North Carolina Department of Environment and Natural Resources
Division of Air Quality

Beverly Eaves Perdue
Governor

Shelia C. Holman
Director

Dee Freeman
Secretary

November 2, 2012

Mr. Wayne Brown
Plant Manager
Pactiv, LLC - Mooresville
314 Mooresville Boulevard
Mooresville, NC 28115

RE: Permitting Applicability Request – Non-hazardous Secondary Material Determination
Air Permit No. 10004R02
Pactiv LLC – Prairie Packaging, Inc.
Mooresville, Iredell County North Carolina
Permit Fee Class: Small
Facility ID# 4900312

Dear Mr. Brown:

The North Carolina Department of Environment and Natural Resources (NCDENR) Division of Air Quality (DAQ) received your letter dated August 30, 2012 requesting a Non-Hazardous Secondary Material (NHSM) determination for pentane. This memorandum summarizes the NHSM determination for the proposed project to utilize captured pentane as a supplementary fuel for process boilers located at your Pactiv LLC (Pactiv) packaging manufacturing facility, formerly known as Prairie Packaging, Inc. in Mooresville, North Carolina (Mooresville facility). The project includes the installation of a new Expanded Polystyrene (EPS) process. As part of the process, EPS beads are sent into a Permanent Total Enclosure (PTE) and pre-expanded with dry heat from process boilers until beads expand through the expansion of the pentane contained within the bead. This proposed process releases pentane gas within the PTE which is captured and routed to the boilers as a control mechanism and to provide supplemental fuel in the boilers. Pactiv is submitting this Applicability Determination pursuant to Title 15A of the North Carolina Administrative Code (15A NCAC) Subchapter 2Q – Air Quality Permit Procedures 2Q .0111 – Applicability Determinations to verify that pentane is not a solid waste as defined by Title 40 Code of Federal Regulations Part 241 (40 CFR Part 241). This determination is being made pursuant to the federal United States Environmental Protection Agency's (USEPA's) March 11, 2011 NHSM regulation. This rule states that any NHSM that is burned is a solid waste unless it qualifies for an exception under the rule.[1]

[1] 40 CFR §241.3 (2011).

Permitting Section
1641 Mail Service Center, Raleigh, North Carolina 27699-1641
217 West Jones., Raleigh, North Carolina 27603
Phone: 919-707-8405 / FAX 919-715-0717 / Internet: www.ncair.org

Background
It is important to note that this determination is limited to review of the pentane as represented by Pactiv and under the NHSM rule. The NHSM rule did not redefine the current definition of "solid waste" at 40 CFR §258.2.[2] The EPA, through the NSHM rule, provided a method to determine whether NHSM materials that were burned would qualify as solid waste for the purpose of §129 of the Clean Air Act (CAA). The EPA has issued several policy interpretation letters since promulgating the NHSM rule in an attempt to clarify any possible confusion regarding the relationship between the existing definition of solid waste and the NHSM rule.[3] More specifically, these letters address the issue of "contained gas" as it relates to the 40 CFR §258.2 "solid waste" definition. Based on these letters, the DAQ has proceeded with applying the NHSM procedures on a case-by-case basis.

A non-hazardous secondary material (NHSM) within the meaning of Title 40, Part 241 of the Code of Federal Regulations (40 CFR Part 241) is defined as a secondary material that, when discarded, would not be identified as a hazardous waste under Part 261. Pentane is not found under 40 CFR § 261.3 *Definition of hazardous waste*. As defined under the NHSM rule, "Secondary Material" means any material that is not the primary product of a manufacturing or commercial process, and can include post-consumer material, off-specification commercial chemical products or manufacturing chemical intermediates, post-industrial material, and scrap.

Pentane is a volatile organic compound (VOC) used as a blowing agent in the production of polystyrene foam and other foams; hence, it is not the primary product in the proposed EPS process. Pentane as described in the letter referenced above remains within the control of the generator, and meets the legitimacy criteria provided in 40 CFR 241.3(d)(1). NC DAQ has determined, therefore, that the material is not a solid waste when used as fuel in this combustion unit.

LEGITIMACY CRITERIA EVALUATION
In order to qualify as a non-hazardous secondary material (NHSM) that is not a solid waste, pentane in the proposed process must meet the following legitimacy criteria listed in 40 CFR 241.3(b)(1) [Control of the Generator] and 40 CFR 241.3(d)(1):

- ✓ managed as a valuable commodity (40 CFR 241.3(d)(1)(i),
- ✓ meaningful heating value (40 CFR 241.3(d)(1)(ii), and
- ✓ comparable contaminant concentrations (40 CFR 241.3(d)(1)(iii).

Control of the Generator [40 CFR 241.3(b)(1)]
Pursuant to 40 CFR 241.2, Definitions: "Generating Facility" is defined as all contiguous property owned, leased, or otherwise controlled by the NHSM generator; and "Control" means the power to direct the policies of the facility, whether by the ownership of stock, voting rights, or otherwise, except that contractors who operate facilities on behalf of a different person as defined in this section shall not be deemed to "control" such facilities.

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[2] In the Resource Conservation and Recovery Act, Congress defined "Solid waste" as any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permit under 33 U. S. C. 1342, or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923). The EPA has adopted a nearly identical definition at 40 CFR 258.2.

[3] Letter from Suzanne Rudzinski (US EPA) to Tim Hunt (AFPA) dated May 13,2011, letter from Suzanne Rudzinski (US EPA) to Sue Briggum (Waste Management) dated August 5,2011, and letter from Mathy Stanislaus, (US EPA) to Paul Noe (AFPA) dated June 25,2012.

Pactiv owns and operates the packaging manufacturing facility where the proposed Expanded Polystyrene (EPS) process will be located. Pactiv will own the Material Preparation Area, which will be operated as a PTE, where the beads are pre-expanded, and the equipment to transport the pentane to the Pactiv owned boilers; thus, the process meets the criterion of being within "Control of the Generator."

Managed as a Valuable Commodity [40 CFR 241.3(d)(1)(i)]
Per the NHSM rule, the NHSM must be managed as a valuable commodity based on the following factors:

> *(A) The storage of the non-hazardous secondary material prior to use must not exceed reasonable time frames;*
> *(B) Where there is an analogous fuel, the non-hazardous secondary material must be managed in a manner consistent with the analogous fuel or otherwise be adequately contained to prevent releases to the environment;*
> *(C) If there is no analogous fuel, the non-hazardous secondary material must be adequately contained so as to prevent releases to the environment;*

Pactiv has chosen to collect, capture, and transport the pentane to the boilers in the proposed process. There are currently no Federal requirements to control pentane within the New Source Performance Standards (NSPS) or National Emissions Standards for Hazardous Pollutants (NESHAP); therefore, the only motivating factor to capture, collect and contain pentane from the EPS process to be utilized as a supplementary fuel in their boilers is economics. By investing both capital costs and operating costs (electricity to transport pentane), Pactiv meets the requirement to manage pentane as a valuable commodity.

Meaningful Heating Value [40 CFR 241.3(d)(1)(ii)]
The NHSM must have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy. Per the Boiler MACT (40 CFR 63.7480, Subpart DDDDD), a "Boiler" is an enclosed device which uses flame combustion and has the primary purpose of recovering thermal energy in the form of steam or hot water. Devices that combust solid wastes are not considered to be boilers according to this rule. The proposed project will use pentane as a supplemental fuel in the boilers to provide steam for the pre-expansion process; thus meeting the definition of a combustion unit that recovers energy.

Per your submittal, pentane has a gross heating value of 20,908 British thermal units per pound (Btu/lb) and a net heating value of 19,322 Btu/lb, which easily surpasses the minimum value established by the EPA. This heating value was verified using Perry's Chemical Engineering Handbook[4], which list pentane's gross heating value as 21,110 Btu/lb. The preamble to the final NHSM definitional rule, states that materials with a heat content of at least 5,000 Btu/lb[5] satisfy the requirement of a meaningful heating value; thus, pentane satisfies the requirement of a meaningful heating value.

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[4] Perry's Chemical Engineering Handbook, 50th Anniversary Edition, Copyright 1984, Table, Table 9-13 Physical Properties of Light Hydrocarbons, Pentane's gross heating value is 21,110 Btu/lb.

[5] **Federal Register** /Vol. 76, No. 54 /Monday, March 21, 2011 /Rules and Regulations **15541**
With respect to the requirement that the non-hazardous secondary material have a meaningful heating value, in the context of the RCRA subtitle C hazardous waste regulations, EPA addressed this concept—that is, whether a hazardous secondary material has a meaningful heating value, in the ''comparable fuels'' rule (63 FR 33781) by defining it with a benchmark Btu content of 5,000 Btu/lb.

Comparable Contaminant Concentrations [40 CFR 241.3(d)(1)(iii)]
40 CFR 241.3(d)(1)(iii) requires that a NHSM "contain contaminants at levels comparable in concentration to or lower than those in traditional fuels which the combustion unit is designed to burn" in order to satisfy this criterion. Based on your letter, it is assumed that your process boilers are designed to burn natural gas. Per Perry's Chemical Engineering Handbook[6] natural gas has several components that vary considerably from city to city. Natural gas is a natural occurring hydrocarbon found in the earth, composed of methane, ethane, butane, propane, nitrogen, carbon dioxide, hexane, pentane, and miscellaneous trace components. Based on the components chemical formulas, other than nitrogen, carbon dioxide and miscellaneous trace components found in natural gas, all other components referred to as alkanes and are composed of carbon and hydrogen. Your submittal request to burn pentane, which is one of the components found in natural gas. Based on the components of natural gas analysis presented in Table 9-14 of Perry's, pentane found in natural gas varies from 0.00 to 0.44 on a percent (%) by volume basis. Natural gas is composed primarily of methane, per Perry's it varies from 72 to 95% on a volume basis. Natural gas is a hydrocarbon composed of one carbon atom and four hydrogen atoms (CH_4). Just as natural gas, pentane is a hydrocarbon. Pentane contains five carbon atoms and twelve hydrogen atoms (C_5H_{12}). Pentane contains no trace contaminants, such as sulfur, or metals which can be found in natural gas[7] both pre- and post-combustion.

Pentane is a component of natural gas; thus, it is assumed that all of the contaminants are present at levels comparable in concentration to or lower than those found in natural gas (the traditional fuel these units are designed to burn); hence, the comparable contaminant concentration criterion is satisfied.

Conclusion
Because the pentane being burned remains within the control of the generator and meets the legitimacy criteria (managed as valuable commodity, meaningful heating value, and has comparable or lower contaminant concentrations) the NCDAQ has determined that the Pactiv pentane gas proposed to be burned in the process boilers as a supplemental fuel is not a solid waste pursuant to 40 CFR §241.3. If you have any questions regarding this NHSM determination, please contact me at (919) 707-8475.

Sincerely,

Donald R. van der Vaart, Ph.D., J.D., P.E.,
Chief, Permits Section

Attachments

c: Morrisville Regional Office
John Evans
Judy Lee
Central Files

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[6] Perry's Chemical Engineering Handbook, Table 9-16 Analysis of Natural Gas
[7] AP-42, Section 1.4, U.S. EPA, July 1998

Non-Hazardous Secondary Material (NHSM) Contaminant Concentration Comparison

Contaminant[1]	ppmv (unless otherwise noted)	Source	ppmv (unless otherwise noted)	Source	EPA de minimis (tpy unless otherwise noted)	Notes
	Natural Gas[2]		**Blowing Agent**			
Nitrogen	3,100 - 25,000	Perry's Handbook	---	---		NOx emission rate same as natural gas-fired enging
Sulfur	0.34 ppmw		---	---		See sulfur compounds below
Hydrogen Sulfide (H_2S)	1,800	Ohio Raw Gas Sample	---	---		Lower than Traditional Fuel
Metals						
Arsenic (As)	35.5 - 86.5	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.005 tpy	Lower than EPA de minimis
Beryllium (Be)	20.3 - 45.6	EPA/OAQPS Survey for Final NHSM Rule	---	---	ND	
Cadmium (Cd)	3.6 -8.3	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.01 tpy	Lower than EPA de minimis
Chlorine (Cl)	2140 - 2870	EPA/OAQPS Survey for Final NHSM Rule	---	---	ND	
Chromium (Cr)	164.3 - 274.6	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.002	Lower than EPA de minimis. The hexavalent was used as the most protective assumption
Lead (Pb)	55.3 - 78.3	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.01	Lower than EPA de minimis
Manganese (Mn)	102.4 - 165.5	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.8	Lower than EPA de minimis
Mercury (Hg)	0.022 - 0.051	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.01	Lower than EPA de minimis
Nickel (Ni)	179.5 - 328.6	EPA/OAQPS Survey for Final NHSM Rule	---	---	0.04	Lower than EPA de minimis. Used nickel subsulfide de minimis of 0.04 conservative assumption.
Organics						
Benzene (C_6H_6)	3.1 - 8.3	Boiler Fuel Sample	---	---	ND	Lower than Traditional Fuel
Toluene (C_7H_8)	4.0-11.2	Boiler Fuel Sample			10 tpy	Lower then EPA de minimis

[1]MSDS for blowing agent is attached. May contain trace isomers of pentane other than n-pentane (i.e. iso- and cyclo-pentanes).

[2]Natural gas contaminant data and references taken from NCDENR Memorandum to Booker T. Pullen, from Donald van der Vaart, PhD, PE, JD

ND: No Data

DIVERSIFIED CPC INTERNATIONAL, INC.

Aeron®

MATERIAL SAFETY DATA SHEET

AERON n-PENTANE

REVISION DATE: Nov-2004

EMERGENCY TELEPHONE NUMBERS: (815) 423-5991 CHANNAHON PLANT
(800) 424-9300 CHEMTREC

(APPROVED BY U.S. DEPARTMENT OF LABOR 'ESSENTIALLY SIMILAR 'TO FORM LSB-OOS-4)

INFORMATION ON THIS FORM IS FURNISHED SOLELY FOR THE PURPOSES OF COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 AND SHALL NOT BE USED FOR ANY OTHER PURPOSE. USE OR DISSEMINATION OF ALL OR ANY PART OF THIS INFORMATION FOR ANY OTHER PURPOSE OR PURPOSES IS ILLEGAL.

PRODUCT NAME: **AERON n-PENTANE**

SECTION I PRODUCT IDENTIFICATION

CAS REGISTRY # : 109-66-0
CHEMICAL FAMILY : PARAFFIN SERIES HYDROCARBON
CHEMICAL NAME: n-PENTANE
CHEMICAL FORMULA: C5H12

SECTION II HAZARDOUS COMPONENTS

INGREDIENT	PERCENT	TLV (PPM)
n-PENTANE	100	1000

**** PHYSICAL HAZARD DUE TO FLAMMABLE NATURE. FLAMMABLE WHEN COMBINED WITH AIR. ****

SECTION III PHYSICAL DATA

BOILING RANGE: 97 F
VAPOR PRESSURE @ 70 DEG F: 8.6 PSIA
VAPOR DENSITY (AIR = 1.00): 2.5
SPECIFIC GRAVITY (H2O = 1.00) : 0.631
PERCENT VOLATILE BY VOLUME : 100%
SOLUBILITY IN WATER @ 70 °F: 0%

EVAPORATION RATE: > 1 (ETHYL ETHER = 1.0)
APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH SWEET PETROLEUM ODOR.

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD) : -40 F (ESTIMATED)
LOWER EXPLOSION LIMIT: 1.4% (VOL.) GAS IN AIR
UPPER EXPLOSION LIMIT: 7.8% (VOL.) GAS IN AIR
EXTINGUISHING MEDIA : DRY CHEMICAL EXTINGUISHER (B-C), WATER

SPECIAL FIRE FIGHTING PROCEDURES

STOP THE RELEASE OF MATERIALS IF POSSIBLE. COOL THE VAPOR SPACE OF THE STORAGE CONTAINER WITH WATER SPRAY. AVOID ACCUMULATION OF UNBURNED MATERIALS. REMOVE PERSONNEL IN GENERAL AREA. OBSERVE MAXIMUM ISOLATION WHEN EXTINGUISING FIRE. EXPANSION OF LIQUID AND CHANGE OF STATE FROM LIQUID TO VAPOR WILL ALLOW COMBUSTIBLE MIXTURE TO ENCOMPASS A LARGE AREA.

UNUSUAL FIRE AND EXPLOSION HAZARDS

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR MAY BE MOVED BY VENTILATION SYSTEMS AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, STATIC DISCHARGE, OR OTHER IGNITION SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

SECTION V HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE

INGESTION- ASPIRATION HAZARD!
INHALATION- INHALATION OF VAPOR MAY PRODUCE ANESTHETIC EFFECTS AND FEELING OF EUPHORIA. PROLONGED OVEREXPOSURE CAN CAUSE RAPID BREATHING, HEADACHE, DIZZINESS, NARCOSIS, UNCONSCIOUSNESS, AND DEATH FROM ASPHYXIATION, DEPENDING ON CONCENTRATION AND TIME OF EXPOSURE.
SKIN CONTACT- CAN CAUSE MODERATE SKIN IRRITATION.
EYE CONTACT- CAN CAUSE SEVERE IRRITATION, REDNESS, TEARING, BLURRED VISION, AND POSSIBLE FREEZE BURNS.

EMERGENCY FIRST AID PROCEDURES

INGESTION- DO NOT INDUCE VOMITING. CONTACT A PHYSICIAN IMMEDIATELY.
INHALATION- REMOVE TO FRESH AIR. IF BREATHING HAS STOPPED, RESTORE BREATHING AT ONCE. ADMINISTER OXYGEN AND GET MEDICAL HELP.
SKIN CONTACT- FOR LIQUID CONTACT, WARM AREAS GRADUALLY AND GET MEDICAL ATTENTION IF THERE IS EVIDENCE OF TISSUE DAMAGE. FLUSH AREA WITH PLENTY OF WATER.
EYE CONTACT- FOR LIQUID CONTACT, IRRIGATE WITH RUNNING WATER FOR MINIMUM OF 15 MINUTES. CONSULT PHYSICIAN IMMEDIATELY.

SECTION VI REACTIVITY DATA

STABILITY:	STABLE
HAZARDOUS POLYMERIZATION:	CAN NOT OCCUR
INCOMPATIBILITY (MATERIALS TO AVOID):	NONE
HAZARDOUS DECOMPOSITION PRODUCTS:	CARBON MONOXIDE, VOLATILE HYDROCARBON VAPORS
CONDITIONS TO AVOID:	HIGH HEAT, SPARK, AND OPEN FLAMES

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

CONTAIN THE SPILL. ELIMINATE SOURCES OF IGNITION. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH ABSORBENT MATERIAL. IF CONFINED SPACE - USE SELF CONTAINED BREATHING APPARATUS. CONSULT LOCAL FIRE AUTHORITIES.

WASTE DISPOSAL

(1) MECHANICAL RECOVERY
(2) BURN UNDER CONTROLLED CONDITIONS.
(3) DEPOSIT CONTAMINATED ABSORBENT IN DESIGNATED LANDFILL

*** COMPLY WITH ALL STATE AND LOCAL REGULATIONS ***

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS.
PROTECTIVE GLOVES:	IMPERVIOUS, INSULATED GLOVES RECOMMENDED
EYE PROTECTION:	FACESHIELD OR GOGGLES RECOMMENDED
OTHER:	IMPERVIOUS CLOTHING FOR PROLONGED OR REPEATED CONTACT

VENTILATION

MECHANICAL:	PROVIDE AS NEEDED TO KEEP CONCENTRATION IN AIR BELOW TLV AND LEL
LOCAL EXHAUST:	CONTINUOUS VENTILATION RECOMMENDED
SPECIAL:	EXPLOSION PROOF FANS AND MOTORS

SECTION IX SPECIAL PRECAUTIONS

WATCH FOR LEAKS AND SPILLS. KEEP CONTAINERS SEALED AND STORE IN COOL, WELL-VENTILATED AREA. BOND AND GROUND DURING LIQUID TRANSFER. PROVIDE MEANS TO CONTROL LEAKS AND SPILLS. PROTECT FROM SOURCES OF IGNITION. PROHIBIT SMOKING IN AREAS OF STORAGE OR USE.

SECTION X MISCELLANEOUS INFORMATION

TRANSPORT INFORMATION

PENTANE

3, FLAMMABLE LIQUID, UN1265, PG I
LABELED / PLACARDED FLAMMABLE LIQUID

NPCA - HMIS RATINGS

HEALTH	**1**
FLAMMABILITY	**3**
REACTIVITY	**0**
PERSONAL PROTECTION	**-**

(PERSONAL PROTECTION INFORMATION TO BE SUPPLIED BY THE USER)

REGULATORY INFORMATION

THE INGREDIENTS LISTED IN SECTION 2 ARE REPORTED/INCLUDED IN THE U.S. TSCA INVENTORY AND CANADIAN DOMESTICS SUBSTANCE LIST.