112(g) Case-By-Case Maximum Achievable Control Technology Determination
Review of Recovery Technology Solutions
Construction/Operation of an Oiled-based Roofing Material Recycling Facility
Located in Jackson, Georgia (Butts County)

NOTICE OF MACT APPROVAL

SIP Permit Application No. 21618
January 2013

Reviewing Authority

State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch
Stationary Source Permitting Program (SSPP)

Prepared and Reviewed By:

Keith Bentley – Chief, Air Protection Branch
Eric Cornwell – Program Manager, Stationary Source Permitting Program
David Matos – Chemical Unit Manager, Stationary Source Permitting Program
Chan Spraley – Environmental Engineer, Stationary Source Permitting Program

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

Recovery Technology Solutions (RTS) has applied for an air quality permit to construct and operate an oil-based roofing material recycling facility in Jackson, Georgia, in Butts County. Asphalt shingles and various oil-based flat-roof materials will be reduced into their basic components of asphalt oil, mineral granules, sand, calcium carbonates, and fiberglass through extraction and separation. These recovered components will be sold to off-site customers.

The facility will consist of Oil Extraction, Separation, and Solvent Recovery Process Equipment, Dryer, Rotochopper, Solid Screening Equipment, Toluene Storage Tank (20,000 gal), 4 Asphalt Oil Storage Tanks (40,000 gal each), Solvent Work Tank (2,100 gal), 20.1 MMBtu/hr Natural Gas Boiler, 4 MMBtu/hr Natural Gas Process Heater, Cooling Tower, and a Propane Storage Tank. Emissions from the facility include particulate matter (PM), particulate matter less than ten microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOCs), toluene (a HAP), other hazardous air pollutants (HAPs), and greenhouse gas (GHG) emissions expressed as carbon dioxide equivalents (CO_2e). Potential emissions for PM, PM_{10}, $PM_{2.5}$, NO_x, SO_2, and CO are below the PSD major source threshold of 249 tpy for each pollutant. Potential emissions for CO_2e are also below the PSD major source threshold of 100,000 tpy. Potential emissions of VOCs and HAPS are above the major source thresholds. Emissions for VOC are requested to be limited to 249 tpy for PSD avoidance. Potential emissions of the highest individual HAP (toluene) and Total HAP are above the 10/25 tpy HAP major source thresholds. Butts County has been designated by the U.S. Environmental Protection Agency (EPA) as attainment or unclassified for all criteria pollutants.

Under 40 CFR 63 Subpart A, Recovery Technology Solutions will be a major source of HAP emissions because it will have the potential to emit more than 10 tons per year of any individual HAP (toluene) or 25 tons per year of any combination of HAPs. As a newly constructed major source of HAPs without a promulgated Part 63 National Emission Standard for Hazardous Air Pollutants (NESHAP) for the type of facility planned, this facility is subject to a case-by-case Maximum Achievable Control Technology (MACT) determination pursuant to Section 112(g) of the Clean Air Act Amendments of 1990. The requirements for such case-by-case control technology reviews are codified in 40 CFR Part 63, Subpart B and adopted by reference, with a few revisions and clarifications, into the Georgia Rules for Air Quality Control.

To satisfy the 112(g) case-by-case MACT requirements (40 CFR 63.40 through 63.44, Control Technology Requirements in Accordance with Section 112(g)(2)(B) of the 1990 Clean Air Act Amendments), RTS submitted an application for a MACT determination specifying control technology that, if properly operated and maintained, will meet the MACT emission limitations or standards determined according to the principles set forth in 40 CFR 63.43(d). Since a solvent extraction process has never been used to extract asphalt from shingles in the past, their analysis of oilseed solvent extraction facilities indicates that case-by-case MACT should be based on the emissions limitations and work practice standards of 40 CFR 63 Subpart GGGG – *NESHAP: Solvent Extraction for Vegetable Oil Production*. The proposal included a solvent loss factor of 0.9 gallons per ton of shingles processed and the use of a Leak Detection and Repair (LDAR) program. The Division has determined that the emission rates, operating limits, and work practice standards of 40 CFR 63 Subpart GGGG – *NESHAP: Solvent Extraction for Vegetable Oil Production* meet the criteria to be a 112(g) case-by-case MACT determination.

RTS will be subject to the Title V operating permit program because actual and potential emissions of VOCs and HAPs will exceed the major source thresholds. RTS must submit an application for a Title V permit within one year of commencing operations at the Jackson facility.

2.0 APPLICATION INFORMATION

The permit application includes: an air quality permit application with process descriptions and an emissions inventory, 112(g) requirements. A toxic impact assessment was performed and included with the application. The toxic emissions impact from the construction and operation of the proposed facility is expected to be insignificant.

2.1 Applicant Name and Address

Recovery Technology Solutions, LLC
325 Alabama Boulevard
Jackson, Georgia 30233
Butts County

2.2 Authorized Representative

Tom Branhan
Chief Executive Officer

2.3 Application Submittals

January 2, 2013	Received date of initial SIP application and case-by-case MACT determination, assigned Application No. 21618.

3.0 BACKGROUND

The permit application and subsequent submittals include: an air quality permit application with process descriptions and an emissions inventory and required elements of the 112(g) case-by-case MACT determination. A toxic impact assessment was performed and included with the application. The toxic emissions impact from the construction and operation of the proposed facility is expected to be insignificant.

3.1 Facility Location

Recovery Technology Solutions submitted Application No. 21618 dated December 20, 2012 to construct and operate an oil-based roofing material recycling facility in Jackson, Georgia (Butts County). The proposed facility is designed to process up to 250 tons per day of oil-based roofing materials, including asphalt shingles and various oil-based flat-roof materials.

3.2 Permit Status of Facility Operations

As a new facility, the proposed Recovery Technology Solutions does not have any pre-existing air quality permits. The facility intends to begin construction in the Spring of 2014. The company will be required to submit a complete Title V application within twelve (12) months after the date that production operations commence at the Jackson facility.

3.3 Project Schedule

Construction on the proposed plant is expected to be completed in Fall 2014, and regular production operations are scheduled to commence in Fall 2014.

3.4 Proposed Operation

Recovery Technology Solutions intends to construct and operate an oil-base roofing material recycling facility. The proposed facility is designed to process up to 250 tons per day of oil-based roofing materials, including asphalt shingles and various oil-based flat-roof materials. The typical roofing shingles are composed of approximately 20% fiberglass matting, 25% asphalt oil, 30% filler (sand), and 25% aggregate (rock, mineral granules). Flat-roof materials are typically composed of 80-85% oil and 15-20% fiberglass. In the recycling process, shingles and flat-roof materials are broken down into their basic components (asphalt oil, mineral granules, sand, calcium carbonates, and fiberglass) through extraction and separation. Markets for the facility's final products include the asphalt industry, pavement industry, landscape block manufacturers, fiberglass insulation companies, and the concrete additives industry. RTS will partner with shingle manufacturers, re-roofing contractors and waste management companies to allow them to reduce costly disposal fees while minimizing the amount of construction and demolition waste being sent to landfills.

3.5 Estimated Emissions

The table below lists potential and projected actual emissions of criteria pollutants and HAPs from the entire facility.

Pollutant	Uncontrolled Annual Emissions (tons/yr)	Controlled Annual Emissions (tons/yr)
CO	9.5	9.5
NO_x	15.8	15.8
SO_2	0.3	0.3
VOC	249	75.5
$PM/PM_{10}/PM_{2.5}$	92.1	7.3
CO_2e	14,516.1	14,516.1
Toluene	249	74.3
Total HAP	249	74.5

4.0 PROCESS DESCRIPTION

4.1 Facility Description

Recovery Technology Solutions intends to construct and operate an oil-base roofing material recycling facility. The proposed facility is designed to process up to 250 tons per day of oil-based roofing materials, including asphalt shingles and various oil-based flat-roof materials.

Raw Material Receiving and Handling
Raw materials (oil-based roofing materials) will be delivered to the facility by truck. Waste material (flashing, wood, asbestos, and other contaminates) is removed and the raw material will be transported to a storage yard by wheel loaders. The raw materials have a natural moisture content of 10 to 20 percent. Due to the large size and high moisture content of the material, PM emissions are considered negligible from this operation.

Grinding and Storage
Roofing material will be transported from the storage yard to a skid mounted Rotochopper (Source Code RC01) and ground to 1.5 inch size. The electric-powered Rotochopper has a throughput capacity of 70 tons per hour. Water will be added to the grinding process to minimize dust and heat generation within the equipment. The Rotochopper is equipped with a magnet to remove any residual metal particles in the roofing material prior to further processing. From the Rotochopper, ground roofing materials will be conveyed to a storage building (500 tons capacity). A water sprinkler system will be used to control temperature and dust in the storage building. Due to the large size, moisture content of the material, and the water injection system on the Rotochopper, PM emissions from raw material grinding and storage are considered negligible.

Drying
Ground roofing material will be conveyed from the storage building to a dryer (Source Code DR01) via a lump breaker. The lump breaker allows for consistent feed to the dryer. Dryer DR01 is equipped with steam heated coils that provide warm air into the dryer (approximately 5^{o}F above ambient temperature) to reduce the moisture content of ground roofing material to less than 6% prior to entering the extraction process. Note that if the temperature in the dryer is too high, the ground roofing material will melt and bind onto itself. Because of the temperature requirement necessary for proper operation of the dryer, VOC emissions from the dryer are expected to be negligible. PM emitted from dryer DR01 will be controlled by a cyclone (Air Pollution Control Device ID CYC1) with control efficiency of 84.5% for PM and 69.0% for PM_{10}/$PM_{2.5}$. Please note that no metal HAP emissions are expected from the dryer because residual metal particles are removed by the magnet in the Rotochopper prior to drying.

Extraction and Separation Processes
From dryer DR01, the dried roofing materials will be conveyed into two extractors. Toluene from the storage tank (Source ID ST01) or work tank (Source ID ST04) will be added to the extractors to immerse the roofing material. The proprietary extraction process uses a countercurrent continuous approach to ensure maximum extraction of oil from the roofing material with minimal solvent use. The extraction process equipment is designed to process 250 tons per day (tpd) roofing materials.

In the extractors, miscella (toluene laden oil) flows counter-current to the solids flow. As the two streams come in contact, the miscella becomes more concentrated with oil as toluene extracts the oil from solids. Additionally, fresh toluene will be added to the extractors to wash the solids prior to discharge to maximize the overall effectiveness of the extraction process. Products from the extraction process are miscella and toluene laden solids (containing approximately 20% residual toluene). Solvent vapor from the extractors is vented to the vent header to the solvent recovery system. The solvent recovery system consists of a vent condenser and a mineral oil scrubber system (MOS). See section 2.1.6 for details on the solvent recovery system. Toluene recovered in the solvent recovery system will be reused in the process.

Separation Process - Miscella
From the extractors, the miscella is sent to a distillation system (via filters) to separate oil and toluene. The distillation system consists of a first stage evaporator followed by a stripper. Vapor from the distillation system goes through a condenser and is vented back to the vent header. Oil leaving the miscella stripper is pumped through a thin film evaporator (TFE) for final stripping. The TFE is also equipped with a condenser that is vented back to the vent header. The final product from the distillation system is oil (containing approximately 1,000 ppm toluene). The oil will be stored in one of the four storage tanks (Source Code ST03) prior to offsite transfers. Vapors from storage tank ST03 and oil loadout operations will be routed back to the vent header, and any collected toluene will be reused in the extraction process.

Separation Process - Toluene Laden Solids
Solids from the extractors (containing approximately 20% toluene) along with fines collected by the miscella filters are sent to a desolventizer using a vapor tight conveyor feeding system. The desolventizer consists of steam-heated trays to separate toluene and solids. Additionally, direct steam will be added to the desolventizer to facilitate separation of toluene and solids. Vapor from the desolventizer goes through a condenser and is vented back to the vent header. Clean solids from the desolventizer will go through a screening process prior to offsite transfers.

<u>Solid Screening Process and Solid Products Loadout</u>
In the screening process (Source Code SC01), clean solids from the desolventizer are separated to sand, rock and fiber material. SC01 is equipped with a fabric filter to collect dust from the screening process. The material collected in the filter will also be sold as product. After the screening process, rock and sand will be transported by bucket loader to a truck or rail loadout area. Meanwhile, the fiber material from the screening process will be baled prior to offsite transfers.

<u>Vent Header/Solvent Recovery System</u>
All solvent vapors from the extraction and separation process equipment, and storage tanks ST01, ST03, and ST04 are vented to the vent header for toluene recovery. The vent header consists of a vent condenser and mineral oil scrubber system (MOS). Since all recovered toluene will be reused in the process, the vent condenser and MOS system are considered inherent process equipment and not air pollution control devices.

The majority of toluene in the solvent vapor stream will be recovered in the vent condenser and sent to the solvent work tank (Source Code ST04). The uncondensed vapor is vented to the mineral oil scrubber system (MOS) consisting of absorption and stripper columns. Uncondensed vapor from the vent condenser enters the bottom of the absorption column and rises through the tower packing. Meanwhile, cold mineral oil is admitted at the top of the column. As the vapor stream comes in contact with oil, toluene in the vapor stream is absorbed by the mineral oil and the desolventized gases are drawn off through a demister at the top venting to the atmosphere (Stack ID S001). The toluene laden mineral oil leaves the bottom of the absorption column and is pumped through a heat exchanger to the top of the MOS stripper column. In the stripper column, steam is used to separate toluene and mineral oil. The toluene vapors drawn off at the top of the stripping column is routed back to the vent condenser. Toluene-free mineral oil leaves the bottom of the stripper and goes through a heat interchanger back to the top of the absorption column where the cycle is repeated. An additional chiller system may be added to the mineral oil system to further improve efficiency.

The recovered toluene from all condensers in the process is sent to the solvent work tank (Source Code ST04). This tank is designed to separate water and toluene by gravity (using differences in density between the two liquids). Part of the tank is also used for working storage of toluene before it is used in the extractors. Toluene is slightly miscible in water, so the wastewater from ST04 will contain a small amount of toluene making it necessary to distill the toluene from the stream before discharging to the sewer. Consequently, a stripping column is provided to remove residual toluene from water. The toluene vapor from the column is condensed in a process condenser and then sent back to the work tank ST04. The bottom of the distillation column (water) will be discharged to the sewer. Vapor from the solvent work tank ST04 and toluene stripper process condenser are vented to the vent header.

Ancillary Equipment

Ancillary equipment will include the following:

- A 20.1 MMBtu/hr boiler for steam generation (Source Code B001). The boiler will burn natural gas as the primary fuel, with propane as backup fuel.
- A 4.0 MMBtu/hr process heater (Source Code H001) will be used to heat oil for the closed loop hot oil system. The hot oil system will also provide indirect temperature control for oil storage tank ST03. The process heater will burn natural gas as the primary fuel, with propane as backup fuel.
- One 100 HP Electric Motor Fire Pump.
- A cooling tower at 34 gpm capacity.
- Propane storage tank (1,000 gallon).
- Mineral oil drum (55 gallon).

4.2 Emission Controls

The pollutants of concern include NO_x, SO_2, PM, CO, volatile organic compound (VOC), HAP, and Toluene. Greenhouse gas (GHG) emissions are also estimated.

NO_x, SO_2, CO, and CO_2 are emitted as products of combustion from the fuel burning equipment at the facility. PM, PM_{10}, and $PM_{2.5}$ are also emitted from the fuel burning equipment, however, the majority of PM/PM_{10}/$PM_{2.5}$ emissions are from dryer DR01. VOC and HAP (toluene) are also emitted from the fuel burning equipment in small amounts; however the majority of VOC and HAP (toluene) emissions are from solvent losses in the process.

The extraction process equipment is designed to process 250 tpd roofing material. It is expected that there may be small fluctuations above and below this capacity due to the variation of raw material. There is no physical constraint that will limit the processing rate of the facility. However, to ensure product quality and operation efficiency, the designed process rate of 250 tpd is not expected to be exceeded. If the processing rate increased significantly over the designed rate, product quality could decrease and the extraction process may not be running efficiently (e.g., in relation to toluene loss).

The primary emissions from the proposed facility are toluene losses from oil extraction and separation, and solvent recovery processes (Source ID GP01). As discussed in the previous sections, all of the extraction and separation process equipment and toluene-containing storage tanks (ST01, ST03, and ST04) are vented to the vent header to recover toluene. The vent header consists of a vent condenser and mineral oil scrubber system. It is designed to maximize toluene recycling and, thereby, minimizing toluene emissions. The solvent recovery process equipment is considered inherent process equipment, rather than an air pollution control device because the recovery of toluene is essential for process safety (due to flammability of the solvent) and economics of the project. The estimated solvent recovery rate is 95 percent based on mass balance methodology.

The total solvent (toluene) loss rate for GP01 is estimated to be 0.9 gallons per ton of roofing material processed. This value was estimated by the equipment design vendor and provided to RTS as a guarantee. The total solvent loss rate of 0.9 gal/ton includes solvent losses for which there are no corresponding roofing material processed (i.e.: due to malfunctions, off-spec materials, etc.). These losses are already accounted for in the steady-state air emissions which are based on the total possible air flow into the system assuming it is all emitted into the air (at toluene concentration of 90% LEL). Furthermore, the total solvent loss rate of 0.9 gal/ton also includes solvent losses to water and products (oil and solids), none of which is considered air emissions. Using a solvent loss rate of 0.9 gal/ton and a maximum production rate of 250 tpd, the toluene PTE for GP01 was estimated to be 286.2 tpy. Since toluene is also a VOC, the VOC PTE for GP01 was set equal to the toluene PTE of 286.2 tpy. The facility is requesting a PSD avoidance limit of 249 tpy VOC. Please note that the PTEs of toluene and VOC are conservative and do not represent the predicted actual air emissions for the reasons described in this paragraph.

The toluene predicted actual air emissions of GP01 are shown in Table 3.2 in the application and also below.

GP01	**Toluene Predicted Actual Emissions (tpy)**	**VOC Predicted Actual Emissions (tpy)**
Steady-State Air Emissions	15.1	Same as toluene
Steady-State Fugitives	39.4	Same as toluene
Other System Losses – Process Equipment Cleaning	19.8	Same as toluene
TOTAL	**74.3**	**Same as toluene**

5.0 EMISSION RATES AND CHANGES

The methodologies used to quantify emissions from the emissions units at the RTS facility are summarized in this section of the Notice of MACT Approval. The emission rates are calculated for all of the operations of the proposed facility. Projected emission rates are estimated by multiplying an emission factor by an associated process rate.

5.1 Case-by-Case MACT Applicability Under Section 112(g) of the 1990 CAAA

A newly constructed or reconstructed major source of HAP without a promulgated Part 63 NESHAP will be subject to the requirements 40 CFR 63.40 through 63.44, including a case-by-case MACT determination as described by the Section 112(g) of the 1990 Clean Air Act Amendments. The proposed RTS facility is a "construct[ion] of a major source" as defined by 40 CFR 63.41. The facility will not be a reconstruction or modification of an existing site, and it will be a major source of HAP because it will have the potential to emit more than 10 tons per year of any individual HAP or 25 tons per year of any combination of HAPs.

5.2 HAP Emissions Profile

The primary HAP emissions from the proposed facility are toluene losses from the Oil Extraction, Separation, and Solvent Recovery Process Equipment (Source Code GP01). As discussed in the previous sections, all of the extraction and separation process equipment and toluene-containing storage tanks (ST01, ST03, and ST04) are vented to the vent header to recover toluene. The vent header consists of a vent condenser and mineral oil scrubber system. It is designed to maximize toluene recycling and, thereby, minimizing toluene emissions. The solvent recovery process equipment is considered inherent process equipment, rather than an air pollution control device because the recovery of toluene is essential for process safety (due to flammability of the solvent) and economics of the project. The estimated solvent recovery rate is 95 percent based on mass balance methodology. Hexane is emitted from the burning of natural gas in the 20.1 MMBtu/hr boiler (Source Code B001). The table below provides a speciation of the HAP emissions from the facility, before (potential) and after (actual) controls.

HAP	Uncontrolled Annual Emissions (tons/yr)	Controlled Annual Emissions (tons/yr)	Comment
Toluene	286.2	74.3	Abated by Solvent Recovery Process
Hexane	0.2	0.2	No controls
Total HAP	**286.4**	**74.5**	

6.0 MAXIMUM AVAILABLE CONTROL TECHNOLOGY (MACT) ANALYSIS

A 112(g) case-by-case MACT determination is required for this facility. MACT emission limitation for new sources is defined as:

> "…the emission limitation which is not less stringent that the emission limitation achieved in practice by the best controlled similar source, and which reflects the maximum degree of deduction in emissions that the permitting authority, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable by the constructed or reconstructed major source." 40 CFR 63.41.

The requirements of the determination are set forth in 40 CFR 63.40 through 63.44.

6.1 MACT Technical Approach

Because EPA could not immediately issue MACT standards for all industries (and there was a potential for significant new sources of toxic air emissions to remain uncontrolled), section 112(g) of the Clean Air Act acts as a "gap-filler" requiring MACT-level control of air toxics when a new major source of HAP is constructed or reconstructed. The facility provides basic information about the source and its potential emissions through its air quality permit application. The application also specifies the emission controls that will ensure that new source MACT will be met. The Division reviews and approves (or disapproves) the application, and provides an opportunity for public comment on the determination.

The principles of a 112(g) case-by-case MACT determination are outlined in 40 CFR 63.43(d)(1) through (4) as follows:

> (d) *Principles of MACT determinations.* The following general principles shall govern preparation by the owner or operator of each permit application or other application requiring a case-by-case MACT determination concerning construction or reconstruction of a major source, and all subsequent review of and actions taken concerning such an application by the permitting authority:
>
> (1) The MACT emission limitation or MACT requirements recommended by the applicant and approved by the permitting authority shall not be less stringent than the emission control which is achieved in practice by the best controlled similar source, as determined by the permitting authority.
>
> (2) Based upon available information, as defined in this subpart, the MACT emission limitation and control technology (including any requirements under paragraph (d)(3) of this section) recommended by the applicant and approved by the permitting authority shall achieve the maximum degree of reduction in emissions of HAP which can be achieved by utilizing those control technologies that can be identified from the available information, taking into consideration the costs of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements associated with the emission reduction.
>
> (3) The applicant may recommend a specific design, equipment, work practice, or operational standard, or a combination thereof, and the permitting authority may approve such a standard if the permitting authority specifically determines that it is not feasible to prescribe or enforce an emission limitation under the criteria set forth in section 112(h)(2) of the Act.

(4) If the Administrator has either proposed a relevant emission standard pursuant to section 112(d) or section 112(h) of the Act or adopted a presumptive MACT determination for the source category which includes the constructed or reconstructed major source, then the MACT requirements applied to the constructed or reconstructed major source shall have considered those MACT emission limitations and requirements of the proposed standard or presumptive MACT determination.

6.2 Potential Control Options

The operations at the proposed Recovery Technical Solutions facility were evaluated for potential applicability under NESHAPs that have already been promulgated. No currently promulgated NESHAP under 40 CFR Part 63 will be applicable to the extraction, separation, and solvent recovery processes at the proposed RTS facility.

RTS facility has only one major emission source of HAPs which is the Oil Extraction, Separation, and Solvent Recovery Process Equipment (Source Code GP01). The Oil Extraction, Separation, and Solvent Recovery Process Equipment (Source Code GP01) was evaluated to determine the appropriate MACT level controls under Section 112(g) of the 1990 Clean Air Act Amendments. As mentioned above, there is no relevant NESHAP standard currently promulgated for the roofing material oil extraction industry and no actual process data or historical examples of control equipment available. Therefore, there are no direct comparisons that can be made pursuant to 40 CFR 63.43(d)(4). However, because the facility's processes and equipment are similar to those of oilseed extraction facilities, parallel comparisons were made to NESHAP Subpart GGGG – Solvent Extractions for Vegetable Oil Production where appropriate. The review of best-controlled similar sources included an evaluation of Producers Cooperative Oil Mill, Archer Daniels Midland-Fremont, AG Processing Inc., Bunge North America, Mankato, and Cargill Oilseeds Division, which are Vegetable Oil or Soybean Oil Manufacturing facilities that use similar process equipment to those used in the roofing material oil extraction process and which has been subject to case-by-case BACT control technology reviews in the past. Emissions from the two similar processes are both generated from solvent losses and are expected to be in the same order of magnitude. The process design vendor designed the extraction process for RTS based on the oilseed extraction process technology. Solvent losses from the two similar process emission units are minimized using process condensers and mineral oil scrubber

Potential control strategies and technologies evaluated for HAP emissions included the following:

- Solvent Loss Cap
- Raw Material Requirements: Consideration and testing of other solvents was conducted
- Process Changes: Not applicable because this is the first plant of its kind.
- Add-on Controls: Condensers and Mineral Oil Scrubbers
- Others: Leak Detection and Repair Program

6.3 Technical Feasibility Review

A control method or technology is considered available if it can be obtained through commercial channels or applied within the common sense meaning of the term. An available control technology is applicable if it can reasonably be installed and operated. A technology that is both available and applicable is technically feasible. EPA has identified the potential control options in the proposed MACT standard as being available and applicable.

6.4 Company's Proposed MACT for HAP Control

As stated above, there is no relevant NESHAP standard currently promulgated for the roofing material oil extraction industry and no actual process data or historical examples of control equipment available. Therefore, there are no direct comparisons that can be made pursuant to 40 CFR 63.43(d)(4). However, because the facility's processes and equipment are similar to those of oilseed extraction facilities, parallel comparisons were made to 40 CFR 63 Subpart GGGG – Solvent Extractions for Vegetable Oil Production where appropriate.

Solvent Loss Cap

RTS proposes a solvent loss cap of 0.9 gallons per ton of roofing material processed. No cap on material (solvent) usage is proposed. Compliance with the proposed solvent loss cap will be achieved by utilizing a solvent recovery system that is designed to maximize solvent (toluene) recovery. All recovered solvent will be reused in the process. Furthermore, the solvent recovery system equipment is considered inherent process equipment, rather than an air pollution control device because the recovery of toluene is essential for process safety (due to flammability of the solvent) and economics of the project

Raw Material Requirements

Toluene has been selected as the preferred solvent for this novel oil extraction process by the design vendor based on research and pilot-scale development. The selection of toluene was based on feasibility, product quality and cost effectiveness of the roofing material oil extraction process.

Toluene is an organic solvent commonly produced from refining crude oil during the production of gasoline. It is a common industrial solvent widely used for paints, paint thinners, cleaning solvents, fuel additives, and other chemical and manufacturing processes. Industrial and commercial use of toluene has increased in past years, as it is a practical replacement for benzene (benzene is classified as a human carcinogen). Gasoline contains approximately 5 to 7 percent toluene, so toluene is a common airborne emission from fuel storage and transportation, and combustion use.

Consideration and testing of other solvents was conducted during various stages of the research and development work on this oil extraction process. Other solvents considered include:

- Hexane: Hexane is the primary solvent used in oilseed extraction; however, it does not dissolve oil in roofing material as effectively as toluene. Replacing toluene with hexane would increase the solvent requirement by approximately four times. Consequently, utility consumption (steam and electrical) to store, handle, and distill this additional solvent volume would increase proportionately. In addition, process and storage equipment would need to be increased in size. Therefore, emissions losses are expected to increase as well due to the increased volume of solvent handled.
- MCl - Methylene Chloride: MCl is a solvent/thinner used in paints, aerosol propellant, and insecticide. MCl is classified as a probable human carcinogen. This solvent also does not dissolve oil in roofing material as effectively as toluene. Replacing toluene with MCl would increase the solvent requirement by approximately 1.5 times. Furthermore, MCl has a relatively low boiling point which would require refrigeration of the condensing systems.
- TCE - Trichloroethylene: TCE is a common degreaser and anesthetic. TCE is also commonly used for cutting and dissolving oil for testing purposes. For example, American Society for Testing and Materials (ASTM) specifications for oil properties utilize TCE for solubility testing. However, TCE is heavier than water, which complicates the process waste water separation and distillation process. It is also considered a possible human carcinogen.
- Acetone: Acetone is a solvent commonly found in nail polish remover, and used in plastics production, fiberglass and epoxies. Acetone has a very poor ability to dissolve oil.
- Vertrel (DuPont): Vertrel is very expensive, and its performance in the oil extraction process is similar to that of hexane. In addition, Vertrel is not readily available in quantities needed for this process.

- Xylene: Xylene is used in plastics, fuels, paints, and thinners. Xylene does not dissolve oil in roofing material as effectively as toluene. Replacing toluene with xylene would increase the solvent requirement by approximately 1.5 times. Xylene also has a higher boiling point than toluene, which increases the difficulty of desolventizing oil because it requires more heat, and therefore, a higher steam pressure. Also, xylene is problematic as it degrades commonly used gasket and hose materials.

In conclusion, after consideration and testing of other solvents, toluene was selected as the preferred solvent in the roofing material oil extraction process.

Process Changes
As this is the first plant of its kind, process changes for MACT are not applicable. The solvent recovery technology proposed represents the highest level of recovery known for this type of process at this time.

Add-On Controls
As mentioned above, there is no relevant NESHAP standard currently promulgated for the roofing material oil extraction process, and no actual process data or historical examples of control equipment available. Therefore, there are no direct comparisons that can be made pursuant to 40 CFR 63.43(d)(4). A review of the RBLC database was conducted to determine a MACT floor which is defined in §63.51 as follows:

Maximum Achievable Control Technology (MACT) floor means:
(2) For new sources, the emission limitation achieved in practice by the best controlled similar source.

The RBLC search covered entries from January 1, 2002 to November 1, 2012 within Process Code 70.300 (Vegetable Oil Manufacturing) and 70.650 (Soybean Oil Manufacturing). The Vegetable Oil Manufacturing and Soybean Oil Manufacturing processes are determined to be similar sources (as defined in §63.51) for this Case-by-Case MACT analysis:

Similar source means that equipment or collection of equipment that, by virtue of its structure, operability, type of emissions and volume and concentration of emissions, is substantially equivalent to the new affected source and employs control technology for control of emissions of hazardous air pollutants that is practical for use on the new affected source.

Additionally, the EPA document Guidelines for *MACT Determinations Under Section 112(j) Requirements* states that at least two questions should be answered to determine if an emission unit is similar:

1. Do the two emission units have similar emission types?
   The process equipment used in the vegetable/soybean oil extraction process is similar to those used in the roofing material oil extraction process. Furthermore, emissions from the two emission units are generated from solvent losses throughout the process and are expected to be in the same order of magnitude. Therefore, it was determined that the two emission units have similar emission types. See Appendix E from the application for detail discussion of process emissions.
2. Can the emission units be controlled with the same type of control technology?
   The process design vendor designed the extraction process for RTS based on the oilseed extraction process technology. Solvent losses from the two emission units (vegetable/soybean oil extraction and roffing material oil extraction) are minimized using process condensers and mineral oil scrubber. Therefore, it was determined that the two emission units can be controlled with the same type of control technology.

Consequently, following the U.S. EPA document Guidelines for *MACT Determinations Under Section 112 (j) Requirements*, Process Code 70.300 (Vegetable Oil Manufacturing) and 70.650 (Soybean Oil Manufacturing) are determined to be similar sources to the proposed facility.

As shown in Table 3.1 of the application, the applicable add-on control equipment is a condenser with a mineral oil absorber. Therefore, installation of a process condenser and mineral oil scrubber established the MACT floor for this analysis. Note that RTS considers the process condenser and mineral oil scrubber system (part of the vent header system) as inherent process equipment because toluene recovered from the system is reused in the process and the recovery rate is essential for the economics of the facility.

Additionally, as part of Best Management Practices (BMP), RTS will implement a Leak Detection and Repair (LDAR) program. The LDAR program will include routine visual inspection and instrument monitoring. RTS will define the type of equipment to monitor, monitoring frequency, monitoring method (e.g.: EPA Method 21), and repair requirements. LDAR records will be kept onsite.

Based on the EPA Air Pollution Control technology Fact Sheet, VOC removal efficiencies for gas absorbers are normally in excess of 90%, depending on the pollutant-solvent system and the type of absorber used. The typical collection efficiency range from 50% to 95% with lower control efficiencies represent flows containing relatively insoluble compounds at low concentrations, while the higher efficiencies are for flows which contain readily soluble compounds at high concentrations. Therefore, the use of the mineral oil scrubber with expected solvent recovery efficiency of 95% will represent the maximum emissions reduction control technology. Although this level of control is less than the level of control proposed by AG Processing Sergeant Bluff (RBLC Record IA-0103) for control of VOC, as there are no reported instances which could be found of a control technology established for control of toluene from a roofing material oil extraction process, 95% solvent recovery efficiency is proposed as sufficient to satisfy MACT.

Proposed MACT Emission Limitation

The proposed MACT emission limit for RTS is a solvent loss cap of 0.9 gallons of toluene per ton of roofing material processed (see section 3.1). The proposed limit was developed based on promulgated NESHAPs for similar sources (i.e. NESHAP Subpart GGGG - Solvent Extraction for Vegetable Oil Production). Table 1 of NESHAP Subpart GGGG provides the allowable HAP loss for the source category. The allowable solvent loss factor for new oilseed sources ranges from 0.2 gal/ton (for conventional oilseed process) to 1.5 gal/ton (for specialty oilseed process). The proposed MACT emission limit of 0.9 gal/ton solvent loss is appropriate for RTS because of the following differences between the roofing material oil extraction process and the oilseed process:

- Differences in material (oilseed vs. ground roofing material) and solvent (hexane vs. toluene) will affect the solvent recovery rate between the two processes. Note that hexane is relatively insoluble in water, while toluene is somewhat soluble in water. This requires an extra step in the roofing material processing to remove toluene emissions from process water that is not required for hexane recovery in oilseed processing.

- Differences in production scale of the plant. The proposed plant is considered small in comparison with typical oilseed recovery facilities. Therefore, a higher solvent lost rate is expected from the proposed facility (the smaller facility). Higher solvent loss rates in smaller facilities are also consistent with the solvent loss rates in NESHAP Subpart GGGG where smaller specialty processes have a higher allowable solvent loss rate than conventional large scale processes. For example, the solvent loss limit for conventional oilseed plants is 0.2 gallons per ton of oilseed processed; whereas the solvent loss limit for oilseed specialty plants is 1.5 gallons per ton of oilseed processed.

6.5 Proposed Compliance Demonstrations, Performance Testing, and Monitoring Requirements

The extraction process is designed to be vapor tight. The facility's primary incentive to minimize solvent loss is to achieve high quality final products, as more solvent in the final product reduces its overall quality. The facility also has an incentive to recover as much solvent as possible to reduce the quantity of fresh solvent that needs to be purchased. The process equipment is designed to maximize toluene recycling and reuse in the process system. Additionally, RTS will implement an LDAR program.

The following sections were developed following 40 CFR 63 Subpart GGGG requirements

Initial Compliance Demonstration
RTS will submit an initial notification for new sources and appropriate notification of compliance status. The compliance date is the startup date of the facility. Additionally, there will be an initial startup period which can last for up to six calendar months. During the initial startup period, RTS will meet the requirements and schedules for demonstrating compliance for a new source operating under an initial startup period.

RTS will notify the Georgia EPD of the actual date of startup within 15 calendar days. The compliance plan will provide detailed procedures to monitor and record data necessary for demonstrating compliance. The plan will be kept onsite for the operating life of the facility. If any changes are made, previous versions of the plan will be kept and made readily available for five years. The plan will include the following:

1. Name and address of the owner or operator.
2. Physical address of the process.
3. Detailed description of all methods of measurement used to determine solvent losses and the tons of roofing material processed.
4. When each measurement will be made.
5. Examples of the calculations used to determine compliance status.
6. Example logs of how data will be recorded.
7. Plan to ensure the data continue to meet compliance demonstration needs.

The table below summarizes the proposed compliance demonstration requirements.

Table 6.5 – Proposed Compliance Demonstration Requirements

RTS is required to….	For periods of normal operation?	For initial startup periods?
Operate and maintain the source in accordance with general duty provisions of §63.6(e).	Yes and HAP solvent loss cap also apply	Yes, RTS is required to minimize emissions to the extent practicable throughout the initial startup period as described in the SSM Plan.
Determine and record the extraction solvent loss in gallons.	Yes	Yes
Record the volume fraction of HAP present at greater than 1 percent by volume and gallons of extraction solvent in shipment received.	Yes	Yes
Determine and record the tons of roofing material processed.	Yes	Yes
Determine the weighted average volume fraction of HAP in extraction solvent received by end of the following calendar month.	Yes	No, the HAP volume fraction in any solvent received during an initial startup period is included in the weighted average HAP determination for the next operating month.

Determine and record the actual solvent loss, weighted average volume fraction HAP, roofing material processed, and compliance ratio for each 12 month operating month period by the end of the following calendar month.	Yes	No, RTS is not required to determine the compliance ratio with data recorded for an initial startup period.
Submit a Notification of Compliance Status or Annual Compliance Certification.	Yes	No
Submit a Deviation Notification Report by the end of the calendar month following the month in which you determined that the compliance ratio exceeds 1.00.	Yes	No, since RTS is not required to determine the compliance ratio with data recorded for the initial startup period.
Submit a Periodic SSM Report	No, a SSM activity is not categorized as normal operation.	Yes
Submit an Immediate SSM Report	No, a SSM activity is not categorized as normal operation.	Yes, only if RTS does not follow the SSM Plan.

Ongoing Compliance Demonstration

RTS will submit necessary ongoing compliance certification, as well as periodic SSM reports when process downtime is scheduled and immediate SSM reports when downtime is unscheduled and will result in increased air emissions. RTS will maintain all records and reports for a period of five years following the date of occurrence, measurement, corrective action, report, or record. Material usage, solvent loss, and compliance ratios, and total throughput will be recorded. Recordkeeping will begin on the startup date of the facility. The first compliance ratio will be determined by the end of the calendar month following the first 12 operating months after termination of the initial startup period, which can last for 6 months. The first compliance ratio will be based on information recorded during the first 12 operating months after the initial startup period.

An operating month is a calendar month in which RTS processes roofing material is not operating under an initial startup period or malfunction period. The 12-month compliance ratio may include operating months occurring prior to a source shutdown and operating months that follow after the source resumes operation. If the source shuts down and processes no roofing material for an entire calendar month, that month is categorized as a non-operating month. Any initial startup period, any solvent and roofing material information recorded for the initial startup period will be excluded from the compliance ratio. Any solvent or roofing material information that occurred during a malfunction period will also be excluded from the compliance ratio determination. A malfunction, as defined in the 40 CFR 63 General Provisions, is any sudden, infrequent, and not reasonably preventable failure of process equipment or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

The MACT solvent loss cap will limit the number of gallons of toluene lost per ton of roofing material processed. For each operating month, RTS will calculate a compliance ratio using Equation 1 below to compare the actual HAP loss to the allowable HAP loss for the previous 12 operating months. If the compliance ratio calculated per Equation 1 is less than or equal to 1.00, RTS is in compliance with the solvent loss cap. An operating month is any calendar month in which RTS processes any quantity of roofing material, excluding any entire calendar month in which RTS operates under an initial startup period or under a malfunction period. An operating month may include time intervals characterized by several types of operating status. However, an operating month must have at least one normal operating period.

$$\text{Compliance Ratio} = \frac{\text{Actual HAP loss}}{\text{Allowable HAP loss}} \quad \text{(Equation 1)}$$

While RTS anticipates using 100 percent toluene as the solvent, it is possible that future solvent will contain chemicals that are not classified as HAPs. Equation1 can be expressed as a function of total solvent loss as shown below in Equation 2.

$$\text{Compliance Ratio} = \frac{f * \text{Actual Solvent Loss}}{0.9 * \text{Roofing Material}} \quad \text{(Equation 2)}$$

Where:

f = Weighted average volume fraction of HAP in solvent received during the previous 12 operating months (dimensionless)

Actual Solvent Loss = Actual Solvent Loss calculated per Equation 4 below

0.9 = Solvent Loss Cap (gal/ton) required for MACT compliance

Roofing Material = Tons of roofing material processed during the previous 12 operating months

To determine the weighted average volume fraction of HAP in the actual solvent loss, RTS will record the volume fraction of each HAP comprising more than 1 percent by volume of the solvent in each solvent delivery. To determine HAP content, reference a material safety data sheet or a manufacturer's certificate of analysis. The weighted average volume fraction of HAP for an operating month includes all solvent received since the end of the last operating month.

$$\text{12 - month Weighted Average of HAP Content in Solvent Received (volume fraction)}$$
$$= \frac{\sum_{i=1}^{n} \left(\text{Received}_i * \text{Content}_i\right)}{\text{Total Received}} \quad \text{(Equation 3)}$$

Where:

Received_i = Gallons of extraction solvent received in delivery "i"

Content_i= Volume fraction of HAP in extraction solvent delivery "i"

Total Received = Total gallons of extraction solvent received since the end of the previous operating month

n = Number of extraction solvent deliveries since the end of the previous operating month

When RTS has processed roofing materials for 12 operating months, sum the products of the monthly weighted average HAP volume fraction and corresponding volume of solvent received and divide by the total volume of solvent received for the 12 operating months. Record the result by the end of each calendar month and use in Equation 2 to determine the compliance ratio.

Actual solvent loss will be calculated for normal operating months. RTS will measure and record the solvent inventory on the beginning and ending dates of each normal operating period that occurs during an operating month. Solvent inventory will only be measured and recorded when the facility is processing roofing material to avoid artificially inflating the solvent inventory when transferring solvent to storage tanks. The total gallons of toluene received in each shipment will be recorded. As the process recycles and recovers toluene, the quantity of recovered toluene will be quantified and included in the gallons of toluene received. Solvent inventory may be adjusted when necessary with reasonable justification. Reasonable justification may include changes in solvent working capacity.

$$\text{Monthly Solvent Loss (gal)} = \sum_{i=1}^{n} \left(SOLV_B - SOLV_E + SOLV_R \pm SOLV_A\right) \quad \text{(Equation 4)}$$

Where:

$SOLV_B$ = Gallons of toluene in the inventory at the beginning of a normal operating month
$SOLV_E$ = Gallons of toluene in the inventory at the end of a normal operating month
$SOLV_R$ = Gallons of toluene received between the beginning and ending inventory dates of a normal operating month
$SOLV_A$ = Gallons of toluene added or removed from the inventory

The actual solvent loss is the total solvent loses during the normal operating periods for the previous 12 operating months. RTS will record the actual solvent loss by the end of each calendar month following an operating month and use it to calculate the compliance ratio. If there is no roofing material processed during the month, there is no compliance ratio determination.

Performance Testing
RTS will not conduct performance testing. Compliance with the MACT solvent loss cap is determined based on the quantity of solvent lost. NO solvent is being destroyed, so there is no control efficiency testing to be conducted.

Initial Compliance Certification
RTS will submit initial notification of the actual startup date of the facility within 15 days of that startup date. The initial notification of compliance status will be consistent with the 40 CFR 63 Subpart A- General Provisions.

Ongoing Compliance Certification
Consistent with 40 CFR 63, Subpart A - General Provisions, RTS will submit ongoing annual compliance certifications. The certifications will include any periods of noncompliance and actions taken to come back into compliance.

Notice of Failure to Follow Plans
RTS plans on following its SSM Plan. In the event that the SSM Plan is not followed, RTS will provide the required notifications. The proposed SSM Plan is detailed in the section below – "Startup, Shutdown and Malfunction Plan."

Record Retention
RTS will maintain all records and reports in a form suitable and readily available for inspection and review. The reports and records shall be retained for at least 5 years following the date of each occurrence, measurement, maintenance, corrective action, report, or record.

Required Records
RTS will keep the records needed to document compliance demonstrations. These records include material usage records, production records, HAP content of solvent used, employee training records, source test results, and emissions data.

Startup, Shutdown and Malfunction Plan
RTS will prepare and implement a startup, shutdown, and malfunction (SSM) plan that complies with §63.6(e) of the 40 CFR 63 General Provisions. It will provide detailed procedures for operating and maintaining the facility to minimize emissions during a qualifying SSM event. The SSM Plan will specify a program of corrective action for malfunctioning process equipment and reflect the best practices to minimize emissions. Some or all of the procedures may come from other plans, such as a Standard Operating Procedure manual or an Occupational Safety and Health Administration (OSHA) Process Safety Management plan.

Due to the fugitive emissions of toluene associated with the extraction process equipment, the difficulty in quantifying the volume of toluene that is in the process at any given time, and the unexpected nature of process failures, capturing and measuring solvent loss during periods of SSM would be infeasible and would likely result in measurement errors. Since emissions from SSM events cannot be accurately quantified, it is not appropriate to set numeric limits during periods of SSM. For this reason, Work Practice Standards (WPS) are appropriate because measuring emission levels during SSM events is technical and economically impracticable, and thus compliance with an emission limit cannot be demonstrated.

The SSM Plan will include the following WPS:

1. Operate equipment in a manner consistent with good air pollution control practices at all times, including SSM.
2. Minimize idle or startup time.
3. Follow manufacturer maintenance requirements.
4. Ensure that employees are trained in SSM procedures including maintenance and cleaning, safety, mineral oil system startup, and procedures to minimize emissions and fugitive leaks.
5. Maintain records of startup and shutdown as well as the reason for the event.

At all times, including periods of startup, shutdown, and malfunction, RTS will operate and maintain the affected source in a manner consistent with good air pollution control practices for minimizing emissions. The SSM Plan and records will be kept onsite.

A malfunction, as defined in the 40 CFR 63 General Provisions, is any sudden, infrequent, and not reasonably preventable failure of process equipment or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions. If the facility continues to operate during a malfunction (including the period reasonably necessary to correct the malfunction), or starts up after a shutdown resulting from a malfunction, they must meet compliance requirements. Within 15 days of the beginning of the malfunction, RTS must comply with either normal operating period requirements or with malfunction period requirements. At the end of the malfunction period, RTS will comply with normal operation requirements.

Operator Training Program

RTS will develop an operator training program for all personnel and will record the training date for all operators. The training program will be designed to include appropriate equipment operation practices and operation and maintenance of the air pollution control equipment to minimize solvent emissions. The operating training program and records will be kept onsite.

6.6 Preliminary MACT Determination

Based on the case-by-case MACT determination, the Oil Extraction, Separation, and Solvent Recovery Process Equipment (Source Code GP01) will be subject to an emission limit of 0.9 gallons of toluene emitted/ton of roofing material processed. The extraction process is designed to be vapor tight. The facility's primary incentive to minimize solvent loss is to achieve high quality final products, as more solvent in the final product reduces its overall quality. The facility also has an incentive to recover as much solvent as possible to reduce the quantity of fresh solvent that needs to be purchased. The process equipment is designed to maximize toluene recycling and reuse in the process system. Additionally, RTS will implement an LDAR program.

7 AIR QUALITY ANALYSIS

7.1 Toxic Impact Assessment (TIA) Modeling Results

Following the procedures as specified in the "Guidelines for Ambient Impact Assessment of Toxic Air Pollutant Emissions", modeling done by both the Division and the company indicate that the maximum ground level concentrations for all toxic air pollutants that will be emitted from this operation are below the acceptable ambient concentrations.

ATTACHMENTS

A.1 Draft Air Quality Permit No. 3999-035-0015-E-01-0

A.2 Narrative for SIP Permit Review for Permit No. 3999-035-0015-E-01-0

A.3 Toxic Impact Assessment (TIA) Information & Results