Inter Office

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Subject: Carcinogens Task Force Report to E&R and M&S Subcommittees

The Task Force on Carcinogens in the Workplace was established by joint action of the E&R and M&S Subcommittees, with representation from affected line and staff activities. The Task Force was chartered to coordinate plans and efforts to identify and quantify carcinogenic substances in use; to develop action plans, take aggressive steps and set targets for elimination of as many carcinogens as possible; and to organize to identify substances systematically.

The Task Force will present its report to the Subcommittees on May 27, 1980.

Attached is a draft of the report. Your comments are requested by May 9, 1980, so that we may meet the timing of the several pre-reviews scheduled.

G. O. Keutgen

Attachment

EXECUTIVE SUMMARY

CARCINOGENS IN THE WORKPLACE

Introduction

The Task Force on Carcinogens in the Workplace was established by the Engineering and Research and Manufacturing and Supply Subcommittees to identify carcinogens and quantities in use, set targets for elimination ahead of regulation, take steps to find substitutes, develop a directive and workplan and organize to identify substances systematically. The Task Force assignment responded to evidence that cancer may be a serious occupational concern and to the Company's and public concern with regard to protection of the environment and public health. Additionally, the Company has been subjected to a growing number of laws which regulate material use, transport, handling and disposal. In summary, internal and external pressures regarding hazardous substance control and compliance have increased substantially since March, 1977, when Directive B-101 assigned responsibilities within the Company.

Past Company Actions

Since 1977, the Company has removed lead chromates and molybdates from paint (except special order), "Tris" flame retardant from fabrics and instituted controls on asbestos, including a Vehicle Engineering directive that newly designed components should not contain asbestos (documented exceptions must be encapsulated or resin coated).

Sprayed-on fireproofing has been asbestos-free since 1969 for new and reworked construction. Several manufacturing standards prohibit asbestos as a constituent. Benzene exposure has been reduced or eliminated at San Jose and Central Laboratories since 1978. Ventilation was increased at Romeo to minimize hazards from paint-related chromium compounds.

Carcinogenic Substances

The Task Force has identified sixty-seven (67) carcinogens in use in the automotive industry. Twenty-six (26) of those are currently regulated byOSHA; the balance have been proposed for new regulation. More restrictive standards have been proposed for some of those substances currently regulated. Thirty-one (31) substances are reported to the Michigan Department of Natural Resources for computation of water surveillance fees. Michigan plants used 1.3 million pounds of the twelve (12) carcinogens on the MDNR list. The largest use was 641 thousand pounds of acrylonitrile at the PPV Paint Plant. Similar data is not currently required to be reported in the other states. The list of carcinogens was prioritized by the Task Force according to impact on the Company to identify the top eight (8). The top three of the eight priority substances, asbestos, chromium compounds and benzene, were examined in detail.

- Asbestos is used by the Company primarily in vehicle brakes, clutches, gaskets and for nonproduction roofing, millboard and core/mold-making materials. Medical evidence links inhalation of asbestos dust to lung cancer, mesothelioma and other diseases. The present OSHA limit is 2 fibers per cc of air (2 million fibers per cubic meter) which is proposed to be reduced to 0.1 f/cc as early as this year.

- Chromium compounds are used primarily in paints and inks for production and nonproduction use. Medical evidence links hexavalent chromium compounds to lung cancer, liver and kidney damage and other diseases. The present OSHA limit is 52 mg per m^3 of air which is proposed to be reduced to 1 mg/m^3.

- Benzene occurs primarily in coke oven operations as a by-product. It is a residual constituent of solvents, primers, adhesives, lubricating oils, fuels and hydraulic fluids. Medical evidence links inhalation and contact with benzene to leukemia, blood disorders and other diseases. OSHA has proposed a limit of 1 ppm in air time weighted average in 8 hours.

Specific lists of bulk materials and parts for production and nonproduction use have been developed. A new computer data base is being developed, Materials and Toxicology System (MATS), which links health, engineering, and manufacturing data bases to facilitate rapid identification of carcinogen applications (2nd quarter 1981). The engineering release system has been audited and is being updated to extend materials identification to all parts. Product Engineering Procedure PEP 3-189 has been rewritten to require systematic review of suspect carcinogens and input to the data base.

Strategy and Workplan

The search for asbestos, chromium compounds and benzene defined the number of parts and materials containing these substances as listed in the table below. Where possible, the applications were divided into three groups: A - Known substitute material without major redesign, B - Known substitute material with major redesign and C - No known substitute or advanced engineering required. The data is directional only. There remain many suspect applications which require time-consuming analyses for identification.

	Bulk Materials and Parts							
	Production				Nonproduction			
	A	B	C	Total	A	B	C	Total
Asbestos	34	49	22	105	8	-	-	8
Chromium Compounds	-	-	25	25	98	81	34	213
Benzene	-	-	15	15	3	-	5	8

Strategies have been formulated to eliminate or control these substances. The recommended strategy is to proceed now to eliminate these three carcinogens by Job #1, 1985, in light of competitive and regulatory pressures, and Company experience. Where elimination cannot be contained, institute controls on design, process and exposure. It is judged that the elimination timetable is practical for Group A asbestos, chromium compounds and benzene-containing parts and materials. For those applications requiring major redesign (Group B, e.g., drum brake linings) the elimination timetable would have to be adjusted to reflect Company cycle plans although G.M. has stated an intent to eliminate asbestos by 1985. Finally, where no known substitute exists (Group C), advanced engineering will have to be completed before a elimination timetable can be established.

A generalized workplan has been prepared on the basis of the evaluation of the carcinogens already referred to. The workplan requires central program management, with action implementation by NAAO/DPO Product Engineering Offices, Purchasing activities, Vehicle activities and the Manufacturing and Supply Staffs. It is judged that approximately a year is required to complete the sorting of the three carcinogens into the known substitute, major redesign and advanced project groups. It is judged that one additional year would be required to implement the most feasible product actions not requiring major redesign. Substitution requiring redesign would take 33 months for vehicle or major powertrain programs.

Recommendations

Achievement of the recommended strategy requires an integrated approach throughout the Company and a sustained effort over a number of years. The Task Force recommends:

1. Establish a Hazardous Substance Control Committee chaired by Environmental and Safety Engineering Staff. The Task Force would be discontinued.
2. Assign Carcinogen Program manager control responsibility to Environmental and Safety Engineering Staff.
3. Request Environmental and Safety Staff to establish carcinogen elimination timetables for the 67 known carcinogens for review and approval by the subcommittees. (The Task Force has requested General Managers and Chief Engineers to recommend directional timetables.)
4. Direct all affected organizations to proceed with the elimination of Group A asbestos, chromium compounds and benzene for Job #1, 1985.
5. Request that NAAO Product Engineering Offices and Manufacturing Staff present to the subcommittee specific action plans and timing for the Group A applications identified.
6. Provide advance program funding to develop designs and/or materials for new parts to identify reliability, cost and weight implications of alternative designs (Group C).
7. Adopt as the Company carcinogen listing the 67 current OSHA-regulated and proposed Category I substances. Establish the top eight priorities proposed by the Task Force as Company priorities.

Engineering Staff - E&RS
Manufacturing Staff
May 2, 1980

D R A F T

ENGINEERING AND RESEARCH SUBCOMMITTEE

MANUFACTURING AND SUPPLY SUBCOMMITTEE

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CARCINOGENS IN THE WORKPLACE

TASK FORCE REPORT - MAY 27, 1980

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- Task Force Charter

Carcinogenic Substances

- Prioritized by consensus
- Asbestos, chromium, benzene
- Asbestos Summary
- Chromium Summary
- Benzene Summary
- Carcinogen Search
  - List specs. and parts
  - Identify items having no substitutes
  - Identify substitutable items
    - Eliminate when redesigned or reordered
  - Develop substitutes for others (advance engrg. funding)
- MATS
- Carcinogen Search Results
- Carcinogen strategies
- Generalized Workplan
- Proposed Chemical Substances Control
- Proposed Priority Actions

Exhibits

- List of "67" Carcinogens
- MATS

Appendices

- Asbestos-containing parts and materials
- Chromium-containing parts and materials
- Benzene-containing parts and materials

CARCINOGENS IN THE WORKPLACE

Introduction

The Task Force on Carcinogens in the Workplace was established during the 4th quarter, 1979 by joint action of the E&R and M&S Subcommittees. The Task Force Charter was to coordinate plans and efforts among Company activities, to identify carcinogens in use, and eliminate or control them in future products and manufacturing operations. Task Force findings and recommendations are summarized in the following pages. Detailed determinations and other relevant data are presented in the Exhibits and Appendices.

Background

Scientific investigations into the occupational factors involved in the development of cancer, conducted in recent years, have provided evidence that occupational related cancer is a serious concern. It has been estimated that in coming decades up to 20% and perhaps as much as 40% of cancer in the U.S. might be associated with occupational factors.[a] Accordingly, Personnel and Organization Staff, Employe Health Services, has exerted a continuing effort to provide employe protection, as knowledge of toxic/hazardous materials has been introduced.

Public concerns relating to the control of toxic/hazardous materials, are shared by Ford, due to the Company's regard for public health and the protection of the environment and potential impact of legislation on our products and manufacturing operations. Also, the right to examine the Hazardous Materials Catalog from the Company's computer file of hazardous materials, and on-line access to the Materials and Toxicology System (MATS) has been extended to the UAW by contract.

Resolution of workplace exposure concerns relating to the management of toxic/hazardous substances, materials, and wastes, involves a consideration of the relationship between the internal and external environments. Emphasis on wastewater pretreatment standards, toxic pollutant effluent standards, nonregulated/hazardous air pollutant emissions control and solid/hazardous waste management has been increased by governmental authority. These factors reinforce the desirability of reducing the amount of residuals generated by Company manufacturing processes and operations, through more efficient manufacturing techniques as well as by materials substitution.

During the past decade, the Company was subjected to a growing number of laws which regulate material use, transport, handling, and disposal (Fig. 1). Under certain of these Acts, a "knowing/willful" criminal violation can expose individuals, including officers of the Company, to five years imprisonment. Civil and criminal penalties include maximum fines up to $25,000 per day, and a citation normally consists of multiple related violations.

Litigation is also a growing concern. At present the Office of General Counsel has three suits pending, involving deaths allegedly due to the inhalation of carcinogenic substances. Some Workman's Compensation expense has also been incurred. The greatest potential for major expense, however, lies in the possibility of punitive action by the court.

Internal and external pressures regarding hazardous substance control and compliance have increased substantially since March, 1977, when Directive B-101 was issued to assign responsibilities within the Company (Fig. 2). Since that time new standards have been issued, additional standards are anticipated, and the level of economic risk has increased.

a Federal Register 45(15): 5031, January 22, 1980.

FIGURE 1

FEDERAL AND MICHIGAN ACTS REGULATING TOXIC/HAZARDOUS MATERIALS HAVING IMPACT ON THE COMPANY

Regulatory Acts

- Occupational Safety and Health Act - 1970 D.O.L. (OSHA)*
- Hazardous Materials Transportation Act - 1975 D.O.T. (HTMA)
- Toxic Substances Control Act - 1976 E.P.A. (TSCA)
- Resource Conservation and Recovery Act - 1976 E.P.A. (RCRA)
- Clean Air Act and Clean Water Act Amendments - (CAA) 1977/78 E.P.A.
- Michigan Act 293, P.A. - 1972 Michigan D.N.R. (MDNR)

Packaging & Stacking

- Federal Hazardous Substances Act - 1970
- Poison Prevention Packaging Act - 1970
- Consumer Product Safety Act - 1972

Waste Management

- Hazardous Waste Management Act - 1979 Mich., P.A. 64
- Solid Waste Management Act - 1978 Mich., P.A. 641

* Expected to be revised during 1980, to lower permissible exposure limit from present 2.0 fibers/cc to 0.5 or 0.1 fibers/cc of air.

FIGURE 2

CORPORATE STAFFS RESPONSIBILITY FOR TOXIC/HAZARDOUS MATERIALS
(DIRECTIVE D-101)

		REGULATORY ACT					
Staff	Responsible Activity	OSHA	TSCA	RCRA & State Solid/ Haz. Wastes	HMTA	CLEAN AIR & WATER	MICH DNR
ESES	SSECO		Compliance Reporting	Compliance Reporting		Compliance Reporting Monitoring	Compliance Reporting
P&O	IH&T	Compliance Reporting Identification of Controls Monitoring	Material Inclusion in EPA Inventory	Chemistry in Data Base	DOT Label in Data Base		Chemistry in Data Base
	SAFETY	Enforce Controls					
MFG. STAFF	Plant Engrg. Office	Facility Controls Development	Non-Prod. & Prod. Matls. Review	Disposal Meth. & Fac. Dev.		Facilities Development	Rouge Consolidation
	Mfg. Engrg. & Systems	Process Controls Development	Non-Prod. Matls. Review		Packaging Storage	Process Contr. Development	
	Plants	Process Controls Implementation Facility Control Implementation	Non-Prod. Matls. Review	Waste Characterization	Material Characterization	Permit Reporting	Usage Reporting
E&RS	Prog. Anal. & Matls. Engrg.		Production Matls. Review				
	Research Staff	Develop new matls., mfg. processes, & measurement devices.					
SUPPLY	Trans. & Traffic				Compliance Reporting		

May 2, 1980

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PAST COMPANY ACTIONS

Production Materials

In response to OSHA regulations in 1978, the Company removed lead chromates and lead molybdates from paint used for topcoats on exterior and interior surfaces, effective with Job #1, 1980. School bus yellow and fleet vehicles were excepted. Also, "Tris" flame retardant treatment for fabrics, was removed during 1977, in response to an inquiry by NHTSA. In response to initial OSHA regulations in 1972, the Company determined plant areas in which employe exposure to asbestos exceeded regulated limits. All domestic line operations were apprised of the OSHA standards and the requirements for employe protection and medical examination. Car Engineering released a practice banning new designs containing asbestos unless documented rationale for its use is provided and it is encapsulated.

Nonproduction Materials

In 1969, sprayed-on structural steel fireproofing containing asbestos fibers was eliminated in all new and reworked construction. In 1970, Corporate mechanical construction standards were revised to prohibit asbestos in thermal insulation. Maintenance Bulletin No. 137 was published, prohibiting the use of air blow-off in all brake/clutch maintenance and substituted vacuum fiber/dust pick-up. In 1974, Steel Division light oil by-product tanker loading operations were reviewed and personnel exposures were pinpointed and appropriate protective equipment supplied. In 1977, the Company replaced M-2C60 Series of maintenance lubricants with the lead naphthenate free M-2C142 materials, and deleted the use of asbestos bearing molding compound at Sheldon Road. In 1978, an adhesive used at San. Jose was reformulated to eliminate benzene exposure. During 1979, analytic chemistry procedures at Central Laboratories was revised to eliminate benzene, the volume of lead-chromate employed in vinyl plant operations was reduced and ventilation/protective measures were identified at the Romeo Tractor Plant to minimize hazards from chromium compounds used in painting. (The substitution of non-hazardous paints is targeted for Romeo for late 1980.)

FIGURE 3

PAST COMPANY ACTIONS

Production

- Removal of lead and chromium from paints.
- Removal of "Tris" flame retardant
- Controls instituted for asbestos in new designs.

Nonproduction

- Removal of asbestos from,
  - Structural fireproofing
  - Thermal insulation
  - Molding compounds
- Substitution of vacuum for air blowing in brake and clutch maintenance
- Personnel protection against benzene in light oil tanker loading operations
- Substitution of lead-containing maintenance oils
- Substitution of benzene-containing adhesives at San Jose
- Reduction of lead-chromates in vinyl operations

TASK FORCE CHARTER

To implement the charter, the Task Force has coordinated plans and efforts to identify usage of potentially carcinogenic substances, developed specific strategies to eliminate the use of these substances and initiated plans to find substitutes for substances ahead of government regulations. The complete Task Force Charter is shown in Figure 4.

In 1977, OSHA issued a draft policy listing numerous chemicals that could be classified as "Category I" and "Category II" carcinogens. According to OSHA's draft policy, Category I substances are known to be carcinogenic in humans or which have been demonstrated to be carcinogenic in two separate laboratory animal studies. Category II substances are so classified where data is suggestive or carcinogenicity in test animals and humans, or unreplicated tests indicate potential occupational carcinogen in a single mammalian test species.

- A listing of 67 Category I substances in use in the automotive industry has been prepared. (Exhibit I).

- For materials regulated by Michigan Department of Natural Resources, quantities have been determined, as shown in Figure 5. As reported to the State of Michigan, in 1979, the Company used asbestos only as articles, 81,377 pounds of chromium compounds, and 385,028 pounds of benzene.

Action on the remaining items in the Task Force Charter will be discussed on the following pages. Category I substances were examined in detail.

FIGURE 4

TASK FORCE CHARTER

The Task Force was chartered by E&R and M&S Subcommittees (Meeting of 10/24/78) for coordinating plans and efforts to:

1. Identify substances in use (OSHA Categories I and II).
2. Determine quantities used (for materials regulated by Michigan Department of Natural Resources).
3. Set targets for elimination of as many Category I substances as possible.
4. Take aggressive steps to find substitutes for as many Category I substances as possible in anticipation of government regulations.
5. Develop a policy and action plan for eliminating potential carcinogens where possible.
6. Organize to identify substances systematically.

FIGURE 5

USAGE OF MICHIGAN CRITICAL MATERIALS AS REPORTED TO MATS* (ADJUSTED BY FIL PLANTS IN FILER MDNR REPORTS)

Material	Lbs. of Usage	Principal Users
Acrylic Acid	251,707	PPV - Paint
Acrylonitrile	641,133	PPV - Paint
Aniline	90	MCC, Dbn. Glass, T&C Sterling
Antimony	830,571	PPV - Vinyl
Arsenic	11,157	T&C Vandyke, PPV - Vinyl
Asbestos (not reported as a material - present in articles only)		
Benzene	385,028	AAD - Dearborn Assy., Gen. Service
Cadmium	3,311	PPV - Vinyl
Chromium	81,377	PPV - Paint, EED - Ypsi.
Cloroprene	24,676	AAD - Utica
Cobalt	210	PPV - Saline
Copper	321,704	AAD - Dearborn, PPV - Saline, MSD - Monroe
Cyanides	923,069	MSD - Monroe
Dichlorobenzenes	2,542	FTO - Highland Park
Formaldehyde	488,965	MCC, PPV - Paint
Hydrazene	130	PPV
Hydroquinone	1	PPV - Vinyl
Hypochlorite	15,841,758	MSD - Monroe
Lead	626,027	AAD - Wayne/Dearborn, PPV - Paint
Lithium	123	ED - Northville, T&C Sterling
Nickel	126,624	MSD - Monroe, T&C Sterling
Phenol	5,839	Mich. Cast. Cntr.
Selenium	127	T&C Sterling
Silver	25	T&C Sterling
Silicon-Dioxide Coated Lead Chromate	2,317	PPV
Styrene	1,413,986	PPV - Milan, PPV - Vinyl
Tetracloroethylene	1,095	AADGO, Mich. Prov. Grnd.
Thiourea	18	PPV - Vinyl
Triaryl Phosphate Esters	160,022	Steel, T&C Sterling
Trichloroethylene	91,849	EED - Rawsonville
Vinyl Chloride	118	PPV - Vinyl
Zinc	1,085,724	PPV - Paint, AAD, FPSD, FTO

* Michigan locations not reported to MATS:

Detroit Industrial Engine	Vulcan Forge
Research & Engineering Center	Dearborn Glass
Research - Glendale	Dearborn Specialty Foundry
Troy - Tractor	Wixon Assembly

CARCINOGENIC SUBSTANCES

A prioritized list of Category I substances that are contained in materials used by the Company or generated as a result of Company operations, is shown in Figure 6. The current exposure limit for these substances is also provided. It is important to note that this does not represent an exhaustive list. (The complete listing is provided in Exhibit I.) The substances and their typical uses listed are presented in order of priority as established by Task Force consensus.

The ability to achieve the strategies designed to meet the objectives of the Task Force was measured by evaluating the scope of usage of asbestos, chromium and benzene (priority ranks 1, 2 and 3, respectively) as test cases because they are considered by Operations and Staffs to have the greatest impact on the Company.

NAAO/DPO material uses of asbestos, chromium and benzene were systematically identified. Strategies to eliminate/control these materials, in a practicable manner in anticipation of Government regulations, were formulated. A plan to extend the strategy formulated for asbestos, chromium and benzene, to as many Category I substances in Company materials as possible, was established.

FIGURE 5

TASK FORCE PRIORITIZED CATEGORY I SUBSTANCES

Substance	Occurence within Company	Current Exposure Limits
1. Asbestos	Friction materials, gaskets, sealers	2 fibers/cc
2. Chromium Compounds	Chrome plating, paint pigments	0.1 mg/m^3
3. Benzene	Product of coking operations, foundry operations, petroleum products, paints, thinners	10 ppm
4. Cadmium/Cadmium Oxide	Fastener plating, solders, foundry effluent, valve alloy	0.1 mg/m^3
5. Coal Tar Volatiles	Coke oven and foundry emissions	0.2 mg/m^3
. Benzo (a) Pyrene	Coke oven and foundry emissions	0.2 mg/m^3
. Benzo (a) Anthracene	Coke oven and foundry emissions	0.2 mg/m^3
6. Ethylene Chloropolymer	Vinyl	None established
7. Beryllium	Aluminum foundry operations	2 $\mu g/m^3$
8. Trichloroethylene	Degreaser	100 ppm

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CARCINOGENIC SUBSTANCES

ASBESTOS

During the past several years, positive evidence has established the link between the inhalation of asbestos-containing dust and chronic respiratory disease (asbestosis), as well as several forms of cancer. These include lung cancer, mesothelioma (cancer of the membranes lining the chest and abdominal cavities), and gastro-intestinal cancer. Asbestos is found in a variety of automotive components, and thus many occupational exposures are possible. The most critical exposure occurs during brake and clutch repair. A small number of Ford employes are potentially exposed due to repair of Company owned vehicles. The permissible exposure limit currently regulated by OSHA, is 2.0 fibers per cubic centimeter of ambient air. The National Institute for Occupational Safety and Health (NIOSH), an advisory group, and OSHA have recommended that limits be tightened to as low as 0.1 in 1980. Industrial Hygiene and Toxicology has issued bulletins detailing controls. An EPA ban on all non-critical uses may occur as early as 1985.

CARCINOGENIC SUBSTANCES

Asbestos

FIGURE 7

Health Effects on Humans

Asbestosis
Lung Cancer
Mesothelioma
Laryngeal Cancer
Digestive System Cancer

FIGURE 8

Exposure Limits

	Regulation (Fibers/cc)	Proposed (Fibers/cc)
Time Weighted Average (NIOSH)	-	0.1
Time Weighted Average (OSHA)	2.0	0.5
Ceiling	10	5

FIGURE 9

Summary of Asbestos Usage

Production	Nonproduction
Clutch Plates	Roofing Materials
Brake Linings	Millboard
Gaskets	Asbestos Reinforced Paper
Insulators	Core & Mold Making Materials
Adhesives	Safety Apparel
Sealers	
Sound Absorbers	

CARCINOGENIC SUBSTANCES

CHROMIUM COMPOUNDS

Some trivalent and hexavalent chromium compounds have demonstrated potential health hazards to human organs and systems (See Figure 10). Chromium in hexavalent combination with hydrogen, the alkali-metals (e.g., sodium), ammonia and oxygen are considered noncarcinogenic. All other hexavalent combinations of chromium (e.g., lead and zinc chromates) are considered carcinogenic. The primary concern for exposure is through inhalation, potentially causing lung cancer.

A number of Ford employes have potential exposure to these compounds by virtue of their handling of materials, primarily in paint making and application. Protective measures are employed to assure regulated limits are not-exceeded.

The current statutory limit is 52 mg/m^3 although NIOSH has recommended lower levels (Figure 11). The classes of materials included in Figure 12 are of current concern since the most critical sources of exposure are in paint manufacture and application.

CARCINOGENIC SUBSTANCES

CHROMIUM COMPOUNDS

FIGURE 10

Health Hazards of Chromium Compounds

Effect on Body Systems	Hexavalent Chromium Compounds	Other Chromium Compounds
Respiratory Tract - Irritation/Perforation of Mucous Membranes, Bronchitis	X	X
Liver - Damage	X	X
Skin - Dermatitis, Ulcers	X	X
Kidneys - Damage	X	X
Lungs - Cancer	X	-

FIGURE 11

Exposure Limits

Time-Weighted Average (NIOSH)	-	25 $\mu g/m^3$ 10 Hr workday
Ceiling (OSHA)	52 $\mu g/m^3$ a/	-
Ceiling (NIOSH)	1 $\mu g/m^3$	50 $\mu g/m^3$/15 Minutes
Exposure Limit (NIOSH)	1/2 of above	1/2 of above

a) Measured as chromium. No differentiation is made regarding valence or type of disease due to exposure.

FIGURE 12

Classes of Materials Containing Carcinogenic Chromium Compounds

Production	Nonproduction
Topcoat Paints	Maintenance Paints
Primer Paints	Paint Strippers
Chromate Coatings	Marking Inks

CARCINOGENIC SUBSTANCES

BENZENE

Benzene is a leukemia producing agent. Excessive exposure can result in a number of other adverse health effects (Figure 13). Benzene may enter the body by inhalation and/or skin absorption.

At present, a small number of Company employes are potentially exposed to benzene in excess of one part of benzene per million parts of air and no employe is exposed in excess of 10 parts of benzene per million parts of air. These potential exposures result from the coke oven steel making processes, and employe protective measures are in effect. Permissible exposure limits allowed by regulatory agencies are summarized in Figure 14. The OSHA standard exempts employers who store, transport, distribute, disperse, sell, or use benzene as a portion of gasoline or other motor fuel after it has been discharged from a bulk terminal. This exemption was necessary since there is no possible way of controlling benzene exposure among service station personnel, mechanics, or tank truck drivers. Employe Health Services has reported that no indication of excessive exposure exists for Ford employes as a result of handling gasoline.

Benzene occurs as an unintentional constituent in many materials used throughout the Company (Figure 15). Petroleum-related materials are of primary concern as they most likely contain benzene at levels that require consideration. (See Exhibit III)

CARCINOGENIC SUBSTANCES

BENZENE

FIGURE 13

ADVERSE HEALTH EFFECTS FROM EXCESSIVE EXPOSURE TO BENZENE

Contact Dermatitis
Eye Irritation
Narcotic and Central Nervous System Effects
Ventricular Fibrillation
Malfunction of Liver and Kidney
Chemical Pneumonitis and Pulmonary Edema
Leukemia
Blood Dyscrasias (disorders)

FIGURE 14

EXPOSURE LIMITS

	Regulation	Proposed
Time-Weighted Avg.	5 ppm/15 min.	1 ppm/8 hr.
Ceiling		1 ppm/ 2hr. Sample collected at 1 liter/minute

FIGURE 15

CATEGORIES OF MATERIALS IN WHICH BENZENE OCCURS OR IS SUSPECTED

Adhesives and Sealers
Rust Preventives
Thinners, Enamels and Lacquers
Primers, Paints and Coatings
Cleaning Solvents and Compounds
Misc. Organic Compounds
Coke Oven By-products
Marking Fluids and Wood Preservatives
Finishing/Polishing Compounds
Lubricating Greases and Oils
Lubricating, Hydraulic & Multiple Purpose Oils
Liquid Fuels and Hydraulic Fluids
Hydraulic Fluids

CARCINOGEN SEARCH

Three Category I carcinogens were examined to determine material specifications, parts and nonproduction uses, was tedious and inexact. Existing data bases containing Engineering, Manufacturing and Purchasing information were found to be incomplete and not readily accessible. In the absence of one reliable system, the detailed steps in Figure 16 were undertaken.

For production materials, each PEO reviewed the material/usage list for completeness and established a list of parts and bulk materials of their design responsibility suspected of containing the subject substances. These lists were returned to Engineering Staff. E&RS consolidated the lists (See Appendices) and provided them, along with the approved source and material identifications to Purchasing and Supply Staff for supplier contact to determine substance usage and to find out if there is a known substitute. Nonproduction materials were identified by similar methods, except for the PEO review.

MATERIALS AND TOXICOLOGY SYSTEM (MATS)

To overcome the deficiencies of manual and semi-computerized search methods, the Materials and Toxicology System (MATS), under development, will consolidate four systems: The CATALOG of Hazardous Materials (P&O Staff); the Engineering Material Approved Source List (E&R Staff); the Nonproduction Material Approved Source List (Mfg. Staff); the Environmental & Process Engineering Review System (Mfg. Staff).

These Systems can be linked together with some manual effort to search for uses of suspect carcinogens in Company products as follows and diagrammed in Figure 17:

1. Materials containing suspect chemical compounds can be identified in the CATALOG.
2. Similar materials and the specifications to which they are approved can be found in the Approved Source Lists.
3. For Production materials, parts lists can be obtained from the engineering release system via the Engineering Material Specification.
4. With the parts list, Purchasing can determine quantity used and Manufacturing Engineering can determine processing methods.

Other functions of MATS include Approved Source Lists for production and nonproduction, materials, Michigan DNR Critical Materials usage reporting, CATALOG of Hazardous Materials for plant doctors and Rouge Poison Control Center, UAW contract agreement to provide nonconfidential list of hazardous material usage and precautions for each plant.

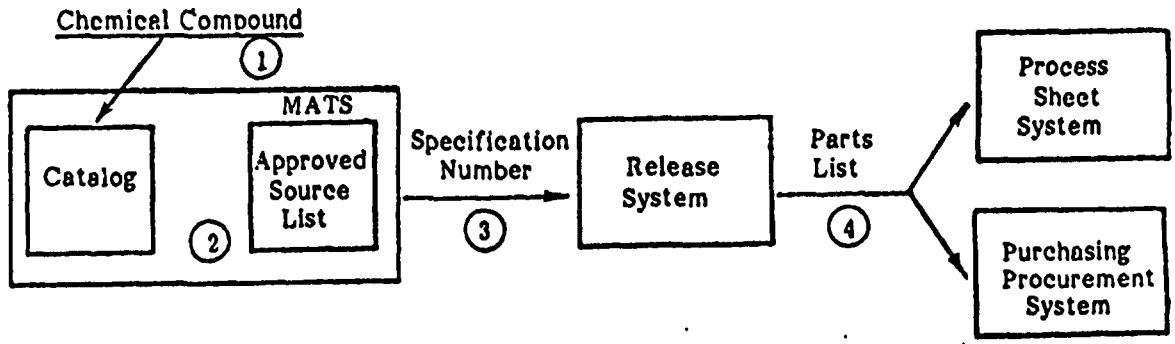
FIGURE 16

CARCINOGEN SEARCH

- Carcinogen Identification
  - Reviewed all likely material specifications and manufacturing standards.
  - Reviewed the IH&T CATALOG of Hazardous Materials.
  - Reviewed NAEPIS to identify Industry Standard Materials
  - Reviewed the Michigan Critical Materials data
  - Surveyed previous assessment of production materials.
  - Communicated with material suppliers.
  - Analyzed the production material list (PEO).
- Carcinogen Usage
  - Reviewed the NAEPIS cross-reference for production material/part usage.
  - Reviewed processes/uses involving the substances in nonproduction materials.
  - Confirmed the NAEPIS usage list for completeness/verification.

FIGURE 17

MATERIALS AND TOXICOLOGY SYSTEM



CARCINOGEN SEARCH RESULTS

From our examination of asbestos, chromium, benzene, a partial list of production and nonproduction material applications has been assembled.

These were classified as:

Known substitute material available for application without major redesign;

Known substitute material available for application with major redesign;

No known substitute. Advanced Engineering Project required;

Even in group A, extensive product or manufacturing engineering effort is required to implement a substitute material. A new material specification may be required, experimental parts must be fabricated and tested to arrive at a successful application. Purchasing must then renegotiate contracts for production or nonproduction applications. Realistic timetables and budget provisions must be established by the responsible manufacturing and product engineering organizations. Broad block timing is proposed later in this paper for the three materials examined in detail.

FIGURE 18

CARCINOGEN SEARCH RESULTS

Production Materials/Parts [1/]

	A	B	C	Total
Asbestos [2/]	34	49	22	105
Cr Compounds [3/]	-	-	25	25
Benzene	-	-	15	15

Nonproduction Materials/Parts [1/]

	A	B	C	Total
Asbestos	8	-	-	8
Cr Compounds [4/]	98	81	34	213
Benzene	3	-	5	8

Note: A = Known substitute material available without major redesign.

B = Known substitute material available with major redesign.

C = No known substitute. Advanced Engineering Project required.

NA= Not available

1/ Data are directional estimates only and refer to materials known to contain the particular carcinogen.

2/ Primary source - Car Engineering.

3/ Only certain hexavalent chromium compounds considered.

4/ All chromium and chromium compounds considered.

CARCINOGEN STRATEGIES

Three major strategic alternatives were considered for the elimination and control of carcinogenic substances. Twenty-six (26) OSHA Category 1 substances and Forty-one (41) substances that affect the auto industry and are proposed for regulation (MVMA analysis) provide the basis for these alternatives. NIOSH advised substance controls were deemed to be of lower priority.

It was agreed by the Task Force and PEO chief engineers that the Company should proceed now to eliminate asbestos, selected chromium compounds and benzene by Job #1, 1985. Where elimination cannot be contained, design, process and exposure controls would continue for specific applications.

Implementation of the recommended alternative can only proceed by specific effort on each of the unique applications identified to date. It is judged that elimination can be completed for applications where a substitute material is known and major redesign is not required. (Group A)

Elimination for applications requiring major redesign (Group B) or advanced engineering (Group C) can be initiated now but cannot with confidence be expected to be fully implemented in the 1985 time frame. Implementation decisions will have to be made for each application in the context of the vehicle cycle plan, component redesign, plans facility renovation/replacement and the practicality of the substitute.

FIGURE 19

CARCINOGEN STRATEGIES

- Continue OSHA Category I carcinogen control by design, process and exposure limits. Eliminate carcinogens where substitutes are known when required by regulation or business pressure. a/

- Proceed now to eliminate OSHA Category I carcinogens by Job #1, 1985. Where elimination cannot be contained, control the design, process and exposure. b/

- Wait for government rulemaking to eliminate or control OSHA Category I carcinogens.

a/ Current Car Engineering practice for asbestos (Dec. 19, 1979).:

Newly designed components should not contain asbestos. In documented cases precluding alternate materials, asbestos must be reduced to thelowest level and encapsulated or resin coated to avoid worker exposure to airborne fibers.

b/ Advanced funding would have to be provided where elimination cannot be contained in the 1985 timeframe.

GENERALIZED WORKPLAN

The foregoing strategies, even though having been tested only for asbestos, chromium compounds and benzene, are judged to be appropriate for other carcinogens with timing adjusted to adapt to the realities associated with elimination.

The first three actions of the workplan have been completed for asbestos, chromium compounds, and benzene. The fourth and fifth actions have been initiated and are expected to be completed by the end of July (asbestos), August (chromium compounds) and September (benzene). Classifying the substances should be completed in the first quarter of 1981.

Completing the actions by these dates requires Corporate direction that the elimination/control of these substances is a mandatory priority effort. Without such direction, vehicle, component, plant renovation and new construction programs will continue with insufficient emphasis on the elimination/control of carcinogens. Overall program management is essential to this effort.

FIGURE 20

GENERALIZED WORKPLAN
(for each Category I Carcinogen)

	Action	Responsibility Production	Nonproduction	Block Timing Prod. (Nonpr
-	Manage Program	SSECO	SSECO	Ongoing
	Propose list of known and suspect specifications [a/]	SSECO	SSECO	1 Month (/
	Verify proposed list [a/]	PEO's	Mfg. Staff	1 (/
	Identify known and suspect part numbers [a/]	PEO's [b/]	Mfg. Staff [b/]	1 (/
-	Request supplier verification of suspect specifications and parts	NAAO/DPO Purchasing	Supply Staff	2
-	Request supplier verification of substitution feasibility	NAAO/DPO Purchasing	Supply Staff	3
-	Sort into Class A (known substitute) Class B (major redesign), Class C (Advanced project)	PEO's (NAAO Pch.)	Mfg. Staff (Supply Staff)	6
-	Implement Group A actions	Veh. Engrg. PEO's	Mfg. Staff	12
-	Implement Group B actions	Veh. Mgr. PEO's	Mfg. Staff	33 (TBD) 45 [c/]
-	Implement Group C Actions	Tech. Plng. PEO's	Tech. Plng. Research Staff BMD	Ongoing
-	Audit effectiveness	SSECO	SSECO	Ongoing

a/ Will be output by MATS effective 2nd quarter 1981.

b/ Powertrain program.

c/ Complete for asbestos, chromium compounds and benzene.

PROPOSED CHEMICAL SUBSTANCES CONTROL

Personnel and Organization Staff has completed an analysis of the requirements for chemical substances control.

It was concluded that designation of a Program Manager would be the least costly and disruptive means for improving coordination among involved activities and would help to surface crucial issued. The Program Manager would have a small staff to assist in collection of data, preparation of reports, bulletins, liaison and other assigned functions (computer systems). Organizationally, an E&SES location was recommended.

In view of budget constraints, it has been agreed that the existing Commpliance and Liaison Department would perform the Program Manager function. The Manager should be responsible for implementing carcinogen control strategies coordinating Company response to potential and promulgated toxic substance regulation. Initial assignments include revising Directive B-101 to clarify responsibilities, assuring that Operating Components and Staffs issue facing documents to B-101, establishing a financial measurement of the compliance effort, and assuming development direction and control for the computer information system and implementing the workplan as directed.

The ongoing responsibilities of the Chemical Substances Control Manager will be to coordinate the product/facility/manufacturing response of the Company to changing regulations. This will include governmental agency comments to proposed regulation, forecasting/regulatory impact, direction and control of the information systems required, and compliance assurance.

It is recommended that the Carcinogen in the Workplace Task Force be discontinued and that the Engineering and Research and the Manufacturing and Supply Subcommittees name as a joint working group a Hazardous Substances Control Committee. This Committee should be composed of responsible executives from the areas shown on the facing page. It is further recommended that the Committee be chaired by the E&SES representative. Presently assigned responsibilities of Staffs and Operations should remain essentially unchanged, except where supplemented or clarified to overcome present inadequacies.

FIGURE 21

MEMBERSHIP

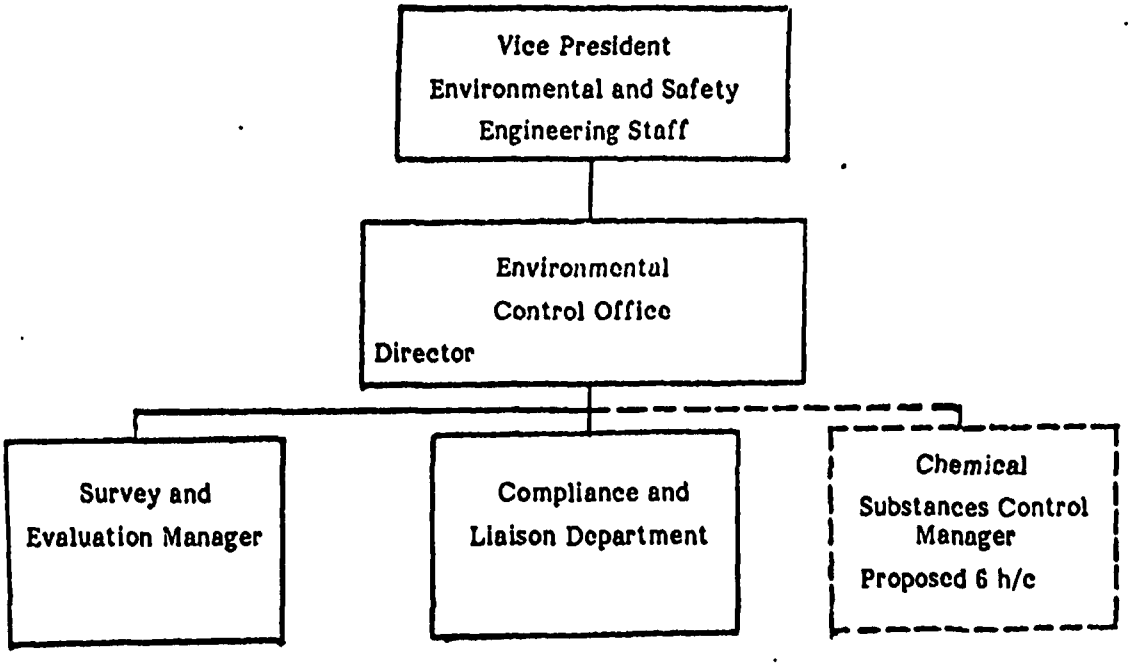
HAZARDOUS SUBSTANCES CONTROL COMMITTEE

Chairman - Director Environmental Control Office

- Environmental and Safety Engineering Staff
- Purchasing and Supply Staff
- Personnel and Organization Staff
- Scientific Research Staff
- Manufacturing Staff
- Car Engineering
- Body and Assembly Operations
- Ford Parts and Service Division
- Ford Tractor Operations
- Powertrain and Chassis Operations
- Basic Products Operations
- Electrical and Electronics Division
- Climate Control Division
- Truck Operations
- European Automotive Operations
- Office of the General Counsel

FIGURE 22

CHEMICAL SUBSTANCE CONTROL MANAGER



PROPOSED PRIORITY ACTIONS

Achievement of the recommended strategy to proceed now to eliminate OSHA Category I carcinogens by Job #1, 1985, with control of design, process and exposure where elimination cannot be contained, requires an integrated approach throughout the Company and a sustained effort over a number of years. The Task Force on Carcinogens in the Workplace recommends that:

1. Establish a Hazardous Substances Control Committee chaired by the Director - Environmental Control Office. The Task Force would be discontinued.

2. Assign Carcinogen Program Manager control responsibilities to the Compliance and Liaison Department, Environmental and Safety Engineering Staff.

3. Request Environmental and Safety Staff to establish carcinogen elimination timetables for the 67 known carcinogens for review and approval by this Subcommittee.

4. Request that NAAO/DPO Product Engineering Offices and Manufacturing Staff present to the Subcommittee specific action plans and timing for the Group A applications identified.

5. Adopt as the Company carcinogen listing, current OSHA regulated Category I substances (26) and proposed for regulation substances (41). Establish the top eight priorities proposed by the Task Force as Company priorities.

6. Direct all affected organizations to proceed with the elimination of Group A asbestos, chromium compounds and benzene by Job #1, 1985, as outlined in the workplan.

FIGURE 23

PROPOSED PRIORITY ACTIONS

1. Hazardous Substances Control Committee
2. Program Manager
3. Direct elimination of Asbestos, Chromium Compounds, Benzene
4. Request Operations Workplans
5. Adopt the priority carcinogen listing
6. Request the establishment of overall elimination timetables.

EXHIBIT I

OSHA CATEGORY I CARCINOGENS

Regulated

Acrylonitrile
Amosite
Anthophylite
Arsenic
Asbestos
Benz (c) acephenanthrylene
Benz (a) anthracene
Benz (a) anthracene, 7, 12-Dimethyl-
Benz (a) anthracene, 7-Methyl-
Benz (a) anthracene, 7, 8, 12-Trimethyl-
Benzene
Benzidine
Benzo (rst) pentaphene
Benzo (c) phenanthrene, 5-Methyl
Benzo (a) pyrene
Chrysotile
Crocidolite
Dibenz (a, h) acridine
Dibenz (a, j) acridine
Dibenz (a, h) anthracene
Dibenzo (b, def) chrysene
Dimethylamine, N-Nitroso-
1-Naphthylamine
2-Naphthylamine
Serpentine
Vinyl Chloride

Proposed for Regulation

Acetamide
Acetic acid, Lead (2+) Salt
Benzidine Sulfate
Beryllium
Beryllium oxide
Beryllium sulfate (1:1)
Cadmium
Cadmium oxide
Cadmium sulfate (1:1)
Carbon tetrachloride
Chloroform
Chromic Acid, Calcium salt (1:1)
Chromic Acid, Calcium salt (1:1), dihydrate
Chromic Acid, Chromium (3+) salt (3:2)
Chromic Acid, Dipotassium salt
Chromic Acid, Disodium salt
Chromic Acid, Lead (2+) salt (1:1)
Chromite
Chromium
Chromium (III) oxide (2:3)
Chromium (VI) oxide (1:3)
Dichromic Acid, Disodium salt
Diethylamine, N-Nitroso-
p-Dioxane
Ethane, 1, 2-Dibromo-
Ethane, 1, 1, 1-Trichloro-2, 2-bis (p-chlorophenyl)
Ethylene, chloro-, monomer
Ethylene, Trichloro-
Hematite
Hydrazine Sulfate
Lead Chromate (VI) oxide
Lead naphthenate
Nickel
Nickel (II) oxide
Polychlorinated biphenyls (Kanechlor 500)
Polyethylene glycol monostearate
Sulfuric acid, Dimethyl ester
Tannic Acid
Tannin
o-Toluidine
Urea, Thio-

May 2, 1980

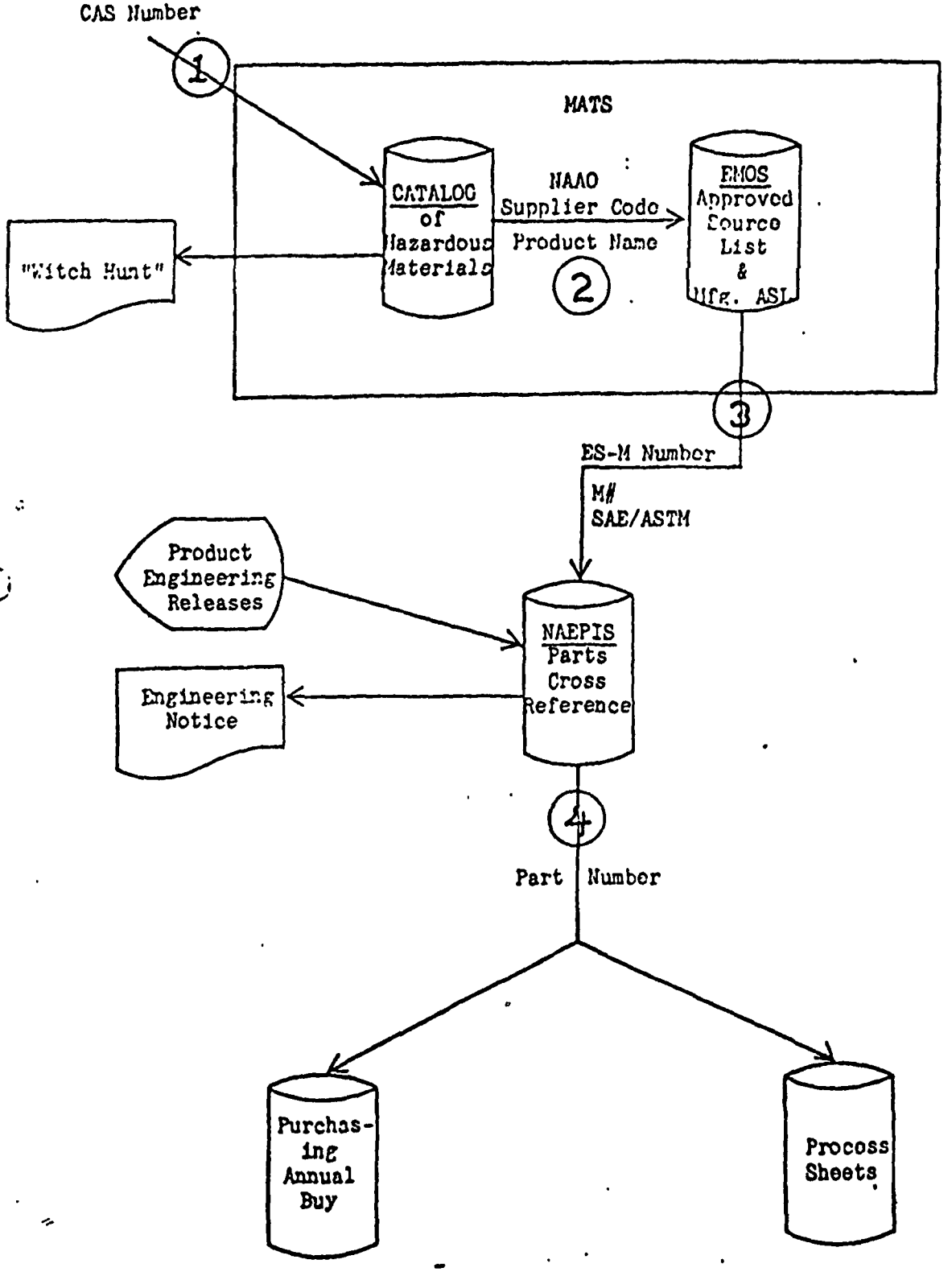
D R A F T

CARCINOGEN SEARCH

Materials and Toxicology System

EXHIBIT II

FIGURE 2



May 2, 1980

D R A F T

EXHIBIT II

CARCINOGEN SEARCH

Materials and Toxicology System (MATS)

To overcome the deficiencies of manual and semi-computerized search methods, the Materials and Toxicology System (MATS), under development, will consolidate four materials approval systems into one common data base. The four systems are: the CATALOG of Hazardous Materials (P&O Staff) containing materials, their toxicological evaluation for worker/consumer protection and the chemical composition, the Engineering Material Approved Source List (E&RS) containing the material specification title and the materials approved to that specification; the Nonproduction Material Approved Source List (Manufacturing Staff) containing the nonproduction material standard and the approved materials; and the Environmental & Process Review System (Manufacturing Staff) containing the waste disposal, treatability, and facility engineering cautions on all materials approved to Engineering Specifications and Manufacturing Standards.

Carcinogen Search Strategy

Developing the links between the above systems will, in the future, provide a method for locating suspect carcinogens in nonproduction materials and production parts and bulk materials. The search methodology is numbered on the facing page to correspond to the following search steps:

1. The Chemical Abstracts Service numbers of the suspect carcinogens and its compounds are identified by IH&T. The system will then generate a list of materials which contain that chemical.
2. Utilizing the NAAO supplier code, the specification number and the product name, the system will then identify other suspect materials and specifications.
3. The Engineering Specification can then be passed to the North American Engineering Product Information System (NAEPIS) which contains the engineering notices from all of the product engineering offices. The NAEPIS system will then produce a cross-reference list of all parts which use that material.
4. The list of production parts can then be matched to Purchasing's Procurement system to determine current sources to be queried for control and elimination of carcinogens. The same list can be matched to the AAD Process Sheet system to determine where and how the part or material is handled in AAD.

Functions

The primary function of MATS is to maintain and produce the Approved Source List for nonproduction and production materials including the toxicology and environmental clearances for use by Purchasing. The system also produces the CATALOG of Hazardous Materials as either a full companywide print or as a plant specific print. The CATALOG is used by health and safety and plant doctors, and is required to be furnished to the UAW under the current contract. The system is also available to the plants and the Poison Control Center at the Rouge to be searched by supplier or specification for complete medical, handling, shipping, waste treatment and disposal instructions on a material.

The system also produces the Michigan DNR Critical Materials report for the consumption of materials which contain a Michigan defined "critical component" e.g., chromium.

Affected Activities

All Corporate Staffs concerned with materials/toxicological/environment controls are currently involved in using/developing the system. All NAAO/DPO plants are planned to have access to the system by third quarter 1980. All NAAO/DPO Engineering activities are also participating with the exception of Chassis which currently does not participate in material control as required by PEP 3-189.

May 2, 1980

8004 0802 PO

PRODUCTION MATERIALS CONTAINING ASBESTOS

Group A — Known Substitute Material Available Without Major Redesign

Specification	Material	Basic Part No.	Part
Light Truck			
ESF-M8G55-A	Gasket	7086	Trans. Ext. Gasket
ESW-M8G109-B	Gasket	4035	Carrier Gasket
—	Deadener	350038	Econ. PDV Box Assy.
—	Sealers	350038	Econ. PDV Box Assy.
—	—	9900000	Courier Box Assy.
Body			
ESB-M2G58-C	Adhesive	—	—
ESB-M2G171-AB	Adhesive	—	Primer for Adhesive
ESB-M2G188-A	Adhesive	—	—
ESB-M3G95	Tape	—	—
ESB-M4G1-B	Sealer	—	—
ESB-M4G31-A	Sealer	—	—
ESB-M4G32-A	Sealer	—	—
ESB-M4G40-A	Sealer	—	—
ESB-M4G58-B	Sealer	—	—
ESB-M4G101-A	Sealer	—	—
ESB-M4G108-A	Sealer	—	—
ESB-M4G109-A	Sealer	—	—
ESB-M4G110-A	Sealer	—	—
ESB-M4G126-A	Sealer	—	—
ESB-M4G137-A/B	Sealer	—	—
ESB-M4G139-B	Sealer	—	—
ESB-M4G141-A	Sealer	—	—
ESB-M4G145-A/C	Sealer	—	—
ESB-M4G147-B	Sealer	—	—
ESB-M4G161-A/C	Sealer	—	—
ESB-M4G162-A	Sealer	—	—
ESB-M4G172-A	Sealer	—	—
ESB-M4G174-A	Sealer	—	—
ESB-M4G175-A	Sealer	—	—
ESB-M4G177-A/B	Sealer	—	—

Specification	Material	Basic Part No.	Part
ESB-M4G188-A	Sealer	—	—
ESB-M4G197-A	Sealer	—	—
ESB-M4G198-C	Sealer	—	—
ESB-M5G8-A/C	Deadener	—	—
ESB-M5G22-A	Deadener	—	—
ESB-M5G25-A	Deadener	—	—
ESB-M7C53-A	Rust Prevent	—	Sprayable Wax Type Rust Preventative
Trans			
ESE-M8G62-A	Gasket	7D026 7A136	Trans. Int. Band Servo Gasket Trans. Front Pump Gasket
ESW-M8G109-B	Gasket	4035	Rear Axle Housing to Pan Gasket
ESW-M2D166-A	Seal	7052	Trans. Extension Oil Seal
ESF-M8G55-A	Gasket	7A247 15520	Trans. Gear Shift Neutral Switch Assy. Trans. Back-Up Lamp Switch Assy.
—	—	9004650	Cigar Lighter Spacer
Ford Division			
ESB-M4G32-A	Sealer	19560	Caulking Cord
ESH-M4G32-B	Sealer	19560	Rope Sealer
ESR-M18P2-A	Sealer	19554	Perfect Seal
ESR-M99P4-B	Coating	19515	Undercoating
EED			
ESF-M3D76-A	Phenolic	18B374 8K621 17B616 18B374	A/C Motor Commutator Cooling Fan Motor Comm. W/S Washer Motor Comm. W/S Wiper Motor Comm.
ESF-M3D113-A	Phenolic	11015	Starter Commutator
ESA-M4D140-A	Polypropylene	13711	I/C Lamp Socket
ESF-M8G55-A	Gasket	10914 12A696	Water Temp. Sender Gasket EEC Seal
ESF-M8G96-A	Gasket	12A676	Air Temp. Sender Gasket
ESW-M8G109-A	Gasket	17C430	W/S Wiper Gasket
ESF-M8G126-A	Gasket	14A427	Window Reg. Yoke Gasket
—	Gasket	13817	Horn Gasket
CCD			
ESF-M8G55-A	Gasket	19D970	A/C Comp. Gasket
Chassis			
ESB-M4G109-A	Sealer	2A792	P/B Cable Opening Cover

NONPRODUCTION MATERIALS CONTAINING ASBESTOS

Group A — Known Substitute Material Available Without Major Redesign

Specification	Material
M-10G11	Asphalt Saturated Asbestos Roofing Felts - 15 lb.
M-10G12	Asphalt Saturated Asbestos Roofing Felts - 30 lb.
M-10G15	Asphalt Saturated and Coated Asbestos Roofing Felts - 20 lb.
M-10G16	Asphalt Saturated and Coated Asbestos Roofing Felts - 50 lb.
M-99G59A	Asbestos Powder
M-99G82A	Hard Asbestos Millboard
M-99G84A	Asbestos Filament Reinforced Paper

PRODUCTION MATERIALS CONTAINING ASBESTOS

Group B — Known Substitute Material Available With Major Redesign

Specification	Material	Basic Part No.	Part
Light Truck			
ESE-M8G106-B	Gasket	5B266	Res. Inlet Pipe Gasket
ESE-M8G140-A	Gasket	5B266	Res. Inlet Pipe Gasket
Trans			
ESW-M3D117-A	Phenolic	7934	Conv. Reactor
ESW-M3D97-A	Phenolic	7937	Conv. Reactor Thrust Washer
Vendor	—	7F314	Conv. Damper Reactor Hub Assy.
Vendor	—	7D034	Trans. Int. Band Assy.
Vendor	—	7D095	Trans. Reverse Band Assy.
Vendor	—	7F196	Trans. Overdrive Band Assy.
Vendor	—	7E311	Trans. Clutch Forward Plate Assy.
Vendor	—	7E313	Trans. Direct Clutch Plate Assy.
Vendor	—	7F219	Trans. Int. Clutch Plate Assy.
Vendor	—	7E312	Trans. Rev. Clutch Plate Assy.
Vendor	—	7F239	Trans. Oil Clutch Plate Assy.
Vendor	—	7E312	Trans. Int. Spline - Rev. Plate Assy.
Vendor	—	7B614	Trans. Clutch Plate Assy.
Chassis			
ESB-M8G106-A	Gasket	5B266	Resonator Gasket Assy.
ESA-M8G140-A	Gasket	5B266	Resonator Gasket Assy.
—	—	2022 2021	Front Disc Brakes

PRODUCTION MATERIALS CONTAINING ASBESTOS

Group C — No Known Substitute. Advanced Engineering Project Required.

Specification	Material	Basic Part No.	Part
Light Truck			
ES-C8AA-2B282-A ES-D2OA-2B072-BB	—	2021	Lining Front Wheel Brake Outer
ES-C8AA-2B282-A ES-D20A-2B072-BB	—	2022	Lining Front Wheel Brake Inner
Vendor Print	—	2019	Shoe and Lining Inner
Vendor Print	—	2018	Shoe and Lining Outer
ES-EOTA-2B120-AA	—	2018	Shoe and Lining Outer
ES-D6TA-2B118-AA ES-C8TA-2B282-A	—	2022	Lining Front Wheel Brake Inner
ES-C8TA-2210-D	—	2209	RR Brake Shoe Lining
ES-CSTA-2010-C	—	2284/5	RR Brake Shoe Lining
ES-D8TA-7550-A	—	7550	Driven Member Clutch
—	—	4797	Clutch Plate
—	—	4A325	Clutch Plate
—	—	2598	Parking Brake Lining
Trans			
Vendor	—	4797	Rear Axle Diff. Clutch Plate Assy.
Vendor	—	4A435	Rear Axle Diff. Clutch Plate Assy.
Vendor	—	7550	Man. Trans. Clutch Disc Assy.
Heavy Truck			
—	—	2010/11	Hydraulic Brakes - Front
—	—	2209/10	Hydraulic Brakes - Rear
—	—	2598	Parking Brake
—	—	2010/11	Air Brake Assy. - Front (Wedge)
—	—	2010/11	Air Brake Assy. - Front (S-Cam)
—	—	2209/10	Air Brake Assy. - Rear (S-Cam)
—	—	2875	Air Brake Compressor
—	—	8A616	Fan Clutch Assy.
—	—	8A627	Clutch and Bracket Assy.
—	—	5230	Muffler Assy.
—	—	7A596 7550	Clutch Disc Assy.
—	—	7E434	Torque Limiting Brake Assy.

Chassis

ESE-M8G149-A	Gasket	5F263	Exhaust Manifold Gasket
—	—	2284 2285	Rear Brake Shoes