



DOW CHEMICAL U.S.A.

OCCUPATIONAL HEALTH
TEXAS OPERATIONS
FREEPORT, TEXAS 77541



Accredited by
Accreditation Association
for Ambulatory
Health Care, Inc.

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Gary Truvar
U. S. Contractors, Inc.
P.O. Drawer 447
Clute, TX 77531

FILE OC-3391W CONTRACTOR APPENDIX

**INDUSTRIAL HYGIENE SURVEY FOR WELDING FUMES AT UNIT III -
PHENOL/ACETONE PLANT, TEXAS OPERATIONS**

Two U. S. Contractors, Inc. employees have been included in an Industrial Hygiene Survey conducted by Dow Texas Operations Industrial Hygiene Department. The results of this survey as it pertains to your employees is attached. It is your responsibility to inform your employees of the monitoring results along with the conclusions and recommendations.

Industrial Hygiene Services
Texas Operations
B-101

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CONTRACTORS, INC.



AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

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CONTRACTOR APPENDIX (CONT'D)

TABLE I
SUMMARY OF 8-HOUR TWA AVERAGE EXPOSURES TO WELDING FUMES
UNIT III - PHENOL/ACETONE, OC-301

JOB CODE/ JOB CLASS	NUMBER OF SAMPLES	8-HR TWA CONCENTRATIONS (MG/M ³)														TOTAL
		Al	V2O5	Ni	Fe	Mn	Co	Mo	Cr	Cu	TiO2	CaO	MgO	ZnO	Cd	
WELDER/C	12	0.02	ND(<0.01)	0.01	0.59	0.04	<0.01	ND(<0.01)	0.01	<0.01	0.03	0.03	0.01	0.18	ND(<0.01)	2.5
INDUSTRIAL HYGIENE GUIDE	5	5	0.05	1	5	1	0.05	5	0.5	0.1	10	5	10	5	0.05 C	5

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CONTRACTOR APPENDIX (CONT'D)

TABLE II
SUMMARY OF 8-HOUR TWA INDIVIDUAL EXPOSURES TO WELDING FUMES
UNIT III - PHENOL/ACETONE, OC-301

JOB CODE/ JOB CLASS	DATE	SOCIAL SEC. NUMBER	8-HR TWA CONCENTRATIONS (MG/M ³)*														TOTAL
			Al	V205	Ni	Fe	Mn	Co	Mo	Cr	Cu	TiO ₂	CaO	MgO	ZnO	Cd	
WELDER/C	10/30/89	105-40-9497	<0.01	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	ND(<0.01)	ND(<0.01)	<0.01	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	ND(<0.01)	ND(<0.01)	0.14'
	10/30/89	463-70-0974	<0.01	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	ND(<0.01)	ND(<0.01)	ND(<0.01)	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	ND(<0.01)	ND(<0.01)	0.21'
	11/02/89	105-40-9497	0.01	ND(<0.01)	0.01	0.34	0.03	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	0.01	0.04	0.02	1.0	ND(<0.01)	2.7
	11/02/89	463-70-0974	0.01	ND(<0.01)	<0.01	0.32	0.02	ND(<0.01)	ND(<0.01)	<0.01	<0.01	0.01	0.03	0.02	0.83	ND(<0.01)	2.0
	11/03/89	105-40-9497	0.01	ND(<0.01)	<0.01	0.84	0.08	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	0.03	0.04	0.02	0.01	ND(<0.01)	2.4
	11/03/89	463-70-0974	0.02	ND(<0.01)	<0.01	0.45	0.03	ND(<0.01)	ND(<0.01)	<0.01	<0.01	0.03	0.04	0.02	0.01	ND(<0.01)	1.4
	11/06/89	105-40-9497	0.02	ND(<0.01)	0.01	1.4	ND(<0.01)	ND(<0.01)	ND(<0.01)	0.02	ND(<0.01)	0.05	0.07	0.03	0.01	ND(<0.01)	4.2
	11/06/89	463-70-0974	0.01	ND(<0.01)	0.01	0.35	0.03	ND(<0.01)	ND(<0.01)	<0.01	<0.01	0.02	0.01	0.01	0.01	ND(<0.01)	1.5
	11/07/89	105-40-9497	0.02	ND(<0.01)	<0.01	0.80	0.04	ND(<0.01)	ND(<0.01)	0.01	ND(<0.01)	0.02	0.08	0.02	0.13	ND(<0.01)	6.9
	11/07/89	463-70-0974	0.01	ND(<0.01)	<0.01	0.19	0.02	ND(<0.01)	ND(<0.01)	ND(<0.01)	ND(<0.01)	0.01	0.07	0.01	0.46	ND(<0.01)	1.8
	11/08/89	105-40-9497	0.05	ND(<0.01)	<0.01	2.2	0.16	<0.01	ND(<0.01)	0.01	<0.01	0.12	0.08	0.03	0.03	ND(<0.01)	5.7
	11/08/89	463-70-0974	<0.01	ND(<0.01)	<0.01	0.11	0.01	ND(<0.01)	ND(<0.01)	ND(<0.01)	ND(<0.01)	ND(<0.01)	0.01	0.01	0.50	ND(<0.01)	1.3
INDUSTRIAL HYGIENE GUIDE			5	0.05	1	5	1	0.05	5	0.5	0.1	10	5	10	5	0.05 c	5

* All sample times were 480 minutes.

** Heli-arc welding on stainless steel. The other samples were stick welding on galvanized and/or carbon steel.

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CONTRACTOR APPENDIX (CONT'D)

CONCLUSIONS AND RECOMMENDATIONS

1. All average and individual 8-hour time-weighted average (TWA) personal exposures of the Welder/Contractor (C) to the metal fumes analyzed (Al, CaO, Cd, Co, Cr, Cu, Fe, MgO, Mn, Mo, Ni, TiO₂, V₂O₅ and ZnO) were below the established Industrial Hygiene Guides (IHGs).
2. The average 8-hour TWA total welding fume exposure (n=12) of the Welder/C was below the established IHG. Total fume exposure during heli-arc welding was less than during stick welding.
3. During stick welding, the average total fume exposure was 2.5 mg/m³ (n=10) which was less than the IHG of 5 mg/m³. Two of the ten samples exceeded the IHG primarily because welding was performed for a full shift. The 95th Percentile was calculated to be 8 mg/m³. This data suggests that approximately 20% of the exposures exceed the IHG.
4. Based on the need to prevent acute toxicity from welding fumes, recommendations for respiratory protection and a flexible/adjustable local exhaust ventilation system were made.
5. It was recommended that Unit III management provide a portable welding screen to be installed in the welding shop to protect personnel working nearby from the ultra-violet radiation emitted from the welding process.
6. It is recommended that the Welder/Cs receive welding fume health hazards training and be informed of the results of this survey.

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