Armstrong

DER

DEC 8 1986

BAQM

December 5, 1986

Mr. C. H. Fancy, P.E.
Bureau of Air Quality Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Dear Mr. Fancy:

Subject: New Production Facility at Pensacola Plant

Enclosed are three copies of an application for a construction permit for a new production facility to be constructed at the Pensacola Plant. Also included is the backup data required for the computer model used in the analysis. A check for $250 for the application fee for this permit is also enclosed.

If you have any further questions, please contact me at (904) 435-2252 or David Buff of KBN Engineering at (904) 375-8000.

Very truly yours,

Peter A. Scaccia

Peter A. Scaccia
Plant engineering Manager

VMS

Enclosure

cc:
Mr. Jack Preece
Department of Environmental Regulation
160 Governmental Center
Pensacola, FL 32501-5794

RECEIVED
DER - MAIL ROOM
1986 DEC -8 PM 1:07

Armstrong

ARMSTRONG WORLD INDUSTRIES, INC.

Pensacola, Florida

CHECK № 028478 63-36/631

PAY TO THE ORDER OF Florida Department of Environmental Regulation | 12-5-86 | $ *250.00*

DATE AMOUNT

IMPREST ACCOUNT

FLORIDA NATIONAL BANK AT PENSACOLA
PENSACOLA, FLORIDA

H W Harper
AUTHORIZED SIGNATURE

DEC 8 1986

BAQM

DER

⑈028478⑈ ⑆063200368⑆ 06800004 33⑈

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION № 76139

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Armstrong World Industries Date Dec. 8, 1986

Address P.O. Box 1991, Pensacola, FL Dollars $ 250.00

Applicant Name & Address Same as above

Source of Revenue

Revenue Code 001031 Application Number AC 17-128287

By Patricia B. Adams

STATE OF FLORIDA AC 17-128287

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER

DEC 8 1986

BAQM

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

ALEX SENKEVICH
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Ceiling Tile Manufacturing [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Armstrong World Industries, Inc. COUNTY: Escambia

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) FMS Manufacturing Line Exhaust #74, 75, 75A, 76, 77, 77A, 78

SOURCE LOCATION: Street 300 South Myrick St. City Pensacola

UTM: East 476.0 North 3364.0

Latitude 30 ° 24 ' 19 "N Longitude 87 ° 15 ' 00 "W

APPLICANT NAME AND TITLE: R.D. Herr, Production Manager

APPLICANT ADDRESS: Armstrong World Industries, Inc., P.O. Box 1991, Pensacola, FL 32589

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Armstrong World Industries, Inc.

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. Furthe[r] I agree to maintain and operate the pollution source and pollution contr[ol] facilities in such a manner as to comply with the provision of Chapter 403, Flori[da] 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-transferab[le] and I will promptly notify the department upon sale or legal transfer of the permitt[ed] establishment.

*Attach letter of authorization

Signed: [signature]

R.D. Herr, Production Manager
Name and Title (Please Type)

Date: 12/5/86 Telephone No. (904) 435-2249

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 hav[e] been designed/examined by me and found to be in conformity with modern engineerin[g] principles applicable to the treatment and disposal of pollutants characterized in th[e] permit application. There is reasonable assurance, in my professional judgment, tha[t]

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

DER Form 17-1.202(1)
Effective October 31, 1982

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 David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, FL 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/26/86 Telephone No. (904) 375-8000

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 PSD Technical Support Document

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

Start of Construction upon permit issuance Completion of Construction 2 years after permit issued

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.)

Dust Collector - $150,000

Structural - $100,000

Ancillary Ductwork/Waste Handling System - $175,000

Engineering - $85,000

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

New emission points - no permits previously issued

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 48 ;

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. Yes

3. Does the State "Prevention of Significant Deteriorioration" (PSD) requirement apply to this source? If yes, see Sections VI and VII. Yes

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.

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

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

Description	Contaminants Type	Contaminants % Wt	Utilization Rate - lbs/hr	Relate to Flow Diagram
Mineral Wool Boards	Particulate	Variable	40,500 lb/hr(max)	1
Paint	Particulate	42*	1,487 lb/hr(max)	2
Paint	Particulate	51*	2,230 lb/hr(max)	3

*Percent Solids in Paint

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

1. Total Process Input Rate (lbs/hr): 44,217 lb/hr (max)

2. Product Weight (lbs/hr): Variable - dependent upon product

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] Maximum lbs/hr	Emission[1] Actual T/yr	Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/hr	Potential[4] Emission T/yr	Relate to Flow Diagram
Particulate	9.33	37.62	17-2.610(1)**	24.5	9.33	37.62	74,75,75A 76,77,77A, 78
Sulfur Dioxide	0.0048	0.02	NA	NA	0.0048	0.02	76, 78
Nitrogen Oxides	0.8	3.22	NA	NA	0.8	3.22	76, 78
Carbon Monoxide	0.16	0.64	NA	NA	0.16	0.64	76, 78
Volitile Organic Cmpds	0.064	0.26	NA	NA	0.064	0.26	76,78

[1] See Section V, Item 2. ** Process Weight table - $3.59\ P^{0.62}$

[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).

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)
Flex-Kleen 120-WTW-	Particulate	99.5%	Submicron	Manufacturer's data
660 or equivalent				
Binks Dynaprecipitor water wash spray booth	Particulate	97%	Submicron	Manufacturer's Data

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Natural Gas (each dryer)	0.004	0.004	4.0 (each dryer)

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

Fuel Analysis:

Percent Sulfur: trace Percent Ash: trace

Density: - lbs/gal Typical Percent Nitrogen: trace

Heat Capacity: 1000 Btu/SCF 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 N/A Maximum ______

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

Wastewater and solids are pumped to a treatment facility on site; liquids and solids are recycled.

See PSD Technical Support Document, Table 2-1.

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

Stack Height: ______________ ft. Stack Diameter: ______________ ft.

Gas Flow Rate: __________ ACFM __________ DSCFM Gas Exit Temperature: ______________ °F.

Water Vapor Content: ______________ % Velocity: ______________ FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type O (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) ______________

Brief description of operating characteristics of control devices: ______________________

____

____

____

____

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

____

____

____

____

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

lease provide the following supplements where required for this application.

.. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

:. 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.

. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

. 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.)

. 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).

. 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.

, 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).

, 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

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

[ ] Yes [X] No

Contaminant	Rate or Concentration

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

[ ] Yes [XX] No

Contaminant	Rate or Concentration

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

Contaminant	Rate or Concentration
Particulate Matter	9.33 lb/hr

Describe the existing control and treatment technology (if any). See Technical Support Document

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

xplain method of determining

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). see Technical Support Document

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.

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:

'. Describe the control technology selected: see Technical Support Document

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

(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:

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

. Company Monitored Data Not Applicable

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).

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. 4 Year(s) of data from 01 / 01 / 72 to 12 / 31 / 75
   (month day year — month day year)

2. Surface data obtained from (location) Pensacola, FL

3. Upper air (mixing height) data obtained from (location) Bootheville, LA

4. Stability wind rose (STAR) data obtained from (location) ______

C. Computer Models Used

1. ISCST ______ 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.

. Applicants Maximum Allowable Emission Data see Technical Support Document

Pollutant	Emission Rate	
TSP	______	grams/sec
SO^2	______	grams/sec

. Emission Data Used in Modeling see Technical Support Document

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.

. Attach all other information supportive to the PSD review.

. 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.

. 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.

TECHNICAL SUPPORT DOCUMENT
FOR
PREVENTION OF SIGNIFICANT DETERIORATION
PERMIT APPLICATION

FMS PROCESS LINE
ARMSTRONG WORLD INDUSTRIES, INC.
PENSACOLA, FLORIDA

Prepared By:

KBN Engineering and Applied Sciences, Inc.
Gainesville, Florida

November, 1986

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Armstrong World Industries, Inc. is proposing to construct and operate a new product line (FMS process) at their existing ceiling tile manufacturing facility located in Pensacola, Florida. The new product line will consist of board finishing activities, including machining, painting, drying and cooling operations. A total of seven (7) new air emission sources will be associated with the FMS process. In conjunction with start-up of the FMS process line, the existing #4 Paint Line and #5 Paint Line will be shutdown.

The proposed FMS process line, by virtue of its increase in particulate matter (PM) emissions, will constitute a major modification under federal and State of Florida Prevention of Significant Deterioration (PSD) regulations. The analysis presented in this Technical Support Document addresses the applicable requirements of the PSD regulations.

Descriptions of the new FMS process line and existing Armstrong facilities are presented in Section 2.0, and the PSD source applicability analysis and applicable regulations are described in Section 3.0. Sections 4.0 through 7.0 contain the air quality impact analysis, air monitoring analyses, additional impact analysis, and Best Available Control Technology Analysis, respectively. Supporting calculations and information are presented in the Appendices.

The air quality analysis presented in Section 4.0 demonstrates that the proposed modification will have an insignificant effect upon PM air quality levels in the vicinity of the Armstrong facility. In addition, the predicted increase in total suspended particulate impacts is predicted to be less than the de minimis impact level which exempts the proposed modification from air quality monitoring.

2.0 PROJECT DESCRIPTION

2.1 FMS PROCESS DESCRIPTION

Armstrong World Industries, Inc. is proposing the construction and operation of a new production line at their existing Pensacola, Florida plant. The existing plant manufactures various types of ceiling tile, which are used in buildings, homes, offices, etc. The new product line, referred to as "FMS", will process four types of mineral wool ceiling boards which have been formed, rough cut, and prime painted during prior operations at the plant. The unfinished boards will be fed from a stack by a vacuum feeder into a machining cell, where they will be cut to finished size, and the surfaces and edges will be profiled to the desired shape and contour (see Figure 2-1, Flow Diagram). Two coats of paint will then be applied in succession to the boards, through two sets of paint booths/dryers/coolers. The finished product is then packaged and sent to the warehouse or shipping. Four types of finished products will be produced by the FMS line. Each product may have a different board composition and differing surface features. Maximum process weight rate will be approximately 44,217 lb/hr, including paint application to the boards. Maximum process and product weight calculations are presented in Appendix A.

As indicated in Figure 2-1, Flow Diagram, the FMS process will have seven (7) points of air emissions (Exhaust # 74, 75, 75A, 76, 77, 77A, 78). The feeder and machining cell emissions [particulate matter (PM)] will be controlled by a fabric filter (baghouse). Specifications for the control device are contained in Section 7.0.

A total of four (4) identical paint booths will be installed, in two pairs. Only one (1) paint booth within each pair will be used at any time. The non-operating paint booth within each pair will be prepared for the next color product. The paint booths will be similar to a Binks Dynaprecipitor water wash spray booth, but will be customized by adding an air supply fan. The water wash scrubbing section, however, will be identical to the Dynaprecipitor booth. Specifications for the Dynaprecipitor spray booth are presented in Appendix B. A water-based paint will be used in the FMS

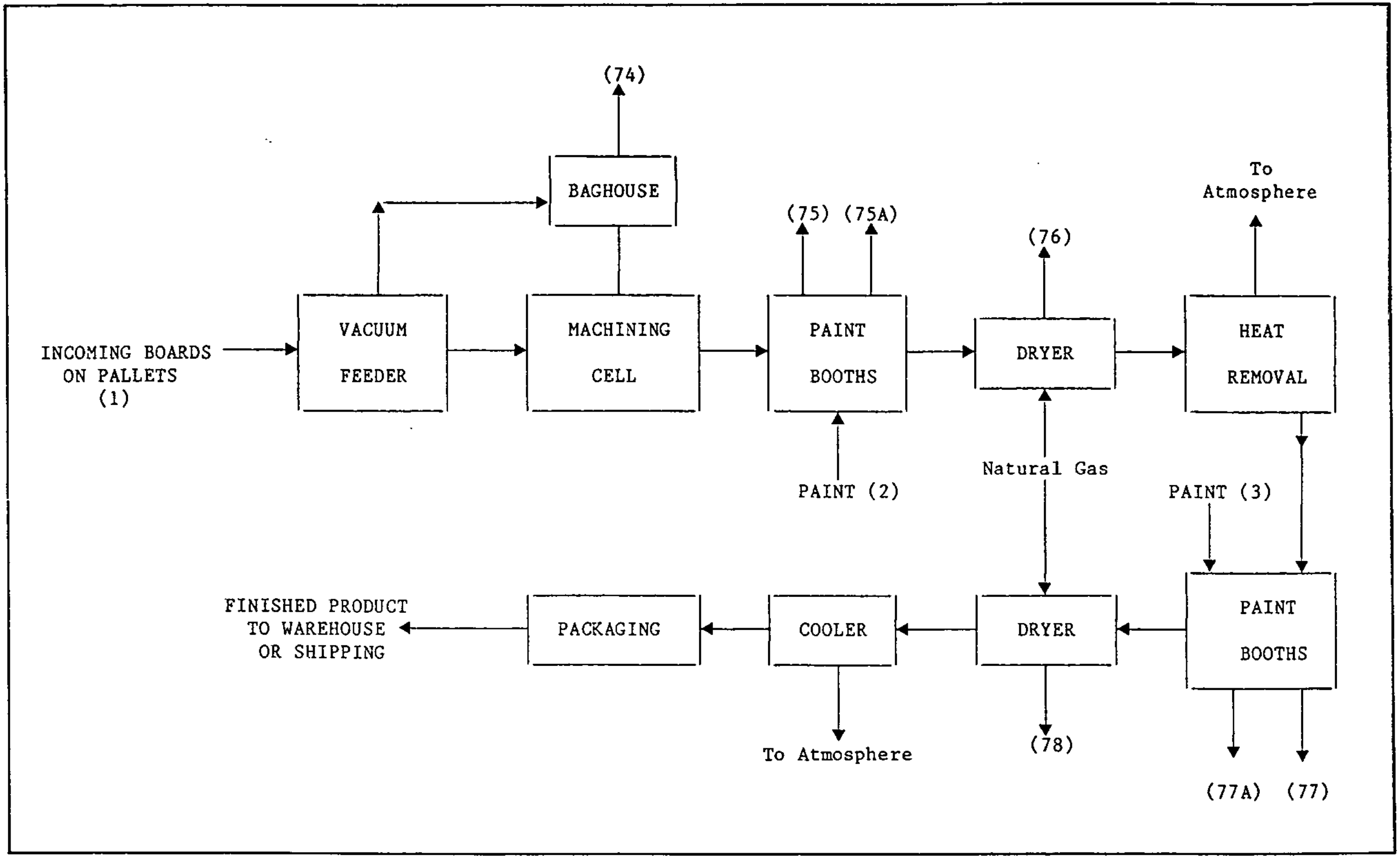


Figure 2-1. Flow Diagram, FMS Process

KBN

process. As a result, the only airborne emission from the paint booths will be PM. No solvents are used in the process, and no volatile organic compounds (VOC) will be emitted from the booths.

The natural gas-fired dryers will be used to dry the freshly-painted boards. Each dryer (two total) will be rated at 4.0 x 10^6 Btu/hr heat input. Maximum natural gas consumption will be 4,000 scf/hr. The only air emissions associated with the dryers are the products of combustion. The two coolers following the dryers will utilize ambient air to cool the dried boards. No air emissions will result from this cooling operation.

Air emission rates and stack parameters for the proposed FMS process line are presented in Table 2-1. Emission calculations are presented in Appendix C. The locations of the proposed FMS process line and associated emission points within the existing Armstrong facility are described in the following section.

2.2 EXISTING #4 PAINT LINE AND #5 PAINT LINE

2.2.1 Site Location

The existing Armstrong facility site in the Pensacola region is shown in Figure 2-2. The site is located just north of the Bayou Chico inlet, which leads to Pensacola Bay. This location is within the city of Pensacola in Escambia County.

A site location map of the Armstrong facility is presented in Figure 2-3. Portrayed in this figure are the plant property boundaries and the general building layout. The only other significant stationary source of air emissions in the nearby area is Reichhold Chemicals, Inc., located immediately to the east of Armstrong.

2.2.2 #4 Paint Line and #5 Paint Line Sources

Air emission sources associated with the existing #4 Paint Line at Armstrong consist of a paint booth, dryer, cooler and feeder. The #5 Paint Line air

Table 2-1. Emission Rates and Stack Parameters for Proposed FMS Process Line

Source	Exhaust No.	Pollutant	Emission Rate lb/hr	Emission Rate tons/yr	Stack Height (ft)	Stack Diameter (ft)	Flow Rate (acfm)	Exit Velocity (ft/min)	Exit Temp. (^oF)
Feeder/Machining Cell Baghouse	74	PM	8.61	34.72	75	4.50	67,000	4213	Amb.
Intermediate Paint Booths*	75, 75A	PM	0.24	0.97	35	2.83	12,600	2003	Amb.
Dryer	76	PM	0.02	0.081	35	1.33	3,000	2159	500
		SO_2	0.0024	0.01					
		NO_x	0.4	1.61					
		CO	0.08	0.32					
		VOC	0.032	0.13					
Finish Paint Booths*	77, 77A	PM	0.44	1.77	35	2.83	12,600	2003	Amb.
Dryer	78	PM	0.02	0.081	35	1.33	3,000	2159	500
		SO_2	0.0024	0.01					
		NO_x	0.4	1.61					
		CO	0.08	0.32					
		VOC	0.032	0.13					

* Only one paint booth will operate at any one time. All figures refer to operation of one paint booth, except for annual emission rate, which reflects total of both paint booths.

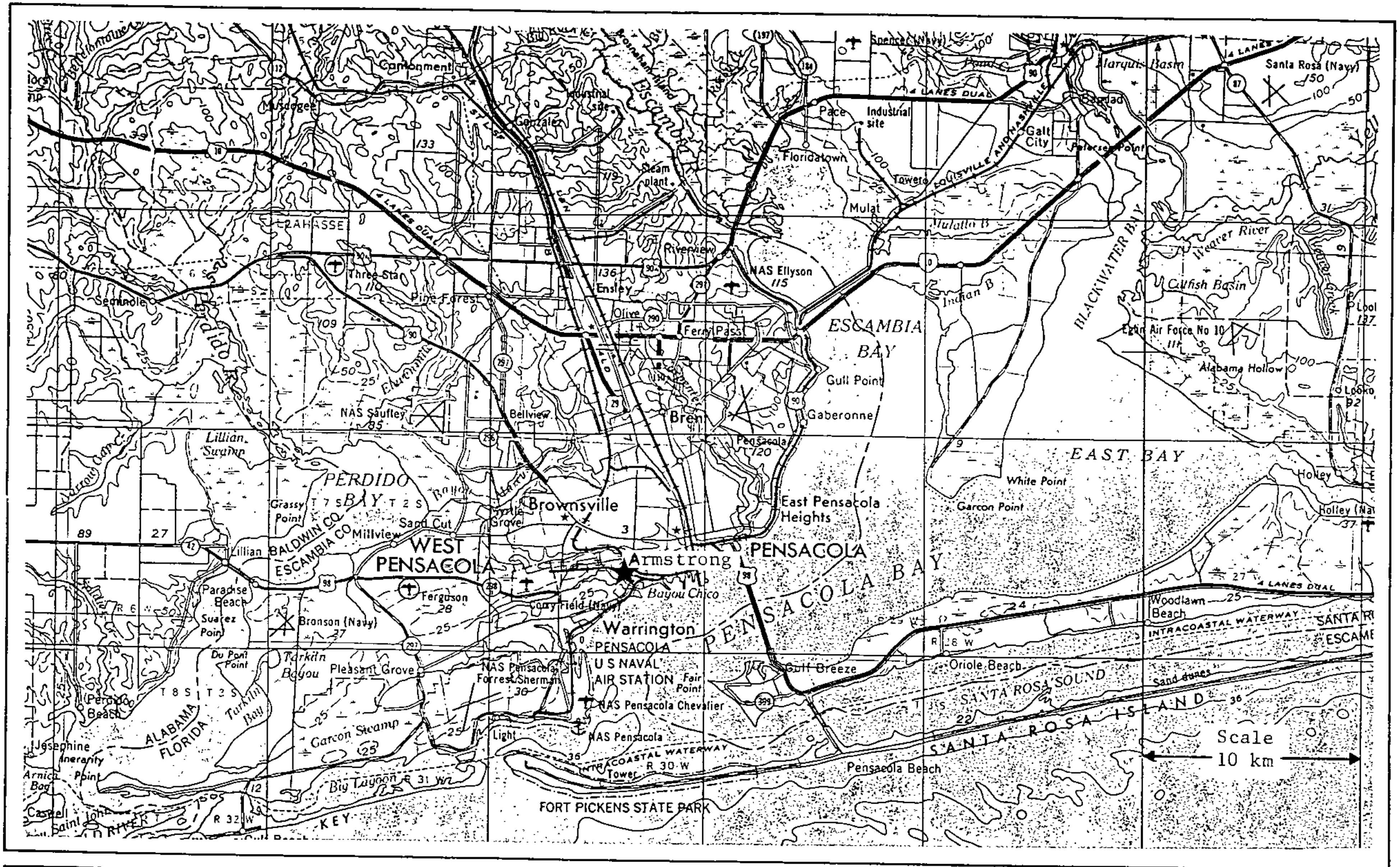


Figure 2-2. Regional Site Location of Armstrong World Industries, Inc., Pensacola Plant.

KBN

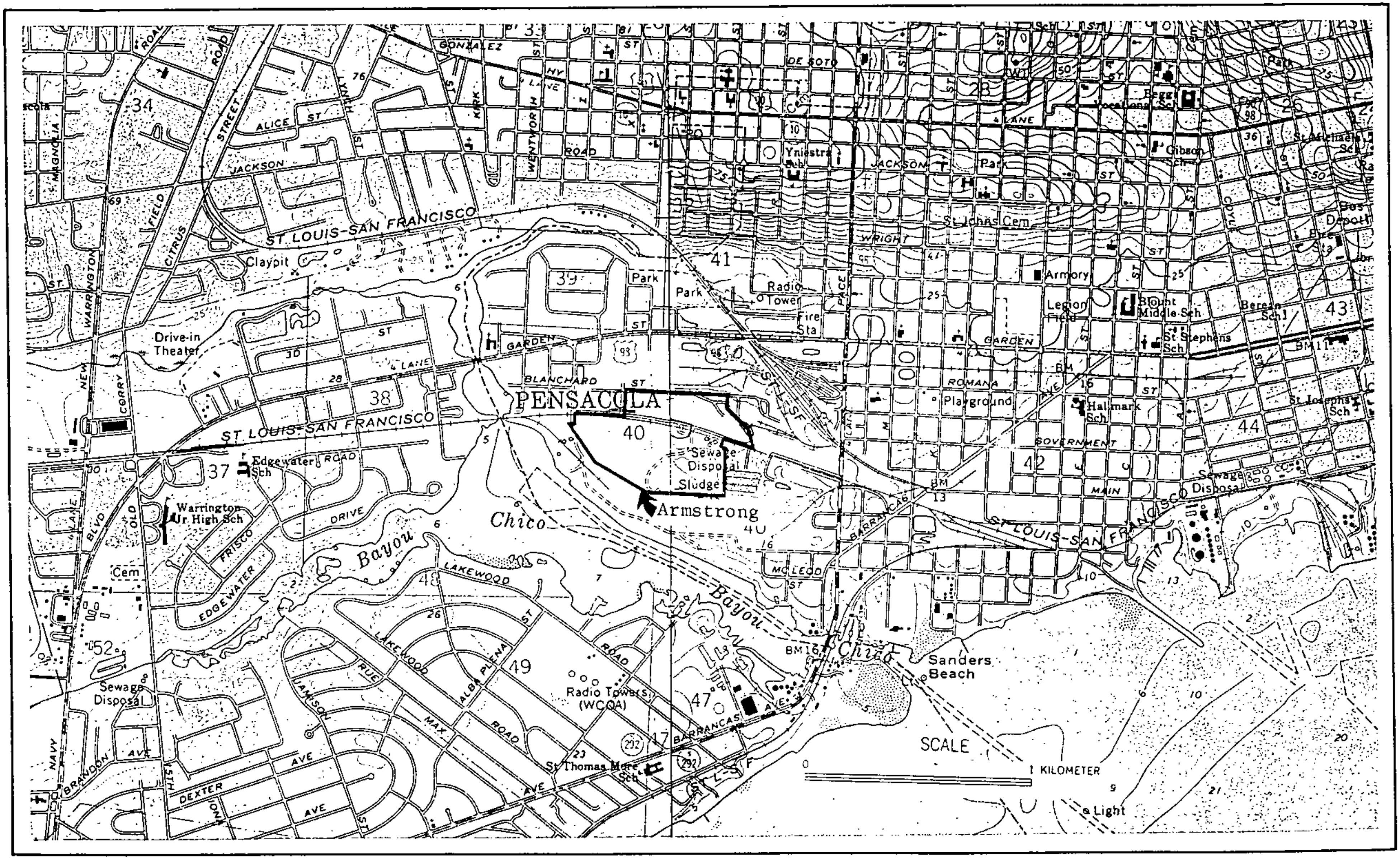


Figure 2-3. Armstrong Plant Location and Property Boundaries

emission source consists of a single exhaust point (Exhaust #63). Current emission rates and stack parameters for these sources are presented in Table 2-2. The locations of the #4 Paint Line and #5 Paint Line within the Armstrong facility, and the locations of the proposed FMS process sources, are shown in Figure 2-4.

Table 2-2. Emission Rates and Stack Parameters for #4 Paint Line and #5 Paint Line

Source	Exhaust No.	Emission Rate		Stack Height (ft)	Stack Diameter (ft)	Flow Rate (acfm)	Exit Velocity (ft/min)	Exit Temp. (°F)
		lb/hr	tons/yr					
#4 Paint Line								
Paint Booth	27	0.63	2.46	28	3.58	17,976	1786	Ambient
Dryer	28	0.30	1.15	28	1.25	1,756	1431	370
Cooler	39	0.20	0.78	28	3.20	16,976	2111	Ambient
Feeder	61	0.34	1.33	35	1.50	4,000	2264	Ambient
#5 Paint Line	63	0.002	0.01	28	3.50	11,000	1143	Ambient

Source: Armstrong World Industries, 1986.

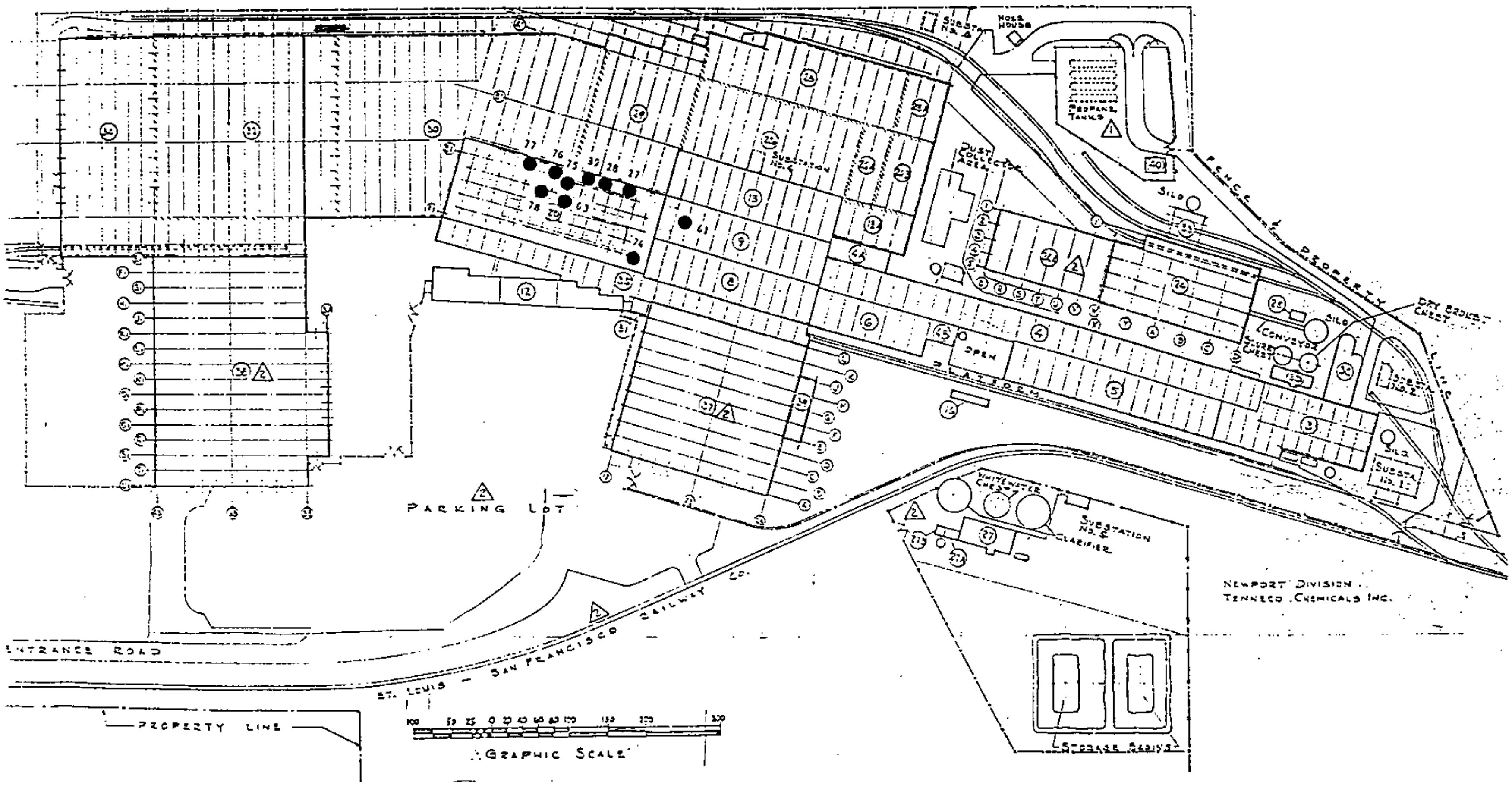


Figure 2-4. Locations of Proposed FMS Sources and Existing Sources

3.0 AIR QUALITY REVIEW REQUIREMENTS AND APPLICABILITY

The following discussion pertains to the regulatory requirements that must be met for the construction and operation of the proposed Armstrong FMS process line, as required by federal and state of Florida air quality regulations.

3.1 NATIONAL AND STATE AAQS

The existing applicable National and Florida ambient air quality standards (AAQS) are presented in Table 3-1. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse affects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Escambia County is currently designated an attainment or unclassifiable area for all criteria pollutants.

3.2 PSD REQUIREMENTS

3.2.1 General Requirements

Under federal PSD review requirements, all major new or modified sources of air pollutants regulated under The Clean Air Act (CAA) must be reviewed and approved by the U.S. Environmental Protection Agency (USEPA) [in this case, reviewed and approved by the Florida Department of Environmental Regulation (DER) since PSD review authority has been delegated to the state]. A "major stationary source" is defined as any one of 28 named source categories which has the potential to emit 100 tons per year (TPY) or more, or any other stationary source which has the potential to emit 250 TPY or more, of any pollutant regulated under CAA. "Potential to emit" means the capability at maximum design capacity to emit a pollutant after the application of control equipment.

A "major modification" is defined under PSD regulations as a change at an existing major stationary source which increases emissions by greater than

Table 3-1. Federal and State of Florida Ambient Air Quality Standards

Pollutant	Averaging Time	AAQS (ug/m^3) Federal Primary Standard	Federal Secondary Standard	State of Florida
Suspended Particulate Matter	Annual Geometric Mean	75	60	60
	24-Hour Maximum*	260	150	150
Sulfur Dioxide	Annual Arithmetic Mean	80	N/A	60
	24-Hour Maximum*	365	N/A	260
	3-Hour Maximum*	N/A	1,300	1,300
Carbon Monoxide	8-Hour Maximum*	10,000	10,000	10,000
	1-Hour Maximum*	40,000	40,000	40,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100
Ozone	1-Hour Maximum+	235	235	235
Lead	Calendar Quarter	1.5	1.5	1.5

Notes: N/A = Not applicable.
ug/m^3 = micrograms per cubic meter

*Maximum concentration not to be exceeded more than once per year.
+Maximum concentration not to be exceeded more than an average of 1 calendar day per year.

Sources: 40 CFR, Parts 50 and 52.
Florida Administrative Code (FAC), Chapter 17-2

"significant amounts". PSD significant emission rates are shown in Table 3-2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified source. PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. Major sources and modifications are required to undergo the following analysis related to PSD for each pollutant emitted in "significant" amounts:

1. Control technology review,
2. Source impact analysis,
3. Air quality analysis (monitoring),
4. Source information, and
5. Additional impact analyses.

In addition to these analyses, a new source must also be reviewed with respect to Good Engineering Practice (GEP) stack height regulations. Discussions concerning each of these requirements are presented in the following sections.

3.2.2 Increments/Classifications

In promulgating the 1977 CAA Amendments, Congress specified that certain increases above an air quality "baseline concentration" level of SO_2 and PM concentrations would constitute "significant deterioration". The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or have an impact. Three classifications were designated based on criteria established in the CAA Amendments. Initially, Congress promulgated areas as Class I (international parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. EPA then promulgated as regulations the requirements for classifications and area designations. The Florida DER has adopted the EPA class designations and allowable PSD increments, which are presented in Table 3-3.

Table 3-2. PSD Significant Emission Rates

Pollutant	Regulated Under	Significant Emission Rate (TPY)
Sulfur Dioxide	NAAQS, NSPS	40
Particulate Matter	NAAQS, NSPS	25
Nitrogen Oxides	NAAQS, NSPS	40
Carbon Monoxide	NAAQS, NSPS	100
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40
Lead	NAAQS	0.6
Sulfuric Acid Mist	NSPS	7
Total Fluorides	NSPS	3
Total Reduced Sulfur	NSPS	10
Reduced Sulfur Compounds	NSPS	10
Hydrogen Sulfide	NSPS	10
Asbestos	NESHAP	0.007
Beryllium	NESHAP	0.0004
Mercury	NESHAP	0.1
Vinyl Chloride	NESHAP	1
Benzene	NESHAP	0
Radionuclides	NESHAP	0
Inorganic Arsenic	NESHAP	0
Any Regulated Pollutant	--	Class I Impact*

* Any emission rate for a source located within 10 km of a Class I area which causes impacts of 1 ug/m^3, 24-hour average, or greater.

Notes: TPY = Tons per year.
NAAQS = National Ambient Air Quality Standards.
NSPS = New Source Performance Standards.
NESHAP = National Emission Standards for Hazardous Air Pollutants.

Source: 40 CFR 52.21.
FAC, Chapter 17-2.

Table 3-3. Federal and State of Florida PSD Allowable Increments

Pollutant/Averaging Time	Allowable Increment (ug/m^3)		
	Class I	Class II	Class III
Particulate Matter			
Annual Geometric Mean	5	19	37
24-Hour Maximum**	10	37	75
Sulfur Dioxide			
Annual Arithmetic Mean	2	20	40
24-Hour Maximum**	5	91	182
3-Hour Maximum**	25	512	700

** Maximum concentration not to be exceeded more than once per year.

Source: 40 CFR Part 52, Section 52.21.
Florida Administrative Code, Chapter 17-2

The term "baseline concentration" evolves from federal and state PSD regulations and denotes a fictitious concentration level corresponding to a specified baseline date and certain additional baseline sources. By definition in the PSD regulations, as amended August 7, 1980, baseline concentration means the ambient concentration level which exists in the baseline area at the time of the applicable baseline date. A baseline concentration is determined for each pollutant for which a baseline date is established and includes:

1. The actual emissions representative of sources in existence on the applicable baseline date; and
2. The allowable emissions of major stationary sources which commenced construction before January 6, 1975, but were not in operation by the applicable baseline date.

The following emissions are not included in the baseline concentration and therefore affect PSD increment consumption:

1. Actual emissions from any major stationary source on which construction commenced after January 6, 1975; and
2. Actual emission increases and decreases at any stationary source occurring after the baseline date.

"Baseline date" means the earliest date after August 7, 1977, on which the first complete application under 40 CFR 52.21 is submitted by a major stationary source or major modification subject to the requirements of 40 CFR 52.21. The baseline date for the entire state of Florida, including Escambia County, has been set as December 27, 1977 (FAC, Chapter 17-2).

3.2.3 Control Technology Review

The control technology review requirements of the federal PSD regulations require that all applicable federal and state emission limiting standards be met and that Best Available Control Technology (BACT) be applied to control emissions from the source (40 CFR 52.21). The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the source or modification exceeds the significant emission rate (see Table 3-2).

BACT is defined in 40 CFR 52.21 as:

> An emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act...which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable...through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.... If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology.

The requirements for BACT were promulgated within the framework of PSD in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increment and thereby enlarge the potential for future economic growth without significantly degrading air quality (USEPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in USEPA's "Guidelines for Determining Best Available Control Technology (BACT)", (USEPA, 1978) and in the "PSD Workshop Manual" (USEPA, 1980). These guidelines were promulgated by USEPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT in one area may not be identical to BACT in another area. According to USEPA (1980), "BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis."

The BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, as a minimum, demonstrate compliance with NSPS for a source (if applicable). An evaluation of the air pollution control techniques and systems, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology, is required. The cost-benefit analysis requires the documentation of the materials, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgement, balancing environmental benefits with energy, economic, and other impacts (USEPA, 1978).

3.2.4 Air Quality Analysis

In accordance with requirements of 40 CFR 52.21(m), any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary source or major modification. For a new major source, the affected pollutants are those that the source would potentially emit in a significant amount. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 3-2).

According to CAA, ambient air monitoring for a period of up to 1 year generally is appropriate to satisfy the PSD monitoring requirements. A minimum of four (4) months of data is required. Existing data from the vicinity of the proposed source may be utilized if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in USEPA's "Ambient Monitoring Guidelines for Prevention of Significant Deterioration" (USEPA, 1981).

The regulations include an exemption which excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that the Administrator may exempt a proposed major stationary source or major modification from the monitoring requirements of 40 CFR 52.21(m) with respect to a particular pollutant if the emissions increase of the pollutant from the source or modification would cause, in any area, air quality impacts less than the *de minimis* levels presented in Table 3-4.

The state of Florida has passed PSD air quality analysis requirements identical to the federal requirements. In February 1981, USEPA revised the *de minimis* levels and averaging times for three of the pollutants (USEPA, 1981). The averaging period for lead was changed to 3 months and the *de minimis* impact levels for beryllium and hydrogen sulfide were changed to 0.001 ug/m^3 and 0.2 ug/m^3, respectively. These revisions have been proposed in the Federal Register, but have not yet been promulgated. The state of Florida recently (August 1986) adopted the revised *de minimis* levels.

3.2.5 Source Impact Analysis

A source impact analysis must be performed by a proposed major source subject to PSD for each pollutant for which the increase in emissions exceeds the significant emission rate (Table 3-2). The PSD regulations specifically require the use of atmospheric dispersion models in performing impact analysis, estimating baseline and future air quality levels, and determining compliance with AAQS and allowable PSD increments. Designated USEPA models must normally be used in performing the impact analysis. Specific applications for other than USEPA-approved models require USEPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in the USEPA publications, "Guideline on Air Quality Models (Revised)" (USEPA, 1986) and "Regional Workshops on Air Quality Modeling: A Summary Report" (USEPA, 1983). Criteria pollutants may be exempt from the source impact analysis if the net increase in impacts due to the new source is below significance levels, as presented in Table 3-5.

Various lengths of record for meteorological data can be utilized for impact analysis. A 5-year period can be used with corresponding evaluation of highest, second-highest short-term concentrations for comparison to AAQS or

Table 3-4. EPA and Florida PSD *De Minimis* Impact Levels

Pollutant	De Minimis Air Quality Impact Level (ug/m^3)	
	Code of Federal Regulations and Florida	EPA Ambient Monitoring Guidelines
Sulfur Dioxide	13, 24-hour	13, 24-hour
Particulate Matter	10, 24-hour	10, 24-hour
Nitrogen Oxides	14, annual	14, annual
Carbon Monoxide	575, 8-hour	575, 8-hour
Ozone	100 TPY*	100 TPY*
Lead	0.1, 24-hour	0.1, 3-month
Sulfuric Acid Mist	**	**
Total Fluoride	0.25, 24-hour	0.25, 24-hour
Total Reduced Sulfur	10, 1-hour	**
Reduced Sulfur Compounds	10, 1-hour	**
Hydrogen Sulfide	0.04, 1-hour	0.2, 1-hour
Asbestos	**	**
Beryllium	0.0005, 24-hour	0.001, 24-hour
Mercury	0.25, 24-hour	0.25, 24-hour
Vinyl Chloride	15, 24-hour	15, 24-hour
Benzene	**	**
Radionuclides	**	**
Inorganic Arsenic	**	**

* Increase in volatile organic compounds (VOC) emissions.
** No ambient air measurement method; no monitoring required.

Sources: 40 CFR 52.21(i)(8).
EPA, 1980.
EPA, 1981.

Table 3-5. Significant Impact Levels for Criteria Pollutants

Pollutant	Average Period	Concentration (ug/m^3)
Sulfur Dioxide	3-Hour	25
	24-Hour	5
	Annual	1
Particulate Matter	24-Hour	5
	Annual	1
Nitrogen Dioxide	Annual	1
Carbon Monoxide	1-Hour	2,000
	8-Hour	500

Source: EPA, 1980

PSD increments. The term "highest, second-highest" refers to the highest of the second-highest concentrations at all receptors (i.e., the highest concentration at each receptor is discarded). The second-highest concentration is significant because short-term AAQS specify that the standard should not be exceeded at any location more than once a year. If less than 5 years of meteorological data are used in the modeling analysis, the highest concentration at each receptor must normally be used for comparison to air quality standards.

3.2.6 Additional Impact Analysis

In addition to air quality impact analyses, federal PSD regulations require analyses of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the proposed source. These analyses are to be conducted primarily for PSD Class I areas. Impacts due to general commercial, residential, industrial, and other growth associated with the source must also be addressed. These analyses are required for each pollutant emitted in significant amounts (Table 3-2).

3.2.7 Good Engineering Practice Stack Height

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP, or any other dispersion technique. On July 8, 1985, USEPA promulgated final stack height regulations (USEPA, 1985).

GEP stack height is defined as the highest of:

1. 65 meters (m), or
2. A height established by applying the formula:

   $H_g = H + 1.5L$

   where: H_g = GEP stack height,

   H = Height of the structure or nearby structure, and

   L = Lesser dimension (height or projected width) of nearby structure(s).
3. A height demonstrated by a fluid model or field study.

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 km. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where "plume impaction" occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with "elevated terrain." "Elevated terrain" is defined as terrain which exceeds the height calculated by the GEP stack height formula. Because the terrain in the vicinity of the Armstrong facility is flat, plume impaction was not considered in determining the GEP stack height.

3.3 PSD REVIEW APPLICABILITY

3.3.1 Pollutant Applicability

The existing Armstrong facility is a major stationary source since its potential to emit PM (i.e., maximum emissions) is greater than 250 TPY. The proposed FMS process line will increase PM emissions from the Armstrong facility by 37.62 TPY (refer to Table 2-1).

The shutdown of the #4 Paint Line and #5 Paint Line will provide a contemporaneous PM emission offset. As shown in Table 3-6, the net increase in emissions due to the proposed modification and other contemporaneous changes exceeds the significant emission rate of 25 TPY for PM, and PSD review is required for PM. The net increase in emissions for all other criteria pollutants are below the respective significant emission rates, and these pollutants are therefore exempt from PSD review.

3.3.2 GEP Stack Height Analysis

The buildings at the Armstrong facility are all approximately 30 feet in height. The length and width of the contiguous buildings are much greater

Table 3-6. Summary of Net Increase in Emissions, Proposed FMS Process Line

Pollutant	Increase Due to Proposed FMS Process Line (TPY)	Decrease Due to #4 and #5 Paint Line Shutdown (TPY)	Net Increase in Emissions (TPY)	PSD Significant Emission Rate (TPY)
Particulate Matter	37.62	5.73	31.89	25
Sulfur Dioxide	0.02	-	0.02	40
Nitrogen Oxides	3.22	-	3.22	40
Carbon Monoxide	0.64	-	0.64	100
Volatile Organic Cmpds.	0.26	-	0.26	40

than this height. The proposed FMS process emission sources will be located above the roof of the existing buildings (see Section 2.2 for source locations).

The GEP stack height is based upon the GEP formula $Hg = H + 1.5L$, where L is the lesser dimension of the height or cross-wind width of the most significant influencing structure. For the Armstrong facility, the height is the lesser dimension of the height or cross-wind width. Applying the GEP formula to the Armstrong facility results in a GEP stack height of 75 feet [i.e., 30 + (1.5 x 30)]. The heights of the proposed Armstrong sources will be 75 feet or less and thus will not exceed the GEP height.

3.3.3 Area Classification

As discussed in Section 3.1, Escambia County is an attainment area for all criteria pollutants. The area is also designated as Class II for PSD purposes. There are no PSD Class I areas within 150 km of the Armstrong site. The nearest such area is the Breton National Wilderness Area, which is located about 170 km west of Pensacola.

4.0 AIR QUALITY IMPACT ANALYSIS

4.1 METHODOLOGY

An air quality impact analysis was conducted to determine if the net increase in PM emissions due to the proposed FMS process line and associated emission offsets would result in a significant net increase in PM air quality impacts. As discussed in Section 3.2.5, a proposed modification may be exempt from the Source Impact Analysis requirements if the net increase in impacts is below designated significance levels. The significance level for PM is 5 ug/m^3 for the 24-hour averaging time, and 1 ug/m^3 for the annual averaging time.

The Industrial Source Complex Short-Term (ISCST) model was used for the impact analysis. The ISCST model is recommended by USEPA and Florida DER for use in flat or gently rolling terrain. The area surrounding the Armstrong facility is flat. The ISCST model calculates hourly concentrations based upon hourly meteorological data. The meteorological data used in the analysis consisted of four (4) years of hourly surface data from Pensacola Airport (1972-1975) and coincident upper air data from Bootheville, LA. The meteorological data was provided by the Florida DER and then preprocessed for model input by KBN.

Model Options selected for use in the modeling analysis included:

* Rural dispersion mode which was selected based upon the land use criteria developed by Auer (1978)
* Default values for wind profile exponents and vertical potential temperature gradients
* Gradual plume rise equation, in conjunction with building wake effects option, since modeled sources have stacks which are lower than GEP stack height.

A rectangular receptor grid was utilized which encompassed the Armstrong facility. The grid consisted of a 16 x 14 rectangular grid, with a grid spacing of 100 m (see Figure 4-1). Some additional receptors were placed along Armstrong property boundaries to assess impacts at the property

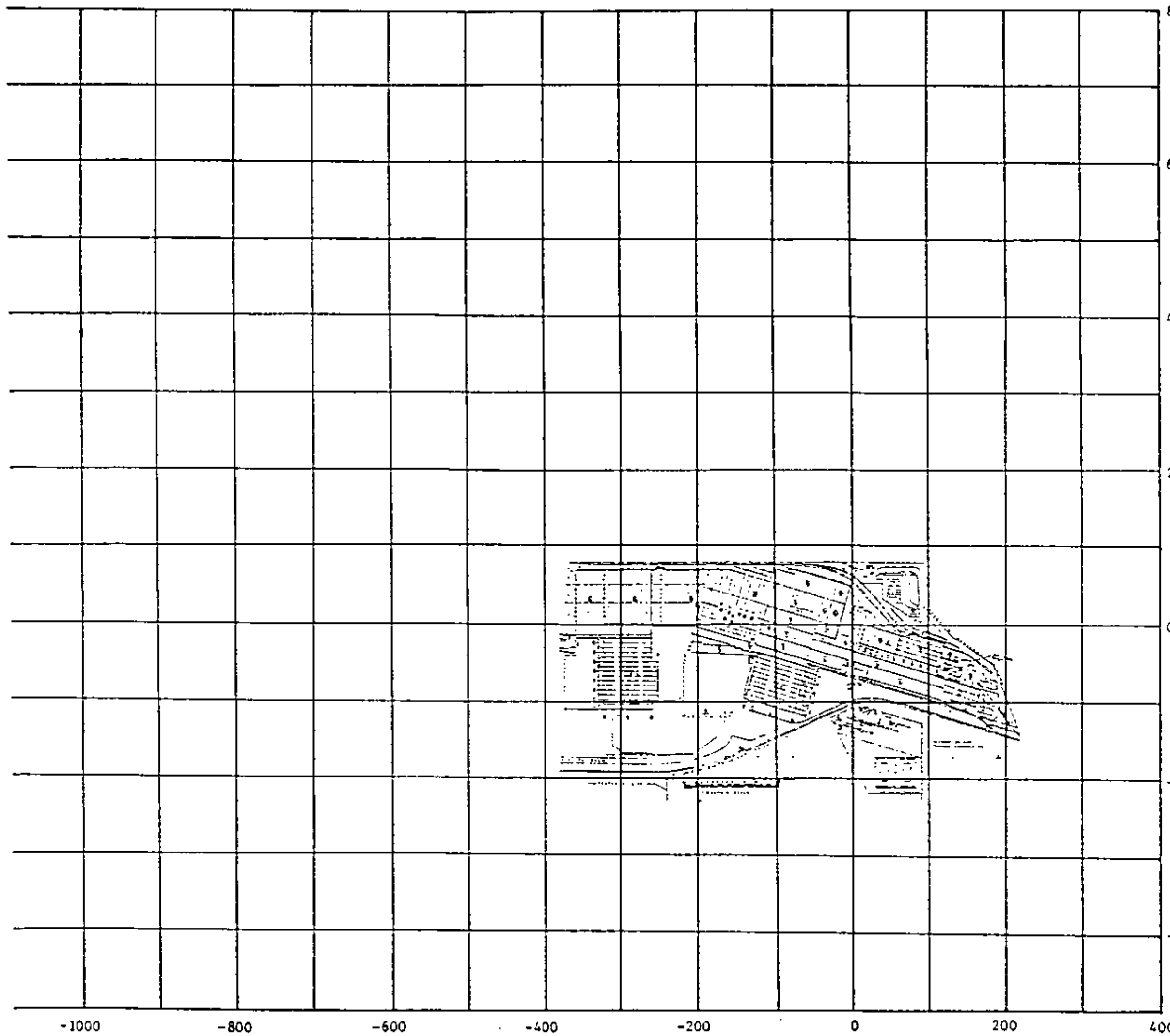


Figure 4-1. Receptor Grid Used in the Modeling Analysis

Note: Scale in Meters

KBN

boundary. Grid receptors which fell within Armstrong property boundaries were not considered in determining maximum air quality impacts.

In order to assess the net increase in PM impacts due to the proposed modification, the proposed FMS sources and the sources which will be shutdown (#4 and #5 Paint Lines) were analyzed in a single model run for each year of meteorology. The sources to be shutdown were modeled as negative emission rates. Two source groups were specified: 1) the proposed FMS sources only, and 2) the proposed FMS sources and the sources to be shut down (#4 and #5 Paint Lines). In order to conserve computer time requirements, several individual sources were combined in the yearly model runs (see Appendix D for basis of combined sources).

Based upon the results of the yearly model runs, the worst-case (highest, second-highest) 24-hour PM impact was identified. This worst-case period was further refined by specifying individual sources and source locations in the model, and executing the model for the worst-case 24-hour period.

4.2 IMPACT ANALYSIS RESULTS

The yearly PM model results are summarized in Table 4-1 for each year of meteorology analyzed. The results show that the proposed FMS sources only have a maximum annual average impact of less than 1.0 ug/m^3. The maximum net increase in annual average concentrations due to the proposed modification is predicted to be 0.4 ug/m^3, well below the 1.0 ug/m^3 significance level.

The highest, second highest (H2H) 24-hour concentrations for the two scenarios evaluated were refined further to account for individual source locations and parameters. For the proposed FMS sources only, the H2H refined concentration, for Day 72, 1973 meteorology, was 8.3 ug/m^3. The refined H2H concentration for the combined effects of the proposed FMS sources and sources to be shut down (i.e., net increase) for Day 248, 1973 meteorology, was 4.6 ug/m^3. This predicted maximum net increase in PM

Table 4-1. Summary of Yearly Model Runs, Proposed FMS Process Line Modification

Scenario	Year	24-hour Average Concentration* (ug/m3)	Day	Direction X (m)	Direction Y (m)	Annual Average Concentration (ug/m3)	Direction X (m)	Direction Y (m)
Proposed FMS Sources Only	1972	7.3	10	-100	100	0.84	-100	400
	1973	8.2	72	-500	600	0.76	-400	400
	1974	7.7	78	-100	100	0.90	-200	400
	1975	7.5	161	-100	600	0.83	-300	100
Proposed FMS Sources and Sources to Be Shut Down - Net Increase in PM Impacts	1972	4.3	166	-600	400	0.36	-100	700
	1973	4.4	248	-500	600	0.36	-800	400
	1974	3.8	365	-200	800	0.40	-200	700
	1975	4.3	86	-900	300	0.37	-900	400

* Highest, Second-highest concentration

impacts is below the significance level of 5 ug/m^3 for the 24-hour averaging time.

Because the predicted maximum net increase in PM impacts is below the PM significance levels, no further modeling analysis is necessary. Based upon these minimal impacts, the proposed modification will not cause or contribute to any violation of AAQS or allowable PSD increments.

5.0 AIR QUALITY MONITORING

5.1 MONITORING REQUIREMENTS

The CAA requires that an air quality analysis be conducted for each pollutant subject to regulation under the Act before a major stationary source or major modification is constructed. This requirement may be satisfied by the use of existing representative monitoring data or by establishing a monitoring network to monitor the existing air quality.

For the criteria pollutants, continuous air quality monitoring data must be used to establish existing air quality concentrations in the vicinity of the proposed source or modification. However, if the maximum predicted impact of the modification is less than the *de minimis* impact monitoring concentrations, the modification would generally be exempt from preconstruction monitoring. For PM, the *de minimis* level is 10 ug/m^3, 24-hour average concentration.

5.2 APPLICABILITY OF PSD PRECONSTRUCTION MONITORING REQUIREMENTS

In order to determine the applicability of the PSD preconstruction monitoring requirements, the impact of the net emissions increase associated with the proposed modification must be determined. The analysis must also include any contemporaneous increases and decreases at the facility. Such changes at Armstrong were identified in Section 3.3.

An atmospheric dispersion modeling analysis was conducted as described in Section 4.0. All sources were analyzed in a single model run for each year of meteorological data. The results of the analysis demonstrated that the highest, second-highest 24-hour impact due to the net change in PM emissions is 4.6 ug/m^3. This maximum 24-hour impact is below the *de minimis* level of 10 ug/m^3. Therefore, the proposed modification is exempt from the air quality monitoring requirements of the PSD regulations.

6.0 ADDITIONAL IMPACT ANALYSIS

The air quality impact analysis presented in Section 4.0 demonstrated that the increase in PM impacts due to the proposed FMS process line modification will produce insignificant PM impacts. As a result, no effects upon soils or vegetation in the vicinity of the Armstrong facility are anticipated. In addition, the low PM emissions and baghouse technology used on the FMS process line will result in low opacity levels, and therefore no impairment to visibility is expected. As discussed in Section 3.0, the nearest Class I area is much greater than 100 km away, and therefore no impacts to such areas will occur due to the proposed modification. No significant increase in employment will occur at the Armstong facility as a result of the proposed modification. As a result, no additional impacts resulting from growth in the area will occur.

7.0 CONTROL TECHNOLOGY REVIEW

7.1 DESCRIPTION OF PROPOSED PM CONTROL TECHNOLOGY

The proposed PM control technology is utilization of a fabric filter (baghouse) on the feeder/machining cell operation (Exhaust #74) and use of high efficiency water-wash systems on the paint booths (Exhaust #75, 75A, 77, and 77A). This combination will limit maximum PM emissions from the facility to 9.33 lb/hr and 37.62 TPY, consisting of 8.61 lb/hr and 34.72 TPY from the baghouse, 0.68 lb/hr and 2.74 TPY from the paint booths, and minor emissions from the two paint dryers. These emission levels are well below the Florida DER emission standard, based on the process weight table, of 24.5 lb/hr.

7.1.1 Feeder/Machining Cell (Exhaust #74)

The baghouse for the feeder/machining cell exhaust will be similar in design to a Flex-Kleen Model #120-WTW-660, or equivalent. Baghouses consist of compartments containing tubular filter bags (typical). As the dirty air stream passes through the filter bags, a filter cake develops on the surface of the bags, providing a highly efficient capture surface through the mechanisms of inertial impaction, interception and diffusion. The filter cake is periodically cleaned from the filter bags by reverse-air or pulsed-air techniques. Baghouses are particularly well suited for removing solid particles with low moisture content, such as the particles associated with the feeder/machining cell emissions.

The baghouse to be employed by Armstrong on the FMS process will have the following characteristics:

Air/cloth ratio = 4.5
Pulse-air type cleaning
Polyester bags, 16 oz. (for low temperature operation)
Maximum air flow rate = 67,000 acfm at ambient conditions
Maximum outlet grain loading = 0.015 gr/acf
Estimated minimum efficiency = 99.5%

The maximum outlet grain loading of 0.015 gr/acf from the baghouse is based upon discussions with baghouse manufacturers, considering such factors as the uncertainty in particle size distribution of PM emissions from the machining cell, and outlet grain loading guarantees.

7.1.2 Paint Booths

The technology Armstrong is proposing for control of PM emissions from the paint booths is the water-wash spray booth (manufacturer's literature attached in Appendix B). This is a proven, demonstrated technology for the control of water-based paint emissions. Armstrong currently utilizes this technology at the Pensacola plant. The principle of operation of the water wash spray booth is fully described in Appendix B. The manufacturer (Binks) estimates that the water wash booth is 97% efficient in the control of particulate emissions.

7.1.3 Dryers

The dryers are inherently low PM emitting sources (0.02 lb/hr each). Natural gas fuel is used in the dryers, which causes insignificant PM emissions. The insignificant nature of the PM emissions from the dryers does not warrant further control.

7.2 ALTERNATIVE PM CONTROL TECHNOLOGIES

7.2.1 Feeder/Machining Cell (Exhaust #74)

There are no alternative control technologies which can achieve a greater degree of PM reduction on the feeder/machining cell operations than the baghouse. Electrostatic precipitators (ESPs) and wet scrubbers are two commonly employed treatment technologies for PM. ESPs operate on the principle of electrostatic attraction. The dirty gas stream enters the ESP where it is subjected to a high voltage field which imparts a charge to the PM in the gas stream. The charged particles are then removed by collection plates of opposite charge. The collection plates are cleaned by periodic rapping. The disadvantages of the ESP include dependence of collection efficiency upon variations in gas stream and particle composition and lower collection-efficiencies for small particles (<2 microns) as compared to the baghouse.

Wet scrubbers have been employed for control in many PM emitting industries, including several existing operations at Armstrong. Wet scrubbers have been designed in a variety of configurations, but all employ the basic mechanisms of impingement, diffusion and agglomeration. The efficiency of the scrubber is related to the degree of interaction produced between the dispersed liquid droplets and the particles to be captured. This in turn is generally related to power input, or pressure drop across the scrubber. The primary disadvantage of the wet scrubber is the high energy normally necessary to obtain PM removal efficiencies equivalent to a baghouse or ESP. While the baghouse and ESP typically operates at 1 to 2 inches pressure drop, the wet scrubber requires 6 to 8 inches pressure drop or more, depending upon design, to achieve similar efficiencies.

Since there are no existing, proven control technologies which can provide a greater degree of PM control than the baghouse on the feeder/machining cell process, no other alternative technologies were considered further. The PM emissions resulting from the feeder/machining cell (Exhaust #74) are low (8.61 lb/hr), and the net increase in PM emissions associated with the modification are less than 4 percent of the PM AAQS and less than 15 percent of the allowable PSD increments for PM.

7.2.2 Paint Booths

As discussed in Section 7.1.1, baghouses and ESPs are proven technologies for the control of solid particles under low moisture conditions. In contrast, the baghouse and ESP are not generally suitable for the collection of liquid aerosols (e.g., paint droplets) or flue gases containing considerable moisture. Baghouses can become plugged, causing "blinding" of the bags and a large decrease in flow rate through the baghouse, rendering the baghouse ineffective. In ESPs, liquid droplets or high moisture can lead to corrosion problems, and the resistivity of the aerosol may render it difficult to collect.

Disposable filters (e.g., fiberglass) can be used to control PM emissions from paint booths. However, disposable filters do not provide higher collection efficiencies than the water wash spray booth, and a solid waste is generated.

The only feasible alternative control technologies which are considered applicable to the paint booths are wet scrubbers which provide a higher collection efficiency than the water wash spray booth. Considering the already high PM removal efficiency of the water wash spray booth (97%), and the low emissions from the spray booths, no further control is warranted. The associated environmental impact of the paint booths at the proposed emission rate is insignificant.

REFERENCES

Auer, A.H., 1978. Correlation of Land Use and Cover with Meteorological Anomalies. J. Applied Meteorology, Vol. 17.

U.S. Environmental Protection Agency. 1986. Guideline on Air Quality Models Revised. EPA-450/2-78-027R.

U.S. Environmental Protection Agency. 1980. Prevention of Significant Deterioration Workshop Manual.

U.S. Environmental Protection Agency. 1981. Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). EPA Report No. EPA-450/4-80-012. Revised February 1981.

U.S. Environmental Protection Agency. 1978. Guidelines for Determining Best Available Control Technology (BACT). Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency. 1983. Regional Workshops on Air Quality Modeling: A Summary Report. EPA Report No. EPA-450/4-82-015.

U.S. Environmental Protection Agency. 1985. Stack Height Regulation. Federal Register, Vol. 50, No. 130, July 8, 1985. Pg. 27892.

APPENDIX A

FMS Process and Product Weight Calculations

Derivation of Process Weight Rate

1. Unfinished Boards

   Maximum process rate:

   Maximum Line speed = 100 fpm

   Maximum width = 5 ft. boards

   Maximum thickness = 3/4 inch

   Material density = 21.6 lb/ft^3

   Process rate (boards) = 100 fpm x 5 ft x 0.0625 ft x 21.6 lb/ft^3 x 60 min/hr = 40,500 lb/hr

2. Paint Usage

   A. Intermediate Paint Application

   16-18 g/ft^2 applied to surface

   Overspray is approximately 20%

   Actual maximum paint usage = 18 g/ft^2 / (1 - 0.2) = 22.5 g/ft^2

   Maximum line speed = 100 fpm

   Maximum board width = 5 ft

   Maximum surface area = 100 fpm x 5 ft = 500 ft^2/min

   Maximum paint usage = 500 ft^2/min x 22.5 g/ft^2 x lb/454 g x 60 min/hr = 1,486.8 lb/hr

   B. Finish Paint Application

   17-27 g/ft^2 applied to surface

   Overspray is approximately 20%

   Actual maximum paint usage = 27 g/ft^2 / (1 - 0.2) = 33.75 g/ft^2

   Maximum surface area = 500 ft^2/min (see A. above)

   Maximum paint usage = 500 ft^2/min x 33.75 x 60/454 = 2,230.2 lb/hr

   C. Total Maximum Paint Usage

   1,468.8 + 2,230.2 = 3,717.0 lb/hr

3. Total Process Input Rate

   Total maximum rate = Boards + Paint

   = 40,500 lb/hr + 3,717 lb/hr

   = 44,217 lb/hr

Product Rate

Product rates will vary according to the type of product produced. The product rate is dependent upon the finished surface features, i.e., the amount of material removed from the surface of the unfinished boards in order to obtain the finished product.

APPENDIX B

Paint Spray Booth Specifications

BINKS

DYNAPRECIPITOR Water Wash Spray Booths (floor type)

Dynaprecipitor Spray Booths

Binks Dynaprecipitor Water Wash Spray Booth handles a larger variety of paints in a wider range of viscosities and drying speeds, at higher production rates than do any of the conventional spray booths.

This booth employs two well known engineering principles to remove paint particles from exhaust air in painting operations. First, by drawing air through a continuous curtain of moving water, suspended paint particles are scrubbed out. Second, when air, carrying paint particles, makes a sudden change in direction of flow, centrifugal force flings the solid particles out of the air stream. Entrained paint particles are thrown against adjacent walls and curtains. Water then flushes them into the collecting pan. Through these two actions, air reaching the exhaust stack is virtually free of airborne particles.

The wash water is treated (compounded). This causes the paint particles to coagulate and allows convenient skimming in clean-out of the collecting pan.

Correctly engineered water wash spray booths provide an extremely efficient means for removing paint particles from the exhausted air. In addition, they are a most acceptable type of spray booth for all health, fire, and building codes.

Construction Features

This booth is constructed of 18 gauge steel panels. It features an upper and lower wash chamber, large capacity collecting pan, slotted water intake pipe to insure sediment free water, circulating water to maintain a constantly flushed system, removable manifold for easy maintenance, hinged water curtain to allow easy access to the rear of the collecting pan, and door located just below the fan for easy maintenance.

The booth saves on floor space. Its short depth wash unit gives water-wash-spray-booth advantages while occupying conventional booth space.

The manifold supplies water for the wash curtain at a minimum rate of 28 gal/ft of booth width and, in addition, maintains over 60 gallons of water in its return pipe section.

An automatic water level control supplies make-up water to compensate for evaporation losses.

Operation Features

Stacks and fan stay cleaner longer. Paint particles practically never reach this zone.

Exhaust air washed 4 times. Paint particles are scrubbed out and trapped in collecting pan.

Access door located to allow easy inspection, repair, or replacement of the fan parts.

Unbroken water curtain: Manifold-deflector plate assembly disperses water evenly and can be easily removed without special tools.

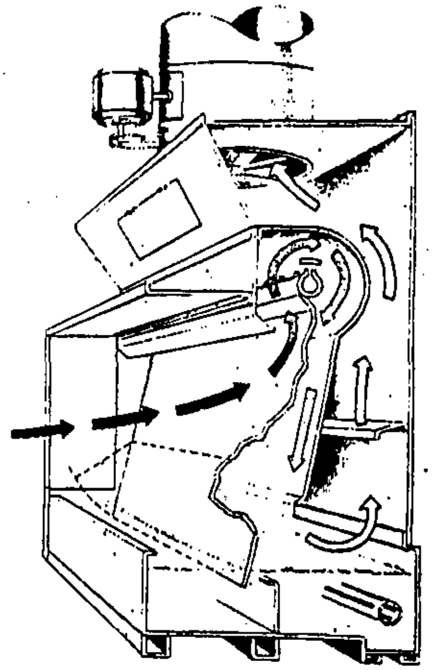
Circulating system: Circulating water forms a continuous, constantly flushed system which has no sediment-accumulating dead-ends. Rate of water flow is quickly adjustable. No new water need be added except to compensate for slight daily evaporation.

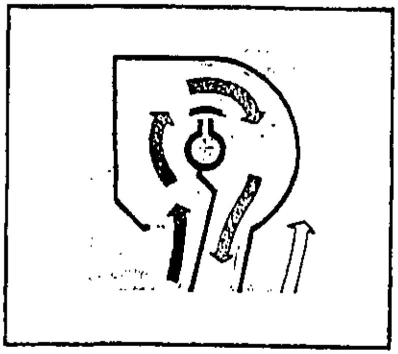
Booth stays cleaner. Every paint-collecting surface is water-scrubbed.

Easy maintenance. Hinged front water curtain permits easy skimming of coagulated paint particles from collecting pan.

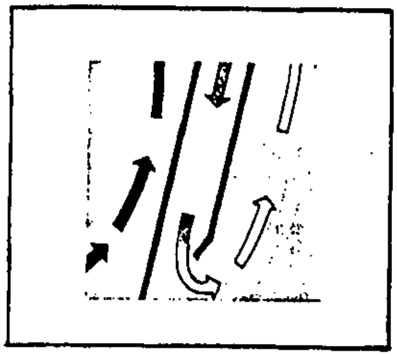
Clog-free water circulating system: Intake pipe is above the pan floor to assure a sediment-free supply of water. System is self-flushing.

See page 59 for other styles.

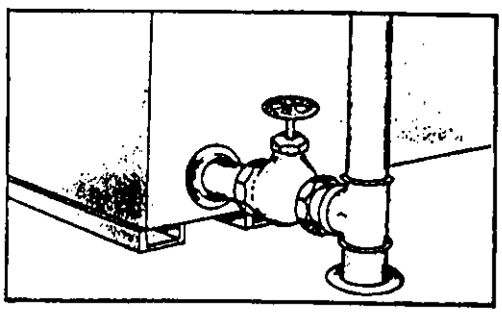




Upper centrifugal wash chamber: Here, most of the paint particles are separated from the exhaust air. This separation is accomplished by centrifugal force on the paint particles as the air abruptly changes direction of flow while simultaneously being forced to pass through powerful water sprays.



Lower wash chamber: In the lower wash chamber, the exhaust air must pass through an unbroken curtain of water. Again, water scrubbing and centrifugal force combine to remove the remaining paint particles before the air passes to the exhaust chamber.



Recessed drain insures complete removal of water from the collecting pan. This feature simplifies the cleaning operation.

APPENDIX C

FMS Process Line - Emission Calculations

FMS Process Line - Emission Calculations

I. Particulate Emissions from FMS Baghouse (Feeder/Machining Cell - Exhaust #74)

A. Input to baghouse:

1. Feeder

1.5 oz per 6′x 4′ board - assume all picked up by feeder

1.5/(6x4) = 0.0625 oz/ft^2 = 0.003906 lb/ft^2

Maximum emission case is with line speed = 100 fpm x 5 ft boards = 500 ft^2/min

500 ft^2/min x 0.003906 lb/ft^2 x 60 = 117.2 lb/hr

2. Machining cell

Max dust generation (Crossgate product = 0.0123 ft^3 removed/ft^2 of board)

Density = 21.6 lb/ft^3

Crossgate - max 50 fpm x 2′ wide = 100 ft^2/min

Dust generated = 100 ft^2/min x 0.0123 ft^3/ft^2 x 60

= 73.8 ft^3/hr generated

= 73.8 ft^3/hr x 21.6 = 1,594.1 lb/hr

3. Total input to baghouse

117.2 + 1,594.1 lb/hr = 1,711.3 lb/hr

B. Baghouse emissions:

Grain loading method: 67,000 acfm @ 0.015 gr/acf

67,000 ft^3/min x 60 min/hr x 0.015 gr/ft^3 x lb/7,000 gr

= 8.61 lb/hr

Annual Emissions: 8.61 lb/hr x 8,064 hr/yr x ton/2,000 lb

= 34.72 tons/yr

Minimum baghouse efficiency = (1,711.3 - 8.61)/1,711.3 = 99.5%

II. Particulate Emissions from Paint Booths (Exhaust # 75, 75A, 77, 77A)

Overspray is 1.3% of total paint usage

Intermediate paint is 42% solids

Finish paint is 51% solids

Paint booth waterwash system is 97% efficient in removing particulate matter.

A. Intermediate Paint Booths (Exhaust # 75, 75A)

Only one (1) booth operates at a time

Maximum paint usage = 1,486.8 lb/hr

Maximum hourly emissions = 1,486.8 lb/hr x 0.42 x 0.013 x (1 - 0.97)

= 0.24 lb/hr

Maximum annual emissions = 0.24 lb/hr x 8,064 hr/yr x ton/2,000 lb

= 0.97 tons/yr

B. Finish Paint Booths (Exhaust #77, 77A)

Only one (1) booth operates at a time

Maximum paint usage = 2,230.2 lb/hr

Maximum emissions = 2,230.2 lb/hr x 0.51 x 0.013 x (1 - 0.97)

= 0.44 lb/hr

Maximum annual emissions = 0.44 lb/hr x 8,064/2,000 = 1.77 tons/yr

III. Dryers - Products of Combustion (Exhaust # 76, 78)

Heat input = 4.0 x 10^6 Btu/hr (each dryer)

Natural gas heating value = 1,000 Btu/scf

Natural gas consumption = 4.0 x 10^6/1,000 = 4,000 scf/hr

Emission factors for natural gas combustion (from AP-42 for domestic/commercial boilers - attached)

PM - 5 lb/10^6 ft^3

SO_2 - 0.6 lb/10^6 ft^3

NO_x - 100 lb/10^6 ft^3

CO - 20 lb/10^6 ft^3

VOC - 5.3 + 2.7 = 8.0 lb/10^6 ft^3

Emissions of other pollutants (i.e. trace metals) are insignificant

Maximum hourly emission rates (each dryer)

PM - 5 $lb/10^6\ ft^3$ x 4,000 scf/hr = 0.02 lb/hr

SO_2 - 0.0024 lb/hr

NO_x - 0.4 lb/hr

CO - 0.08 lb/hr

VOC - 0.032 lb/hr

Maximum annual emissions, each dryer (based upon 8064 hr/yr operation).

PM - 0.02 lb/hr x 8,064 hr/yr x ton/2,000 lb = 0.081 ton/yr

SO_2 - 0.010 ton/yr

NO_x - 1.61 ton/yr

CO - 0.32 ton/yr

VOC - 0.13 ton/yr

IV. Allowable emissions by Process Weight Table [FAC Chapter 17-2.610(1), for process input rates less than 30 tons/hr]:

$E = 3.59\ P^{0.62}$

P = 44,217/hr (max) = 22.11 tons/hr

$E = 3.59\ (22.11)^{0.62} = 24.5$ lb/hr

TABLE 1.4-1. UNCONTROLLED EMISSION FACTORS FOR NATURAL GAS COMBUSTION[a]

Furnace Size & Type (10^6 Btu/hr heat input)	Particulates[b]		Sulfur[c] Dioxide		Nitrogen[d,e] Oxide		Carbon[f,g] Monoxide		Volatile Organics: Nonmethane		Volatile Organics: Methane	
	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$
Utility boilers (>100)	16-80	1-5	9.6	0.6	8800[h]	550[h]	640	40	23	1.4	4.8	0.3
Industrial boilers (10 - 100)	16-80	1-5	9.6	0.6	2240	140	560	35	44	2.8	48	3
Domestic and commercial boilers (<10)	16-80	1-5	9.6	0.6	1600	100	320	20	84	5.3	43	2.7

[a] All emission factors are expressed as weight per volume fuel fired.
[b] References 15-18.
[c] Reference 4 (based on an average sulfur content of natural gas of 4600 $g/10^6 Nm^3$ (2000 $gr/10^6$ scf).
[d] References 4-5,7-8,11,14,18-19,21.
[e] Expressed as NO_2. Test results indicate that about 95 weight % of NO_x is NO.
[f] References 4,7-8,16,18,22-25.
[g] References 16 and 18. May increase 10 to 100 times with improper operation or maintenance.
[h] Use 4400 $kg/10^6 m^3$ (275 $lb/10^6 ft^3$) for tangentially fired units. At reduced loads, multiply this factor by the load reduction coefficient given in Figure 1.4-1. See text for potential NO_x reductions by combustion modifications. Note that the NO_x reduction from these modifications will also occur at reduced load conditions.

APPENDIX D

Basis for Combined Sources in Modeling Analysis

Basis for Combined Sources in Modeling Analysis

Exhaust #74 - Feeder/Machining Cell Baghouse - modeled as individual source

Exhaust #75, #77 - Paint Booths - have identical stack parameters therefore modeled as one source (#7577) with total emission rate =

0.24 lb/hr + 0.44 lb/hr = 0.68 lb/hr = 0.086 g/s

Exhaust #76, #78 - Dryers - not modeled in yearly run due to insignificant emissions (0.04 lb/hr)

Exhaust #27, #39 and #63 have similar stack parameters, therefore modeled as one source (#4000) with following parameters:

Emissions = 0.63 + 0.2 + 0.002 = 0.832 lb/hr
= 0.105 g/s

Average height = 28 ft = 8.53 m

Average temperature = Ambient = 294°K

Average velocity = 1680 fpm = 8.53 m/s

Average flow = 15,317 acfm

Calculated diameter = 3.41 ft = 1.04 m

Exhaust #28, #61 have similar stack parameters, therefore modeled as one source (#5000) with following parameters:

Emissions = 0.30 + 0.34 = = 0.64 lb/hr = 0.081 g/s

Average height = 32 ft = 9.6 m

Average temperature 220°F = 377°K

Average velocity = 1848 fpm = 9.39 m/s

Average flow = 2878 acfm

Calculated diameter = 1.41 ft = 0.43 m