Check Sheet

009005 1

Company Name: NASA
Permit Number: HC 05-6545 & 73084
PSD Number:
Permit Engineer:

Application:

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

Cross References:

- [ ]
- [ ]
- [ ]

Intent:

- [x] Intent to Issue
- [x] Notice of Intent to Issue
- [x] Technical Evaluation
- [ ] BACT Determination
- [x] Unsigned Permit

Correspondence with:

- [ ] EPA
- [ ] Park Services
- [ ] Other

- [x] Proof of Publication
  - [ ] Petitions - (Related to extensions, hearings, etc.)
  - [ ] Waiver of Department Action
  - [ ] Other

Final Determination:

- [x] Final Determination
- [x] Signed Permit
- [ ] BACT Determination
  - [ ] Other

Post Permit Correspondence:

- [x] Extensions/Amendments/Modifications
- [ ] Other

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899

NASA

0090051

SEP 30 1983

Reply to Attn of DF-EMS

DER
OCT 06 1983
BAQM

Florida Dept. of Environmental Regulation
Attn: Mr. C. H. Fancy, P. E. Deputy Chief
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Subject: Application for Construction Permit for Existing Solid Rocket Booster Refurbishment and Subassembly Facility

The enclosed information is forwarded to you as requested in your letter of August 25, 1983, same subject. Please refer any questions you may have regarding this information to Mr. Kirby Key/Chief, Environmental Management Staff, at Telephone No. (305) 867-4049.

Henry G. Paul
for Peter A. Minderman
Director of Engineering Development

Enclosures

APPLICATION FOR CONSTRUCTION PERMIT FOR EXISTING SOLID ROCKET BOOSTER REFURBISHMENT AND SUBASSEMBLY FACILITY

Section II

A. Project Description

1. In the course of applying thermal protection (MSA-1 coating and hypalon topcoat) on SRB structure and components there are no previous or intermediate operations involved. The MSA-1 coating operation consists of batch mixing, spraying, ambient cure and hot cure. The hypalon topcoat operation consists of batch preparation, spraying and ambient cure.
2. The SRB refurbishment operation is the only refurbishment operation conducted at the Kennedy Space Center.
3. The spray equipment is cleaned utilizing methylene chloride.
4. A detailed description of the refurbishment operation is as follows:

   United Space Boosters, Inc. (USBI) operates an ablative coating process at the Kennedy Space Center in the Vehicle Assembly Building (VAB-RSF) for the National Aeronautices and Space Administration (NASA). This coating process involves the spray application of thermal protection on the refurbished booster rockets utilized in space shuttle flight.

The coating process first involves the application of an ablative coating (MSA-1) followed by a hypalon topcoat. This process is conducted inside spray/cure cells which are vented to the atmosphere by a multi-fan/stack exhaust system.

The two operations as previously outlined are the MSA-1 coating and hypalon topcoat. The breakdown of each of these operations is as follows:

MSA-1 Coating

1) Batch Mixing
2) Spraying
3) Ambient Cure
4) Hot Cure

Hypalon Topcoat

1) Batch Preparation
2) Spraying
3) Ambient Cure

The components which are MSA-1 coated for each Solid Rocket Booster are the nose cap, frustum, forward skirt and the system tunnels. The aft skirt is not MSA-1 coated. This component is covered with cork and only a small area is coated with MTA-2, a trowelable ablative coating. This trowelable coating does not contain volatile components thus has zero emission potential.

All of the components listed above receive the hypalon topcoat.

B. Project's Schedule:

1. Construction on the existing SRB refurbishment facility was completed in 1978.
2. This existing facility does not have a previous construction permit.

F. Operating Time

1. The maximum operating time for each SRB MSA-1 coating operation is 259 hours.
2. The maximum operating time for each SRB hypalon topcoat operation is 95 hours.
3. There are two spray and two cure cells which are fully functional at the present time. This would allow for the processing of only two SRB components concurrently.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES

A. Raw Materials and Chemicals Used:

1. The compounds utilized and the composition of each are as follows:

MSA-1 COATING COMPOSITION

COMPONENT	PERCENT BY WEIGHT	
METHYLENE CHLORIDE	43.3	78.2% VOLATILE
PERCHLOROETHYLENE	34.9	
CREST 7344 RESIN	7.6	21.8% SOLIDS
ETHYL ALCOHOL	0.4	
PHENOLIC MICROBALLOONS	8.2	
GLASS ECCOSPHERES	2.7	
BENTONE "27"	0.8	
1/4" CHOPPED GLASS FIBER	0.3	
1/16" MILLED GLASS FIBER	0.7	
SHELL CURING AGENT "Z"	1.1	
	100.0	

HYPALON TOPCOAT COMPOSITION

COMPONENT	PERCENT BY WEIGHT	
TITANIUM DIOXIDE	7.0	
ALUMINUM SILICATE	8.0	
HYPALON RUBBER	10.0	28% NON-VOLATILE
NON-VOLATILE HYDROCARBON RESIN	2.0	
EPOXIDIZED SOYBEAN OIL	1.0	
PERCHLOROETHYLENE	47.0	72% VOLATILE
1, 1, 1 TRICHLOROETHANE	25.0	
	100.0	

2. The various types and amounts of chemicals used in the thermal protection process are listed in Table 1 (Page 5) for the MSA-1 coating and Table 2 (Page 6) for Hypalon Topcoat.

3. Materials are stored as follows:

MATERIAL	CONTAINER/LOCATION
Hypalon Paint	5 gallon cans/mix room
Methylene Chloride	50 gallon walker tank/mix room storage tank (outside)
Perchloroethylene	1000 gallon storage tank/ mix room (outside)
Ethyl Alcohol	5 & 10 gallon cans/mix room flammable storage locker

RAW MATERIAL USE TABLE 1

MSA-1 COATING

COMPONENT	PERCENT BY WEIGHT	PER SRB	#YR/48 SRB's	TONS/YR
METHYLENE CHLORIDE	43.3	725#	34800	17.400*
PERCHLOROETHYLENE	34.9	584#	28032	14.016
CREST 7344 RESIN	7.6	127#	6096	3.048
ETHYL ALCOHOL	0.4	7#	336	0.168
PHENOLIC MICROBALLOONS	8.2	137#	6576	3.288
GLASS ECCOSPHERES	2.7	45#	2160	1.080
BENTONE "27"	0.8	13#	624	0.312
1/4" CHOPPED GLASS FIBER	0.3	5#	240	0.120
1/16" MILLED GLASS FIBER	0.7	12#	576	0.288
SHELL CURING AGENT "Z"	1.1	18#	864	0.432
TOTALS	100.0	1673#	80304	40.15

*TOTAL METHYLENE CHLORIDE USED MUST INCLUDE AMOUNT UTILIZED FOR CLEAN UP

MECL (CLEANUP) = 14 Kg x 4 COMPONENTS = 56 Kg/SRB

MECL (CLEANUP) = 56 Kg/SRB x 48 SRB's = 2688 Kg

MECL (CLEANUP) = 2688 Kg x 2.2.#/Kg = 5913.6#/YR

MECL (CLEANUP) = 5913.6#/YR ÷ 2000#/TON = 2.96 TPY

TOTAL MECL USED = 17.4 TPY + 2.96 TPY = 20.36 TPY

RAW MATERIAL USE TABLE 2

HYPALON TOPCOAT

COMPONENT	PERCENT BY WEIGHT	* #/SRB	#/YR 48 SRB's	TONS/YR
TITANIUM DIOXIDE	7.0	72.8	3494.4	1.747
ALUMINUM SILICATE	8.0	83.2	3993.6	1.996
HYPALON RUBBER	10.0	104.0	4992.0	2.496
NON-VOLATILE HYDROCARBON RESIN	2.0	20.8	998.4	0.499
EPOXIDIZED SOYBEAN OIL	1.0	10.4	499.2	0.250
PERCHLOROETHYLENE	47.0	488.8	23462.4	11.731
1, 1, 1 TRICHLOROETHANE	25.0	260.0	12480.0	6.240
TOTALS	100.0	1040	49920.0	24.959

*INVENTORY RECORDS SHOW 80 GALLONS OF HYPALON PAINT/SRB. HYPALON PAINT WEIGHS 13#/GALLON

∴ 80 x 13 = 1040 # HYPALON PAINT/SRB.

C. Airborne Contaminants Emitted

1. There is no other process capable of emitting any pollutant performed at this facility.
2. There are no significant detectable Particulate Matter (PM) emissions from the overall thermal protection process. The total VOC estimated emission potential from this process is delineated in Table 3 (Page 7).

VOC EMISSION POTENTIAL TABLE 3

THERMAL PROTECTION PROCESS

PROCESS	VOC COMPONENT	EMISSION POTENTIAL (TONS PER YEAR (TPY)
MSA-1 COATING	METHYLENE CHLORIDE	20.36
	PERCHOLOROETHYLENE	14.016
HYPALON TOPCOAT	1, 1, 1, TRICHLORO-ETHANE	6.24
	PERCHLOROETHYLENE	11.73*

*BASED ON ACTUAL INVENTORY USEAGE OF HYPALON PAINT.

D. Control Device

1. Should control devices be required, we would envision utilizing dual media filtration. This dual media filter could be composed of a glass filter followed by activated carbon. Typical removal efficiencies for this type of dual media filter range from 60-75%.
2. Both of the existing storage tanks outside of the mix room have high pressure release vents which are normally closed. Based on this there should be no significant or appreciable emissions of either Methylene Chloride or Perchloroethylene from these tanks.

E. Liquid Disposal

1. There are no emissions associated with this operation. Spent solvents are immediately drummed and disposed of via permitted vendor.

H. SECTION V - SUPPLEMENTAL REQUIREMENTS

1. The derivation of emission estimates are as follows:

MSA-1 COATING

(1) 50.78 Kg MECL/BATCH x 6.5 $\frac{\text{BATCHES}}{\text{SRB}}$ = 330.07 Kg/SRB MECL

(2) 40.98 Kg PERC/BATCH x 6.5 $\frac{\text{BATCHES}}{\text{SRB}}$ = 266.37 Kg/SRB PERC

(1) MECL = 330.07 Kg/SRB x 48 SRB's/YR x 2.2 #/Kg = 34855 #/YR

(2) PERC = 266.37 Kg/SRB x 48 SRB's/YR x 2.2 #/Kg = 28128 #/YR

(3) CLEANUP = 14 Kg/BATCH x 4 COMPONENTS/SRB = 56 Kg/SRB MECL

= 56 Kg/SRB x 48 SRB's x 2.2 #/Kg = 5913 #/YR

HYPALON TOPCOAT

80 GALLONS/SRB x 13 #/GAL = 1040 #/SRB

(1) PERC = 47% BY WT x 1040 #/SRB = 488.8 #/SRB

(1) PERC = 488.8 #/SRB x 48 SRB's/YR = 23462 #/YR

(2) 1, 1, 1, TRICHLOROETHANE = 25% BY WT x 1040 #/SRB = 260 #/SRB

(2) 1, 1, 1, TRI = 260 #/SRB x 48 SRB's/YR = 12480 #/YR

2. Flow diagrams and mass balance are shown in attachments 1, 2, and 3.

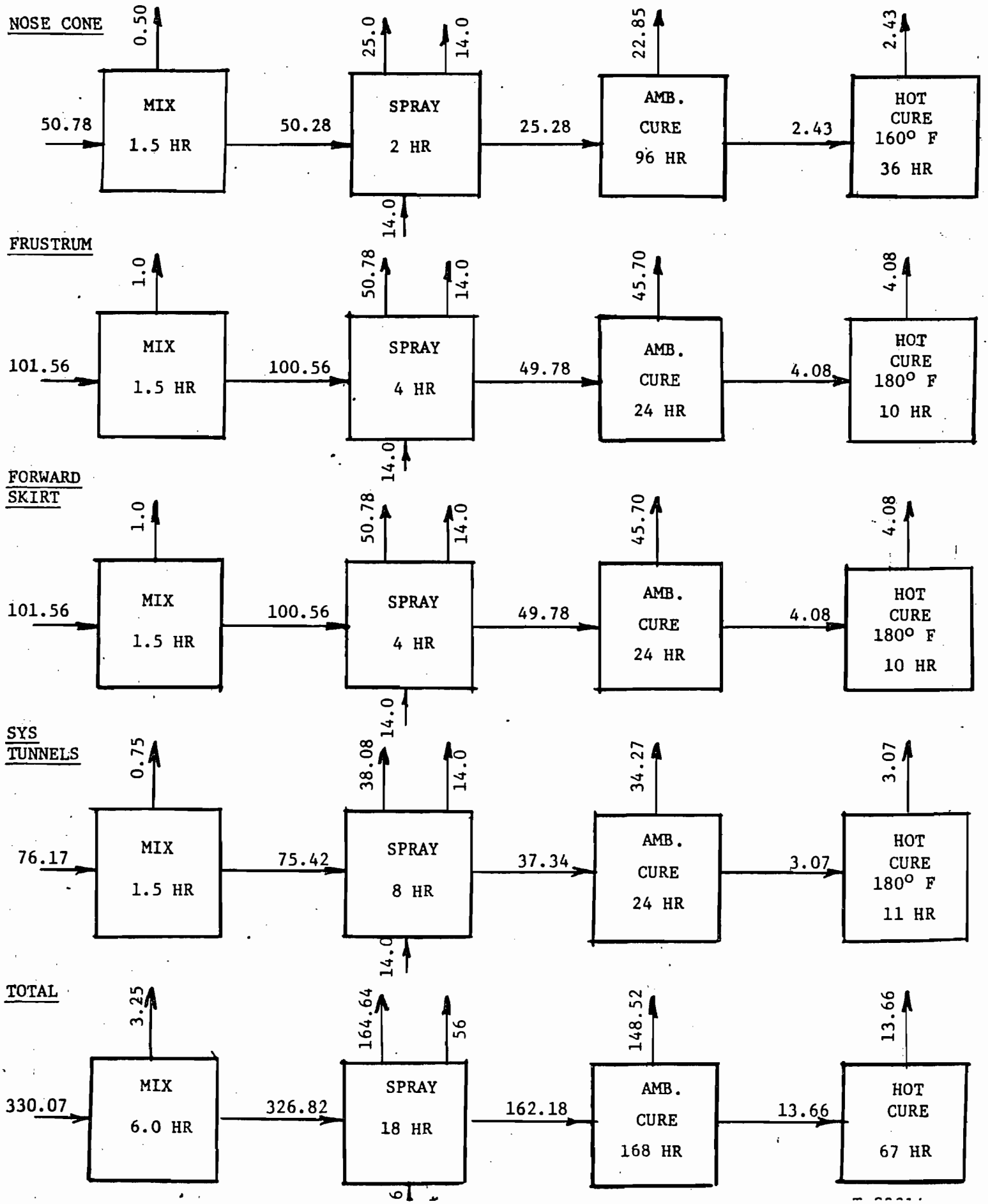
ATTACHMENT 1
SI - 7

*SPRAY CLEAN UP

MSA-1 COATING

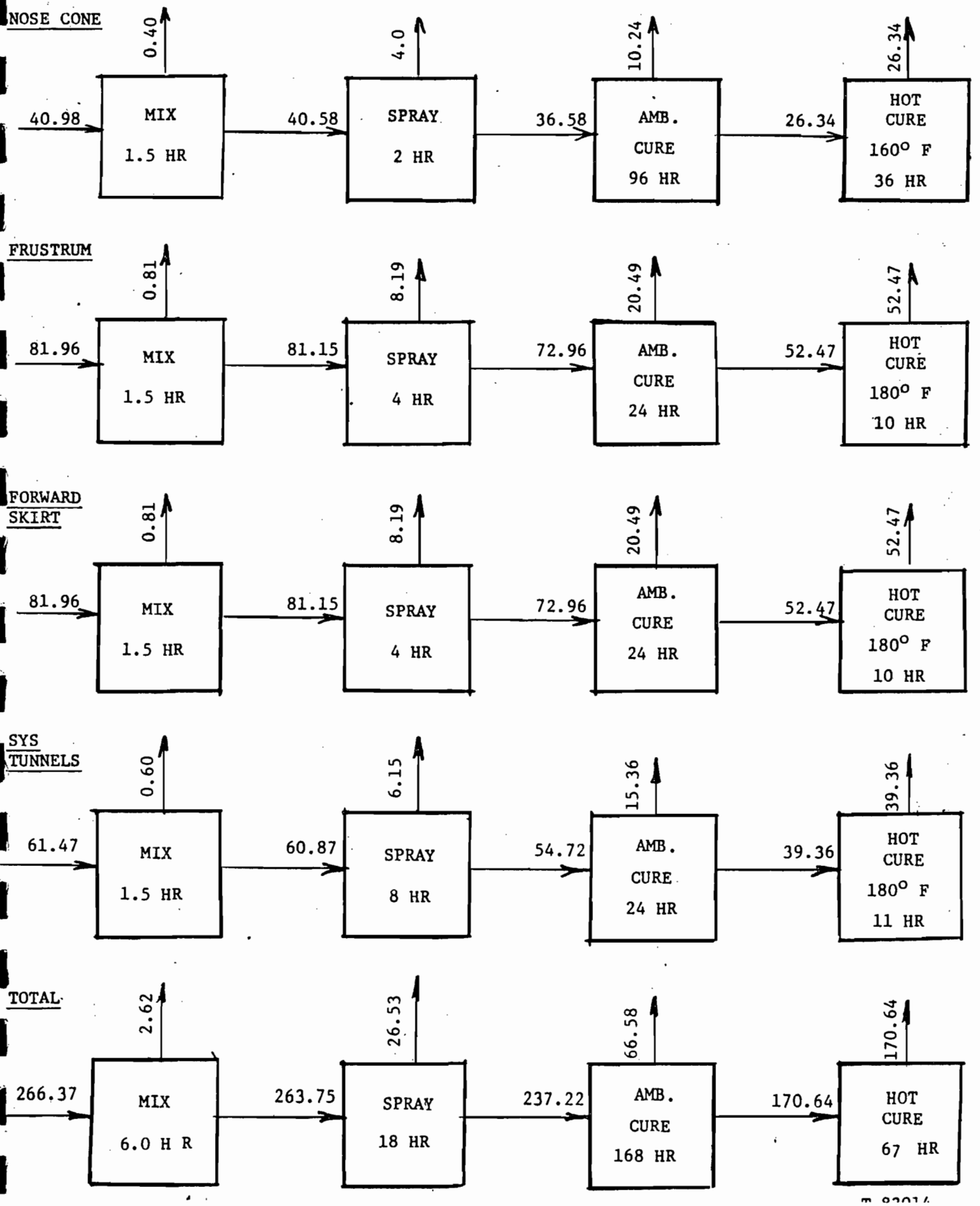
METHYLENE CHLORIDE EMISSIONS

(ALL NUMBERS IN KILOGRAMS)



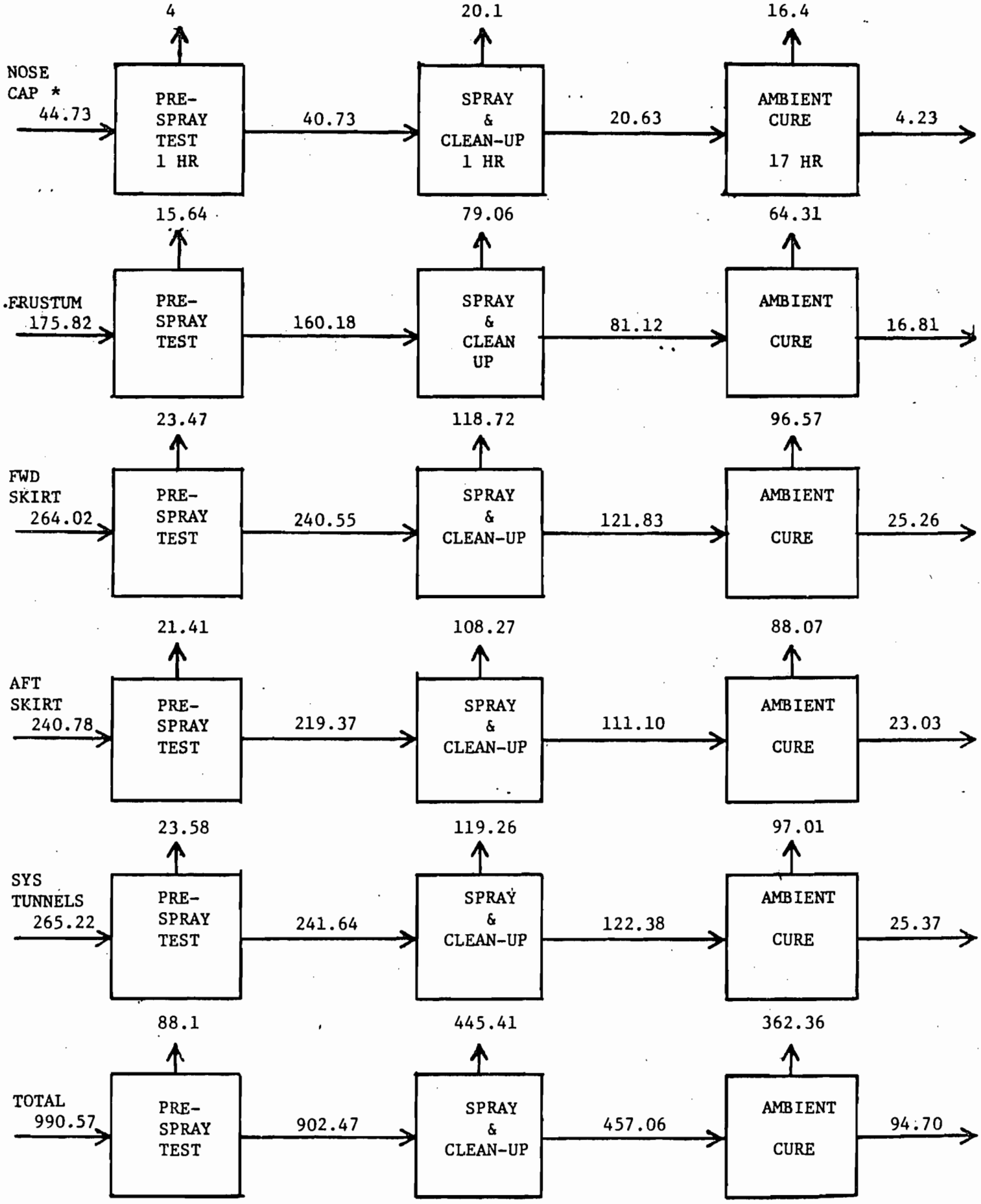
MSA-1 COATING
PERCHLOROETHYLENE

(ALL NUMBERS ARE IN KILOGRAMS)



ATTACHMENT 3
SI-14

HYPALON TOPCOAT
PERCHLOROETHYLENE
(ALL NUMBERS IN POUNDS)



* BASED ON ACTUAL SAMPLING DATA

T-83014

CLARK
engineers - scientists

NASA

KENNEDY SPACE CENTER

AIR POLLUTION SOURCE INVENTORY

December 23, 1983

EDWARD E. CLARK ENGINEERS-SCIENTISTS, INC. ▪ 7520 Southwest 57 Avenue ▪ Miami, Florida 33143 ▪ (305) 665-5736

CLARK
engineers - scientists

December 23, 1983

Mr. Kirby K. Key
NASA
DF-EMS
Kennedy Space Center, Florida 32899

Re: Air Pollution Source Inventory
KSC P.O. CC-32002B

Dear Kr. Key:

Enclosed please find five copies of the Air Pollution Source Inventory prepared, under your technical direction, for the John F. Kennedy Space Center in accordance with the referenced purchase order dated November 30, 1983.

This report represents the results of our efforts regarding the compilation and evaluation of air emissions associated with the operation of the Kennedy Space Center. These efforts included a field survey of possible emission sources, review of existing air permits at KSC and discussions with appropriate facility personnel.

Accepted EPA handbook methods were used where appropriate to estimate and verify emission values for these air pollution sources. For other processes present at KSC, values were based on information obtained from NASA personnel and numerous environmental reports and studies provided by NASA personnel. This information has been adjusted to reflect a shuttle flight rate of 18 launches per year.

As mentioned in the report, the greatest emissions are SO2 emissions from the heating plants and VOC emissions from SRB refurbishment and assembly operations at the VAB Low Bay. As a result of SO2 emissions, KSC will be considered as a major emitting facility by the DER. Each of the facilities included in the report have been discussed with Mr. Bill Thomas of the Bureau of Air Quality, Department of Environmental Regulation, in Tallahassee. Due to the nature of the operations of some of the facilities, no emission estimates will be required. However, further evaluation may be required following the DER review of this initial information.

CLARK

In addition, there are a few points we would like to bring to your attention at this time. We recommend that all conditions included in existing air permits be reviewed to ensure that there will be no unanticipated restrictions on any operations at KSC (i.e., waste quantities, operating schedule, etc.). Moreover, some further evaluation of the impacts of the hypergolic fuel incinerator and hypergolic scrubbers may be required.

Clark Engineers-Scientists has attempted to be most responsive and thorough in its satisfaction of the KSC Task Description provided under the referenced purchase order, and look forward to discussing the results of the source inventory with you in the very near future.

Very truly yours,

T. A. Paris
Project Manager

TAP/mtf
8349

AIR POLLUTION SOURCE INVENTORY

A. INTRODUCTION

Under John F. Kennedy Space Center, NASA, Order Number CC-32002B of November 30, 1983, Edward E. Clark Engineers-Scientists, Inc., was charged with conducting services for a Kennedy Space Center-wide inventory of all Air Pollution Sources. A complete task description is attached to this report as Enclosure A.

Due to the urgency of the task, based upon the Kennedy Space Center's needs to obtain certain permits, Clark Engineers has moved forward with a well-defined approach to meet the requirements of the task. Dr. Thomas E. Lodge and John J. McNally, Environmental Engineer, visited the Kennedy Space Center for field investigation and data collection. With the assistance of Kennedy Space Center personnel, this initial phase of the investigation was completed. Included was a review of existing DER air permits regarding the details of each of these air emission sources. This information was supplemented and verified by discussions with facility personnel regarding the actual operation of these facilities. In addition, information pertaining to these operations was obtained from numerous reports and studies provided by NASA/KSC personnel assessing the air emissions associated with the processes performed at these facilities.

In order to meet the December 23, 1983 deadline for task completion, singular priority was given. The results of the Clark efforts are submitted in the form of a final report suitable for submission to the Florida Department of Environmental Regulation. That report is presented.

B. OBJECTIVE

The approach taken by Clark Engineers-Scientists in satisfying the requirements of the Task Description to the Air Pollution Source Inventory, was to ensure that the questions posed by Mr. C. H. Fancy, P.E., Deputy Chief, Bureau of Air Quality Management, Department of Environmental Regulation, in his letter to Mr. Peter A. Minderman, Director of Engineering Development, KSC, of November 4, 1983, were responded to in every detail. The Mr. C. H. Fancy letter is attached to this report as Enclosure 2. The three questions of significance are repeated here:

1. Is your facility, the Kennedy Space Center, a major emitting facility? (see 17-2.100(62) and 17-2.100(95)FAC for applicable definitions).

2. Are the potential emissions (criteria pollutants) from any equipment operation, or chemical process at this facility over 250 tons per year?

3. How many companies have contracts to operate air pollution sources at the Kennedy Space Center?

The provision of complete responses to these inquiries will permit the Florida DER to determine whether or not the Kennedy Space Center Application must be reviewed under the Prevention of Significant Deterioration (PSD) rule as a modification to a major facility.

C. APPROACH

A general field survey was undertaken to identify and evaluate the major air emission sources associated with the support and operation at Kennedy Space Center. Following this survey, existing DER permits were reviewed and evaluated with respect to their contribution to the total air emissions at the Kennedy Space Center. Information collected during these two phases of the inventory program was discussed with Mr. Bill Thomas at the Bureau of Air Quality, Department of Environmental Regulation in Tallahassee, Florida. The nature and magnitude of the air emissions were considered resulting in an appropriate method of treatment for each of these air emission sources.

The actual air emissions based on normal operations would be estimated and submitted to the Department of Environmental Regulation along with a general description of the nature and schedule of operations of other facilities located at the Kennedy Space Center that contribute any air emissions.

Our field survey involved consideration of a wide variety of operations with subsequent evaluation of the magnitude and type of associated air emissions. These sources include heating units varying from the two main heat plants to numerous small heating units, incinerators utilized for pathological waste and contaminated hypergolic fuel wastes, gasoline service stations, sandblasting operations and the major support activities associated with the refurbishment and assembly of the solid rocket boosters required for the Space Shuttle program.

Effective air emission permits exist for the following operations:

o Major Heat Plants	
Central heat plant	A005-24130
	A005-34274
	A005-34276
VAB Annex heat plant	A005-24131
	A005-34275
	A005-34277
o Pathological Incinerator	A005-52118
o Hypergolic Waste Incinerator	A005-37676
o Vehicle Assembly Building (VAB)- SRB - Refurbishment and Assembly Activities	Permit applications submitted

D. AIR EMISSION SOURCE DESCRIPTION

The following is a description of each of these activities in order to provide information necessary to evaluate the scale of each of these operations and, ultimately, the magnitude of the air emissions associated with each activity. Each source is listed in Table 1 with resulting emission type.

Major Heat Plants

Central heat plant consisting of three heating units (2 @ 40 MM BTU/hr; 1 @ 16 MM BTU/hr). Operation consists of utilization of one large heating unit full time with very occasional use of the small unit for supplemental heating. All units are presently permitted. Permit emission values and actual emissions are presented in Table 2.

VAB Annex heat plant consisting of three heating (3 @ 16 MM BTU/hr each). Operation consists of utilization of one heating unit full time with use of a second unit approximately one-half year. All units presently permitted. Permit emission values and actual emissions are presented in Table 2.

Pathological Incinerator

This unit is utilized approximately once a month to dispose of pathological wastes generated at the Life Sciences Building at Hangar L - CCAFS. Total waste loading is about two tons/year with negligible emissions.

Hypergolic Fuel Incinerator

This unit is utilized as necessary to dispose of contaminated hypergolic fuel. The waste consists of water with a very low concentration of hypergolic fuel. The unit is located at Fuel Farm #1 at CCAFS with operations resulting in negligible emissions.

TABLE 1
SUMMARY OF AIR EMISSION SOURCES
KENNEDY SPACE CENTER

SOURCE	TYPE OF POLLUTANT	COMMENTS
o Heat Plants - Central - VAB annex	SO_2, CO, NO_2, particulate SO_2, CO, NO_2, particulate	Sulfur dioxide emissions constitute major air emissions from these facilities. Refer to heat plant emissions for actual and permitted emission levels. See emission source description for operation schedule.
o Pathological Incinerator	SO_2, CO, NO_2, particulate	Emissions are negligible due to nature of waste, size of unit, level of usage. See emission source description for operation schedule.
o Hypergolic Waste Incinerator	SO_2, CO, NO_2, particulate	Emissions are negligible due to size of unit and level of usage. See emission source description for operation schedule.
o Gasoline Service Stations	VOC	Emissions negligible. No permit required according to DER regulations.
o VAB-Solid Rocket Booster Refurbishment & subassembly	VOC's particulate	Perchloroethylene and methylene chloride constitute major VOC air emissions. Refer to Tables 3 and 4 for chemical usage and air emission estimates.
o CCAFS-Hangar AF Solid Rocket Motor Paint Facility	VOC's particulate	Emissions result from cleaning preparations and painting of SRM's.
o SRM Hot Fire Test Facility	Ammonia	Emissions result from testing of SRM's.
o Sandblasting Ransom Road and other locations	Particulate	No DER regulation pertains. Estimate of grit consumption required.
o Multiple small heater	SO_2, CO, NO_2 Particulate	Dedicated building service. Emissions negligible. No permit required by DER due to low heat input

TABLE 2

HEAT PLANT EMISSIONS (Tons/year)

SOURCE	Type of Emissions			
	Particulate	SO_2	CO	NO_2
Actual *				
Central Plant	9.30	112.26	3.58	15.76
VAB Annex Plant	4.24	51.18	1.63	7.19
	13.54	163.44	5.21	22.95
Existing Permits **				
Central Plant	5.13	213.8	0	2.40
VAB Annex Plant	5.13	213.8	0	2.40
	10.26	427.6	0	4.80

* Values represent emissions according to EPA AP 42, "Compilation of Air Pollutant Emission Factors", based on actual operational schedule at the heating facilities.

** Values represent emissions listed in existing permits for the heaters at these facilities.

Gasoline Service Stations

There are two gasoline service stations operated by the NASA motor pool. There is also one publicly operated service station located in the industrial area at Kennedy Space Center. The throughput level at these facilities requires vapor control during loading although no DER permit is required.

	Throughput Gallons/Month
o GSA Motor Pool	60,000 (+ 9,000 Diesel)
o Contractor's Road Station	30,000
o Industrial Area (public station)	30,000
Total	120,000

Vehicle Assembly Building - Solid Rocket Booster Refurbishment and Assembly

These operations are limited to the activities in the original SRB refurbishment facility (1978) as well as the new facility completed in 1983. Both of these facilities are located in the VAB Low Bay. Activities involved here consist of a variety of processes in preparing the solid rocket boosters. These processes include cleaning, surface preparation, painting and thermal coating applications. The emissions included are based on activities required to support a flight rate of 18 shuttle launches per year. Table 3 presents a list of chemicals used for these SRB refurbishment activities based on their flight rate.

TABLE 3
CHEMICAL USAGE IN SRF RSF OPERATIONS
VEHICLE ASSEMBLY BUILDING*

(* Values represent activities associated with 18 shuttle launches per year)

Material	Amount (lbs/yr)
Surface Prep	
o PR 1422 Polysulfide Sealing	28.1
- Calcium Dichromate	1.7
- Toluene	1.7
- Dimethyl Formamide	1.7
o DC-93-076 Sealing Comp	168.3
- Dibutyltindilaurate	16.5
o DC 1204 Primer	11.6
- VM&P Naptha	6.6
- Toluene	1.7
- Butanol	1.7
o SS-4004 Silicone Primer	6.6
- N-Butanol	1.7
- Acetone Alcohol	1.7
- Isopropyl Alchol	1.7
- Toluene	1.7
o RTV Silicone Rubber	985.1
- Ethyl Silicate	49.5
o Bonaid Etchant S16943	42.9
- Diethylene Glycoldimethyl Ether	36.3
- Napthalene	5.0
- Sodium	1.7
Bostik	
o Methyl Ethyl Ketone	1029.6
o Epoxy Catalyst X-304	1428.9
- Alcohol Solvents	356.4
- Glycol Ether Solvent	214.5
- Ketone Solvent	714.5
- Aromatic Solvent	71.0
o Epoxy Catalyst X-306	844.8
- Amine Curing Solvents	118.8
- Aromatic Solvents	379.5
- Alcohols	422.4

Ref: Batelle Environmental Analysis Report, May, 1983

TABLE 3
CHEMICAL USAGE IN SRF RSF OPERATIONS
VEHICLE ASSEMBLY BUILDING*
(continued)

(* Values represent activities associated with 18 shuttle launches per year)

Material	Amount (lbs/yr)
o Bostik Topcoat 443-3	6765.0
- Ketone Solvents	2031.2
- Aromatic Solvents	1016.4
- Glycol Ether Solvents	1692.9
- Alcohol solvents	1587.3
o Bostik Primer 643-3	4827.9
- Aromatic Solvents	1930.5
- Ketone Solvents	1447.1
- Chromium Solvents	1255.7
o Epoxy Enamel Reducer TL-29	11.6
- Ketone Solvents	6.6
- Alcohol Solvents	3.3
- Glycol Ether Solvents	1.7
o Epoxy Primer Reducer	18.2
- Ketone Solvents	8.3
- Aromatic Solvents	5.0
- Alcohol Solvents	5.0
o Alodine 1200	87.5
- Chromic Acid	31.4
- Ferricyanide Salts	18.2
- Complex Fluoride Salts	44.6
MSA-2	
o Ethyl Alcohol	1287.0
o PERC	50325.0
o MECL	62205.0
o MECL (wash down)	6418.5
o Adhesive 2216 A&B	15411.0
- Bisphenol A Epoxy Resin	5395.5
- Amine Hardner	7705.5
MTA-2 Mixing	
o Epon Curing Agent Z	905.9
o LP-2 Polysulfide Polymer	20,790.0
o Tin Octoate	8.3
o Epon Resin 828 (Bisphenol-A/ Epichlorohydrin based)	18,810.0

TABLE 3

CHEMICAL USAGE IN SRB RSR OPERATIONS
VEHICLE ASSEMBLY BUILDING*
(continued)

(* Values represent activities associated with 18 shuttle launches per year)

Material	Amount (lbs/yr)
MTA-2 Molding	
o Plastilease 512B	64.4
- Isopropyl Alcohol	26.4
o Partall Paste #2	13.2
- AMSCO Solvent #140	
- Petrolite C-700	
o Partall Paste #10	92.4
- Methanol	
- Ethyl Acetate	
- Ethanol	
- Methyl Isoluctyl Ketone	
- N-Butanol	
o 1,1,1 Trichloroethane	224.4
Hypalon Topcoat	
o Hypalon Paint HFR-2200	20790.0
- Titanium dioxide	1452.0
- Aluminum Silicate	1666.5
- Hypalon Rubber	2079.0
- PERC	9751.5
- 1,1,1 Trichloroethane	5197.5
- Hydrocarbon Resin	415.8
o Accelerator-Gacoflex	5.0
- Xylol	1.7
- Diethylamino Ethanol Polymer of Undistilled MDI Isocyanate	1.7
o PERC	168.3
TPS Cleaning Shop	
o MECL	13,909.5
TPS Test Lab	
o MECL	1782.0
o 1,1,1 Trichloroethane	107.3
o 1,1,1 Trichlorofluoroethane	1.7

TABLE 3

CHEMICAL USAGE IN SRF RSF OPERATIONS
VEHICLE ASSEMBLY BUILDING*
(continued)

(* Values represent activities associated with 18 shuttle launches per year)

Material	Amount (lbs/yr)
Hot Fire	
o Isopropyl Alcohol	1897.5
o Citric Acid	567.6
o Hydrazine	4537.5
Miscellaneous	
o Solvents ST-397	54.5
- Mineral Spirits	21.5
- Xylol	21.5
- Aromatic Hydrocarbons	11.6
o Ethyl Alcohol	28.1
o Insta-Foam A	3019.5
- Dichlorodifluoromethane	211.2
- Polymeric Isocyanate	2788.5
- Silicone Surfactant	14.9
o Insta Foam B	3019.5
- Dichlorodifluoromethane	211.2
- Trichlorofluoromethane	280.2
- Amine Catalyst	3.3
- Tris (beta chloroprxyl) Phosphate	618.8
- Polyether PClyol	1881.0
o Isopropyl Alcohol	379.5
o Methyl Ethyl Ketone	54.5
o PERC	3267.0
o 1,1,1 Trichlorotrifluoroethane	9.9
o 1,1,1 Trichloroethane	179.9
o Polyamide Epoxy	47.2
- Xylene	6.6
- Methyl Cellosolve	1.7
- Cellosolve	3.3
- Hi-sol 15	1.7
o Methyl Isobutyl Ketone	54.5

Varying percentages of each of these materials are volatile and thereby contributing VOC emissions. The largest portion of these emissions will result from perchloroethylene and methylene chloride. It is estimated that together these two chemicals contribute approximately 74 tons per year VOC emissions based on 18 launches annually. It is estimated that the other chemicals contribute about 15 percent of the VOC emissions which will result in a total VOC emission of about 87 tons/year as shown in Table 4. These emissions are based on the assumption that all the volatiles in the materials will ultimately reach the atmosphere. The emissions, as a result, are considered conservative since a portion of these materials will be recovered as waste materials.

Particulate matter will be generated from surface preparation and thermal coating applications. Exhaust air from these operational areas will be filtered by efficient filtering systems with removal efficiencies of greater than 99 percent. As a result no significant particulate emissions are expected from these operations.

Cape Canaveral Air Force Station, Hangar AF, Solid Rocket Motor Paint Facility

This facility involves cleaning and painting of the recovered solid rocket boosters. Based on a flight rate of 18 launches per year, the facility will service a maximum of 36 SRB annually. The blast booth will use walnut shells for blasting, seventy to eighty percent of which will be recycled. The blast booth wll also be provided with a particulate removal system with an efficiency greater than 99 percent. The two paint spray booths will be directed through the roof and will utilize a set of efficient filters to remove paint particles. In-depth environmental assessments of this facility have resulted in conclusions that no significant emissions will occur from these operations. Estimates of these emissions are listed in Table 4.

TABLE 4
SOLID ROCKET BOOSTER
REFURBISHING AND ASSEMBLY ACTIVITIES
AIR EMISSIONS SUMMARY

SOURCE	TYPE OF POLLUTANT	AMOUNT (TONS/YEAR)
VAB-SRB Refurbishing/ Assembly Activities	VOC *	
	perchlorethylene	31.8
	Methlyene chloride	42.2
	Others	13.0
		87.0
CCAFS - Hanger AF SRM Spray Painting Facility	VOC **	0.58
	particulate	0.91

* Chemical usage information obtained from Batelle Environmental Analysis report. Perchloroethylene and methylene chloride constitute major VOC air emission (assumed 100% volatile). Emission from other materials estimated to be 15% of total based on volatility and chemical usage.

** Emission estimate obtained from NASA, KSC engineering. Values based on 18 launches per year.

Solid Rocket Motor Hot Fire Test Facility

Preparation of the solid rocket motors for shuttle launching requires test firing of the motors. It has been estimated that about 500 gallons of hydrazine fuel will be consumed annually to support 18 shuttle launches. Utilization of this fuel quantity will produce about one ton of ammonia per year.

In addition to the major air emission sources there also exists minor sources such as isolated sand blasting and spray painting facilities. These include facilities located at Ransom Road and Contractor's Road. Based on the size of these operations, no significant emissions are anticipated. According to present DER rules, no control practices are required although further evaluation may be required in the future.

E. SUMMARY

From the preceding information, it is seen that the majority of the air emissions generated at the Kennedy Space Center may be attributed to two large scale operations in particular. These operations include the two major heating plants and the chemical processes associated with the refurbishment and assembly of the solid rocket boosters currently taking place at the Vehicle Assembly Low Bay Facilities. In addition, several other operations have been evaluated with respect to air emissions. The scope of these activities has been described with the conclusion that these operations will not result in significant air emission contributions.

The major emission sources and amounts of associated pollutants is presented in Table 5. It can be seen from this table that SO2 and VOC constitutes the major emission constituents with SO2 emmissions of about 163 tons/year. Significant VOC emissions are discharged to the atmosphere, the majority of which, 87.0 tons/year, are generated from SRB refurbishment activities at the VAB Low Bay facilities.

These emission levels indicate that only the SO2 emissions are above 100 tons/year. Therefore, in response to the Department of Environmental Regulation letter from Mr. C. H. Fancy, dated November 4, 1983, the Kennedy Space Center would be categorized as a major emitting facility with emissions exceeding 100 tons/year for one of the DER designated criteria pollutants. However, none of the emission parameters approach the 250 tons/year emission level.

TASK DESCRIPTION
FOR
AIR POLLUTION SOURCE INVENTORY

The contractor shall conduct a KSC-wide inventory of all air pollution sources for the purposes of regulatory compliance in obtaining air permits for KSC projects.

The contractor shall identify all stationary sources which are applicable to calculating maximum potential pollutant emissions at KSC as a possible "major facility", as defined by Florida Administrative Code 17-2.100(95). Data shall be collected on each source, and appropriate calculations shall be performed to determine the maximum "potential emissions," as defined in FAC 17-2.100(124), for each regulated pollutant (SO_2, CO, etc.) for KSC as a whole.

The task shall be completed by December 23, 1983. There shall be a final report suitable for submission to the Florida Department of Environmental Regulation. Office area shall be provided in the KSC Headquarters Building, Room 3206.

Enclosure 1

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 25, 1983

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Peter A. Minderman
Director of Engineering
Development, KSC, NASA
Headquarters Building
Kennedy Space Center, Florida 32899

Dear Mr. Minderman:

The Bureau of Air Quality Management has received your application for a permit to construct a Space Shuttle Solid Rocket Booster (SRB) refurbishment facility at the Kennedy Space Center, Brevard County, Florida. Based on our initial review of your proposal, it has been determined that additional information is needed before we can process the application. The information required to complete the application is listed below:

SECTION II: GENERAL PROJECT INFORMATION

A. Project Description

In the course of applying thermal protection (MSA-1 coating & hypalon topcoat) on SRB structure and components, are any other previous or intermediate operations involved ? Is any other refurbishment of SRB's done at the Kennedy Space Center by you or other contractors? How is the spray equipment system cleaned/degreased? Please submit a detailed description of the refurbishment operation.

B. Project's Schedule

Completion of Construction 1978

Please explain this date. Does this facility have a previous construction permit? What are the facilities that were completed in 1978? Do they have a permit?

F. Operating Time

How much time does the ablative coating system application take? Are the 259 hours (Pag T-83014) the maximum operating time for the MSA-1 coating application? How long does the hypalon topcoat system application take? (hours per SRB) How many SRB's is your facility capable of refurbishment concurrently?

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES

A. Raw Materials and Chemicals Used

List all chemical compounds used in the thermal protection process that have the potential to emit any pollutant. How many gallons of these chemical compounds (list each compound and percent VOC) are consumed per year? How are the solvents stored?

C. Airborne Contaminants Emitted

Is any other process(s) capable of emitting any pollutant performed at your facility? If so, please explain. Please list total VOC and PM emissions from the overall thermal protection process.

D. Control Device

What type of control device are you proposing? Specifically, what type of filters? What is the expected removal efficiency of this filters? How are the emissions from the storage tanks controlled?

E. Liquid Disposal

What emissions (TPY of VOC) are associated with this operation?

H. SECTION V SUPPLEMENTAL REQUIREMENTS

Please show derivation of emission estimates.
Please submit a flow diagram showing the individual operations (MSA-1 coating & Hypalon topcoat etc).

As soon as the requested information is received, we will resume processing your application. If you have any questions on this matter, please call Teresa Heron, review engineer, 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/TH/s

DER PERMIT APPLICATION TRACKING SYSTEM MASTER RECORD

FILE#0000000073084 COE# DER PROCESSOR:COLLINS DER OFFICE:ORL
FILE NAME:ABLATIVE COAT & CURE DATE FIRST REC: 07/26/83 APPLICATION TYPE:AC
APPL NAME:KENNEDY SPACE CENTER APPL PHONE:(305)494-2234 PROJECT COUNTY:05
ADDR:DETACH, 1, SPACE & MISSLE CNTR., PAFB CITY:PATRICK AFB ST:FLZIP:32925
AGNT NAME: AGNT PHONE:( ) -
ADDR: CITY: ST: ZIP:

ADDITIONAL INFO REQ: / / / / / / REC: / / / / / /
APPL COMPLETE DATE: / / COMMENTS NEC:Y DATE REQ: / / DATE REC: / /
LETTER OF INTENT NEC:Y DATE WHEN INTENT ISSUED: / / WAIVER DATE: / /

HEARING REQUEST DATES: / / / / / /
HEARING WITHDRAWN/DENIED/ORDER -- DATES: / / / / / /
HEARING ORDER OR FINAL ACTION DUE DATE: / / MANUAL TRACKING DESIRED:N
THIS RECORD HAS BEEN SUCESSFULLY ADDED 07/26/83 15:39:55
FEE PD DATE#1:07/26/83 $0250 RECEIPT#00073702 REFUND DATE: / / REFUND $
FEE PD DATE#2: / / $ RECEIPT# REFUND DATE: / / REFUND $
APPL:ACTIVE/INACTIVE/DENIED/WITHDRAWN/TRANSFERRED/EXEMPT/ISSUED:AC DATE:07/26/83
REMARKS:

DER
AUG 10 1983
BAQM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

No. 73702

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from U.S. Treasury Date July 26 1983
Address Washington D.C. Dollars $ 250.00
Applicant Name & Address
Source of Revenue Ablative Coat + Cure
Revenue Code 000001 CHK 52,973, Application Number AC 05-23023
By

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899

NASA

JUL 22 1983

Reply to Attn of DF-EMS

Florida Dept. of Environmental Regulation
Attn: Mr. C. M. Collins
3319 Maguire Blvd.
Suite 232
Orlando, FL 32803-3767

Subject: Application for Construction Permit for Existing Solid Rocket Booster Refurbishment and Subassembly Facility

We are applying for a construction permit for our "Solid Rocket Booster Refurbishment and Subassembly Facility." Enclosed are copies of the signed application and a check for $250.00 for the permit fee.

Please refer any questions to Mr. K. Key, DF-EMS, telephone no. 867-4049.

Peter A. Minderman
Director of Engineering Development

Enclosures

DER
AUG 10 1983
BAQM

AC 05-73084

$1,250.00

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

SOUTHWEST DISTRICT
7601 HIGHWAY 301 NORTH
TAMPA, FLORIDA 33610

PAID
JUL 26 1983
SAINT JOHNS RIVER DISTRICT

RECEIVED
JUL 1983
Saint Johns River District

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

WILLIAM K. HENNESSEY
DISTRICT MANAGER

DER

AUG 10 1983

BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCE

SOURCE TYPE: Ablative Coat & Cure [ ] New[1] [X] Existing[1]

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

COMPANY NAME: Kennedy Space Center, NASA 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) Ablative Cure System

SOURCE LOCATION: Street Vehicle Assembly Bldg. (Low Bay) City Kennedy Space Center

UTM: East X=612,000 North Y=1,554,000

Latitude 28° 35' 05"N Longitude 80° 39' 00"W

APPLICANT NAME AND TITLE: Peter A. Minderman, Director of Engineering Development, KSC, NASA

APPLICANT ADDRESS: Headquarters Bldg., Kennedy Space Center, FL 32899

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Kennedy Space Center/NASA

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: Peter A. Minderman

Peter A. Minderman, Director of Engr., Dev.
Name and Title (Please Type)

Date: JUL 22 1983 Telephone No. 305/867-2565

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_____

EXEMPT PER 471.05 F.S.

_____
Name (Please Type)

_____
Company Name (Please Type)

_____
Mailing Address (Please Type)

Florida Registration No._____ Date:_____ Telephone No._____

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.

The ablative coating system is required for refurbishment of the Solid Rocket Boosters utilized in shuttle space flight. At the present time, only filters are utilized to capture fugitive emissions in spray booths. After source testing this project will be in full compliance including control equipment, if required.

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

Start of Construction 1976 Completion of Construction 1978

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.)

Total cost including filters, exhauster building, stack and associated duct work is $66,000.

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

FDER letter OSJ-82-1496, dated June 18, 1982, from Mr. Charles M. Collins

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

A. Raw Materials and Chemicals Used in your Process, if applicable: (See Attachment I)

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

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

1. Total Process Input Rate (lbs/hr): See Attachment I

2. Product Weight (lbs/hr): See Attachment I

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

Name of Contaminant	Emission[1]		Allowed[2] 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/~~xx~~ Launch	T/~~xx~~ Launch	
PERC	27.0	37.83	N/A	N/A	3153.16	1.576	Mass Balance
MECL	45.0	20.38	Exempt	N/A	1698.68	0.849	Mass Balance
3, TRI	--	6.24	Exempt	N/A	520.0	0.26	Mass Balance

* Based on projected 24 launches per year.
** Per launch emission potential.

[1]See Section V, Item 2.

[2]Reference 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)

[3]Calculated from operating rate and applicable standard.

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

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? DNA

   b. If yes, has "Lowest Achievable Emission Rate" been applied? DNA

   c. If yes, list non-attainment pollutants. DNA

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

3. Does the State "Prevention of Significant Deterioriation" (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 justification for any answer of "No" that might be considered questionable.

DNA - DOES NOT APPLY

D. 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)
N/A				

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: N/A

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/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.

(1) Dry material which has been tested for leachate is taken to permitted landfill.

(2) Wet waste material is drummed and disposed of by permitted vendor.

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

Stack Height: 102 ft. Stack Diameter: 4.5 (54") ft.

Gas Flow Rate: 29784 ACFM 29055 DSCFM Gas Exit Temperature:** Avg. 78 °F.

Water Vapor Content: 1.8 (Avg.) % Velocity: 34.5 (Avg.) FPS

* One stack only ** If more than 1 cell is utilized, flow rate is 60,000 CFM

SECTION IV: INCINERATOR INFORMATION

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 Diamter: _____ 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)_____

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

NOT APPLICABLE

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

Brief description of operating characteristics of control devices: N/A

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

N/A

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.

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:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

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 device, 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:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

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.

*This process of refrubishing Solid Rocket Boosters is vital in the design to achieve the goal of space shuttle flight. The environmental impact of this is considered minimal; however, pertinent data from the stack testing in progress will be available to verify the pollution levels.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

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

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant 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

A. Company Monitored Data

1. _____no. sites _____ TSP _____( ) SO^2* _____ 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).

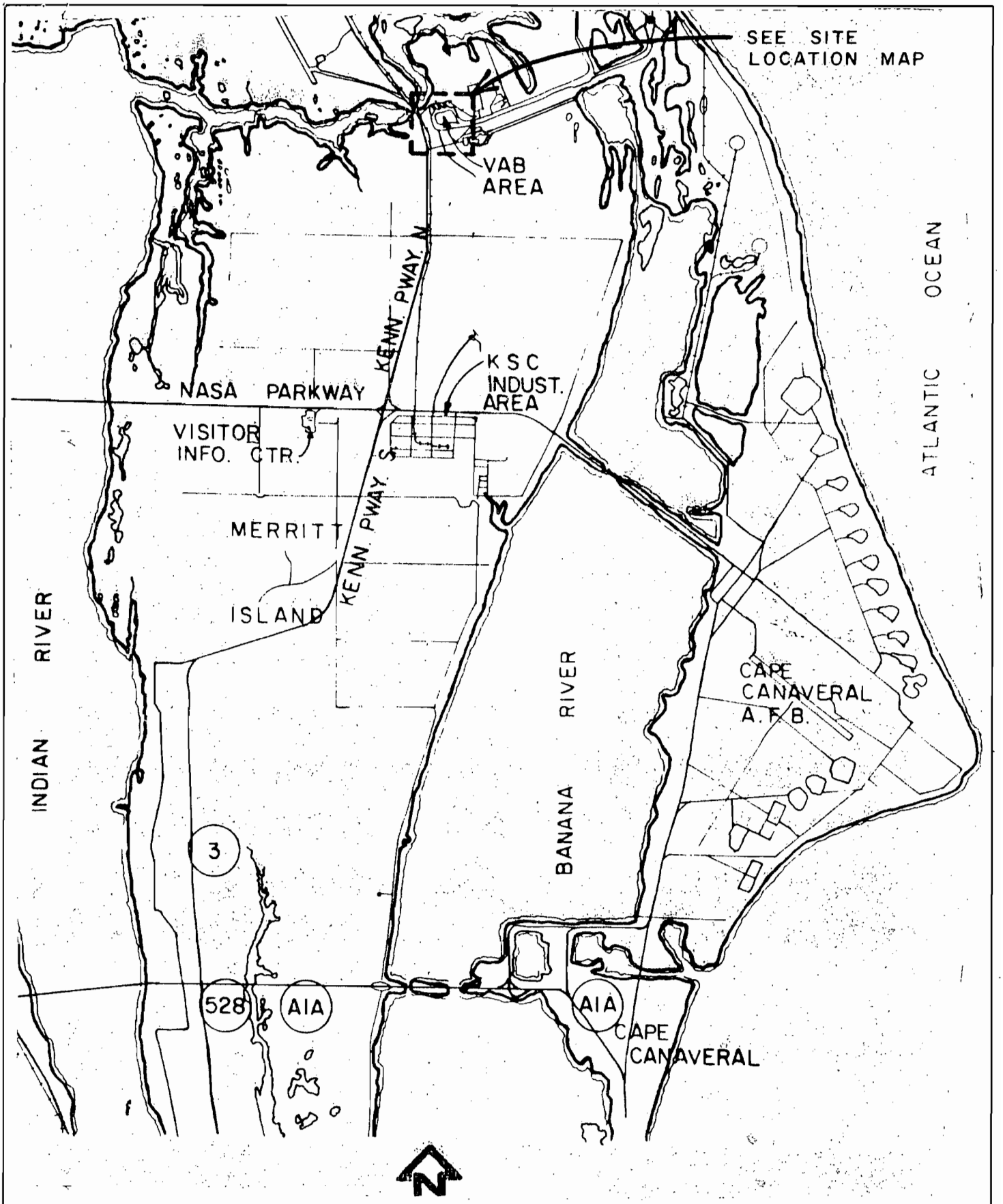
ATTACHMENT I

SECTION V: SUPPLEMENTAL INFORMATION

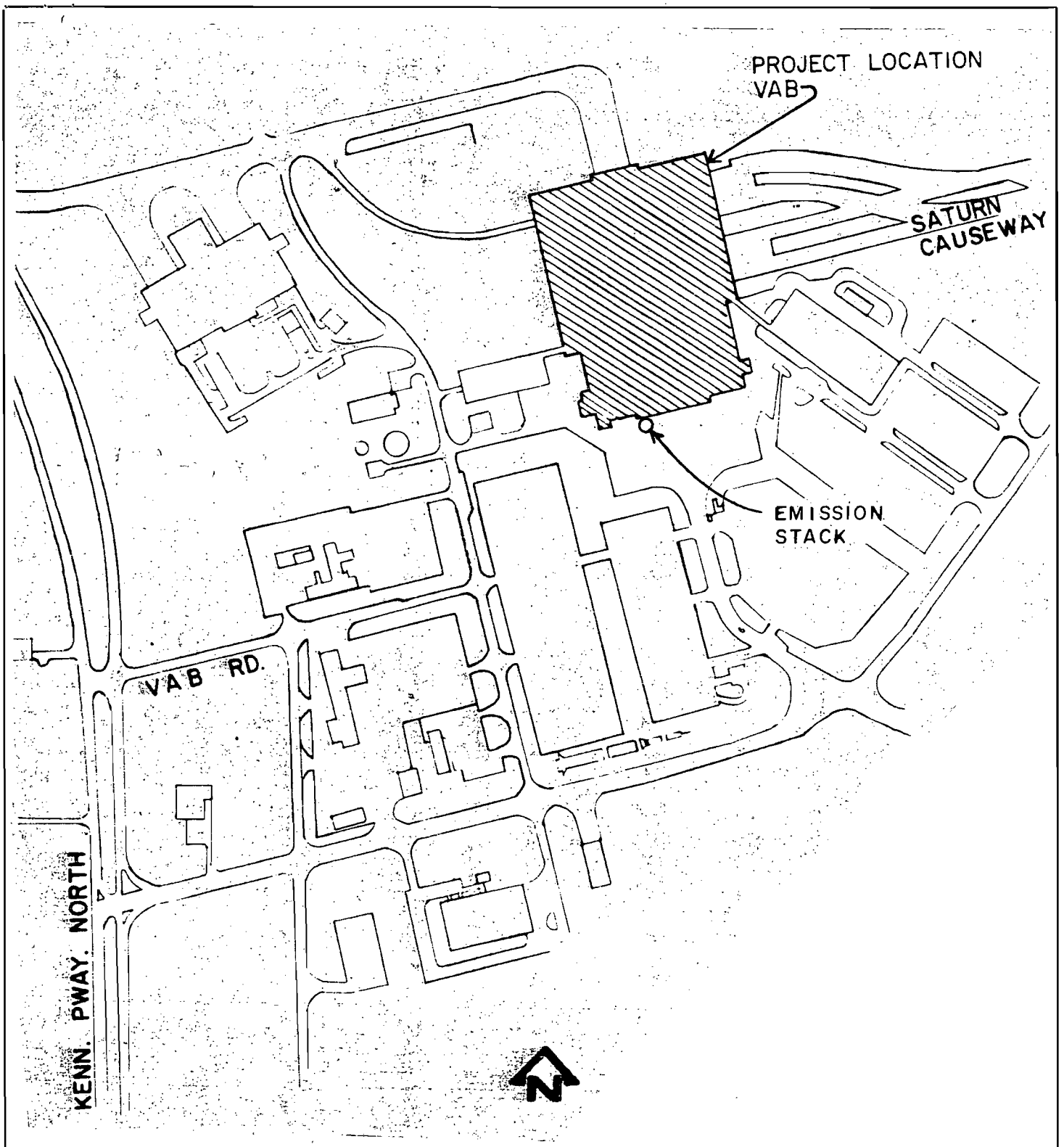
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

EXISTING ABLATIVE COAT AND CURE SYSTEM

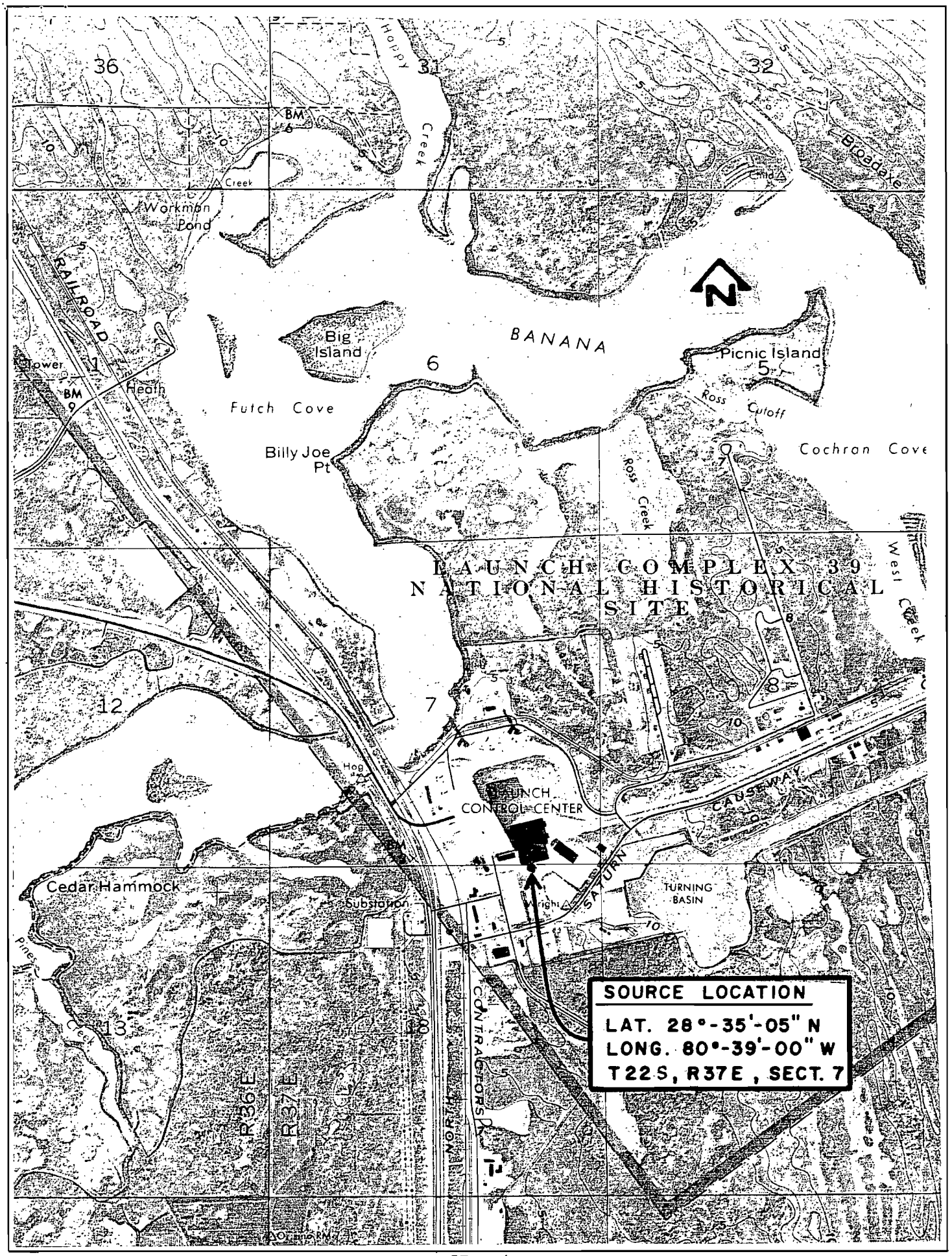
VAB AREA, KENNEDY SPACE CENTER

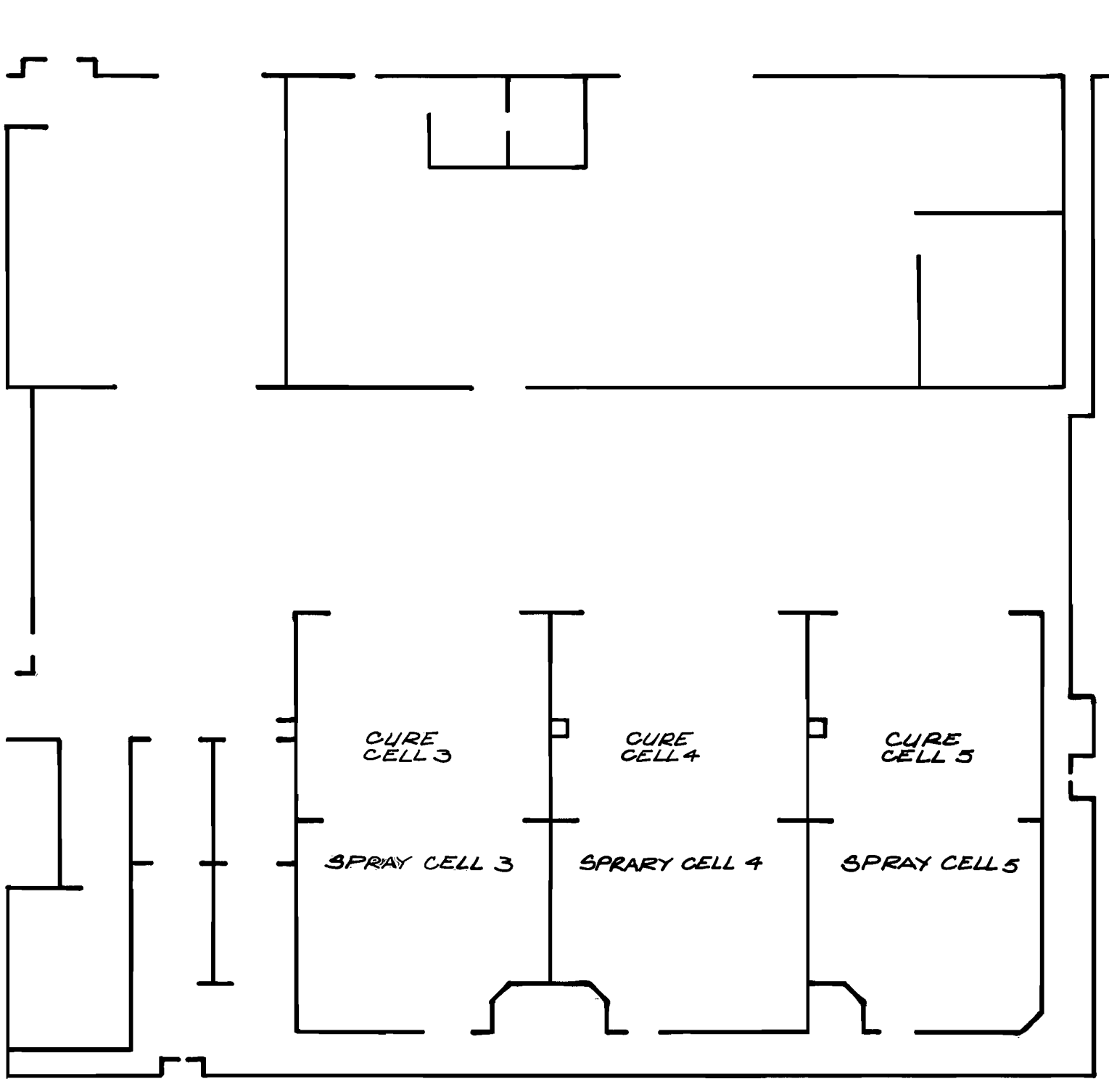


VICINITY MAP



SITE LOCATION


36
31
32
BM 6
Happy Creek
Boggy Creek
Child
Workman Pond
RAILROAD
Big Island
BANANA
Picnic Island
Tower
BM 9
Heath
Futch Cove
Billy Joe Pt
Ross Cutoff
Cochran Cove
Ross Creek
West Creek
LAUNCH COMPLEX 39
NATIONAL HISTORICAL
SITE
12
7
8
Hog
LAUNCH CONTROL CENTER
CAUSEWAY
SATURN
TURNING BASIN
Cedar Hammock
Substation
Wright
Pines
Creek
13
R36E
R37E
CONTRACTORS
SOURCE LOCATION
LAT. 28°-35'-05" N
LONG. 80°-39'-00" W
T22S, R37E, SECT. 7



PARTIAL PLAN

SOLID ROCKET BOOSTER
REFURBISHMENT FACILITY
AT KSC VAB - RSF

SCALE 1/16" = 1'-0"

MSA-1 COATING COMPOSITION*

COMPONENT	PERCENT BY WEIGHT	
METHYLENE CHLORIDE	43.3	78.2% VOLATILE
PERCHLOROETHYLENE	34.9	
CREST 7344 RESIN	7.6	21.8% SOLIDS
ETHYL ALCOHOL	0.4	
PHENOLIC MICROBALLOONS	8.2	
GLASS ECCOSPHERES	2.7	
BENTONE "27"	0.8	
1/4" CHOPPED GLASS FIBER	0.3	
1/16" MILLED GLASS FIBER	0.7	
SHELL CURING AGENT "Z"	1.1	
	100.0	

SOLID ROCKET BOOSTER (SRB) FLIGHT SET DATA**

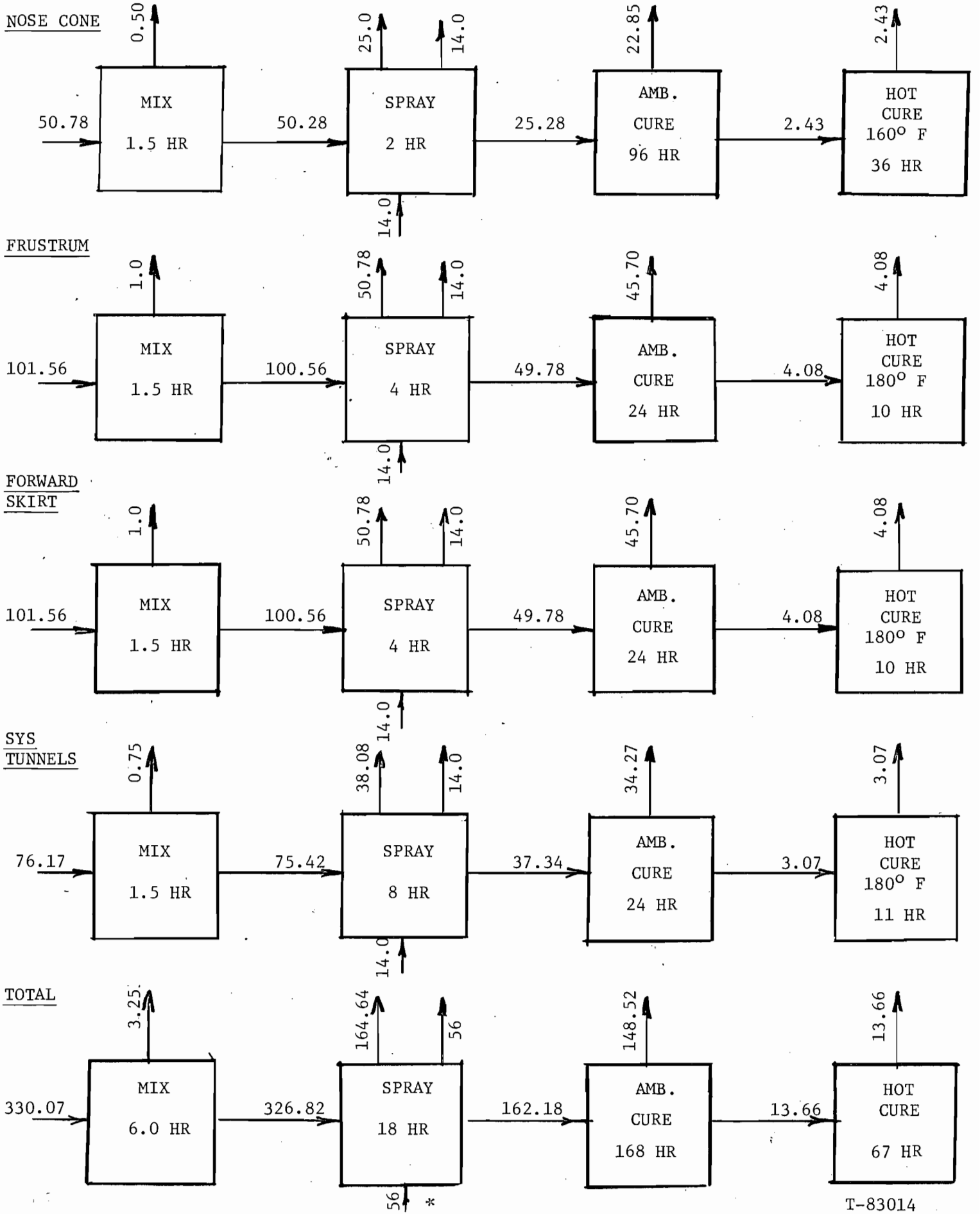
SRB COMPONENT	SURFACE AREA TO BE COATED WITH MSA-1 IN SQUARE FEET
NOSE CONE	75
FRUSTUM	285
FORWARD SKIRT	413
TUNNELS	100
TOTAL	873

* CURED DENSITY 16 POUNDS PER CUBIC FOOT

** 2 SOLID ROCKET BOOSTERS PER FLIGHT SET

*SPRAY
CLEAN UP

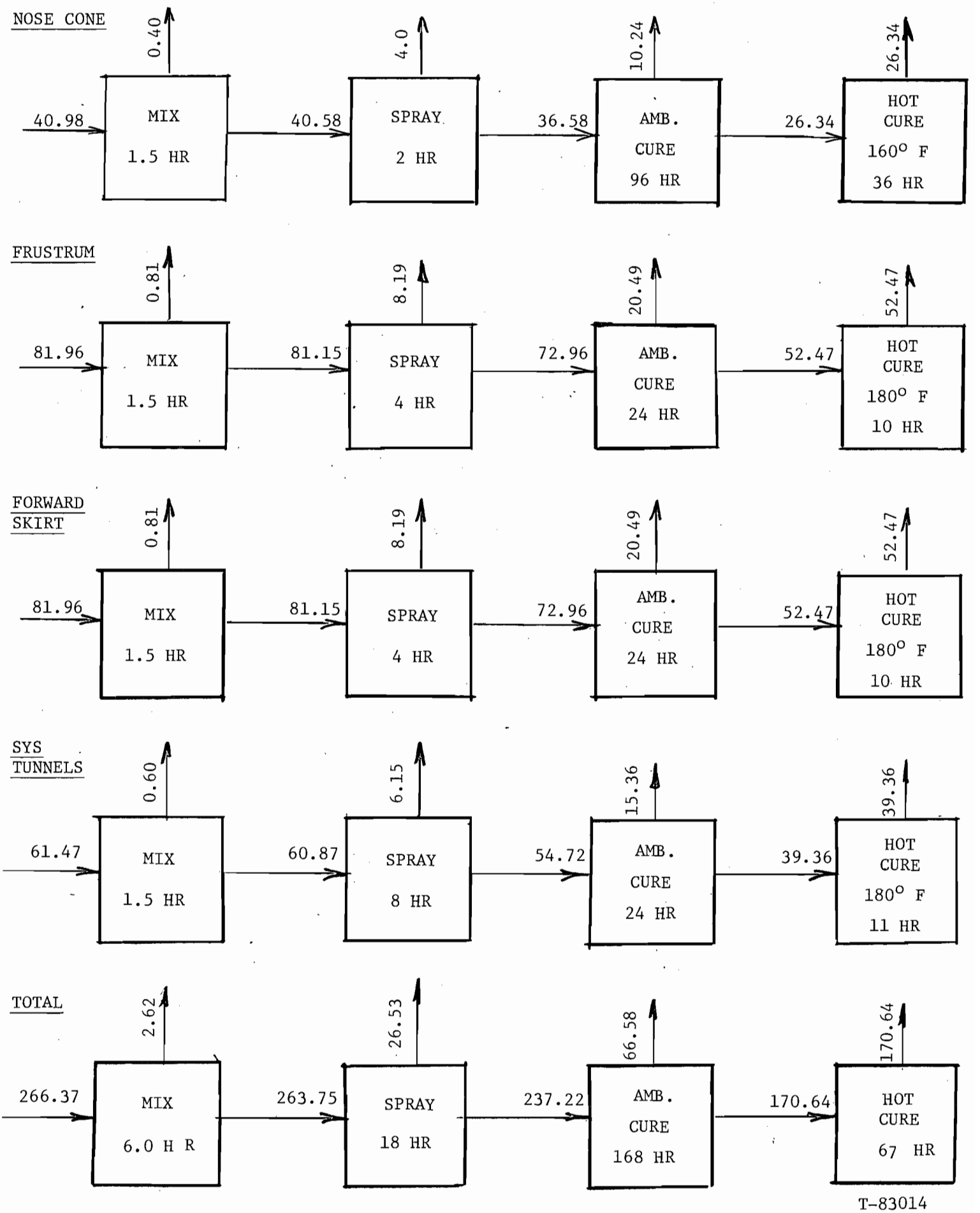
MSA-1 COATING
METHYLENE CHLORIDE EMISSIONS
(ALL NUMBERS IN KILOGRAMS)



T-83014

MSA-1 COATING
PERCHLOROETHYLENE

(ALL NUMBERS ARE IN KILOGRAMS)



T-83014

MSA-1 COATING PER BOOSTER

EMISSION SUMMARY*

OPERATION	TIME (HRS)	MECL EMISSIONS			PERC EMISSIONS		
		AVG LBS PER HR	TOTAL LBS	% EMITTED	AVG LBS PER HR	TOTAL LBS	% EMITTED
MIXING	6.0	1.19	7.15	0.8	0.96	5.76	1.0
SPRAYING	18.0	26.96	485.40	57.2	3.24	58.37	10.0
AMBIENT CURE	168.0	1.94	326.74	38.5	10.87	146.48	25.0
HOT CURE (160-180°F)	67.0	0.45	30.05	3.5	5.60	375.40	64.0
TOTALS	259.0	-0-	849.34	100.0	-0-	586.01	100.0
AVERAGE	-0-	3.28	-0-	-0-	2.26	-0-	-0-

NOTES:

MECL - METHYLENE CHLORIDE

PERC - PERCHLOROETHYLENE

* 2 SOLID ROCKET BOOSTERS PER FLIGHT SET

ANNUAL MSA-1 COATING

EMISSION POTENTIAL

EMISSION COMPONENT	LBS PER BOOSTER	LBS PER LAUNCH*	TONS/LAUNCH	TONS/YR. EMITTED BASED ON PROJECTED 24 LAUNCHES/YEAR
MERTHYLENE CHLORIDE (MECL)	849.34	1698.68	0.849	20.38
PERCHLOROETHYLENE (PERC)	586.01	1172.02	0.586	14.06
TOTAL	1435.35	2870.70	1.435	34.44

NOTE:

* 2 BOOSTERS PER LAUNCH FLIGHT SET

HYPALON TOPCOAT COMPOSITION*

COMPONENT	PERCENT BY WEIGHT	
TITANIUM DIOXIDE	7.0	28% NON-VOLATILE
ALUMINUM SILICATE	8.0	
HYPALON RUBBER	10.0	
NON-VOLATILE HYDROCARBON RESIN	2.0	
EPOXIDIZED SOYBEAN OIL	1.0	
PERCHLOROETHYLENE	47.0	72% VOLATILE
1, 1, TRICHLOROETHANE	25.0	
	100.0	

SOLID ROCKET BOOSTER FLIGHT SET DATA**

SRB COMPONENT	SURFACE AREA TO BE COATED WITH HYPALON TOPCOAT IN SQUARE FEET
NOSE CONE	75
FRUSTUM	295
FORWARD SKIRT	443
AFT SKIRT	404
TUNNELS	445
TOTAL	1662

* CURED DENSITY 120 POUNDS PER CUBIC FOOT

** 2 SOLID ROCKET BOOSTERS PER FLIGHT SET

HYPALON TOPCOAT

EMISSION POTENTIAL

1,1,1, TRICHLOROETHANE

1. INVENTORY RECORDS SHOW 80 GALLONS OF HYPALON PAINT IS CONSUMED FOR EACH SRB.

2. HYPALON'S WEIGHT PER GALLON AVERAGE IS 13#.
   THEREFORE, 80 GAL. x 13#/GAL = 1040#/SRB

3. FORMULATION IS 25% BY WEIGHT 1,1,1 TRICHLOROETHANE.
   1040# HYPALON/SRB x 0.25% 1,1,1 TRIC = 260# 1,1,1 TRIC/SRB

4. 1,1,1 TRICHLOROETHANE TOTAL EMISSION POTENTIAL IS
   260# 1,1,1 TRIC/SRB x 2 SRB/FLIGHT x 24 FLIGHTS/YR x
   1 TON/2000# = 6.24 TON 1,1,1 TRIC/YR

HYPALON TOPCOAT

PECHLOROETHYLENE

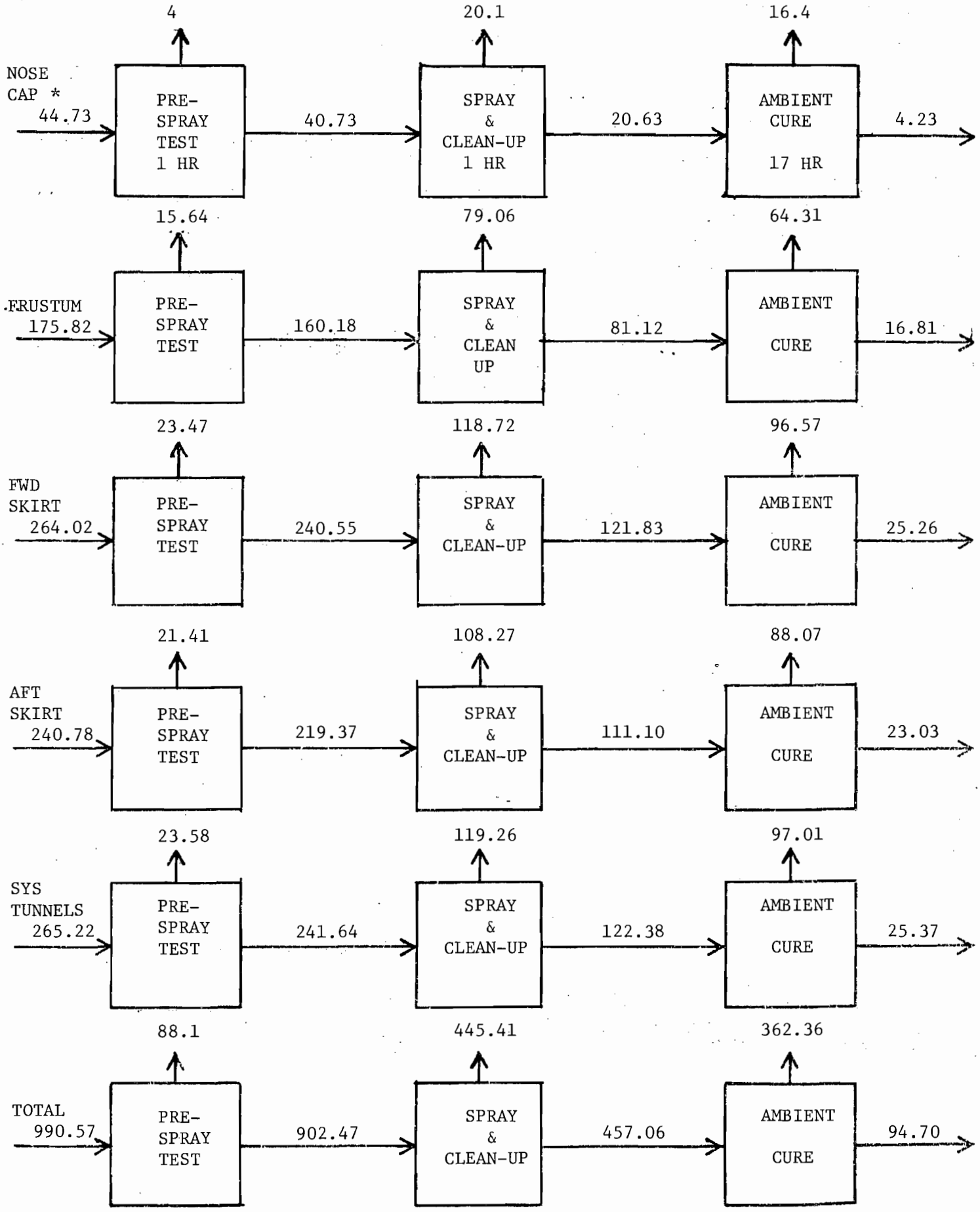
(ALL NUMBERS IN POUNDS)

COMPONENT PART	PRE-SPRAY & TEST	SPRAY & CLEAN-UP	AMBIENT CURE	ON-PRODUCT & FUGITIVE
NOSE CAP*	4.0	20.1	16.4	4.23
FRUSTUM**	15.64	79.06	64.31	16.81
FORWARD SKIRT**	23.47	118.72	96.57	25.26
AFT SKIRT**	21.41	108.27	88.07	23.03
SYS. TUNNELS**	23.58	119.26	97.01	25.37
TOTALS	88.10	445.41	362.36	94.70

* BASED ON ACTUAL AIR SAMPLING DATA

** EMISSION POTENTIAL FACTORED ON A FT^2 BASIS
AS COMPARED TO NOSE CAP AT 75 FT^2 COATED AREA

HYPALON TOPCOAT
PERCHLOROETHYLENE
(ALL NUMBERS IN POUNDS)



* BASED ON ACTUAL SAMPLING DATA

T-83014

ANNUAL HYPALON TOPCOAT

EMISSION POTENTIAL

EMISSION COMPONENT	LBS PER BOOSTER	LBS PER LAUNCH*	TONS/LAUNCH	TONS PER YEAR BASED ON PROJECTED 24 LAUNCHES/YEAR
PERCHLOROETHYLENE (PERC)	990.57	1981.14	0.99	23.77
1,1,1 TRICHLOROETHANE	260.0	520	0.26	6.24
TOTAL	1250.57	2501.14	1.25	30.01

NOTE:

* 2 BOOSTERS PER LAUNCH FLIGHT SET

OVERALL SRB PROCESS

EMISSION POTENTIAL

EMISSION COMPONENT	LBS PER BOOSTER	LBS PER LAUNCH*	TONS/LAUNCH	TONS PER YEAR BASED ON PROJECTED 24 LAUNCHES/YEAR
PERCHLOROETHYLENE (PERC)	1576.58	3153.16	1.576	37.83
METHYLENE CHLORIDE (MECL)	849.34	1698.68	0.849	20.38
1,1,1 TRICHLOROETHANE (3, TRI)	260.0	520.0	0.26	6.24
TOTAL	2685.92	5371.84	2.685	64.45

NOTE:

* 2 BOOSTERS PER LAUNCH FLIGHT SET

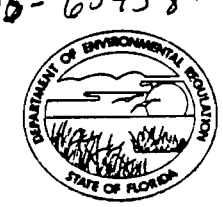
SECTION III

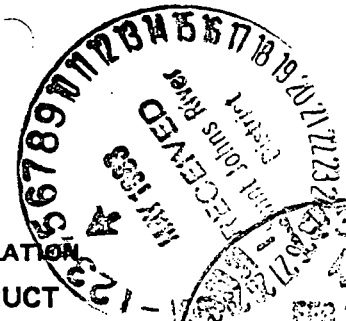
AIR POLLUTION SOURCES & CONTROL DEVICES

ITEM D. Filters in spray booths and operations supplemental information as follows: (1) Catch Overspray from Robotic Spray Operations, (2) Diffuse hydrocarbon solvents, (3) Control operations limited movement of SRB components (See SI-5 in Attachment I). Filter in exhauster building acts as a final control for all air exhaust prior to stack emission.

AC 05-65458

SAINT JOHNS
RIVER DISTRICT





STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Exhaust Vent - Spraying Room [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Kennedy Space Center, NASA COUNTY: Brevard

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peeking Unit No. 2, Gas Fired) Exhaust vent - Solid Rocket Booster Refurbishment Facility

SOURCE LOCATION: Street Vehicle Assembly Bldg. (Low Bay) City Kennedy Space Center

UTM: East X = 612.000 North Y = 1,554,000

Latitude 28 ° 35 ' 05 "N Longitude 80 ° 39 ' 04 "W

APPLICANT NAME AND TITLE: Peter A. Minderman, Director of Design Engineering, KSC, NASA

APPLICANT ADDRESS: Headquarters Bldg., Kennedy Space Center, FL 32899

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Kennedy Space Center, NASA

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: Henry C Paul,
for Peter A. Minderman, Director of Design Eng.
Name and Title (Please Type)

Date: _____ Telephone No. 305/867-2565

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 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.

Exempt per 471.05 F.S.

Signed: _____

Name (Please Type)

(Affix Seal)

Company Name (Please Type)

Mailing Address (Please Type)

Florida Registration No. _____ Date: _____ Telephone No. _____

[1]See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

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.

This project involves five new cure booths added to existing Solid Rocket Booster Assembly and Refurbishment Facility at Vehicle Assembly Building, KSC. The SRB Refurbishment Facility is to spray the SRB shell retrieved from ocean after the launch with an ablative, MSA-1, and paint it with a topcoat. The purpose is to prepare the SRB for reuse in the Space Shuttle Project. The detail is described in the process data for the existing SRB Refurbishment Facility attached. (Cont. on next page).

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

Start of Construction March, 1983 Completion of Construction March, 1984

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.)

The project costs $600,000. There is no particular equipment for pollution control alone.

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

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? ____ Yes _X_ No

F. Normal equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ; If power plant, hrs/yr N/A ;

if seasonal, describe:

G. 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? DNA
   b. If yes, has "Lowest Achievable Emission Rate" been applied? DNA
   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 Deterioriation" (PSD) requirements 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

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

Section II

A. (Cont.)

It is intended to obtain operating data and pollutant concentrations in the air emissions after the completion of this construction. These data will serve as the guideline to obtain operation permits for the existing facilities and the newly constructed facilities.

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

A. Raw Materials and Chemicals Used in your Process, if applicable: (See Attachment I)

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

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

1. Total Process Input Rate (lbs/hr): _____

2. Product Weight (lbs/hr): (See Attachment I)

C. Airborne Contaminants Emitted: (See Attachment I)

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	

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

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5])
None				

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 0.1 pounds per million BTU heat input)

[3] Calculated from operating rate and applicable standard

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

[5] If Applicable

E. Fuels

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

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, lbs/hr

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/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.

Drummed and disposed by vendor.

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

Stack Height: 124 ft. Stack Diameter: 4.0 ft.

Gas Flow Rate: 44,000 max. ACFM Gas Exit Temperature: 160 max. °F.

Water Vapor Content: To be determined % Velocity: 58 max. FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

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.)
Lbs/hr Incinerated							

Description of Waste _____

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

Approximate Number of Hours of Operation per day _____ days/week _____

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.):

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation.
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, 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 8½" 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 8½" 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 8½" 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. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. 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

Not Applicable

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 [X] 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:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

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*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy*: 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:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy**: h. Maintenance Costs:

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:

*Explain method of determining efficiency.

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: h. Maintenance Cost:

*Explain method of determining efficiency above.

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*: d. Capital Cost:

e. Life: f. Operating Cost:

g. Energy: 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*: 3. Capital Cost:

4. Life: 5. Operating Cost:

6. Energy: 7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City: (4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

10. Reason for selection and description of systems:

*Applicant 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

A. Company Monitored Data

1. _____ no sites _____ TSP _____ ( ) SO^2* _____ 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.

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 on 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.

*Specify bubbler (B) or continuous (C).

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.

This process of refurbishing Solid Rocket Booster is necessary in the design to achieve the goal of Space Shuttle Project. The environmental impact of this project is considered minimal; however, pertinent data from the monitoring system will be available to verify the degree of pollution.

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.

ATTACHMENT I

Section III, Air Pollution Sources

A. The raw materials and chemicals used are listed in Figure 1 to prepare the ablative MSA-1 for the SRB. Figure 2 indicates the paint constituents for the topcoat over MSA-1.

B. The wet mix for spraying (MSA-1) weighs 1403 pounds for each SRB and based upon percentages of the volatile organic chemicals, there are:

630.4 pounds perchloroethylene
518 pounds methylene chloride

used in each of the SRB for the ablative only. The Hypalon paint (topcoat) uses 55 gallons of solvents for each SRB, and they are 191 pounds of trichloroethane and 359 pounds of perchloroethylene.

Figure 1: MSA-1

	Constituents	Wt. %
1.	Resin	6.57
2.	Methylene Dianiline	.92
3.	Meta-Phenylenediamine	
4.	Phenolic Microballoons	6.77
5.	Glass Eccospheres	2.24
6.	¼" Chopped Glass Fibers	.22
7.	1/16" Milled Glass Fibers	.56
8.	Bentone 27	.62
9.	Alcohol	.33
10.	Perchloroethylene	44.84
11.	Methylene Chloride	36.93
		100.00

MSA-1: Thickness = 0.14"
Cured Density = 16 pounds/ft^3

Total quantity per booster = 1403 pounds

Hypalon (paint over MSA-1)

	Percent
Titanium Oxide	7.00
Al SiO_2	8.00
Hypalon Rubber	10.00
Hydrocarbon Resin	2.00
Perchloroethylene	47.00
1, 1, 1 Trichloroethane	25.00
Epoxidized Soybean Oil	1.00
	100.00

Thickness = 0.08 inches

Density = 120 pounds per cubic foot

Trade Name: Gacoflex, supplied by
Gaco Western Corp.
Tukwila, Washington 98188

Quantity: 110 gallons per flight (2 SRB's)

Figure 2

C. Based upon the ultimate capacity of KSC operation, the potential number of launch flights of Space Shuttle per year is 16 flights. Each flight involves two SRB's, therefore, there are 32 SRB's to be refurbished.

Total perchloroethylene involved is:

32(630.4 + 359.0)/2000 = 15.83 tons/year

Total methylene chloride involved is:

32(518)/2000 = 8.29 tons/year

Total Trichloroethane involved is:

32(191)/2000 = 3.06 tons/year

Extra methylene chloride needed for cleaning the equipment is estimated to be 20% of the total solvents used or (15.83 + 8.29 + 3.06) x .20 = 5.44 tons/year.

The potential emission of contaminants on a yearly basis are listed below:

Name of Contaminant	Potential Emission (tons/year)
Perchloroethylene	15.83
Methylene Chloride	13.69
Trichloroethane	3.06

The maximum (or worst condition) potential hourly emission is derived from the fact that only four of the five units that make up the SRB are sprayed with MSA-1 wet mix. The aft skirt is hand-troweled with MSA-1. The following table shows the area of each unit to be treated:

SRB Unit	Area - Sq. Ft.
Nose Cone	75
Frustrum	285
Forward Skirt	413
Tunnels	100
Aft Skirt	493
Total	1370

Estimation indicates that (630.4)(1370-497)/(1370) or 401.7 pounds perchloroethylene in MSA-1 mixture and (518)(1370-497)/(1370) or 330.1 pounds methylene chloride sprayed in a duration of 40 minutes. Assuming all the solvents involved are exhausted through the vent (which is not the actual case; but, it will be determined when monitored), the hourly emission can be:

401.7 x 60/40 = 602.6 pounds/hour for perchloroethylene

330.k x 60/40 = 495.2 pounds/hour for methylene chloride

D. The potential pollutants methylene chloride and perchloroethylene will be monitored for the new construction. Therefore, realistic data can be acquired to assess the actual air emissions of this project into the environment. Conservation Consultants, Inc. has proposed to use a Miran 1A (Foxboro Analytical) infrared spectrophotometer. It is capable of measuring a wide range of compounds across a concentration range from sub-parts per million to approximately 2% by volume. Sampling will be conducted continuously (24 hours per day) for a total of twenty days. Reported concentration data and calculated mass emission rates will characterize the volatile organic compounds emission profile for complete refurbishment cycles for the SRB components.