



Shell Oil Company • Shell Chemical Company
Interoffice Memorandum

720-1
PLAINTIFF'S EXHIBIT

SH-1203

SEPTEMBER 7, 1982

FROM: SENIOR INDUSTRIAL HYGIENIST
DEER PARK MANUFACTURING COMPLEX

TO: R. R. ERICKSON, SUPERINTENDENT, HEALTH & SAFETY
F. G. REITZ, MANAGER, SAFETY SOUTH
H. L. LEE, MANAGER, SAFETY NORTH
DEER PARK MANUFACTURING COMPLEX

SUBJECT: PROPOSED DPMC EXPOSURE GUIDELINES

The DPMC Industrial Hygiene Exposure Guidelines which we previously discussed are provided for your review (Attachment I). The plan is for this to be widely distributed to Safety Inspectors, TSO's, Supervisors, etc.

The basis for this document is Attachment II. A comparison between recommended levels is made. This document is not to be distributed as is Attachment I.

Attachment III highlights those chemicals where an OSHA value has not been adopted/applied. This listing is also for our use only.

Thanks,

Phil Snyder

P.J. Snyder

PJS/mh

Attachments

cc: M. T. Walsh
PJS Chron
ECB Satellite

LAM 000425

DPMC-16137

ATTACHMENT I

DPMC INDUSTRIAL HYGIENE EXPOSURE GUIDELINES

SEPTEMBER 1982

Basis

Acceptable levels of employee exposure to chemical substances have been established in recent years by various regulatory and scientific groups. This includes the Occupational Safety and Health Administration, (OSHA); the American Conference of Governmental Industrial Hygienists, (ACGIH); and the National Institute for Occupational Safety and Health (NIOSH). Recommendations on acceptable levels of employee exposure for individual chemical substances often vary between these groups due to 1) differences in data interpretation, or 2) a review of new health hazard information not previously considered. Where existing acceptable limits of exposure are determined to be inadequate, Shell may establish a Shell Internal Limit; for example, epichlorohydrin.

To provide an updated listing of recommended acceptable limits of employee exposure, the attached summary of "DPMC Exposure Guidelines" was prepared.

DPMC Exposure Guidelines represent target control levels for employee protection. At the minimum, precautionary workpractices, respiratory protection and where indicated protective clothing should be used to reduce exposure to or below the DPMC Exposure Guideline. For many chemical substances, two guidelines have been set 1) a short term @ 15 minutes and 2) an 8 hour TWA.

DPMC Exposure Guidelines reflect reasonably current health hazard and toxicological information and will be updated annually. DPMC Exposure Guidelines are as strict as those established by OSHA and incorporate Shell Internal Limits where these have been established. Guidelines have been established for those substances with greater exposure potential or in more frequent use.

Respiratory Protection

For each DPMC Exposure Guideline listed, the minimum type of respiratory protection recommended for use has been identified. Respirators affording a higher level of protection may be used if determined to be appropriate, e.g. a full-face mask may be used to avoid eye irritation instead of a half facepiece; an air supplied respirator may be used instead of a cartridge respirator, etc.

Protective Clothing

Certain chemical substances have the capacity to cause a toxic effect by being absorbed through the skin. This may occur with or without any local skin effect (reddening, rash, burn, etc). Of those substances which can be absorbed, the capacity or rate in which absorption will occur may vary significantly (slightly, moderately, readily absorbed). Each chemical substance reported to have this capacity has been identified on the listing of DPMC Exposure Guidelines. It is generally recommended that uncontaminated PVC gloves be used for protection against chemical substances which may be absorbed through the skin.

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ABBREVIATIONS USED

A.C.G.I.H.	American Conference of Governmental Industrial Hygienists - A professional standard setting organization.
T.W.A.	Time-Weighted Average - The usual term referred to for 8 hour exposures.
S.T.E.L.	Short Term Exposure Limit - Generally referred to as the upper exposure level allowed over a short duration.
E.N.T.	Eyes, Nose and Throat.
PPM	Parts Per Million (Volume/Volume) - Usually used for gases and vapors.
O.V.	Organic Vapor Cartridge - Black in color.
mg/m ³	Milligram dust per cubic meter of air (weight/volume).

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DPMC EXPOSURE GUIDELINES

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA
	TWA	STEL		SELECTION	AND COMMENTS
(Requirements)					
A Section					
Acetone	1000.0	-	ppm	Above 750 ppm & up to 2000 ppm half-face mask w/black dual organic vapor cartridge.	Mild E.N.T. irritant at conc. below 1000 ppm; may be narcosis producing above 1000 ppm.
Acetonitrile	40.0	60.0	ppm	Above 40 ppm & up to 400 ppm half-face mask w/yellow dual O.V. acid gas cartridge.	Colorless liquid. Acute toxicity due to cyanide, ether-like odor detected 40-50 ppm. <u>Skin absorption possible.</u> Possible respiratory tract effects. Hydrogen cyanide gas may be formed in a fire.
Acrolein	0.1	0.3	ppm	Above 0.1 ppm & up to 1 ppm full-face mask w/dual O.V. black cartridges.	Vapors extremely irritating at .3 - 1.0 ppm. <u>Skin absorption possible.</u>
Allyl Chloride	1.0	2.0	ppm	Above 1 ppm & up to 50 ppm half-face mask w/dual O.V. black cartridge.	Unpleasant pungent odor. Odor detected at 0.2 ppm. Possible liver and kidney effects.
Allyl Glycidyl Ether	5.0	10.0	ppm	Above 5 ppm & up to 50 ppm half-face mask w/black dual O.V. cartridge.	<u>Skin absorption possible.</u> Eye, nose, throat & resp. irritant.
Ammonia	25.0	35.0	ppm	Above 25 ppm & up to 250 ppm full-face mask w/green dual cartridge	Odor detected 1-5 ppm; marked E.N.T. irritant; irritating at 50 ppm. Skin burns may occur.

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DPMC EXPOSURE GUIDELINES

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DATA SUBSTANCE	DPMC TWA	GUIDELINES STEL	UNITS	MINIMUM RESPIRATOR SELECTION (Requirements)	HEALTH DATA AND COMMENTS
A Section (Cont'd)					
Aniline	2.0	5.0	ppm	Above 2 ppm & up to 50 ppm half-face mask w/dual O.V. black cartridge.	Skin absorption possible. Odor threshold 1.0 ppm. Causes blood effects, headaches, dizziness, etc.
Aluminum Metal Dust	10.0	-	mg/m ³	Disposable 3M 9900 mask for operations which may exceed 10 mg/m ³ .	Considered an inert or nuisance dust.
Asbestos	2.0	10.0	Fibers per cc	Disposable 3M 9900 dust mask for all exposure potential i.e. insulation removal, etc.	Recognized lung carcinogen.
Asphalt Fumes (mineral pitch, petroleum pitch, mixture of polycyclic aromatic and paraffinic hydrocarbons)	5.0	10.0	mg/m ³	Half-face mask w/dual black O.V. cartridge & dust covers for operations which may exceed 5 mg/m ³ .	Respiratory & skin irritant; contact can cause acne-like sores.
Acetophenone (Phenyl Methyl Ketone)	None Available			Full facepiece mask w/dual black O.V. cartridges for anticipated exposure to vapors of heated material.	Skin irritation, mild burns and transient eye injury possible. Persistent pleasant sweet, almond odor, colorless liquid. Low acute toxicity but potentially narcotic at high concentrations. Odor detection less than 1 ppm.

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DPMC EXPOSURE GUIDELINES

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA
	TWA	STEL		SELECTION	
(Requirements)					AND COMMENTS
<u>B Section</u>					
Bisphenol A(BPA)	10.0	-	mg/m³	Disposable 3M 9900 dust mask for operations which may exceed 10 mg/m³ i.e. drum loading.	Considered a nuisance dust; possible skin sensitization, irritation.
Benzene	-	10.0	ppm	Above 10 ppm & up to 50 ppm half-face mask with dual O.V. black cartridge.	Suspect human carcinogen; odor threshold 4-5 ppm.
1,3 Butadiene	1000.0	-	ppm	Above 1000 ppm & up to 2000 ppm half-face mask with red O.V. canister.	Moderate irritant eye, nose & throat Narcosis producing at high concentrations.
n-Butyl Alcohol	100.0	-	ppm	Above 100 ppm & up to 1000 ppm half-face mask with dual O.V. black cartridges.	<u>Skin absorption possible</u> ; odor threshold 10 ppm; reported effect on hearing ability.
sec-Butyl Alcohol	150.0	-	ppm	Above 150 ppm & up to 1000 ppm half-face mask w/dual O.V. black cartridges.	Some irritative & narcotic effects.
tert-Butyl Alcohol	100.0	150.0	ppm	Above 100 ppm & up to 1000 ppm half-face mask with dual O.V. black cartridges.	Narcotic effect (dizziness, headache).

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DPMC EXPOSURE GUIDELINES

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA
	TWA	STEL		SELECTION	
(Requirements)					
B Section (Cont'd)					
n-Butyl Glycidyl Ether (BGE)	25.0	-	ppm	Above 25 ppm & up to 250 ppm half-face mask w/dual O.V. black cartridges.	Sensitization possible. Alleged reproductive carcinogen and mutagenic effects. Irritant. Odor detected at .02 ppm. NIOSH recommends 4 ppm ceiling limit.
C Section					
Coal Tar Pitch Volative. (Benzene Soluble Fraction analyzed for specific PCAs)	0.2	-	mg/m³	Half-face mask w/dual black O.V. cartridge and dust covers for operations which may exceed .2 mg/m³.	Polycyclic Aromatic (PCA) containing; respiratory and skin irritant; possible cancer association.
Cadium Oxide Fume	-	0.05	mg/m³	Half-face mask with dual purple high efficiency filter cartridges or airline mask for all fume generating activities.	Kidney, lung and possible long-term chronic effect.
Carbon Monoxide	50.0	400.0	ppm	Air supplied respirators only.	Odorless chemical asphyxiant.
Catalyst Dust (Excluding toxic metals)	10.0	-	mg/m³	Disposable 3M 9900 dust mask w/goggles or full-face mask w/dual purple filter high efficiency cartridges or airline mask.	Long-term lung effects suspected
Chromium Fume (metal and insoluable salts as Cr)	0.5Cr III 0.05 CrVI	-	mg/m³	Half-face mask w/dual purple high efficiency cartridges or airline mask.	Chronic lung hazard.
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SUBSTANCE	DPMC GUIDELINES			MINIMUM RESPIRATOR SELECTION (Requirements)	HEALTH DATA AND COMMENTS
	TWA	STEL	UNITS		
C Section (Cont'd)					
Cobalt Fume or Dust (as Co)	0.05	0.1	mg/m³	Half-face mask w/dual purple filter high efficiency cartridge or airline mask.	Long term lung effects possible.
Copper Fume (as Cu)	0.1	-	mg/m³	Half-face mask w/dual purple high efficiency filter cartridge or airline mask.	Metal fume fever possible from fume, an irritant to the upper respirator tract.
Copper Dust (as Cu)	1.0	-	mg/m³	Disposable 3M 9900 dust mask.	Possible long term lung effects.
1,3 Cyclo- pentadiene	75.0	150.0	ppm	Above 75 ppm & up to 750 ppm half-face mask w/dual O.V. black cartridges.	Vapors irritating near 200 ppm.
Cresol	5.0	-	ppm	Above 5 ppm & up to 50 ppm full-face mask w/dual O.V. black cartridges.	<u>Skin absorption possible.</u> Dermal irritant. Toxicity similar to phenol.
Cumene	50.0	75.0	ppm	Above 50 ppm & up to 500 ppm half-face mask w/dual O.V. black cartridges.	<u>Skin absorption possible.</u> Narcotic and irritative effects possible.
Chlorine	-	1.0	ppm	Above 10 ppm & up to 100 ppm full-face mask w/orange & white can- ister. Air supplied mask for levels above 100 ppm or unknown concentrations.	Eyes, nose and throat irritant; pulmonary irri- tation.
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Chloroform	10.0	50.0	ppm	Above 10 ppm & up to 50 ppm half-face mask w/dual O.V. black cartridges.	Suspect cancer agent. Category "A" Embryo-Fetus hazard.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
C Section (Cont'd)					
Cyclohexane	300.0	375.0	ppm	Above 300 ppm & up to 1000 ppm half-face mask w/dual O.V. black cartridges.	Pungent odor detectable near 300 ppm. Skin, eye & respiratory irritant.
D Section					
Diacetone Alcohol	50.0	75.0	ppm	Above 50 ppm & up to 500 ppm half-face mask w/dual black O.V. cartridges.	Vapors irritating near 100 ppm. Narcotic effect possible.
1,3 Dichloropropene (D-D soil fumigant) CHCL = CH-CH ₂ CL	1.0	3.0/ 1 hr.	ppm	Above 1 ppm & up to 50 ppm half-face mask w/dual black O.V. cartridges.	Respiratory irritant, kidney & liver effects.
Dicyclopentadiene (DPCD)	5.0	-	ppm	Above 5 ppm & up to 50 ppm half-face mask w/dual black O.V. cartridges.	Disagreeable odor at 0.2 ppm and irritating below 10 ppm. Possible chronic effects.
Diethylamine	25.0	-	ppm	Above 25 ppm & up to 100 ppm half-face mask w/dual green AM cartridges.	Eye and upper respiratory tract irritant. Odor detected at 0.05 ppm.
Diethylenetriamine	1.0	-	ppm	Above 1 ppm & up to 50 ppm full-face mask w/dual green AM cartridges.	<u>Skin absorption possible.</u> Eye and respiratory irritation.
Diethanolamine	3.0	-	ppm	Above 3 ppm & up to 50 ppm full-face mask w/dual green AM cartridges.	Colorless, liquid with slight ammonia odor; may cause irritation to E.N.T.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
<u>D Section (Cont'd)</u>					
Diglycidyl Ether	-	0.5	ppm	Supplied air respirator <u>only</u> for all exposure potential which may exceed 0.5 ppm.	Causes CNS depression, severe eye irritant. Odor threshold is above 5 ppm.
<u>E Section</u>					
Epichlorohydrin	1.0	3.0	ppm	Above 1 ppm & up to 50 ppm full-face mask w/ dual black O.V. cartridges.	<u>Skin absorption possible.</u> Suspect human carcinogen.
Ethanolamine	3.0	6.0	ppm	Above 3 ppm & up to 50 ppm full-face mask w/ dual green AM cartridges.	Acute systemic toxicity. Odor threshold 3-4ppm. Irritant to skin & eyes. CNS stimulant.
Ethyl Alcohol	1000.0	-	ppm	Above 1000 ppm & up to 2000 ppm half-face mask w/red type N canister mask.	Narcotic effects above guideline.
Ethyl Chloride	1000.0	-	ppm	Above 1000 ppm & up to 2000 ppm half-face mask w/red type N canister.	Narcotic effects above guideline.
Ethylene Glycol m-Butyl Ether (Butyl Oxitol)	50.0	150.0	ppm	Above 50 ppm & up to 500 ppm half-face mask w/dual O.V. black cartridges.	<u>Skin absorption possible.</u> Irritation and acute systemic effects possible.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
E Section (Cont'd)					
Ethylene Dichloride	10.0	15.0	ppm	Above 10 ppm & up to 50 ppm an airline respirator for VCM & EDC. Half-face mask w/dual O.V. black cartridges permitted for exposures involving only EDC.	<u>Skin absorption possible.</u> Toxic to liver, narcotic effects, suspect carcinogen. "A" category embryo-fetus hazard.
Ethylene Glycol m-Ethyl Ether (Ethyl Oxitol, or 2-Ethoxyethanol)	5.0	15.0	ppm	Above 5 ppm & up to 50 ppm half-face mask w/dual O.V. black cartridges.	<u>Skin absorption possible.</u> Acute systemic toxicity suspect Embryo-fetus hazard.
Ethylene Glycol m-Methyl Ether (Methyl Oxitol)	5.0	15.0	ppm	Above 5 ppm & up to 50 ppm half-face mask w/ dual O.V. black cartridges.	<u>Skin absorption possible.</u> Acute systemic toxicity.
G Section					
Gasoline (Bulk Handling)	300.0	500.0	ppm	Above 500 ppm & up to 1000 ppm half-face mask w/dual O.V. black cartridges.	Anesthetic effects above guideline; irritating to mucous membranes.
H Section					
Hydroquinone	2.0	4.0	mg/m ³	Disposable 3M 9920 dust mask for operations which may reasonably exceed 2 mg/m ³ .	White crystals; may cause dermatitis, sensitization, eye injury and systemic toxicity.
n-Heptane	500.0	-	ppm	Above 500 ppm & up to 1000 ppm half-face mask w/black O.V. cartridges.	Narcosis producing at high concentrations.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
<u>H Section (Cont'd)</u>					
n-Hexane	50.0	100.0	ppm	Above 50 ppm & up to 500 ppm half-face mask w/black O.V. cartridge.	Polyneuropathy & narcosis effects.
Hydrazine	0.1	1.0	ppm	Above 0.1 ppm & up to 10 ppm half-face mask w/green AM cartridges.	<u>Skin absorption possible</u> ; respiratory irritant; suspect cancer hazard, "A" category Embryo-Fetus hazard.
Hydrogen Chloride	-	5.0	ppm	Above 5 ppm & up to 50 ppm full-face mask w/dual white chlorine cartridges.	Eyes, nose, and respiratory irritant.
Hydrogen Sulfide	10.0	20.0	ppm	Air supplied respirator for exposure potential above 500 ppm. Canister mask type or type GMC-SS-1 for 10-500 ppm, and escape.	Marked irritant to eyes, lung; loss of smell, highly toxic.
<u>I Section</u>					
Inorganic Lead Dust and Fume (as Pb)	0.05	-	mg/m ³	Half-face mask w/dual purple dust filter cartridges, disposable 3M 9920 dust mask or airline mask.	Chronic toxicity from inhalation or ingestion. Good personal hygiene required. OSHA action level is 0.03 mg/m ³ .
Iron Oxide (as Fe)	10.0	-	mg/m ³	Disposable 3M 9900 dust mask for operations which may exceed 5 mg/m ³ .	Long term minor lung hazard.
Isopropyl Alcohol	400.0	-	ppm	Above 400 ppm & up to 1000 ppm half-face mask w/black O.V. cartridges.	<u>Skin absorption possible</u> .

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
I Section (Cont'd)					
Isoprene (2 Methyl, 1-3 Butadiene)	None Available		ppm	Full facepiece mask w/black O.V. cartridges. For protection against odor or if irritation occurs.	Vapors irritating to eyes, nose and throat.
Isopropyl Ether	250	310	ppm	Above 250 ppm & up to 1000 ppm half-face mask w/black O.V. cartridges.	More toxic than ethyl ether. Vapor irritating above 250 ppm.
M Section					
Magnesium Oxide Fume (as Mg)	10.0	-	mg/m ³	Half-face mask w/dual purple filter cartridge or airline mask.	Long term minor lung hazard.
Manganese (as Mn) Fume or Dust	1.0	3.0	mg/m ³	Half-face mask w/dual purple filter cartridge or airline mask.	Central nervous system disorders.
Mesityl Oxide	25.0	-	ppm	Above 25 ppm & up to 250 ppm half-face mask w/ black cartridges.	Irritating above 25 ppm, more toxic than other ketones. Causes narcosis and systemic injury.
Methyl Ethyl Ketone	200.0	-	ppm	Above 200 ppm & up to 1000 ppm half-face mask w/dual black O.V. cartridges.	Irritant to eyes, nose and throat. Narcosis produc- ing.
Methyl Isobutyl Carbinol	25.0	40.0	ppm	Above 25 ppm & up to 250 ppm full-face mask with dual black O.V. cartridges.	Skin absorption possible. Eye & skin irritant.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
M Section (Cont'd)					
Methyl Isobutyl Ketone	100.0	-	ppm	Above 50 ppm & up to 1000 ppm half-face mask w/dual black O.V. cartridges.	Irritation to eyes, nose and throat; Narcosis producing.
Methyl Mercaptan	-	10.0	ppm	Air supplied respirator <u>only</u> for all exposure potential.	Toxicity similar to but less than hydrogen sulfide but odor less tolerable.
Methacrylic Acid	20.0	-	ppm	Above 30 ppm & up to 200 ppm full-face mask w/ dual black O.V. cartridges.	Corrosive to skin & eyes sensi- tization possible.
Molybdenum (as Mo) Soluble	5.0	10.0	mg/m³	Disposable 3M 9900 dust mask or half-face mask with dual purple dust cartridges for catalyst handling.	Long term lung effects possible
N Section					
Naphthalene	10.0	15.0	ppm	Above 10 ppm & up to 50 ppm full-face dual black O.V. cartridges.	Eye irritant and narcotic effects possible at high concentrations.
Nickel (Insoluable Fume or Dust)	1.0	-	mg/m³	Half-face mask w/dual purple cartridges for all exposure potential.	Suspect lung cancer agent.
Nickel Catalyst Dust	1.0	-	mg/m³	Disposable 3M 9900 dust mask or full-face mask with dual purple dust cartridges or airline respirator for catalyst handling.	Suspect lung cancer agent.

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DPMC EXPOSURE GUIDELINES

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA
	TWA	STEL		SELECTION	
(Requirements)					
N Section (Cont'd)					
Nickel Carbonyl, (as Ni)	0.001	-	ppm	Air supplied respirator <u>only</u> for all exposure potential.	Suspect lung cancer agent; high concentra- tions may cause pulmonary edema. Delayed respira- tory system effects possible.
O Section					
Ozone	0.1	0.3	ppm	Air supplied respirator only.	Lethal gas at low concentrations, odor threshold est. 2 ppm.
Organic Lead (Tetra Ethyl or Tetra Methyl)	.075	-	mg/m ³	Half-face mask w/dual purple dust cartridges for all exposure potential.	<u>Skin absorption possible.</u>
P Section					
Pentane	1000.0	1000.0	ppm	Above 1000 ppm & up to 2000 ppm full-face mask w/red canister.	Irritant to eyes, respiratory sys- tem, CNS depres- sant.
Phenol	5.0	-	ppm	Above 5 ppm & up to 50 ppm full-face mask w/dual black O.V. cartridges.	<u>Skin absorption possible.</u> Odor threshold .047 ppm. Skin burns and systemic toxicity possible.
Phenyl Glycidyl Ether	10.0	15.0	ppm	Above 10 ppm & up to 50 ppm full-face mask w/dual black O.V. cartridges.	May cause Central Nervous System depression. Skin & eye irritant.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
<u>S Section</u>					
Styrene, Monomer	100.0	200.0	ppm	Above 100 ppm & up to 500 ppm half-face mask w/dual black O.V. cartridges.	Odor threshold 0.047 - 0.1 ppm. Eyes, nose and respiratory irritant. CNS depressant.
Sulfur Dioxide	2.0	5.0	ppm	Above 5 ppm & up to 50 ppm half-face mask w/ dual white cartridges.	Colorless with strong suf-focating odor. Respiratory irritant.
Sulfuric Acid Mist	1.0	-	mg/m ³	Full-face mask w/dual white AG cartridges w/dust covers above 1 mg/m ³ .	Eyes, nose, throat and pulmonary irritation.
<u>T Section</u>					
Titanium Fume/Dust	10.0	-	mg/m ³	Disposable 3M 9920 dust mask for operations which may exceed 10 mg/m ³ .	Considered a nuisance dust hazard.
Toluene	100.0	150.0	ppm	Above 1000 ppm & up to 1000 ppm half-face mask with black O.V. cartridges.	<u>Skin absorption possible.</u> E.N.T. irritant. Odor threshold approx. 2 ppm. "A" category Embryo-Fetus hazard.
Trichloroethylene	100.0	150.0	ppm	Above 50 ppm & up to 1000 ppm half-face mask w/black O.V. cartridges.	Chronic liver hazard, narcotic effects.

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA AND COMMENTS
	TWA	STEL		SELECTION (Requirements)	
T Section (Cont'd)					
Total (Nuisance Dust)	10.0	-	mg/m ³	Disposable 3M 9900 Dust mask for operations which may exceed 10 mg/m ³ .	Long term lung effects suspected.
1,2,3-Trichloro-propane	5.0	7.5	ppm	Above 5 ppm & up to 50 ppm full face mask with black O.V. cartridges.	Chloroform odor colorless, liquid, irritant, mild skin sensitizer.
Teflon (FEP) Welding Fumes (Fluoroethylene-propylene)	No Detectable Level Permitted			Air supplied respirators <u>only</u> for all exposure potential.	Respiratory irritation. FEP decomposes to Hydrogen Fluoride.
V Section					
Vanadium (Fume)	0.05 (as V)	-	mg/m ³	Half-face mask w/dual purple filter cartridge or airline mask.	Oxides of Vanadium are acutely toxic possibly resulting in delayed respiratory system effects.
Vinyl Chloride Monomer	1.0	5.0	ppm	Air supplied respirator only for all exposure potential.	Suspect human carcinogen. "A" category Embryo-Fetus hazard.
W Section					
Welding Fume	5.0	-	mg/m ³	Half-face mask w/dual purple cartridges or or airline welding mask or 3M 9920 mask for welding in enclosed areas or in areas with poor ventilation.	Metal fume fever from galvanized metal; possible long term lung effects.

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DPMC EXPOSURE GUIDELINES

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SUBSTANCE	DPMC GUIDELINES		UNITS	MINIMUM RESPIRATOR	HEALTH DATA
	TWA	STEL		SELECTION	
(Requirements)					
-					
<u>X Section</u>					
Xylene	100.0	150.0	ppm	Above 100 ppm & up to 1000 ppm half-face mask w/dual black O.V. cartridges.	<u>Skin absorption possible.</u> "A" category Embryo-Fetus-hazard.
<u>Z Section</u>					
Zinc Oxide Fume	5.0	-	mg/m ³	Half-face mask w/dual purple filter cartridge or airline mask which may exceed 5 mg/m ³ i.e. welding in confined spaces.	Metal fume fever from inhalation of fumes.

LAM 000442

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ATTACHMENT II

SHELL DEER PARK MANUFACTURING COMPLEX EXPOSURE GUIDELINES

<u>SUBSTANCE</u>	<u>OSHA</u>		<u>1981 ACGIH</u>		<u>SHELL DPMC GUIDELINES</u>		<u>UNITS</u>
	<u>PEL-TWA</u>	<u>PEL-CEILING</u>	<u>TLV-TWA</u>	<u>TLV-STEL</u>	<u>TWA</u>	<u>STEL</u>	
Acetone	1,000.0	-	750.0	1,000.0	1,000.0	-	ppm
Acetonitrile	40.0	-	40.0	60.0	40.0	60.0	ppm
Acrolein	0.1	-	0.1	0.3	0.1	0.3	ppm
Allyl Chloride	1.0	-	1.0	2.0	1.0	2.0	ppm
Allyl Glycidyl Ether	-	10.0	5.0	10.0	5.0	10.0	ppm
Aluminum Metal Dust Fume	15.0	-	10.0	20.0	10.0	-	mg/m ³
	-	-	5.0	-	5.0	-	mg/m ³
Ammonia	50.0	-	25.0	35.0	25.0	35.0	ppm
Aniline	5.0	-	2.0	5.0	2.0	5.0	ppm
Asbestos	2.0	10.0	2.0	-	2.0	10.0	f/cc
Asphalt Fumes	-	-	5.0	10.0	5.0	10.0	mg/m ³
Acetophenone (Phenyl Methyl Ketone)	-	-	-	-	-	-	-

LAM 000443

SUBSTANCE	OSHA		1981 ACGIH		SHELL DPMC GUIDELINES		UNITS
	PEL-TWA	PEL-CEILING	TLV-TWA	TLV-STEL	TWA	STEL	
Bisphenol A (BPA)	-	-	See Total Nuisance Dust	-	10.0 (total weight)	-	mg/m ³
Butyl Oxide	-	-	-	-	50.0	-	ppm
Benzene	10.0	25.0	10.0	25.0	-	10.0	ppm
1,3-Butadiene	1,000.0	-	1,000.0	1,250.0	1,000.0	-	ppm
n-Butyl Alcohol	100.0	-	-	50.0	100.0	-	ppm
tert-Butyl Alcohol	100.0	-	100.0	150.0	100.0	150.0	ppm
sec-Butyl Alcohol	150.0	-	150.0	-	150.0	-	ppm
n-Butyl Glycidyl Ether (BGE)	50.0	-	25.0	-	25.0	-	ppm
Butyl Oxitol (Ethylene Glycol m-Butyl Ether)	50.0	-	50.0	150.0	50.0	150.0	ppm
Coal Tar Pitch Volatile (Benzene Soluble Fraction analyzed for specific PCAs)	0.2	-	-	-	0.2	-	mg/m ³
Cadmium Oxide Fume	0.1	0.3	-	0.05	-	0.05	mg/m ³

LAM 000444

SUBSTANCE	OSHA		1981 ACGIH		SHELL DPMC GUIDELINES		UNITS
	PEL-TWA	PEL-CEILING	TLV-TWA	TLV-STEL	TWA	STEL	
Catalyst Dust	See Total Nuisance Dust	-	-	-	10.0	-	mg/m ³
Carbon Monoxide	50.0	-	50.0	400.0	50.0	400.0	ppm
Chlorine	-	1.0	1.0	3.0	-	1.0	ppm
Chloroform	50(c)	-	10.0	50.0	10.0	50.0	ppm
Chromium Fume (Metal and insoluble salts as Cr)	1.0 -	- -	0.5 CrIII 0.05 CrVI	- -	0.5 CrIII 0.5 CrVI	- -	mg/m ³ mg/m ³
Cobalt Fume or Dust (as Co)	0.1	-	0.05	0.1	0.05	0.10	mg/m ³
Copper Fume (as Cu) Dust (as Cu)	0.1 1.0	- -	0.2 1.0	- -	0.1 1.0	- -	mg/m ³ mg/m ³
-resol	5.0	-	5.0	-	5.0	-	ppm
Cumene	50.0	-	50.0	75.0	50.0	75.0	ppm
Cyclohexane	300.0	-	300.0	375.0	300.0	375.0	ppm
1,3-Cyclopentadiene	75.0	-	75.0	150.0	75.0	150.0	ppm

LAM 000445

DPMC-16157

SUBSTANCE	OSHA		1981 ACGIH		SHELL DPMC GUIDELINES		UNITS
	PEL-TWA	PEL-CEILING	TLV-TWA	TLV-STEL	TWA	STEL	
Diacetone Alcohol	50.0	-	50.0	75.0	50.0	75.0	ppm
1,3-Dichloropropene (D-D soil fumigant) CHCL = DH-CH ₂ CL	-	-	1.0	10.0	1.0	3.0(1Hr)	ppm
1,2-Dichloropentadiene (DPCD)	-	-	5.0	-	5.0	-	ppm
Diethanolamine	-	-	-	-	3.0	-	ppm
Diethylamine	25.0	-	10.0	25.0	25.0	-	ppm
Diethylenetriamine	-	-	1.0	-	1.0	-	ppm
Diglycidyl Ether	-	0.5	-	0.5	-	0.5	ppm
Dichlorohydrin	5.0	-	2.0	5.0	1.0	3.0	ppm
Ethanolamine	3.0	-	3.0	6.0	3.0	6.0	ppm
Ethyl Alcohol	1,000.0	-	1,000.0	-	1,000.0	-	ppm
Ethyl Chloride	1,000.0	-	1,000.0	1,250.0	1,000.0	-	ppm
Ethylene Dichloride	50.0	100.0	10.0	15.0	10.0	15.0	ppm

LAM 000446

DPMC-16158

SUBSTANCE	OSHA		1981 ACGIH		SHELL DPMC GUIDELINES		UNITS
	PEL-TWA	PEL-CEILING	TLV-TWA	TLV-STEL	TWA	STEL	
Ethyl Oxitol (Ethylene Glycol m-Ethyl Ether)	200.0	-	5.0	-	5.0	15.0	ppm
Gasoline (Bulk Handling)	-	-	300.0	500.0	300.0	500.0	ppm
Hydroquinone	2.0	-	2.0	4.0	2.0	4.0	mg/m ³
n-Heptane	500.0	-	400.0	500.0	500.0	-	ppm
n-Hexane	500.0	-	50.0	-	50.0	100.0	ppm
Hydrazine	1.0	-	0.1	-	0.1	1.0	ppm
Hydrogen Chloride	-	5.0	-	5.0	-	5.0	ppm
Hydrogen Sulfide	-	20.0	10.0	15.0	10.0	20.0	ppm
Inorganic Lead Dust and Fume (as Pb)	0.05	-	0.15	0.45	0.05	-	mg/m ³
Iron Oxide (as Fe)	10.0	-	5.0	10.0	10.0	-	mg/m ³
Isoprene (2 Methyl, 1-3 Butadiene)	----- None Available -----						
Isopropyl Alcohol	400.0	-	400.0	500.0	400.0	-	ppm

LAM 000447

DPMC-16159

SUBSTANCE	OSHA		1981 ACGIH		SHELL DPMC GUIDELINES		UNITS
	PEL-TWA	PEL-CEILING	TLV-TWA	TLV-STEL	TWA	STEL	
Isopropyl Ether	500.0	-	250.0	310.0	250.0	310.0	ppm
Magnesium Oxide Fume (as Mg)	15.0	-	10.0	-	10.0	-	mg/m ³
Manganese (as Mn) fume or dust	-	5.0	1.0	3.0	1.0	3.0	mg/m ³
Mesityl Oxide	25.0	-	25.0	-	25.0	-	ppm
Methyl Ethyl Ketone	200.0	-	200.0	300.0	200.0	-	ppm
Methyl Isobutyl Carbinol	25.0	-	25.0	40.0	25.0	40.0	ppm
Methyl Isobutyl Ketone	100.0	-	50.0	75.0	100.0	-	ppm
Methyl Mercaptan	-	10.0	0.5	-	-	10.0	ppm
Methyl Oxitol (Ethylene Glycol m-Methyl Ether)	25.0	-	5.0	-	5.0	15.0	ppm
Methacrylic Acid	-	-	20.0 Rohm & Haas	- 5.0	20.0	-	ppm
Molybdenum (as Mo soluble)	5.0	-	5.0	10.0	5.0	10.0	ppm
Naphthalene	10.0	-	10.0	15.0	10.0	15.0	ppm

LAM 000448

SUBSTANCE	OSHA		1981 ACGIH		SHELL DPMC GUIDELINES		UNITS
	PEL-TWA	PEL-CEILING	TLV-TWA	TLV-STEL	TWA	STEL	
Nickel Carbonyl	0.001	-	0.05 (as Ni)	0.35	0.001	-	ppm
Nickel (insoluble) fume or dust	1.0	-	1.0	-	1.0	-	mg/m ³
Ozone	0.1	-	0.1	0.3	0.1	0.3	ppm
Organic Lead	0.075	-	TEL 0.1 TML 0.15	0.3 0.5	0.075	-	mg/m ³
Pentane	1,000.0	-	1,000.0	-	1,000.0	1,000.0	ppm
Phenol	5.0	-	10.0	15.0	5.0	-	ppm
Phenyl Glycidyl Ether	10.0	-	1.0	-	10.0	15.0	ppm
Polycyrene, Monomer	100.0	200.0	50.0	100.0	100.0	200.0	ppm
Sulfur Dioxide	5.0	-	2.0	5.0	2.0	5.0	ppm
Sulfuric Acid Mist	1.0	-	1.0	-	1.0	-	mg/m ³
Titanium Fume or Dust	15.0	-	-	-	10.0	-	mg/m ³
Toluene	200.0	300.0	100.0	150.0	100.0	150.0	ppm

LAM 000449

DPMC-16161

<u>SUBSTANCE</u>	<u>OSHA</u>		<u>1981 ACGIH</u>		<u>SHELL DPMC GUIDELINES</u>		<u>UNITS</u>
	<u>PEL-TWA</u>	<u>PEL-CEILING</u>	<u>TLV-TWA</u>	<u>TLV-STEL</u>	<u>TWA</u>	<u>STEL</u>	
Total (Nuisance) Dust	15.0	-	10.0	-	10.0	-	mg/m ³
Total Welding Fume	15.0	-	5.0	-	5.0 inside hood 10.0 outside hood		mg/m ³ mg/m ³
Trichloroethylene	100.0	200.0	50.0	150.0	100.0	150.0	ppm
1,2,3-Trichloropropane	-	-	50.0	75.0	5.0 (Tentative Guideline)	7.5	ppm
Teflon (FEP Welding Fumes) (Fluoroethylene Propylene)	----- No Detectable Level Permitted -----						
Vanadium Fume	-	0.1 (as V ₂ O ₅)	-	.05 (as V)	0.05 (as V)	-	mg/m ³
Vinyl Chloride Monomer	1.0	5.0	5.0	10.0	1.0	5.0	ppm
ylene	100.0	-	100.0	150.0	100.0	150.0	ppm
Zinc Oxide Fume	5.0	-	5.0	-	5.0	-	mg/m ³

PJS/07
8/16/82

LAM 000450

DPMC-16162

ATTACHMENT III

CHEMICAL SUBSTANCES ASSIGNED PERMISSIBLE EXPOSURE
LIMITS (PELS) OTHER THAN THAT REQUIRED BY OSHA

<u>Chemical Name</u>	<u>Basis of Selection of Permissible Exposure Limit</u>
Allyl Glycidyl Ether	OSHA TWA value not available
Aluminum Metal Dust or Fume	Adjusted to be consistent with Total Nuisance Dust
Ammonia	Irritation at OSHA PEL
Aniline	Increased margin of safety for toxicity
Asphalt Fumes	OSHA TWA value not available
Bisphenol A (BPA)	OSHA TWA value not available
Butyl Oxide	OSHA TWA value not available
Benzene	DPMC internal guideline
n-Butyl Glycidyl Ether (BGE)	OSHA PEL reflects irritation effect only
Cadmium Oxide Fume	OSHA PEL does not reflect all chronic effects
Chloroform	OSHA PEL does not reflect all chronic effects
Chromium Fume	OSHA PEL does not reflect all chronic effects
Cobalt Fume or Dust	Effects at OSHA PEL have been reported
1,3-Dichloropropene	OSHA TWA value not available
Dicyclopentadiene (DPCD)	OSHA TWA value not available
Diethanolmine	OSHA TWA value not available
Diethylenetriamine	OSHA TWA value not available
Epichlorohydrin	Internal Shell limit
Ethylene Dichloride	OSHA PEL does not reflect all suspect chronic effects
Ethyl Oxitol (Ethylene Glycol m-Ethyl Ether)	Shell internal guideline

LAM 000451

<u>Chemical Name</u>	<u>Basis of Selection of Permissible Exposure Limit</u>
Gasoline (Bulk Handling)	OSHA TWA value not available
n-Hexane	OSHA PEL does not reflect all suspect chronic effects
Hydrazine	OSHA PEL does not reflect all suspect chronic effects
Hydrogen Sulfide	OSHA TWA value not available
Isopropyl Ether	Irritation at OSHA PEL
Magnesium Oxide Fume (as Mg)	Adjusted to be consistent with Total Nuisance Dust
Manganese Fume or Dust (as Mn)	OSHA TWA value not available
Methyl Oxitol (Ethylene Glycol m-Methyl Ether)	Shell internal guideline
Methacrylic Acid	OSHA TWA value not available
Titanium Fume or Dust	Adjusted to be consistent with Total Nuisance Dust
Toluene	Toxic effects reported at OSHA PEL
Total Nuisance Dust	Recommended value for low hazard dusts
Total Welding Fume	OSHA TWA value not available
1,2,3-Trichloropropane	OSHA TWA value not available
Teflon	No OSHA value not available
Vanadium Fume	OSHA value does not reflect all toxic effects

LAM 000452

DPMC-16164