractionator and Slurry Oil System</u> High boiling aromatic oils	A. <u>If a heavy cool liquid:</u> None normally required. B. <u>If a solid requiring chipping:</u> Cartridge Dust Mask (No. 1 above)
<u>Sandblasting - Non-Silica Containing Grit</u>	A. <u>Sandblasters:</u> Blaster's Air-line Hood B. <u>Helpers, Transients:</u> Cartridge Dust Mask (No. 1 above)
<u>Cat Cracker Catalyst Dust</u>	Cartridge Dust Mask (No. 1 above)

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Contaminant or Activity	Minimum Respiratory Protection
<u>Welding</u> Stainless Steel: - Hex Metal (chrome) - Plenum - Cyclones - Fluffing Lines - Precipitator Clips - Etc.	<u>Inside</u> <u>Welders:</u> Airline Mask (No. 2 or 3 on the previous page) <u>Helpers, Transients:</u> Cartridge Dust Mask (No. 1 on the previous page)

2. Use of Wash Facilities and Protective Clothing

- A. Appropriate protective clothing, to prevent skin contact as far as practical (including slicker suits) washing after incidental contact and daily showering at the end of the shift required for all personnel who have anticipated exposure potential to polycyclic aromatic containing materials:
- All cleaning, preparation work inside vessels including fractionator, and on slurry oil system; removing or washing slurry oil and coke deposits.
- B. Appropriate protective clothing, to prevent skin contact as far as practical, washing after incidental contact, and daily showering at the end of the shift made available.
- unflanging slurry system lines
 - slurry system pump removal and cleaning
 - ancillary fractionator personnel
 - etc.
- C. Vacuuming of dust on clothing, washing prior to eating, and leaving work required for all personnel cutting, grinding, welding or otherwise exposed to chrome containing metals.

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Vacuuming of clothing by other personnel recommended but not required.

- D. Where asbestos is encountered, special precautionary measures will be implemented which are consistent with the Shell DPMC Asbestos Safety Order.

3. Hearing Conservation Measures

Contaminant or Activity	Required Protective Measures
Arcing, Grinding, Hammering, Chipping	Appropriate hearing protection required. By personnel directly involved in these activities and in the immediate vicinity of the noise source.

← Welding Rod Composition, % →

Other

Type	C	Cr	Ni	Mo	Colomb + Tantal.	Mn	Si	P	S	Tung- sten	V		Fe	F
E-308	.08	18-21	9-11	-	-	2.5	0.9	.04	.03	-	-		Yes	Yes
E-310	.2	25-28	20-22	-	-	2.5	.75	.03	.03	-	-		Yes	Yes
E-502	.1	4-6	.4	.45- .65	-	1.0	.9	.04	.03	-	-		Yes	Yes
E-6018-B2	.12	1-1.5	-	.4- .65		.9	.8	.03	.04		-		Yes	Yes
E-7018		.2	.3	.3		1.25	.9				.08		Yes	Yes
E-6010	NO	REQUIREMENTS											Yes	Yes
E-9018-B3	.12	2-2.5	-	.9-1.2	-	.9	.8	.03	.04	-	-		Yes	Yes
SHA/PEL hr(TW H) mg/m ³		0.5	1.0	5.0		15.0							10.0	
posed 105 H F g/m ³														2.5
current 261 H 2V														

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REGENERATOR - REACTOR WELD ROD SELECTION CHART AND WELDING SPECIFICATION 1980 CCU SHUTDOWN

Location & Identification	Base Metal	Weld Rod & Procedure	Preheat	Post Heat	Remarks
Reg. Cyclones, Dust Hoppers Plenum A-5 & 7	304 S.S.	E-308 H-8	NONE	NONE	
Reg. Suspension		E-6010 Root			
Nozzles A-8	C. S.	E-7018 Weldout H-15	NONE	NONE	
Reg. Dip legs and trickle Valves A-9	304 S.S.	E-308 H-8	300°	NONE	
New 48" Section of Flue Gas Duct B-6	2-1/4% cr-1 mo.	2-1/4 cr-1 mo			
		E-9018B3L H-3	200°	1250°	* 100% Radiograph 225 BHT
Reactor New Blank Wall C-5					
Reactor Old Wall - Egg Crates C-6 A&B	C.S.	E-6010 Root	NONE	NONE	
Reactor - Repairs to Eroded Holes C-6 C	C.S.	E-7018 Weldout H-15	NONE	NONE	
Reactor - New Distributor Nozzle C-6 G	C.S.	E-6010 Root	300°	NONE	* 100% Radiograph Back Gauge and weld both sides
Reactor Cyclones - Dust Hopper Repairs C-8	1-1/2% CR 1/2 mo/410 CR.	E-7018 Weldout H-15	500°	NONE	
Reactor Steam Pipe and Strip-Coil C-9&10	Type 410 12% CR	E-8018 B2L NONE	NONE	NONE	
Reactor Nozzles in Vessel Wall C-11	C.S.	E-309 NONE	NONE	NONE	
Reactor C.S. Diplegs	C.S.	E-6010 Root	NONE	NONE	
Reactor 12% CR Diplegs C-14	C.S.	E-7018 Weldout H-15	300°	NONE	
	5% CR 1/2 mo	E-6010 Root	NONE	NONE	
		ER-502 Root	400°	1250°	
		E-502 Weldout H-4			
Piping III-2	5% CR 1/2 mo.	EK-502 Root			
		E-502 Weldout H-4	400°	1250°	* 100% Radiograph 225 BHT

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* Weld to completion after weld has been started

ENERGY RECOVERY SYSTEM WELD ROD SELECTION CHART AND WELDING SPECIFICATION 1980 CCU SHUTDOWN

[illegible]

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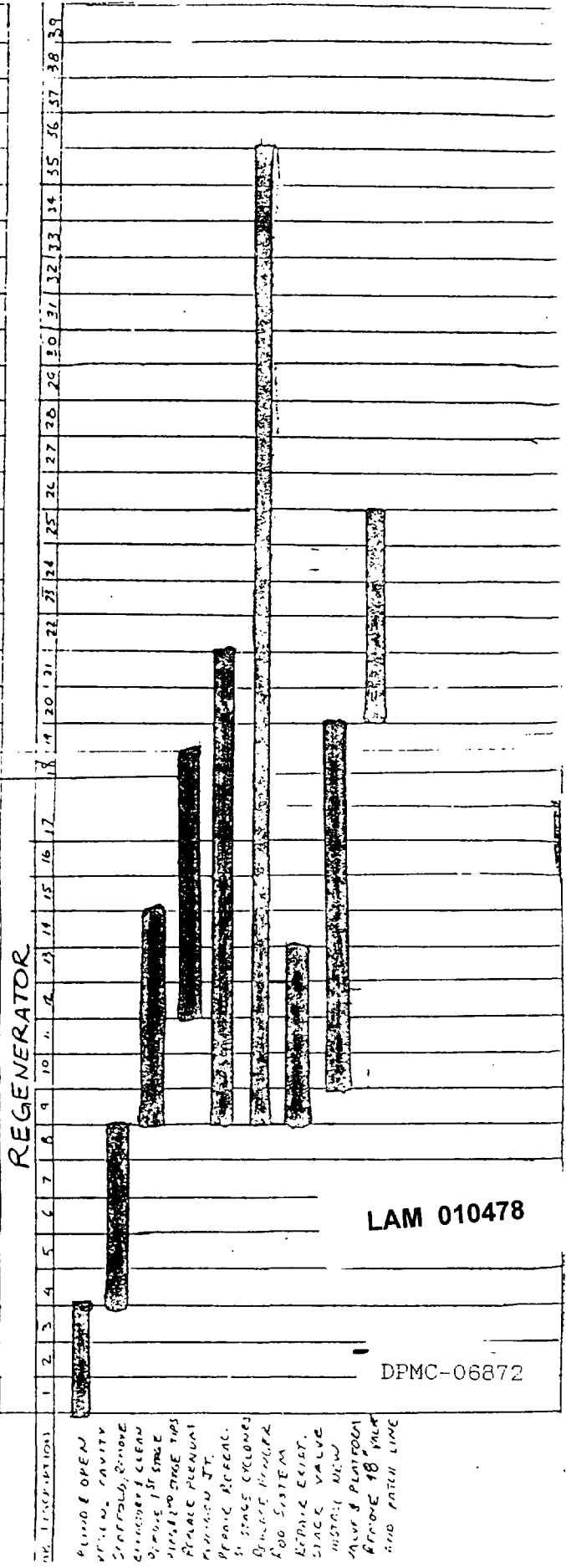
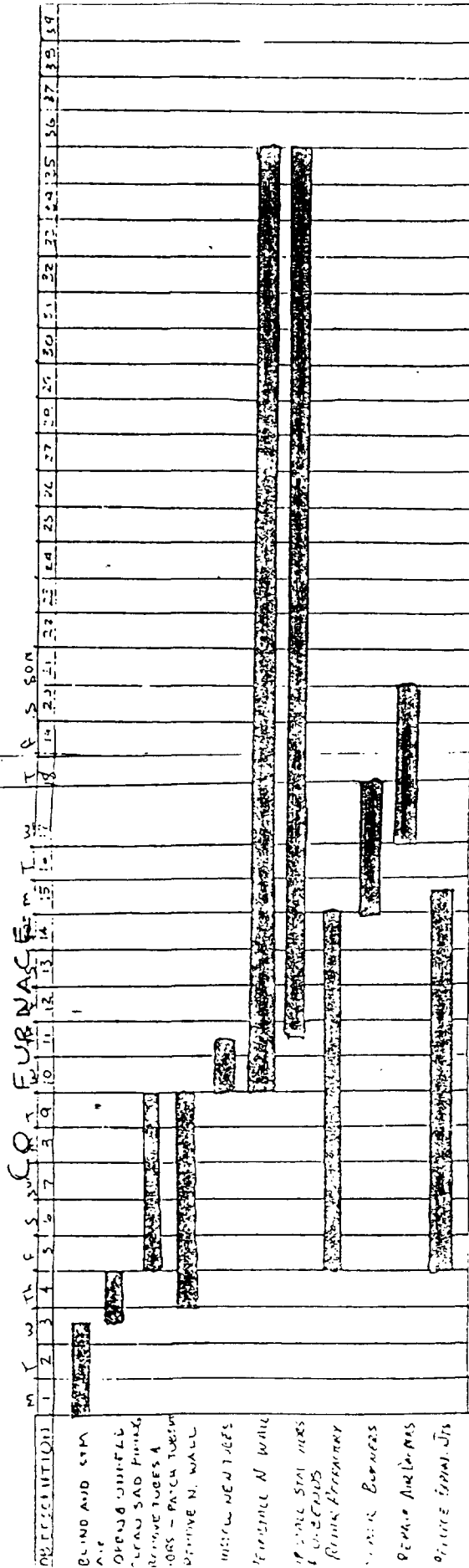
* Weld to Completion after weld has been started

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Preliminary Industrial Hygiene Surveillance Program:

September, 1980 CCU Shutdown

A. Background

Previous Industrial Hygiene monitoring conducted at DPMC during a catalytic cracker shutdown was limited to only area monitoring. Area air sampling performed identified total particulate levels exceeding 10 mg/m^3 on 87.5% of the samples collected. Hexavalent chromium levels exceeded the PEL 0.05 mg/m^3 (as cr) on 75% of the samples. Monitoring conducted at that time addressed:

- . catalyst dust as total particulate
- . silica dust - from sandblasting
- . asbestos - refractory removal in regenerator
- . air arc gouging - total particulate, iron oxide, and copper, } 3rd stage separator and regenerator
- . coated electrode welding - chromium, nickel, manganese, and total particulate } regenerator, 3rd stage separator, reactor

Based on a review of catalytic cracker shutdowns throughout Shell, a list of anticipated exposure potentials has been provided as Attachment 1.

B. Proposed Industrial Hygiene Activities

1. Monitoring

- a. Assess individual breathing zone exposure levels to dusts and fumes (metals) on a daily basis where practical
 - (1) Welders and laborers will be monitored at the same time. Personnel sampling to be supplemented by area monitoring.
 - (2) Breathing zone samples on welders will be collected under the hood.
 - (3) Monitoring will be conducted for 7-8 hours of the 10-hour shift.
 - (4) Monitoring will be conducted principally during daylight hours, but may be performed on the second shift depending on work to be performed.
- b. Perform special area evaluations for heat (if applicable), ozone, oxides of nitrogen and carbon monoxide. Determine personnel exposure potential to fluorides.

The above monitoring will be performed to determine the effectiveness of the ventilation and housekeeping measures used, as well as the adequacy of the respirators selected

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- c. Perform special evaluations for noise (sound level measurements and dosimetry) to determine the need for hearing protection.

Where monitoring is conducted, documentation will be made of day-to-day work activities involved, placement of air movers, use of respirators, actual air flow readings, and other contributing factors.

2. Audit Function

- a. Industrial Hygiene personnel on a daily basis or as appropriate, will audit the contractors' performance with regards to the use of:

respirators (including maintenance)

hearing protection

protective clothing

vacuums (clothing)

super vacs

showers as outlined

3. Special Studies

- a. Will include an evaluation of the methods used to:

(1) handle and protect against PCA containing materials

(2) control dust/fume exposure by ventilation

C. Implementation

1. Anticipated Distribution of Industrial Hygiene Activities

G. Buchanan	Fulltime	20 days (shifts)
J. Lawson	Support	10 days est.
P. Snyder	Support	10 days est.

2. Anticipated Number of Samples to be Collected

G. Buchanan	15 x 3	45
J. Lawson & P. Snyder	10 x 2	20
		65 dust/fume

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Noise Dosimetry Measurements 15-20

ATTACHMENT 1

Summary of Anticipated CCU Shutdown Potential Exposure

Activity	Potential Exposure(s) Recognized	Where
Air Arc Gouging	(1) Dust/fume: iron, cadmium, zinc, copper, chrome (total and hex.), nickel, total particulate, lead and total metals (2) Noise	Cutting in vessels, cyclones plenum chambers, spent catalyst risers, dead spots of larger vessels. Note: Reactor is mainly carbon steel, the regenerator a S.S. alloy and the 3rd stage separator chrome.
Coated Electrode Welding	(1) Dust/fume: iron, cadmium, zinc, copper, lead, chrome (total and hex.), nickel, total particulate, total metals, fluorides, carbon monoxide, nitrogen dioxide, and ozone.	Same as above
Refractory Removal	(1) Dust: total, trapped catalyst, (check for presence of asbestos)	Same as above
Brick Removal	(1) Dust: total, trapped catalyst, (check for presence of asbestos)	Furnace
Chipping Coke Deposits	(1) Dust: (PCA containing) total particulate	Reactor
Grinding	(1) Dust: total particulate, (metals) (2) Noise	All

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DUST/FUME SAMPLING

PVC FILTERS

Required for Cr^{+6} analysis via the phenylcarbazide method.

Not hygroscopic therefore it can accommodate total weight.

Pvc can be run for metals but this is not preferred. Westhollow will preweigh.

MCE FILTERS

AFFECTED BY MOISTURE, AND CANNOT BE USED FOR Cr^{+6} .

TOTAL CHROME AND METALS CAN be run though. Westhollow will preweigh.

• MATCHED WEIGHT FILTERS - ACCURATE TO ± 0.1 MG IF NO OTHER PROBLEMS ARE ENCOUNTERED IN SEPARATING THE FILTERS. THIS ± 0.1 ERROR IS ABOUT EQUAL TO THE MOISTURE EFFECTS OF SELF-LOADED MCE CASSETTES.



Shell Oil Company • Shell Chemical Company
Interoffice Memorandum

724
East District
Cat Cracker
Eng. Center
R

JULY 18, 1980

FROM: INDUSTRIAL HYGIENE
TO: MAINTENANCE MANAGER - EAST DISTRICT
SUBJECT: CAT CRACKER SHUTDOWN

Attached please find the proposed respirator selection sheet which has been prepared for the upcoming cat cracker shutdown. Please note that the guideline reflects those changes which were discussed on July 17, 1980.

I would appreciate it if you would forward the attached information to the appropriate Brown & Root project representative and other Shell personnel as deemed necessary.

Thank you again.

P. J. Snyder

P. J. Snyder

PJS/gri

cc: M. T. Anderson
J. W. Burks
D. J. Erickson
R. P. Frutiger
D. E. Johnson
J. D. Ransdell
ECB Satellite
PJS Chron

LAM 010483

DPMC-06877

CAT CRACKER SHUTDOWN
PIRATOR SELECTION SHEET

1. Scott full-face air-purifying mask with high efficiency dust cartridges (Part No. 652L)
2. MSA full-face constant flow airline mask with attached protective welding lens (Part No. 461-699 and Part No. 449-646)
3. MSA half-face constant flow welder's airline mask (Part No. 460-862)

Contaminant or Activity	Minimum Respiratory Protection	Other Protective Measures
<u>Vessel Entry</u> - cleaning - preparation work - inspection - observation	Cartridge Dust Mask (No. 1 above)	. Appropriate protective clothing, washing after contact and daily showering at the end of the shift required for all <u>personnel</u> who have anticipated exposure potential to polycyclic aromatic containing materials: - All cleaning, preparation work inside fractionator, and on slurry oil system; washing slurry oil and coke deposits
<u>Fractionator and Slurry Oil System</u> - High boiling aromatic oils	A. <u>If a heavy cool liquid:</u> None normally required. B. <u>If a solid requiring chipping,</u> Cartridge Dust Mask (No. 1 above)	. Appropriate protective clothing, washing after contact, and daily showering at the end of the shift made <u>available:</u> - unflanging slurry system lines - slurry system pump removal and cleaning - ancillary fractionator personnel - etc.
<u>Sandblasting - Non Silica Containing Grit</u>	A. <u>Sandblasters:</u> Blaster's Air-line Hood B. <u>Helpers, Transients:</u> Cartridge Dust Mask (No. 1 above)	

LAM 010484

Contaminant or Activity	Minimum Respiratory Protection	Other Protective Measures
<u>Cat Cracker Catalyst Dust</u>	Cartridge Dust Mask (No. 1 on previous page)	. vacuuming of dust on clothing, washing prior to eating and leaving work required for all personnel cutting, grinding, welding or otherwise exposed to chrome . vacuuming of clothing by other personnel recommended but not required
<u>Welding</u> Stainless Steel: - Hex Metal (chrome) - Plenum - Cyclones - Fluffing lines - Precipitator Clips - Etc.	<u>Inside</u> <u>Welders:</u> Airline Mask (No. 2 or 3 on previous page) <u>Helpers, Transients:</u> Cartridge Dust Mask (No. 1 on previous page)	LAM 010485

September 10, 1980

GLB

RETURN ORIGINAL ✓

NORTH MANAGEMENT TEAM
SOUTH MANAGEMENT TEAM

Attached is a preliminary report on Health/Safety considerations for CCU shutdowns from a design standpoint as well as S/D planning and implementation. This road map was used in developing the strategy we are currently following on the DPMC CCU S/D. Although directed toward CCU shutdowns, I believe it has applicability on other unit shutdowns and encourage its use where appropriate.

Attachment

RPF:ikg

R. P. Frutiger / ikg
R. P. FRUTIGER

LAM 010486

ENVIRONMENTAL	
DATE	10/9/80
NAME	PTS
	RETURN TO EVC FILE
✓	COPY IN EVC FILE
	FOR EVC INFO ONLY
COPY	(H)
FILE	

DPMC-06880



Shell Oil Company

Interoffice Memorandum

SEPTEMBER 3, 1980

FROM MANAGER, HEALTH & SAFETY - OPERATIONS

TO DEER PARK MANUFACTURING COMPLEX, GENERAL MANAGER
 MANUFACTURING COMPLEX MANAGERS
 ~~MARTINEZ~~ ~~WILMINGTON~~
 NORCO
 REFINERY MANAGERS
 ~~ANACORTES~~ WOOD RIVER
 ODESSA/CINIZA

SUBJECT HEALTH ASPECTS OF CCU SHUTDOWNS

Because of concern for personnel exposure to air contaminants during maintenance turnarounds of cat crackers, we began in 1978 to evaluate the potential for excessive exposures. As a consequence, in the fall of 1979 a Head Office team representing Health & Safety - Operations, Maintenance Support - Manufacturing, and Engineering Services - Products was appointed to work with field locations in the planning, execution, and critique of CCU shutdowns with respect to the health aspects of personnel exposure to dust and fumes. Since that time the team has had both dialog with location personnel and direct involvement in CCU shutdowns at several field locations. As a result, we believe it now timely to issue a report of work to date so that all locations with cat crackers may gain greater awareness of potential problem areas as well as knowledge of practical solutions to problems.

We would like to emphasize the interim nature of the attached taskforce report since existing knowledge is being tested and new knowledge is being gained with each additional cat cracker turnaround. As a consequence, we wish to continue working with field locations to apply what we have learned and to learn more. We have found that taskforce and location personnel working together have been beneficial in catalyzing effective management of personnel exposures to dust and fumes during shutdown periods.

For your information, the current members of the taskforce are: J. D. Ransdell, Health & Safety - Operations; H. C. Grant, Maintenance Support - Manufacturing; and S. S. Braun - Engineering Services - Products. Your continued cooperation in the taskforce's efforts is appreciated.

R. L. Brunner
 R. L. Brunner

LAM 010487

HCG:MLH

Enclosure

DPMC-06881

cc: Messrs. W. A. Carpenter, Jr.
H. L. Kusnetz
R. R. Kienle
R. H. Brown
R. M. Weeks/R. D. Provost

LAM 010488

DPMC-06882

PRELIMINARY REPORT
OF
TASK FORCE ON HEALTH ASPECTS OF CCU SHUTDOWNS

Summary

During the past two years, investigations have been conducted at several Manufacturing locations to evaluate potential personnel exposures to dust and fumes during CCU shutdowns for maintenance and repair. The objectives of this work have been twofold: 1) To better understand the potential health affecting exposures that may exist, and 2) to evaluate procedures, techniques, and equipment utilized to minimize or manage such personnel exposures.

The results of these efforts indicate that specific actions can be taken to reduce personnel exposure to catalyst dust, coke dust, certain other particulates, and metal fumes from welding and air-arc gouging. Specific actions vary from ventilation and housekeeping procedures to the use of respiratory protection.

Listed below are pertinent health/safety considerations which have been developed from the investigative work. They have application both to CCU maintenance shutdown activities and to future cat cracker revamps and design changes.

Health/Safety Considerations For CCU Work

I. Plant Design

- 1) Provide sufficient and properly located manways for fan mounting to supply general ventilation.
- 2) Include safety considerations when locating and sizing accessways and work platforms.
- 3) Provide means for gathering and routing utility lines and hoses to reduce tripping hazards and avoid interference with ventilation facilities.
- 4) Avoid use of asbestos and crystalline - silica materials whenever feasible.

LAM 010489

DPMC-06883

II. Shutdown Planning

- 1) Include industrial hygiene considerations early in the shutdown planning activity.
- 2) Develop respiratory protection requirements (see example 1 in appendix).
 - a) Provide dust and fume respirators in adequate numbers.
 - b) Provide air-line respirators for areas with poor ventilation and potentially high levels of air contamination.
 - c) Provide training in use and care of respirators.
- 3) Develop hygiene requirements for: (see example 2 in appendix)
 - a) Sand blasting material (use substitute for silica if feasible)
 - b) PNA's (from slurry oil and coke deposits)
 - c) Abestos containing materials
- 4) Develop hearing protection requirements considering: (see example 3 in appendix).
 - a) Air-arc gouging
 - b) Grinding/chipping operations
 - c) Breathing air compressors
 - d) Fans/eductors
- 5) Develop general ventilation plans and strategies (see example 4 in appendix).
 - a) Provide for proper mounting of fans.
 - b) Consider reliability, capacity, mounting ease and noise levels when selecting fans.
 - c) Provide for movement of fans if required as the work progresses.
 - d) Provide for bulkheads and air supply openings in lines and vessels if effective in avoiding ventilation dead spots.

PRELIMINARY REPORT OF TASK FORCE
ON HEALTH ASPECTS OF CCU SHUTDOWNS

3

- 6) Develop procedures and provide equipment and facilities for adequate cleanup of dust (see example 5 in appendix).
 - a) Initial cleanout of catalyst dust.
 - b) During shutdown as required to control refractory, coke and sandblast dust.

III. Shutdown Execution

- 1) Provide monitoring during course of shutdown to assure:
 - a) Proper operation and use of ventilation fans, bulkheads, and air supply openings.
 - b) Proper use of respiratory protective equipment.
 - c) Proper use of hearing protection.
 - d) Control of excessive dust generation.
- 2) Provide for removal of coke and other deposits prior to cutting or welding to minimize generation of SO_2 .

IV. Miscellaneous

- 1) Evaluate feasibility of providing tempered air makeup for ventilation during cold weather operations.
- 2) Consider innovative methods of minimizing or controlling particulates during maintenance operations (chipping, grinding, arc gouging, welding).
- 3) Consider operating procedures and equipment and facility designs which minimize catalyst hang-up and retention in vessels and lines upon unit shutdown.

LAM 010491

DPMC-06885

APPENDIX

Example 1. Develop Respiratory Protection Requirements --

One location (WMC) specified respirator requirements by preparing a "Respirator Selection Sheet" (Attachment 1). Implementation of these respirator requirements involved the following:

- a. 18 Scott air line masks with face mounted regulators and welder lens inserts for stainless steel welding.
- b. Breathing air trailers (119,000 ft³) were piped to a header with branches to four active entry sites where multiple outlets were available to plug into.
- c. About two trailers of air were actually consumed of the three ordered in the six week period.

Example 2. Define Work Practices for the Handling of --

- a. Sandblasting in the reactor feed and catalyst return lines was done during the midnight shift to avoid silica exposure to craftsmen working in the reactor. However, sand particles which ended up on reactor surfaces created silica "overexposure" conditions on the day shift as the sand became suspended in the atmosphere from grinding and air arcing activities. As a result, the reactor was water washed to remove the residual sand. (WRR, 1979)
- b. During the manual sludge removal from the bottom of the fractionator, laborers wore protective boots, gloves, trousers, and jackets while doing the two hour job. (WRR, 1979)

Example 3. Develop Hearing Protection Requirements --

Testing has shown that the following noise levels may occur during certain operations:

- a. 113 dBA six feet from a chipping gun working under the the regenerator plenum.
- b. 100-103 dBA on the level below a chipping gun operator.

LAM 010492

DPMC-06886

- c. 108 dBA four feet from power grinder in regenerator cyclone.
- d. Up to 104 dBA in the vicinity of steam educators.

Significant noise levels may also be generated by other maintenance operations not shown above (e.g. air-arcng).

Example 4. Develop General Ventilation Plans and Strategy --

- a. Ventilation was improved both in type and in quality. Steam or air aspirators were replaced by electrically driven tank blowers. This approach minimizes the problems of varying steam or air supply pressures and dripping condensate. It also allows an easier visual audit of ventilator performance. Tank blowers generally have higher capacities than air or steam aspirators. Flange mounting of tank blowers is relatively straight forward, so you can more easily avoid the problem of poor mounting which contributes to severe short circuiting of the air.

In addition to this substitution, more blowers were added. The combination of replacing aspirators and adding more blowers increased general ventilation volumes 100% in the regenerator and approximately 50% in the reactor. The regenerator had approximately 26,000 CFM connected exhaust (Figure 1) while the reactor had approximately 18,000 CFM (Figure 2). (WRR, 1979)

- b. Work in lines such as the line from the reactor to the fractionator (O-10 line), from the regenerator to the external cyclones (C-21 line) and from the external cyclones to the CO boiler can be effectively ventilated. The two tank blowers on the O-10 line provided excellent ventilation (800-900 fpm). Some of that capacity was used on the reactor before the outlet had to be blocked to separate work activities. Refractory repair on the C-21 lines was estimated to be minimal so we started with four blowers, two on the north line and two on the south. This provided adequate ventilation for initial inspection and installation of chain ladders. As the work began, particulate levels increased because of dead spots where the fans were pulling against each other. This problem was eliminated by adding additional fans, cutting openings in the line for proper air supply and installing bulkheads (wooden blinds built inside the line) to control the direction of air flow. (WRR, 1979)

- c. One problem in mounting ventilators is the opening sometimes has to double as a manway or welding cable entry point. A combination manway/ventilator scheme was successfully used on the regenerator plenum (Figure 3). A spool piece with a hole big enough for cables was added at another location (Figure 5).

In both types of installations, proper design is important to minimize ventilation leakage around the doorway and/or cable entry. (WRR, 1979)

Note: Increased general ventilation will usually result in some cooling effects. This is helpful during warm-weather months but may create discomfort during colder months. No practical means of providing tempered make-up air has yet been demonstrated. This remains a consideration for further development.

Example 5. Develop Procedures and Provide for Equipment and Facilities --

Initial cleanout of catalyst fines was accomplished through the use of a large Super Sucker truck and drum-filter type vacuum systems. As the work progressed, wood scaffolds were periodically wetted to control dust. (WMC, 1979)

Wetting and washing procedures have been useful in the control of dust. In one case, the reactor was initially cleaned by water washing (with a fire hose). This removed much of the coke and catalyst which otherwise would become airborne by chipping and grinding. A second water washing was done following extensive sandblasting in the reactor feed and catalyst return lines. This helped to eliminate residual sand in the reactor before it could be disturbed by chipping and grinding operations. In addition, a garden hose with spray nozzle was used to wet refractory in the C-21 line during refractory removal. (WRR, 1979)

A high-power vacuum truck (specialty contractor) was successful in removing catalyst fines from the regenerator and regenerator lines prior to maintenance work. (WRR, 1979)

LAM 010494

DPMC-06888

CAT CRACKER SHUTDOWN
RESPIRATOR SELECTION SHEET

The following respirators are available for use as indicated:

1. American Optical R-1050 Throwaway (dust) mask.
2. American Optical R-5000 Face Piece Respirator with Cartridges
(a) R-56 (b) R-57
3. Airline Mask - Welders
4. Airline Mask with egress bottle

CONTAMINANT	NORMAL PROTECTION	ACCEPTABLE
Insulation	A/O-R1050 TROWAWAY	2a, 2b, 3 or 4 above
Hydrogen Sulfide	Air Line Mask with Egress Bottle	-----
Cat Cracker Catalyst Super DX	A/O-R1050 Throwaway	2a, 2b, 3 or 4 above
Stainless Steel Welding - Hex metal - Plenum - Cyclones - Fluffing lines - Precipitator clips	A. <u>In a confined space</u> Welders - Airline Mask Helpers and Transients A/O 5000 Facepiece R-57 Cartridges B. <u>Open area</u> A/O-R5000 Facepieces R-57 Cartridge	----- 3 or 4 above
Field Welding Carbon Steel	A. <u>In a confined spaces</u> Welders R5000 Facepiece R-56 Cartridge B. <u>Open Area</u> None required	2b, 3 or 4 above
Process Blinding	Airline Mask with Egress Bottle	
Refractory	A/O-R1050 Throwaway	2a, 2b, 3 or 4 above

LAM 010495

CONTAMINANT	NORMAL PROTECTION	ACCEPTABLE
Heater tube cleaning (with wire brush)	A/O-R5000 Facepiece R-56 Cartridge	2b, 3 or 4 above
Brick work removal in heaters	A/O-R5000 Facepiece R-56 Cartridge	2b, 3 or 4 above
Brick work repair when dusty	A/O-R1050 Throwaway	2a, 2b, 3 or 4 above
Fractionator and Slurry Settlers High Boiling Aromatic Oils	A. <u>In a heavy cool liquid</u> None normally required B. <u>If a solid requiring chipping</u> A/O-R5000 Facepiece R-56 Cartridge	2b, 3 or 4 above

NOTE #1: Other tasks that arise during the shutdown that require respirators must be reviewed with Safety and Industrial Hygiene prior to issuance of any respirators.

NOTE #2: Individuals checking out respirators will be held accountable for its condition upon its return. Any damage to the equipment or an empty egress bottle must be brought to the attention of your Supervisor or a Safety Inspector immediately upon the equipment's return.

NOTE #3: No respirator is to be issued to any individual who has obvious hinderance to a face seal, e.g., facial hair in the respirator flange to face seal area, temple bars on spectacles that must be worn to work. Eye frame attachments for such eyeglasses are available through S&IH.

HCG:cjh

LAM 010496

DPMC-06890

P. J. SNYDER

11/1 '80

Phil:

Re. CCU SLD monitoring data. I would like to see an informative report issued on this. As an example, let's offer constructive suggestions on problems we observed. In the case of some reluctance to wearing protective gear because it was so much better, I would suggest an educational program at the off-set to present data ^{and need} to ^{the} comp.

R. P. PRUTIGER

LAM 010497

DPMC-06891

JMB - we see no people in circumstances
and contractors have to be - and
more vigorous approach in ensuring these "9/8/80"
measures enforced during current shut down -

~~SKB~~ - it would be difficult to disagree

~~RPF~~

~~RGS~~ - M

Do we concur with all of these
statements? If so, I want to circulate
broadly within the complex as a model
for thinking through health effects on all big ~~systems~~

to

J. M. BRAUS

C.U. 10/24/80

RPF

9/29/80

RPF -

After the CCU shutdown, please review
the performance against this plan. Then
promulgate the report as a ^{general} planning document
on the north side.

Also see if the South report team would
like to learn from the CCU experience

J. Braus

LAM 010498

DPMC-06892

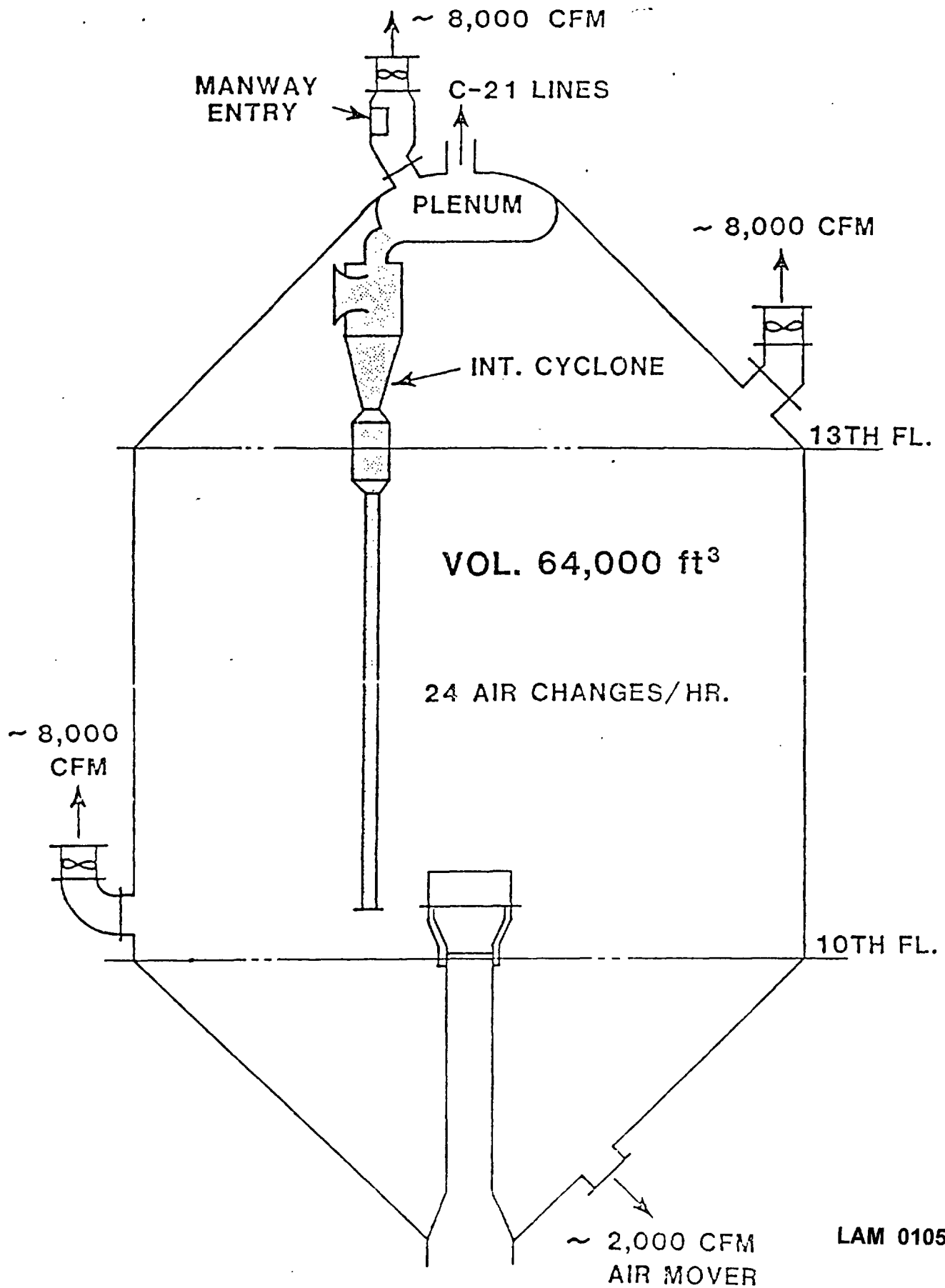


FIGURE 1
REGENERATOR VENTILATION

LAM 010509

DPMC-06903

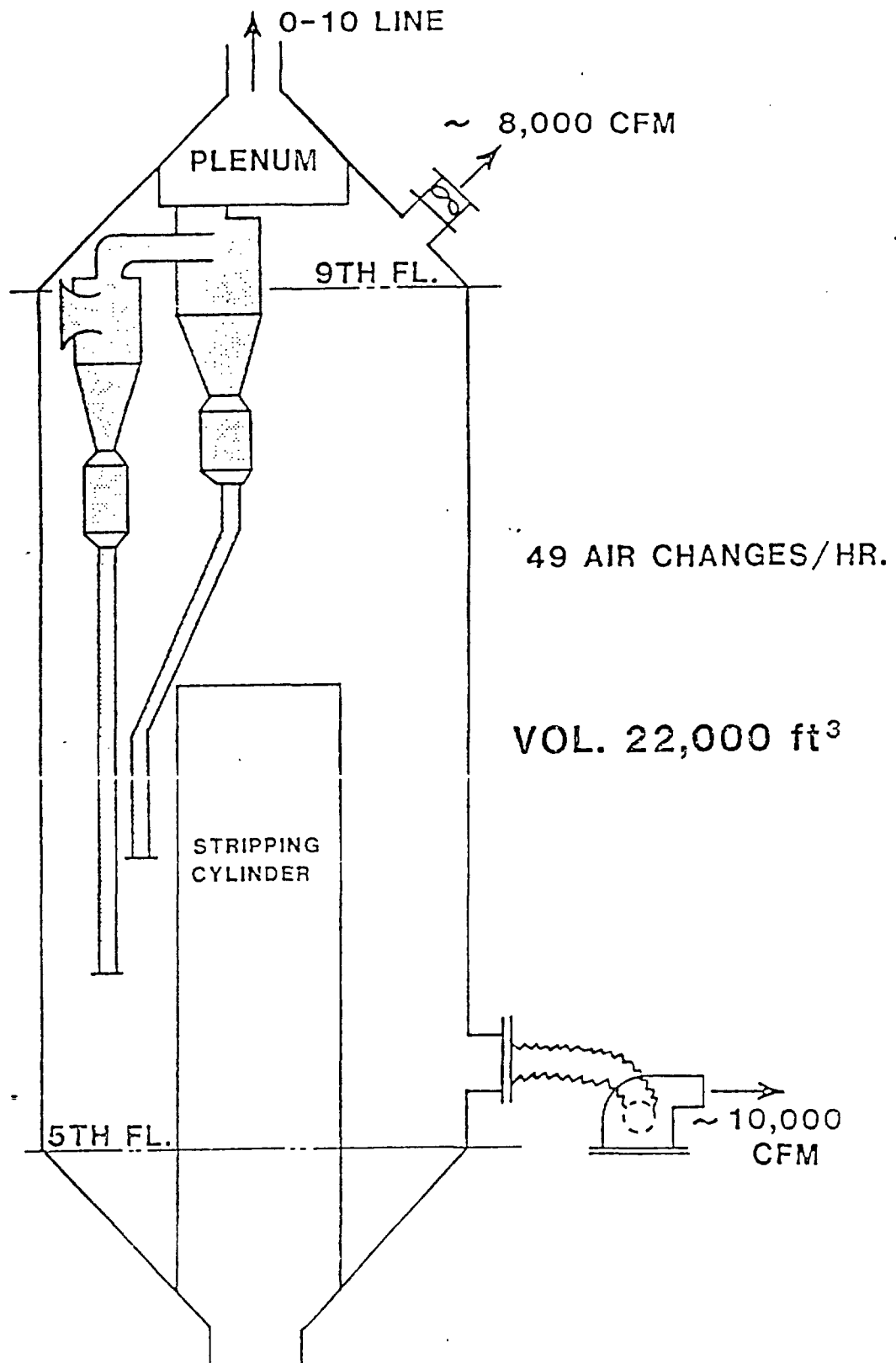
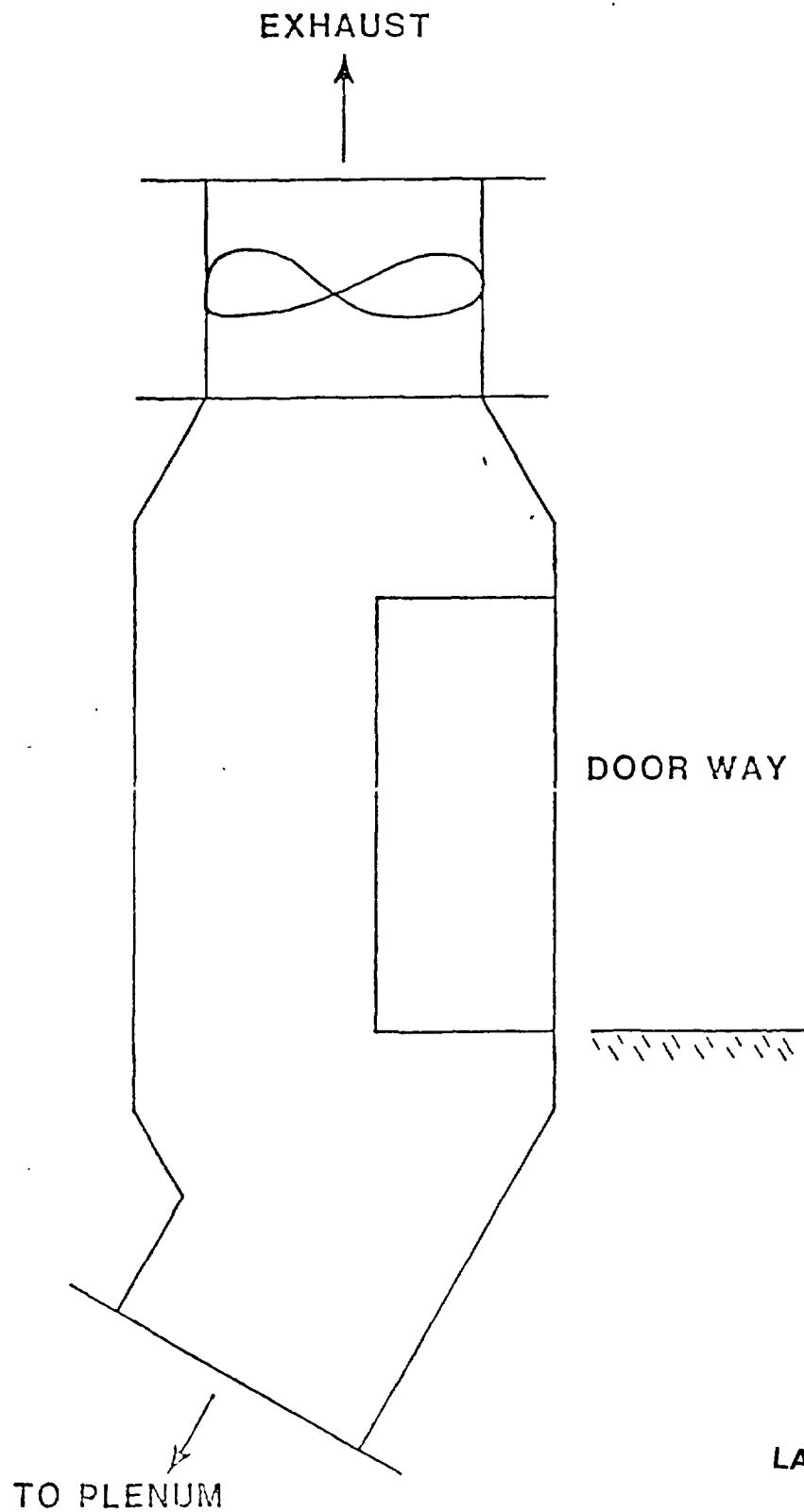


FIGURE 2
REACTOR VENTILATION

LAM 010510



LAM 010511

FIGURE 3
COMBINATION MANWAY/FAN MOUNT

DPMC-06905

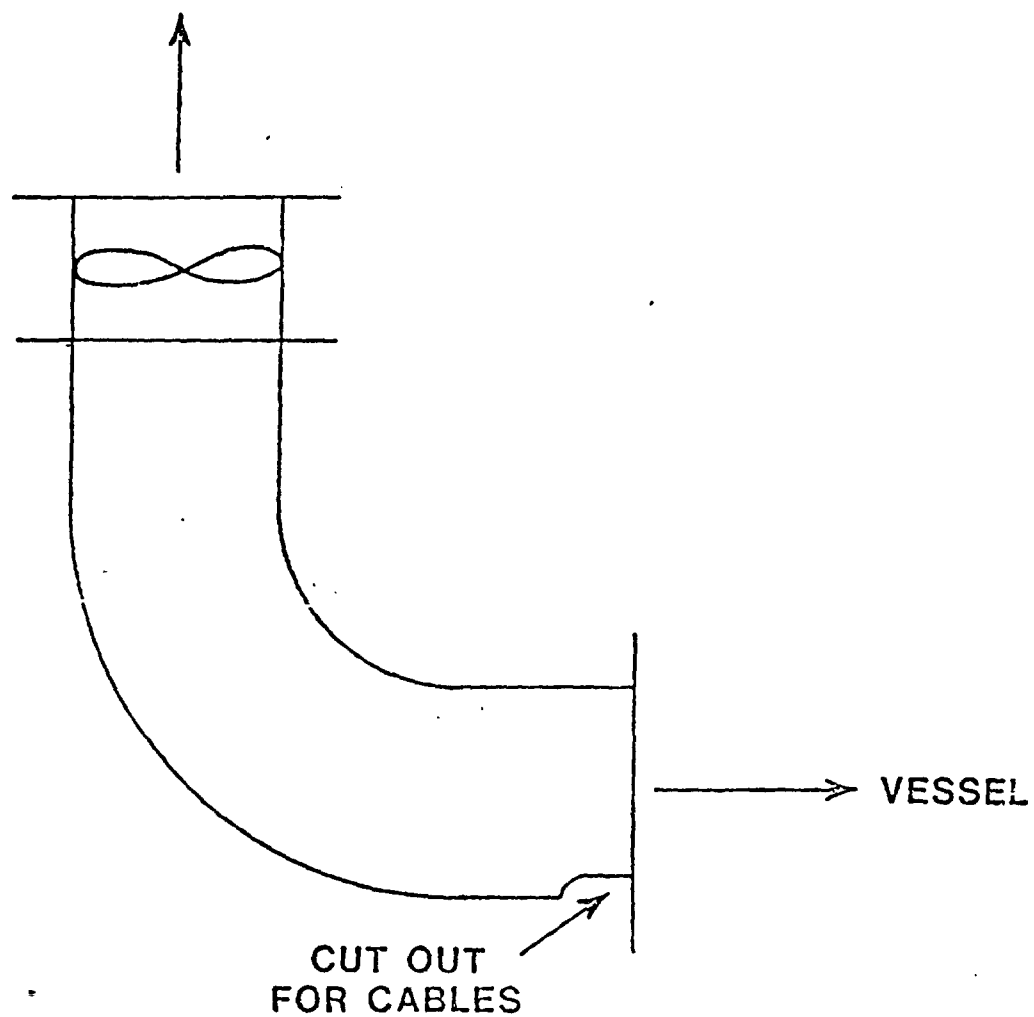


FIGURE 5
ELBOW TRANSITION WITH
CUTOUT FOR CABLES

LAM 010512

July 25, 1980

Jerry Ransdell

Attached is a preliminary monitoring game plan for the CCU shutdown. I'd appreciate any comments you may have. The use of an Industrial Hygiene person from Carolyn's staff will supplement the attached.

PJS/gri

Attachment

cc: ECB Satellite
Project File
PJS Chron

A handwritten signature in cursive script that reads "Phil".

P. J. SNYDER

LAM 010516

DPMC-06910

Preliminary Industrial Hygiene Surveillance Program:

September, 1980 CCU Shutdown

A. Background

Previous Industrial Hygiene monitoring conducted at DPMC during a catalytic cracker shutdown was limited to only area monitoring. Area air sampling performed identified total particulate levels exceeding 10 mg/m^3 on 87.5% of the samples collected. Hexavalent chromium levels exceeded the PEL 0.05 mg/m^3 (as cr) on 75% of the samples. Monitoring conducted at that time addressed:

- . catalyst dust as total particulate
- . silica dust - from sandblasting
- . asbestos - refractory removal in regenerator
- . air arc gouging - total particulate, iron oxide, and copper, } 3rd stage separator and regenerator
- . coated electrode welding - chromium, nickel, manganese, and total particulate } regenerator, 3rd stage separator, reactor

Based on a review of catalytic cracker shutdowns throughout Shell, a list of anticipated exposure potentials has been provided as Attachment 1.

B. Proposed Industrial Hygiene Activities

1. Monitoring

- a. Assess individual breathing zone exposure levels to dusts and fumes (metals) on a daily basis where practical
 - (1) Welders and laborers will be monitored at the same time. Personnel sampling to be supplemented by area monitoring.
 - (2) Breathing zone samples on welders will be collected under the hood.
 - (3) Monitoring will be conducted for 7-8 hours of the 10-hour shift.
 - (4) Monitoring will be conducted principally during daylight hours, but may be performed on the second shift depending on work to be performed.
- b. Perform special area evaluations for heat (if applicable), ozone, oxides of nitrogen and carbon monoxide. Determine personnel exposure potential to fluorides.

The above monitoring will be performed to determine the effectiveness of the ventilation and housekeeping measures used, as well as the adequacy of the respirators selected.

LAM 010517

DPMC-06911

- c. Perform special evaluations for noise sound level measurements and dosimetry to determine the need for hearing protection.

Where monitoring is conducted, documentation will be made of day-to-day work activities involved, placement of air movers, use of respirators, actual air flow readings, and other contributing factors.

2. Audit Function

- a. Industrial Hygiene personnel on a daily basis or as appropriate, will audit the contractors' performance with regards to the use of:

respirators (including maintenance)

hearing protection

protective clothing

vacuums (clothing)

super vacs

showers as outlined

3. Special Studies

- a. Will include an evaluation of the methods used to:
 - (1) handle and protect against PCA containing materials
 - (2) control dust/fume exposure by ventilation

C. Implementation

1. Anticipated Distribution of Industrial Hygiene Activities

G. Buchanan	Fulltime	20 days (shifts)
J. Lawson	Support	10 days est.
P. Snyder	Support	10 days est.

2. Anticipated Number of Samples to be Collected

G. Buchanan	15 x 3	45
J. Lawson & P. Snyder	10 x 2	20
		65 dust/fume

Noise Dosimetry Measurements 15-20

LAM 010518

ATTACHMENT 1

Summary of Anticipated CCU Shutdown Potential Exposure

Activity	Potential Exposure(s) Recognized	Where
Air Arc Gouging	(1) Dust/fume: iron, cadmium, zinc, copper, chrome (total and hex.), nickel, total particulate, lead and total metals (2) Noise	Cutting in vessels, cyclones plenum chambers, spent catalyst risers, dead spots of larger vessels. Note: Reactor is mainly carbon steel, the regenerator a S.S. alloy and the 3rd stage separator chrome.
Coated Electrode Welding	(1) Dust/fume: iron, cadmium, zinc, copper, lead, chrome (total and hex.), nickel, total particulate, total metals, fluorides, carbon monoxide, nitrogen dioxide, and ozone.	Same as above
Refractory Removal	(1) Dust: total, trapped catalyst, (check for presence of asbestos)	Same as above
Brick Removal	(1) Dust: total, trapped catalyst, (check for presence of asbestos)	Furnace
Chipping Coke Deposits	(1) Dust: (PCA containing) total particulate	Reactor
Grinding	(1) Dust: total particulate, (metals) (2) Noise	All

LAM 010519

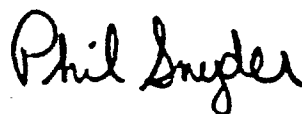
DPMC-06913

JULY 1, 1980 -

TO: M.T. Anderson	J.T. Flynt
D.P. Atwood	R.P. Frutiger
S.S. Brown	H.G. Grant
J.W. Burks	D.E. Johnson
D.O. Chrismer	J.D. Ransdell
M.E. Davison	E.G. Suhr

Attached for your information and further reference are the minutes from the 6/20 Cat Cracker meeting.

cc: PJS Chron
ECB Satellite



P. J. SNYDER

LAM 010520

DPMC-06914

August 28, 1980

NOTES TO FILE

Re: CCU Meeting 8/28/80

SHOWERS

12 Showers (single heads) available. Towels and lockers to be supplied.

Decontamination will be completed prior to welding in the Fractionator. Welders should not have to shower.

Personnel wearing slicker suits for PCA protection will have to shower. Other personnel may also have to depending on exposure conditions.

Coveralls will be worn underneath protective slicker suits; not street clothing.

PCA protection will include boots (inside contaminated vessel), pants, coat and gloves. Boots may be washed if practical, pants and coats contaminated from decontamination work will be discarded.

VACUUMING

(3) 55 gallon vacuums have been acquired to clean contaminated clothing. Vacuums will be emptied by vacuum trucks for removal.

VACUUMING TIMES:	11:45 a.m.	4:30 p.m.
	7:30 a.m.	11:45 p.m.

ASBESTOS

Brown & Roots David Ortiz is knowledgeable of DPMC's Safety Order and will comply with these requirements. Asbestos personnel have been medically qualified.

RESPIRATORS

Initially high efficiency cartridges will be replaced 1x/shift.

BREAKS

Anticipated break times:

12 - 12:30	5:30 p.m.	12 Midnight	4:00 a.m.
------------	-----------	-------------	-----------

PJS:md

LAM 010515

DPMC-06909

NOTE TO FILE

On 6/20/80 a meeting was held to review the summary of action items from the 5/23/80 CCU Shutdown Planning Meeting (Attachment 1). Present were:

J. Burks
M. Davison
J. Flynt
D. Johnson
P. Snyder
E. Suhr

Summary of discussion held:

1. The Cat Cracker Shutdown is currently planned for 9/5/80, with work beginning on 9/8/80.
2. Mr. J. Burks is to provide to DPMC Industrial Hygiene the required cross sectional drawings. A target date of 6/26/80 was agreed to.
3. The practical aspects of vacuuming equipment walls (twice) per day was discussed.

It was agreed that the contractor would be required to vacuum particulates on scaffolding, ledges and other horizontal surfaces at least once per day. Vacuuming twice per day would be required during periods of heavy dust loading. It is anticipated that the vacuuming of walls would not be required on a routine basis.

Vacuuming is to minimize secondary employee exposure from accumulated particulate material.

4. Agreement was reached that all personnel directly involved in performing air arc gouging and welding would be required to wear air-supplied respiratory protection. Special combination air-supplied welding units would be used. Auxiliary personnel would be permitted to use appropriate air-purifying respirators in most situations.
5. Providing shower facilities to all contractor personnel was discussed. As the principal intent of requiring showering is to address skin contact with polycyclic aromatic (PCA) material, it was agreed that personal hygiene facilities would be required for all personnel who may reasonably expect to have contact with polycyclic aromatic containing materials, e.g. personnel working in the fractionator, and related equipment, handling slurry oil, etc.

Other personnel would be able to vacuum off work clothing and wash prior to eating and leaving the site.

6. Respirators used by contractor personnel will have to be cleaned daily. Per shift 60-100 masks will be in use. Consideration will be given to having these masks cleaned at DPMCs new respirator maintenance station.

7. Maintenance indicated that they would follow-up on:
 - a. investigating the use of a super vac for accumulated particulate control.
 - b. requiring the contractor to use respiratory protection specified by DPMC Industrial Hygiene.
 - c. requiring the contractor to use shower facilities where PCA content could occur.
 - d. providing DPMC Industrial Hygiene a shutdown activity schedule as soon as it is available.
 - e. installing the required breathing air manifold on the Cat Cracker; arranging for breathing air trailers.
 - f. investigate possibly adding a penthouse at level 4 which would permit access without interfering with air mover function.
8. Brown and Root are to be selected as the shutdown contractor. Reportedly the contractor will have an EMT and a safety man on site at all times. One Safety Inspector will be present at night, and two during daylight hours.

PJS/gri
6/30/80

LAM 010522

NOTE TO FILE

On 6/20/80 a meeting was held to review the summary of action items from the 5/23/80 CCU Shutdown Planning Meeting (Attachment 1). Present were:

J. Burks
M. Davison
J. Flynt
D. Johnson
P. Snyder
E. Suhr

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Vacuuming is to minimize secondary employee exposure from accumulated particulate material.

4. Agreement was reached that all personnel directly involved in performing air arc gouging and welding would be required to wear air-supplied respiratory protection. Special combination air-supplied welding units would be used. Auxiliary personnel would be permitted to use appropriate air-purifying respirators in most situations.
5. Providing shower facilities to all contractor personnel was discussed. As the principal intent of requiring showering is to address skin contact with polycyclic aromatic (PCA) material, it was agreed that personal hygiene facilities would be required for all personnel who may reasonably expect to have contact with polycyclic aromatic containing materials, e.g. personnel working in the fractionator, and related equipment, handling slurry oil, etc.

Other personnel would be able to vacuum off work clothing and wash prior to eating and leaving the site.

6. Respirators used by contractor personnel will have to be cleaned daily. Per shift 60-100 masks will be in use. Consideration will be given to having these masks cleaned at DPMCs new respirator maintenance station.

7. Maintenance indicated that they would follow-up on:
- a. investigating the use of a super vac for accumulated particulate control. *J. H. H. 7/2/80*
 - b. requiring the contractor to use respiratory protection specified by DPMC Industrial Hygiene.
 - c. requiring the contractor to use shower facilities where PCA content could occur.
 - d. providing DPMC Industrial Hygiene a shutdown activity schedule as soon as it is available.
 - e. installing the required breathing air manifold on the Cat Cracker; arranging for breathing air trailers.
 - f. investigate possibly adding a penthouse at level 4 which would permit access without interfering with air mover function.
8. Brown and Root are to be selected as the shutdown contractor. Reportedly the contractor will have an EMT and a safety man on site at all times. One Safety Inspector will be present at night, and two during daylight hours.

PJS/gri
6/30/80

LAM 010524

DPMC-06918

SUMMARY OF ACTION ITEMS
FROM
CCU S/D PLANNING MEETING

Participants

Mike Anderson (part-time)
Dave Atwood
S. S. Braun-1100 Milam
Mike Davis
Dave Davison
Dick Frutiger
H. C. Grant-OSP
Jerry Ransdell
Phil Snyder

Date: May 23, 1980

Action Items:

- 1) Ventilation - Cross sectional drawings of the equipment will be provided to the Head Office, along with a preliminary assessment of work activities, so they can develop a recommended ventilation strategy. Additionally, Head Office will review adequacy of manways and propose additions where appropriate.
- 2) Sandblasting - The Complex policy of using an alternate material for silica sand will be followed on this shutdown.
- 3) Particulate Control - As a minimum, the contractor will be required to vacuum (or equivalent) particulates on the walls of equipment at least once per day, and twice per day during periods of heavy dust generation (gouging, blasting, etc.). Use of a super-vac or other means of controlling particulate generation will be investigated.
- 4) Asbestos - Investigate the use of a super sucker and equivalent to remove asbestos backed refractory to control asbestos exposure. If this is impractical, appropriate respiratory will be required.
- 5) Air Arc Gouging and Welding - An air line respirator will be required until we can ascertain the exposure level is below PEL.
- 6) Hearing Protection - Contractor is responsible for providing hearing protection and enforcing its use.
- 7) Personal Hygiene Facilities - Contractor should be required to provide showers so that personnel can wash before leaving site.

LAM 010525

DPMC-06919

- 8) Monitoring - The industrial hygiene monitoring should cover the same materials monitored during the last shutdown plus the following: copper, cadmium, lead, and refractory silica.
- 9) PNA's - Phil Snyder will contact Bill Cunningham at Wood River to gain their knowledge and identify an appropriate monitoring program for Deer Park.

Dist.: Attendees

DPMC
5/28/80
UPF:ikg

LAM 010526

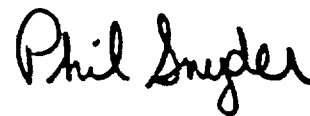
DPMC-06920

JULY 1, 1980 -

TO: M.T. Anderson	J.T. Flynt
D.P. Atwood	R.P. Frutiger
S.S. Brown	H.G. Grant
J.W. Burks	D.E. Johnson
D.O. Chrismer	J.D. Ransdell
M.E. Davison	E.G. Suhr

Attached for your information and further reference are the minutes from the 6/20 Cat Cracker meeting.

cc: PJS Chron
ECB Satellite



P. J. SNYDER

LAM 010527

DPMC-06921

NOTE TO FILE

On 6/20/80 a meeting was held to review the summary of action items from the 5/23/80 CCU Shutdown Planning Meeting (Attachment 1). Present were:

J. Burks
M. Davison
J. Flynt
D. Johnson
P. Snyder
E. Suhr

Summary of discussion held:

1. The Cat Cracker Shutdown is currently planned for 9/5/80, with work beginning on 9/8/80.
2. Mr. J. Burks is to provide to DPMC Industrial Hygiene the required cross sectional drawings. A target date of 6/26/80 was agreed to.
3. The practical aspects of vacuuming equipment walls (twice) per day was discussed.

It was agreed that the contractor would be required to vacuum particulates on scaffolding, ledges and other horizontal surfaces at least once per day. Vacuuming twice per day would be required during periods of heavy dust loading. It is anticipated that the vacuuming of walls would not be required on a routine basis.

Vacuuming is to minimize secondary employee exposure from accumulated particulate material.

4. Agreement was reached that all personnel directly involved in performing air arc gouging and welding would be required to wear air-supplied respiratory protection. Special combination air-supplied welding units would be used. Auxiliary personnel would be permitted to use appropriate air-purifying respirators in most situations.
5. Providing shower facilities to all contractor personnel was discussed. As the principal intent of requiring showering is to address skin contact with polycyclic aromatic (PCA) material, it was agreed that personal hygiene facilities would be required for all personnel who may reasonably expect to have contact with polycyclic aromatic containing materials, e.g. personnel working in the fractionator, and related equipment, handling slurry oil, etc.

Other personnel would be able to vacuum off work clothing and wash prior to eating and leaving the site.

6. Respirators used by contractor personnel will have to be cleaned daily. Per shift 60-100 masks will be in use. Consideration will be given to having these masks cleaned at DPMCs new respirator maintenance station.

LAM 010528

7. Maintenance indicated that they would follow-up on:
 - a. investigating the use of a super vac for accumulated particulate control.
 - b. requiring the contractor to use respiratory protection specified by DPMC Industrial Hygiene.
 - c. requiring the contractor to use shower facilities where PCA content could occur.
 - d. providing DPMC Industrial Hygiene a shutdown activity schedule as soon as it is available.
 - e. installing the required breathing air manifold on the Cat Cracker; arranging for breathing air trailers.
 - f. investigate possibly adding a penthouse at level 4 which would permit access without interfering with air mover function.
8. Brown and Root are to be selected as the shutdown contractor. Reportedly the contractor will have an EMT and a safety man on site at all times. One Safety Inspector will be present at night, and two during daylight hours.

PJS/gri
6/30/80

LAM 010529

DPMC-06923

March 10, 1980

Head Office Manufacturing
Health and Safety - Operations
D. P. Atwood

Dave - attached is Les Cotton's preliminary review of samples taken during the November 1979 shutdown of the catalytic cracking unit. I presume you will provide a copy to the Health, Safety and Environmental organization.

WGP:gw

RLB	GEG	HMM	DPA	KCC
HEALTH & SAFETY OPERATIONS				
MAR 17 1980				
WMC	PJW	BJD		Wilmington Mfg Complex FILE


W.G. PICKENS

Wilmington Mfg Complex

LAM 010534

DPMC-06928

MEMO TO FILE
SAFETY & INDUSTRIAL HYGIENE DEPARTMENT
MARCH 3, 1980
PRELIMINARY INDUSTRIAL HYGIENE REVIEW OF CCU SHUTDOWN

Previous industrial hygiene testing at other locations has shown the need for controls and respiratory protection against airborne materials during CCU shutdowns. We spot checked our contaminate levels for evaluation and to further insure the adequacy of our respiratory protection program.

The attached 1979 CCU Result Summary is incomplete in that some welding and dust samples have not been analyzed, metals have not been analyzed on brick dust samples and the crystalline free silica (SiO_2) content of refractory has not been determined so the SiO_2 dependent TLV's can be set. Refractory is now reported to vary from 0 to 35% SiO_2 . Inadvertently our welding tests were too few in number to adequately represent our exposures.

Although respiratory protection was worn during periods of high exposure, some levels measured may exceed the levels permitted for dust masks and half mask respirators depending on the SiO_2 content of the particular refractory being worked.

Attached are a Respirator Selection Sheet and two Memos to File that discuss respirator control procedures and noise levels during the shutdown. As a part of the respirator program, 18 Scott's air line masks with face mounted regulators and welder lens inserts were placed in service for stainless steel welding. Breathing air trailers (119000 ft^3) were piped to a header with branches to four active entry sites where multiple outlets were available to plug into. About two trailers of air were actually consumed of the three ordered in the 6 week period. Foreman commented that air mask use caused inefficiency, but it was not obvious to me in the field. Also, the willingness to work longer and more comfortably in a confined space seemed to offset any minor inconveniences. A field sink with hot water was provided for respirator sanitation and check out control. Half mask cartridge respirators with high efficiency filters clog quickly in high dust concentrations. The weight of the half masks causes the mask to move on the face unless the straps are so tight they also become an irritant when worn for awhile. All aspects of respirator use, cleaning and controls require continuous audit.

Catalyst dust for some unknown reason was noticeably reduced during this shutdown as though it was coated and thus more dense. Perhaps this is due to the lower attrition rate of the catalyst promoter now being used (Super DX). Our fines production has dropped. Large (Super Sucker truck) and small (air driven drum filter) vacuums were used to assist in final removal and water was used to wet down to keep wood scaffolds damp and dust free.

Confined spaces such as the regenerator plenum, vapor lines, primary and secondary cyclones and particularly reactor stripping cells posed continuous problems requiring adjustment for access, ventilation, dust, noise, or communications.

LAM 010535

DPMC-06929

General dilution ventilation is difficult to achieve and maintain. Ventilation requirements are in a state of flux as job locations or job priorities shift. Air driven coppos blowers and steam eductors were frequently adjusted or relocated for ventilation, access or noise. A large bug blower (ca 5' diameter) was stationed in the regenerator manway to pressurize the vessel. The ventilation was often found cut back or shut off apparently for worker comfort. Wind chill indexes for exposed flesh show that a temperature of 54°F with a 2-MPH breeze gives a temperature equivalent to 23°F. This must impact on enthusiasm and productivity for workers acclimated to California weather and even worse in colder climates during winter shutdowns.

Unsolicited comments indicated a high incidence of colds and sore throats. There is some evidence to indicate this can occur as a reaction to irritants.

Our primary defenses during CCU shutdown must remain (a) clean up, (b) ventilation, and (c) respiratory protection until our materials of construction, equipment or procedures reduce or eliminate their need.

Changes that would help for the future:

- ✓ 1. Larger work platforms at entry areas.
- ✓ 2. Larger entry accessways - preferably walk ins.
- 3. Separate access for utility headers e.g., lights, power outlets, process air, breathing air.
- 4. Bottom clean out drains with a valve on major vessels, e.g., regenerator.
- 5. Consider alternatives to creating the dusts and welding fumes of toxic concern.
- 6. Provide temperate air.
- 7. Heated water facilities for contractor cleanup.

*replace rather
than repair*

- a. Bolt in prepared spares instead of field repair, e.g., stripping cells, cyclones, feed lines, vapor lines.
- b. Substitute materials, e.g., use SiO₂ free refractory.
- c. Prefab refractory in replaceable sections by bolting in, stud guns or other suitable means.

LSC
L. S. Cotton

LSC:cr

*No asbestos?
Was Contractor given showers?*

LAM 010536

Memo to File

3

cc: Head Office
Mfg Safety & Health - D. P. Atwood

bc: JWA/CFG
KHT
VJM
JDU
WGP
LSC File P.1, 102a

Attachment (1) 1979 CCU Result Summary
(2) Respirator Selection Sheet
(3) Memo to File - Nov. 28, 79
(4) Memo to File - Dec. 03, 79

LAM 010537

DPMC-06931

Threshold Limit Values (TLV)

Nuisance dusts = 10 milligrams per cubic meter (mg/M³)

Mineral dusts = $\frac{30 \text{ mg/M}^3}{\% \text{ SiO}_2 + 3}$ for total particulates

$\% \text{ SiO}_2 + 3$

Polynuclear Aromatics (PNA) = 0.2 mg/M³ - Benzene Soluble Fraction (BSF)

Fluorides = 2.5 mg/M³ (F₂) and 2.0 mg/M³ (HF gaseous)

Carbon Monoxide = 50 parts per million (PPM)

Nitrogen Dioxide = 5.0 PPM "C" (not to be exceeded)

Ozone = 0.1 PPM

Hexavalent Chrome = 0.05 mg/M³ - (Proposed 0.001 mg/M³)

1979 CCU Result Summary

Test	Location/Task	Highest Rates Tested	Time in Minutes	8 hr TWA
Dust -	Regenerator			
	(a) cleanup	12.40 mg/M ³	107	5.84 mg/M ³
	cleanup	20.0 mg/M ³	89	(1)
	(b) Build scaffold	7.16 mg/M ³	373	7.16 mg/M ³
	(c) Remove catalyst	10.88 mg/M ³	324	10.88 mg/M ³
Dust -	Heater 16			
	(a) Remove brick	104.0 mg/M ³ **	67	22.66 mg/M ³ (2)**
Dust -	Plenum			
	(a) Remove refractory	129.0 mg/M ³ **	141	76.2 mg/M ³ (3)**
Dust -	2ndary Cyclones			
	(a) Remove refractory	77.0 mg/M ³ **	422	67.7 mg/M ³ (3)**
PNA's	Reactor			
	(a) chipping	.07 mg/M ³ BSF	371	.07 mg/M ³ BSF
Fluorides -	Regenerator			
	(a) welding			
	- particulates	0.1 mg/M ³	195	0.1 mg/M ³
	- gaseous	<0.1 mg/M ³	195	<0.1 mg/M ³
Carbon	Regenerator			
Monoxide -	(a) welding	5.0 PPM	2.5	(1)
	welding	6.1 PPM	382	6.1 PPM (4)
Nitrogen	Regenerator			
Dioxide -	(a) welding	<0.24 PPM	382	<0.24 PPM (4)
Ozone -	Regenerator			
	(a) welding	<0.05 PPM	2.5	<0.05 PPM (4)
Hexavalent	Regenerator			
Chrome -	(a) welding	0.001 mg/M ³ *	107	0.00043 mg/M ³

* Results suspect due to Fe interference

** May exceed protection level of half mask respirators.

LAM 010538

(1) Not enough data for a TWA

(2) No metal analysis yet

(3) No SiO₂ analysis yet.

(4) Area test - not breathing zone.

the
LSC/cr
2 7 80

DPMC-06932

CAT CRACKER SHUTDOWN

RESPIRATOR SELECTION SHEET

The following respirators are available for use as indicated:-

1. American Optical R-1050 Throwaway (dust) mask
2. American Optical R-5000 Face Piece Respirator with Cartridges
(a) R-56 (b) R-57
3. Airline Mask - Welders
4. Airline Mask with egress bottle

CONTAMINENT	NORMAL PROTECTION	ACCEPTABLE
Insulation	A/O-R1050 Throwaway	2a, 2b, 3 or 4 above
Hydrogen Sulfide	Air Line Mask with Egress Bottle	_____
Cat Cracker Catalyst Super DX	A/O-R1050 Throwaway	2a, 2b, 3 or 4 above
Stainless Steel Welding - Hex metal - Plenum - Cyclones - Fluffing lines - Precipitator clips	A. <u>In a confined space</u> -Welders - Airline mask -Helpers and Transients A/O 5000 Facepiece R-57 Cartridges B. <u>Open area</u> A/O-R 5000 Facepiece R-57 Cartridge	_____
Field Welding Carbon Steel	A. <u>In a confined space</u> - Welders R5000 Facepiece R-56 Cartridge B. <u>Open Area</u> None required	2b, 3 or 4 above
Process Blinding	Airline Mask with Egress Bottle	
Refractory	A/O R 1050 Throwaway	2a, 2b, 3 or 4 above

LAM 010539

DPMC-06933

RESPIRATOR SELECTION SHEET (Continued)

2

CONTAMINANT	NORMAL PROTECTION	ACCEPTABLE
Heater tube cleaning (with wire brush)	A/O-R5000 Facepiece R-56 Cartridge	2 & 3, 3 & 4 above
Brick work removal in heaters	A/O-R5000 Facepiece R-56 Cartridge	2b, 3 or 4 above
Brick work repair when dusty	A/O-R1050 Throwaway	2a, 2b, 3 or 4 above
Fractionator and Slurry Settlers High Boiling Aromatic Oils	A. <u>If a heavy cool liquid</u> None normally required B. <u>If a solid requiring</u> <u>chipping</u> A/O-R5000 Facepiece R-56 Cartridge	2b, 3 or 4 above

NOTE #1: Other tasks that arise during the shutdown that require respirators must be reviewed with Safety and Industrial Hygiene prior to issuance of any respirators.

NOTE #2: Individuals checking out respirators will be held accountable for its condition upon its return. Any damage to the equipment or an empty egress bottle must be brought to the attention of your Supervisor or a Safety Inspector immediately upon the equipment's return.

NOTE #3: No respirator is to be issued to any individual who has an obvious hinderance to a face seal, e.g., facial hair in the respirator flange to face seal area, temple bars on spectacles that must be worn to work. Eye frame attachments for such eyeglasses are available through S&IH.

LSC
LSC/ss
9/27/79

LAM 010540

DPMC-06934

SAFETY AND INDUSTRIAL HYGIENE

MEMO TO FILE
DECEMBER 3, 1979

CCU SHUTDOWN/RESPIRATORS

On December 3, 1979, respirator control was reviewed at the CCU shutdown area as indicated:

A. Respirator check out station

Recommend:

1. Instruction sheets for respirator use be packaged with each respirator given out. (Sheets have been previously supplied.)
2. Each airline welding helmet must have a shroud to protect against sparks and UV light.

B. Regenerator

- No respirators available for transient check-out at any entry point.
- Cartridge and airline masks taken off frequently and left laying inside regenerator area. This allows particulates to accumulate inside the respirator for later inhalation.
- Several people were found inside without respirators and some with throwaway dust respirators in the area of the bug blower.

Recommend:

1. An adequate supply of appropriate respirators be provided for transients at entry manways. The firewatchers appear to be aware of the necessary controls but have not been convinced they must enforce the entry controls.
2. Cartridge and airline masks should ^{workers} not be removed from the face in a contaminated area. If ~~they~~ must leave or have extended conversations, they should wear their numbered masks to the manway and leave it with the firewatch if necessary until their return or until the conversation is completed.
3. Cartridge respirators must be worn by transients during stainless welding. Dust masks are not acceptable.

LAM 010541

DPMC-06935

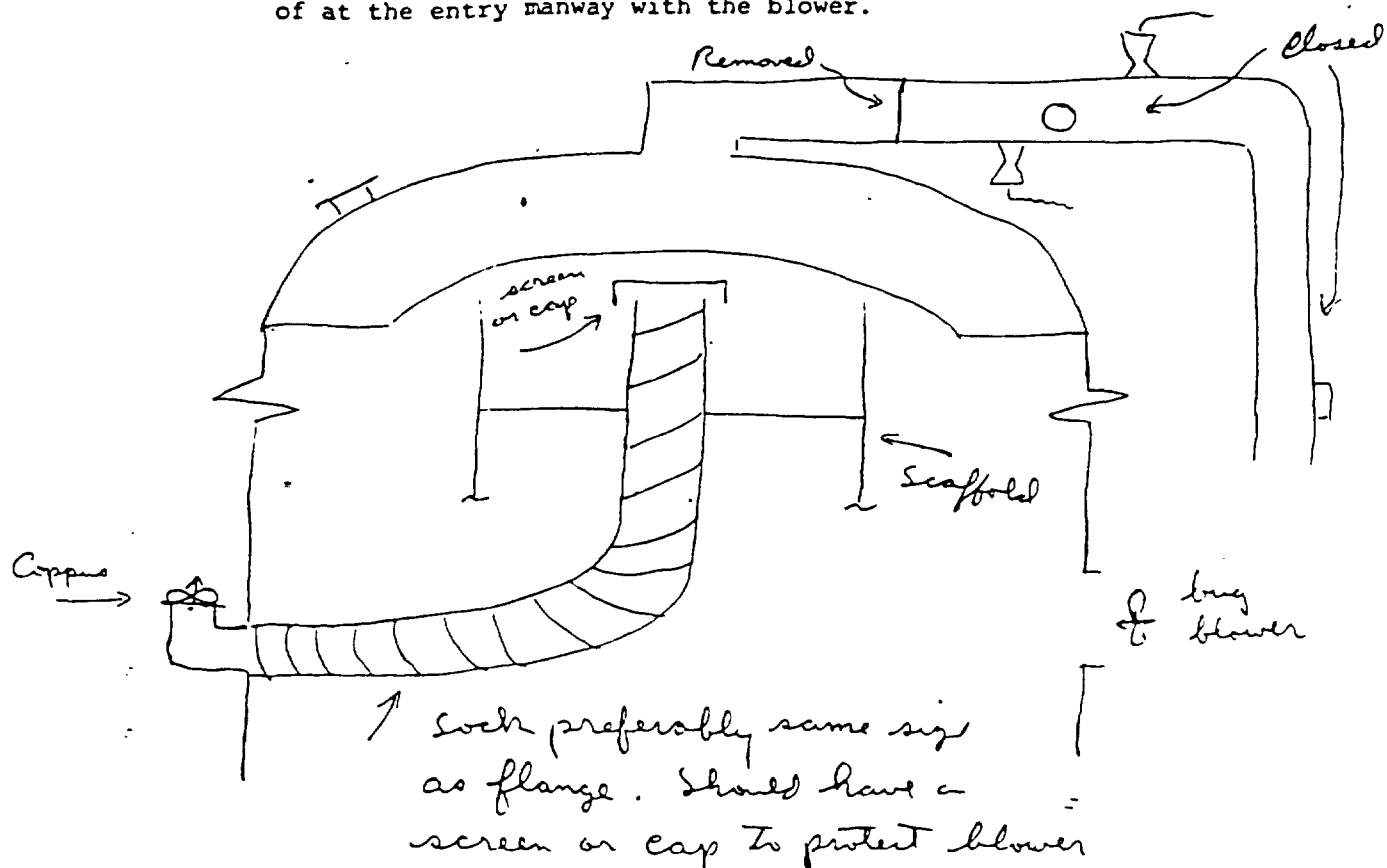
C. Ventilation

- The major ventilation now for the regenerator is from a bug blower at the 10th floor manway blowing in. Fumes and gases are accumulating under the plenum and this will increase as the plenum ceiling is welded closed.
- Various air movement devices are being shut down at night due to wind chill factor.

Recommend:

1. Remove the bulkheads from regenerator vapor lines to allow the steam eductors to ventilate above the plenum. Unused manways should be kept in the closed position. If fallout protection is still necessary, screens could be installed in the vapor line openings at the plenum.
2. A 15" to 20" diameter sock should be connected directly (sealed) from the 10th floor coppus thru the scaffold floor to a point in the center of and about 6" below the ceiling under the plenum. This should allow us to minimize gas accumulation, and perhaps allow us to shut down the bug blower at the manway. It may also give a noise control problem at the 10th floor coppus instead of at the entry manway with the blower.

Note done →



LAM 010542

D. Bug Blower at 10th floor

- Partially in manway and transients placing hands on cage with 1" x 1-3/4" *opening*.

Recommend:

1. Cage mask openings should not exceed 3/8" or cage must be farther from this propeller to avoid contact.

E. Rental compressor at north side of CCU

- The new rental compressor is so quiet most people are surprised that it is running. A tremendous improvement in the total work atmosphere in this area.

L S Cotton

L. S. Cotton

LSC/clw

cc: WGP
JDU
CEE
LSC/File P.1 & P.20
KHT/Maintenance-Information

LAM 010543

DPMC-06937