CONSTRUCTION PERMIT
OFFICE OF AIR MANAGEMENT
and
CITY OF INDIANAPOLIS
ENVIRONMENTAL RESOURCE MANAGEMENT DIVISION

Formpac Division, W. R. Grace & Company
7950 North Allison Avenue
Indianapolis, Indiana 46268

is hereby authorized to construct

additional two (2) extruders 251 and 261, which are vented to stacks 251-1 and 261-1. Four (4) thermoformers 10 through 13, and one (1) reclaim extruder 530, which will be vented to stack RC3. This new construction will enable the source to increase their throughput.

This permit is issued to the above mentioned company (herein known as the Permittee) under the provisions of 326 IAC 2-1 and 40 CFR 52.780, with conditions listed on the attached pages.

Construction Permit No.: CP-097-5348-00093	
Issued by: Paul Dubenetzky, Branch Chief Office of Air Management	Issuance Date:

Construction Conditions

General Construction Conditions

1. That the data and information supplied with the application shall be considered part of this permit. Prior to any proposed change in construction which may affect allowable emissions, the change must be approved by the Office of Air Management (OAM), and the City of Indianapolis, ERMD.

2. That this permit to construct does not relieve the permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.

Effective Date of the Permit

3. That pursuant to 40CFR Parts 124.15, 124.19 and 124.2, the effective date of this permit shall be thirty-three (33) days after its issuance, unless its waived by the United States Environmental Protection Agency.

4. That pursuant to 326 IAC 2-2-8 (a)(1), this permit to construct shall expire if construction is not commenced within eighteen (18) months after receipt of this permit, or if construction is discontinued for a period of eighteen (18) months or more.

5. That notwithstanding Construction Condition No. 6, all requirements and conditions of this construction permit shall remain in effect unless modified in a manner consistent with procedures established for modifications of construction permits pursuant to 326 IAC 2 (Permit Review Rules).

First Time Operation Permit

6. That this document shall also become a first-time operation permit pursuant to 326 IAC 2-1-4 (Operating Permits) when, prior to start of operation, the following requirements are met:

   (a) The attached affidavit of construction shall be submitted to the Office of Air Management (OAM), Permit Administration & Development Section, verifying that the facilities were constructed as proposed in the application. The facilities covered in the Construction Permit may begin operating on the date the Affidavit of Construction is postmarked or hand delivered to IDEM, and the City of Indianapolis, ERMD.

   (b) If construction is completed in phases; i.e., the entire construction is not done continuously, a separate affidavit must be submitted for each phase of construction. Any permit conditions associated with operation start up dates such as stack testing for New Source Performance Standards (NSPS) shall be applicable to each individual phase.

   (c) The Permittee shall receive an Operation Permit Validation Letter from the Chief of the Permit Administration & Development Section and attach it to this document.

   (d) The operation permit will be subject to annual operating permit fees pursuant to 326 IAC 2-7-19 (Fees).

(e) The Permittee has submitted their Part 70 (T-097-6114-00093) permit application on June 11, 1996 for the existing source. The equipment being reviewed under this permit shall be incorporated into the submitted Part 70 application.

7. That when the facility is constructed and placed into operation the following operation conditions shall be met:

Operation Conditions

General Operation Conditions

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in allowable emissions exceeding those specified in 326 IAC 2-1-1 (Construction and Operating Permit Requirements), the change must be approved by the Office of Air Management (OAM), and the City of Indianapolis, ERMD.

2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder.

Preventive Maintenance Plan

3. That pursuant to 326 IAC 1-6-3 (Preventive Maintenance Plans), Formpac Division, W.R. Grace & Company shall prepare and maintain a preventive maintenance plan, including the following information:

(a) Identification of the individual(s) responsible for inspecting, maintaining, and repairing emission control devices.

(b) A description of the items or conditions that will be inspected and the inspection schedule for said items or conditions.

(c) Identification of the replacement parts which will be maintained in inventory for quick replacement.

The preventive maintenance plan shall be submitted to IDEM, OAM, and City of Indianapolis, ERMD upon request and shall be subject to review and approval.

Transfer of Permit

4. That pursuant to 326 IAC 2-1-6 (Transfer of Permits):

(a) In the event that ownership of this (polystyrene extrusion) is changed, Formpac Division, W.R. Grace & Company shall notify OAM, Permit Branch, and the city of Indianapolis, ERMD within thirty (30) days of the change. Notification shall include the date or proposed date of said change.

(b) The written notification shall be sufficient to transfer the permit from Formpac Division, W.R. Grace & Company to the new owner.

(c) The OAM and the City of Indianapolis, ERMD shall reserve the right to issue a new permit.

Permit Revocation

5. That pursuant to 326 IAC 2-1-9(a)(Revocation of Permits), this permit to construct and operate may be revoked for any of the following causes:

(a) Violation of any conditions of this permit.

(b) Failure to disclose all the relevant facts, or misrepresentation in obtaining this permit.

(c) Changes in regulatory requirements that mandate either a temporary or permanent reduction of discharge of contaminants. However, the amendment of appropriate sections of this permit shall not require revocation of this permit.

(d) Noncompliance with orders issued pursuant to 326 IAC 1-5 (Episode Alert Levels) to reduce emissions during an air pollution episode.

(e) For any cause which establishes in the judgment of IDEM, and City of Indianapolis ERMD the fact that continuance of this permit is not consistent with purposes of 326 IAC 2-1 (Permit Review Rules).

Availability of Permit

6. That pursuant to 326 IAC 2-1-3(l), the Permittee shall maintain the applicable permit on the premises of this source and shall make this permit available for inspection by the IDEM, and the City of Indianapolis, ERMD or other public official having jurisdiction.

Performance Testing

7. (a) That pursuant to 326 IAC 2-1-3 (Construction and Operating Permit Requirements) an analysis of the VOC content in the polystyrene products shall be performed to determined compliance with condition no. 8 (a) and (b).

(b) A compliance test shall also be performed for the Reclaim Flash incinerator to determine or verify the minimum operating temperature that will achieve an overall 90% control efficiency. This compliance tests (a) and (b) shall be performed within 60 days after achieving maximum production rate, but no later than 180 days after the receipt of the Operation Permit Validation Letter. These tests shall be performed according to 326 IAC 3-2.1 (Source Sampling Procedures) using the methods specified in the rule or as approved by the Commissioner.

(c) The analysis of the VOC content in the polystyrene products shall be conducted once a year. Compliance test for the incinerator shall be conducted once every five (5) years.

(d) A test protocol shall be submitted to the OAM, Compliance Data Section, and City of Indianapolis, ERMD 35 days in advance of the test.

(e) The Compliance Data Section, and City of Indianapolis, ERMD shall be notified of the actual test date at least two (2) weeks prior to the date.

(f) All test reports must be received by the Compliance Data Section and City of Indianapolis, ERMD within 45 days of completion of the testing.

(g) Whenever the results of the tests performed exceed the level specified in this permit, appropriate corrective actions shall be implemented within thirty (30) days of receipt of the test results. These actions shall be implemented immediately unless notified by OAM, and City of Indianapolis, ERMD that they are acceptable. The Permittee shall minimize emissions while the corrective actions are being implemented.

(h) A second test to demonstrate compliance shall be performed within 120 days. Failure of the second test to demonstrate compliance may be grounds for immediate revocation of this permit to operate the affected facility.

PSD BACT

8. That pursuant to 326 IAC 2-2-3(a) "Control Technology Review Requirements" this modification shall comply with Best Available Control Technology (BACT). The BACT shall be considered satisfied provided that:

(a) That the input of resin beads to extruders 251 and 261 shall be limited to 12,496 tons per 365-day period, rolled on a daily basis.

(b) That the input of pentane as blowing agent to polystyrene at extruders 251 and 261 shall be limited to 630.0 tons per 365-day period, rolled on a daily basis. These material usage limitations will restrict the modification VOC emissions before control to 424 tons per 365-day period, rolled on a daily basis.

During the first 365 days of operation, the input material usage shall be limited such that the total usage divided by the accumulated days of operation (365 days) shall not exceed 34.0 tons of resin/day and 1.7 tons of pentane/day. These limits (a) and (b) shall be verified and adjusted accordingly, based on the compliance test in condition 7.

(c) That an incinerator shall be installed as the BACT for the "Reclaim Flash", and shall be operational when the new extruders 251 & 261 are in operation.

Compliance with this condition will satisfy rule 326 IAC 2-2-3(a)(3) and 326 IAC 8-1-6.

9. Incinerator Operating Temperature

When operating the incinerator shall maintain a minimum operating temperature determined in the most recent compliance stack test to maintain at least 90% overall destruction of the VOC captured. The temperature of the exhaust from the incinerator shall be recorded continuously whenever the "Reclaim Flash" is in operation. In the event of a malfunction of the temperature recorder, to the extent practicable, the parameter shall be intermittently monitored and implemented at intervals no less than one hour until such time as the continuous monitor is back in operation.

Annual Emission Reporting

10. That pursuant to 326 IAC 2-6 (Emission Reporting), the owner/operator of Formpac Division, W. R. Grace & Company must annually submit an emission statement for the source. This statement must be received by April 15 of each year and must comply with the minimum

requirements specified in 326 IAC 2-6-4. A copy of this rule is enclosed. The annual statement must be submitted to:

Data Support Section, Office of Air Management
100 North Senate Avenue, P. O. Box 6015
Indianapolis, Indiana 46206-6015

and

City of Indianapolis
Environmental Resource Management Division
Air Quality Management Section
2700 South Belmont Avenue
Indianapolis, Indiana 46221-2097

The annual emission statement covers the twelve (12) consecutive month time period starting December 1 and ending November 30.

Opacity Limitations

11. That pursuant to 326 IAC 5-1-2 (Visible Emission Limitations) except as provided in 326 IAC 5-1-3 (Temporary Exemptions), the visible emissions shall meet the following:

    (a) visible emissions shall not exceed an average of 30% opacity in 24 consecutive readings.

    (b) visible emissions shall not exceed 60% opacity for more than a cumulative total of 15 minutes (60 readings) in a 6-hour period.

Particulate Matter Limitation

12. That pursuant to 326 IAC 6-1-2(a), particulate matter (PM) emissions from the grinding and conveying unit shall be limited to 0.03 grain/dry standard cubic foot.

Open Burning

13. That the Permittee shall not burn any material except as provided in 326 IAC 4-1-3, 326 IAC 4-1-4 or 326 IAC 4-1-6.

14. Reporting Requirements

That log of information necessary to document compliance with condition nos. 8 & 9 shall be maintained. These records shall be kept for at least the past 36 month period and made available upon request to the Office of Air Management (OAM) and City of Indianapolis, ERMD.

(a) A quarterly summary shall be submitted to:

Compliance Data Section, **Office of Air Management**
100 North Senate Avenue, **P.O. Box 6015**
Indianapolis, Indiana 46206-6015

and

City of Indianapolis
Environmental Resource Management Division
Air Quality Management Section
2700 South Belmont Avenue
Indianapolis, Indiana 46221-2097

within 30 days after the end of the quarter being reported in the format attached.

(b) Unless otherwise specified in this permit, any notice, report, or other submissions required by this permit shall be timely if:

(i) Delivered by U.S. mail and postmarked on or before the date it is due; or

(ii) Delivered by any other method if it is received and stamped by IDEM, OAM, and City of Indianapolis, ERMD on or before the date it is due.

(c) All instances of deviations from any requirements of this permit must be clearly identified in such reports.

(d) Any corrective actions taken as a result of an exeedance of a limit, an excursion from the parametric values, or a malfunction that may have caused excess emissions must be clearly identified in such reports.

(e) The first report shall cover the period commencing the postmarked submission date of the Affidavit of Construction.

15. Malfunction Condition

That pursuant to 326 IAC 1-6-2 (Records; Notice of Malfunction):

(a) A record of all malfunctions, including startups or shutdowns of any facility or emission control equipment, which result in violations of applicable air pollution control regulations or applicable emission limitations shall be kept and retained for a period of three (3) years and shall be made available to the Indiana Department of Environmental Management (IDEM), Office of Air Management (OAM) or appointed representative upon request.

(b) When a malfunction of any facility or emission control equipment occurs which lasts more than one (1) hour, said condition shall be reported to OAM, using the Malfunction Report Forms (2 pages). Notification shall be made by telephone or facsimile, as soon as practicable, but in no event later than four (4) daytime business hours after the beginning of said occurrence.

(c) Failure to report a malfunction of any emission control equipment shall constitute a violation of 326 IAC 1-6, and any other applicable rules. Information of the scope and expected duration of the malfunction shall be provided, including the items specified in 326 IAC 1-6-2(a)(1) through (6).

(d) Malfunction is defined as any sudden, unavoidable failure of any air pollution control equipment, process, or combustion or process equipment to operate in a normal and usual manner. [326 IAC 1-2-39]

16. Emergency Reduction Plans

Pursuant to 326 IAC 1-5-2 (Emergency Reduction Plans; Submission):

(a) The Permittee prepared and submitted written emergency reduction plans (ERPs) consistent with safe operating procedures on June 1, 1989.

(b) If the ERP is disapproved by IDEM, OAM and the City of Indianapolis, ERMD, the Permittee shall have an additional thirty (30) days to resolve the differences and submit an approvable ERP. If after this time, the Permittee does not submit an approvable ERP, IDEM, OAM and the City of Indianapolis, ERMD, shall supply such a plan.

(c) These ERPs shall state those actions that will be taken, when each episode level is declared, to reduce or eliminate emissions of the appropriate air pollutants.

(d) Said ERPs shall also identify the sources of air pollutants, the approximate amount of reduction of the pollutants, and a brief description of the manner in which the reduction will be achieved.

(e) Upon direct notification by IDEM, OAM and the City of Indianapolis, ERMD, that a specific air pollution episode level is in effect, the Permittee shall immediately put into effect the actions stipulated in the approved ERP for the appropriate level. [326 IAC 1-5-3]

Indiana Department of Environmental Management
Office of Air Management

Technical Support Document (TSD) for New Construction and Operation

Formpac Division, W. R. Grace & Company
7950 North Allison Avenue
Indianapolis, Indiana 46268

The Office of Air Management (OAM) has reviewed an application from the above company relating to the modification of the existing polystyrene meat and poultry trays production plant. This modification involves the construction of two (2) extruders 251 & 261, four (4) thermoformers 10-13 and one (1) reclaim extruder 530, to accommodate the increase in the source throughput.

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (^{0}F)
RC3	reclaim extruder	unknown	unknown	2,500	85
CE1	incinerator	unknown	unknown	unknown	85
251-1	extruder 251	fug.	-	unknown	85
261-1	extruder 261	fug.	-	unknown	85

Recommendation

The staff recommends to the Commissioner that the construction and operation be approved. This recommendation is based on the following facts and conditions:

An application for the purposes of this review was received on February 23, 1996, with additional information received on September 6, 1996, January 14, 16, and 31, 1997, February 3, 1997, and May 28, 1997 .

Emissions Calculations

The Emission factors used in computing the potential volatile organic compounds (VOC) emissions were obtained through testing conducted at this Indianapolis plant and at the Formpac Reading, Pennsylvania plant. These analysis had included tests of stack exhausts, and of the VOC (pentane) content in the foam at each point of the process.

The installation of two (2) extruders, four (4) thermoformers and one (1) reclaim extruder will result in an increase in the throughput that will affect or increase the emissions from the whole processing line.

Future Potential Emissions Before Control = 885.4 tons/year

Past Actual Emissions:
1995 VOC actual emissions = 451.6 tons/year
1996 VOC actual emissions = 470.4 tons/year
Average actual emissions = 461 tons/year

Federal Potential Emissions:

The federal potential emissions are estimated based on the future potential emissions versus past actual emissions. Future potential emissions are the emissions from the existing source and the emissions from the modification after control, based on 8,760 hours per year. Past actual emissions are the emissions generated prior to the modification after control, based on the actual hours of operation.

Future Potential Emissions before control = 885.4 tons per year
Past Actual Emissions = - 461.0 tons per year
Modification Uncontrolled Potential Emissions = 424 tons per year

Future Potential Emissions after control = 804.8 tons per year
Past Actual Emissions = - 461.0 tons per year
Modification Controlled Potential Emissions = 343.8 tons per year

There are no creditable contemporaneous emissions increases and decreases.

Material Usage Limitation Before Control:

The calculations were obtained from previous testing and from the determination of the pentane content in the foam at each step of the process using mass balance.

The modification will be limited to its resins and pentane usage to restrict the VOC emissions to 424 tons per year before control, taking into account the actual hours of operation at 8736 hr/yr.

Total Allowable Emissions

Indiana Permit Allowable Emissions Definition (based on 8760 hours of operation per year at rated capacity).:

Pollutant	Emissions (tons/year)
PM	0.11
VOC	424
NOx	0.11
CO	0.2

Allowable emissions (as defined in the Indiana Rule) of volatile organic compounds (VOC) are greater than 25 tons per year. Therefore, pursuant to 326 IAC 2-1, Sections 1 and 3, a construction permit is required.

County Attainment Status

Volatile organic compounds (VOC) are precursors for the formation of ozone. Therefore, VOC emissions are considered when evaluating rule applicability relating to the ozone standards. Marion County has been redesignated as attainment or unclassifiable for ozone. Therefore, VOC emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2 and 40 CFR 52.21.

Marion County, at the area of Washington Township east of Fall Creek and east of Five Points Road is classified as attainment or unclassifiable for Total Suspended Particulate (TSP), and the rest of the county is classified as nonattainment. The source is located in Pike Township, which is classified as nonattainment for TSP. Marion County is classified as nonattainment for the rest of the criteria pollutants. Therefore, these emissions were reviewed pursuant to the requirements for Emission Offset, 326 IAC 2-3.

Source Status

Existing Source PSD Definition (emissions after controls, based on the Quick Look Report Emissions Inventory, dated February 26, 1996, for the VOC, and the PM from actual emissions and was corrected to 8760 hr/yr, taking into account the control as an integral part of the process).:

Pollutant	Emissions (ton/yr)
PM=PM10	0.11
VOC	473.0

This existing source is a major stationary source for PSD because VOC, an attainment regulated pollutant is emitted at a rate of 250 tons per year, and the source is not one of the 28 listed source categories, and it is not major for Emission Offset for Particulate Matter, a nonattainment criteria pollutant, because this pollutant is not emitted at a rate of 100 tons per year or more.

Proposed Modification

PTE from the proposed modification (based on 8,760 hours of operation per year at rated capacity including enforceable emission control and production limit where applicable):

Pollutant	PM (t/y)	PM10 (t/y)	VOC (t/y)	NOx (t/y)	CO (t/y)
Proposed Modification	0.11	0.11	343	0.11	0.2
Contemporaneous Increase	-	-	0.0	0.0	-
Contemporaneous Decrease	-	-	0.0	0.0	-
Offset Threshold Level	100	100	-	-	100
PSD Significant Level	-	-	40	40	-

This modification to an existing major source is major only for VOC, because the net emissions increase is more than PSD significant level. Therefore, pursuant to 326 IAC 2-2, and 40 CFR 52.21, the PSD requirements do apply.

This modification is not major for PM and CO because each pollutant net emission increase is less than the Emission Offset threshold level. Therefore, pursuant to 326 IAC 2-3 Emission Offset requirements do not apply.

PSD Requirements:

(1) 326 IAC 2-2-3 Control Technology Review: requirements:
326 IAC 2-2-3 (a)(3) - A major PSD modification shall apply Best Available Control Technology (BACT) for each pollutant subject to regulation under the provisions of the Clean Air Act for which said modification would result in a significant net emissions increase at the source.

The proposed modification will result in a significant emissions increase of volatile organic compounds (VOC). Therefore, a BACT analysis must be made for VOC.

(2) BACT: FOR VOC

BACT analysis for VOC submitted by Formpac Division, W. R. Grace & Company has been conducted in accordance with the “Top Down BACT Guidance” U. S. EPA, Office of Air Quality Planning and Standards, March 15, 1990. The BACT analysis includes control technologies found in the US EPA

RACT/BACT/LAER Clearinghouse database and permits issued by the State, and local Agencies.

(A) U.S. EPA RACT/BACT/LAER Clearinghouse & State Regulatory Agencies:

(A1) First Evaluation:

Options:

Search for sources with SIC code 3086 (foam products manufacturing), although the processes involved are different from Formpac Division, W. R. Grace & Company.
Use BLISS Code of 99.99 - Other miscellaneous sources as a subset to cover other operations not specified. Major pollutant is volatile organic compounds (VOC).
Search for similar sources based on the process name " polystyrene foam production".

Results:

The following facilities are listed in the database under SIC code 3086:
All five (5) plants in this table 1 involve **polystyrene bead expansion in molds**, except for Amoco, Virginia which involves extrusion, and thermoforming. **Polystyrene bead expansion in molds VOC emission is easy to capture and control as compared to extrusion where continuous sheets of foam from polystyrene pellets and pentane is produced**. VOC is emitted from the extrusion process. The continuous sheets of foam that is produced, continuously emit fugitive VOC, at the roll lot where it is stored until it goes to thermoforming to form usable food trays. These usable trays will still continue to emit VOC even when stored at the warehouse. The same is true with grinding of unusable trays, conveying of fluff to storage silos, and reclaim extruders.

Two (2) of these companies have installed a PSD BACT controls. Western Insulfoam had proposed the installation of a natural gas-fired boiler for control. Falcon Manufacturing had proposed the installation of a direct flame incinerator. The other three (3) had proposed to modify their processes to accommodate the use of low VOC material.

There is no detail information available on the EPA database regarding the specific operation being controlled in this Table 1. No verification has been made by the OAM if these proposed PSD BACT have been implemented.

Table 1

Company Name	Location	Facility Type/Description	Status
Western Insulfoam	Phoenix Arizona	Foam panel manufacturing-Polystyrene bead expansion, bead storage, pre-expanders, and molding machines	Major source. Located in an ozone attainment area. No potential VOC emissions were calculated. The bead storage, pre-expanders, and molding machines are controlled by natural gas-fired process boiler for control. Compliance was not verified.
Tuscarora, Inc.	Putnam, Connecticut	Molding expandable polystyrene	Major source. Located in an ozone attainment area. The BACT determined was the use of a double pass pre-expander to accommodate low VOC beads.
Falcon Manufacturing	Byron Center, Michigan	Expandable polystyrene bead (EPS) block manufacturing; process expands the EPS, then mold EPS into blocks, cut & shipped to the customer.	Major source. Located in an ozone nonattainment area. The expander is required to have a direct flame incinerator. This operation has a potential VOC emissions of 607.6 tons/year.
Tuscarora Plastic, Inc.	Saginaw, Michigan	Storage, pre-expansion & pre-puff, molding, storage	Major source Located in an attainment area. The PSD BACT determined for the EPS beads is process modification using low VOC content beads.
Tuscarora Plastic, Inc.	Chesaning, Michigan	Storage, pre-expansion & pre-puff, molding, storage	Major source Located in an attainment area. The PSD BACT determined for the EPS beads is process modification using low VOC content beads.
Universal Urethane, Inc.	Las Vegas, Nevada	Polyurethane manufacturing products	Information was not clear. Tried verifying info but the person issued left the agency.

Amoco Foam Products Company	Winchester, Virginia	Expanded polystyrene manufacturing, which produces food service styrofoam products	Minor source. It is located in an ozone attainment area. The State BACT determined for the product lines are: a) Limit of 245 tons of VOC per year. b) Source to continue research & development for alternative blowing agents; otherwise back-up incineration control system will be required. c) Daily material balance records to be maintained on the premises with quarterly reports submitted on amounts & types of blowing agents consumed & emitted. d) Progress reports on blowing agent substitution schedule.

(A2) Second Evaluation:
A research by the OAM has been made for permits issued from other states and local regulatory agencies for sources currently in operation with similar process as Formpac Division, W. R. Grace & Company. The table 2 below summarizes the search. No verification has been made if proposed BACT has been implemented.

Results:

The State BACT for two (2) sources one located in an attainment area and one is located in a serious non-attainment area, consisted of a VOC limitation and the installation of a control equipment. The State BACT for one (1) source located in a non-attainment area consisted of a VOC limit and no installation of a control equipment was required. The State BACT for one (1) source located in an attainment area consisted of a VOC limit and the installation of a control equipment.

Table 2
Sources from Other States Researched by IDEM, OAM

Company Name	Location	Facility type/Description	Status
Cellofoam	Conyers, Georgia	Expandable Polystyrene frozen beads processing in molds	Serious non attainment for ozone. Limited to 49.9 tons of VOC/year Boiler incinerator for control.

Free-Flow Packaging Corporation	Atlanta, Georgia	Manufacture of and expansion of polystyrene beads and manufacture of polyethylene foam sheets, using molds.	Serious non attainment for ozone. Emission limited to 49 tons of VOC per year. No VOC Control.
Tenneco Plastics Company	Covington, Georgia	Polystyrene foam packaging and polyethylene bag and stretch film extrusion production. **See table 3 below, for specific operations being controlled.**	Located in an ozone attainment area. Existing minor source. A limit of 249 tons of VOC per year Installation of a Regenerative Thermal Oxidizer with an overall efficiency of 90%.
Dolco Packaging	Lawrenceville, Georgia	Polystyrene foam sheet extrusion packaging production **See table 3 below, for specific operations being controlled.**	Serious non-attainment area. Emission limited to 49 tons of VOC per year. Installation of a Regenerative Thermal Oxidizer

Tenneco Plastics Company and Dolco Packaging from Table 2, are the two plants that have similar process operations with Formpac Division, and therefore, a comparison between these plants was made as follows:

Table 3

Tenneco Plastics Company	Dolco Packaging	Formpac Division, W. R. Grace
1. Existing minor source	1. Existing minor source	1. Existing major source
2. Located in an attainment area for ozone	2. Located in a severe nonattainment area for ozone	2. Located in an attainment area for ozone
3. Tenneco's airflow is approximately 1.1 million cfm	3. DOLCO Packaging's airflow is approximately 10,000 scfm	5. Formpac's airflow is approximately 252,000 cfm

4.Emissions from extrusion, cooling and aging/curing are considered fugitive, and are not counted towards PSD applicability. For this reason, these areas are not being controlled by the RTO. **Scrap grinding, re-pelletizing, and fluff storage tanks** are considered point source emissions and are counted towards PSD applicability. These point sources are the ones to being controlled by the RTO to maintain their emissions below the PSD threshold.	4. **Curing room, thermoforming and the scrap silos** are the areas that are being controlled.	4. Extrusion, cooling, and curing were not considered fugitive emissions under Indiana rule, and were counted towards PSD applicability. All areas were analyzed for possible control. LEL (lower explosive limit) was also a problem that is why the VOC laden air stream has to be diluted which in turn will require a larger control. Control equipment was determined to be economically not feasible. **Reclaim Flash extruder** or **re-pelletizing** will be controlled by an incinerator. This is the emission point were VOC exhaust directly into a stack.
5. Uses isopentane and CO_2 as the blowing agents.	5. Uses butane as the blowing agent, 59% is retained in the finished product.	5. Uses pentane as the blowing agent, 33% is retained in the finished product.
6. **Scrap grinding, re-pelletizing, and fluff storage tanks** are being controlled by the RTO to maintain their emissions below the PSD threshold.	3. Proposed the installation of a Regenerative Thermal Oxidizer to meet the RACT rule requirements for polystyrene packaging products manufacturing. Dolco is presently emitting above the 25 tons/yr, and are in violation of Rule (tt). The installation of the RTO is to meet the RACT requirement of Rule (tt), RACT rule applies to facilities with pot'l VOC emissions of 25 tons/yr or more. The rule allows the facility to emit up to 49 tons/yr with control.	3. PSD application, and the control equipment has been considered and analyzed but was not economically feasible. There are no RACT rule for polystyrene products manufacturing, except for the catch all rule 326 IAC 8-1-6, which is satisfied by the PSD BACT.
7. Manufactures fast food containers.	7. Manufactures egg cartons, and poultry trays.	7. Manufactures poultry and meat trays.
Conclusion: If the extruder emissions are considered fugitive emissions as what Georgia considered them, then the emission increase from Formpac's modification will be 41.1 tons/year. **(Total pot'l emissions (885.4 tons/yr) - extrusion emissions (383.3 ton/yr) = 502.1 ton/yr - 461 ton/yr, past actual emissions**.		

Note: Extruder bldg. Fugitive - These are VOC emissions occurring right after the foam has been extruded and then rolled out.
Extruder die and mandrel - Emissions occurring right at the extrusion itself, and the foam is still in the process of being extruded.

(A3) Third Evaluation:
A research was made by Formpac for permits issued from other states and local regulatory agencies for sources currently in operation with similar process as Formpac Division, W. R. Grace & Company. The table below summarizes the search.

Results:

The BACT for one (1) source is no material substitution and no add-on control required, and the BACT for the other one (1) is 15% CO_2 substitution for pentane, and no add-on control required.

Table 4
Sources From Other States Researched by Formpac Division, W. R. Grace & Company

Company Name	Location	Facility type/Description	Status
Formpac	Reading, Pennsylvania	Polystyrene foam sheet extrusion packaging production	The BACT is, 15% CO_2 substitution for pentane No add-on control required
Genpak	Cedar City, Utah	Polystyrene foam sheet extrusion packaging production	The BACT is, no material substitution nor add-on control device required.

(A4) Fourth Evaluation:
Source Located in Indiana, with similar operation as Formpac Division. The table below summarizes the search.

Results:

The state BACT for this source is an emission limit before control of 323 ton of VOC per year and the installation of a Regenerative Thermal Incinerator.

Table 5
Sources Located in Indiana

Company Name	Location	Facility type/Description	Status
Dolco Packaging	Decatur, Indiana	Polystyrene foam sheet extrusion packaging production. Dolco Packaging airflow being controlled is approximately 15,000 acfm. Curing room, thermoformer grinders, and finish storage are the processes being controlled. Butane is used as blowing agent. Manufactures egg cartons, and poultry trays.	Synthetic Minor Limited to 323 tons of VOC per year before control. Installation of a Regenerative Thermal Oxidizer

Dolco Packaging, Decatur, Indiana proposed the installation of a Regenerative Thermal Oxidizer to stay below the PSD and Title V threshold levels, and remain a minor source.

(B) Process Modification:

Formpac has evaluated the feasibility of substituting a non-VOC material for pentane as a blowing agent for polystyrene form extrusion. The two materials most feasible would be carbon dioxide (CO_2) and 1,1,-difluoroethane (HFC-152a).

Using CO_2:
Formpac has recently constructed a polystyrene foam extruder in Reading, Pennsylvania which has a 15% substitution of CO_2 for pentane. Formpac has found this to provide satisfactory results for some products, but not for all. Operating experience in Reading has shown that CO_2 substitution is satisfactory for "Barrier Foam", but is not satisfactory for processor poultry foam and meat tray foam.

Using HFC-152a:
The use of HFC-152a has proven to be feasible for some products, it has not been satisfactory for meat tray foam.

(C) Control Technology Options:

(i) Recuperative Thermal Oxidizer - This is technically feasible option to the Formpac process operations. This control uses high temperature to destroy VOC. It can recover up to 70% of the heat of combustion using a gas-to-gas heat exchanger, and is recommended for emission streams containing a minimum of 20 ppm of combustible VOCs but less than 25% of the lower explosive limit (LEL) of the pollutant. Further analysis will be made on this control option.

(ii) Regenerative Thermal Oxidizer- This is technically feasible option to the Formpac process operations. This technology is similar in concept to Recuperative Thermal Incinerator, where both use high temperature to destroy VOC. It is suitable for the same inlet streams as the Recuperative Thermal Incinerator. The difference is the method of preheating the pollutant stream before the combustion chamber. Instead of the air-to-air heat exchanger used in recuperative systems, regenerative installations have two or more heat recovery chambers

(iii) Recuperative Catalytic Incinerator - This control option is technically feasible to the Formpac process operation. This technology involves the presence of catalysts in the combustion chamber. The catalyst lowers the activation energy of the oxidation reaction so combustion occurs at temperature ranging from 600 ^{o}F to 1,200 ^{o}F, which is lower than the temperature to operate a thermal incinerator. Further analysis will be made on this control option.

(iv) Regenerative Catalytic Incinerator - This control option is technically feasible to the Formpac process operation. This technology uses the same method of heat recovery as Regenerative Thermal Incinerator. The

pollutant stream passes through a heat recovery chamber for preheating by the ceramic packing and into the combustion chamber. After destruction, the high temperature exhaust from the combustion chamber flows through a second heat recovery chamber, heating the packing there. Then the flow reverses and the second chamber becomes the preheater while the first reheats. Further analysis will be made on this control option.

(v) Flare - This control option is technically feasible to the Formpac process operation. A Flare is an open flame used to combust emission streams resulting from normal or upset process conditions. It is typically applied when the heat content of the emission stream is greater than 300 Btu/scf and when the value of any recovered product is negligible. The emission stream enters the flare stack where pilot burners ignite the VOCs. The destruction efficiency depends on factors such as flare gas exit velocity, emission stream heating value, residence time in the combustion zone, emission stream/oxygen mixing and flame temperature. Further analysis will be made on this control option.

(vii) Carbon Adsorption - This control option is technically feasible to the Formpac process operation. Carbon Adsorption uses a bed of activated carbon to remove VOC's from an emission stream. The process is effective to remove many organic pollutants. This analysis considers a fixed bed system because systems using replaceable carbon cartridges are suited only to very low flow rates. As the VOC laden stream passes through a carbon bed, the contaminant molecules occupy active sites on the carbon surface. At some concentration the pollutant molecules saturate the carbon so adsorption stops and breakthrough occurs. Further analysis will be made on this control option.

(viii) Carbon Adsorption - Oxidation - This is technically feasible to the Formpac process operation. This system concentrates the VOC stream by using carbon adsorption to remove low concentration VOC in an emission stream and then uses a lower volume of hot air to desorb the pollutant. A recuperative incinerator for destroying pollutants in the concentration stream is much smaller and has lower supplemental fuel requirements than an incinerator sized for the full emission stream volume. Further analysis will be made on this control option.

(ix) Condensation - This is not technically feasible to the Formpac process operation. This technology is the separation of VOC's from an emission stream through a phase change, by either increasing the system pressure or commonly lowering the system temperature below the dew point of the VOC vapor. The emission stream enters a heat exchanger, usually of shell tube design and encounters the cold surface of tubes carrying the heat transfer fluid. The emission stream temperature drops to the dew point of its VOC constituents. The VOC liquefies and drops out of the emission stream. The cleaned emission stream is then vented to the stack while the

condensed solvent is collected for reuse.
No further analysis will be made for this control option.

(x) Absorption - This is not technically feasible to the Formpac process operation. This system can only be used to concentrate emission streams to reduce the size of destruction equipment. The concentration effect is not as extreme as with carbon adsorption. Absorption concentrators are typically suited for batch processes or to equalize pollutant concentration in a variable stream. No further analysis will be made for this control option.

The following is the cost analysis for the technically feasible control options:

Extruder Building Fugitive						
Control Option	Overall Control Efficiency	VOC Emissions (t/y)	VOC Emissions Reduction (t/y)	VOC After Control (t/y)	Cost $ Per Ton removed	Energy Impacts (mmBtu/hr)
(Option 1) Carbon Adsorption w/Oxidation	adsorption = 68% oxidation = 95% overall = 98.4	391.7	385.0	6.3	$8,129	0
(Option 2) Recuperative Catalytic Incinerator	95%	391.7	372.0	19.7	$12,613	142.0
(Option 3 Recuperative Thermal Incineration	95%	391.7	372.0	19.7	$18,037	198.0
(Option 4) Carbon Adsorption	68%	391.7	266	125.3	$16,108	0
Reclaim Flash						
(Option1) Recuperative Thermal Incinerator	90%	38.15	34.3	3.8	$3,026	0.18
(Option 2) Regenerative Catalytic Incineration	90%	38.15	34.3	3.8	$3,808	1.3

(Option 3) Recuperative Catalytic Incinerator	90%	38.15	34.3	3.8	$4,060	0.06
(Option 4) Regenerative Thermal Incinerator	90%	38.15	34.3	3.8	$4,450	1.02
(Option 5) Carbon Adsorption	95%	38.15	36.2	1.9	$5,453	0
(Option 6) Carbon Adsorption W/ Thermal oxidizer	adsorption = 95% oxidizer = 95% overall = 99.7%	38.15	38.0	.095	$7,257	0
(Option 7) Flare	98%	38.15	37.4	0.75	$14,084	16.08
Reclaim Scrap						
(Option 1) Carbon adsorption w/ Oxidation	adsorption = 88% Oxidation = 95% overall = 99.4%	29.5	29.3	0.17	$ 9,413	0.42
(Option 2) Regenerative Catalytic Incineration	95%	38.15	36.2	1.9	$9,125	1.0
(Option 3) Recuperative Catalytic Incineration	95%	29.5	28.0	1.5	$13,829	0
(Option 4) Recuperative Thermal Incinerator	95%	29.5	28.0	1.5	$13,833	5.67
(option 5) Carbon Adsorber	88%	29.5	26.0	3.5	$ 12,366	0
Fluff Grinding & Conveying						

(Option 1) Carbon Adsorption w/ Oxidation	adsorption = 81% Oxidation = 95% overall = 99%	176.4	174.7	1.76	$8,623	4.4
(Option 2) Regenerative Thermal Incineration	95%	176.4	167.6	8.82	$ 10,232	19.2
(Option 3) Recuperative Catalytic Incineration	95%	176.4	167.6	8.82	$12,491	37.3
(Option 4) Recuperative Thermal Incineration	95%	176.4	167.6	8.82	$14,082	52.9
(Option 5) Carbon Adsorption	81%	176.4	143.0	33.4	$13,038	0
Warehouse						
(Option 1) Regenerative Thermal Incineration	95%	157.3	149.4	7.8	$29,249	76.7
(Option 2) Regenerative Catalytic Incineration	95%	157.3	149.4		$31,031	45.6
(Option 3) Recuperative Thermal Incineration	95%	157.3	149.4	7.8	$45,130	205.5
(Option 4) Recuperative Catalytic Incineration	95%	157.3	149.4	7.8	$45,904	149.0

Building fugitive emissions includes emissions from new and existing facilities (extruders and thermoformers), that are not stacked. A combined emission analysis was made for some facilities since it is impossible to separate the emissions from the new and existing facilities.
Reclaim scrap is synonymous to reclaim scrap conveying. Scrap system is synonymous to fluff grinding and conveying.

Environmental Impacts:

Emission Factor (lb/MMCF)	PM=PM10 (6.2)	SOx (0.6)	NOx (140)	VOC (2.8)	CO (35)
Extruder Building Fugitive (ton/year)					
(option 1) Carbon Adsorption w/Oxidation (0)	0	0	0	0	0
(Option 2) Recuperative Catalytic Incinerator (142 MMBtu/hr)	3.85 t/y	0.37	86.9	1.7	21.7
(Option 3) Recuperative Thermal Incineration (198 MMBtu/hr)	5.4	0.52	121.4	2.4	30.3
(Option 4) Carbon Adsorption (0)	0	0	0	0	0
Reclaim Flash (ton/year)					
(Option 1) Recuperative Thermal Incinerator (0.18 MMBtu/hr)	0	0	0.11	0	0.03
(Option 2) Recuperative Catalytic Incinerator (0.06 MMBtu/hr)	0	0	0	0	0
(Option 3) Regenerative Thermal Incinerator (1.02 MMBtu/hr)	0	0	0.6	0	0.2
(Option 4) Regenerative Catalytic Incineration (1.3 MMBtu/hr)	0	0	0.8	0	0.2
(Option 5) Carbon Adsorption (0)	0	0	0	0	0
(Option 6) Carbon Adsorption W/ oxidizer (0)	0	0	0	0	0
(Option 7) Flare (16.08 MMBtu/hr)	0.44	0	9.8	0.2	2.5
Reclaim Scrap (ton/year)					

(Option 1) Carbon adsorption w/ Oxidation (0.42 MMBtu/hr)	0	0	0.26	0	0.1
(Option 2) Regenerative Catalytic Incineration (1.0 MMBtu/hr)	0	0	0.6	0	0.15
(Option 3) Recuperative Catalytic Incineration (0)	0	0	0	0	0
(Option 4) Recuperative Thermal Incinerator (5.76 MMBtu/hr)	0.15	0	3.5	0.1	0.88
(Option 5) Carbon Adsorber (0)	0	0	0	0	0
Fluff Grinding & Conveying (ton/year)					
(Option 1) Carbon Adsorption w/ Oxidation (4.4 MMBtu/hr)	0.11	0	2.7	0	0.7
(Option 2) Regenerative Thermal Incineration (19.2 MMBtu/hr)	0.5	0	11.8	0.2	2.9
(Option 3) Recuperative Catalytic Incineration (37.3 MMBtu/hr)	1.0	0.1	23.0	0.45	5.7
(Option 4) Recuperative Thermal Incineration (52.9 MMBtu/hr)	1.4	0.13	32.4	0.6	8.1
(Option 5) Carbon Adsorption (0)	0	0	0	0	0
Warehouse (ton/year)					
(Option 1) Regenerative Thermal Incineration (76.7 MMBtu/hr)	2.1	0.2	47.0	0.9	11.8
(Option 2) Regenerative Catalytic Incineration (45.6 MMBtu/hr)	1.2	0.11	27.9	0.6	6.9

(Option 3) Recuperative Thermal Incineration (205.5 MMBtu/hr)	5.6	0.5	126.0	2.5	31.5
(Option 4) Recuperative Catalytic Incineration (149.0 MMBtu/hr)	4.0	0.4	91.3	1.8	22.8

Methodology:

Emission = heat input, MMBtu/hr * MMCF/1000 MMBtu * 8760 hr/yr * Ef, lb/MMCF * ton/2000 lb

Control Option	Equipment Cost	Installation/ Ductwork, etc.	Total Capital Cost	Direct Operating Cost	Indirect Operating Cost	Total Annual Cost	Ton of VOC Removed	$ Cost/Ton VOC Removed
Extruder Building Fugitive								
(Option 1) Carbon Adsorption w/Oxidation	$8,726,257	$813,005	$9,539,263	$1,183,549	$1,946,381	$3,129,930	385.0	$8,129
(Option 2) Recuperative Catalytic Incinerator	$4,579,725	$426,682	$%5,006,407	$6,031451	$766,584	$6,798,035	372.0	$12,613
(Option 3) Recuperative Thermal Incineration	$2,327,638	$216,860	$ 2,544,497	$ 6,173,716	$ 536,220	$ 6,709,936	372.0	$18,037
(Option4) Carbon Adsorption	$2,103,317	$195,961	$2,299,278	$3,264,725	$1,336,338	$4,601,063	266.0	$16,108
Reclaim Flash								
(Option 1) Recuperative Thermal Incinerator	$206,431	$6,411	$212,842	$40,293	$63,487	$103,780	34.3	$3,026
(Option 2) Regenerative Catalytic Incineration	$460,231	14,293	$474,524	$123,988	$206,367	$330,355	34.3	$3,808
(Option 3) Recuperative Catalytic Incinerator	$212,328	$6,594	$218,922	$76,664	$62,611	$139,274	34.3	$4,060
(Option 4) Regenerative Thermal Incinerator	$206,431	$6,411	$212,842	$36,109	$116,542	$152,651	34.3	$4,450

(Option 5) Carbon Adsorption	$60,396	$1,876	$62,271	$42,758	$32,801	$197,406	36.2	$5,453
(Option 6) Carbon Adsorption W/ Thermal oxidizer	$1,056,622	$32,814	$1,089,436	$34,668	$241,132	$275,800	36.2	$7,619
(Option 7) Flare	$72,039	$1,885	$73,924	$493,728	$33,010	$526,739	37.4	$14,083
Reclaim Scrap								
(Option 1) Carbon adsorption w/ Oxidation	$1,522,513	$141,849	$1,664,362	$71,003	$357,162	$428,165	26.0	$16,468
(Option 2) Regenerative catalytic Incineration	$915,037	$85,251	$1,000,288	$213,365	$173,967	$387,332	36.2	$9,125
(Option 3) Recuperative Catalytic Incineration	$761,177	$70,917	$832,094	$206,159	$181,058	$387,216	28.0	$13,829
(Option 4) Recuperative Thermal Incinerator	$693,181	$64,582	$757,762	$213,365	$173,967	$387,332	28.0	$13,833
(Option 5) Carbon Adsorber	$484,570	$45,146	$529,715	$100,593	$220,926	$321,519	28.0	$11,483
Fluff Grinding & Conveying								
(Option 1) Carbon Adsorption w/ Oxidation (4.4 MMBtu/hr)	$4,807,065	$447,863	$5,254,928	$431,943	$1,083,293	$1,515,236	143.0	$10,596
(Option 2) Regenerative Thermal Incineration	$4,103,333	$382,298	$4,485,631	$783,859	$930,996	$1,714,854	167.2	$10,232
(Option 3) Recuperative Catalytic Incineration (37.3 MMBtu/hr)	$3,749,899	$349,369	$4,099,268	$1,677,020	$780,294	$2,457,314	167.2	$12,491

(Option 4) Recuperative Thermal Incineration (52.9 MMBtu/hr)	$2,758,175	$256,973	$3,05,148	$1,727,374	$632,862	$2,360,236	167.2	$14,082
(Option 5) Carbon Adsorption (0)	$2,509,056	$233,763	$2,428,819	$732,388	$1,132,106	$1,864,494	143.0	$13,038
Warehouse								
(Option 1) Regenerative Thermal Incineration (76.7 MMBtu/hr)	$7,036,941	$655,615	$7,692,556	$2,789,839	$1,579,965	$4,369,804	149.4	$29,249
(Option 2) Regenerative Catalytic Incineration (45.6 MMBtu/hr)	$6,501,427	$605,722	$7,107,149	$3,449,711	$1,186,281	$4,635,992	149.4	$31,031
(Option 3) Recuperative Thermal Incineration (205.5 MMBtu/hr)	$2,758,175	$256,973	$3,015,148	$6,39381	$345,179	$6,742,560	149.4	$45,130
(Option 4) Recuperative Catalytic Incineration (149.0 MMBtu/hr)	$3,749,899	$349,369	$4,099,268	$6,298,766	$559,351	$6,858,117	149.4	$45,904

Methodology:

Total Capital Cost = Base Price + Direct Installation, Ductwork Cost + Indirect Cost
Total Annual Operating Cost = Direct Operating Cost + Indirect Operating Cost
$ Per Ton VOC Removed = Total Annual Operating Cost / Ton of VOC Removed

The breakdown of the cost are as follows:

1) Capital Cost
   a) Equipment Cost: purchase price, sales tax, and freight.
   b) Direct Cost: Foundation and support, installation, and ductwork, insulation, piping and painting.
   c) Indirect Cost: Engineering, construction and start-up, contractor's fee, performance testing and contingencies.

2) Annual Cost
    a) Direct Annual Cost: Utilities, operating labor (operator, supervisor) maintenance (labor and materials).
    b) Indirect Cost: Overhead, property tax, insurance, capital recovery.

Summary of BACT Analysis:

There are ten (10) technically feasible control options that can be applied to the proposed additions:

Extruder Building Fugitive:

a) Recuperative Catalytic Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. However, the company rejected this option as cost prohibitive at $12,613 per ton of VOC removed.

b) Recuperative Thermal Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. However, the company rejected this option as cost prohibitive at $18,037 per ton of VOC removed.

c) Carbon Adsorption w/ Oxidation - This is technically feasible for the Formpac process operation, with a 98.4% overall control efficiency. However, the company rejected this option as cost prohibitive at $8,129 per ton of VOC removed.

d) Carbon Adsorption - This is technically feasible for the Formpac process operation, with a 68% overall control efficiency. However, the company rejected this option as cost prohibitive at $16,108 per ton of VOC removed.

Reclaim Flash:

a) Flare - This is technically feasible for the Formpac process operation, with a 98% overall destruction efficiency. This control option was not chosen because recuperative thermal incineration is more economical.

b) Recuperative Thermal Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. The company chose this option as also being economically feasible at $2,863 per ton removed.

c) Recuperative Catalytic Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. This control option was not chosen because recuperative thermal incineration is more economical.

d) Regenerative Catalytic Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. This control option was not chosen because recuperative thermal incineration is more economical.

e) Regenerative Thermal Incineration - This is technically feasible for the Formpac process operation,

with a 95% overall destruction efficiency. This control option was not chosen because recuperative thermal incineration is more economical.

f) Carbon Adsorption - This is technically feasible for the Formpac process operation, with a 95% overall control efficiency. This control option was not chosen because recuperative thermal incineration is more economical.

g) Carbon Adsorption w/ Thermal Oxidizer -This is technically feasible for the Formpac process operation, with a 99.7% overall control efficiency. This control option was not chosen because recuperative thermal incineration is more economical.

Reclaim Scrap:

a) Regenerative Catalytic Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. However, the company rejected this option as cost prohibitive at $9,125 per ton of VOC removed.

b) Recuperative Catalytic Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. However, the company rejected this option as cost prohibitive at $13,829 per ton of VOC removed.

c) Recuperative Thermal Incineration - This is technically feasible for the Formpac process operation, with a 95% overall destruction efficiency. However, the company rejected this option as cost prohibitive at $13,833 per ton of VOC removed.

d) Carbon Adsorber - This is technically feasible for the Formpac process operation, with 88% overall control efficiency. However, the company rejected this option as cost prohibitive at $12,366 per ton of VOC removed.

e) Carbon Adsorption w/ Oxidation - This is technically feasible for the Formpac process operation, with 99.4% overall control efficiency. However, the company rejected this option as cost prohibitive at $16,468 per ton of VOC removed.

Fluff Grinding and Conveying:

a) Regenerative Thermal Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $10,232 per ton of VOC removed.

b) Recuperative Catalytic Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $12,494 per ton of VOC removed.

c) Recuperative Thermal Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $14,082per ton of VOC removed.

d) Carbon Adsorption w/ Oxidation - This is technically feasible for the Formpac process operation, with 99% overall control efficiency. However, the company rejected this option as cost prohibitive at $10,596 per ton of VOC removed.

e) Carbon Adsorption - This is technically feasible for the Formpac process operation, with 81% overall control efficiency. However, the company rejected this option as cost prohibitive at $13,038 per ton of VOC removed.

Warehouse:

a) Regenerative Thermal Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $29,249 per ton of VOC removed.

b) Regenerative Catalytic Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $31,031 per ton of VOC removed.

c) Recuperative Catalytic Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $45,904 per ton of VOC removed.

d) Recuperative Thermal Incineration - This is technically feasible for the Formpac process operation, with 95% destruction efficiency. However, the company rejected this option as cost prohibitive at $45,130 per ton of VOC removed.

A research for acceptable substitute raw materials was conducted. This would be substitution of a non-VOC material for pentane as a blowing agent for polystyrene foam extrusion. The two (2) materials most feasible for such a substitution would be carbon dioxide (CO2) and HFC 152a.

Using CO_2:

Formpac has recently constructed a polystyrene foam extruder in Reading, Pennsylvania which has a 15% substitution of CO_2 for pentane. Formpac has found this to provide satisfactory results for some products, but not for all. Operating experience in Reading has shown that CO_2 substitution is satisfactory for “Barrier Foam”, but is not satisfactory for processor poultry foam and meat tray foam.

Using HFC-152a:
The use of HFC-152a has proven to be feasible for some products, it has not been satisfactory for meat tray foam.

Therefore, the use of substitute blowing agent is not technically feasible.

USEPA Report:

Based on a study commissioned by the USEPA, entitled “Control of VOC Emissions from Polystyrene (PS) Manufacturing”, EPA 450/3-90-020 September 1990. This PS foam plant emissions study conducted by Radian Corporation was performed for the USEPA Control

Technology Center and sponsored by the two (2) USEPA, Research Triangle Park, NC Groups (Emission Standards Division of the Office of Air Quality Planning and Standards and the Air & Energy Engineering Research Laboratory of the Office of Research & Development, and the USEPA Cincinnati OH Group (Center for Environmental Research Information, Office of Research & Development).

The study indicates that majority of the emissions occurs from scrap grinding, and re-pelletizing, and these processes account for the 30% in the VOC emissions, and residual in the product leaving the plant is at 50% and the rest comes from the rest of the processes.

In an evaluation of the costs for control of emissions in the same USEPA report, the **only emissions subjected to control** were those from **scrap grinding and repelletizing of recycled foam sheets**.

Blowing agent retention and emissions in each step of the process vary with the product mix, and the type of the blowing agent used. Isopentane is more highly retained in the product than other blowing agents normally used (pentane and butane).

VOC BACT Conclusion:

Tenneco Plastics Company and Dolco Packaging are the two (2) sources similar with Formpac Division, W. R. Grace & Company's operations that control their VOC emissions. These sources are similar in operations except with the type of blowing agent used. Tenneco Plastics is using isopentane and CO_2 as blowing agents. Dolco is using butane as the blowing agent. Formpac is using pentane as the blowing agent. **The reclaim flash or re-pelletizing are the part of the operation being controlled by both Tenneco and Formpac. No other similar part of the operation is controlled by these three plants, because of the different types of blowing agent used which have different VOC retention and emissions.**

In the case of Formpac, using pentane as the blowing agent, causes majority of the emissions to occur at the extrusion, known as the extruder building fugitive (170.8 ton/yr), scrap grinding (76.3 ton/yr), reclaim flash (38.2 ton/yr) and warehousing (69 ton/yr).

Capture of all the emissions associated with the extrusion becomes a problem of capturing emissions along the total sheet path to the windup roll because of the length of the product. The extruder die drum area must be accessible and clear as possible during line start up to facilitate line stringup and minimize fire hazard.

Effective capture of the pentane emissions from each process will require enclosure of each process area and control of the air flows. Again, **fire prevention is a primary concern** in the **polystyrene production**. In order to minimize the potential for fire, VOC laden air in each area has to be ventilated, which drives up the cost of control because a bigger control will be necessary to accommodate the bigger air stream.

VOC BACT Determined:

Finally, the BACT determined was the addition of Incineration at the Reclaim Flash, and a resin and pentane usage limitation to restrict the VOC emissions to 343 tons/year.

326 IAC 2-2-4 Air Quality Analysis Requirements:

326 IAC 2-2-4(a)(2) - PSD application shall contain an analysis of ambient air quality in the area for which the major PSD modification would result in a significant net emissions increase.

326 IAC 2-2-5 Air Quality Impacts Requirements:

326 IAC 2-2-5(c)(1) - Any estimate of ambient air concentrations shall be based upon applicable air quality model, data bases and other requirements specified by USEPA.

The air analysis submitted by Formpac Division, W.R. Grace Company was checked and verified by the Air Modeling Section (Mr. Mark Derf). See Appendix A.

326 IAC 2-2-6 Increment Consumption Requirements:

326 IAC 2-2-6(a) - The increase in emissions will not exceed 80% of the available maximum allowable increase (MAI) over the baseline concentrations for SO_2, PM and NOx.

326 IAC 2-2-7 Additional Analysis Requirements:

326 IAC 2-2-7 - Analysis of the impairment to visibility, soils and vegetation shall be provided.

Commercial growth, as a result of the modification is not expected since the modification has no significant ambient air quality impact and minimal growth impacts are not expected. There will be no adverse impact on air quality in the area due to industrial, residential or commercial growth. According to the modeled concentrations for ozone, there are no soils which might be adversely affected by this modification. Impacts from Formpac are not considered significant and the NAAQS limit of 120 ppb is not threatened. Additionally, the maximum modeled concentrations for ozone are below the threshold limits necessary to have adverse impacts on surrounding vegetation. The nearest Class I area is more than 100 kilometers from the facility and a Class I impact and visibility analysis is not required.

Marion County Maintenance Contingency Plan:

The construction of this modification will not affect the ozone maintenance status of Marion County.

Based on the emissions from the 1995 STEPS Data	= 35,000 lb VOC/day
Emissions from Formpac's modification, after control (343 t/y)	= + 1,879 lb VOC/day
	36,879 lb VOC/day < 52,000 lb/day (budget emissions)

The VOC maintenance budget emissions of 52,000 lb/day came from the county's point sources emissions.

NSPS:

There are no New Source Performance Standards (326 IAC 12) applicable to this modification.

326 IAC 8-1-6, New Facilities, General Reduction Requirements

The facilities under this modification are subject to this rule, which requires a State BACT analysis performed. The State BACT requirements in this rule has been addressed by the PSD BACT analysis.

326 IAC 2-6 (Emission Reporting)

This facility is subject to 326 IAC 2-6 (Emission Reporting), because it emits more than 10 tons/yr of VOC for Marion County. Pursuant to this rule, the owner/operator of this facility must annually submit an emission statement of the facility. The annual statement must be received by April 15 of each year and must contain the minimum requirements as specified in 326 IAC 2-6-4. A copy of the applicable rule will be enclosed with the permit.

326 IAC 6-1-2(a): (Particulate Matter (PM) Emissions Limitations)

The fluff grinding and conveying process is subject to this rule. This rule mandates a PM emissions not to exceed 0.03 grain per dry standard cubic foot (dscf). The source is in compliance with this rule since the cyclones controlling this process have a grain loading of 0.0292 dscf.

326 IAC 2-1-3.4 New Source Toxics Control Rule:

This rule will not apply to this modification, because single HAP is not emitted at a rate of 10 tons per year or more, or the HAPs combined emission is less than 25 tons per year.

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 189 hazardous air pollutants set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Management (OAM) Construction Permit Application Form Y.

This modification will emit levels of air toxics less than those which constitute a major source according to Section 112 of the 1990 Amendments to Clean Air Act (see Appendix A for Air Toxic Analysis and below table).

Air Toxic	Rate of Emissions (lb/hr)	Modeled Concentration ($\mu g/m^3$)	OSHA PEL ($\mu g/m^3$)	% OSHA PEL
Styrene	0.27	1,798	420,000	0.43
Ethylbenzene	0.039	265	435,000	0.06

Conclusion

The construction of this polystyrene extrusion modification will be subject to the conditions of the

attached proposed **Construction Permit No. CP-097-5348, Plt ID No.097-00093.**

Indiana Department of Environmental Management
Office of Air Management
and
City of Indianapolis
Environmental Resource Management Division

Addendum to the
Technical Support Document for New Construction and Operation

Source Name:	Formpac Division, W. R. Grace & Company
Source Location:	7950 North Allison Avenue, Indianapolis, IN 46268
County:	Marion
Construction Permit No.:	CP-097-5348-00093
SIC Code:	3086
Permit Reviewer:	Aida De Guzman

On September 18, 1997, the Office of Air Management (OAM) had a notice published in the Indianapolis Star & News, Indianapolis, Indiana, stating that Formpac Division had applied for a construction permit to modify the existing polystyrene meat and poultry tray production plant. This modification involves the construction of two (2) new extruders 251 & 261, four (4) thermoformers 10 through 13 and one (1) extruder 530 to accommodate the increase in the source throughput. The notice also stated that OAM proposed to issue a permit for this installation and provided information on how the public could review the proposed permit and other documentation. Finally, the notice informed interested parties that there was a period of thirty (30) days to provide comments on whether or not this permit should be issued as proposed.

On September 23, 1997 and October 8, 1997, US EPA , Region 5 asked some clarification via the Internet on the proposed construction permit. On October 1, 1997, the City of Indianapolis, Environmental Resource Management Division (ERMD) has submitted comments on the proposed construction permit. The summary of the comments and corresponding responses is as follows:

1. Comment: EPA, Region 5
   EPA had made some clarification on how the potential emissions from the various processes were obtained, since the TSD public version does not have a detail calculation like the TSD confidential version.

1. Response: OAM
   A copy of the detailed calculation has been faxed to EPA. This clarification did not affect the proposed permit.

2. Comment: EPA, Region 5
   Proposed Operation Condition 7 covers analyzing VOC content in the polystyrene products. What part of the process does this cover? Are they measuring VOCs at the extruder, from the warehouse or another place, and what analysis will they be utilizing?

2. Response: OAM
   The blowing agent (pentane) retained in the polystyrene in each step of the process (extruder, thermoforming, reclaim conveying, reclaim flash, fluff grinding, roll lot, packaging and warehousing) will be analyzed in order to determine the amount of VOC that is lost or emitted. There is no EPA Method that can be used to determine VOC emissions from polystyrene, however, the source will utilize gas chromatography (GC Mass Spec) .

1. Comment : ERMD
Proposed Construction Condition 6(d) operating fees citation 326 IAC 2-1-7-1 should be changed to 326 IAC 2-7-19.

1. Response: OAM
Since Formpac is a Title V source, the operating fees citation in the proposed construction permit was changed from 326 IAC 2-1-7-1 to 326 IAC 2-7-19 in the final permit.

2. Comment: ERMD
Proposed Construction Condition 6(e) "Pursuant to 326 IAC 2-7-4, the Permittee shall apply for a Title V operating permit within twelve (12) months after the source becomes subject to Title V. This 12-month period starts at the postmarked submission date of the Affidavit of Construction. If the construction is completed in phases, the 12-month period starts at the postmarked submission date of the Affidavit of Construction that triggers the Title V applicability. The operation permit issued shall contain as a minimum the conditions in the Operation Conditions section of this permit", should be replaced with the following:

"The Permittee has submitted their Part 70 (T097-6114-00093) permit application on June 11, 1996 for the existing source. The equipment being reviewed under this permit shall be incorporated into the submitted Part 70 application".

2. Response: OAM
The proposed Construction Condition 6(e) was changed in the final permit to the following condition, since the source has submitted their Part 70 application:

" The Permittee has submitted their Part 70 (T 097-6114-00093) permit application on June 11, 1996 for the existing source. The equipment being reviewed under this permit shall be incorporated into the submitted Part 70 permit application".

3. Comment: ERMD
Proposed Construction Condition 7 should be deleted, since ERMD follows the same procedure as OAM, outlined in construction condition 6 (a) through (c).

3. Response: OAM
Proposed Construction Condition 7 in the proposed permit was deleted in the final permit, because the source which includes this modification will be issued a Part 70 Operating permit by the OAM. The succeeding conditions were renumbered.

4. Comment: ERMD
Revise lower case lettering noted as (a) through (e) in the proposed Operation Condition 7.

4. Response: OAM
The Proposed Operation Condition 7 Performance Testing has been revised, and noted as (a) through (h).

5. Comment: ERMD
The Affidavit of Construction should also be revised to match the language of Construction Condition 6(e).

5. Response: OAM
The Affidavit of Construction was revised to match the language of Construction Condition 6(e).

6. Comment: ERMD
On TSD page 3 of 26, second paragraph, and second to the last sentence states " Marion County is classified as nonattainment for the rest of the criteria pollutants". This statement is incorrect, for the pollutants listed in the proposed modification table, Marion County is attainment for PM10, Nox and CO.

6. Response: OAM
Pursuant to 40 CFR Chapter 1, § 81.315, Marion County, has been **redesignated as attainment or unclassifiable for ozone**.

The area of Washington Township east of Fall Creek and east of Five Points Road is classified as attainment or unclassifiable for TSP, and the rest of the county, where **the source is located is classified as nonattainment for TSP.**

Part of the City of Indianapolis (area bounded by 11th Street on the north, Capitol on west, Georgia Street on the south, and Delaware on the east is classified as nonattainment for carbon monoxide (CO). The remainder of Indianapolis and Marion County where **the source is located is unclassifiable or attainment for CO.**

Marion County is classified as **attainment for NO_2.**

The area included within Lawrence, Washington, and Warrick Townships are unclassifiable for SO_2. The remainder of Marion County where **the source is located is classified as nonattainment for SO_2.**

Marion County is attainment for PM10.

7. Comment: ERMD
PM10 is listed as having an Offset Threshold Level of 100 tons per year. This should be listed under PSD Significant Level and changed to 15 tons per year.

7. Response: OAM
Marion County is attainment for PM10, where the PSD threshold is 250 tons per year. Since the source is major for an attainment pollutant, PM10 which is an attainment pollutant is considered major and the significant threshold level is 15 tons/year. Carbon monoxide (CO) which is also an attainment pollutant will be considered major and the significant threshold level is 100 tons/year.

The table on page 5 of 28 for the PTE from the proposed modification will be revised from:

Pollutant	PM (t/y)	PM10 (t/y)	VOC (t/y)	NOx (t/y)	CO (t/y)
Proposed Modification	0.11	0.11	343	0.11	0.2
Contemporaneous Increase	-	-	0.0	0.0	-
Contemporaneous Decrease	-	-	0.0	0.0	-
Offset Threshold Level	100	100	-	-	100
PSD Significant Level	-	-	40	40	

to the following table:

Pollutant	PM (t/y)	PM10 (t/y)	VOC (t/y)	NOx (t/y)	CO (t/y)
Proposed Modification	0.11	0.11	343	0.11	0.2
Contemporaneous Increase	-	-	0.0	0.0	-
Contemporaneous Decrease	-	-	0.0	0.0	-
Offset Threshold Level	100		-	-	
PSD Significant Level	-	15	40	40	100

8. Comment: ERMD
On the **Air Quality Analysis**, for Pollutants analyzed for Air Quality Impact, the last sentence which states the significant level for VOC as 100 tons/year. This should be 40 tons/year.

8. Response: OAM
The significant level for VOC is 40 tons/year, since Formpac is an existing major source. This was reflected in the final draft of the Air Quality Analysis.

9. OAM changed the word **destruction** to **control** on Operation condition 7(b) of the proposed permit which states as follows:

b) A compliance test shall also be performed for the Reclaim Flash incinerator to determine or verify the minimum operating temperature that will achieve an **overall 90% destruction efficiency**. This compliance tests (a) and (b) shall be performed within 60 days after achieving maximum production rate, but no later than 180 days after the receipt of the Operation Permit Validation Letter. These tests shall be performed according to 326 IAC 3-2.1 (Source Sampling Procedures) using the methods specified in the rule or as approved by the Commissioner.

10. Proposed Operation Condition 6 has been changed from “That a copy of this permit shall be available on the premises of the source “ to the following: “ That pursuant to 326 IAC 2-1-3(l), the Permittee shall maintain the applicable permit on the premises of this source and shall make this permit available for inspection by the IDEM, and the City of Indianapolis, ERMD or other public official having jurisdiction.

11. OAM included the following Operation Conditions that were overlooked and be numbered 15, and 16.

15. Malfunction Condition
That pursuant to 326 IAC 1-6-2 (Records; Notice of Malfunction):

(a) A record of all malfunctions, including startups or shutdowns of any facility or emission control equipment, which result in violations of applicable air pollution control regulations or applicable emission limitations shall be kept and retained for a period of three (3) years and shall be made available to the Indiana Department of Environmental Management (IDEM), Office of Air Management (OAM) or appointed representative upon request.

(b) When a malfunction of any facility or emission control equipment occurs which lasts more than one (1) hour, said condition shall be reported to OAM, using the Malfunction Report Forms (2 pages). Notification shall be made by telephone or facsimile, as soon as practicable, but in no event later than four (4) daytime business hours after the beginning of said occurrence.

(c) Failure to report a malfunction of any emission control equipment shall constitute a violation of 326 IAC 1-6, and any other applicable rules. Information of the scope and expected duration of the malfunction shall be provided, including the items specified in 326 IAC 1-6-2(a)(1) through (6).

(d) Malfunction is defined as any sudden, unavoidable failure of any air pollution control equipment, process, or combustion or process equipment to operate in a normal and usual manner. [326 IAC 1-2-39]

16. Emergency Reduction Plans
Pursuant to 326 IAC 1-5-2 (Emergency Reduction Plans; Submission):

(a) The Permittee prepared and submitted written emergency reduction plans (ERPs) consistent with safe operating procedures on June 1, 1989.

(b) If the ERP is disapproved by IDEM, OAM and ERMD, the Permittee shall have an additional thirty (30) days to resolve the differences and submit an approvable ERP. If after this time, the Permittee does not submit an approvable ERP, IDEM, OAM and ERMD, shall supply such a plan.

(c) These ERPs shall state those actions that will be taken, when each episode level is declared, to reduce or eliminate emissions of the appropriate air pollutants.

(d) Said ERPs shall also identify the sources of air pollutants, the approximate amount of reduction of the pollutants, and a brief description of the manner in which the reduction will be achieved.

(e) Upon direct notification by IDEM, OAM and ERMD, that a specific air pollution episode level is in effect, the Permittee shall immediately put into effect the actions stipulated in

the approved ERP for the appropriate level. [326 IAC 1-5-3]

11. Post Construction Monitoring is not necessary for Formpac, since there are at least five (5) monitoring sites in the area that would have a representative data that can be utilized to measure the ozone impact from this modification.