

June 20, 1984

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I thought it might be timely to provide an overview of the Industrial Hygiene function at DPMC. Three major areas are addressed: 1) Staffing levels (comparison between manufacturing locations), 2) Changes over the last 10 years and 3) The work product. The report is self-explanatory, but please let me know if you have any questions.



P. J. SNYDER

LAM 000866

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**Shell Oil Company • Shell Chemical Company**  
Interoffice Memorandum

JUNE 18, 1984

FROM: SENIOR INDUSTRIAL HYGIENIST  
DEER PARK MANUFACTURING COMPLEX

TO: SEE DISTRIBUTION LIST

SUBJECT: DPMC INDUSTRIAL HYGIENE PROGRAM ACTIVITIES

The Industrial Hygiene function has been developing at DPMC for approximately 11 years. During this interval changes in regulations, legal doctrines and business needs have caused gradual changes in the role of Industrial Hygiene within Shell. To provide an update and overview of current work activities (and trends), a summary report is provided.

Organizational Structure

See Table 1

Presently there are nine positions in Industrial Hygiene (redline case). Based in part on geographic considerations, 4-5 individuals are assigned to field monitoring duties so as to provide adequate coverage and a timely response to most requests. The remaining paraprofessional staff are involved with supervising the respirator program, epidemiology, fit testing, and an ever increasing number of HSE/Medical/Regulatory and Field requests.

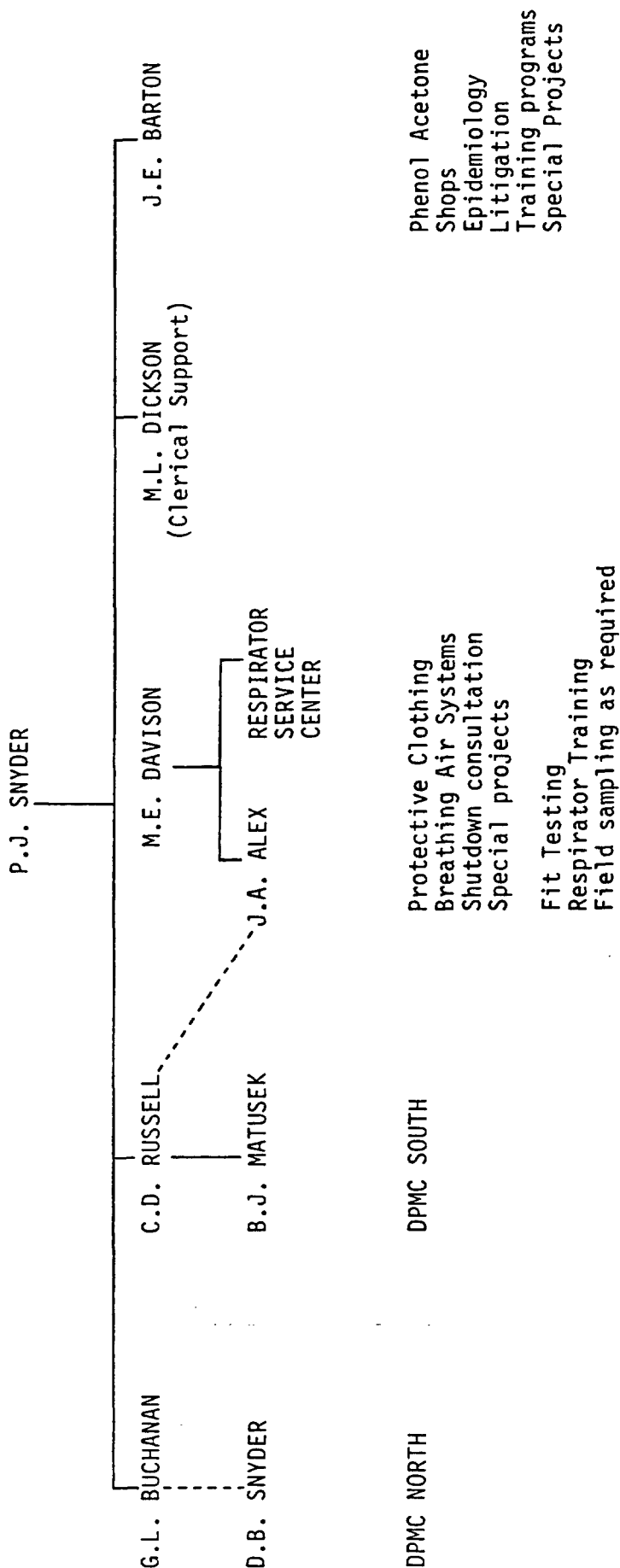
Industrial Hygiene personnel continue to receive O.T.J. training and technical development through outside course work. Several are pursuing certification by the American Board of Industrial Hygiene which is required by Shell for promotion to Senior Industrial Hygiene Assistant. A significant percentage of this authors time continues to be allotted to supervising and offering technical guidance to the Industrial Hygiene field assistants.

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TABLE 1

INDUSTRIAL HYGIENE ORGANIZATION



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The Industrial Hygiene Resource (1973-1984)

See Table 2

Prior to 1980, when Industrial Hygiene was consolidated under one supervisor, several separate work groups were engaged in Industrial Hygiene duties. This total headcount is somewhat different than the number "assigned" to Industrial Hygiene. Using the total number of individuals engaged in Industrial Hygiene activities as a basis, a review shows current staffing at 1977 manpower levels. In spite of an increasing work load, this staffing level is possible because of upgrading the skills of personnel, cross-training, discontinuing routine laboratory analysis, and reducing fit testing frequency.

Comparison of I.H. Staffing Between  
Selected Manufacturing Locations

See Tables 3 &amp; 4

A comparison of Industrial Hygiene staffing levels was performed using as a primary basis the number of operating non-exempt hourly job categories. This recent comparison revealed the following:

- Only 40-50% of I.H. personnel at each location are directly involved in exposure monitoring. An increasing amount of time at each location is being allocated to program development, auditing, training, etc.
- As baseline data is developed, a gradual shift is occurring to place emphasis on program management. A Head Office task force is currently assessing the ongoing monitoring needs within Shell.
- Based on job categories or total hourly workers, Industrial Hygiene staffing levels at DPMC are comparable to other locations (see Rank Ordering).

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TABLE 2

# INDUSTRIAL HYGIENE RESOURCE 1973-1984

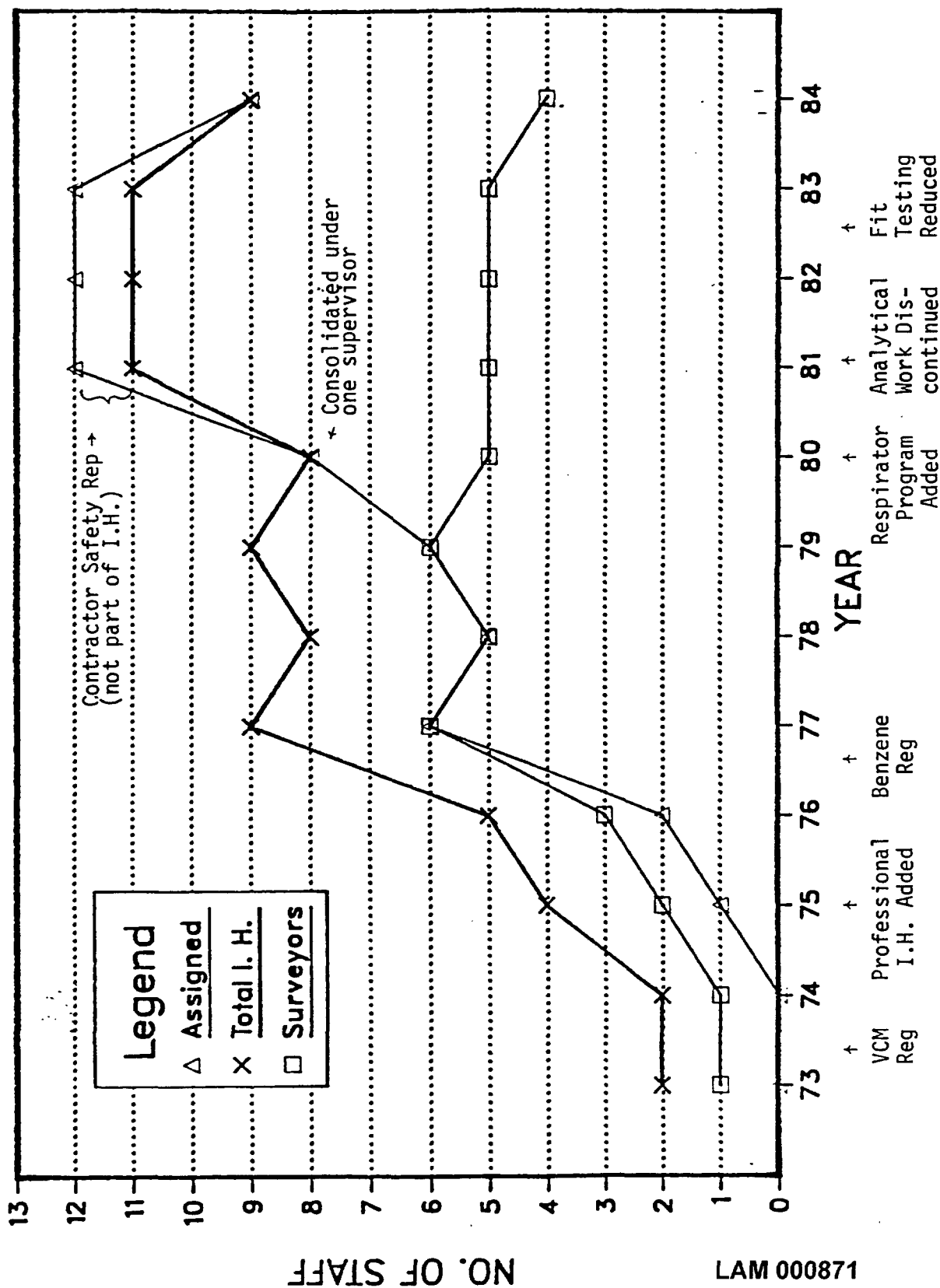


TABLE 3

## SHELL I.H. FUNCTION AT MNF. LOCATIONS

|            | STAFFING          |                                                     |                                                 | FACILITY SIZE |                                                                                |
|------------|-------------------|-----------------------------------------------------|-------------------------------------------------|---------------|--------------------------------------------------------------------------------|
|            | #Certified I.H.'s | Surveyors                                           | Other                                           | Total         |                                                                                |
| Geismar    | 1                 | (.75 Lab)                                           | .5 S.I. (Respiratory) protection                | 2.25          | No. Jobs<br>Hourly Operations<br>Non-exempt<br>No. Employees<br>Mnt, Lab, Oper |
| DPMC       | 1                 | 4.5                                                 | 2.5                                             | 8             | 500<br>1700<br>235                                                             |
| Wilmington | 1                 | 1 contractor<br>.5 (paperwork)                      | .5                                              | 3             | 500<br>85                                                                      |
| Martinez   | 1                 | 1.5 I.H. Techs                                      | .25 Supv<br>.50 Tech<br>.50 Equip Man           | 3.75          | 540<br>85                                                                      |
| Wood River | 1                 | .25                                                 | 1 Fit Tester<br>.75 I.H. Tech                   | 3             | 1180<br>120                                                                    |
| Norco      | 2                 | (.5) (2)<br>I.H. Lab<br>(.5) Lab Tech<br>(.25) HS&E | Tech Coord .75<br>Safety Eng .25<br>Tech .50(2) | 5.75          | 990<br>130                                                                     |
|            |                   | 1.75                                                | 2.0                                             |               |                                                                                |

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TABLE 4  
I.H. STAFFING COMPARISONS AT MANUFACTURING LOCATIONS

TABLE 1  
RATIO OF NO. SURVEYORS TO TOTAL I.H. PERSONNEL

|            |               |   |     |   |
|------------|---------------|---|-----|---|
| Geismar    | 3/4 : 2 1/4   | = | .33 | - |
| DPMC       | 4 1/2 : 8     | = | .56 | - |
| Wilmington | 1 : 3         | = | .33 |   |
| Martinez   | 1 1/2 : 3 3/4 | = | .40 |   |
| Wood River | 1/4 : 3       | = | .08 |   |
| Norco      | 1 3/4 : 5 3/4 | = | .30 |   |

TABLE 2 (SEE FOOTNOTES)

|            | <u>No. Non-Exempt Hourly<br/>Operating Jobs Per<br/>I.H. Person (Total)</u> | <u>No. Non-Exempt Hourly<br/>Operating Jobs Per<br/>I.H. Surveyor</u> | <u>No. Oper/Mnt/Lab<br/>Personnel Per<br/>I.H. Person (Total)</u> |
|------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------|
| Geismar    | 31                                                                          | 93                                                                    | 222                                                               |
| DPMC       | 29                                                                          | 52                                                                    | 213                                                               |
| Wilmington | 28                                                                          | 57                                                                    | 167                                                               |
| Martinez   | 23                                                                          | 57                                                                    | 144                                                               |
| Wood River | 40                                                                          | 480                                                                   | 393                                                               |
| Norco      | 23                                                                          | 74                                                                    | 172                                                               |

RANK ORDERED

|              |              |              |
|--------------|--------------|--------------|
| { Martinez   | { DPMC       | Martinez     |
| { Norco      | { Martinez   | { Wilmington |
| { Wilmington | { Wilmington | { Norco      |
| { DPMC       | Norco        | { DPMC       |
| { Geismar    | Geismar      | { Geismar    |
| Wood River   | Wood River   | Wood River   |

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MAJOR FACTORS WHICH INFLUENCE I.H. STAFFING LEVELS

- Facility size (more jobs requires more coverage).
  - Areas of health concern (certain chemicals may represent a disproportionate share of the work effort).
  - "Maturity level" of the program (what services are provided, and which have become part of the plant culture). Older programs have more technicians (initially a larger percentage of the work effort was put into developing baseline exposure levels).
1. It is unlikely that staffing levels differ between locations unless the numbers are different by  $\pm 50\%$ .
  2. Wood River currently is planning to add to their I.H. staffing.

DPMC-16574

Elements of the Mature I.H. Program

See Table 5

One explanation for the differences that do exist between locations is that each program has evolved differently and is at a different stage of "maturity".

Eleven different elements were identified as being important to a "mature" program. To put DPMC into perspective, the Industrial Hygiene Program was graded against this criteria. While DPMC has an overall satisfactory performance level, some risks are assumed by not placing emphasis on certain program elements. The measurement of this risk is difficult at best, as a successful program minimizes unknown future costs (less illnesses, less litigation, less compliance costs, and less burdensome regulation). One area where additional emphasis should be placed using this criteria is program auditing.

I. H. Technician (Surveyor) Work Distribution

See Table 6

Monitoring is conducted on a regular basis per a written sampling schedule (updated annually). Monitoring involves 50-70% of each technicians time, (includes equipment maintenance, calibration, field observations, and recordkeeping). Remaining time is utilized responding to employee complaints, and assisting operations/maintenance. For example, analyzing vessel gas samples during decontamination, performing informal audits, evaluating the impact of non-routine activities (e.g. tank venting), providing special training on request, and assisting with shutdown planning. On many work permits the Industrial Hygiene technician offers guidance to safety inspectors and to operations. Due to the increasing quantity of office work, frequently the I.H. Technician functions as an important interface with the field for the Senior Industrial Hygienist. Significantly, this role enlargement for the I.H. technician reflects an increased demand for services by employees who are more aware of the health aspects of their work environment. Providing these services has in part been possible by discontinuing all routine laboratory analysis (now done at Westhollow).

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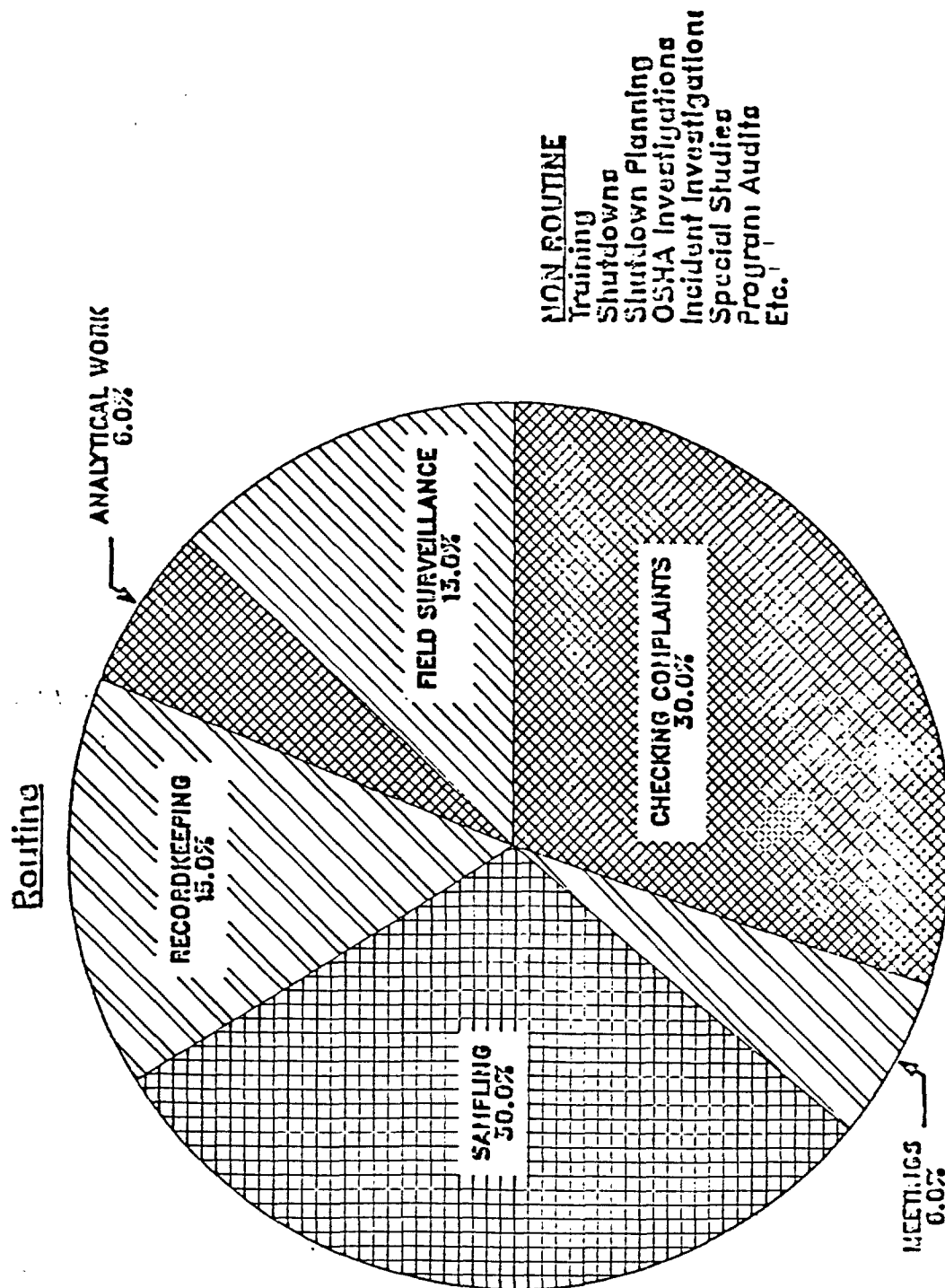
TABLE 5  
ELEMENTS OF THE MATURE I.H. PROGRAM

|                                                                                                                                                                                                   |  | <u>DPMC GRADE</u>       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|
|                                                                                                                                                                                                   |  | 0 = Not addressed       |
|                                                                                                                                                                                                   |  | 1 = Minimal involvement |
|                                                                                                                                                                                                   |  | 2 = Active involvement  |
|                                                                                                                                                                                                   |  | 3 = Desired level       |
| 1. Periodic baseline monitoring for primary exposures on each job, (to document compliance, for epidemiology, and for defensive litigation).                                                      |  | 3                       |
| 2. Special monitoring and reviews made pro-actively to minimize impact of new regs and Shell guidelines; responsive to HS+E requests and employee complaints.                                     |  | 2                       |
| 3. Coverage of turnarounds to evaluate exposures, and work practices. Measurements made to assess decontamination status.                                                                         |  | 2                       |
| 4. Compliance or intent to comply with specific OSHA/EPA Health Regs and Shell Health/Safety Programs.                                                                                            |  | 3                       |
| 5. Active interface with Medical.                                                                                                                                                                 |  | 3                       |
| 6. Audits of field programs routinely conducted to facilitate and document compliance.                                                                                                            |  | 1                       |
| 7. Ongoing development of new programs to meet new health issues ( welding hazards, Facial Hair Policy, etc.).                                                                                    |  | 3                       |
| 8. Technical oversight provided on respirator use, protective clothing selection, ventilation, exposure controls, etc.                                                                            |  | 2                       |
| 9. Special training and educational programs provided to employees, supervisors, contractor mgt., and line organizations to keep them up to date on regs., and current Industrial Hygiene issues. |  | 2                       |
| 10. Program management: providing training to Health/Safety personnel, review of data collected, cross training, improving departmental efficiency and internal auditing.                         |  | 2                       |
| 11. Responsiveness to special demands outside agencies, emergencies, non-Shell facilities, customers, litigation needs.                                                                           |  | 2                       |

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TABLE 6

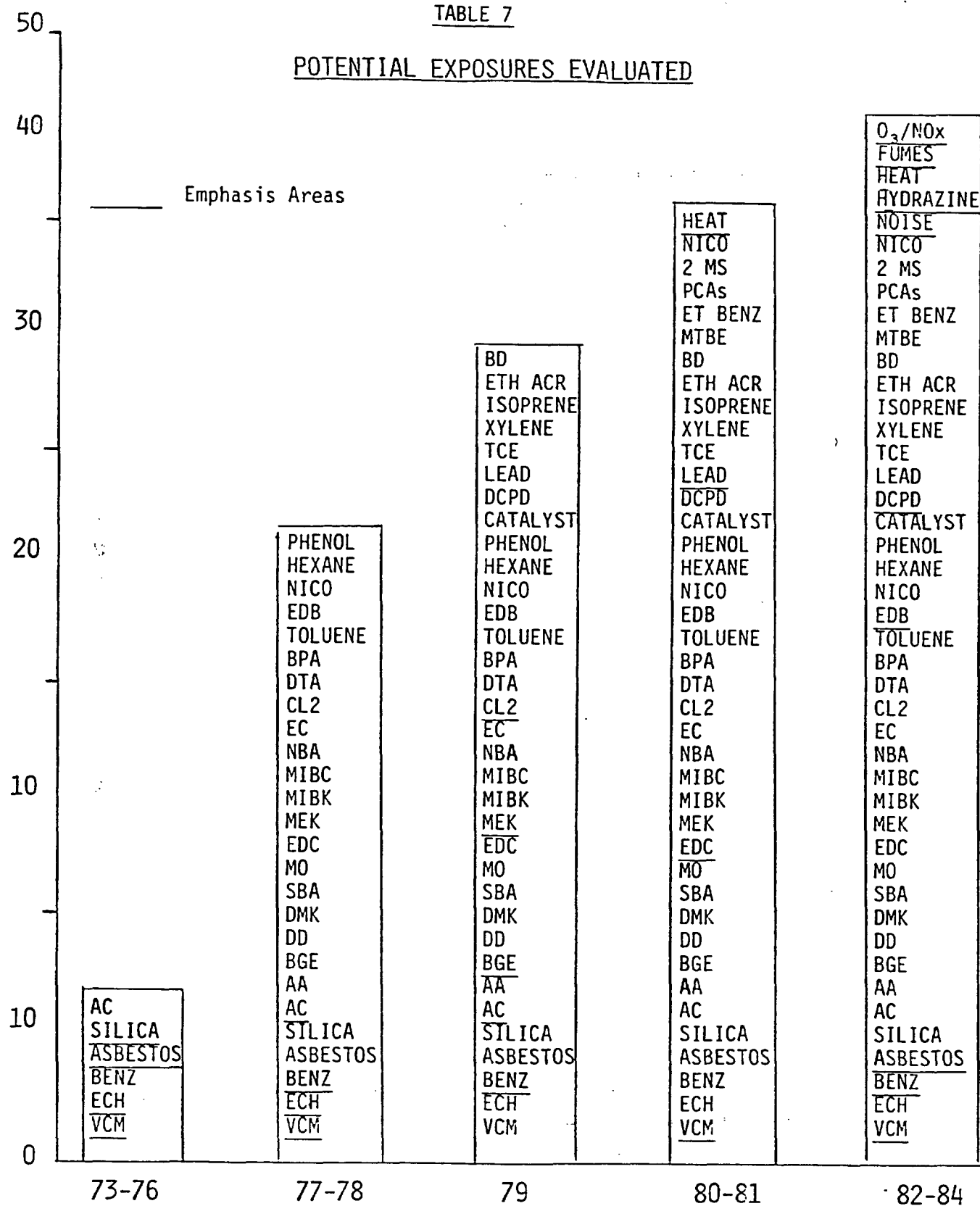
# I.H. SURVEYOR WORK DISTRIBUTION



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TABLE 7

## POTENTIAL EXPOSURES EVALUATED



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Increased Monitoring Coverage

See Tables 7, 8, 9

The mechanics of monitoring has also changed with several different methodologies being utilized to address a growing number of potential exposures. Many methods require special sampling and storage considerations. The program has evolved to the point where 1800 measurements are collected yearly in 30-40 different work areas for 40+ different potential exposures.

Further, a significant new emphasis is also being placed on recordkeeping. The full recognition that each exposure measurement generates a legal document (which may be subpoenaed in the future) has caused additional quality assurance measures to be incorporated in the program. The above factors require that each technician conducting sampling be capable of following specific sampling and recordkeeping procedures, and understand the significance of each measurement made.

Past Growth, Future Program Needs

See Table 10

Table 10 illustrates the number of different programs that now require the time of a professional Industrial Hygienist, or experienced paraprofessional. Wherever possible, Industrial Hygiene support staff may also participate in program development, and implementation. Some programs are eventually "turned over" to the line organization; however updates, consultation and followup periodically involve the Industrial Hygiene resource.

It is anticipated that new/future regulations will place additional work on the Central DPMC Industrial Hygiene organization, (hazard communications, TOSCA, benzene regulation, etc). To the extent that this does occur, appropriate reallocation of technician time will have to be made to accommodate local needs. While a temporary increase in technical staff may be indicated to prepare for the retirement of a senior Industrial Hygiene group member, no long term increase in staff levels is anticipated.

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TABLE 8  
INDUSTRIAL HYGIENE ROUTINE MONITORING DPMC SOUTH\*

| INDUSTRIAL HYGIENE ROUTINE MONITORING DPMC SOUTH* |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
|---------------------------------------------------|------------|----|--------------|---------|---------|-----|-----------|----------|-----|------|-----|-----|-----|-----|-----------------|----|-----------|-----|-----|-----|-----|------|------|----|-----|---------|-----|---------|-----|-----|
| EXPOSURE                                          | DEPARTMENT | AC | Acetonitrile | Acetone | Benzene | BPA | Butadiene | Chlorine | DAA | DCPD | DDO | ECH | EDC | 2EH | Glycidyl Ethers | HG | Hydrazine | IBA | IPA | MDA | MEK | MIBC | MIBK | MO | NBA | Oxetols | SBA | Styrene | TCP | VCM |
| A/SR                                              |            |    |              |         |         |     |           |          |     |      |     |     |     | X   |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| PA                                                |            |    |              |         | X       |     |           |          |     |      |     |     |     |     |                 |    |           | X   |     |     |     |      |      |    |     |         | X   |         |     |     |
| ENVIRONMENTAL                                     |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| (C)                                               |            |    |              |         |         |     |           | X        |     |      |     |     |     |     |                 | X  |           |     |     |     |     |      |      | X  |     |         |     |         | X   |     |
| ABS                                               |            |    |              |         | X       |     |           | X        |     | X    |     | X   |     |     |                 | X  |           |     |     |     |     |      | X    |    |     |         |     |         |     |     |
| LIQUID RESINS                                     |            |    |              |         | X       |     |           |          |     |      |     | X   |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| P III                                             |            |    |              |         |         |     | X         |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| IS DIST.                                          |            |    |              |         | X       |     | X         |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| ESINS DIST.                                       |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| ESIN SOLUTIONS                                    |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| SPECIALITIES                                      |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| OLID RESINS                                       |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| ILITIES SO.                                       |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| M                                                 |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |
| INTENANCES                                        |            |    |              |         |         |     |           |          |     |      |     |     |     |     |                 |    |           |     |     |     |     |      |      |    |     |         |     |         |     |     |

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MONITORED FOR VARIOUS MATERIALS INCLUDING CRAFT SPECIFIC EXPOSURES, EG. WELDING FUMES, ASBESTOS.

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MONITORED FOR VARIOUS MATERIALS INCLUDING CRAFT SPECIFIC EXPOSURES, EG. WELDING FUMES, ASBESTOS.

Routine monitoring - annual, semi-annual, quarterly or more frequent.  
 Noise monitoring is routinely conducted on all jobs which exceed 80 dBA (8 Hr. TWA).  
 Non-routine monitoring may include: heat stress, asbestos, PCA's, catalyst dust & nickel carbonyl.

TABLE 9  
INDUSTRIAL HYGIENE ROUTINE MONITORING DPMC NORTH

| EXPOSURE          | Alpha Methyl Styrene | Benzene | Cumene | Ethyl Benzene | ECH | EDC | Hexane | Hydrazine | MEK | MTBE | Toluene | Xylene |
|-------------------|----------------------|---------|--------|---------------|-----|-----|--------|-----------|-----|------|---------|--------|
| DEPARTMENT        |                      |         |        |               |     |     |        |           |     |      |         |        |
| Alkylation        |                      |         |        |               |     |     |        |           |     |      |         |        |
| Aromatics         |                      | X       |        |               |     |     | X      |           |     |      | X       | X      |
| Cat Cracking      |                      | X       |        |               |     |     |        |           |     |      | X       |        |
| Cat Reforming     |                      | X       |        | X             |     |     |        |           |     | X    | X       |        |
| Disp. Docks       |                      | X       |        |               | X   | X   |        |           |     | X    |         |        |
| Disp. Tank Farm   |                      | X       |        |               |     |     |        |           |     |      | X       |        |
| Distilling        |                      | X       |        |               |     |     |        |           |     |      | X       |        |
| Environmental     |                      | X       |        |               |     |     |        |           |     |      | X       |        |
| Gas Recovery      |                      |         |        |               |     |     |        |           |     |      |         |        |
| Hydroprocessing   |                      | X       |        |               |     |     |        |           |     |      |         |        |
| Lube A            |                      |         |        |               |     |     |        |           |     |      |         |        |
| Lube B            |                      |         |        |               |     |     |        |           | X   |      | X       |        |
| Lube C            |                      |         |        |               |     |     |        |           |     |      |         |        |
| Phenol Acetone    | X                    | X       | X      |               |     |     |        |           |     |      | X       |        |
| Refinery Lab      |                      | X       | X      |               |     |     |        |           |     |      | X       |        |
| Solvents & Treat. |                      | X       |        |               |     |     |        |           |     |      |         |        |
| Thermal Crack.    |                      | X       |        |               |     |     |        |           |     |      | X       |        |
| Utilities Cent.   |                      |         |        |               |     |     |        | X         |     |      |         |        |
| Utilities North   |                      |         |        |               |     |     |        | X         |     |      |         |        |
| Maintenance       |                      |         |        |               |     |     |        |           |     |      |         |        |

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Monitored for various materials including craft specific exposures eg. welding fumes, asbestos, lead burning.

TABLE 10

## INDUSTRIAL HYGIENE ACTIVITIES 1973 - 1986

| 1973-74                 | 1975-76                                                                         | 1977-79                                                                                                                                                                                                              | 1980-82                                                                                                                                                                                                                                                             | 1983-84                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1985-86                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VCM Reg<br>Lab Analysis | VCM Reg<br>Lab Analysis<br>Chlorine<br>Asbestos Reg<br>Benzene Sampling<br>Misc | VCM Reg<br>VCM Records<br>Lab Analysis<br>Chlorine<br>Asbestos Reg<br>Benzene Reg<br>Lube Study<br>ECH Study<br>MSDS Program<br>Wall Charts<br>ECH Exposures<br>DDO Exposures<br>Shutdown Assist<br>Training<br>Misc | VCM Reg<br>VCM Records<br>Asbestos Reg<br>Benzene Guideline<br>MSDS Program<br>Respirator Prog<br>Fit Testing<br>JEPs<br>Mortality Study<br>I.H. Recordkeeping<br>Vessel Entry<br>Tank Cleaning Proc<br>Shutdown Assist<br>Shutdown Ventil<br>Expanded Trng<br>Misc | VCM Reg<br>VCM Records<br>Asbestos Reg<br>Benzene Guideline<br>MSDS Program<br>Respirator Prog<br>Inert Entry<br>JEPs<br>Mortality Study<br>I.H. Recordkeeping<br>Audits<br>Vessel Entry Checks<br>Tank Cleaning Proc<br>Welding<br>Leukemia Study<br>Litigation<br>Respirator Training<br>Embryo Fetus<br>Respirator Trng<br>Embryo Fetus<br>Complaint Investig<br>Hearing Cons Reg<br>Safety Insp Trng<br>Shutdown Assist<br>Shutdown Ventil<br>Expanded Training<br>Misc | VCM Reg<br>Asbestos Reg<br>Benzene Reg<br>MSDS Program<br>Resp Program<br>Inert Entry<br>JEPs<br>Mortality Study<br>I.H. Recordkeeping<br>Audits<br>Vessel Entry Checks<br>Welding<br>Leukemia Study<br>Litigation<br>Respirator Training<br>Embryo Fetus<br>Hearing Cons Reg<br>Complaint Investig<br>Hazard Comm Reg<br>TOSCA<br>Safety Insp Trng<br>Shutdown Assist<br>Shutdown Ventil<br>Expanded Training<br>Misc |

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DPMC-16582

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- Lab Analysis stopped
- VCM monitoring reduced
- Chlorine stopped
- Wall Charts stopped
- "Training Manuals"
- Fit testing reduced by 50%
- Reduced inter-action with field
- Reduced interaction with catalyst jobs
- Reduced clerical
- 1 JEPs to MUTs
- VCM records to V

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### Program Benefits

While several Industrial Hygiene work activities have no immediate "pay out", there have been recent noteworthy accomplishments, which include:

- \* Exposure monitoring has identified excessive exposure in the following circumstances (either now abated or under review).
  - Railroad cab noise
  - North and South Shops noise levels
  - Plasma arc cutting fumes/gases
  - Benzene exposure from barge loading
  - Welding exposures in confined spaces
  - VCM exposure during T.C. loading
  - DCPD T.T. Loading
  - Hydrazine handling facilities
- \* The Respirator Service Center now provides excellent employee protection at a cost approximately equal to 1977 levels. Equipment purchases are significantly less due to improved maintenance and resource management.
- \* Respirator use is increased at DPMC due to better acceptance in the field. Monthly over 1,000 respirators are cleaned at the Respirator Service Center, with 300 airline masks being used in a "good" month.
- \* Benzene monitoring data from 1977 was recently successfully used to defend against a law suit alleging workplace induced leukemia.
- \* Significant savings have been realized managing respiratory protective equipment as a shared resource. Approximately \$100,000 is saved annually by providing contractors equipment for turnarounds, (equipment costs alone).

**LAM 000882**

- \* DPMC Industrial Hygiene is occasionally able to influence proposed regulations, examples include:
  - Proposed regulations on oxitols.
  - Fit test data submitted to OSHA showing the capability of a mask presently in use at DPMC.
- \* Work completed at DPMC frequently influences Head Office guidance and pro-actively allows a smoother implementation locally, e.g.
  - Hydrazine monitoring
  - Video display terminal eyeglass recommendations (ergonomics)
  - DPMC mortality study
  - Welder health/safety training.
- \* Frequently employee complaints are resolved locally by Industrial Hygiene prior to the employee contacting OSHA. (Industrial Hygiene serves as the "last stop" prior to going outside Shell). This "good will" avoids several OSHA visits each year.
- \* A tracking mechanism (JEPs) has been put into place to minimize the need for conducting future epidemiology studies through interviews. The estimated cost for the 1983 study was \$800,000 based on 1,000 manhours of work.

*Phil Snyder*

P. J. Snyder

PJS/mh

cc: ECB Satellite

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