EPA Flexible Permit Implementation Review: Saturn Permit Review Report

Source: Saturn Corporation - Spring Hill, Tennessee Automobile Manufacturing & Assembly Plant

Permitting Authority: Tennessee Department of Environment and Conservation (TDEC)

Flexible Permit: Permit to Construct or Modify an Air Contaminant Source (PSD Permit), Permit No. 952233, issued on June 6, 2000 and expires on December 31, 2005[1]; Saturn submitted a title V permit application in December 2000 that is under review by TDEC.

1. BACKGROUND

General Questions for Permitting Authority

1.1 Agency name

Tennessee Department of Environment and Conservation (TDEC)

1.2 Number of major sources (title V)

Approximately 345 major source title V permits applications have been submitted to TDEC, from approximately 300 companies operating in Tennessee.

1.3 Number of permit actions per year

1.3.a Minor NSR

1.3.b Major NSR

1.3.c Operating permits

- **Title V issuance**
- **Title V revisions**

1.3.d Other permits

TDEC writes approximately 350-400 minor New Source Review (NSR) permits per year.

1.4 Number of permit writers

1.4.a Workload (permit actions per year per permit writer)

TDEC employs approximately 40 engineers to help with the permitting, enforcement, and construction for title V permits. Each Prevention of Significant Deterioration (PSD) permit requires approximately 200 hours of staff time to develop and issue. To address a heavy workload associated with the initial development of title V permits in Tennessee, TDEC contracted with four private firms to support the initial issuance of title V permits. Over time, TDEC found that contracting out the work was not

[1]The permit expires on December 31, 2005, but the PAL extends to July 2010.

cost effective, since significant staff time was needed to ensure adequate quality review of contractor work.

1.5 Minor NSR provisions (summary of requirements, citation(s))

Applicability:

Unless specifically exempt, no modification of an air contaminant source which may result in the discharge of air contaminants is allowed, without first applying for and receiving a construction permit for the construction or modification of the source. Modification and construction refer to any physical change or change in the method of operation (including fabrication, erection, installation, demolition, or modification of an emissions unit) which would result in a change in actual emissions.

Tennessee rules (Rule 1200-3-9-.04) contain a *de minimis* exemption for activities and emissions units that have a potential to emit (PTE) of less than 5 tons/year, or 1,000 pounds/year of each hazardous air pollutant (HAP). Tennessee rules also contain lists of "insignificant activities" that do not require minor NSR permitting.

Application Requirements:

- The application is to be made on Department forms and submitted no less than 90 days prior to the estimated construction start date. Major sources must submit construction permit applications at least 120 days prior to the estimated date of construction. The application form requires the address of the facility, principal contact, and the estimated construction start and completion dates.
- In addition to completed forms, the applicant may need to submit additional information on the project, the nature and amounts of air contaminants to be emitted by the source, and any other information necessary to insure compliance with all applicable requirements.
- Source impact analyses are to demonstrate that allowable emissions increases would not cause or contribute to air pollution in violation of any ambient air quality standard. Estimates are to be based on applicable air quality modes and databases.
- Construction permits are not issued if the activity would result in a violation of ambient air quality standards, any other regulatory applicable requirement, or would interfere with attainment or maintenance of a national ambient air quality standard in a neighboring state.

1.6 Public participation provisions (summary of requirements, citation(s))

On a monthly basis, the Department is to notify the public, by advertisement in a newspaper of general circulation in each air quality control region in which the proposed sources or modifications would be constructed, of the applicants seeking to obtain a permit to construct or modify. Notice is to specify the general vicinity or location of the proposed sources or modifications, the type of sources or modifications, and the opportunity for public comment. Public comment periods last for 30 days.

For construction or modification of major sources, additional public participation requirements apply as follows.

- Make available in at least one location in each air quality control region in which the proposed source or modification would be constructed a copy of all materials the applicant submitted, a copy of the preliminary determination, and a copy or summary of other materials considered in making the preliminary determination.
- As part of its notice of public comment, include the degree of increment consumption that

is expected from the source or modification.

- Send notice to officials and agencies having cognizance over the location where the proposed construction would occur (e.g., State or Federal Land Managers, etc.).
- The opportunity for a public hearing must also be provided, and all written and oral comments must be considered before making a final decision on the application.
- TDEC must maintain all public comments for one year from the date of issuance.

1.7 Reporting and feedback mechanisms (summary of requirements)

Where the applicable requirements do not require periodic testing or instrumental or non-instrumental monitoring, periodic monitoring is required that is sufficient to yield reliable data from the relevant time period that are representative of the source's compliance with the permit. Monitoring requirements are to assure use of such permit terms, test methods, units, averaging periods, and other conventions consistent with the applicable requirements.

- Records of required monitoring information is to include:
  - the date, place as defined in the permit, and time of sampling or measurements;
  - the date(s) analyses were performed;
  - the analytical techniques or methods used;
  - the results of such analyses; and
  - the operating conditions as existing at the time of sampling or measurement.

- Applicable reporting requirements are to include:
  - prompt reporting of deviations from permit requirements, including those attributable to upset, malfunction or emergency conditions as defined in the permit; and
  - submittal of reports of any required monitoring at least every 180 days, including identification of all instances of deviations from permit requirements.

1.8 Requirements and/or ability to be more stringent than EPA rules.

TDEC representatives indicated that the department has the ability to apply more stringent rules than required by EPA for reasons of good cause. TDEC representatives indicated that the Director of the Air Quality Program at TDEC has significant discretion to impose any monitoring requirement deemed to be important for protection of environmental quality and/or human health.

1.9 Status of initial title V issuance (i.e., number issued, renewed, in process)

TDEC representatives indicated that 85% the 345 title V permits will be written by September 2001.

1.10 Number of flexible permits written and public reaction to them

As of September 2001, Saturn was the only flexible permit that has been issued in the state of Tennessee. TDEC representatives indicated that public reaction to the Saturn flexible permits has been supportive. See Section 3 for a discussion of public participation.

1.11 Air quality status of area where flexible pilot permit was issued

Spring Hill, Tennessee, where Saturn is located, is an attainment area for all criteria pollutants.

1.12 Number of inspections that have occurred re: flexible permit

Since the permit was issued on June 6, 2000, TDEC has conducted one compliance inspection of the facility, in January 2001. TDEC representatives indicated that inspections of title V major sources

are typically conducted annually, although the current focus on the issuance of initial title V permits has caused TDEC to devote some inspection resources to permit writing.

1.13 Authority to impose P2 requirements and/or additional safeguards suggested by WPN3 (e.g., monitoring, notices, up-front magnitude limits)

TDEC representatives indicated that they believe that the Department does have authority to require the safeguards identified by draft EPA White Paper Number Three.

1.14 Agency's overall orientation to P2 (e.g., how is P2 considered in permit writing?)

P2 activities and requirements are not typically considered as part of Tennessee's permit development process. See section 5.9 for a discussion of the TDEC's efforts to encourage P2 in the Saturn PSD permit. TDEC, however, generally encourages P2 efforts through the Tennessee Pollution Prevention Partnership (TP3). The partnership encourages the community, businesses, and governments to identify and implement P2 activities. The partnership sponsors annual P2 events around the state.

1.15 Time required to issue flexible permit

The total permit development process spanned just over two years. Table 1.15 below summarizes the chronology of the Saturn Prevention of Significant Deterioration (PSD) permit development process. TDEC representatives indicated that their development of the Plant-wide Applicability Limits (PALs) and other flexibility provisions took approximately 200 hours more in TDEC staff time than would have been necessary under a conventional permit. A significant portion of this time was devoted to TDEC meetings and conversations with EPA Region 4, EPA Headquarters, and the source.

Table 1.15 **Chronology of Saturn Flexible PSD Permit Development**

May 1998	Saturn began initial research for the flexible PSD permit
March 1999	Meetings between Saturn and TDEC to discuss flexible permit concept
May - July 1999	Meetings between Saturn, TDEC, and EPA Region 4 to discuss flexible permit plan
October 1999	Saturn submitted the flexible PSD permit application to TDEC
June 2000	Permit issued

In December 2000, Saturn submitted a title V permit application to TDEC. TDEC representatives indicated that they believe that the time necessary to develop and issue Saturn a flexible title V permit will be comparable to the title V permit development time necessary for issuing a conventional title V permit to a comparable source, since the existing flexibility provisions can be incorporated into the title V permit with little modification.

1.16 Time required to issue conventional title V permits (on average)

On average, TDEC estimates that the time required to issue a conventional title V permit is approximately 125 hours. The exact time varies based on source complexity and other factors.

1.17 History of any deviations, violations and/or enforcement actions over the period before the

effective date of the flexible permit

TDEC representatives indicated that the Saturn facility has an excellent historical compliance record since the facility began production in July 1990. TDEC representatives reported that the facility self-reported a minor compliance violation during the early 1990s and that the issue was promptly resolved by Saturn.

1.18 Compare characteristics of flexible permits vs. traditional permits.

1.18.a Considering all the different types of sources for which you issue Title V permits, what are some examples of good candidates for flexible permits?

1.18.b What are some examples of sources that are not good candidates?

1.18.c Have you ever turned down a facility that asked for a flexible permit? If so, what reasons did you have for making this decision? What facility characteristics were important in making this decision?

TDEC representatives indicated that they expect source candidates for flexible permitting techniques to match their commitments to applying Best Available Control Technology (BACT) to all modifications and new equipment installed and to meeting additional monitoring, recordkeeping, and reporting requirements necessary to ensure compliance with emissions limits. In addition, TDEC representatives expect to see evidence that the source candidate has demonstrated the technical capacity to effectively understand and implement the monitoring, recordkeeping, and reporting requirements associated with tracking facility-wide emissions and operational changes.

TDEC representatives indicated that the following factors can be considered as indicators of a candidate source's technical capacity to manage flexible permit provisions: compliance history, ability to articulate specific flexibility needs, history of open communications with TDEC and the local community, and completeness of the source's permit application. TDEC representatives added, however, that past compliance violations should not automatically preclude a source from receiving a permit with flexibility provisions.

TDEC representatives reported that no sources have approached TDEC to request flexibility provisions since the issuance of the Saturn PAL permit. TDEC representatives speculated that many companies that might have been interested in flexibility provisions are unwilling to commit to implementing the necessary BACT and/or monitoring requirements.

Questions Specific to the Pilot Source

1.19 Source description, types of operations, and applicable requirements

Saturn operates an integrated automotive production facility in Spring Hill, Tennessee. Construction of the facility began in 1985, and production commenced in July 1990. Saturn is a member of the General Motors (GM) family of companies, and it produces a range of Saturn-brand vehicles. Production peaked in 1996 at 314,035 units and has declined every year since 1996 reflecting weakness in the subcompact market segment. Saturn is preparing to launch its new, fuel-efficient sport utility vehicle, the Saturn VUE™, in fall 2001. Saturn is authorized to make modifications (under the current PSD permit) to expand total production capacity to at least 595,350 vehicles per year.

The facility, located on 2,450 acres in a rural site about 40 miles south of Nashville, encompasses three primary business units:

- Body Systems, which includes the body panel manufacturing, body fabrication operation and painting operations.
- Vehicle Systems, which includes vehicle interior systems and general assembly operations.
- Powertrain, which includes foundry, heat treating, machining, and engine assembly operations.

In addition, a central utilities complex serves a support function supplying water and compressed air to the various business units, operating the facility wastewater pretreatment facility, and monitoring the status of the various facility support functions (e.g., HVAC, utility delivery). The Saturn facility uses natural gas for comfort and process heating. The Tennessee Valley Authority (TVA) provides electrical power to the facility.

All major Saturn parts such as the space frame, exterior panels, engine and transmission, and major interior components are manufactured on-site. Relatively few parts, such as tires, glass for windshields and doors, electrical and electronic components, floor coverings, and some specialized plastic and metal parts, are outsourced and delivered to the Spring Hill plant for assembly. In addition, the vehicles are assembled and painted on-site. Major facility operations are described in more detail below.

Body Panels: Saturn body panels and space frame components are manufactured in the body panels area. Polymer body panels and fascias are injection molded using thermoplastic and thermoset resins supplied by several resin manufacturers. Sheet metal body panels and sheet metal components of the Saturn space frame are manufactured from sheet metal roll stock in hydraulic stamping presses.

Body Fabrication: Sheet metal and structural components of Saturn vehicles are constructed in the body fabrication area. Component parts of the various assemblies (space frames, doors, hoods, etc.) are secured in place by manufacturing tools or "jigs". Once secured, the assemblies pass through a series of welding stations where resistance welds are robotically applied to complete the finished piece. The assembled components are then advanced to the phosphate wash and electro-coat processes within the paint shop operations.

Paint Shop: The general sequence of surface coating of major exterior Saturn body panels is electro-coat (E-coat) primer - primer/surfacer - waterborne basecoat - clearcoat. Space frames and cockpits receive only electrocoat (E-coat) primer. Saturn has two E-coat lines, one major panel primer-surfacer line, three major panel topcoat lines, one fascia primer-surfacer line with an adhesion promoter booth, one fascia/reprocess topcoat line, one service parts primer-surfacer booth, one powder blackout booth, and one sealer line. Each of the coating lines has a curing oven. Paint shop abatement systems include waterwash overspray control systems, a carbon abatement system, and oxidizers on each curing oven. A regeneration oxidizer is used to abate volatile organic compounds (VOCs) desorbed from the carbon abatement system and to generate hot air used in the desorption process.

Powertrain: The Saturn Powertrain business unit includes an aluminum lost foam foundry for casting aluminum engine heads and blocks; an iron lost foam foundry for casting crankshafts, various heat treatment processes, and various automated machining operations. Fabric filters are used to abate particulate matter emissions from foundry operations, high efficiency mist eliminators are used to

abate oil mist/particulate matter emissions from machining operations, and regenerative thermal oxidizers are used to abate VOC emissions from the foundry shakeout operations. The PSD permit enabled the facility to construct manufacturing operations for the new L850 "world engine" that will power many Saturn and GM vehicles over the next several years.

Vehicle Systems: Vehicle Systems includes vehicle interior systems (VIS) and general assembly (GA) operations. Minor coating, engine testing, fluid filling, and final vehicle assembly activities are included in these operations. The final assembly lines in vehicle systems are centrally located at the facility and continuously receive components from the body systems business unit for the assembly of completed vehicles.

Applicable Requirements:
Environmental requirements applicable to the Saturn facility include:

- *Title V*: Saturn is a title V major source because its potential to emit (PTE) is above 100 tons/year of volatile organic compounds (VOCs). Criteria pollutants emitted at the Spring Hill facility (other than VOCs) include NO_x, CO, PM_{10}, and SO_2 from combustion sources such as boilers.

- *Prevention of Significant Deterioration (PSD)*: The Saturn plant is considered to be a major source under the PSD program because potential VOC emissions exceed 250 tons/year.

- *New Source Performance Standards (NSPS), Subpart MM*: 40 CFR Part 60, Subpart MM -- Standards of Performance for Automotive and Light Duty Truck Surface Coating Operations and EPA's "Protocol for Determining the Daily VOC Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" are applicable to the source and are incorporated by reference into the PAL permit. These referenced documents require specific information for conducting and documenting the material balance and for reporting the results and any deviations.

1.20 Actual and allowable source emissions (tpy) for every year since flexible permit issuance

Table 1.20 below presents monthly actual emissions since the permit was issued in June 2000. The bottom of Table 1.20 presents the Plant-wide Applicability Limits (PALs), or allowable emissions that are included in the flexible permits. These PALs state the allowable 12-month rolling emissions limits. Note that the allowable levels of Volatile Organic Compound (VOC) emissions are based on the annual production volume (in vehicles per year) of the facility. Prior to the flexible permit, the allowable emissions for the Saturn facility were 2,896 tons/year of VOCs, 380 tons/year of NO_x, 179 tons/year of CO, and 305 tons/year of PM_{10}, based on limits imposed by Saturn's original PSD/construction permit and subsequent permit modifications.

Table 1.20 **Saturn Monthly Emissions (tons)**

Month	NO_x	CO	PM_{10}	SO_2	VOC	Production
June-00	5.10	9.69	10.38	0.03	45.42	19,328
July-00	3.12	7.46	5.94	0.02	33.19	8,438
August-00	4.91	8.18	10.80	0.03	62.81	20,570
September-00	5.04	8.61	8.82	0.03	53.67	16,818

October-00	6.09	9.25	9.26	0.04	51.03	17,619
November-00	7.33	9.50	7.46	0.04	41.05	14,571
December-00	9.54	10.67	7.92	0.06	46.23	11,509
January-01	10.93	12.73	8.45	0.07	47.45	15,038
February-01	8.13	10.63	8.29	0.05	47.10	15,425
March-01	8.80	11.22	9.35	0.05	47.24	16,538
April-01	5.07	8.08	8.48	0.03	53.62	15,756
May-01	4.84	8.30	9.98	0.03	51.38	17,422
June-01	4.27	7.68	9.71	0.03	44.08	16,703
June-00 thru May-01	78.89	114.31	105.13	0.47	580.20	189,032
July-00 thru June-01	78.06	112.30	104.46	0.47	578.86	186,407
PAL Limits (tpy)	190	220	205	39	1134	300K
					1319	300-400K
					1502	400-500K
					1563	500K+

Actual annual emissions for the year prior to the flexible permit (1999) were 91.66 tons of NO_x, 136.75 tons of CO, 144.44 tons of PM_{10}, 0.55 tons of SO2, and 798.22 tons of VOC, based on calculation methods employed under the flexible permit.

1.21 Amount and nature of fugitive emissions

Fugitive emissions are predominantly volatile organic compound (VOC) emissions from the lost foam bead expansion process and curing losses from adhesives, sealants, and miscellaneous solvents used throughout the facility. Fugitive VOC emissions account for approximately 6% of total VOC emissions from the facility. These VOC emissions are accounted for in the facility's mass balance-based emissions monitoring procedures.

1.22 Source flexibility needs

1.22.a Characterization of pre-flexible permit regulatory concerns

1.22.b Type and number of source changes potentially subject to air permitting

1.22.c Which changes incur an opportunity cost of being 'late to market' due to permitting "delays," and the potential extent of that cost

1.22.d Why conventional permitting process may not be sufficient for certain types of changes

The original goals associated with the Saturn facility included production of an economical automobile exhibiting world class quality. During the first six years of production, the focus of the facility was to perfect the production of the basic Saturn vehicle. Changes to the basic vehicle during this time period were limited to mechanical enhancements and cosmetic changes, none of which required significant changes to the manufacturing systems and equipment originally installed at the facility. Saturn representatives estimated that, prior to the issuance of the flexible PSD permit in June 2000, approximately two changes per year at the facility required applications for air permits under Tennessee's permitting program. "Late to market" delays were not a critical concern for Saturn during the initial production years. Saturn representatives stated, however, that experiences at other GM facilities motivated Saturn to seek opportunities to avoid potential delays associated with air

permitting, including both attainment (PSD) and non-attainment New Source Review (NSR) program requirements.

More significantly, Saturn representatives reported that the automotive market has shifted dramatically in recent years, necessitating more rapid responsiveness to market demands. Since reaching a peak production rate in 1996, demand for small, fuel-efficient Saturn vehicles has declined every year. In 1998, Saturn decided to expand the available product line to include a small sport utility vehicle. Additional Saturn and possibly GM products were also envisioned for future production at the facility. Such additions of new vehicle lines typically require significant retooling and process adjustments that can trigger air permitting requirements.

At the same time, the Vehicle Development Process (VDP) has significantly shortened in the automobile industry. Where historically it took five years to bring a new vehicle from concept to production, the VDP time frame has been collapsed to as little as 18 to 24 months. The long lead times associated with the design-engineering-production process historically left ample time in most cases to secure required air permits. As the VDP time frame has shortened due to increased computer design capabilities, air permitting is increasingly on the critical path of the project time lines, with potential to cause costly project delays and introduce uncertainty into business planning activities. Saturn representatives stated that to ensure that the new vehicles envisioned for the Saturn facility could be brought to market as needed to meet critical deadlines, Saturn evaluated possible alternatives to the conventional NSR permitting process and decided to pursue a flexible permit through the major NSR process.

To illustrate the facility's need for the flexible permit, Saturn representatives described how the flexible PSD permit played a primary role in Saturn's selection (from a field of more than 10 competing facilities around the world) as a site to produce the L850 "world engine", that will be included in numerous GM vehicles over the coming years. GM officials estimated that Saturn's flexible air permit could shave as much as six months off the 30 month overall project time line for production of the new engine. The local UAW acknowledged the importance of the Saturn flexible permit as a key factor during the L850 plant siting decision making process and expressed full UAW support for the permit. With the PSD permit in hand, the Saturn facility was able to begin construction of the new engine line within one month of the Spring Hill facility being awarded the GM contract.

Saturn identified the following as source changes that potentially could be subject to air permitting.

- New coating lines
- Modified coating lines causing conveyor changes
- New final assembly line
- Combining surface coating operations
- New engine machining/ assembly operations
- Increase in overall vehicle capacity

Saturn representatives stated that the existing NSR process is too uncertain in its applicability (e.g., difficult determinations about emissions unit, size of increases, debottlenecking, routine maintenance, and project aggregation are not well defined and are subject to interpretation) and too time consuming when it does apply. Saturn and GM expressed frustration with what they considered to be changing

EPA interpretation of NSR "major modification" rules, especially when applied to highly regulated existing auto assembly plants already subject to stringent emissions limits such as RACT, MACT, NSPS, and state toxic requirements.

1.23 What has been the frequency of required NSR permits over the period before the effective date of the flexible permit?

There has been one PSD permit application filed since start-up to incorporate facility changes needed to increase facility capacity to 595,350 vehicles per year and to produce multiple vehicle platforms. It was filed in October on 1999 and the permit was issued on June 6, 2000. The application was also for a flexible permit including PALs. Revisions and permitting under Tennessee's construction permit program were required more frequently in the first several years of facility operation. Saturn representatives reported that the facility had 54 individual permits in place prior to their consolidation under the new PSD permit. Saturn representatives also reported that the facility had an overall average of two or less NSR construction permitting actions per year prior to the issuance of the flexible permit.

1.24 Flexible permit's inspection history

No compliance violations or issues were reported by TDEC from the January 2001 TDEC inspection of the Saturn facility.

1.25 Source's history of P2 commitment

Saturn has demonstrated a strong commitment to environmental excellence and pollution prevention (P2) since the company began construction of its Spring Hill facility in the mid-1980s. The Saturn complex received ISO 14001 certification in November 2000. Saturn is also participating in TDEC's "Pollution Prevention Partnership" (TP3) program. Saturn was awarded "Partner" level status in 2001 and anticipates achieving "Performer" level status by 3rd quarter 2002. The TP3 program consists of four distinct and successive levels.

- Prospect - Requires that an organization sign up.
- Pledge - Requires that the organization returns a signed industry pledge card including written commitments to positive environmental actions.
- Partner - Requires that the organization demonstrate "commendable environmental compliance" for the past three years as determined by TDEC; submit a TP3 plan detailing P2 initiatives in each of the following areas - clean air, energy conservation, hazardous materials management, land and water conservation, and solid waste reduction; implement at least one project from the TP3 plan; submit a success story documenting completion of the P2 project; submit company's environmental policy statement.
- Performer - Same achievements as Partner level, plus requires the organization to complete one project from each of the five areas and submit a success story for each; implement an environmental management system, meeting TP3 criteria for at least one year; submit documentation demonstrating community outreach; submit documentation of mentoring; receive final approval from the TDEC review panel for quality assurance and credibility.

Saturn also participates in the Tennessee Pollution Prevention Roundtable, promoting communication and environmental stewardship between academic, environmental, governmental, and business groups. Additionally, Saturn is working with General Motors, NIST, EPA, and the University of

Tennessee, on a "Saturn Supply Chain Sustainable Business Franchise" pilot project. The project will demonstrate methods for improving environmental performance and promoting cleaner production throughout the automotive supply chain, with an initial focus on packaging waste reduction.

A more detailed discussion of Saturn's P2 initiatives and accomplishments is provided in Appendix A to this report. As discussed in section 5.9, Saturn's PSD permit does not contain any enforceable P2 requirements. Both Saturn and TDEC representatives, however, believe that the PALs and advance approval conditions create a framework that is conducive to making modifications that result in P2 (see section 5.9 for additional discussion). The plant has an incentive to reduce emissions to remain below applicable emissions limits. At the same time, the advance approval provisions in the flexible permit facilitate the source in making modifications that result in P2.

2. FLEXIBLE PERMIT DESIGN FEATURES

2.1 What flexible permit tools contained within this permit accomplish advance approvals (ROPs, PTE limits, PALs, clean buildings, category of changes, etc.)?[2]

The Saturn PSD permit included the flexibility provisions described below:

Plant-wide Applicability Limits (PALs):

TDEC and Saturn describe the emissions caps found in the flexible permit as Plant-wide Applicability Limits (PALs) for volatile organic compounds (VOCs) and criteria pollutants, including particulate matter less than 10 microns (PM), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon monoxide (CO). The duration of the PAL is for ten years even though the permit term is only for five years. The permit further defines a variable PAL for VOC emissions based on the annual vehicle production rate (see Table 2.1.a for specific limits). Compliance with the VOC PAL is determined monthly and calculated on a rolling 12-month basis. The permit also places a limit on monthly VOC emissions, with a monthly PAL set at 198.5 tons/month. The 12-month rolling PALs for PM, NO_x, SO, and CO are presented in Table 1.20 under section 1.20. See section 2.2 and 2.3 for more details for establishing the PAL.

Table 2.1.a **Variable VOC Limits in the Saturn PAL Permit**

1134 tons/year	up to 300,000 vehicles/year
1319 tons/year	300,000 to 400,000 vehicles/year
1502 tons/year	400,000 to 500,000 vehicles/year
1563 tons/year	greater than 500,000 vehicles/year

Advance-Approved Changes to Existing Emissions Sources:

For emissions sources documented in Table 1 of the permit, Saturn is authorized to undertake any physical change or change in the method of operation, provided that the emissions from the facility do not exceed the PALs and provided that Saturn continues to use the control technology described in the permit application or alternative control technology, including P2 and alternative configurations, agreed to by TDEC (see permit condition B.10.1).

Advance-Approved Construction of New Emissions Sources:

Saturn is permitted to undertake the addition of new emissions sources provided that PAL emissions levels are not exceeded and that certain additional conditions are met (see permit condition B.10.2). For significant new emissions units (i.e., those with a potential to emit (PTE) greater than the tons per year emissions levels identified in Table 2.1.b below), Saturn must register the addition with TDEC and must apply best available control technology (BACT) that is approved by TDEC.

[2]Terms used in this document are defined in draft White Paper Number Three.

Table 2.1.b **BACT Thresholds for New Sources Added Under Advance Approval Provisions**	
Pollutant	PTE Threshold (tons/year)
VOC	40
PM	15
NO_x	40
CO	100

TDEC must approve or deny the BACT analysis submitted by Saturn within 45 days of the registration date. TDEC's Technical Secretary provides public notice of such changes. Therefore, the subsequent change to the title V permit qualifies for the administrative permit amendment process. Saturn's registration must include the appropriate State application forms, a brief process description, documentation of the BACT as required, and periodic monitoring parameters for any control equipment.

New emissions units with a PTE less than the ton per year levels identified in Table 2.1 above must be registered with TDEC and must apply minor source BACT (mBACT) that is approved by TDEC. TDEC must approve or deny the mBACT analysis within 30 days of the registration date. mBACT is defined in the permit as any combination of work practices, raw material specifications, source design characteristics, or air pollution control devices for new emissions units that are typical of the emissions level achieved by well controlled new or modified sources similar in type and size to the new emissions unit.

2.1.a Describe the information and level of detail provided in the application to support these flexible permit provisions.

Saturn's PSD permit application, submitted to TDEC in October 1999, contains detailed information including description of facility operations and the proposed projects, a detailed emissions inventory and discussion of emissions changes projected to result from the proposed facility modifications, BACT analyses for the proposed changes, and proposed PALs for the facility. TDEC representatives reported that they believe that the application provided sufficient detail on existing and proposed facility operations and emissions to support the flexibility provisions contained in the PSD permit.

2.1.b Describe the types of information needed in or required by the permit to support the ongoing implementation of the flexible permit provisions.

Recordkeeping and reporting requirements contained in the PSD permit are described below. TDEC representatives reported that additional reporting requirements, including an annual compliance certification, will be required in the forthcoming title V permit for the Saturn facility.

Emissions Monitoring:

Within 30 days of the end of each calendar month, Saturn must determine and document the actual VOC, PM, NO_x, SO_2, and CO emissions for the month. These monthly emissions totals must then be added to the actual emissions for the prior 11 months to determine the 12-month rolling total emissions. These records are required to be maintained on-site by Saturn, and available for TDEC

inspection upon request. Saturn representatives reported that emissions and compliance records are provided to TDEC during annual on-site inspections usually in January.

Registration of New Emissions Sources:
As discussed in section 2.1, Saturn must register new emissions sources with TDEC prior to their implementation. The registrations must include the appropriate State application forms, a brief process description, documentation of the BACT as required, and periodic monitoring parameters for any control equipment.

Performance/Emissions Testing Requirements:
Section A of the permit requires Saturn to perform an initial one-time demonstration that the source and control equipment are in place and operating consistent with the permit application. This performance testing must be completed within 180 days of start-up of the new or modified source, and must be conducted pursuant to performance/emissions testing requirements established in Section C of the permit and further described in test protocols to be submitted to TDEC no later than 30 days prior to the proposed test date.

Saturn submits an annual fee report to TDEC in June.

2.1.c How were any18-month "commencement of construction" requirements met?
Condition A.2.4.1 states that the contemporaneous BACT date is 18 months from the expected completion date (i.e., July 30, 2004). All projects initiated after that date, including those identified in the permit application, will be evaluated under the provisions of B.10: "Pre-Approved New Source Review" which includes a contemporaneous BACT review.

2.1.d What were the processes, if any, for extending any BACT determinations (i.e., keeping them contemporaneous)?
See section 2.1.c.

2.2 If the flexible permit contains a PAL, how was the PAL baseline set?
The PALs contained in the Saturn PSD permit are based on a blend of past actual emissions and projected future actual emissions. For the process units that are part of the modifications proposed in the PSD permit application, maximum annual emissions rates were calculated based on actual emissions rates obtained through the application of BACT controls (note: Saturn had completed BACT analyses for pollutants associated with the proposed modifications) and projected maximum production levels. For process units not included in the facility modification plans outlined in the PSD permit application, average actual annual emissions from 1995 and 1996 were used for the baseline emissions. The projected future actual emissions associated with expanding current production capacity were added to the past actual emissions to calculate the PAL baseline emissions for VOCs. The actual amount of anticipated future emissions of the expansion was determined as the allowable emissions for a given level of new production (i.e., 1134 tons/year at 300,000 cars per year and 1563 tons/year at 500,000 cars per year and beyond; see Table 2.1.a or permit condition B1.1. in the Saturn permit for additional information).

To calculate the contribution of combustion-related emissions to the PAL baselines, the 1996 natural gas usage for each business unit was utilized. The combustion units at the Saturn facility mainly

consist of small (<10 MMBtu/hr) burners, and they are all fired solely by natural gas. Future natural gas usage was projected by multiplying the total 1996 gas usage by the ratio of 595,350 vehicles/360,000 vehicles to adjust for the planned increase in facility production capacity. A 25 percent increase was applied to the projected total to account for potential unforeseen circumstances.

Table 2.2 provides information submitted by Saturn in the PSD permit application associated with establishment of the PAL baseline emissions levels. The "pre-PAL allowable" emissions represent the combined emissions limits based on conditions from Saturn's operating and construction permits in effect at the time of the PSD permit application (October 1999). The "baseline actual" emissions are the average actual annual emissions for 1995 and 1996. The "established PALs" are the actual PAL emissions limits included in the PSD permit. The "net change" represents the difference between the "baseline actual" emissions and the "established PAL" levels.

Table 2.2 **Summary of Saturn Allowable, Actual, and PAL Emissions Levels** (tons/year)

	VOC	NO_x	CO	PM_{10}
Pre-PAL Allowable	2,897	380	179	305
Baseline Actual	949	95	133	163
Established PALs	1,563 (variable)	190	220	205
Net Change	614	95	87	42

The permit also contains a provision (permit condition B.8) to periodically review and adjust, if warranted, the PAL for each regulated pollutant. According to the permit, adjustments to the PALs are warranted only under the following circumstances.

- Within 180 days after achieving a 12-month total vehicle production level of 595,350 vehicles, TDEC will revise the permit to reset the PALs consistent with the actual facility emissions levels achieved during the same 12-month period, provided that the reset levels do not exceed the PALs specified in the current permit; include an operating margin equivalent to the major modification threshold for each pollutant (see Table 2.1.b); and are based on the annual emissions identified for ESRN 01 (Site-wide Products of Combustion) in the permit application. The effective date of the reset PALs will be 45 days after issuance of the revised permit.
- A reduction in the PAL level will be necessary if new regulatory requirements become applicable to the facility during the term of the permit. In this event, the reduction in the PAL levels will reflect the impact the new applicable requirement would have had on the emissions sources affected by the applicable requirement.
- Changes in sampling, monitoring, or other similar procedures that impact reported emissions without changing actual emissions rates should be made as necessary to assure continued compliance with these emissions caps.

The PAL for volatile organic compounds (VOCs) is expressed as a 12-month rolling average annual limit, ranging from 1,134 to 1,563 tons/year, based on the associated vehicle production rate measured

as finished vehicles exiting the final assembly operation. There are also 12-month rolling average annual limits for NO_x (190 tons/year), CO (220 tons/year), PM_{10} (205 tons/year), and SO_2 (39 tons/year).

2.3 How was the PAL monitoring, recordkeeping, and reporting approach justified?

2.3.a What is the rationale for the monitoring approach and averaging time?

2.3.b What data conversions are required?

2.3.c What is the averaging time for each emissions cap and/or the duration of the cap?

2.3.d What is the rationale supporting the use of any longer (e.g., longer than one month) duration?

The VOC monitoring approach is based on EPA's "Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" (EPA-450/3-88-018, from December 1988). The monitoring approach assumes all VOCs contained in raw materials used is emitted to the various control devices or the environment. VOC emissions from the curing ovens serving the paint lines are controlled by 11 recuperative thermal oxidizers. VOC emissions from the lost-foam process (located in the Powertrain operations) are routed to two regenerative thermal oxidizers (RTOs). In addition to the recuperative oxidizers associated with the curing ovens, VOC emissions from the major panel and fascia basecoat heated flash zones and clearcoat spray zones are directed to a hybrid carbon adsorption/thermal oxidation system.

Monitoring the quantity of each VOC containing material (e.g., coatings, solvents, sealants, and cleaning materials) provides an accurate accounting of VOC usage. Monitoring control equipment operating parameters on a continuous basis and material usage on a daily basis provides the information necessary for calculating the monthly and annual emissions. Monitoring monthly emissions also allows on-going tracking of performance with respect to the annual limit. The monthly VOC emissions are then aggregated for the previous 12 months to determine the annual pollutant emissions and compliance with the VOC annual PAL.

When the monthly VOC emissions are calculated, the daily production rates of finished vehicles are also totaled for the month, and then both values are aggregated with the data from the previous 11 months. Compliance with the VOC PAL is then demonstrated if the 12-month rolling average VOC emissions is less than the applicable VOC limit based on the annual vehicle production rate for the past 12 month period.

As mentioned, this facility also has PALs for NO_x, CO, PM_{10}, and SO_2 emissions from the miscellaneous combustion sources at the facility (i.e., thermal oxidizers used for controlling VOC emissions). Natural gas is the only fossil fuel used in the Saturn manufacturing processes. Fabric filters are used to abate particulate matter emissions from the foundry operations and mist eliminators are used to abate oil mist/particulate matter emissions from machining operations. Compliance with the PALs is determined by monitoring monthly fuel usage and multiplying the fuel usage rate by the appropriate emission factors. The volume of fuel (natural gas) is the only varying parameter used in determining compliance with the NO_x and SO_2 PALs.

Saturn's flexible PAL permit requires Saturn to "prepare and utilize monitoring protocols for each category of air pollution device used at the facility". These protocols, at a minimum, must address the types of air pollution control equipment used at the facility and must be submitted for TDEC

review prior to the issuance of the initial title V operating permit for the facility. Saturn submitted monitoring protocols to TDEC in December 2000. The protocol document includes a monitoring approach, rationale for selection of performance indicators, and a deviation plan to specifically address all of the following requirements: parameters monitored; monitoring techniques; calibration of monitoring devices; monitoring frequency; parameter operating ranges; recordkeeping; and start-up, shut-down, and malfunction periods.

Some data conversions are required to implement the mass balance VOC emissions monitoring technique. The basic values measured are the weight (lbs) or volume (gallons) of VOC-containing materials used (e.g. coatings, solvents, sealants, and cleaning materials). The material usage must be converted to the mass (lbs) of VOC introduced into the system. This requires the concentration (percent) of VOC in each raw material and the density (lb/gal) of the raw material, provided by the suppliers with the Certification of Analysis for each batch of coating, solvent, sealant, or other substance.

The Saturn PAL has 12 month rolling emissions limits as follows:

Table 2.3 Annual Emissions Limits

Pollutant	Annual limit, tons per year
NO_x	190
CO	220
PM_{10}	205
SO_2	39
VOC	1,134 to 1,563 based on annual vehicle production rate

The PAL permit was issued on June 6, 2000 and expires on December 31, 2005.

Because the Saturn facility in Spring Hill, Tennessee is located in an ozone attainment area, monitoring averaging time duration longer than one month are appropriate. The permit addresses both intermediate- and long-term concerns for VOC, CO, PM_{10}, SO_2, and NO_x emissions since the permit includes monthly calculations for each pollutant which are then used in calculating 12-month rolling average emissions.

2.4 Where applicable, describe the following aspects of the permit that are used for purposes of tracking emissions under a PAL or an emissions cap:

2.4.a Details regarding source emission factors and processes for changing emission factors.

2.4.b Tracking emissions from startups, shutdowns, and malfunctions of monitoring, control, and/or process equipment.

2.4.c Requirements for tracking emissions from insignificant emissions units.

2.4.d Requirements for quantifying fugitive emissions

See section 4.2.

Additional Permitting Authority Inquiries

2.5 How did the source articulate its need for flexibility?
See section 1.22.

2.6 What were your key rule interpretations or determinations?
TDEC representatives indicated that one important rule interpretation was that the State could use a combination of past actual and projected future actual emissions in establishing PAL baseline limits (see section 2.2 for additional discussion).

2.7 Was there a need for follow-up rulemaking?
TDEC representatives indicated that no rulemaking was necessary for the Saturn permit.

2.8 Might you include additional flexible approaches for this source in the future?
TDEC representatives indicated that they are interested to incorporate the flexibility provisions contained in the PSD permit (e.g., PALs, advance approved changes) into the facility's title V air operating permit. Saturn submitted its title V permit application to TDEC in December 2000. TDEC representatives stated that they believe the Saturn PAL permit has been a positive experience and that "they would do it again".

3. PUBLIC PARTICIPATION AND PUBLIC PERCEPTION

3.1 Were comments received from the public? Please provide a summary of any comments and of your response(s) to them.

3.1.a In what venues/times were public comments received? (formal permit process, public information sessions not required by the permit process, permit implementation, etc.)

3.1.b How many public meetings/information sessions were requested and subsequently held?

TDEC representatives reported that they utilized the standard public notice procedure for the Saturn PSD permit. A 30-day public comment period was publicized by TDEC using the agency's standard public notification operating procedures. TDEC representatives indicated that notices were placed on the Department's web site, and in a local newspaper (Columbia) and a regional newspaper (Nashville), that described the proposed construction and mentioned the innovative nature of the permit. Copies of Saturn's permit application were made available for public review at the Spring Hill, Tennessee public library and at TDEC's offices in Nashville. TDEC and Saturn representatives also indicated that the state and local media reported on the permitted project in advance of the official public comment period. TDEC received no public hearing requests and a public hearing was not held.

TDEC representatives indicated that the public comments that the Department received regarding the draft permit were in support of the permit. TDEC received a letter from the Tennessee Environmental Council, a citizens environmental group, voicing support for the permit. The letter stated "we applaud Saturn and TDEC for their forward thinking leadership in forging a new type of

air permit which protects the environment and provides the flexibility needed by a growth industry in our state. In general, the Council is pleased to see that the permit provides both a lower air emissions cap with subsequent emissions reductions and a method to address relative toxicity levels of emissions as those reductions take effect."[3] TDEC also received a letter from Ronald Hankins, President of UAW Local 85, commending Saturn on its environmental performance.

TDEC representatives indicated that the Saturn facility has maintained good relations with the surrounding community. Saturn is located in Spring Hill, Tennessee on 2,450 acres in a farming community about 40 miles south of Nashville. Saturn and TDEC representatives reported that when Saturn began construction of the facility in the mid-1980s, there was some local concern voiced over the facility. Some local residents were concerned that the facility would impact the rural way of life in the farming community, and have associated environmental impacts. They indicated that other local residents were supportive of the facility, and the economic prosperity that it would bring to the area. To address community concerns, Saturn began monthly meetings with the local Spring Hill Concerned Citizens Group. To help address neighbor's concerns, the Citizens Environmental Council met regularly with Saturn officials from July 1985 until 1990 (near the time when vehicle production began).

In response to public environmental concerns, Saturn undertook many steps to minimize the environmental impact on the local community. For example, the facility was constructed on the property so that it was situated away from local roadways and adjacent residents. An earthen berm was also constructed around the facility to shield most of the facility from public view. TDEC and Saturn representatives reported that there have been very few public complaints since the facility was constructed. The only documented complaints were associated with a particular solvent that the facility used in the mid-1990s. Saturn representatives reported that use of this solvent was discontinued, and that complaints ceased. TDEC representatives reported that, historically, there has been little interest in environmental permitting activities associated with the Saturn facility.

3.2 Was there a discussion in notices, meetings and/or public comments of the source's need for flexibility, possible environmental benefit, and/or administrative burden from getting additional permit(s) or permit revisions?

According to TDEC representatives, comments on the source's need for flexibility, possible environmental benefits, and/or reductions in administrative burden were not expressly discussed in the public notices. TDEC and Saturn representatives indicated that some of these topics were discussed in the context of local media reporting in advance of the public comment period.

3.3 Were there any environmental justice issues? If so, how were they addressed?

TDEC representatives indicated that there have been no environmental justice issues associated with the Saturn facility.

3.4 Were there any CBI issues? If so, how where they addressed?

No confidential business information (CBI) protections have been claimed by Saturn associated with the PSD permit.

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[3]Letter from Gwen Griffith, Executive Director of Tennessee Environmental Council, to Barry Stephens, Director of the TDEC Air Pollution Control Division, May 17, 2000.

3.5 What was the ongoing level/adequacy of information flow to the public?

3.5.a What was the amount and type of information available during the title V permit development and public notice/comment period?

3.5.b What input was obtained back from the public beyond initial comments?

3.5.c What level of detail of source activity was provided to the permitting authority, and/or the public for flexible permit changes that took place during the permit term (e.g., logs and other records)?

- **What required information was submitted directly to the permitting authority?**
- **What and how much information submitted by the source was claimed as CBI?**
- **What additional information was available to the public only through FOIA requests?**

3.5.d What was the timing of the availability of relevant information to the public during permit implementation and development?

3.5.e What was the level of interest in annual P2 reports provided?

3.5.f Were advance notices circulated or made publicly available?

TDEC representatives indicated that they believe that the level and timing of information flow to the public during the public comment period for the draft permit was adequate to enable public understanding of the proposed permit, and equivalent to that associated with conventional PSD permitting. TDEC representatives reported that they followed the standard public notice procedures for the Saturn PSD permit. In some respects, the public may have received more information than usual due to the media attention associated with the permit development effort. That is, the type and amount of growth is described in advance. Any new unit additions are subject to an additional round of public comment through the title V administrative amendment process.

TDEC representatives indicated that Saturn's PSD permit application contained substantial detail on the facility's planned construction projects (e.g., construction of the L850 engine facility). The amount of information on planned construction activities contained in the permit was comparable to the level of information contained in conventional PSD permit applications.

No information was required to be made available to TDEC or the public regarding changes implemented using the advance-approved changes for existing emissions sources (permit condition B.10.1). Had the facility utilized the advance approval provisions contained in the flexible permit for new emissions sources, the change registrations (a form of advance notice) would be available to the public in Saturn's file at TDEC in Nashville. Saturn representatives reported that emissions and compliance records are provided to TDEC during annual on-site inspections usually in January. No P2 reports were required by the permit.

3.6 Based on document/record review, compare conventional regulatory permitting versus flexible permits in terms of:

3.6.a How provisions are described to the public

3.6.b Number of comments received

3.6.c Number of complaints received

3.6.d Level of ongoing public interest

3.6.e Amount of information (if any) not available to the public (e.g., logs) and how this may or may not contribute to the public's understanding of the permit

3.6.f Amount of P2 information made available

TDEC representatives indicated that the amount and timing of information associated with the PSD permit development process and how permit provisions were described to the public was comparable for the flexible permit and conventional permitting. As mentioned previously, TDEC followed standard public notice procedures during the permit development process.

With regard to the number of public comments and complaints associated with the permit, TDEC representatives indicated that the absence of public opposition and complaints is consistent with the ongoing level of public interest associated with many other facilities in Tennessee. TDEC representatives indicated that the ongoing public support (or lack of opposition) for the permit cannot necessarily be attributed to the flexibility provisions contained in the permit, but rather to Saturn's commitment to environmental improvement and proactive communications with the local community.

As mentioned in section 3.5, information on new emissions sources constructed using the advance-approved change provisions in condition B.10.2 of the flexible permit would be relatively equivalent, if not superior, to that provided under a conventional permitting process. Under the flexible permit, Saturn is required to "register" the proposed construction with TDEC (see section 2.1 for a description of the registration requirement). Although the type and amount of advance-approved changes are described, new units are subject to a conventional review focused on BACT. Under a conventional permitting scenario, the facility would likely be required to submit a Notice of Construction permit application for some of these changes. Both processes create a publicly available record of the proposed construction prior to commencement of the construction.

In the case of modifications to existing emissions sources, the Saturn flexible permit may result in a different level of information being available to the public when compared with a conventional permitting scenario. No logs or notices of changes to existing emissions units are required by the Saturn PSD permit, although any subsequent changes in emissions will be captured in the monthly facility emissions calculations. Under a conventional permitting scenario, some of these changes may have required individual permit applications to receive case-by-case approval. However, the flexible permit does bound the amount of these changes and describes them in general terms sufficient to assure compliance with all technology requirements.

No P2 information is required to be made available under either the flexible PSD permit or under a conventional PSD permit in Tennessee.

4. IMPLEMENTATION OF FLEXIBLE PERMIT PROVISIONS (ON-SITE VERIFICATION)

Utilization

4.1 What was the source's overall flexibility provision utilization throughout the permit term?

4.1.a How often were the flexible approaches used?

- **Describe the nature of the changes that occurred at the facility under the flexibility provisions.**
- **Identify which changes took advantage of which flexibility provisions (e.g.,**

new unit A was added pursuant to advance approval and within a PAL emissions limit).

Saturn and TDEC representatives indicated that Saturn has completed several of the construction activities and modifications that were explicitly outlined in the PSD permit (e.g., construction of the L850 engine line, addition of a new general assembly line). Several other proposed changes, related mostly to paint shop capacity, have not yet been initiated.

Saturn and TDEC representatives indicated, however, that the facility has not fully utilized the advance approval provisions during the first year of the permit term. They stated, however, that they anticipate that the flexibility to add new emissions sources will likely be utilized over the next three years, as Saturn implements vehicle model changeovers. Most changes implemented during the first year of the permit term are those construction activities specifically described in the PSD permit application.

As of August 2001, no new emissions units have been constructed utilizing the advance approval provisions contained in section B.10.2 of the PSD permit. As mentioned above, Saturn and TDEC anticipate that this provision will be utilized later in the permit term, after the current construction activities are completed and new vehicle model modifications are made.

Saturn representatives indicated that it is likely that changes to existing emissions units have been made during the first year of the permit term (i.e., June 2000 to August 2001) that utilize the advance approval provision contained in permit condition B.10.1. This condition allows Saturn to make modifications to existing emissions units (listed in Table 1 of Permit No.952233) provided the source remains below established PALs and meets other criteria (see section 2.1 for a summary of the permit requirements). No estimate of the number of changes made using this advanced approval provision was available. Saturn is not required to maintain records of physical changes and/or changes in the method of operation made utilizing this advanced approval provision.

4.1.b How many minor NSR permits and/or title V permit revisions were necessary (i.e., not covered under the advance approval)?

TDEC and Saturn representatives indicated that the facility did not have significant need for minor New Source Review (NSR) permits prior to the issuance of the PSD permit in June 2000. TDEC and Saturn representatives, however, indicated that they believed that the need for permitting actions associated with facility changes would increase over the next several years as the facility undertook significant changes to expand production capacity and flexibility. This was one of their primary reasons for pursuing a flexible permit. TDEC and Saturn representatives also pointed to the shortening vehicle development process (VDP) as a reason for the increased likelihood of permitting actions in the facility's future operations (see section 1.22 for a more detailed discussion of the source's stated need for permit flexibility). As of August 2001, the facility does not yet have a title V operating permit, so no title V permit revisions have been necessary.

4.1.c Contrast these results with implementation under a conventional permit design for the same source.

- **What approach would the source have taken for changes that utilized a flexible permit provision, absent that provision?**
  - **S not made the change**

- **S taken steps to avoid triggering requirements (e.g., netted out of major NSR)**
- **S complied with full major/minor NSR permitting**

- **Were any other conditions taken to avoid applicable requirements other than NSR? If so, which ones?**
- **How much time & resources were saved by utilizing the flexible permit provision(s), compared to the option you would have chosen above?**

Based on experience at Saturn and other GM plants, Saturn and GM representatives indicated that they expect some of the ongoing projects that have been authorized by the flexible PSD permit to have triggered PSD or minor NSR permitting requirements several times and to have potentially delayed implementation of the projects pending repeated review of baseline versus allowable emissions, completion of several PSD modeling studies, and the associated delay in issuance of permits.

Documentation

4.2 What problems, if any, did you encounter regarding the following:

4.2.a Tracking of fugitive emissions
4.2.b Inclusion of emissions from startups, shutdowns, and malfunctions
4.2.c Inclusion of emissions from insignificant emissions activities
4.2.d Missing data
4.2.e Use of/updates to emission factors
4.2.f Application of ROPs (amount of errors noted) and missing critical assumptions
4.2.g Required content of logs
4.2.h Use of advance notices

The EPA Review Team identified no problems associated with documentation and recordkeeping for the permit.

Fugitive emissions are predominantly VOC losses into buildings from the lost foam bead expansion process and from curing of adhesives, sealants, and miscellaneous solvents used throughout the facility. Tracking fugitive emissions from these sources does not pose any problems since emissions calculations are based on the material VOC content and tracking. There are no fugitive VOC emissions associated with the coating operations because the monitoring approach is based on the amount of VOC input to - and generated by - the system. Any fugitive VOC emissions from the paint lines, including cure volatiles, are accounted for in EPA's "Protocol for Determining the Daily VOC Emission Rate of Automobile and Light-Duty Truck Topcoat Operations," which Saturn uses. Testing was performed to determine both capture and transfer efficiency for the spray booths and booth/oven splits on the coating lines.

Historically, start-up and shut down periods at the facility have not been problematic at the facility. Occasionally, equipment malfunctions may impact emissions rates. The major sources of VOC emissions from the facility are the surface coating lines in the paint shop. Emissions resulting from malfunctions are accounted for at the end of the month while preparing the required monthly PAL emission report. For example, if the carbon abatement system were to experience a malfunction requiring temporary shutdown, Saturn would account for the resultant temporary increase in VOC emissions based on the records of abatement system operation.

VOC emissions from several insignificant sources, e.g., bulk gasoline storage tanks, are tracked and included in monthly emissions reports (i.e., bulk gasoline storage tanks). VOC emissions from solvent storage tanks are included in mass balance calculations. Examples of sources excluded from the monthly report include maintenance activities, fluid filling in general assembly (except gasoline filling), body fabrication (spot welding), phosphate washing, injection molding, and sheet metal stamping.

Should instances of missing data occur, Saturn would investigate the cause of the gap and take steps to ensure that similar instances are minimized in the future. Representative data, possibly from redundant systems, would be developed and used instead of the missing data. The emissions report including the alternative data would be noted as such. For example, worst-case coating parameters are used as default values should actual batch data be unavailable. No evidence of any past problems associated with missing data was reported or found.

Emission factors (and emissions calculations) are updated to reflect most recent data. Calculations will be updated upon completion of required testing as specified in Section C of the flexible permit.

The concept of replicable operating procedures, or ROPs, was included in Draft White Paper Number Three in August of 2000. Because Saturn's Permit No. 952233, issued on June 6, 2000, predates the release of the draft White Paper for comment, the use of ROPs was not applicable. However, the monitoring specifications for the thermal oxidizers, as identified in Section C of the permit are analogous to ROPs, since deviations from normal operation are identified based on "...the average temperature measured during the most recent performance test...." Section C of the permit covers "Monitoring and Reporting Requirements" and states that Saturn shall evaluate transfer efficiency, oven solvent loading, VOC destruction efficiencies using EPA's Automotive Protocol, EPA test method 25A, and the test protocols to be submitted to TDEC. The permit also requires for new emission sources that Saturn perform an initial one-time demonstration that the source and control technology are in place and operating consistently with the permit application (permit condition A.1.2). There is language in the test protocol document for the thermal oxidizer monitoring that states "A deviation is defined as any 3-hour period during which the average temperature is more than 28 C less than the average temperature measured during the most recent performance test (where applicable) or the manufacturers suggested set point. Saturn representatives indicated that they anticipate that the concept of ROPs will be incorporated into Saturn's forthcoming title V permit. TDEC anticipates approving the approach under the automotive protocol that provides for the use of the most recent test results.

Currently, Saturn's flexible operating permit does not require specific logs to identify changes made to existing sources under Condition B.10.1 of the permit. Saturn representatives indicated that such facility changes are identified and evaluated by Saturn's environmental management system that includes several processes to identify facility changes and impacts (see below).

S Chemical Review - Chemicals must be reviewed and approved through Hazardous Material Control Committee (HMCC) before being brought on site. This includes an environmental review for applicable reporting requirements (SARA, CERCLA, CAA, CWA, RCRA), permit considerations, waste disposal, safe use, personal protective equipment, etc. Impacts of new chemicals on air emissions and on air permit requirements are assessed as part of this process.

S New Projects or Modifications - New projects or plant modifications are identified and assessed for environmental impact on many levels:

- New projects are discussed routinely in meetings between the Manager of Environmental Affairs and the Team Leader for Future Projects/Models.
- The Manager of Environmental Affairs regularly attends top management meetings that discuss future projects (i.e., State of the Business).
- Manufacturing Cost Estimate Studies are circulated through the various leadership groups (facilities, environmental, product engineering, manufacturing engineering, etc) to study the feasibility of major changes before appropriation for funds is ever requested.
- Environmental engineers in each Business Unit are part of regularly scheduled engineering meetings and maintenance meetings where plans are discussed prior to implementation.
- Any projects that have a potential environmental impact are evaluated internally, and by Saturn's environmental consultant, to assess any air permitting requirements.
- Involvement with supplier's administration teams.
- Involvement with GM product development teams.

S ISO 14001 - The ISO 14001 system ensures that an environmental management system is in place to:

- Review environmental aspects, legal and other requirements, objectives and targets
- Communicate relevant environmental information to top management
- Communicate relevant environmental information to team members on the manufacturing floor via training classes, written operating procedures and job instructions

TDEC and Saturn representatives indicated that the emissions impacts (e.g., increases or decreases in emissions) associated with changes made at the facility to existing emissions sources under B.10.1 of Permit No. 95223 are reflected in the emissions records for the facility.

The concept of advance notices for new emissions units is included in the permit in the form of registration with TDEC of new emissions units constructed using advance approval provisions. Conditions B.10.2 allows new sources to be installed on an expedited basis after TDEC review and approval of mBACT or BACT, depending on the magnitude of the new source.

Quality/Quantity of Information

4.3 What was the quality and the quantity of monitoring data received?

4.3.a. Are CEMS in place? If yes, were data provided?

4.3.b. Were stack tests performed? If yes, were results provided?

4.3.c. Was parametric monitoring performed? If yes, were results provided?

4.3.d. Were any other monitoring approaches used? If yes, were data provided?

TDEC representatives indicated that they believe that the quantity and quality of monitoring data required by the permit and received to-date under the permit are adequate to determine compliance with all applicable requirements.

Pollutant continuous emissions monitoring systems (CEMS) are not in place at the facility. However, combustion chamber temperature is monitored and recorded on a continuous basis for all body systems and powertrain oxidizers at the facility.

Stack tests were performed to demonstrate the control efficiency of the body systems oven oxidizers in 1991 and included as part of the original compliance demonstration. Stack tests were conducted after installation and start-up of the paint shop carbon adsorption system in 1993. The results of that test program were submitted to and reviewed by EPA. Diagnostic stack testing has been performed on several powertrain and body systems sources during the period of 1993 to 1997 to ascertain performance of pollution control systems and in support of the original title V operating permit application for the facility. Section C of the flexible operating permit requires significant stack testing to demonstrate the performance of the body systems oven oxidizers, carbon abatement system, and the regeneration oxidizer. Copies of the required Section C tests will be provided to TDEC upon completion.

Parametric monitoring was performed at the Saturn facility. Condition C.5 of the flexible operating permit requires Saturn to prepare and utilize monitoring protocols for each category of air pollution control device used at the facility. Saturn has developed the protocols and has submitted them to TDEC for review and approval. The protocols specify control device parameters to be monitored as indicators of control device performance. Saturn is implementing the control device monitoring protocols across the site.

Additional monitoring approaches are utilized at the Saturn facility. The flexible permit specifies other monitoring approaches required for the facility in Section C.6 of the permit and describes how those approaches are used to calculate monthly emissions for each source in Tables 2 through 5 of the permit. The basis for much of the recordkeeping is EPA Publication 450/3-88-018, Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light Duty Truck Topcoat Operations.

4.4 What was the percentage/amount of site-wide emissions subject to enhanced monitoring, recordkeeping, reporting and/or controls that were greater than required by applicable requirements under a conventional permitting approach?

The monitoring, recordkeeping, and reporting requirements currently used by Saturn are greater than the requirements of the initial Saturn permits, even though the number of total permit conditions has been substantially reduced. Saturn and TDEC representatives reported that the additional monitoring, recordkeeping, and reporting activities that Saturn is currently undertaking will be incorporated into the forthcoming title V permit and associated monitoring protocols. Saturn has historically maintained air pollution control equipment in optimum performance condition. The pollution control device monitoring protocols will provide additional documentation and assurance that these systems are operating as designed.

4.5 Did actual changes made match their up-front descriptions? If not, why not and how were the discrepancies addressed?

TDEC representatives indicated that the changes authorized as part of the flexible permit (PSD changes) match their description included in the permit application (i.e., L850 engine facility and second assembly line in general assembly). A new stamping press was also added as described in

the application. The paint shop capacity related projects described in the application have not yet been initiated.

4.6 How many changes (e.g., potential NSR triggering events) are identified in the logs?
No logs are required to be maintained of changes implemented at the facility that utilize the advance approval permit provisions under B.10.1 of the permit. No registrations of new emissions units (see permit condition B.10.2) were available, since no changes utilizing this advance approval provision had been implemented during the permit term, as of August 2001.

4.7 What types of information and level of documentation detail are included in the logs?
The permit does not require that a log be maintained (see section 4.6 for additional discussion).

4.8 Was there any confusion over the location of new emissions units and what requirements are applicable to them? If so, please describe the confusion and how it was resolved.
The EPA Review Team did not find any evidence of confusion over the location of new emissions units and their applicable requirements. All new emissions units (e.g., L850 engine facility) constructed as of August 2001 were explicitly described in Saturn's PSD permit application.

4.9 What types of information and level of documentation detail are included in the notices?
If new emissions sources are added, pursuant to permit condition B.10.2, Saturn is required to provide notice to TDEC by way of registration of the sources. See section 2.1 for a description of information required by this registration process. As of August 2001, no modifications or constructions have been made by Saturn that utilize this advance approval permit provision.

4.10 Were the calculations required by the permit included in or attached to the on-site log?
The permit does not require that a log be maintained (see section 4.6). Changes at the facility under B.10.1 of permit No. 95223 that affect facility emissions would be reflected in the PAL emission records for the facility. The calculations required by the permit pertain to emissions tracking systems for use in demonstrating compliance with PAL requirements. This information, including monitoring data calculations, were made available to the EPA Review Team during their August 2001 site visit to the facility.

5. DESIGN ADEQUACY OF THE FLEXIBLE PERMITS

General inquiries based on subsequent implementation of the flexibility provisions

5.1 Were any applicable requirements omitted?
The EPA Review Team did not find evidence of any applicable requirements potentially applying to the advance-approved change that were omitted from the permit.

5.2 Was monitoring sufficient?

5.2.a Does the permit utilize appropriate monitoring methodologies based on the types of emissions units involved?
TDEC representatives stated that they believe that the monitoring approach required in Saturn's PSD

permit is appropriate given source operations, and that it is sufficient to determine compliance with all applicable requirements. In general, the EPA Review Team found the monitoring methods contained in the PSD permit to be sufficient given the types of emissions units at the facility. The EPA Review Team found that the material balance methodology (which is based on EPA's protocol) used for determining the VOC emission rate from the Saturn manufacturing and assembly plant is appropriate. The parametric monitoring requirements (for combustion temperature) associated with the facility oxidizers were also deemed appropriate and consistent with similar emission sources. Saturn is conducting appropriate monitoring for the cap, and has submitted a complete monitoring protocol to TDEC, in accordance with permit term C.2. When TDEC revises the permit to formalize Saturn's current monitoring practices, the EPA Review Team believes the permit will provide the appropriate level of monitoring for the control systems.[4] The following paragraphs more specifically describe the necessary permit content for monitoring procedures.

The key parameters to monitor for a fixed bed carbon adsorber of the type Saturn uses are the exhaust gas flow rates, adsorption/desorption cycle times, and the (carbon) bed operating temperatures. Currently these parameters are monitored effectively, even though there are no actual established permit limits to prevent changes from the current operational practices. Although the correct monitoring parameters were selected, the EPA Review Team recommends including more specific monitoring procedures and specific performance indicator ranges in the revised permit. Current guidance for parameter monitoring of control device operating parameters suggests the permit include the following elements in the monitoring provisions:

(a) specific description of how the operating parameter is to be measured;
(b) the frequency of measurement;
(c) the averaging period for the measurements, if appropriate; and
(d) the specific operating range that defines when an excursion from normal operation has occurred and corrective action and reporting is required.

While Saturn is currently using a 30-hour regeneration cycle time, there are no provisions in the current PAL permit to prevent an increase in that time, allowing for an oversaturation of the carbon bed. The EPA Review Team recommends when TDEC revises the permit (or issues the title V permit) to address the monitoring protocol submittals that specific operating ranges be included for the cycle times and/or the carbon bed temperatures so that a process change will be evident to the operator or an auditor reviewing such information. The indicator ranges should be set based on historical data, the most recent test information, design specifications, and engineering judgment. If one of the key operating parameters changes significantly (i.e., falls outside the indicator range) in the future, or if a process change is to be considered, Saturn would need to provide documented technical data (e.g., test data or design information) showing the impact on VOC emissions. Because the overall control device efficiency is directly used in the VOC emissions calculation, any change in operation that reduces the control efficiency needs to be quantified, so that a new control efficiency can be used in the daily, monthly, and annual VOC emissions calculations to determine compliance with the PAL limit.

Although monitoring carbon bed operating parameters provides an indication of proper operation and

[4]EPA Region 4 reports that TDEC has issued Saturn's title V permit (as of August 2002) and that the permit has addressed EPA Review Team recommendations.

a reasonable assurance of continued compliance, a periodic check of actual bed performance provides additional confidence. Likewise, when TDEC revises the permit (or issues the title V permit) to address the monitoring protocol submittals, the EPA Review Team recommends that a quality assurance requirement be added to the title V permit to use a portable (hand-held) flame ionization detector (FID) to test each carbon bed on a quarterly basis to verify the continual performance of the beds. During the Team visit, Saturn representatives indicated that they have such equipment and have used it for random testing in the past several years. In addition, when TDEC revises the permit (or issues the title V permit), the EPA Review Team recommends that a regular visual inspection for the dry filtration system, cartridge filters, and mist eliminators be included in the permit.

The current monitoring parameters and techniques used by Saturn are based on a previously EPA and TDEC-approved monitoring protocol and were included in a new proposed monitoring protocol submitted to TDEC for review and approval. While Saturn representatives indicated that the company believes that the proposed monitoring procedures for the carbon abatement system are consistent with EPA guidance, they added that proposed revisions to the monitoring protocol that improve the effectiveness of the monitoring system will be considered by Saturn.

The EPA Review Team found the emission factor/fuel usage approach used for the miscellaneous combustion sources (i.e., ovens, oxidizers, water heaters, boilers, furnaces, etc.) to be appropriate for calculating $NO_{x,}$ CO, SO_2, and PM_{10} emissions.

5.3 Were there any problems translating the advance approval concepts into actual permit provisions?

The EPA Review Team found no evidence to suggest that there have been any problems translating the advance approval concepts into actual permit provisions.

5.4 Were the advance approved categories of changes sufficiently well defined to cover the actual changes made? If not, how were these changes made?

The EPA Review Team found that the advance-approved change categories were broadly defined and capable of accommodating a broad range of physical changes and changes in method of operation. See section 2.1 for a description of the advance-approved change provisions that are included in the permit.

5.5 Did the permit contain all calculation procedures/ROPs needed by the source to determine applicability and assure practical enforceability? If not, how did the source determine applicability and assure practical enforceability?

The EPA Review Team found that all calculation procedures necessary to determine compliance were included in the permit (or included by reference in the EPA protocol).

5.6 Were all critical assumptions for ROPs use and/or emissions tracking also included in the permit? If not, how were these gaps addressed?

The EPA Review Team did not find evidence of any critical assumptions associated with emissions tracking that were omitted from the permit.

Tool Specific Inquiries

5.7 Clean Buildings

5.7.a What safeguards were imposed to prevent the overloading of the control equipment?

5.7.b Were any emissions excluded from the central control device? Were they subject to any applicable requirements, and, if so, how were they accounted for in the permit?

Clean building tools are not applicable in the case of Saturn, since Saturn conducted a plant-wide BACT for its advance approvals.

5.8 Replacement Conditions

5.8.a Were the mass balance based formulae adequate to limit actual emissions? If not, what were the inadequacies and how were they corrected by the source and permitting authority?

5.8.b Were all critical assumptions for using the formulae contained in the permit? If not, what were the inadequacies and how were they corrected by the source and permitting authority?

See section 5.2.

5.9 P2 Provisions

5.9.a Was P2 adequately recognized and encouraged by the design of the permit? If not, why not and what changes could be made to better recognize and encourage P2?

No explicit P2 provisions were included in the Saturn PSD permit. TDEC representatives indicated that they believe that the PAL provisions contained in the permit encourage P2 since the facility has an incentive to lower per unit vehicle emissions to maintain a comfortable margin of compliance under the PAL and to accommodate possible future production increases. Saturn representatives indicated that, when operating under a conventional air permit, there was a disincentive to initiate pollution prevention or pollution reduction projects (i.e., the "actual to potential" test encourages sources to operate at or near their maximum emissions rate so they are not penalized when making modifications). See Appendix A for information on recent facility P2 activities.

5.10 Fugitive Emissions

5.10.a How dependent on changes in fugitive emissions was the ability of the source to comply with any cap?

The amount and change in fugitive emissions does not affect the source's ability to comply with the PALs since the mass balance VOC monitoring approach combined with certain parameter monitoring accounts for fugitive VOC emissions and the facility is operating with a large margin of compliance.

6. PRACTICAL ENFORCEABILITY OF THE FLEXIBILITY PROVISIONS

6.1 Assess the overall practical enforceability of the permit's flexibility provisions.

6.1a Does the permit require monitoring, recordkeeping and reporting in appropriate time intervals (e.g., daily records for daily limits)?

6.1b Can an inspector visiting the site determine historical and contemporaneous compliance with the flexible permit from records maintained on site?

6.1c Does the permit contain a legal obligation for the source to adhere to the terms and conditions of the limitation?

6.1d Does the permit rely on the efficiency of an air pollution control device for compliance with an emissions limit? If so, how is that efficiency determined and shown to be accurate?

The permit contains a legal obligation for the source to adhere to the conditions contained in the permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations. TDEC representatives indicated that they believe that the flexibility provisions contained in Saturn's PSD permit are enforceable from a practical standpoint. Overall, the EPA Review Team found the provisions contained in the Saturn flexible PSD permit to be enforceable on a practical basis.

The permit requires monitoring, recordkeeping, and reporting in appropriate time intervals. Daily and monthly tracking of monthly VOC usage and calculated emissions provides adequate monitoring and recordkeeping for practical enforceability of the annual (12-month rolling) limit. When the end-of-month VOC emissions are calculated, the daily production rates of finished vehicles are also totaled for the month, and then both values are aggregated with the data from the previous 11 months. This monitoring approach allows both Saturn and TDEC the ability to detect trends and the actual margin of compliance with the permit VOC PAL. The monthly fuel (natural gas) usage records provide adequate information for determining compliance with the annual $NO_{x,}$ CO, and SO_2 limits.

During an analysis of Saturn monitoring data and replication of selected Saturn emissions calculations, the EPA Review Team found that an inspector visiting the site can determine historical and contemporaneous compliance with the flexible permit conditions from records maintained on-site by Saturn. Moreover, the EPA Review Team was able to replicate the exact numbers calculated by Saturn for a period of time selected by the Team using the same information used by Saturn and available in the records.

Records are maintained on-site for all time periods covered by the current permit. Documentation of the key parameters (raw material usage, coating batch certification of analysis, production reports, and performance test results) were available for review on site. Records of the calculations used for the daily, monthly, and annual (12-month rolling totals) VOC emissions were available for the entire time period back to 1990 (via hardcopy reports and electronic database).

VOC emissions from the major panel and fascia basecoat heated flash zones and clearcoat spray zones are captured and controlled by a hybrid carbon adsorption/oxidation abatement system. VOC emissions from each of the paint shop curing ovens are captured and controlled by regenerative thermal oxidizers. Obviously, the capture and destruction efficiencies associated with the control devices are two of the key factors included in the VOC emissions calculations. Per the permit conditions that reference EPA's "Protocol for Determining the VOC Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" (Protocol), the destruction efficiency is included in the VOC calculations. The permit specifies that performance testing must be done in accordance with EPA-approved test methods and the test results must be approved by the State. Only then can the approved capture and destruction efficiency numbers be used in the emissions rate calculations. There is also an annual requirement in the Protocol for the source to review the process and control equipment and certify that no significant changes have occurred.

6.2 Does the permit require the correct type and amount of information (in logs, notices, monitoring data, etc.) to determine the number and duration of any deviations?

Saturn's PAL permit contains specific recordkeeping requirements (see Section C and Tables 2 through 5 in the Saturn permit). Such records are required to accurately calculate emissions on a monthly basis. In addition, the applicable requirements contained in the provisions of 40 CFR Part 60, Subpart MM -- Standards of Performance for Automotive and Light Duty Truck Surface Coating Operations and EPA's "Protocol for Determining the Daily VOC Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" are incorporated by reference into the PAL permit. These referenced documents require specific information for conducting and documenting the material balance and for reporting the results and any deviations. The monitoring specifications referenced in EPA's protocol for performance testing of control devices do not specify any frequency other than the annual review and certification. The EPA Review Team recommends that a required frequency of actual testing be changed to a minimum of once per permit period (e.g., five years).[5]

6.3 What was the nature and duration of any deviations?

TDEC representatives stated that no deviations or compliance violations associated with the PSD permit have been identified as of August 2001. See section 1.24 for information on the PSD permit inspection history.

6.4 Can all calculations required by the permit, including ROPs, be duplicated? Can anybody understand and apply them consistently?

TDEC representatives stated that they believe that all monitoring-related calculations required by the permit are well understood and can be duplicated.

The calculations are contained in a spreadsheet format. The EPA "Protocol for Determining the Daily VOC Emission Rate of Automobile and Light-Duty Truck Topcoat Operations" includes many equations that utilize several different terms and factors. While these equations are long and may appear to be complex, they basically follow an "IN-OUT" material balance approach. Once all the variables (or inputs) from the daily/monthly material tracking and reporting are identified, they can be plugged into the equations. Simple calculations are needed to demonstrate compliance with the PALs.

6.5 Does the permit clearly set forth the applicable requirements for every change made by the source? If not, what additional information is necessary?

TDEC representatives stated that they believe that the permit clearly sets forth the applicable requirements for every change made by the source that was advance-approved by the permit. The EPA Review Team found that the permit addressed all applicable requirements for the advance-approved changes.

6.6 Were there any issues associated with off-permit notices (e.g., adequacy of descriptions)?

No issues associated with off-permit notices were identified by TDEC, Saturn, or the EPA Review Team.

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[5] As previously mentioned, EPA Region 4 reports that TDEC has issued Saturn's title V permit (as of August 2002) and that the permit has addressed EPA Review Team recommendations.

6.7 Compare the "ease" of inspecting sources with flexible provisions to that of inspecting similar sources with conventional permits. For the units affected by flexibility provisions, what worked well and what posed difficulties?

TDEC representatives indicated that they believe that the flexibility provisions contained in the Saturn PSD permit have resulted in "less complexity" during their inspection when compared with a conventional PSD permits. They acknowledged that TDEC inspectors must take some time to review and understand the flexibility provisions contained in the permit (e.g., PALs). However, they indicated that the monitoring and recordkeeping requirements associated with facility emissions make it relatively straightforward to determine compliance with the permit requirements.

6.8 Compare the compliance rate (to date) of flexible provisions within the permit with compliance rates of conventional regulatory permits governing the same types of changes at similar sources, and for similar types of changes with the same source under previous conventional permits.

TDEC representatives indicated that Saturn has an excellent compliance record, and that the source's compliance record compares favorably with other large sources in the state (see section 1.17 for a discussion of Saturn's compliance history). TDEC representatives indicated, however, that the source's compliance record under the flexible permit provisions is consistent with its permit compliance prior to the flexible permit. They also indicated that this compliance performance probably results from Saturn's commitment to environmental compliance, its effective environmental and compliance management systems, and its trained environmental personnel.

7. PERMIT COSTS, BENEFITS & VALUE ADDED

7.1 Did the flexible permits provide you with benefits in terms of: practical enforceability; information flow; environmental/emissions results; economic results; etc.?

Saturn and TDEC representatives identified several environmental benefits associated with the flexible permit.

- Saturn capped its future site-wide emissions of volatile organic compounds (VOCs), including those arising from a doubling of current capacity, to a level about 50 percent of its previous allowable emissions (i.e., from 2,897 tons/year of VOCs to 1,563 tons/year or less, depending on the production level). Saturn's current actual VOC emissions are considerably below this rate (i.e., 595 tons/year).
- Future construction at the facility is subject to Best Available Control Technology (BACT), which will help to minimize air emissions associated with expanded production activities. Saturn volunteered this BACT approach, thus giving up "netting" under NSR.
- The permit reduced the regulatory friction associated with making changes with P2 benefits. See section 5.9 for a discussion of this, and see Appendix A for a summary of Saturn's P2 activities.

Saturn indicated that they anticipate that the permit will generate savings by reducing the need for case-by-case applications and approvals for changes made under the advance approval provisions. Saturn representatives identified several instances where the flexible PSD permit offered certainty for the company to make several changes without complicated applicability determinations.

- The installation of a second final assembly line for alternative vehicle platforms (i.e., SUV)

could have triggered PSD review. Emissions from the actual second final assembly line, when considered alone would have been less than PSD modification thresholds. However, under EPA's current interpretation of PSD applicability, emissions increases associated with increased utilization of the paint shop probably would have been considered in the project emissions inventory. Under that scenario, barring any modifications to the paint shop, the difference between baseline emissions associated with the affected paint shop sources and their potential to emit would have been included in the project emissions inventory. Assuming that netting was not feasible, the project would likely trigger PSD and the emissions from affected paint shop sources included in an ambient air quality impacts analysis. Under current guidance, BACT would have been required for units that were physically modified.

- Depending upon the original project schedule, each of the capacity-related changes in the paint shop could have triggered PSD review. The decision on whether to embark on the PSD permitting path for each project would have been project specific based upon many variables including the actual emissions increase associated with the project, the impact of federally enforceable limits to avoid PSD, and the ability of the project to net out of PSD. Absent any PSD avoidance options, the impact of PSD on the project scope, schedule and budget would have been ascertained. If the project were still viable, the PSD path would have been initiated. If, after consideration of the PSD impacts, the project was no longer viable, alternatives to the project would have been evaluated including the no change alternative.
- Saturn indicated that the flexible permit was a principle factor in General Motors' (GM) selection of the facility to manufacture the L850 engine, leading to the creation of 700 jobs. Saturn was awarded the contract primarily because it could implement the necessary changes within 24 months and accommodate future changes with minimal delay. The flexible PSD permit is enabling Saturn to add and modify coating, assembly and machining lines in a timely manner while ensuring that best available pollution control technologies are installed and that air emissions remain under approved limits. Using a combination of the PAL emissions caps and advanced approvals, the flexible permit will allow Saturn to upgrade the facility over the next few years with minimal delays to produce several new vehicles, including Saturn's new fuel-efficient SUV, the Saturn VUE™.
- Saturn representatives stated that the flexible permit avoids the NSR "backlog" associated with the conventional permitting process, thereby providing a competitive advantage to Saturn. The company believes that the PAL permit facilitates enabling the company to bring new vehicle models to market and improve existing models in advance of its competition and to address changes in customer expectations and the marketplace.

TDEC representatives identified the following benefits associated with the Saturn flexible permit.

- Permit has reduced agency paperwork associated with processing individual construction permit applications and permit modifications, allowing agency staff to focus on higher environmental priorities. The permit saved TDEC significant staff time associated with processing notice of construction applications from Saturn.
- The permit eliminates the need for full minor NSR permitting. Traditionally, permitting for minor NSR takes approximately 24 to 40 staff hours, plus issuance of a public notice and a town meeting or public hearing. This process has been streamlined to a state BACT review for new unit additions not subject to major BACT. TDEC representatives believe that during

the life of the permit, TDEC will need to invest less hours of staff time to address air permitting needs associated with the Saturn facility due to the anticipated future use of the advance approval provisions.

- The source is easier to inspect, since the number of unit-specific requirements (e.g., production limits, hours of operation limits, unit-specific emissions limits) was significantly reduced. TDEC inspectors now can focus on ensuring that overall facility emissions remain below the emissions caps. The flexible permit further simplified compliance inspections by replacing fifty-four air permits with the single PSD permit.
- The permit reduced the need for additional toxicity assessments, by requiring Saturn to conduct an assessment of the emissions of toxic, volatile pollutants from the facility.

7.2 Did the flexible permit allow the source to better plan operations (e.g., longer planning horizon)? If so, how? Please give examples of activities that could be planned better with flexible permit, with details as to how typical permits do not allow similar planning.

Saturn representatives stated that construction of several projects authorized by Permit No. 95223 could not be initiated until the permit was issued. This permit has not yet had a significant impact on new projects beyond the initial list. They further indicated that it is important to note that market conditions, cost reductions, and continuous improvement will drive additional project planning and implementation. The permit allows the facility to respond to these opportunities in a timely manner. The overall advantages of having such flexibility in the permit are significant to Saturn. The permit provides certainty regarding changes to existing emissions units (i.e., resources are not focused on determining if a proposed project is major, minor or exempt), certainty with regard to new emissions units (i.e., BACT or mBACT, 45 or 30 day approval of registration), certainty regarding pollution prevention projects (i.e., ability to implement without NSR implications, impact on baseline, etc.). The permit also provides certainty with regard to compliance (i.e., simplified compliance determination).

Conventional air permits do not permit similar planning due to uncertainty regarding schedule, level of control, and cost. Facilities in many cases do not have significant lead time to implement projects due to significant improvements realized in the design-engineering-construction cycle. GM has found that permitting lead times can be longer than the ever-decreasing project time lines. When this happens, facilities will embark on the fastest possible permitting track (i.e., PSD avoidance, synthetic minor conditions) that in many cases lead to future compliance problems and strained relations with regulatory agencies.

7.3 What P2 activities did you undertake during the term of the flexible permit?

7.3.a Which P2 activities, if any, would you have performed even without the flexible permit?

7.3.b Did having the flexible permit change the timing or extent of your P2 efforts?

7.3.c What emissions reductions were achieved as a result?

7.3.d How much environmental benefit do you perceive in P2 provisions?

7.3.e Have P2 provisions helped enhance permit flexibility and/or efficiency?

P2 activities taken under the flexible permit included replacement of paint applicators (i.e., primer-surfacer, basecoat, and clearcoat) which resulted in a reduction in paint shop material usage. Saturn also eliminated the underbody PVC coating process, leading to reductions in VOC emissions. Table 7.3 summarizes additional P2 activities undertaken during the permit term.

Table 7.3 **Saturn Spring Hill Facility P2 Projects**
Supply chain mapping pilot to reduce environmental footprint via UT, EPA, and GM partnership.
Saturn VUE SUV-CVT technology for fuel efficiency; electronic power steering.
L850 facility construction - install liner, apply stringent environmental specifications.
Special loading docks to handle chemical loading areas. Segregated from stormwater and wastewater drains.
Relationship with Ryder logistics using reusable containers.
Work with NIST, suppliers, tier II & II suppliers with an initial focus on energy consumption and packaging.
Waste vendor and on-site personnel integrated into a team on P2 activities.
Work with chemical and paint suppliers to integrate P2 activities.
Weekly energy reported by building.

Saturn representatives indicated that the organization routinely evaluates possibilities for P2 projects. Saturn representatives went on to state that they believe the flexible permit will facilitate implementation of P2 projects that would otherwise face potential delays due to the need to assess PSD applicability.

Saturn representatives indicated that an added benefit of the flexible permit is the ability to initiate changes motivated primarily by cost savings that result in significant P2 benefits. Such changes could be accomplished under Condition B.10.1 of the permit with the resulting environmental benefits (i.e., reduced VOC and PM emissions, reduced sludge generation, and reduced clean-up material usage) and cost benefits (i.e., reduced paint costs, reduced clean-up costs, reduced labor associated with clean-up, and reduced wasted disposal costs). Saturn representatives indicated that more engineering time could be utilized to maximize the P2 components of the project rather than becoming engulfed by the NSR process (i.e., interpretation of confusing and sometimes conflicting guidance). If such a change would require a permit application, the source would likely have second thoughts due to the complications that could result during the application process.

7.4 How useful is the annual P2 report?

7.4.a How useful was it to have the source track P2 activities and their results?

The Saturn PSD permit was not a Pollution Prevention in Permitting Program (P4) project and thus does not contain any P2 reporting requirements.

7.5 Describe the type and amount of emissions reductions made to comply specifically with emissions caps/PALs (e.g., when you added or expanded units, or increased use of units, how did you ensure that emissions would stay below the PAL or emissions cap?).

7.5a Did your emissions per unit of production (e.g., lbs/widget or lbs/MMBtu) go down, stay the same or go up during the term of the flexible permit?

7.5.b In the absence of a PAL or emissions cap, please explain how you would have accommodated those same expansions or increases in use.

- **Would emissions have differed?**

- **Would you have been able to net out of NSR/PSD review?**
- **Would you still have triggered title V permit modification tracks?**
- **Would you not have made the change?**

The facility is currently operating with a large margin of compliance, and has not needed to decrease emissions in order to remain in compliance with the PALs. Actual annual (12-month rolling VOC emissions are running at approximately 595 tons/year against a PAL of 1134 tons/year (given current production levels).

Saturn representatives indicated that not enough data is available to make a determination of the trend in emissions per unit of production as only 12 months of operation have occurred under the permit and the capacity-related projects authorized by the permit have not yet been initiated. Emissions in pounds/vehicle for the first 13 months of operation are summarized in Table 7.5.a.

Table 7.5.a **Emissions (lbs/vehicle)**

Month	NO_x	CO	PM_{10}	SO_2	VOC
June-00	0.53	1.00	1.07	0.003	4.70
July-00	0.74	1.77	1.41	0.004	7.87
August-00	0.48	0.80	1.05	0.003	6.11
September-00	0.60	1.02	1.05	0.004	6.38
October-00	0.69	1.05	1.05	0.004	5.79
November-00	1.01	1.30	1.02	0.006	5.63
December-00	1.66	1.85	1.38	0.010	8.03
January-01	1.45	1.69	1.12	0.009	6.31
February-01	1.05	1.38	1.08	0.006	6.11
March-01	1.06	1.36	1.13	0.006	5.71
April-01	0.64	1.03	1.08	0.004	6.81
May-01	0.56	0.95	1.15	0.003	5.90
June-01	0.51	0.92	1.16	0.003	5.28

Saturn representatives stated that comparing emissions per vehicle over a short time period (i.e., month to month) does not always provide a true indicator of performance since many variables tend to cause these numbers to change significantly from month to month. For example, pollutants from combustion activities (e.g., boilers) are influenced by seasonal variations in natural gas usage. Vehicle production fluctuations compound the problem since certain facility emissions are relatively constant and may not vary with the production volume. VOC emissions are affected in a similar manner under low production scenarios since clean up and purge material usage can actually increase during such periods (i.e., lower production does not automatically result in lower emissions). VOC emissions are also affected by the shipment schedule of waste solvent. Solvent usage and recovery records are reconciled on a monthly basis. Should a waste solvent pick-up scheduled for a given month carry over to the next month, the miscellaneous solvent emission rate for the month of record will be artificially high for the month of record and artificially low for the next month.

Saturn representatives stated that, in the absence of the PAL permit, the L-850 project, if initiated independently, would have likely not triggered PSD review. The installation of a second final assembly line for alternative vehicle platforms (i.e., SUV), however, would likely have triggered PSD review. Emissions from the actual second final assembly line, when considered alone would have been less than PSD modification thresholds. However, under EPA's current interpretation of PSD

applicability, emissions increases associated with increased utilization of the paint shop probably would have been considered in the project emissions inventory. Under that scenario, barring any modifications to the paint shop, the difference between baseline emissions associated with the affected paint shop sources and their potential to emit would have been included in the project emissions inventory. Assuming that netting was not feasible, the project would likely trigger PSD applicability and the emissions from affected paint shop sources included in an ambient air quality impacts analysis. Under current guidance, BACT would have been required for units that were physically modified.

Depending upon the original project schedule, each of the capacity-related changes in the paint shop could have triggered PSD review. Saturn representatives indicated that the decision on whether to embark on the PSD permitting path for each project would have been project-specific based upon many variables including the actual emissions increase associated with the project, the impact of federally enforceable limits to avoid PSD, and the ability of the project to net out of PSD. Absent any PSD avoidance options, the impact of PSD on the project scope, schedule and budget would have been ascertained. If the project were still viable, the PSD permitting path would have been initiated. If, after consideration of the PSD impacts, the project was no longer viable, alternatives to the project would have been evaluated including the no change alternative.

Emissions from unaffected emissions units would have remained at original allowable levels. Emissions from affected units not being physically modified would likely have remained at original allowable levels or would have increased in proportion to the increase in production. Emissions from units subject to a BACT analysis would be equivalent to emissions projections included in the PALs. The net result would have likely been allowable emissions, in aggregate, higher than the current PALs.

7.6 Did the timing and/or design of the PAL influence the timing of additional control equipment and/or pollution prevention? If so, how and why?

Saturn representatives indicated that the timing and/or design of the PAL did not specifically influence the timing of additional control equipment and/or P2 activities. They indicated, however, that significant control commitments were made to launch the permit. Pollution prevention and additional pollution control (if necessary) are key tools for reducing emissions to maintain sufficient margins of compliance under the applicable PALs, since the various PAL limits are fixed. P2 is encouraged by Saturn since projects intended to reduce costs by increasing efficiency may now be initiated under Conditions B.10.1 and B.10.2. Such projects are typically targeted to reduce raw material usage. By reducing raw material usage (i.e., surface coatings), both costs and emissions are reduced.

7.7 Do you believe any of the flexible approaches are transferable to other jurisdictions/sources? If so, which ones? For what sources? Why are these approaches transferable?

TDEC representatives indicated that they believe that the flexibility provisions contained in the Saturn permit are potentially transferable to other sources in Tennessee. See section 1.18 for a discussion of the source selection considerations identified by TDEC representatives. Saturn representatives indicated that they believe that PALs, pre-approved NSR, and compliance demonstration through PAL compliance are transferable to other sources and jurisdictions. They further stated that flexibility

provisions as expressed in the Saturn flexible permit could be transferred to other "new" sources that utilize BACT or equivalent controls and can track emissions accurately on a month to month basis.

7.8 Compare a conventional permitting approach to that taken under flexible permits in terms of:

7.8.a Environmental performance, including emissions trends, emissions increases/reductions, emissions gaps between actual and allowable emissions, and other notable environmental results;

7.8.b Overall development effort and ongoing maintenance costs (what were/ have been the investments of both the permitting authority and the source?)

- **Which type of permit has more up-front costs (uses more resources)?**
- **What is the difference in up-front transaction costs?**
- **Which type of permit has fewer implementation costs?**
- **What is the difference in the implementation costs?**

7.8.c Number of permit actions/modifications required, as well as associated transaction costs or costs avoided (e.g., source reductions in opportunity cost, permitting authority value added for advance notice, of MRR, control devices, etc.)

See sections 4.1 and 7.1 for discussion of comparisons between the flexible permit and conventional permitting scenarios.

8. OTHER ISSUES

Future Flexible Permit Development

8.1 Do you anticipate any changes in the next version of the flexible permit?

8.1.a If so, what changes would you request/make (e.g., additions and subtractions) and why?

8.1.b Do you believe the existing regulations already provide for such changes? If so, how? If not, why not?

The next permit will differ somewhat from the existing PSD permit, since it will be a title V air operating permit. TDEC and Saturn anticipate that the flexibility provisions (i.e., PALs, advance-approved changes) will be included in the title V permit. Saturn and TDEC representatives indicated that the forthcoming title V permit and associated monitoring protocols will contain the monitoring, recordkeeping, and reporting requirements that are identified in the initial flexible permit and that are currently being used by Saturn.

Additionally, the PAL provisions in the permit include conditions (permit conditions B.8.1, B.8.2, B.8.3, and B.11.4) that mandate periodic review and adjustment (i.e., downward) of the PALs. This opens the possibility that PAL levels could be adjusted downward in future versions of Saturn's permit.

8.2 Do you believe there be any value added by EPA's finalizing guidance in this area? If not, why not? If so, how?

TDEC representatives indicated that they see significant value in EPA's finalization of guidance associated with flexible permitting techniques. They indicated that such guidance would likely reduce uncertainty regarding EPA positions on various flexible permitting techniques, reducing the time

needed to develop subsequent flexible permits. This would also promote greater consistency among EPA's Regional Offices.

Saturn representatives stated that, since the Saturn permit was obtained in the absence of specific PAL regulations, Saturn's position is that PALs and flexible permitting techniques are available under existing regulations and are legal. Guidance regarding how a source may procure a PAL/flexible permit under this scenario would be value added. However, current rules are not explicit regarding PALs although draft guidance outlines EPA's PAL concept (Draft White Paper Number Three). NSR rulemaking specifying flexible permit eligibility, structure, control requirements, entrance requirements, etc. would be beneficial and offer greater certainty than just guidance in articulating EPA flexible permit policy. Saturn representatives stated that any final action by EPA that stifles innovative permits or prohibits present conditions in its PAL permit would be unwelcome and would hurt American manufacturers' ability to compete globally.

8.3 Will you have any flexible permit writing/implementation training needs?

TDEC representatives reported that the EPA P4 flexible permitting workshop conducted in Atlanta, Georgia was instrumental in encouraging TDEC to pursue a flexible permit with Saturn. TDEC representatives indicated that similar EPA-sponsored training opportunities would be welcomed and encouraged by TDEC in the future.

8.4 Do you have recommendations for web-site materials?

TDEC and Saturn representatives indicated that a web-based flexible permit clearinghouse would be very useful. The site could identify flexible permits issued to date, provide copies of such permits, identify the permitting path the source took to obtain the permit, and summarize public comments received and how those comments were addressed by the source and the permitting authority.

8.5 What else could EPA do to limit the up-front design costs?

TDEC representatives did not have any additional recommendations, aside from finalization of EPA guidance or rulemaking, flexible permit training sessions, and documentation of flexible permitting techniques and case studies made available via a clearinghouse web site. Saturn representatives suggested that EPA could establish PALs (allowable/actual/flexible) as specific NSR options, providing clear guidance to the Regions.

8.6 How do you predict your up-front transaction costs would have compared if you had undertaken the same flexible permit for the same source with EPA guidance and the mentioned support structure already in place?

TDEC and Saturn representatives stated that they believe that the up front costs would be significantly reduced in the presence of EPA guidance and other supporting resources. TDEC representatives indicated that they believe that their interactions with EPA Region 4 during the permit development process could have been streamlined significantly (e.g., reduced number of meetings, conference calls, and review loops) if EPA's expectations and guidelines regarding flexible permitting techniques were clarified in EPA guidance.

8.7 How much time do you believe must pass before the reduced costs of overseeing the flexible permit would compensate for the higher up-front design cost?

TDEC representatives indicated that this is difficult to estimate, since it depends completely on the source's utilization of advance-approved change provisions, and the timing of those changes.

Source Screening Criteria

8.8 What criteria should be used to reject inappropriate flexibility proposals from sources (e.g., relevance of compliance history, P2 commitment, potential for environmental benefit, sustainable compliance over the long term)?

See section 1.18 for a discussion of criteria for determining the appropriateness of flexible permitting techniques for a source candidate.

Public Outreach

8.9 How can these permits be better communicated to the public (e.g., consistency with air program goals; potential improvements to monitoring, recordkeeping, reporting, etc.)?

TDEC representatives did not provide suggestions for enhancing communication with the public related to flexible permits.

8.10 What fact sheets would be useful to the permitting authority, source and the public?

TDEC representatives indicated that fact sheets on specific flexible permitting techniques, and examples of how they have been used, would be potentially useful to permitting authorities.

8.11 When and how should up-front meetings (i.e., before public comment period) be used to address potential public concerns? How should concerns from those meetings be addressed?

TDEC representatives indicated that interactions and meetings between the source, permitting authority, and interested members of the public can be useful for addressing public concerns. No additional comments were provided by TDEC.

APPENDIX A:
Saturn Pollution Prevention Activities and Accomplishments

The following information was provided by Saturn regarding the company's pollution prevention (P2) activities. Saturn's environmental philosophy embraces and encourages P2 for all waste streams generated on-site and off-site including waste reduction, energy conservation, land and water conservation, emissions reduction, and other related conservation activities. A description of P2 activities follows.

Waste Reduction

Reduce

Painting Saturn vehicles involves applying several layers of coatings to parts to provide corrosion protection, aid noise reduction, and enhance appearance. One of these coatings, called the "e-coat" layer, is applied early in the painting process to ensure even build-up of subsequent coatings and ensure all areas of the car part get painted. The e-coat material currently used contains a compound with about 4% lead. Due to the toxicity level of the lead, e-coat related solid waste is characterized as a hazardous waste under EPA regulatory classifications, and is disposed in an EPA permitted hazardous waste landfill. Saturn will be replacing this material with a "lead-free" e-coat material, reducing the toxicity of the waste and the amount of hazardous waste generated. The level of lead will be reduced to 0% in the new e-coat material, and hazardous waste will be reduced by about five (5) tons per year based on 1999 and 2000 baseline levels. (Expected completion: fall, 2002)

Saturn and its chemical supplier are initiating a project to better maintain the oil quality used in hydraulic systems. Equipment and operational procedure changes are being implemented to prevent water contamination of oil used in injection molding machines. Water contamination can occur, for example, when humid air is introduced into the machines. Besides increased productivity, the benefits will include generating less used oil waste, as well as requiring less replacement oil. Supplier personnel will be monitoring the quality and quantity of machine oils to help quantify improvements. (Expected completion: 2001)

In robots applying urethane sealer, bead tips were replaced, old ones reworked, robot programs updated and shutdown procedures were implemented. These improvements reduced landfill volumes created by scrap urethane, reduced manufacturing scrap disposal charges, and reduced material usage and VOC emissions. (Completed in 1998)

Body Systems evaluated areas of excessive waste and costs, involving SL1, SL2 and SW fascias. The fascia regrind percentage was raised from 20 to 30 percent. Scrap fascias can be reground and reused back in the production process.

Reuse

Saturn selected polymer plastics as a raw material in making most of the exterior body panels, partially due to their recyclability. When a plastic part is not up to specification, it may be ground up and recycled through off-site vendors into non-automotive plastic goods. However, ideally, reusing that plastic back into the same production process or reusing it into another car part component is preferred for both environmental and economic reasons. Saturn is working with several suppliers and GM's Design for the Environment team to evaluate processing and reusing painted TPO-type plastic back into the original production process, and reusing GTX-type plastic back into GM wheel covers and caps. This would eliminate a scrap stream of about 225,000 pounds per year for TPO plastic and 200,000 lbs per year of GTX plastic, and also importantly,

reduce the amount of new plastic that must be manufactured as a raw material. Recycling these plastics would be in addition to other plastics already recycled into parts such as blade assembly fans, air house cleaner, wheel liner and covers, rocker supports, and fascia bracket. (Expected completion: 2002)

Saturn suppliers are also working on behalf of Saturn to study the potential for food waste composting from site cafeterias. Saturn has four cafeteria locations for about 7,500 team members. This would reduce waste going to landfill. (Expected completion: 2001)

Recycle

Seven tons of seatbelts, obsolete due to a webbing change for model year 2000, were recycled instead of landfilled using the Maury County Impact Center. The Center is comprised of 250 people, and it provides training and jobs for people with disabilities. Oil absorbent pads are used throughout the Saturn facility to help maintain a clean and safe working environment. Pads are placed near equipment containing hydraulic fluids and lubricants and in areas where oil is handled, such as steel stamping presses and engine machining areas. Currently, Saturn uses about 450 packages of absorbents each year, and the used absorbents are landfilled (total of about 222 tons per year of oily debris disposed based on 1999 and 2000 baseline). Saturn is initiating a project to replace these pads with recyclable oil absorbents. The used absorbents will be sent off-site to be reclaimed and then returned to Saturn for additional use. Saturn's target is to reduce the use of disposable oil absorbents and related oily debris waste by 20%. (Expected completion: 2001)

Saturn is expanding the Powertrain facility by approximately 450,000 square feet to accommodate new assembly operations. A proactive plan to capture as much construction debris as possible for recycle was instituted (vs. traditional landfilling of co-mingled construction waste). Some of the key plan elements include segregating recyclable materials, education and training for contractors, oversight by Waste Management personnel, providing containers and outlets for recyclables, and establishing tracking systems. This will reduce the amount of materials going to landfill. (Expected completion: 2001-2002)

Recycled materials in 2000:

- 33,944 tons of metals (steel, aluminum, brass, copper, iron)
- 646 tons of plastics (various types-LDPE, Polypropylene, Polycarbonate, ABS, TPO, and others)
- 1,067 tons of wood
- 217 tons of solvents, returned to supplier, reclaimed, returned to Saturn in virgin solvents
- 2,195 tons of foundry sand and furnace refractory, recycled into concrete/rock products
- 418 tons of cardboard
- 114 tons of paper
- 297 tons of used oil
- 276 tons of other materials-antifreeze, batteries, fluorescent bulbs, gloves, electronic equipment

Energy Conservation

There are three energy conservation projects being initiated:

1. Targeting energy use during non-production hours
2. Changing temperature setpoints for heating in the winter and cooling in the summer

3. Investigating, through Saturn's partnership with the University of Tennessee, how landscaping around buildings can result in energy conservation. (Expected completion: 2001.)

Saturn has implemented an "Energy Report Card" and identifies weekly energy costs and detailed utility conservation savings. A site-wide group of Saturn team members comprise the Energy Conservation Task Force. Weekly discussions identify new conservation opportunities, which are prioritized for implementation. Major energy conservation successes include:

1. Site-wide compressed air leak survey and repair
2. Site-wide reduction in heating, ventilation, and cooling equipment
3. Site-wide reduction in lights and process equipment
4. Regular energy audits for compliance

Land and Water Conservation

Supplier personnel from Henkel Chemical Management (HCM), Henkel Surface Technologies (HST), and members of the Saturn's Phosphate/E-coat team in Body Systems Paint Shop found a new way to reuse rinse water in a multi-stage paint preparation process. With the original process, Saturn started out purging de-ionized water in stage #12, which flowed back to stage # 11, then flowed back to stage #10. From there it went to the drain and was treated at Saturn's wastewater pretreatment plant. A change was made to take that water and redirect it to flow into the stage #8 reservoir, which enabled an additional reuse as rinse water. This replaced using city water in stage #8, so Saturn eliminated that need for city water and also eliminated one of the waste flow streams going to the wastewater plant. Over 21 million gallons of water per year have been saved, beginning in 1999.

Recycled water is used for the Powertrain head quench tank by replacing piping to recirculate water rather than use city water.

A liner is being installed under the new Powertrain L850 building to minimize the risk of groundwater contamination. This is in addition to other liners installed during original plant construction.

Henkel Chemical Management, Castrol, and Saturn team members are currently evaluating several opportunities for source reduction in the Powertrain manufacturing areas to reduce oily wastewater generation.

Clean Air

Saturn has undertaken several continual improvement projects reducing air emission impacts from painting Saturn vehicle parts:

- In 1998, Saturn implemented an initiative to target waste and cost reduction. Examples from the Body Systems Paint Shop include process improvements resulting in an annual raw material use reduction of over 59,000 gallons. For example, team members put in place improved controls for changing paint colors, reducing the use of paints and solvents and related emissions to air, wastewater, and hazardous waste.

- Eliminating spraying of an anti-chip sealer coating to the underbody of car and wheel wells and reducing air emissions. (Completed in 1999)

- Decreasing air emissions by four tons per year by substituting a different raw material in paint preparation. Specifically, lactic acid replaces a acetic acid/nitric acid blend used in the E-coat process. (Completed in 1999)

- A new process for molding interior plastic parts eliminated the need for painting, eliminating VOC and PM emissions from this process and eliminating 258 tons/year of solid waste.

- Saturn's Vehicle Systems Car Final Team is responsible to repair minor paint defects on Saturn vehicle panels at the end of the assembly process. If the repair area is minimal, repair is accomplished by preparing the area and spraying with several coatings providing gloss, abrasion resistance, and weather protection. The team plans to reduce the level of clear coat use on panels by approximately twenty percent, and decrease related air emissions. (Expected completion in 2001.)

- Additional emission reduction projects include adopting new paints and coatings with fewer "Hazardous Air Pollutants" (HAPs) ingredients and/or SARA Title III Section 313 "Toxic Chemicals", as designated by EPA. Paint technology is evolving to change these solvents allowing fewer potential air impacts. (Expected completion: 2001-2002).

- Saturn started filling vehicles with low sulfur Amoco Ultimate fuel, supporting the broader introduction of low sulfur fuel into the Nashville area. Low sulfur fuel allows catalytic converters to operate more efficiently and reduces pollutants such as NOx and hydrocarbons (which contribute to ozone formation).

- Saturn's newest product, the SUV VUE, incorporates a continuous variable transmission, offering a 5-10% increased fuel economy over ordinary automatic transmissions, and also uses electronic power steering system, which will increase fuel economy and eliminate the use of hydraulic fluid.

Other Related Accomplishments and Activities

The Saturn complex achieved ISO 14001 certification for its EMS in November 2000, including Automobile Manufacturing Operations (Powertrain, General Assembly, Vehicle Interior Systems, Body Panels, Body Fabrication, Paint, Central Utilities), Service Parts Operations, and Northfield Administration.

Saturn is working with General Motors, NIST, EPA, and the University of Tennessee, on a "Saturn Supply Chain Sustainable Business Franchise" pilot project. The project will demonstrate methods for improving environmental performance and promoting cleaner production throughout the automotive supply chain, with an initial focus on packaging waste reduction.

Saturn is participating in TDEC's "Pollution Prevention Partnership" program, recently attaining "Partnership" level and pursuing the "Green" level status. Saturn also participates in the Tennessee Pollution Prevention Roundtable, promoting communication and environmental stewardship between academic, environmental, governmental, and business groups.

Saturn started a small scale take back initiative from volunteer Saturn retailers for damaged fascias. Through this effort, Saturn is able to learn about feasibility issues in life cycle management.

In material selection, Saturn minimizes substances that are potentially hazardous in the manufacturing or recycling of vehicles. The use of over 200 hazardous chemicals in parts and components is restricted or prohibited, based on a material specification developed by consensus among a GM Global Engineering team.

Other related initiatives at Saturn include:

- Use of returnable packing in over 90% of facility.
- Use of just in time inventory control to minimize waste.
- Innovative supplier relationships with chemical and waste management suppliers.
- Saturn University teaches suppliers topics related to quality and efficiency.
- No underground storage tanks installed-use of above ground storage tanks helps protect groundwater.
- Preservation of historic buildings-1850 Greek Revival Rippavilla, Haynes Haven, and an old horse barn (Barn is now used as the Saturn Welcome Center.)
- Gloves are reconditioned and reused instead of being thrown away.
- Chose environmentally beneficial manufacturing technologies-water borne paints and adhesives and lost foam casting technologies.
- Installed specially designed docks in loading and unloading areas to contain spills.
- Established baselines for environmental quality around the site (soil, water, air quality, meteorological conditions, etc.) so we could gage how well our environmental protection measures are working.
- Maintain an on-site weather station.
- Continue to farm-soybeans, alfalfa, and other crops.
- Established storm water ponds, which protect surrounding creeks, aid in sediment and erosion control, and provide fire protection water.
- Saturn teamed with EPA and University of Tennessee to develop a Life Cycle Assessment tool for the car industry, allowing designers to use a computer model to see the environmental effectiveness of their design elements and material choices.
- Installation of state-of-the-art paint shop carbon filtration system, significantly reducing air emissions.
- Implemented system for reviewing and minimizing environmental, health, and safety impacts of materials being considered for use.
- Instituted cost allocation mechanisms to assign utility and environmental costs to users and generators.