

SHELL OIL COMPANY

DATE JUNE 20, 1975

10 MARTINEZ MANUFACTURING
COMPLEX - SAFETY DEPARTMENT -
MANAGER

FROM INDUSTRIAL HYGIENIST -
DEPARTMENT OF OCCUPATIONAL
SAFETY AND HEALTH -
WALNUT CREEK

WILMINGTON/DOMINGUEZ
MANUFACTURING COMPLEX -
SAFETY DEPARTMENT - MANAGER

SUBJECT EVALUATION - EMPLOYEE
SAFETY AND ABRASIVE
BLASTING

During separate plant visits Messrs Pickens, Wilmington/Dominguez Manufacturing Complex, and Dodd, Martinez Manufacturing Complex, asked the question, "What is the silica exposure to Shell employees working downwind of an abrasive blasting operation?" To answer the question, air samples were collected at Martinez Manufacturing Complex during a test designed to compare the cleaning efficiency and airborne levels of two abrasives: sand; and Kleen Blast, a commercial crystalline copper slag material containing oxides of silicone, iron, aluminum, calcium, magnesium, copper, and manganese. The manufacturer of Kleen Blast claims it contains no free silica and is safer than and still as effective as sand.

On March 31, April 1 and April 9, 1975, air samples were collected during the abrasive blasting of a storage tank exterior at Martinez Manufacturing Complex. The results of the air sampling are contained in Figure 1 and the attached table. While the employees doing the work wore respiratory protection, the data represents air concentrations for unprotected workers since other employees working in the area would not routinely wear respirators.

The results show that:

- The major air contaminant from sandblasting is free silica while CaO and inert dust are major contaminants from the Kleen Blast operation. There is no free silica hazard from Kleen Blast.
- At the point of blasting the current Federal OSHA standard for respirable free silica of 0.6 mg/M^3 is exceeded by a factor of up to 8.8 for sand. With Kleen Blast the 10 mg/M^3 proposed Cal-OSH standard for total inert dust is exceeded by a factor of up to 5.8. Neither the standards for CaO or respirable inert dust were exceeded for Kleen Blast.

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DPMC-02770

EVALUATION - EMPLOYEE SAFETY
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- Approximately 50 feet downwind of the blasting, the level of contaminants from Kleen Blast are below the applicable OSHA standards, while for sand the 0.7 mg/M^3 calculated total silica proposed Cal-OSH standard is exceeded by a factor of up to 2.2.
- Approximately 125 feet downwind of the sandblasting, the airborne silica level was still 35% of the 0.3 mg/M^3 calculated respirable silica dust OSHA standard.

In conclusion, this study helps to answer the above question. It indicates that there is a silica exposure to employees working up to 125 feet downwind of a sandblasting operation. While such exposures are subject to varying weather conditions, such as wind velocity and direction, had employees been working 125 feet downwind of this sandblasting situation, their exposure to free silica would have approached 35% of the current OSHA respirable silica standard. However, if the proposed NIOSH level of 0.05 mg/M^3 for silica is adopted, employees 125 feet downwind of a sandblasting operation would be working in an area considered a "free silica" work area and hence be subject to the requirements of the standard, i. e. monitoring, recordkeeping, respirator program, and medical examinations.

The Industrial Hygiene Sampling Forms for these samples were forwarded to Jerry Hermene at Martinez for the plant files. If there are any additional questions, please advise.

Original Signed By
S. E. KILLANY, JR.

S. E. Killany, Jr.

Attachments - 2

cc (w/a): Head Office - Manufacturing - Safety & Health - Manager
Head Office - Dept. of Occu. Safety & Health - Staff Ind. Hyg.
Head Office - Public Affairs - Medical Director
Wood River - Regional Industrial Hygienist
New Orleans - Regional Industrial Hygienist
Houston - Industrial Hygiene Lab Coordinator

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TABLE I. COMPARISON OF AIR CONTAMINANTS DURING ABRASIVE BLASTING USING SAND AND A COMMERCIAL SLAG (KLEEN BLAST) - EXTERIOR SURFACE OF STORAGE TANK AT MARTINEZ MANUFACTURING COMPLEX⁽¹⁾

Location	Sand				Cal-OSH Standards ^{b)}	Cal-OSH Standard	% of Cal-OSH Standard	Kleen Blast					
	Sampling Results			% of Cal-OSH Standard				Sampling Results			% of Cal-OSH Standard		
	Dust							Dust					
	Respirable (mg/M ³)	Total (mg/M ³)	% SiO ₂					Respirable ^{c)} (mg/M ³)	Total ^{d)} (mg/M ³)	% SiO ₂		CaO ^{e)} (mg/M ³)	Respirable ^{c)} (mg/M ³)
Point of Blast - 1	1.2	--	15	0.6	200	0.27	(54) ^a	0.01	2.7	36	(540)	54	
Point of Blast - 2	3.4	--	15	0.6	540	1.2	12	0.01	0.6	24	120	12	
Point of Blast - 3	5.3	--	15	0.6	550								
Point of Blast - 4	5.2	--	15	0.6	550								
Point of Blast - 5	0.15	--	33	0.3	52	0.27	2.4	0.01	0.1	5	24	2	
Point of Blast - 6	--	1.9	33	0.7	220								
Point of Blast - 7	0.22	--	33	0.3	55								
Point of Blast - 8	--	1.0	33	0.7	140								
Point of Blast - 9	0.1	--	33	0.3	34	--	--	--	--	--	--	--	
Point of Blast - 10	--	--	--	--	--	0.46	13.4	0.03	0.2	14	40	4	
Point of Blast - 11	--	--	--	--	--	0.31	9.31	0.01	0.15	16	161	3	
Point of Blast - 12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22%	N/A	N/A	N/A	N/A	
Point of Blast - 13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22%	N/A	N/A	N/A	N/A	

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Numbers in parentheses are calculated values

Silica standard - for respirable dust: 10 mg/M³ / (% quartz - 3)
Silica standard - for total dust: 30 mg/M³ / (% quartz - 3)

- Noise dust standard - 5 mg/M³ (respirable dust)

- Nuisance dust standard: - 10 mg/M³ (total dust)

FIGURE 1
DOWNWIND RESPIRABLE SILICA LEVELS
DURING SANDBLASTING
MARTINEZ MANUFACTURING COMPLEX

