

Check Sheet

Company Name: Harris Semiconductor
Permit Number: AC 09-147883
PSD Number: _____
Permit Engineer: _____

Application:

- Initial Application
 - Incompleteness Letters
 - Responses
 - Waiver of Department Action
 - Department Response
 - Other

Cross References:

- AC 09-138794
- AC 09-147321
-

*not necessary
app fees not reimbursed*

Intent:

- Intent to Issue
- Notice of Intent to Issue
- Technical Evaluation
- BACT Determination
- Unsigned Permit
- Correspondence with:
 - EPA
 - Park Services
 - Other
- Proof of Publication
 - Petitions - (Related to extensions, hearings, etc.)
 - Waiver of Department Action
 - Other

Final Determination:

- Final Determination
- Signed Permit
- BACT Determination
- Other

Post Permit Correspondence:

- Extensions/Amendments/Modifications
- Other

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

FOR ROUTING TO DISTRICT OFFICES AND/OR TO OTHER THAN THE ADDRESS		
To: _____	LOCTR: _____	
To: _____	LOCTR: _____	
To: _____	LOCTR: _____	
From: _____	Date: _____	
Reply Options:	Reply Required:	INTC. Only:
Date Due: _____	Date Due: _____	

*Record 138794 does
not exist.*

TO: Air Quality

FROM: Larry Wright, Assistant Chief *LW*
Bureau of Accounting and Budgeting

DATE: 1-26-88

SUBJECT: Refund of Fees

Your application for refund for Harris Semiconductor,
File # AC05-138794, is complete.

State of Florida Warrant 4 13658 37, dated 1-20-88 and
in the amount of \$ 100.00, was mailed 1-22-88.

April 13, 1988

LRW/kbr

*This permit number has been replaced
with permit number AC05-147883. The refund
can now be entered into the pats system.*

*Manks,
Maggie*

Refund processed on Agency Voucher C 3662

Fiscal Year 87-88

BEST AVAILABLE COPY



March 12, 1990

Express Mail

Charles M. Collins, P.E.
Program Administrator
Air Resources Management
Central Florida District
Florida Department of Environmental Regulation
3319 Maguire Blvd., Suite 232
Orlando, Florida 32803

RE: Brevard County - AP
Warning Notice - OWN-AP-89-0151

Dear Mr. Collins:

This letter is submitted on behalf of Harris Corporation, Semiconductor Sector ("Semiconductor") to follow-up on our letter of February 16. In that letter, it was stated that Semiconductor would, within 30 days, submit a schedule outlining the activities that will be undertaken to identify reasonable and appropriate solutions to the odor issue.

As mentioned in previous correspondence, Jacobs Engineering Group, Inc. ("Jacobs") has been retained by Semiconductor to facilitate the odor issue investigation. In a recent meeting, Jacobs recommended a revision of the suggested activities as outlined in the February 16 letter. As such, Jacobs has recommended that the odor investigation continue as follows:

Work Item One : Chemical inventory and historical stack monitoring information will be reviewed and used in a dispersion model to determine areas that may be affected by odors. This change was recommended by Jacobs as opposed to running stack analyses on all emission points from Bldg. 54. Jacobs feels that previous monitoring activities will provide the information needed for the dispersion modeling.

This item is scheduled to be completed by March 30, 1990.

Work Item Two: Through the use of an Organic Vapor Analyzer in GC mode, investigate the level of constituents present at likely "odor hot spots." These areas would be determined through the use of the computer dispersion model outlined in Work Item One.

This item is scheduled for completion by April 27, 1990.

This is the plan of action Semiconductor intends to pursue.

RECEIVED

MAR 22 1990

DER-BAQM

BEST AVAILABLE COPY

Subsequent to these activities, Semiconductor will submit a completed report, by May 4, 1990, detailing the information obtained during completion of the Work Items. This report will include any proposed modifications or process changes.

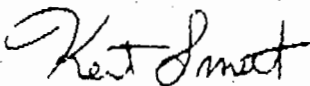
To supplement these activities, Semiconductor has already contracted with Air Consulting and Engineering (ACE) to conduct GC/MS sampling from one of the stacks at Building 54. The stack chosen is the most likely candidate to be contributing to the alleged odor problem. Due to the prohibitive cost of running complete analyses on all stacks (\$60,000 per stack for 24 hours of sampling as quoted by Jacobs), we chose to sample one stack for a period of 10 operating hours. This will give us total coverage of first shift activities along with 1 hour on either side of shift changes. This data will subsequently be utilized in the dispersion model to add further background information to the investigation.

In addition to these activities, Semiconductor has taken a close look at the processes within the Building 54 wafer fabrication area that may be a source of the odor issue. We are contacting our customers to determine if it may be possible to replace some of the process chemicals currently in use with substitutes that may have less potential to cause or contribute to odors at the facility. We are also continuing to review operating procedures and process configurations in order to ensure that reasonable steps have been taken in the proper control of the subject chemicals.

As indicated in my telephone conversation with Caroline Shine on March 8, Semiconductor has requested the Tallahassee DER office for an extension on the submission of appropriate operating permit applications for this facility. It does not appear worthwhile for either DER or Semiconductor to put effort into obtaining operating permits that will be ultimately denied.

Please contact me at 729-5736 if I can provide any further assistance in this matter.

Yours truly,



Kent Smith
Manager, Environmental Services

3-22-90

Bill,

Here's the FAX from

Harris Semi. Nancy sent
the original on Monday
to the wrong FAX #.

- cc: D. R. Erdley
- R. R. Sands
- L. R. Hutker
- J. R. Steiner

*of Jacobs
3-22-90
for*

BEST AVAILABLE COPY

HARRIS SEMICONDUCTOR
ENVIRONMENTAL SERVICES DEPARTMENT
FAX TRANSMITTAL

DATE: 3/22/90
TO: B. Mitchell
FROM: Nancy Baldisserotto
of pages (including cover)
MESSAGE:

FAX (904) 487-4938
FAX # (407) 729-5153

*Please call B. Mitchell
or P. Adams
at 8-1344.*

(407) 729-4061
P.O. Box 883, Melbourne, FL 32901-00833
MS 59-006

P 274 010 467

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL
(See Reverse)

* U.S.G.P.O. 1985-480-794

PS Form 3800, June 1985

James R. Kolanek	
Harris Semiconductor	
Street and No.	
P.O. Box 883	
Melbourne, FL 32901	
Postage	\$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt showing to whom and Date Delivered	
Return Receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date	
Mailed: 01/22/88	
RE: Exhaust Fan System - Building 54	

SENDER: Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. Show to whom delivered, date, and addressee's address. 2. Restricted Delivery.

3. Article Addressed to: James R. Kolanek
 Manager, Environmental Services
 Harris Semiconductor
 P.O. Box 883
 Melbourne, FL 32901

4. Article Number

P 274 010 467

Type of Service:

- Registered Insured
 Certified COD
 Express Mail

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature - Addressee

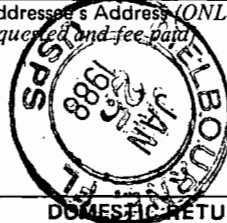
X

6. Signature - Agent

X

7. Date of Delivery

8. Addressee's Address (ONLY if requested and fee paid)



file

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400



BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY

January 21, 1988

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. James R. Kolanek
Manager, Environmental Services
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

Dear Mr. Kolanek:

Re: Application to Construct an Air Pollution Source
Exhaust Fan System - Building 54

Based on a review of the above referenced application package, supplementary material, and discussions with the Central Florida District office, it has been determined that the proposal to install an exhaust fan system in Building 54 at your existing facility does not require an air construction permit at this time. A request for reimbursement of the application fee is already in processing (copy enclosed).

If there are any questions, please call Bruce Mitchell at (904)488-1344, or write to me at the above address.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/BM/s

enclosure

cc: T. Sawicki, CFD
B. Pittman, Esq.

Form DBF-AA-4
Rev. 7/1/80

APPLICATION FOR REFUND
FROM
STATE OF FLORIDA

STATE OF FLORIDA)

COUNTY OF _____)

Pursuant to the provisions of Section 215.26, or Section _____ *,
Florida Statutes, I hereby apply for a refund and request that a State warrant be
drawn in favor of:

NAME: Harris Semiconductor

ADDRESS: Post Office Box 883

Melbourne, Florida 32901

AMOUNT: \$100.00

which represents moneys I paid into the State Treasury subject to refund, and to substantiate
such claim the following facts are submitted:

Reason for Claim: Over payment

Associated with permit # AC05-138794 and AC 05-138795

CERTIFIED TRUE AND CORRECT this 5th day of January 1988

(Signature)

*Must be completed if authority is other than Section 215.26, Florida Statutes.

(FOR AGENCY USE ONLY)

(1) Agency recommends denial of above claim based on the following facts, including statutory
authority for collection: _____

or

(2) Agency recommends approval of above claim and submits the following information to sub-
stantiate such claim.

The amount recommended \$ _____.

The amount requested above was originally deposited into the State Treasury, included
in the State Treasurer's Receipt # _____, dated _____.

() General Revenue _____
(Revenue Code)

() Trust _____
(Name and Code Number of Trust Account)

Statutory Authority for Collection _____

It is requested that payment be made from:

() Refund of Overpayment of Taxes - General Revenue-Refunds (1-441-0211)

() Trust _____
(Name and Code Number of Trust Account)

CERTIFIED TRUE AND CORRECT this _____ day of _____ 19 _____,

(Agency)

R Bruce Mitchell

(Signature of Authorized Person)

Engineer IV

(Title)

SECTION 215.26 STATES, IN PART: "APPLICATION FOR REFUNDS AS PROVIDED BY THIS SECTION SHALL BE
FILED WITH THE COMPTROLLER, EXCEPT AS OTHERWISE PROVIDED HEREIN, WITHIN 3 YEARS AFTER THE RIGHT
TO SUCH REFUND SHALL HAVE ACCRUED ELSE SUCH RIGHT SHALL BE BARRED." Three years is interpreted
as meaning three years from the date of payment into the State Treasury.

1989

Department of Environmental Regulation

BEST AVAILABLE COPY

Daily Cash Listing

Date Received 9-01-87

Bureau of Accounting & Budgeting (Revenue Section)

Date Bureau of Air Quality Received 9/2/87

Lister's Signature Nola Daughtry

8

Signature of Receiver Margaret Jones

REMITTED BY	CHECK NUMBER	AMOUNT	RECEIPT NUMBER	REVENUE CODE	FILE NUMBER
Harris Corporation	# 020316	\$ 100.00	76177	001031	AC 05-138792
Harris Corporation	# 020335	\$ 100.00	76178	001031	AC 05-138795
DER SEP 01 1987 BAQM					
		\$ 200.00			

VOUCHER NUMBER	INVOICE NUMBER	PURCHASE ORDER	INVOICE DATE	AMOUNT	DISCOUNT	NET AMOUNT
071654	072787		07-27-87	100.00	.00	100.00
T O T A L S				100.00	.00	100.00

REMITTANCE STATEMENT / DETACH BEFORE DEPOSITING **BEST AVAILABLE COPY** HARRIS SEMICONDUCTOR SECTOR



1989
THE FIRST NATIONAL BANK OF ATLANTA
AUGUSTA, GEORGIA 64-1327 611

020316

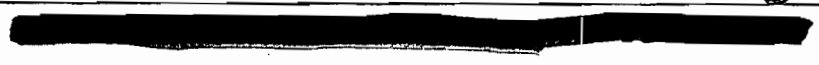
DATE	CHECK NO.	NET AMOUNT
08/14/87	00020316	***100.00

PAY ONE HUNDRED AND 00/100 DOLLARS

TO THE ORDER OF STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

HARRIS CORPORATION SEMICONDUCTOR SECTOR

[Signature]
COUNTERSIGNED
AUTHORIZED SIGNATURE



STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION No. 76177

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Harris Semiconductor Date Sept 2, 1987
 Address Palm Bay Rd., Palm Bay, FL 32901 Dollars \$ 100.00
 Applicant Name & Address J.R. Kolanek, Mgr., Env. Svs., P.O. Box 883, Melbourne, FL 32901
 Source of Revenue ✓ # 00020316
 Revenue Code 001031 Application Number AD05-15879A
 By Margaret V. Deard

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices And/Or To Other Than The Addressee		
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
To: _____	Loctn.: _____	
From: _____	Date: _____	
Reply Optional []	Reply Required []	Info. Only []
Date Due: _____	Date Due: _____	

TO: Revenue Section
Bureau of Accounting and Budgeting

FROM: Cost Center Air Quality - Bruce Mitchell

SUBJECT: Cash Listing Number 8 Dated 9-1-87

The cash listing received from your office has been checked and confirmed to be correct in all areas.

09-02-87
Date

Margaret V. James
Signature of verifying party

DER

SEP 01 1987

BAQM

The cash listing received from your office has been checked and found to contain one or more discrepancies. A corrected cash listing is attached. Please adjust your records accordingly.

Date

Signature of verifying party

Number of remittances in this cash listing 2.

Mailed 9/28/87 - wmk

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400



BOB MARTINEZ
GOVERNOR
DALE TWACHTMANN
SECRETARY

September 25, 1987

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. James R. Kolanek
Manager, Environmental Services
Harris Semiconductor
P. O. Box 883
Melbourne, Florida 32901

Dear Mr. Kolanek:

Re: Completeness Review on the Applications to Construct
Air Pollution Sources
Permit Nos. AC 05-138794 and -138795

The Department received your cover letter dated August 28, 1987, and the above reference applications on August 31, 1987. Based on a review of these applications, they have been deemed incomplete. The following information, including all reference material, calculations and assumptions, will have to be submitted to the Department's Bureau of Air Quality Management before the status can, again, be ascertained.

AC 05-138794

1. For the volatile organic compounds and organic solvents, quantify the potential emissions per chemical in pounds per hour, month, and year.
2. What is the facility designated identification for the scrubber to be used to handle the gas cylinder purges?
3. Where will the scrubber medium be discharged after collection occurs?
4. What is the scrubber's medium?

9-25-87

Clair,

Day 30 for this
is 29th of Sept., which
is Tuesday. Filed under

R/a/MISCELL
BM/Kolanek - return for
typos, edit, etc. For your
approval and signature.
Lambert,
Burr

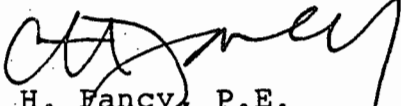
Mr. James R. Kolanek
Page 2
September 25, 1987

AC 05-138795

1. What is the heat capacity in Btu per gallon of the propane?
2. Quantify the potential pollutant emissions in pounds per hour and annually from the firing of the propane.
3. What is the maximum consumption of propane per hour?
4. Based on the submitted potential pollutant emissions, the appropriate processing fee, pursuant to FAC Rule 17-4.05, is \$250.00. Therefore, remit to the Department of Environmental Regulation the amount deficient, which is \$150.00.

If there are any questions, please call Bruce Mitchell at (904)488-1344 or write to me at the above address.

Sincerely,



C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/BM/s

cc: T. Sawicki



Subcedu 05
PM
8-28-87
Purolator Courier
Jcket # 880612765

AC 05-138794
Rec'd: 8-31-87
Pd. \$100.00
Receipt # 76177
MR-9-1-87

FS-JRK-029-88

August 28, 1987

DER ^{New permit number}
AC05-147883
AUG 31 1987
BAQM

Mr. C. H. Fancy
Deputy, Bureau Chief
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

SUBJECT: Air Permit Application - B-54 Exhaust (F54E17)

Dear Mr. Fancy:

Enclosed please find the original and three copies for the subject air permit application for Harris Semiconductor's facility in Palm Bay, Florida. Also enclosed is the construction permit application fee.

This source will be exhausting air from three areas; aligners, furnace source cabinets, and gas cabinets. Normal emissions from these sources are anticipated to be less than detectable concentrations.

If you should have any questions, please feel free to contact me at (305) 724-7467.

Sincerely,

James R. Kolanek, Manager
Environmental Services

/pgc

enclosures

cc: FDER - Orlando

BEST AVAILABLE COPY

Purolator courier Purolator Account No. to be billed: 53-94-2771 Date: 7-27-87 **880612765**

Service - Check One - See reverse side for detail
 ParaLetter Overnight Letter ParaPak Overnight Pack Priority National Overnight Service Network Priority Regional Overnight Service Standard 2-day Service Optional Service Saturday Deliv. Extra Charge Hold for Pick-up Payment Sender Prepaid Third Party Cash/Check Collect

From Sender's Name: 7-Eleven Sender's Area Code/Phone Number: (351) 747-7472 To Recipient's Name: Qui Quarty Recipient's Area Code/Phone Number: (404) 391-1111

Company Name: HARPLES STEEL INDUST Company Name: F.D.F.C. - Nancy Dept./Suite: DER

Street Address: PALM BEACH PD IL... Street Address (P.O. Box numbers not deliverable): ...

City: PALM BEACH State: FL Zip Code - Required: 33411 City: TALLAHASSEE State: FL Zip Code - Required: 32302

Sender's Signature: [Signature] P.O. or Reference Number: ... Third Party Billing Name/Address: ...

Tariff	Rate Item	SM	Origin Airport	Destination Airport		
Advance	Valuation	Code	Amount	Code	Amount	Total Charge
Special Charge	<input type="checkbox"/> DB	Route	Courier Guard Initial	S.S. - Last 4 digits	PUROLATOR USE ONLY	

Weight: 5 L ... W ... H ...

81-3 Rev. 4-86

RECIPIENT'S COPY

Handwritten notes: BAOM, DER, AUG 31 1987, 113 31 055, 770

01-000-S0101

HARRIS SEMICONDUCTOR

00020316

VOUCHER NUMBER	INVOICE NUMBER	PURCHASE ORDER	INVOICE DATE	AMOUNT	DISCOUNT	NET AMOUNT
071654	072787		07-27-87	100.00	.00	100.00
TOTALS				100.00	.00	100.00

REMITTANCE STATEMENT / DETACH BEFORE DEPOSITING

HARRIS SEMICONDUCTOR SECTOR



HARRIS CORPORATION
SEMICONDUCTOR SECTOR

1989
THE FIRST NATIONAL BANK OF ATLANTA
AUGUSTA, GEORGIA

64-1327
611

020316

PAY

DATE
08/14/87

CHECK NO.
00020316

NET AMOUNT
*****100.00

ONE HUNDRED AND 00/100 DOLLARS

TO THE ORDER OF

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

HARRIS CORPORATION SEMICONDUCTOR SECTOR

COUNTERSIGNED
[Signature]
AUTHORIZED SIGNATURE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

No 76177

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Harris Semiconductor Date Sept. 2, 1987
 Address Palm Bay Rd., Palm Bay, FL 32901 Dollars \$ 100.00
 Applicant Name & Address J.R. Kolanek, Mgr., Env. Svs., P.O. Box 883, Melbourne, FL 32901
 Source of Revenue ✓ # 00020316
 Revenue Code 001031 Application Number AC05-138794

By Margaret V. [Signature]



FS-JRK-029-88

80103)

August 28, 1987

Mr. C. H. Fancy
Deputy, Bureau Chief
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

SUBJECT: Air Permit Application - B-54 Exhaust (F54E17)

Dear Mr. Fancy:

Enclosed please find the original and three copies for the subject air permit application for Harris Semiconductor's facility in Palm Bay, Florida. Also enclosed is the construction permit application fee.

This source will be exhausting air from three areas; aligners, furnace source cabinets, and gas cabinets. Normal emissions from these sources are anticipated to be less than detectable concentrations.

If you should have any questions, please feel free to contact me at (305) 724-7467.

Sincerely,

James R. Kolanek, Manager
Environmental Services

/pgc

enclosures

cc: FDER - Orlando

DER

SEP 01 1987

BAQM

RECEIVED
DER - MAIL ROOM
1987 SEP - 1 AM 10: 31

DEPARTMENT OF ENVIRONMENTAL REGULATION



DER

AUG 31 1987

BAQM

BOB GRAHAM
GOVERNOR
VICTORIA J. TSCHINKEL
SECRETARY

WIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Stationary [X] New¹ [] Existing¹

APPLICATION TYPE: [X] Construction [] Operation [] Modification

COMPANY NAME: Harris Semiconductor COUNTY: Brevard

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) B-54 Exhaust F54E17

SOURCE LOCATION: Street Palm Bay Road City Palm Bay

UTM: East 17-538700 North 17-3100900

Latitude 28 ° 1 ' 20 "N Longitude 80 ° 36 ' 10 "W

APPLICANT NAME AND TITLE: N.A. Baldisserotto, Environmental Engineer, Environmental Services

APPLICANT ADDRESS: P.O. Box 883, Melbourne, Florida 32901

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Harris Semiconductor

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: James R. Kolanek

J. R. Kolanek, Manager, Env. Scvs.
Name and Title (Please Type)

Date: 8-18-87 Telephone No. (305) 724-7467

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

¹ See Florida Administrative Code Rule 17-2.100(57) and (104)



the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed Chet Bach

Chet Bach
Name (Please Type)

Harris Semiconductor
Company Name (Please Type)

P.O. Box 883, Melbourne, Florida 32901
Mailing Address (Please Type)

Chet Bach
8/10/87

Florida Registration No. 19110 Date: 8/10/87 Telephone No. (305) 724-7324

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

See Attachment A

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction October 1, 1987 Completion of Construction November 1, 1987

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Beverly Pacific Model CB-24 exhaust fan

\$ 5,020.00

\$ 300.00 shipping

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

See Attachment B

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;
if power plant, hrs/yr _____; if seasonal, describe: _____

F. If this is a new source or major modification, answer the following questions.
(Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? NO
a. If yes, has "offset" been applied? _____
b. If yes, has "Lowest Achievable Emission Rate" been applied? _____
c. If yes, list non-attainment pollutants. _____

2. Does best available control technology (BACT) apply to this source?
If yes, see Section VI. NO

3. Does the State "Prevention of Significant Deterioration" (PSD)
requirement apply to this source? If yes, see Sections VI and VII. NO

4. Do "Standards of Performance for New Stationary Sources" (NSPS)
apply to this source? NO

5. Do "National Emission Standards for Hazardous Air Pollutants"
(NESHAP) apply to this source? NO

H. Do "Reasonably Available Control Technology" (RACT) requirements apply
to this source? NO

a. If yes, for what pollutants? _____

b. If yes, in addition to the information required in this form,
any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justifi-
cation for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
SEE TABLE I.				

B. Process Rate, if applicable: (See Section V, Item 1)

- Total Process Input Rate (lbs/hr): N/A
- Product Weight (lbs/hr): N/A

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission ¹		Allowed Emission Rate per Rule 17-2	Allowable ³ Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
SEE TABLE I.							

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

J. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Beverly Pacific Model CB-24	N/A	N/A	N/A	
Exhaust Fan Harris I.D.#F54E17				
See Attachment C				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
N/A			

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ STU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

N/A

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: _____ ft. Stack Diameter: 20½" X 26¼" ~~XXX~~
 Gas Flow Rate: 8,650 ACFM _____ DSCFM Gas Exit Temperature: ambient °F.
 Water Vapor Content: 3.12 % Velocity: 26.73 FPS

SECTION IV: INCINERATOR INFORMATION

N/A

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____

Manufacturer _____

Date Constructed _____ Model No. _____

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: Cyclone Wet Scrubber Afterburner
 Other (specify) _____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.
10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

Yes No

Contaminant	Rate or Concentration
_____	_____
_____	_____
_____	_____

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

Yes No

Contaminant	Rate or Concentration
_____	_____
_____	_____
_____	_____

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration
_____	_____
_____	_____
_____	_____

D. Describe the existing control and treatment technology (if any).

- | | |
|---------------------------|--------------------------|
| 1. Control Device/System: | 2. Operating Principles: |
| 3. Efficiency:* | 4. Capital Costs: |

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

10. Stack Parameters

- a. Height: ft.
- b. Diameter: ft.
- c. Flow Rate: ACFM
- d. Temperature: °F.
- e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:¹
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:²
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes:
- k. Ability to construct with control devices, install in available space, and operate within proposed levels:

2.

- a. Control Device:
- b. Operating Principles:
- c. Efficiency:¹
- d. Capital Cost:
- e. Useful Life:
- f. Operating Cost:
- g. Energy:²
- h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:¹

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:²

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:¹

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:²

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:¹

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:²

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

Explain method of determining efficiency.

Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

(8) Process Rate:¹

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant

Rate or Concentration

Contaminant	Rate or Concentration

(8) Process Rate:¹

10. Reason for selection and description of systems:

¹Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION - N/A

A. Company Monitored Data

1. _____ no. sites _____ TSP _____ () SO₂* _____ Wind spd/dir

Period of Monitoring _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

- a. Was instrumentation EPA referenced or its equivalent? Yes No
- b. Was instrumentation calibrated in accordance with Department procedures?
 Yes No Unknown

B. Meteorological Data Used for Air Quality Modeling

- 1. _____ Year(s) of data from _____ / _____ / _____ to _____ / _____ / _____
month day year month day year
- 2. Surface data obtained from (location) _____
- 3. Upper air (mixing height) data obtained from (location) _____
- 4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

- 1. _____ Modified? If yes, attach description.
- 2. _____ Modified? If yes, attach description.
- 3. _____ Modified? If yes, attach description.
- 4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO ²	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

TABLE #1
EQUIPMENT ATTACHED TO NEW EXHAUST SYSTEM
BUILDING 54

EQUIPMENT	#	CONTAINER	CHEMICAL	VOLUME	GMS OF MATERIAL
Aligner	10	Mercury Lamp	Hg Vapor	N/A	1 g Hg
Furnace Source Cabinet	10	Bubbler	BBr ₃ , POCl ₃	0.0177 CF	BBr ₃ -1200 g; POCl ₃ -750 g
Gas Cabinet	1	T-gas cylinder	Diborane 2%	276 CF	121 g B ₂ H ₆ /6021 g N ₂
	1	K-gas cylinder	Phosphine 2%	187 CF	149 g PH ₃ /6020 g N ₂
	2	T-gas cylinder	Phosphine 1%	240 CF	96 g PH ₃ /7806 g N ₂
	2	T-gas cylinder	Silane 4%	276 CF	415.8 g silane/8705 g N ₂
	2	K-gas cylinder	Ammonia	187 CF	22700 g
	2	K-gas cylinder	Halocarbon-23	187 CF	31800 g
	4	K-gas cylinder	Silane 100%	187 CF	1250 g silane

8/17/87

ATTACHMENT A

HARRIS SEMICONDUCTOR

PROCESS DESCRIPTION

ATTACHMENT A

Harris Semiconductor plans to install an exhaust fan on the east side of Building 54 to handle air flow from a variety of sources. Design criteria calls for the system to handle 6,000 cfm (at 1.0 inch T.S.P.) of exhaust from the following sources;

- Aligners (100 cfm each)
- Furnace source cabinets (200 cfm each)
- Gas cabinets (75 cfm each).

The aligners contain sealed mercury lamps (see Table 1). The mercury vapor is encapsulated in the glass bulb of the lamp. Release of vapors would only occur in the event of the breakage of the bulb. Historically, Harris Semiconductor has not had a problem with lamp breakage.

The furnace source cabinets contain bubblers of BBr_3 and $POCl_3$ (see Table 1). Because the liquids are maintained in a closed system, no vapor emissions should occur. Furnace process fumes are emitted from the open end of the furnace into a scavenger box. These emissions are handled by the existing scrubber systems.

The gas storage cabinets contain sealed cylinders of the gases listed on Table 1. Under normal operating conditions, these cylinders provide gases to the manufacturing process equipment via sealed lines. Emissions into the cabinet do not normally occur. When the cylinders are changed, the remaining gas in the line is purged with nitrogen to the existing scrubber system by way of a separate purge line. In addition to this safeguard, the PH_3 , B_2H_6 and SiH_4 gas cabinets are equipped with MDA PSM 8e Hazardous Gas Monitoring Systems (see Attachment C). The MDA indicates gas leaks by way of an attached alarm system, hence preventing fugitive emissions from going unnoticed.

ATTACHMENT B

HARRIS SEMICONDUCTOR

CURRENT AIR PERMITS

CURRENT AIR PERMITS--HARRIS SEMICONDUCTOR--AUGUST 21, 1987

PERMIT NO.	SCRUB #	ISSUED	EXPIRES
AC 05-104512	F63S02	01/15/86	06/30/86
AC 05-104513	F62S02	01/15/86	06/30/86
AC 05-104515	F59S03	01/15/86	06/30/86
AC 05-104519	F61S01	01/15/86	06/30/86
AC 05-104521	F58S01	01/15/86	06/30/86
AC 05-104522	F57S01	01/15/86	06/30/86
AC 05-104523	F55S01	01/15/86	06/30/86
AC 05-104524	F04S03	01/15/86	06/30/86
AC 05-104525	F04S01	01/15/86	06/30/86
AC 05-104527	F58S02	01/15/86	06/30/86
AC 05-108260	F63S03	02/28/86	06/30/86
AD 05-109845	N/A (F04S07)	11/05/85	10/30/90
AD 05-109846	N/A (F04S06)	11/05/85	10/30/90
AD 05-109850	F04S04	11/05/85	10/30/90
AD 05-109852	N/A (F04S08)	11/05/85	10/30/90
AD 05-109853	F51S02	11/05/85	10/30/90
	F51S03	11/05/85	10/30/90
AD 05-109855	F51S04	11/05/85	10/30/90
AD 05-115803	F04S02	05/20/86	05/22/91
AD 05-115804	F54S03	05/20/86	05/22/91
	F54S04	05/20/86	05/22/91
AD 05-117084	F60S01	05/20/86	05/22/91
AD 05-117085	F51S01	05/20/86	05/22/91
AD 05-121924	F59S01	09/17/86	09/14/91
AD 05-121927	F62S01	09/18/86	09/14/91
AD 05-121930	F63S01	09/16/86	09/14/91
AD 05-121934	F04S05	09/16/86	09/14/91
AD 05-121939	F61S02	09/16/86	09/14/91
AD 05-65408	F54S01	05/03/83	05/02/88
	F54S02	05/03/83	05/02/88
AD 05-71405	F51S05	09/13/83	09/12/88

ATTACHMENT C

HARRIS SEMICONDUCTOR

CONTROL EQUIPMENT

Section 3 Functional Operation

How the PSM-8e Works

The PSM-8e detects toxic gas concentrations by drawing sample air through a chemically impregnated tape, the Chemcassette, which is specially formulated to detect specific toxic gases. It features a dual-level alarm system which permits greater monitoring flexibility. The low-level alarm is usually used as a warning level; the high-level alarm as an evacuation or emergency response level.

The system is equipped with high-flow pumps which pull a representative air sample from each monitoring point to the PSM-8e and subsequently exhaust it from the system. The input from the individual sample lines is controlled by eight two-way solenoid valves. These lines are arranged in two groups, A and B, which are controlled by three-way solenoid valves.

It should be noted that the pumps also maintain a flow of sample air through certain lines which are not being monitored. This ensures rapid, continuous movement of air samples and minimizes sample gas transport time, thereby providing fast response to gas leaks.

The overall operation of the PSM-8e is controlled by the system microcomputer. The monitoring sequence and dual alarm levels are pre-programmed at the factory but can also be user-programmed when necessary. The user-programmable functions are explained in the Programming Section of this manual. If your PSM-8e is designed to

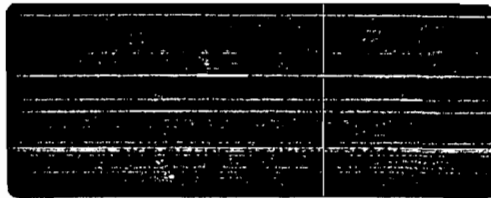
monitor Hydride gases, each individual monitoring point can also be programmed with a response curve for a different hydride gas.

The microcomputer also controls the operation of the Analyzer. It moves the Chemcassette Detection tape through the Detector Head and exposes it to a metered gas sample for a programmed amount of time. If any of the toxic gas is present, a colored stain proportional to the concentration develops on the Chemcassette.

The Opto-Electric system in the Detector Head measures the intensity of the stain and transmits this information to the microcomputer. The computer, in turn, converts this signal into a concentration value. In the Sequential mode of operation, the concentration value at each point is also printed. (Note: This printer function may be disabled, if desired; see Programming Section.)

If the concentration exceeds the pre-programmed alarm level(s), the system automatically activates the appropriate alarm functions and relays.

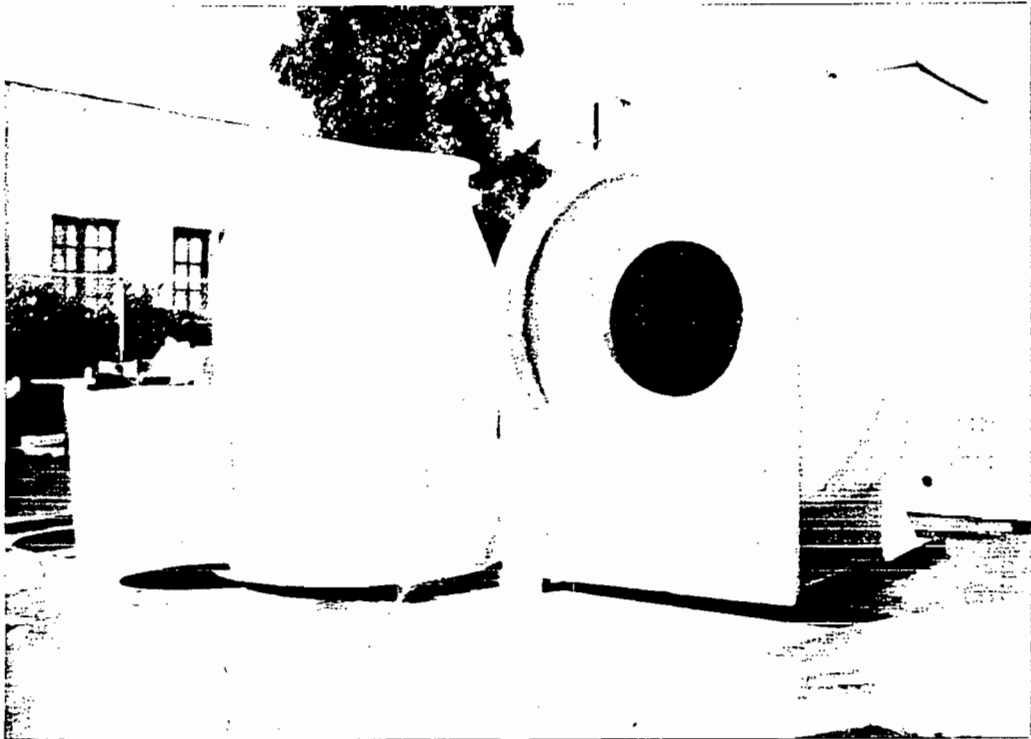
If no, or very low, levels of gas are detected, the segment of Chemcassette is reused for additional samples before the computer advances the tape to the next segment. In this way, analysis time and Chemcassette consumption are minimized. Typically, a Chemcassette will provide 168 hours of continuous, uninterrupted monitoring.



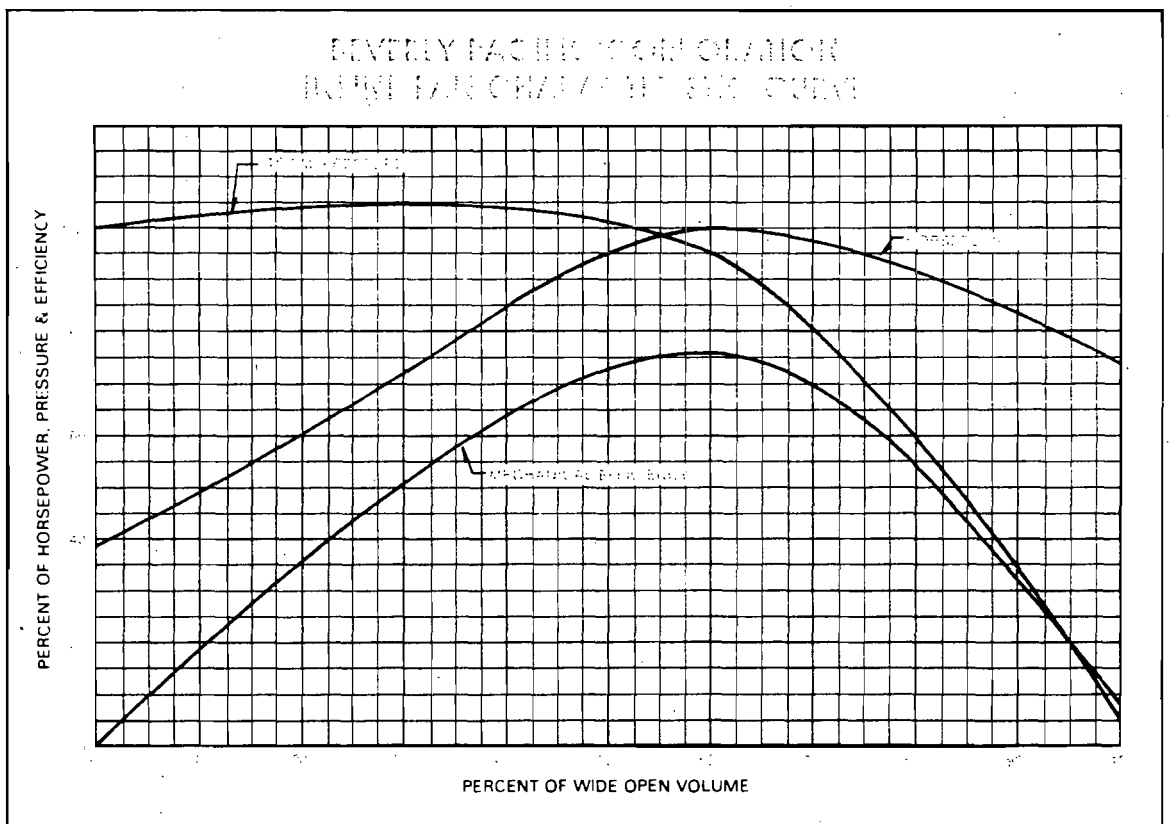
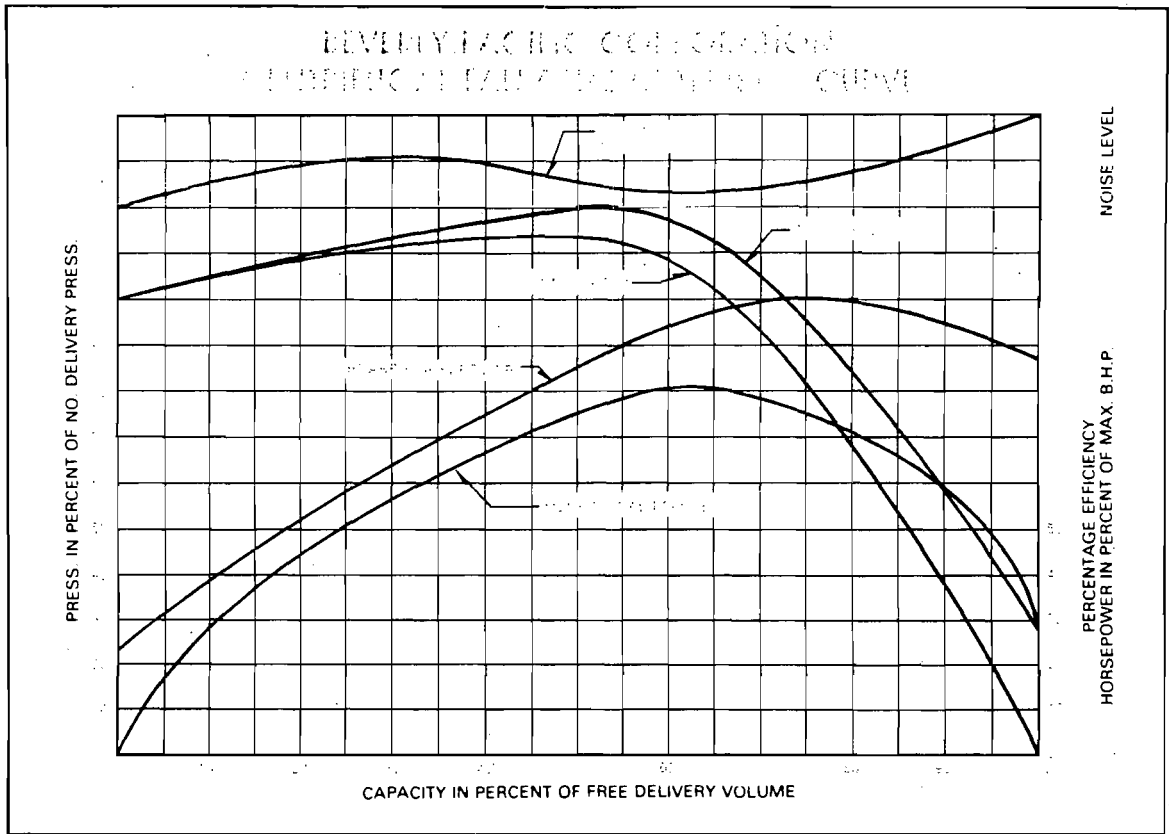
BEVERLY PACIFIC CORPORATION

Industrial Systems Division

EXHAUST FANS



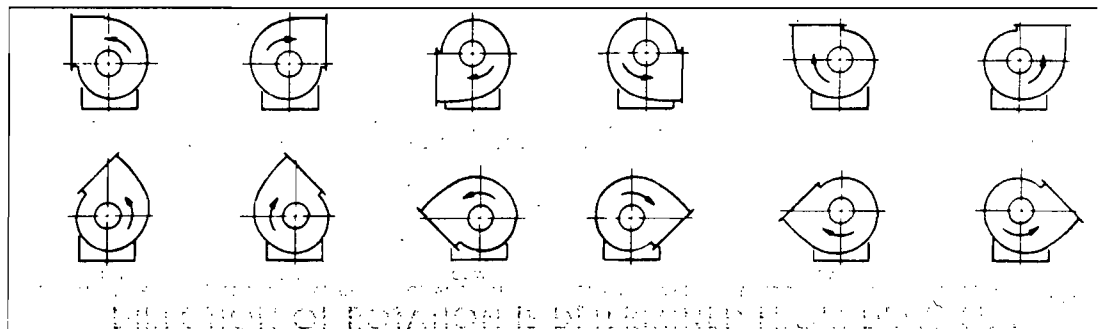
FIBERGLASS REINFORCED PLASTIC



INDUSTRIAL FAN SIZES

	2,150	2,625	3,200	3,900	4,750	5,800	7,075	8,650	10,550	12,875	15,700	19,100
MID-RANGE CFM RECOMMENDED	2,150	2,625	3,200	3,900	4,750	5,800	7,075	8,650	10,550	12,875	15,700	19,100
FAN WHEEL DIAMETER	12 1/4	13 1/2	15	16 1/2	18 1/2	20	22 1/4	24 1/2	27	30	33	36 1/2
A	13 1/2	14 1/2	16 1/2	18 1/4	20	22	24 1/2	26	29 1/4	32 1/4	36	40
B	10 3/8	11 3/8	12 7/8	14 3/8	15	17	18 3/4	20 1/2	22 3/4	25	27	30
C	13 3/8	14 7/8	16 3/8	18 3/8	20	22 1/2	24	26 1/4	29 1/2	32	35 1/4	39
D	34 1/4	35 1/4	40 1/16	42 7/16	45	47 3/4	54	57 1/4	61 1/2	64 3/4	66 3/4	69 3/4
E	22 1/4	22 1/2	27 1/4	29 3/4	32 3/8	36 1/2	39 3/4	43 1/4	49	53	58 3/4	65 1/4
F	15	16	18	19	20	23	26	28	30	33	36	51 1/2
G	11	11 1/2	12 1/2	14	15 1/2	17 1/4	19	21 1/2	23	25 1/2	28 1/2	30 1/2
H	13 3/8	14 3/8	15 7/8	17 3/8	18	21	22 3/4	24 1/2	26 3/4	29	31	34
I	16	16	18 1/4	18 3/4	20	20 1/2	23	23	25	26	26	26
J	3	3	4	4	4	4	6	6	6	6	6	6
K	9 1/4	10 1/4	11 1/4	12 1/2	13 1/2	15	16	18	20 1/2	22	24	27
L	9 1/4	10 1/4	11 1/4	12 1/2	13 1/2	15	16	18	20 1/2	22	24	27
M	3 1/2	3 3/4	4 1/4	4 1/2	5	5 3/4	6 3/8	6 3/8	7 3/8	8 1/4	9 1/2	10 1/2
DRIVE SHAFT DIAMETER	1	1	1 3/16	1 3/16	1 7/16	1 7/16	1 11/16	1 11/16	1 5/16	1 5/16	1 5/16	2 3/16
SHIPPING WEIGHT POUNDS	170	205	230	400	550	600	650	720	850	1,000	1,380	1,610

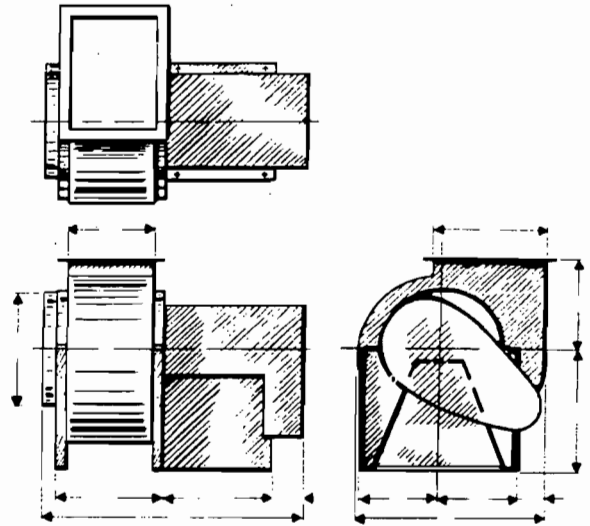
DESIGNATION OF DIRECTION OF ROTATION AND DISCHARGE



INLINE EXHAUST FANS

	IE-12	IE-15	IE-18	IE-20	IE-22	IE-24	IE-27	IE-30	IE-33	IE-36	IE-40	IE-44
MID-RANGE CFM RECOMMENDED	2,550	3,842	4,648	5,614	6,948	8,424	10,242	12,644	15,300	18,718	22,761	27,800
FAN WHEEL DIAMETER	12 1/4	15	18 1/4	20	22 1/4	24 1/2	27	30	33	36 1/2	40 1/2	44 1/2
P	21"	28"	32 1/2"	36 1/2"	40"	47"	53"	55"	58"	63 3/4"	70"	78"
Q	14"	16"	20"	22"	24"	26"	30"	32"	36"	42"	46"	50"
R	18"	22"	26"	28"	32"	34"	38"	42"	45"	50"	56"	62"
S	2"	2"	2"	2"	2"	3"	3"	3"	3"	3"	3"	3"
T	23"	28"	31"	32"	34"	35"	37"	39"	40 1/2"	45"	52"	63"
U	2"	2"	2"	2"	2"	3"	3"	3"	3"	3"	3"	3"
DRIVE SHAFT DIAMETER	1	1 3/16	1 7/16	1 7/16	1 11/16	1 11/16	1 5/16	1 5/16	1 5/16	2 3/16	2 3/16	2 7/16
SHIPPING WEIGHT POUNDS	90	130	290	320	350	380	450	525	730	850	1,110	1,250

19,150	23,375	28,525	34,775	42,450	51,775	63,175	MID-RANGE CFM RECOMMENDED
36 1/2	40 1/4	44 1/2	49	54 1/4	60	66	FAN WHEEL DIAMETER
40	44 1/2	49	54	60	66	72	A B C D E F G H I J K L M
30	34 1/2	37 1/2	40 3/4	44 3/4	49 3/4	54 3/4	
39	43	47 1/4	52 3/8	57 3/8	63 3/8	70 1/4	
69 3/4	79 3/4	84 3/4	88	93	97 3/8	104 3/8	
65 1/4	72 1/2	79 1/2	88 1/4	97	108	119	
51 1/2	42	49 3/4	49	54	59	64	
30 1/2	34 1/2	37 1/2	41	46	50 1/2	55	
34	40 1/2	43 1/2	46 3/4	50 3/4	53 3/4	60 3/4	
26	27 1/2	29 1/2	29 1/2	31 1/4	33	33	
6	8	8	8	8	8	8	
27	25 3/4	26 3/4	30	34	37	40	
27	25 3/4	26 3/4	30	34	37	40	
10 1/4	11 1/4	12 1/4	14 5/16	15 5/16	17 5/8	19 7/8	
2 3/16	2 3/16	2 7/16	2 7/16	2 15/16	2 15/16	2 15/16	DRIVE SHAFT DIAMETER
1,610	2,050	2,300	2,650	3,110	3,525	4,000	SHIPPING WEIGHT POUNDS

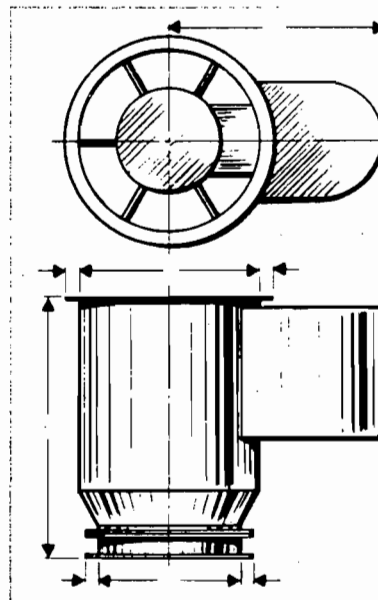


STANDARD CLASSIFICATIONS FOR SPARK RESISTANT CONSTRUCTION

	All parts of the fan in contact with the air or gas being handled shall be made of non-ferrous material.
	The fan shall have an entirely non-ferrous wheel and non-ferrous ring about the opening through which the shaft passes.
	The fan shall be so constructed that a shift of the wheel or shaft will not permit two ferrous parts of the fan to rub or strike.

DIMENSIONAL CHART

27,822	33,733	41,349	50,579	61,201	MID-RANGE CFM RECOMMENDED
41 1/2	49	54 1/4	60	66	FAN WHEEL DIAMETER
78"	84"	93"	104"	116"	P Q R S T U
50"	54"	60"	66"	72"	
32"	66"	72"	80"	88"	
3"	3"	3"	3"	3"	
33"	65"	68"	72"	76"	
3"	3"	3"	3"	3"	
2 7/16	2 7/16	2 15/16	2 15/16	2 15/16	DRIVE SHAFT DIAMETER
1,250	1,420	1,650	1,800	2,100	SHIPPING WEIGHT POUNDS



EXHAUST FAN APPLICATIONS

Beverly Pacific's complete line of centrifugal and inline exhaust fans have proven their reliability with years of successful, continuous corrosive service throughout the nation and around the world.

Our solid "FRP" construction defies corrosion and each is designed to provide smooth, quiet and maintenance-free operation . . . this superior combination permits peak performance with the lowest possible power consumption.

A wide selection of standard models, types and sizes are available to meet your specific requirements.

FAN WHEEL DURABILITY

The Beverly Pacific fan wheels are fabricated of corrosion-resistant Fiberglass Reinforced Plastic (FRP) materials. The fan wheel design is that of a "backward curve blade," Class II construction, and are available in standard sizes of 12 $\frac{1}{4}$ " through 66" diameters.

All of Beverly Pacific's fan wheels are both statically and dynamically balanced and run on a test stand prior to final assembly to insure continuous, vibration-free performance.

Every surface in contact with the air stream is corrosion resistant. The steel hub (providing the positive-lock connection to the drive shaft) is totally encapsulated in the wheel laminate and even the weight added during the wheel balancing process is corrosion resistant, Fiberglass Reinforced Plastic materials.

Should your particular requirement involve moving a volume of only a few hundred CFM at $\frac{1}{4}$ " S.P. or over 80,000 CFM at 6" S.P., Beverly Pacific has a proven standard size to meet your requirement.

EXHAUST FANS STANDARD AND OPTIONAL EQUIPMENT

Standard Equipment: Beverly Pacific's centrifugal fans are equipped with a scroll bottom drain and flanged discharge outlet, and are furnished with a purchaser's choice of twelve (12) discharge outlet directions and a choice of right or left fan wheel rotation. Both of our fan styles, centrifugal and inline, are equipped with an OSHA approved belt guard and powered by 230-460/30/60 Hz motors . . . totally enclosed, fan-cooled, (TEFC) up to 20 horsepower, and Multi-guard motors are furnished when horsepower requirements are 25 or larger. Also, as standard equipment, Beverly Pacific furnishes the following list of first-line, top quality drive components which were selected based on motor horsepower, RPM, tip speed and weight of fan wheel, with a safety factor of 1.3 times the motor horsepower.

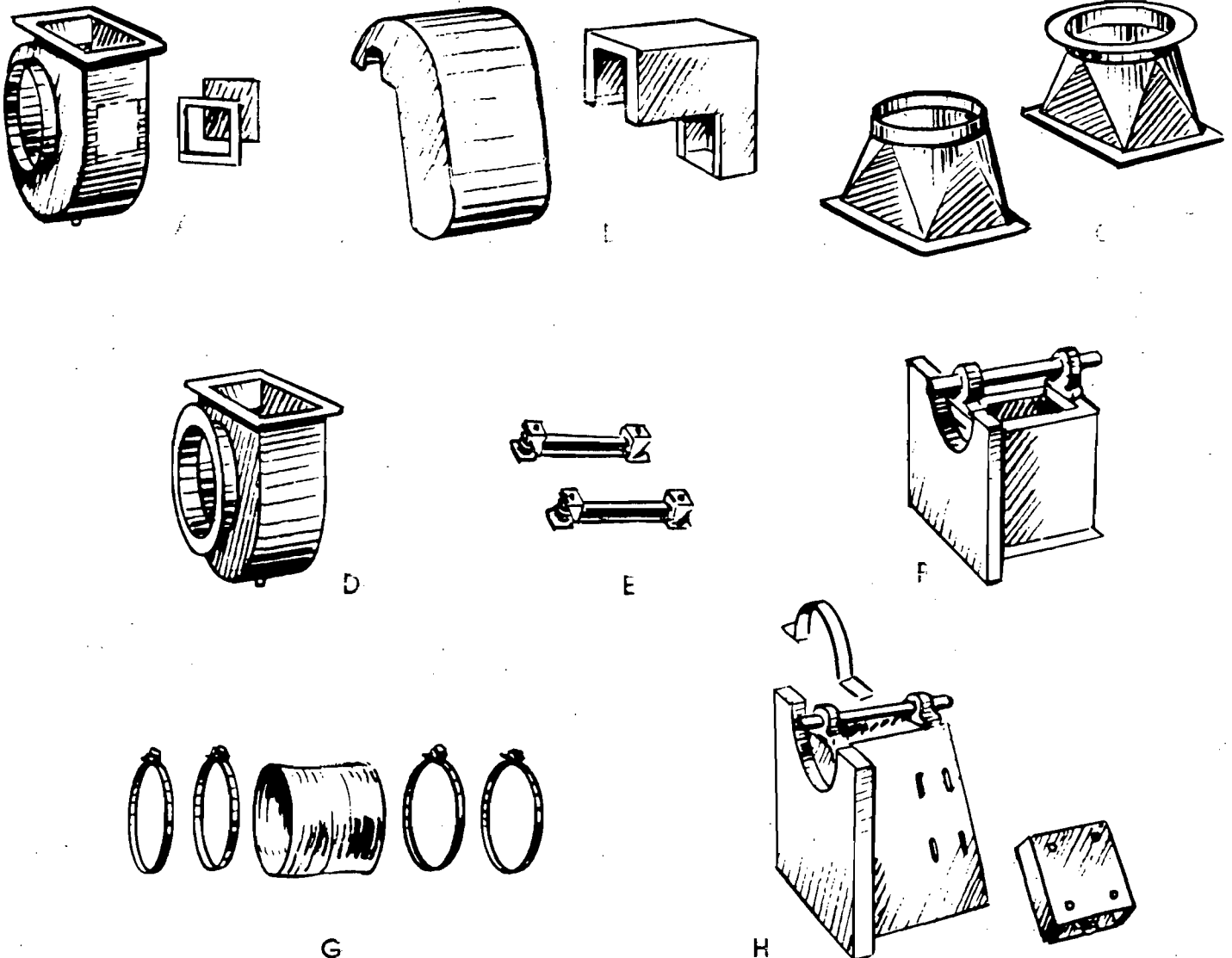
- a. BEARINGS — Beverly Pacific furnishes Dodge-Type K pillow blocks on the inline model. These Dodge bearings have Timken-tapered roller bearings, are fully self-aligning and designed to meet the stringent demands of power transmission. Based on radial and thrust load computations, bearing life expectancy is in excess of 100,000 hours.
- b. SHEAVES — Beverly Pacific Corporation furnishes Dodge sheaves, which are cast from the finest quality gray iron and machined to rigid quality control specifications. Groove design and spacing conforms to ASA, MPTA and RMA standards. These sheaves are equipped with Taper-Lock bushings, a superior mounting well recognized and widely used in industry.
- c. V-BELTS — Beverly Pacific furnishes Dodge Sealed-Life Belts, Type A, B and C which have a longer wearing protective cover, crowned top, concave sidewall, exceptional stability and an improved cord section which prevents failures caused by cord separation.
- d. WHEEL BACKING PLATES — Beverly Pacific uses Rex taper-lock, single-duty, Type B, steel sprocket, in the backing plate of all FRP fan wheels. This steel sprocket is completely embedded and encased with FRP materials to prevent corrosion attack.
- e. DRIVE SHAFTS — Beverly Pacific uses ground and polished, 1045 TGP shafting rounds, as produced by Inland Steel. This medium carbon steel is used because of its greater strength and hardness. The mechanical properties, based on $\frac{3}{4}$ " -- 1 $\frac{1}{4}$ " diameter round bars of 1045, include a tensile strength of 98,000 PSI, yield strength of 59,000 PSI and a Brinell Hardness of 212.

INDUSTRIAL SALES & SUPPLY Co. - ISSCo.
11 WIMBLEDON RD.
LAKE BLUFF, IL 60044
312/295-5272

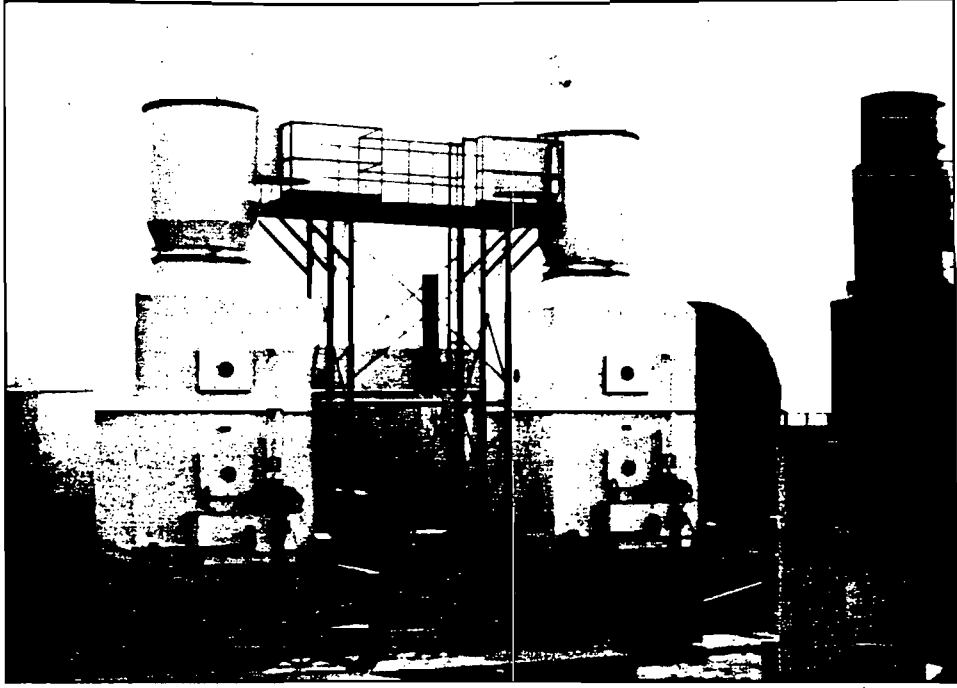
OPTIONAL EQUIPMENT:

Optional exhaust fan components are available, at an additional cost, to meet the purchaser's special requirements.

- a. CLEAN-OUT DOORS — To provide access to fan wheel and scroll interior in severe contaminant loading service.
- b. WEATHER COVERS — To aid the protection of motor and power transmission drive components from environmental elements.
- c. DISCHARGE TRANSITIONS — To convert the exhaust fan rectangular discharge opening for installation of cylindrical discharge stack.
- d. FLANGED INLETS — To provide a bolted connection between exhaust fan inlet and flanged exhaust duct.
- e. VIBRATION ISOLATORS — To minimize operational noise level and vibration annoyance of mezzanine and/or roof-mounted installations.
- f. DRIVE COMPONENTS — Purchaser preference of special drive components (other than Beverly Pacific's standards) may be substituted to meet those special requirements.
- g. FLEX CONNECTORS — To provide a vibration-minimizing connection between flange-less duct and fan inlet or discharge outlet transition and stack.
- h. ADJUSTABLE MOTOR BASE — To provide easier belt tension adjust or replacement.



FIBERGLASS REINFORCED PLASTIC



INDUSTRIAL VENTILATION EQUIPMENT



BEVERLY PACIFIC CORPORATION

Industrial Systems Division

QUALIFYING FABRICATOR an "important function"

There are many factors involved in order to determine whether a company is a "qualified FRP fabricator". The main factors a person with purchasing responsibilities needs to recognize are the specific factors with which Beverly Pacific Corporation has had years of experience.

These factors deal with the handling and managing of the construction process itself — a few, of which, are as follows:

- 1. A "qualified fabricator" should be able to exhibit expertise in the basic principles of building corrosion-resistant laminates.*
- 2. A "qualified fabricator" should have personnel familiar with resin compounding and curing, including variables such as catalysts, promoters, resin, reinforcement, time, temperature, humidity, rate of exotherm, mass of structure, etc.*
- 3. A "qualified fabricator" should be able to demonstrate that shop personnel have necessary understanding and ability to produce good quality laminates consistently.*
- 4. A "qualified fabricator" should apply proven procedures to assure adequate quality control of raw material and finished products.*
- 5. A "qualified fabricator" should be able to use and produce engineering specifications, drawings and equipment designs and fabricate in accordance therewith.*



BEVERLY PACIFIC CORPORATION a "qualified fabricator"

Beverly Pacific Corporation has served industry for over a quarter century. Our products, service, component equipment and complete engineered systems are located throughout the nation and around the world.

We have a "HIGHLY QUALIFIED TEAM" of engineers, production supervisors and experienced plant personnel, equipped with the latest production equipment, tools and proven methods of fabrication. This combination offers economical, dependable and efficient "ANSWERS" to your exhaust ventilation and corrosion control "PROBLEMS", and we want to serve you!



CORROSION CONTROL...

... a "necessity"

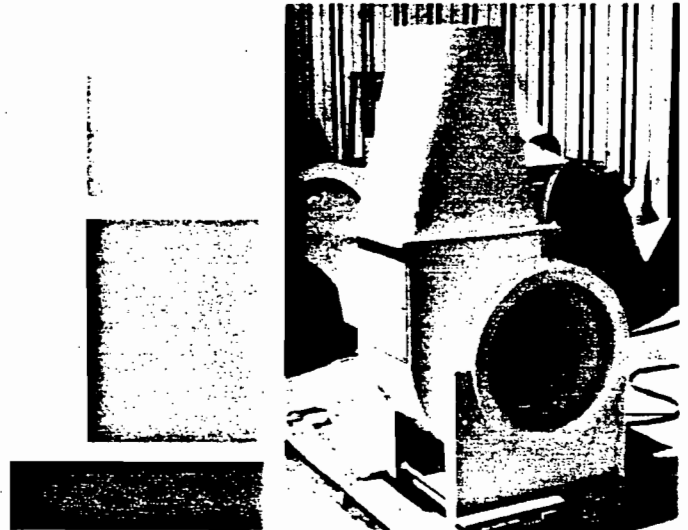
The "chemical resistance" of a Fiberglass Reinforced Plastic (FRP) product depends on the resin system and the method and type of reinforcement used in the construction. Polyester resin systems provide the best overall chemical resistance to the widest possible range of chemical environments. Superior performance of the resin is then assured by combining it with fiberglass and/or synthetic surfacing materials designed to accomplish both the "chemical resistance" and the "structural" requirements of the product.



POLYESTER RESIN SYSTEMS...

... the "answer"

The continuing combined technical efforts of manufacturers such as Beverly Pacific and the producers of polyester resin have resulted in three (3) general CHEMICAL-RESISTANT polyester resin system groups: Isophthalic, Bisphenol and Vinyl Ester polyesters. Each of these polyester resin systems are available in FIRE-RETARDANT grades.

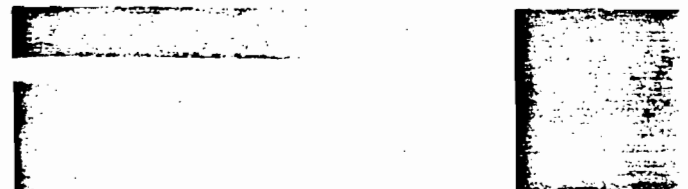


PRODUCTION CAPABILITIES...

... the "dependable"

Beverly Pacific specializes in "CORROSION CONTROL THRU ENGINEERING", utilizing the unexcelled characteristics of Fiberglass Reinforced Plastic (FRP) materials in the design, fabrication and installation of industrial exhaust systems, component equipment and services requiring a high degree of corrosion resistance and exhaust emission contaminate removal.

The fabrication of standard or custom designed hoods, ducts, fittings, exhaust fans, fume scrubbers and washers, and exhaust stacks is one of the many services we offer to the metal plating, anodizing, chem-milling, petro-chemical and chemical processing industries.



MANUFACTURING TECHNOLOGY...

... the "result"

Beverly Pacific's years of air handling experience has brought about many innovated fabrication techniques, each designed to offer unsurpassed product quality at the lowest possible price.

STANDARD HOUSINGS: *Our standard line of air pollution control scrubbers and washers; our centrifugal and inline exhaust fan housings; and our exhaust ventilation hoods are produced with "female" molds.*

With this process, actual fabrication begins from the outside-in, whereas the "exterior" of the structure is first applied to the mold surface in the form of a color pigmented gel-coat material. This method of fabrication produces a uniformly smooth product exterior which provides excellent resistance to corrosive environments and ultra-violet deterioration.

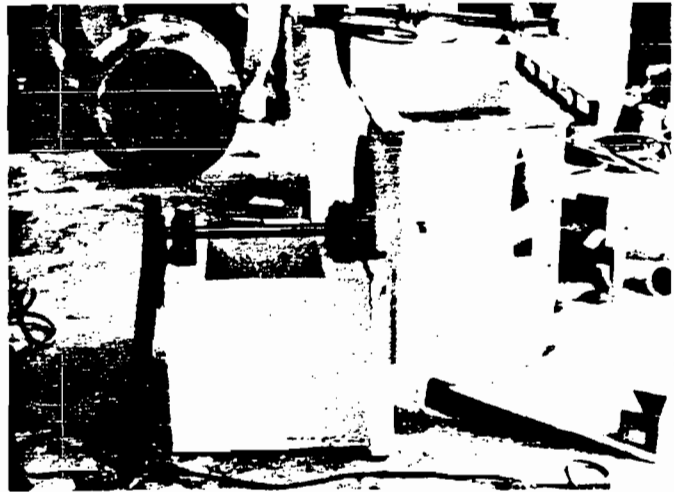
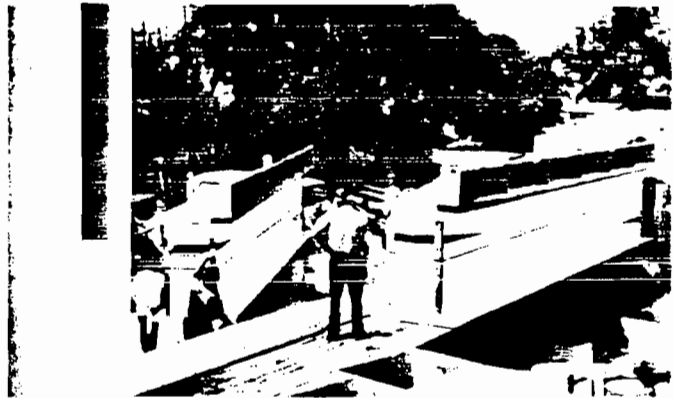
The structural layers are then laminated to the shape of the mold, firmly bonding to the gel-coated surface of the structure.

The "interior corrosion-barrier" is applied as a final step during this manufacturing process, offering a selection of a resin-rich reinforcement of chopped glass, a synthetic veil or a "C" glass surfacing mat. Selection of the type reinforcement used for the "corrosion-barrier" depends entirely on the particular corrosion-resistant service involved.

Upon completion of the "cure-cycle", the one (1) piece product structure is removed from the mold and prepared for installation of fittings and/or accessories for final assembly with component parts

STANDARD DUCTS AND FITTINGS: *Our standard line of ducts and fittings is produced by a process the opposite of our housings. This process involves the use of rotating mandrels and "male" molds, whereas the "interior corrosion-barrier" is applied first to the mold surface, backed by the structural laminate layers and finally the exterior gel-coat surface is applied as a final step.*

NON-STANDARD CUSTOM STRUCTURES: *Non-standard custom structures are produced by selecting a tooling method best suited to provide top quality products at the lowest possible price to our customers.*



GENERAL CONSTRUCTION SPECIFICATIONS

1.0 SCOPE OF SPECIFICATIONS

1.1 This specification describes the materials of construction, procedures and physical properties that Beverly Pacific employs in the fabrication of Fiberglass Reinforced Plastic (FRP) equipment, utilizing hand lay-up and spray-up methods of construction, in compliance with the N.B.S. Voluntary Product Standard PS 15-69 for "Custom Contact-Molded Reinforced Polyester Chemical Resistant Process Equipment" issued by the U.S. Department of Commerce.

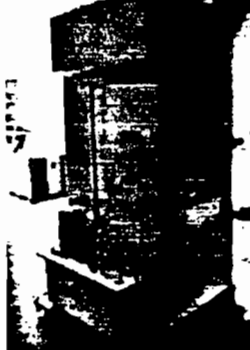
1.2 This standard is not intended to cover the selection of the exact resin of fiberglass reinforcement combination for any specific application. The specific resin selection is to be accomplished with the aid of the resin manufacturers' corrosion charts and/or recommendations made by their technical service departments.

2.0 GENERAL LAMINATE CONSTRUCTION

2.1 The FRP laminate shall consist of an inner surface, an interior layer, a structural layer and an exterior surface layer.

2.2 The compositions specified for the inner surface and the interior layer are intended to achieve optimum chemical resistance. This portion of the laminate is referred to as the "corrosion barrier".

2.3 The use of a premium grade chemical resistant resin throughout the laminate, or the use of a premium grade resin for the "corrosion barrier" in combination with an isophthalic resin for the structural layer, shall be agreed upon with the purchaser. This agreement shall be as specified on the request for quotation, our proposal, your acknowledgement and/or the drawings submitted for approval.



2.4 The laminate surface shall have a Barcol hardness of at least 90 percent of the resin manufacturers' minimum specification.

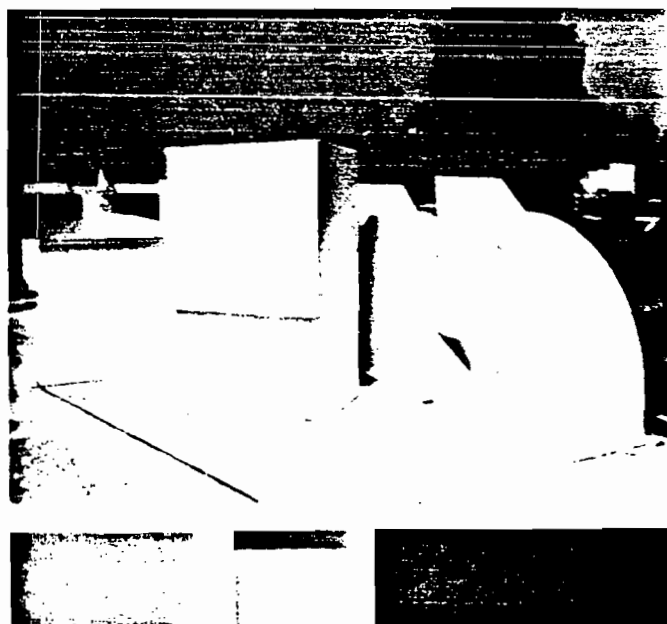
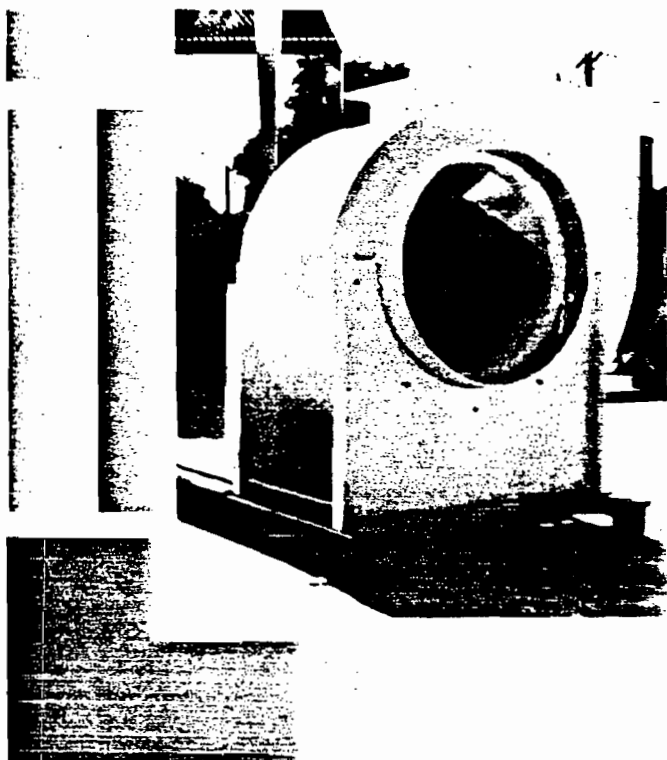
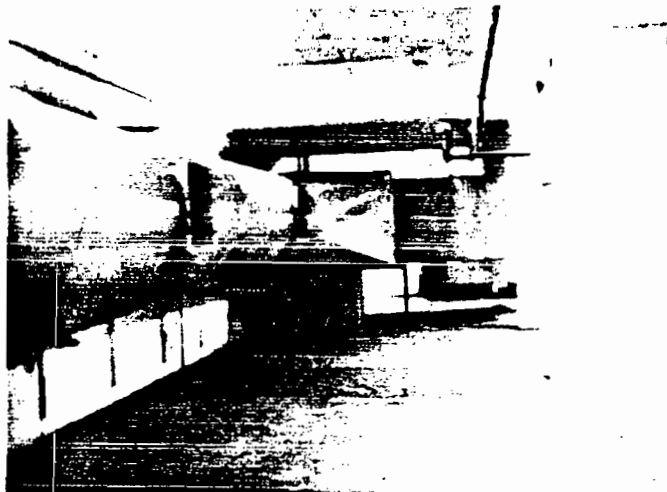
3.0 HAND LAY-UP AND SPRAY-UP LAMINATE CONSTRUCTION

3.1 **INNER SURFACE:** The inner surface resin shall be between 0.010 and 0.020 inches thick and be reinforced with glass or synthetic surfacing veil, depending on the chemical environment. This surface shall be free of cracks and crazing, having an average of not more than two (2) pits per square foot, providing these pits are less than 1/8" in diameter and not more than 1/32" deep. All pits must be covered with sufficient resin to prevent exposure of inner surface reinforcement.

3.2 **INTERIOR LAYER:** A minimum of 0.100 inch of laminate next to the inner surface shall be reinforced with not less than twenty (20) percent nor more than thirty (30) percent by weight of noncontinuous glass (chopped strand) fibers, having fiber lengths of 0.5 to 2.0 inches.

3.3 **STRUCTURAL LAYER:** The structural layer of the laminate shall provide the additional strength necessary to meet the tensile and flexural requirements. Where separate layers such as mat or woven roving are used, all layers shall be lapped a minimum of one (1) inch. Laps shall be staggered as much as possible and if woven roving is used, alternate layers of chopped strand glass shall be used.

3.4 **EXTERIOR LAYER:** The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Hand-work finish is acceptable; however, a sufficient amount of resin shall be present to prevent fiber exposure. The final laminate shall be coated with a resin containing a paraffin surfacing agent to achieve a fully cured exterior surface.



4.0 MATERIALS OF CONSTRUCTION

4.1 **RESIN:** The resin used shall be of commercial grade and shall have had previous service history acceptable for the specific environment. Environment includes the nature of the chemical, the concentration and the service temperature.

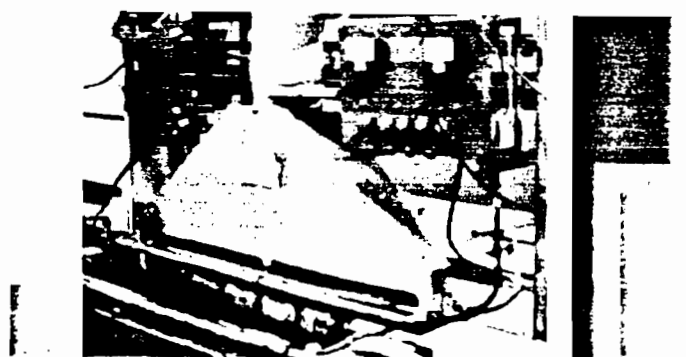
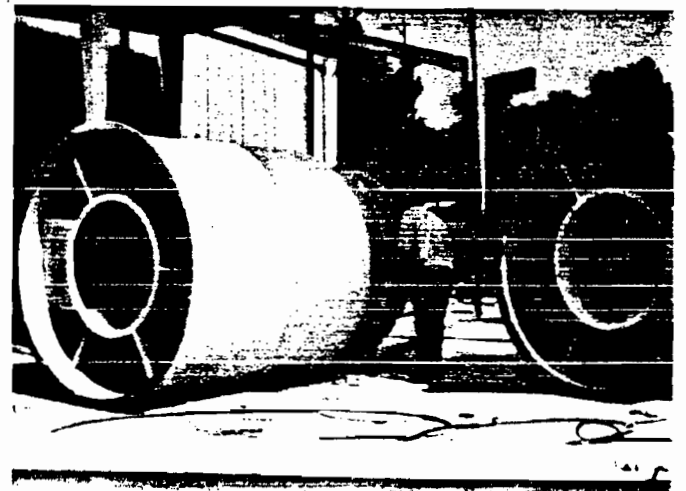
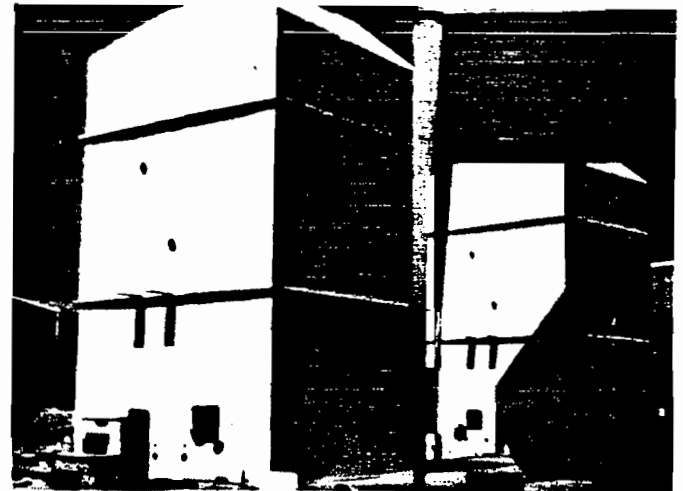
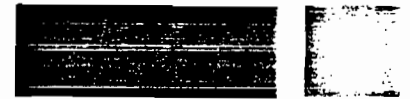
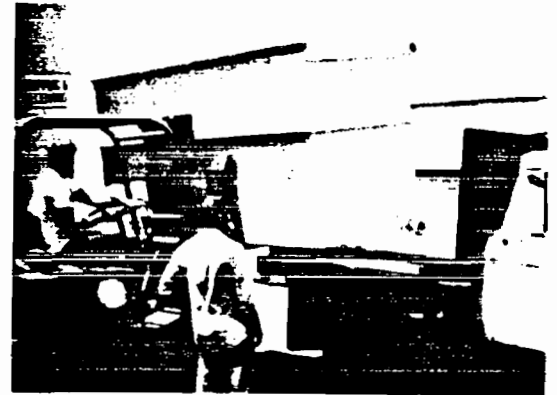
4.2 **FILLERS AND PIGMENTS:** The resins used shall not contain fillers or pigments except when required as follows:

- a. Up to 5% thixotropic agent which will not interfere with visual inspection may be added for viscosity control.
- b. Antimony compounds or other fire-retardant agents may be added to improve fire resistance at the request of the purchaser.
- c. Ultraviolet absorbers and/or pigments shall be added to final resin coating on the exterior surface to improve weather resistance.
- d. To insure a tack-free, fully cured, corrosion-resistant surface, up to 0.6 percent of paraffin wax, by weight, must be added to the final resin coat.

4.3 **SURFACE REINFORCEMENT:** The glass fiber reinforcement used on surfaces exposed to chemical environment shall be Type "C" monofilament surfacing veil, having a thickness of 10 to 20 mils, a silane finish and a styrene soluble binder.

4.4 **OPTIONAL SURFACE REINFORCEMENT:** Where the chemical environment would attack glass fibers, synthetic surfacing materials such as acrylic, polyester, asbestos or other organic fiber may be used, as agreed upon by Beverly Pacific and the purchaser.

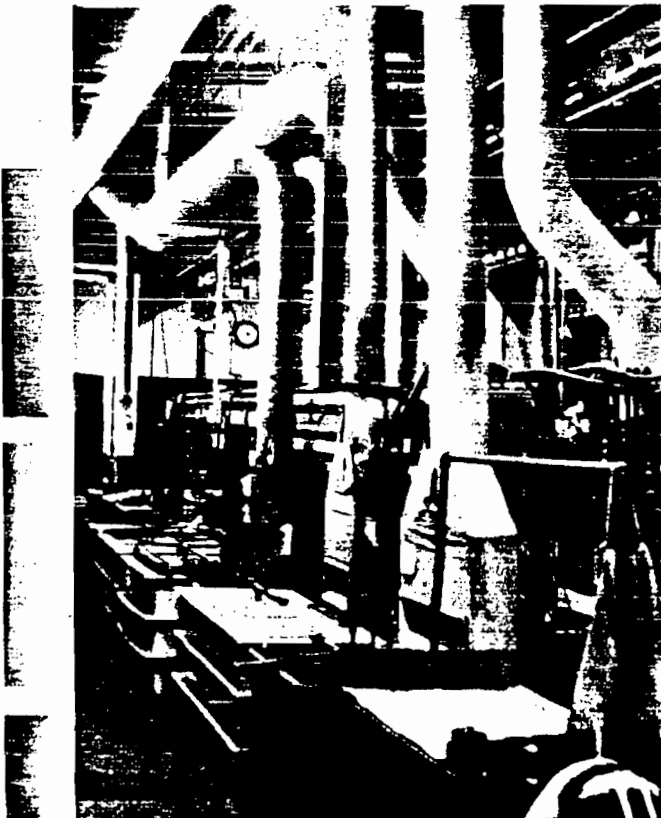
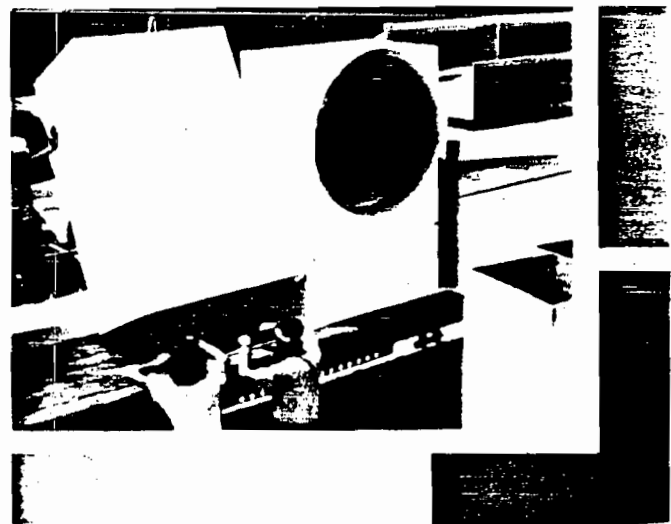
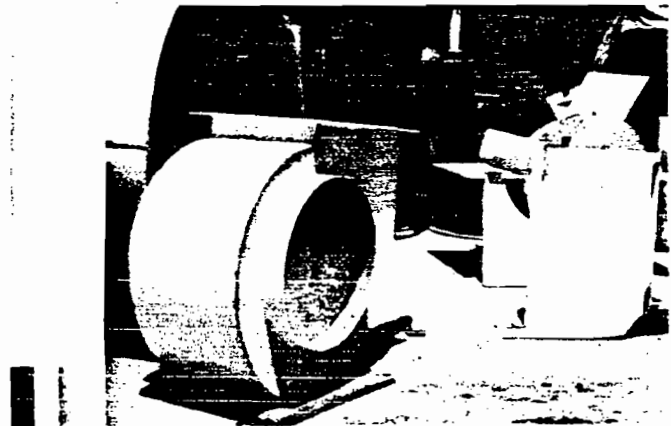
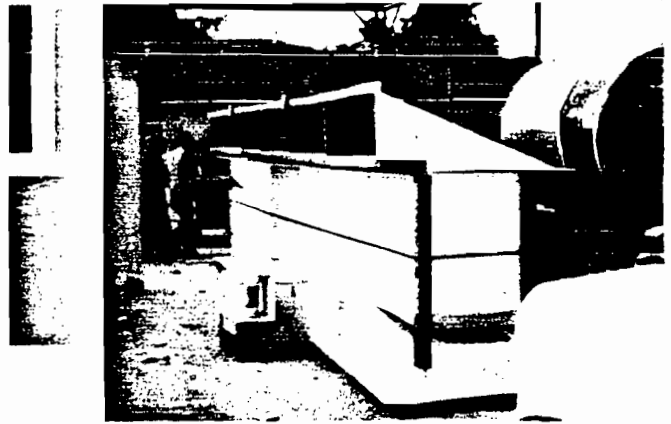
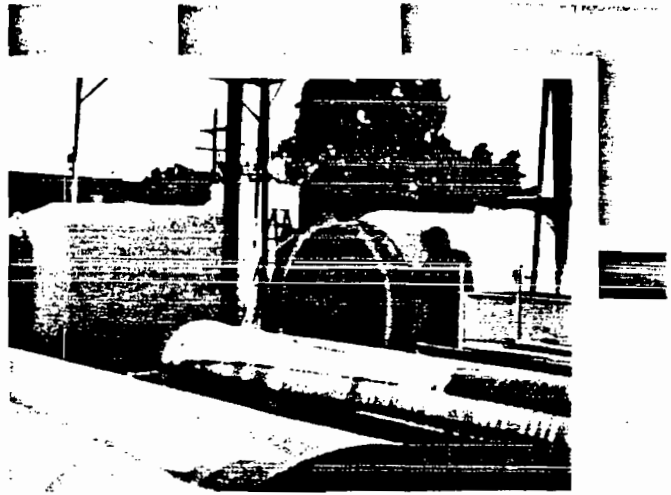
4.5 **CHOPPED STRAND MAT REINFORCEMENT:** Chopped strand glass mat used for reinforcement shall be Type "E" glass, 1½ oz. per square foot, having a silane finish and a soluble binder.



4.6 **WOVEN ROVING REINFORCEMENT:**
Woven roving used for additional structural reinforcement shall be 60 end, Type "E" glass, having a silane finish.

4.7 **GUN ROVING REINFORCEMENT:**
Continuous gun roving used in chopper gun spray-up shall be 60 end, Type "E" glass having a silane or chrome-silane finish.

NOTE. As stated in Paragraph 1.1 of these specifications, Beverly Pacific's standard methods of construction comply with PS15-69; however, as evidence of our industry leadership, up-graded modifications of this quality standard have been utilized by Beverly Pacific for years. At the time of this printing, it is our understanding that such up-graded modifications are to be standardized by proposed ASTM Product Standards for the corrosion-resistant equipment manufacturing industry.



ATTACHMENT D

HARRIS SEMICONDUCTOR

MATERIAL SAFETY DATA SHEETS



HARRIS
SEMICONDUCTOR
A DIVISION OF HARRIS CORPORATION

TITLE: BORON TRIBROMIDE

CONTROLLED
DOCUMENT

PROPRIETARY DATA

VERTICAL BAR IN RIGHT MARGIN INDICATES REVISION.



CHEMICAL SAFETY
SPECIFICATION

CODE
IDENT. NO.
34371

REVISION
SPECIFICATION NUMBER 856051
PAGE 1 OF

CONTROLLED DOCUMENT HISTORY

TITLE: BEST AVAILABLE COPY
BORON TRIBROMIDE

CURRENT REVISION	ECO NO.	PAGES AFFECTED	ORIGINATOR APPROVAL	DATE	REVISION DATE
0	59429	1 - 5	<i>Re Cox</i>	<i>9 JAN 86</i>	1/8/86


HARRIS
HARRIS CORPORATION
SEMICONDUCTOR GROUP

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CODE IDENT. NO.	SPECIFICATION NUMBER
34371	856051
PAGE 5 OF 5	

1.0 PURPOSE

This specification defines the chemical safety requirements for Boron Tribromide supplied by the applicable manufacturer(s) or distributor(s) of the product.

TITLE		REVISION	SPECIFICATION NUMBER
BORON TRIBROMIDE		0	856051
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		34371	PAGE 1 OF 1



MATERIAL SAFETY DATA SHEET

J. C. SCHUMACHER COMPANY

No. 101
Rev. Date Sept. 1983

I. MATERIAL IDENTIFICATION

CHEMICAL NAME: BORON TRIBROMIDE

SYNONYMS: Boron Bromide, Tribromoborane CHEMICAL FAMILY: Inorganic Halides

FORMULA: BBr₃ MOLECULAR WEIGHT: 250.54

TRADE NAME AND SYNONYMS: Boron Tribromide, Boron Bromide, Tribromoborane, BBr₃

II. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	91.3°C	MELTING POINT	-46°C
SPECIFIC GRAVITY (H ₂ O=1)	2.638	VAPOR PRESSURE AT 14°C 24°C	40 mm Hg. 100 mm Hg.
VAPOR DENSITY (air=1)	8.65	SOLUBILITY IN WATER, % by wt.	Decomposes
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (=1)	Not Established
APPEARANCE AND ODOR	Colorless fuming liquid with a pungent odor.		

III. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
BORON TRIBROMIDE	100	1 ppm* (10 mg/l)
*California - OSHA Limit		

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Non-Flammable	AUTOIGNITION TEMPERATURE	N.A.		
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	N.A.	UPPER	N.A.	

EXTINGUISHING MEDIA	Do not use water if this chemical is involved in a fire. Use dry sand or dry chemical extinguishing agents from behind body shield or barricade if possible. (Boron tribromide will react violently with water or steam, liberating heat and forming toxic and corrosive fumes of hydrogen bromide.)
SPECIAL FIRE FIGHTING PROCEDURES	Wear approved self-contained breathing apparatus and vapor protective clothing, boots and gloves. If without risk, remove chemical from fire area. If fire is massive or advances, evacuate area.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Although boron tribromide is non-flammable and does not support combustion, it decomposes when heated emitting hot bromine and vapors which are very harmful. Hydrobromic acid can form in moist environments and react with metals to liberate hydrogen, a flammable gas.


EMERGENCY PHONE NUMBERS

J. C. Schumacher Company, (619) 433-1663; Safety Department, (619) 942-0965 (Evening)
Toll Free Numbers 1-800-545-9242 (Continental U.S.A.) 1-800-545-9241 (California Only)

Legal responsibility is assumed only for the fact that all studies reported here and all opinions are those of qualified experts.

580 Airport Road/P.O. Box 1158/Oceanside, California 92054/(619)433-1663/Twx(910)322-1382

MSDS 301

TITLE	REVISION	SPECIFICATION NUMBER
BORON TRIBROMIDE	1	856051
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V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	1 ppm (California - OSHA limit) (8 Hr. TWA)
EFFECTS OF OVEREXPOSURE	Severe burns to skin and eyes. Severe irritation of respiratory tract upon inhalation along with coughing, nose bleeds, abdominal pain and diarrhea, and measles-like eruptions on torso and extremities.
FIRST AID	Remove from area. Remove contaminated clothing. Eye Contact: Flush with running water for 15 minutes-including under eyelids. Get medical attention. Skin Contact: Blot with dry absorbent to remove excess material then flush with running water for 15 minutes. Get medical attention. Inhalation: Remove to fresh air. Administer artificial respiration/O ₂ if needed. Get medical attention. Hold for medical observation for 24 hours in case pulmonary edema develops.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID	Heating to decomposition.
UNSTABLE	STABLE		
	X		
INCOMPATIBILITY (materials to avoid)		Contact with water, steam or moist air. Also avoid contact with metallic sodium or potassium and cellulose materials (wood, paper products, etc.).	
HAZARDOUS DECOMPOSITION PRODUCTS		Hydrogen bromide gas, hydrobromic acid, when exposed to air or water large volumes of hydrogen bromide gas evolve.	
HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	
May Occur	Will Not Occur		
	X		

VII. SPILL OR LEAK PROCEDURES


STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Clear area of personnel. Wearing approved self-contained breathing apparatus, vapor-proof protective clothing, boots, gloves, and eye protection, contain spill and soak up with sufficient dry sand or vermiculite. Once fuming subsides apply water spray carefully to absorbent to hydrolyze.
WASTE DISPOSAL METHOD	Once the boron tribromide has been hydrolyzed in the absorbent, the absorbent can be scooped up and transferred to an acid resistant drum for disposal. Consult local, State, and Federal regulations for disposal of corrosive materials.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)	Half or full mask respirator with acid-gas absorbent cartridges or canisters. Use air-line or self-contained breathing apparatus in an emergency.		
VENTILATION	LOCAL EXHAUST	Not acceptable	Glove box or bag with dry inert atmosphere.
	MECHANICAL (general)	Required - Designed to handle heavy vapors and scrubbed.	OTHER
PROTECTIVE GLOVES	Acid resistant types must be worn (Rubber, plastics, etc.)	EYE PROTECTION	Chemical safety goggles or glasses plus face shield when appropriate
OTHER PROTECTIVE EQUIPMENT	Rubber-safety shoes, rubber jacket and coveralls or rubber apron for splash protection.		

IX. SPECIAL PRECAUTIONS AND COMMENTS

HANDLING AND STORING	Wear full-protective equipment and clothing. Store in a cool, dry ventilated area. (Containers may rupture violently if overheated.) Protect containers against physical damage.
OTHER	Have sufficient absorbent on hand in the event of a spill or leak. Safety eye wash and shower to be located in the area of use.

TITLE	REVISION	SPECIFICATION NUMBER
BORON TRIBROMIDE		856051
 HARRIS SEMICONDUCTOR <small>A DIVISION OF HARRIS CORPORATION</small>	CODE IDENT. NO.	DATE OF REVISION
	34371	PAGE OF



HARRIS
SEMICONDUCTOR
A DIVISION OF HARRIS CORPORATION

TITLE: PHOSPHORUS OXYCHLORIDE

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PROPRIETARY DATA

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**CHEMICAL SAFETY
SPECIFICATION**

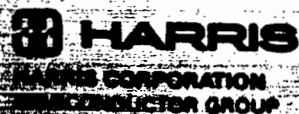
CODE
IDENT. NO.
34371

REVISION <i>[Handwritten mark]</i>
SPECIFICATION NUMBER 856291
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CONTROLLED DOCUMENT HISTORY

TITLE:
PHOSPHORUS OXYCHLORIDE

CURRENT REVISION	ECO NO.	PAGES AFFECTED	ORIGINATOR APPROVAL	DATE	REVISION DATE
0.	59429	1 - 5	Re Cop	1/13/86	2/4/86




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1.0 PURPOSE

This specification defines the chemical safety requirements for Phosphorus Oxychloride supplied by the applicable manufacturer(s) or distributor(s) of the product.

TITLE		REVISION	SPECIFICATION NUMBER
PHOSPHORUS OXYCHLORIDE		7	856291
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MATERIAL SAFETY DATA SHEET

J. C. SCHUMACHER COMPANY

No. 100
Rev. Date Sept. 1993

I. MATERIAL IDENTIFICATION

CHEMICAL NAME: PHOSPHORUS OXYCHLORIDE

SYNONYMS: Phosphoryl Chloride CHEMICAL FAMILY: Inorganic Halide

FORMULA: $POCl_3$ MOLECULAR WEIGHT: 153.33

TRADE NAME AND SYNONYMS: Phosphorus Oxychloride, Phosphoryl Chloride *Spec. SCH 57*

II. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	105 - 106°C	MELTING POINT	2°C
SPECIFIC GRAVITY ($H_2O=1$) @20°C	1.675	VAPOR PRESSURE AT 20°C.	25 mmHg
VAPOR DENSITY (air=1)	5.3	SOLUBILITY IN WATER, % by wt.	Decomposes
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (=1)	Not Established
APPEARANCE AND ODOR	Clear, colorless, fuming liquid; odor is pungent and musty - disagreeable and lingering.		

III. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Phosphorus Oxychloride	100	100 ppb*
*Recommended by A.C.G.I.R.		

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Non Flammable	AUTOIGNITION TEMPERATURE	N.A.		
FLAMMABLE LIMITS IN AIR, % by volume		LOWER	N.A.	UPPER	N.A.

EXTINGUISHING MEDIA	If this material is involved in a fire situation, AVOID THE USE OF WATER. Its reaction with water produces hydrochloric acid and phosphoric acid, which, in turn, can react with most metals to generate hydrogen, a flammable gas. CO_2 Halon and dry chemical, are preferred extinguishing media.
SPECIAL FIRE FIGHTING PROCEDURES	Firefighters to wear self-contained breathing apparatus and vapor protective clothing, boots, and gloves. If without risk, remove chemical from fire area. If fire is massive or advances, evacuate area.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Reacts with water to form acids which can react with most metals to form hydrogen, a flammable gas. Reaction with water can also result in rupture of a closed or inadequately vented container. When heated to decomposition, emits highly toxic fumes of oxides and chlorides of phosphorus.


EMERGENCY PHONE NUMBERS

J. C. Schumacher Company, (619) 433-1663; Safety Department, (619) 942-0965 (Evening)
Toll Free Numbers 1-800-545-9242 (Continental U.S.A.) 1-800-545-9241 (California Only)

Legal responsibility is assumed only for the fact that all studies reported here and all opinions are those of qualified experts.

580 Airport Road/P.O. Box 1158/Oceanside, California 92054/(619)433-1663/Twx(910)322-1382

MSDS 001

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V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	100 ppb (8 hr. TWA) Recommended by A.C.G.I.H.
EFFECTS OF OVEREXPOSURE	Vapors irritating to mucus membranes and lungs. Liquid can cause severe burns to skin and eyes; eyes may become permanently impaired. Reaction with moisture liberates hydrochloric and phosphoric acids which can also cause burns. Inhalation symptoms range from coughing to wheezing due to bronchial irritation or pulmonary edema (symptoms can be delayed 2-24 hrs.).
FIRST AID	Skin, Eyes, Eyelids: Immediately flush with large quantities of running water for at least 15 minutes. Remove contaminated clothing prior to shower as water will react with phosphorus oxychloride to form large volumes of hydrochloric acid fumes which can overcome the person(s). Get medical attention. Inhalation: Remove to fresh air; if necessary apply artificial respiration. Get medical attention. Ingestion: Dilute by drinking water, then neutralize with milk, milk of magnesia, egg white, etc. Do not induce vomiting. Do not use sodium bicarbonate. Get medical attention.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID	Do not mix with water or organic compounds in closed vessels except under controlled conditions of adding and mixing. Avoid personal contact with vapor or liquid. Corrosive to most common metals except lead or nickel.
UNSTABLE	STABLE		
	X		
INCOMPATIBILITY (materials to avoid)		Can react violently with water, alkalis or fibrous organic matter (wood, etc.).	
HAZARDOUS DECOMPOSITION PRODUCTS		Hydrochloric and phosphoric acids, and phosphorus oxides.	
HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID	
May Occur	Will Not Occur		
	X		

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Wear full-protective equipment. Soak up in sand, Fuller's earth, vermiculite, or other absorbent compound. Shovel absorbent into drums for transport to disposal site. If fuming occurs while shoveling, add more absorbent or spray absorbent lightly with water to knock down fumes. Clean spill area with large quantities of water. Do not attempt to neutralize with alkalis.
WASTE DISPOSAL METHOD	Collect absorbent or liquid in DOT approved containers for transport to disposal site according to Federal, State and Local regulations. If appropriate systems, controls and regulations exist, material can be slowly hydrolyzed and then neutralized with caustic or lime and discharged.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)	Half or full mask with acid-gas absorbent cartridges or canisters. Use air-line or self-contained apparatus in an emergency.		
VENTILATION	LOCAL EXHAUST	Not acceptable	SPECIAL Glove box
	MECHANICAL (General)	Designed to handle heavy vapors	OTHER
PROTECTIVE GLOVES	Rubber	EYE PROTECTION	Chemical safety goggles or glasses plus face shield when appropriate.
OTHER PROTECTIVE EQUIPMENT	Rubber-safety shoes, rubber jacket and coveralls or rubber apron for splash protection.		

IX. SPECIAL PRECAUTIONS AND COMMENTS

HANDLING AND STORING	Wear full-protective equipment and clothing. Store in cool, dry ventilated area. Keep from freezing (-2°C). Appropriate materials for storage vessels include nickel, lead, some stainless steels, glass or glass-lined vessels and some plastics.
OTHER	Have sufficient absorbent on hand in the event of a spill or leak. Safety eye wash

TITLE

PHOSPHORUS OXYCHLORIDE

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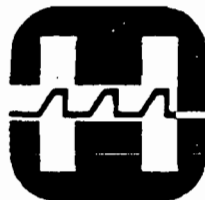
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HARRIS
SEMICONDUCTOR

A DIVISION OF HARRIS CORPORATION

TITLE: DIBORANE MADE BY AIR PRODUCTS & CHEMICALS, INC.

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DOCUMENT

PROPRIETARY DATA

VERTICAL BAR IN RIGHT MARGIN INDICATES REVISION.



CHEMICAL SAFETY
SPECIFICATION

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856150-002

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DIBORANE MADE BY AIR PRODUCTS & CHEMICALS, INC.

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0	59429	1 - 7	<i>Re Co</i>	1-24-86	1/22/86



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SPECIFICATION NUMBER

856150-002

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1.0 PURPOSE

This specification defines the chemical safety requirements for Diborane made by Air Products & Chemicals, Inc. supplied by the applicable manufacturer(s) or distributor(s) of the product.

TITLE DIBORANE MADE BY AIR PRODUCTS & CHEMICALS, INC.	REVISION ①	SPECIFICATION NUMBER 856150-002
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Specialty Gas Material Safety Data Sheet


PRODUCT NAME DIBORANE MIXTURES	
EMERGENCY PHONE (800) 523-6374; IN PENNSYLVANIA (800) 322-9092	
AIR PRODUCTS AND CHEMICALS, INC. BOX 538 ALLENTOWN, PA 18185 (215) 481-5257	TRADE NAME AND SYNONYMS Diborane [C.A.S. #19287-45-7 (pure B ₂ H ₆)]
	CHEMICAL NAME AND SYNONYMS Diborane, Boroethane, Boron Hydride
ISSUE DATE January 1978 AND REVISIONS April 1984	FORMULA B ₂ H ₆
CHEMICAL FAMILY Boron Hydride	
HEALTH HAZARD DATA	
TIME WEIGHTED AVERAGE EXPOSURE LIMIT TWA = 0.1 ppm (1983 ACGIH)	
SYMPTOMS OF EXPOSURE Inhalation of diborane will irritate the respiratory system. Symptoms of exposure to diborane may include headache, nausea, general fatigue, drowsiness, shortness of breath, coughing, and tightness and pain of the chest. Skin contact with diborane may cause dermatitis or burns. Prolonged exposure may cause dizziness, vertigo, chills, fatigue, muscular weakness, and transient tremors.	
TOXICOLOGICAL PROPERTIES Inhalation (mouse) LC50:30 ppm/4 hours (1974 NIOSH Toxic Substances List) Diborane is a very toxic gas. If inhaled, diborane will irritate the respiratory system. Pulmonary edema may occur. Damage to the kidneys and liver may occur. Diborane is detectable by smell; however, breathing diborane can deaden the olfactory senses so that concentrations above the normal detectable limit can no longer be detected. Odor is an unsatisfactory warning.	
RECOMMENDED FIRST AID TREATMENT RESCUE PERSONNEL SHOULD USE APPROPRIATE PROTECTIVE EQUIPMENT TO AVOID UNNECESSARY EXPOSURE. Inhalation: Move the victim of inhalation to an uncontaminated atmosphere. If breathing has stopped or is impaired, give assisted respiration (e.g. mouth-to-mouth). Supplemental oxygen should be administered. Keep the victim warm and quiet. Seek medical assistance at once. Skin Contact: Flush the affected area promptly with large quantities of water for 15 minutes. Remove contaminated clothing as quickly as possible. Treat as a thermal burn thereafter.	
(Continued on Last Page)	

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition or matter or use. Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

TITLE DIBORANE MADE BY AIR PRODUCTS & CHEMICALS, INC.		REVISION 	SPECIFICATION NUMBER 856150-002
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HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	
<p>Diborane forms flammable mixtures with air and will ignite spontaneously in moist air at room temperature. It may react violently with oxidizing agents, ammonia, aluminum, alcohols, lithium, and similar reactive metals, halogens, and compounds containing a reducible organic functionality.</p>	
PHYSICAL DATA	
BOILING POINT -134.5°F (-92.5°C)	LIQUID DENSITY AT BOILING POINT 27.6 lb/ft ³ (428 kg/m ³)
VAPOR PRESSURE at 70°F (21.1°C) Above the critical temperature	GAS DENSITY AT 68°F (20°C), 1 atm 0.0715 lb/ft ³ (1.146 kg/m ³)
SOLUBILITY IN WATER Hydrolyzes	FREEZING POINT -265°F (-165°C)
APPEARANCE AND ODOR Colorless gas with a repulsive, sickly sweet odor	
FIRE AND EXPLOSION HAZARD DATA	
FLASH POINT (Method used) -90°C (closed cup)	AUTO IGNITION TEMPERATURE 100-125°F (38-52°C)
FLAMMABLE LIMITS % BY VOLUME LEL 0.8% UEL 98%	
EXTINGUISHING MEDIA Water spray or fog; diborane reacts violently with halogenated extinguishing agents.	ELECTRICAL CLASSIFICATION Class I, Group Not Specified
SPECIAL FIRE FIGHTING PROCEDURES Stop the flow of gas and allow the fire to burn itself out. Use water to keep fire-exposed containers cool. Fire fighting should be done from an explosion-resistant location.	
UNUSUAL FIRE AND EXPLOSION HAZARDS Diborane ignites spontaneously in moist air. Toxic residues may remain after fire. Clean up personnel should use appropriate protective equipment and clothing.	
REACTIVITY DATA	
STABILITY Unstable	CONDITIONS TO AVOID Avoid exposure to elevated temperatures. Diborane mixture storage time should be minimized. Diborane decomposes to form higher boranes (primarily tetraborane). These boranes may be more shock sensitive than diborane itself.
Stable	
INCOMPATIBILITY (Materials to avoid) Oxidizing agents, aluminum, lithium, hydrocarbons, halocarbons, metal oxides, grease	
HAZARDOUS DECOMPOSITION PRODUCTS Decomposes slowly at room temperature to yield hydrogen and higher boranes.	
HAZARDOUS POLYMERIZATION May Occur	CONDITIONS TO AVOID
Will Not Occur	X
SPILL OR LEAK PROCEDURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from the affected area. All personnel involved in controlling a release must use appropriate protective equipment to prevent exposure. Shut off the gas supply. If the cylinder itself is leaking or if assistance is required, call the Air Products emergency number (800) 523-9374; in Pennsylvania (800) 322-9092.	
WASTE DISPOSAL METHOD Do not attempt to dispose of waste or surplus diborane. Return all unused quantities to Air Products and Chemicals, Inc. for disposal with positive pressure in cylinder, valve tightly closed, and with outlet plug and valve cap in place. For emergency	
(Continued on Last Page)	

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TITLE DIBORANE MADE BY AIR PRODUCTS & CHEMICALS, INC.	REVISION ①	SPECIFICATION NUMBER 856150-002
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SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure self-contained breathing apparatus should be available for emergency use.		
VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (Gen.)	OTHER
	X	
PROTECTIVE GLOVES Rubber, neoprene or PVC gloves		
EYE PROTECTION Safety glasses or goggles		
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyebath		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION D.O.T. shipping name: Diborane Mixture; D.O.T. hazard class: Flammable Gas; D.O.T. labels: Flammable Gas and Poison; ID No.: UN 1911

SPECIAL HANDLING RECOMMENDATIONS

Use only in a well-ventilated area, preferably a hood with forced ventilation. Never drop cylinders or allow them to strike each other violently. Avoid dragging or sliding cylinders, even for short distances. They should be moved by a suitable hand truck. Keep the valve protection cap in place until cylinder is secured and ready for use. Always insert a trap or check-valve in the line to prevent hazardous backflow into the cylinder. Use a pressure-reducing regulator when connecting to lower pressure piping systems. Installation of a cross-purge assembly between the cylinder and regulator is recommended. Thoroughly purge the gas handling system with dry, inert gas and test the system for leaks before introducing diborane mixtures. For additional handling recommendations, consult the Air Products Specialty Gas Catalog, Safety and Technical Information Section, or Compressed Gas Association Pamphlet P-1.

SPECIAL STORAGE RECOMMENDATIONS

Protect against physical damage. Store cylinders in a cool, dry, well-ventilated area of noncombustible construction. Protect cylinders from excessive temperature rise by storing away from sources of heat. No part of a cylinder should be subjected to a temperature above 130°F (54°C). Store cylinders in an upright position and firmly secured. Segregate full and empty cylinders. Store cylinders away from open flames and electrical sparks. Separate from halogens and oxidizing agents. Check cylinders periodically for decomposition which may cause a rise in cylinder pressure.

For additional storage recommendations consult the Air Products Specialty Gas Catalog, Safety and Technical Information Section, or Compressed Gas Association Pamphlet P-1.


SPECIAL PACKAGING RECOMMENDATIONS

Diborane is a noncorrosive and most common structural materials (except aluminum) can be used.

OTHER RECOMMENDATIONS OR PRECAUTIONS

Personnel must immediately evacuate the area as soon as diborane is detected. Inhalation of diborane temporarily deadens olfactory senses; therefore, concentrations above the normal threshold concentration for smell can no longer be detected. Diborane mixtures should be used in a timely manner.

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

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Air Products and Chemicals, Inc.
 Specialty Gas Department
 Box 535, Allentown, PA 18105
 (215) 481-8257

HEALTH HAZARD DATA: (Continued)

RECOMMENDED FIRST AID TREATMENT

Note To Physician: There is no specific antidote for the boranes. Treatment is symptomatic and supportive.


SPILL OR LEAK PROCEDURES: (Continued)

WASTE DISPOSAL METHOD

disposal instructions, call Air Products and Chemicals, Inc. emergency phone number.

Printed in U.S.A.

120-341

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HARRIS
SEMICONDUCTOR

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TITLE: PHOSPHINE MADE BY UNION CARBIDE

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PHOSPHINE MADE BY UNION CARBIDE

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0	59429	1 - 5	<i>Ra Cap</i>	11 Feb 86	2/3/86
1	66898	1-2; 4 - 7 pg 6 and 7 added pgs renumbered	<i>Ra Cap</i>	2/19/87	2-13-87

1.0 PURPOSE

This specification defines the chemical safety requirements for Phosphine supplied by the applicable manufacturer(s) or distributor(s) of the product.

TITLE PHOSPHINE MADE BY UNION CARBIDE		REVISION 0	SPECIFICATION NUMBER 856289-001
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L-4643-B
September 1985

MATERIAL SAFETY DATA SHEET

An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200, available from OSHA regional or area offices.

(Essentially similar to U.S. Department of Labor Form OSHA-20 and generally accepted in Canada for information purposes.)
Do Not Duplicate This Form. Request an Original.

I. PRODUCT IDENTIFICATION

PRODUCT	Phosphine		
CHEMICAL NAME	Phosphine	SYNONYMS	Hydrogen Phosphide, Phosphorus Trihydride, Phosphuretted Hydrogen
FORMULA	PH ₃	CHEMICAL FAMILY	Covalent Hydride
		MOLECULAR WEIGHT	34.00
TRADE NAME	Phosphine		

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data Sheets. See Section IX.

MATERIAL (CAS NO.)	Wt (%)	1984-1985 ACGIH TLV-TWA (OSHA-PEL)	
Phosphine (7803-51-2)	100	0.3 ppm	(0.3 ppm)

III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	-87.7°C (-125.9°F)	FREEZING POINT	-133.8°C (-208.8°F)
SPECIFIC GRAVITY (H ₂ O = 1)	0.57 @ 20 atm	VAPOR PRESSURE AT 20°C.	592.7 psig
VAPOR DENSITY (air = 1)	1.184 @ 21°C (70°F)	SOLUBILITY IN WATER, % by wt.	Slight
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	Not applicable

APPEARANCE AND ODOR Colorless gas at normal temperature and pressure; odor of decaying fish.

EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times:

In the USA 304 — 744-3487

In Canada 514 — 645-5311

For routine information contact your local supplier

Union Carbide requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

UNION CARBIDE CORPORATION LINDE DIVISION

UNION CARBIDE CANADA LIMITED LINDE DIVISION

L-4643-B

TITLE	REVISION	SPECIFICATION NUMBER
PHOSPHINE MADE BY UNION CARBIDE	1	856289-001



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PRODUCT: Phosphine

L-4843-B
September 1985

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: 0.3 ppm TWA - ACGIH (1984-85)

EFFECTS OF SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING — An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid.

SKIN ABSORPTION — No information available.

INHALATION — Highly toxic; may be fatal if inhaled. Effects include dizziness, headache, nausea, vomiting, abdominal and chest pain, difficulty with breathing, diarrhea and collapse. Causes irritation of the respiratory tract and lungs. Pulmonary edema may occur 1 to 2 days after exposure.

SKIN CONTACT — No harmful effects expected from vapor. Liquid may cause frostbite.

EYE CONTACT — No harmful effects expected from vapor. Liquid may cause frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Repeated exposure may result in anemia, bronchitis, gastrointestinal disturbances, and visual, speech and motor disturbances.

OTHER EFFECTS OF OVEREXPOSURE: Central nervous system depression, heart, liver and kidney damage, and cerebral edema may occur.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Breathing of vapor and/or mist may aggravate asthma and inflammatory or fibrotic pulmonary disease.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING — This product is a gas at normal temperature and pressure.


SKIN — For exposure to liquid, immediately warm frostbite area with warm water (not to exceed 105°F). In case of massive exposure, remove clothing while showering with warm water. Call a physician.

INHALATION — Remove to fresh air. Give artificial respiration if not breathing. Give oxygen if breathing is difficult. Call a physician.

EYES — In the case of splash contamination, immediately flush eyes thoroughly with water for at least 15 minutes. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN: Symptoms may be delayed 1 to 2 days. Maintain alkaline urine.

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TITLE PHOSPHINE MADE BY UNION CARBIDE		REVISION 1	SPECIFICATION NUMBER 856289-001
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PRODUCT: Phosphine

L-4643-B
September 1985

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Flammable Gas	AUTOIGNITION TEMPERATURE	100° to 150°C (212° to 305°F)
FLAMMABLE LIMITS in AIR, % by volume	LOWER 4.0%	UPPER 50% (See UNUSUAL FIRE AND EXPLOSION HAZARDS)	

EXTINGUISHING MEDIA: CO₂, dry chemical, water spray or fog.

SPECIAL FIRE FIGHTING PROCEDURES:

DANGER: Poisonous gas (See Section IX). Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur; therefore appropriate measures should be taken; e.g., total evacuation. Reapproach with extreme caution. Reduce toxic vapors with water spray or fog. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out. On site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Poisonous, flammable gas. May form explosive mixtures with air and oxidizing agents. Phosphine may spontaneously ignite in contact with air. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable and toxic vapors may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with appropriate device. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F).

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID: Decomposes at temperatures in excess of 365°C (See Section IX).
UNSTABLE	STABLE	
X		

(INCOMPATIBILITY (materials to avoid): Halogenated hydrocarbons, oxidizing agents, especially oxygen and halogens, acids, as well as aluminum alloys and copper.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce hydrogen, phosphorus, phosphorus oxides.

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID: None currently known.
May Occur	Will not Occur	
	X	

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

DANGER: Immediately evacuate all personnel from danger area. Poisonous, flammable gas. May form explosive mixtures with air (see Section V). Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area. Prevent runoff from contaminating surrounding environment.

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Keep personnel away. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations.

TITLE	REVISION	SPECIFICATION NUMBER
PHOSPHINE MADE BY UNION CARBIDE	1	856289-001



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PRODUCT: Phosphine

L-4643-B
September 1985

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type): Select in accordance with OSHA 29 CFR 1910.134. Respirators shall be acceptable to MSHA and NIOSH.

VENTILATION	LOCAL EXHAUST — See SPECIAL.
	MECHANICAL (general) — See SPECIAL.
	SPECIAL — Use in a closed system. Explosion proof forced draft fume hood is preferred.
	OTHER — See SPECIAL.

PROTECTIVE GLOVES: Neoprene.

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

IX. SPECIAL PRECAUTIONS

DANGER: Poisonous, flammable, liquefied gas under pressure. May be fatal if inhaled. Do not breathe gas. Do not get liquid or vapors in eyes, on skin or on clothing (see Section V). Safety showers and eyewash fountains should be immediately available. Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air. Keep away from heat, sparks and open flame. Ground all equipment. Use spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty. When returning cylinder, install valve outlet plug tightly.

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Be sure to read and understand all labels and instructions supplied with all containers of this product.

NOTE: Compatibility with plastics should be confirmed prior to use. For safety information on general handling of compressed gas cylinders, obtain a copy of pamphlet P-1, "Safe Handling of Compressed Gases in Containers" from the Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak. Keep away from oxidizing agents and flammables.

The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and these opinions and the conditions of use of the product are not within the control of Union Carbide, it is the user's obligation to determine the conditions of safe use of the product.



GENERAL OFFICES

IN THE USA:
Union Carbide Corporation
Linde Division
39 Old Ridgebury Road
Danbury, CT 06817-0001

IN CANADA:
Union Carbide Canada Limited
Linde Division
123 Eglinton Avenue East
Toronto, Ontario M4P 1J3

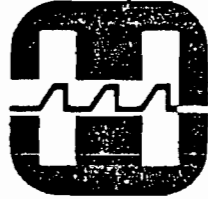
Other offices in principal cities all over the world.

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TITLE: AMMONIA, ANHYDROUS MADE BY UNION CARBIDE

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PROPRIETARY DATA

VERTICAL BAR IN RIGHT MARGIN INDICATES REVISION.

REVISION
SPECIFICATION NUMBER 856024-001
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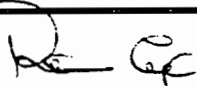


CHEMICAL SAFETY
SPECIFICATION

CODE
IDENT. NO.
34371

CONTROLLED DOCUMENT HISTORY

TITLE: AMMONIA, ANHYDROUS MADE BY UNION CARBIDE

CURRENT REVISION	ECO NO.	PAGES AFFECTED	ORIGINATOR APPROVAL	DATE	REVISION DATE
0	59429	1 - 7		9 JAN 86	1/7/86

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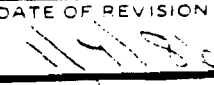
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1.0 PURPOSE

This specification defines the chemical safety requirements for Ammonia, Anhydrous made by Union Carbide supplied by the applicable manufacturer(s) or distributor(s) of the product.

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MATERIAL SAFETY DATA SHEET

F-4562

(Essentially similar to U.S. Department of Labor Form OS-HA-20)

Do Not Duplicate This Form. Request an Original

I. PRODUCT IDENTIFICATION

PRODUCT	Ammonia, Anhydrous (Liquefied Gas Under Pressure)		
CHEMICAL NAME	Ammonia, Anhydrous	SYNONYMS	Liquid Ammonia
FORMULA	NH ₃	CHEMICAL FAMILY	Alkaline Gas
TRADE NAME AND SYNONYMS	---	MOLECULAR WEIGHT	17.031

II. HAZARDOUS INGREDIENTS

Refer to Section V for TLV information.
For mixtures of this product request the respective component Material Safety Data Sheets.

III. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	-33.35°C (-28°F)	FREEZING POINT	-77.7°C (-107.9°F)
SPECIFIC GRAVITY (H ₂ O = 1)	0.62 (15°C)	VAPOR PRESSURE AT 20°C.	128.8 psia
VAPOR DENSITY (air = 1)	0.597	SOLUBILITY IN WATER, % by wt.	Appreciable
PER CENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	High
APPEARANCE AND ODOR	Colorless, pungent, irritating odor.		

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Flammable Gas	AUTOIGNITION TEMPERATURE	637°C (1204°F)
FLAMMABLE LIMITS IN AIR, % by volume	LOWER 15%	UPPER	28%
EXTINGUISHING MEDIA	CO ₂ dry chemical, water spray or fog.		

SPECIAL FIRE FIGHTING PROCEDURES

Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Reduce corrosive vapors with water spray or fog. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Flammable, toxic, corrosive gas. Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable and corrosive vapors may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with appropriate device. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F).

EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times at this telephone number:


304: 744-3487

For routine information contact your local Linde Supplier.

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While Union Carbide Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the tests conducted, the data are not to be taken as a warranty or representation for which Union Carbide Corporation assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

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TITLE	REVISION	SPECIFICATION NUMBER
AMMONIA, ANHYDROUS MADE BY UNION CARBIDE		856024-001
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PRODUCT: Ammonia, Anhydrous (Liquefied Gas Under Pressure)

F-4582

V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE TLV-TWA: 25 ppm (18 mg/m³) (ACGIH-1978)

EFFECTS OF OVEREXPOSURE AND EMERGENCY AND FIRST AID PROCEDURES

Can cause edema of respiratory tract, asphyxiation. Can burn eyes, lungs and skin.

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

In case of contact with liquid or vapor, immediately flush areas of exposure with large quantities of water while removing contaminated clothing and shoes. Call a physician. Continue to flush with water for at least 15 minutes or until medical attention is obtained. Discard contaminated clothing and shoes.

Restore tissue to normal body temperature (98.6°F) as rapidly as possible followed by protection of the injured tissue from further damage and infection. Call a physician. Rapid warming of the affected part is best achieved by using water at 108°F. Under no circumstances should the water be over 112°F, nor should the frozen part be rubbed either before or after re-warming. The patient should not smoke, nor drink alcohol. Keep warm and at rest.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
Unstable	Stable	
	X	See Section IX.

INCOMPATIBILITY (materials to avoid) Silver, mercury, oxidizing agents, halogens, acids, brass (copper).

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur	Will not Occur	
	X	---

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Immediately evacuate all personnel from danger area.


WARNING: Flammable, corrosive, toxic gas. Forms explosive mixtures with air (see Section IV). Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray.

Note: Suck-back into cylinder may cause explosion (see Section IX). Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area. Prevent run-off from contaminating surrounding environment.

CAUTION: Flammable, corrosive, toxic vapors may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD

Prevent waste from contaminating surrounding environment. Keep personnel away. Call supplier for disposal information.

TITLE AMMONIA, ANHYDROUS MADE BY UNION CARBIDE		REVISION 0	SPECIFICATION NUMBER 856024-001
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PRODUCT: Ammonia, Anhydrous (Liquefied Gas Under Pressure)

F-4562

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
Self-contained breathing apparatus where needed.

VENTILATION	LOCAL EXHAUST	Explosion-proof, corrosion resistant system is acceptable.
	MECHANICAL (general)	Inadequate
	SPECIAL	Explosion-proof, corrosion resistant, forced draft fume hood is preferred.
	OTHER	---

PROTECTIVE GLOVES Neoprene

EYE PROTECTION Safety glasses and a full face shield.

OTHER PROTECTIVE EQUIPMENT Metatarsal shoes for cylinder handling. Protective clothing where needed.

IX. SPECIAL PRECAUTIONS

WARNING: Toxic, corrosive, flammable, liquefied gas under pressure.

Do not breathe gas. Do not get liquid or vapors in eyes, on skin or clothing (see Section V). Safety showers and eyewash fountains should be immediately available.


Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air. Keep away from heat, sparks and open flame. Ground all equipment. Only use spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation at all times.

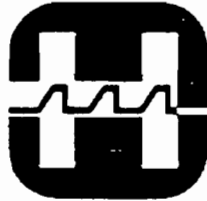
Use only in a closed system constructed of corrosion-resistant materials. Close valve when not in use and when empty.

Suck-back into cylinder may cause explosion. Always use a vacuum break or other protective apparatus in any line or piping from the cylinder to prevent suck-back.

OTHER HANDLING AND STORAGE CONDITIONS

Keep away from oxidizing agents

TITLE AMMONIA, ANHYDROUS MADE BY UNION CARBIDE		REVISION ①	SPECIFICATION NUMBER 856024-001
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TITLE: HALOCARBON 23, TRIFLUOROMETHANE

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PROPRIETARY DATA

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CHEMICAL SAFETY
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<i>[Signature]</i>
SPECIFICATION NUMBER
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CONTROLLED DOCUMENT HISTORY

TITLE:

HALOCARBON 23, TRIFLUOROMETHANE

CURRENT REVISION	ECO NO.	PAGES AFFECTED	ORIGINATOR APPROVAL	DATE	REVISION DATE
0	59429	1 - 7	<i>Re Co</i>	11 Feb 86	1/31/86

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CODE IDENT. NO.
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SPECIFICATION NUMBER
 856225
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1.0 PURPOSE

This specification defines the chemical safety requirements for Halocarbon 23, Trifluoromethane supplied by the applicable manufacturer(s) or distributor(s) of the product.

TITLE		REVISION	SPECIFICATION NUMBER
HALOCARBON 23, TRIFLUOROMETHANE		1	856225
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L-4868-A
August 1985

MATERIAL SAFETY DATA SHEET

An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200, available from OSHA regional or area offices.
(Essentially similar to U.S. Department of Labor Form OSHA-20 and generally accepted in Canada for information purposes)
Do Not Duplicate This Form. Request an Original.

I. PRODUCT IDENTIFICATION

PRODUCT	Halocarbon 23		
CHEMICAL NAME	Trifluoromethane	SYNONYMS	Fluorotom, Methyl Trifluoride, Carbon Trifluoride, Fluoryl
FORMULA	CHF ₃	CHEMICAL FAMILY	Fluorocarbon
		MOLECULAR WEIGHT	70.01
TRADE NAME	Halocarbon 23		

II. HAZARDOUS INGREDIENTS

For mixtures of this product request the respective component Material Safety Data Sheets. See Section IX.

MATERIAL (CAS NO.)	WT (%)	1984-1985 ACGIH TLV-TWA (OSHA-PEL)
Trifluoromethane (75-48-7)	100	None currently established (None currently established)

III. PHYSICAL DATA


BOILING POINT, 760 mm. Hg	-82.2°C (-115.9°F)	FREEZING POINT	-155.2°C (-247.4°F)
SPECIFIC GRAVITY (H ₂ O = 1)	1.52 @ -100°C	VAPOR PRESSURE AT 21°C	635 psig
VAPOR DENSITY (air = 1)	2.430 @ 21°C	SOLUBILITY IN WATER, % by wt.	Slight
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	High
APPEARANCE AND ODOR	Colorless gas at normal temperature and pressure; slightly ether-like odor.		

EMERGENCY PHONE NUMBER

IN CASE OF EMERGENCIES involving this material, further information is available at all times:
In the USA 304-744-3487 In Canada 514-645-5311
For routine information contact your local supplier

Union Carbide requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

UNION CARBIDE CORPORATION ☐ LINDE DIVISION
UNION CARBIDE CANADA LIMITED ☐ LINDE DIVISION

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PRODUCT: Halocarbon 23

L-4668-A
August 1985

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section II.

EFFECTS OF SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING—An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid.

SKIN ABSORPTION—Prolonged or widespread skin contact with the liquid may result in the absorption of harmful amounts of material.

INHALATION—Asphyxiant. High concentrations can cause dizziness, nausea, vomiting, disorientation, confusion, incoordination, and narcosis. These effects of very high concentrations are due to suffocation. Lack of oxygen can cause death.

SKIN CONTACT—Liquid may cause frostbite.

EYE CONTACT—Liquid may cause severe corneal injury.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No evidence of adverse effects from available information.

OTHER EFFECTS OF OVEREXPOSURE: At very high concentrations exposure may produce cardiac arrhythmias or arrest due to sensitization of the heart to adrenalin and noradrenalin.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: A knowledge of the available toxicology information and of the physical and chemical properties of the material suggest that overexposure is unlikely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None currently known.

EMERGENCY AND FIRST-AID PROCEDURES:

SWALLOWING—This product is a gas at normal temperature and pressure.


SKIN CONTACT—For exposure to liquid, immediately warm frostbite area with warm water (not to exceed 105°F). In case of massive exposure, remove clothing while showering with warm water. Call a physician.

INHALATION—Remove to fresh air. Give artificial respiration if not breathing. Give oxygen if breathing is difficult. Call a physician.

EYE CONTACT—For contact with the liquid, immediately flush eyes thoroughly with water for at least 15 minutes. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN: Do not administer adrenalin due to the sensitizing effect of fluorocarbons on the myocardium. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

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TITLE	REVISION	SPECIFICATION NUMBER
HALOCARBON 23, TRIFLUOROMETHANE	5	856225
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PRODUCT: Halocarbon 23

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V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	Not applicable		AUTOIGNITION TEMPERATURE	Not applicable	
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	Not applicable		UPPER	Not applicable

EXTINGUISHING MEDIA:

Halocarbon 23 cannot catch fire. Use media appropriate for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES:

Evacuate all personnel from danger area. Immediately deluge containers with water spray from maximum distance until cool, then move containers away from fire area if without risk.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Gas cannot catch fire. Container may rupture due to heat of fire. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F). Most containers are provided with pressure-relief devices that are designed to vent the contents when they are exposed to elevated temperature. Toxic fumes may be produced when heated.

VI. REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID: Elevated temperatures (the presence of certain metals may promote catalytic decomposition of the gas).
UNSTABLE	STABLE	
	X	

INCOMPATIBILITY (materials to avoid): Polystyrene, natural rubber, alloys containing greater than 2% magnesium in the presence of water. Nitroaryl fluorides, N₂O₅, lime at dull red heat, metals at elevated temp.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce toxic fumes of fluorides.

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID: None currently known.
May Occur	Will not Occur	
	X	


VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area. Test area, especially confined areas, for sufficient oxygen content prior to permitting re-entry of personnel.

WASTE DISPOSAL METHOD:

Prevent waste from contaminating surrounding environment. Keep personnel away. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with Federal, state and local regulations.

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VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type): Select in accordance with OSHA 29 CFR 1910.134. Respirators shall be acceptable to MSHA and NIOSH.

VENTILATION	LOCAL EXHAUST—Preferred
	MECHANICAL (general)—Acceptable
	SPECIAL—Use in a closed system
	OTHER—Not applicable. See "SPECIAL"

PROTECTIVE GLOVES: Neoprene

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

IX. SPECIAL PRECAUTIONS

CAUTION: Liquefied gas under pressure. Can cause rapid suffocation due to oxygen deficiency. Use piping and equipment adequately designed to withstand pressures to be encountered. Store and use with adequate ventilation at all times. Use only in a closed system. Close cylinder valve when not in use and when empty.

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death. Be sure to read and understand all labels and other instructions supplied with all containers of this product.

NOTE: Compatibility with plastics should be confirmed prior to use. For safety information on general handling of compressed gas cylinders, obtain a copy of pamphlet P-1, "Safe Handling of Compressed Gases in Containers" from the Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak.

The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and these opinions and the conditions of use of the product are not within the control of Union Carbide, it is the user's obligation to determine the conditions of safe use of the product.

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Toronto, Ontario M4P 1J3

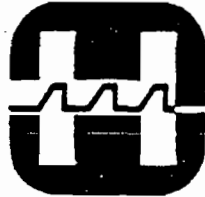
Other offices in principal cities all over the world.



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TITLE	REVISION	SPECIFICATION NUMBER
HALOCARBON 23 TRIFLUOROMETHANE		856225
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HARRIS
SEMICONDUCTOR
A DIVISION OF HARRIS CORPORATION

TITLE: SILANE MADE BY UNION CARBIDE

CONTROLLED
DOCUMENT

PROPRIETARY DATA

VERTICAL BAR IN RIGHT MARGIN INDICATES REVISION.



CHEMICAL SAFETY
SPECIFICATION

CODE
IDENT. NO.
34371

REVISION
SPECIFICATION NUMBER 856362-001
PAGE 1 OF 7

CONTROLLED DOCUMENT HISTORY

TITLE: SILANE MADE BY UNION CARBIDE

CURRENT REVISION	ECO NO.	PAGES AFFECTED	ORIGINATOR APPROVAL	DATE	REVISION DATE
0	59429	1 - 5	<i>Re Cop</i>	<i>11 Feb 86</i>	02/07/86
1	66898	1-2; 4--7 pgs 6 and 7 added pgs renumbered	<i>Re Cop</i>	<i>2/19/87</i>	2-13-87

 **HARRIS**
HARRIS CORPORATION
SEMICONDUCTOR GROUP

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SPECIFICATION NUMBER
856362-001

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1.0 PURPOSE

This specification defines the chemical safety requirements for Silane made by Union Carbide supplied by the applicable manufacturer(s) or distributor(s) of the product.

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SILANE MADE BY UNION CARBIDE		A	856362-001
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MATERIAL SAFETY DATA SHEET

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An explanation of the terms used herein may be found in OSHA 29 CFR 1910.1200, available from OSHA regional or area offices.

(Essentially similar to U.S. Department of Labor Form OSHA-20 and generally accepted in Canada for information purposes)
Do Not Duplicate This Form. Request an Original.

PRODUCT	Silane		
CHEMICAL NAME	Silane	SYNONYMS	Silicon Tetrahydride, Silicane, Monosilane
FORMULA	SiH ₄	CHEMICAL FAMILY	Metalloid Hydride
		MOLECULAR WEIGHT	32.12
TRADE NAME	Silane		

For mixtures of this product request the respective component Material Safety Data Sheets. See Section IX.

MATERIAL (CAS NO.)	WT. (%)	1984-1985 ACGIH TLV-TWA (OSHA-PEL)
Silane (7803-62-5)	100	5 ppm (None currently established)

BOILING POINT, 760 mm. Hg	-111.7°C (-169°F)	FREEZING POINT	-185°C (-301°F)
SPECIFIC GRAVITY (H₂O = 1)	0.68 @ -185°C	VAPOR PRESSURE AT 20°C.	Gas
VAPOR DENSITY (air = 1)	1.114 @ 21.1°C	SOLUBILITY IN WATER, % by wt.	Negligible
PERCENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	Not Applicable


APPEARANCE AND ODOR Colorless gas at normal temperature and pressure; choking odor.

IN CASE OF EMERGENCIES involving this material, further information is available at all times:
In the USA 1-800-UCC-HELP (1-800-822-4357) In Canada 514-645-5311
For routine information contact your local supplier

Union Carbide requests the users of this product to study this Material Safety Data Sheet (MSDS) and become aware of product hazards and safety information. To promote safe use of this product a user should (1) notify its employees, agents and contractors of the information on this MSDS and any product hazards and safety information, (2) furnish this same information to each of its customers for the product, and (3) request such customers to notify their employees and customers for the product of the same product hazards and safety information.

UNION CARBIDE CORPORATION □ LINDE DIVISION
UNION CARBIDE CANADA LIMITED □ LINDE DIVISION

L-4649-A

TITLE SILANE MADE BY UNION CARBIDE		REVISION 1	SPECIFICATION NUMBER 856362-001
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PRODUCT: Silane

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THRESHOLD LIMIT VALUE: See Section II.

EFFECTS OF SINGLE (ACUTE) OVEREXPOSURE:

SWALLOWING — An unlikely route of exposure.

SKIN ABSORPTION — No information available.

INHALATION — May cause headache, nausea, and irritation of the respiratory tract.

SKIN CONTACT — No information available.

EYE CONTACT — No information available.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No information available.

OTHER EFFECTS OF OVEREXPOSURE: None currently known.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: A knowledge of the available toxicology information and of the physical and chemical properties of the material suggest that overexposure is unlikely to aggravate existing medical conditions.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING — This product is a gas at normal temperature and pressure.


SKIN CONTACT — Wash with soap and water.

INHALATION — Remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

EYE CONTACT — Flush with water. If irritation develops, see a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN: There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

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Best Available Copy

PRODUCT: Silane

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FLASH POINT (test method)	None currently known	AUTOIGNITION TEMPERATURE	None currently known
FLAMMABLE LIMITS IN AIR, % by volume	LOWER None currently known	UPPER	None currently known

EXTINGUISHING MEDIA: Gas may ignite spontaneously in air (fire cannot be extinguished).

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool containers with water spray from maximum distance. Stop flow of gas if without risk while continuing cooling water spray. If flow of gas cannot be shut off, allow fire to burn out. Reduce combustion products with water spray or fog. Remove all containers from area of fire if without risk. Allow fire to burn out.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Gas may ignite spontaneously in air. Vapors form from this product and may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges or other ignition sources at locations distant from product handling point. May form explosive mixtures in air. Container may rupture due to heat of fire. No part of a container should be subjected to a temperature higher than 52°C (approximately 125°F). Reverse flow into cylinder may cause rupture. Most containers are provided with a pressure-relief device designed to vent contents when they are exposed to elevated temperature.

STABILITY	CONDITIONS TO AVOID: Temperatures in excess of 400°C. See Section IX.			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">UNSTABLE</td> <td style="width: 50%;">STABLE</td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> </tr> </table>		UNSTABLE	STABLE	X
UNSTABLE	STABLE			
X				

INCOMPATIBILITY (materials to avoid): Air, water, solutions of bases, oxidizing agents, chlorine, Halogens.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen, silica dust.


HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID: None currently known.			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">May Occur</td> <td style="width: 50%;">Will not Occur</td> </tr> <tr> <td></td> <td style="text-align: center;">X</td> </tr> </table>		May Occur	Will not Occur	
May Occur	Will not Occur			
	X			

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Immediately evacuate all personnel from danger area.

DANGER: Flammable, toxic gas. May ignite spontaneously in air. May form explosive mixtures in air. See Section V. Use self-contained breathing apparatus and protective clothing where needed. See Section VIII. Reduce combustion products with fog or fine water spray. Shut off leak if, without risk. Ventilate area of leak or move leaking container to well ventilated area.

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Keep personnel away. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with Federal, State and local regulations.

TITLE SILANE MADE BY UNION CARBIDE	REVISION 1	SPECIFICATION NUMBER 856362-001
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PRODUCT: Silane

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RESPIRATORY PROTECTION (specify type): Select in accordance with OSHA 29 CFR 1910.134. Respirators shall be acceptable to MSHA and NIOSH.

VENTILATION	LOCAL EXHAUST — Explosion-proof system is acceptable.
	MECHANICAL (general) — Inadequate.
	SPECIAL — Not Applicable.
	OTHER — Not Applicable.

PROTECTIVE GLOVES: Preferred for cylinder handling.

EYE PROTECTION: Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

DANGER: Flammable, high pressure gas. Gas may ignite spontaneously in air. May form explosive mixtures with air. Does not need a source of ignition. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only in a closed system purged with an inert gas prior to discharge from cylinder. Store and use with adequate ventilation. Close valve when not in use and when empty. Ground all equipment. Only use spark-proof tools and explosion-proof equipment.

NOTE: Reverse flow into cylinder may cause rupture. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow.

MIXTURES: When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Be sure to read and understand all labels and other instructions supplied with all containers of this product.

NOTE: Compatibility with plastics should be confirmed prior to use. For safety information on general handling of compressed gas cylinders, it is recommended that a copy of pamphlet P-1, "Safe Handling of Compressed Gases in Containers" be obtained from the Compressed Gas Association, Inc., 1235 Jefferson Davis Highway, Arlington, VA 22202.

OTHER HANDLING AND STORAGE CONDITIONS: Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, then repair the leak.

The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and these opinions and the conditions of use of the product are not within the control of Union Carbide, it is the user's obligation to determine the conditions of safe use of the product.



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Other offices in principal cities all over the world.

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ATTACHMENT E

HARRIS SEMICONDUCTOR

SUPPLEMENTAL INFORMATION

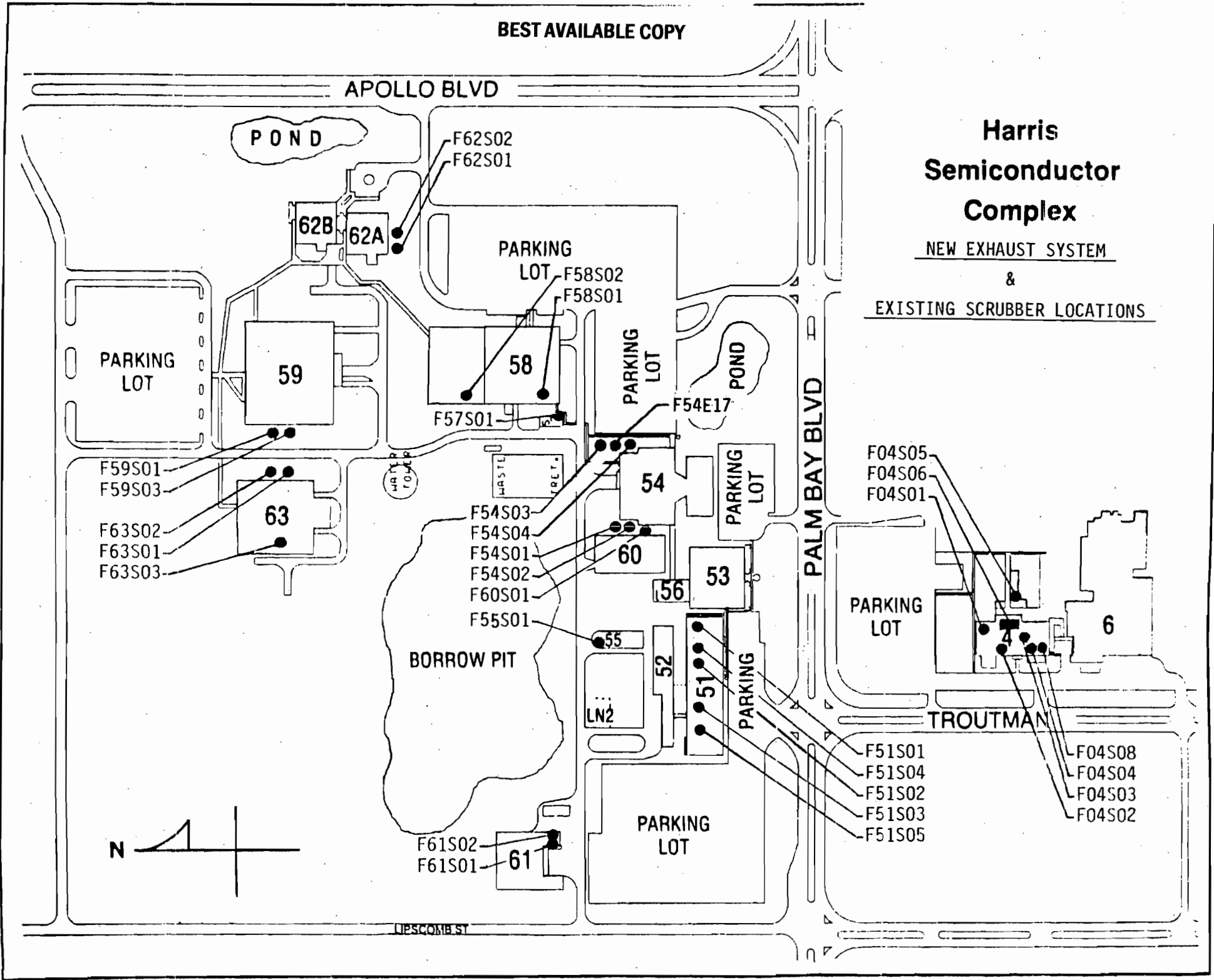
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NEW EXHAUST SYSTEM

&

EXISTING SCRUBBER LOCATIONS



FLOW DIAGRAM--BUILDING 54

