Timetable for Implementation of Remedial Measures in Painting Unit

	Year 1				Year 2			
Activities	T1	T2	T3	T4	T1	T2	T3	T4
Planning								
Profitability assessment	■							
Establishment of constraints	■							
Research and pilot testing								
Search for alternatives		■	■					
Pilot testing			■	■				
Feasibility assessment				■				
Plans and specifications of facilities				■	■			
Presentation and approval					■			
Taking action								
Calls for tenders					■	■		
Equipment installation						■		
Staff training						■		
Test runs and adjustments						■	■	
Marketing of project (neighbourhood)						■	■	
Verification of actions								
Performance evaluation							■	
Impact assessment							■	
Necessary adjustments							■	■
Follow up								
Communication of results							■	■
Employee feedback								■
Cost-benefit analysis								■

T: trimester

IMPLEMENTATION PLAN

Having selected the Painting Unit for intervention, the NCI audit team draws up a timetable to see the process through to completion, in co-operation with the workshops concerned.

The NCI audit team, working from examples of modifications to other plants with painting production processes similar to its own, developed an action plan around the idea of replacing the traditional paint production line with a dry electrostatic paint line.

The expected environmental and economic impacts of this modification on the plant's painting process are compared in the table below. Administrators of Novo Composites Inc. think that the attendant savings will be significant, and believe that the approach advocated by the Simplified Process Audit will help the company better fulfil its environmental responsibilities even while doing so in a cost-effective and profitable manner.

Expected Impacts of Intervention to Painting Process

	Environmental indicators (in metric tons per year)		**Economic indicators** (in $000s per year)			**Other** (in percentage)
Painting Unit	Hazardous residue	Atmospheric emissions (VOCs)	Losses of raw materials	Disposal of hazardous residue	Losses of solvents	Odour nuisance
Before SPA	1.6	10.0	10.0	12.0	8.0	60%
After SPA	0.2	< 0.1	< 0.1	1.8	0.4	0%
Percentage of reduction	**88%**	**> 99%**	**> 99%**	**85%**	**95%**	**100%**

Simplified Process Audit (SPA) – Model Plant

"P2 Fact Sheets" provide a showcase for the pollution prevention projects of Canadian companies, and reflect the sustainable development priorities of the Government of Canada. They are intended for companies, industries, agencies and individuals interested in the economic and environmental benefits of in-house pollution prevention activities.

In the face of burgeoning market globalization, Canadian companies are having to prioritize their activities to remain competitive. The process audit is an approach that marries economic and environmental aspects in a way that companies profit by the adoption of pollution prevention measures.

The Simplified Process Audit (SPA) was developed by Environment Canada – Quebec Region, and serves as one of the reference tools used in federal pollution prevention programs affecting Canadian companies. This first fact sheet in the series describes the audit methodology and its in-plant application.

INFORMATION

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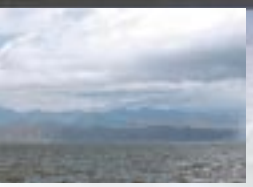
P2 Fact Sheets

In-Plant Pollution Prevention

Simplified Process Audit (SPA) – Model Plant



The fictitious company Novo Composites Inc. (NCI), of Belleville, Quebec, specializes in the manufacture of fibreglass and thermoplastic components for the automobile industry. Since its founding in 1995, NCI has developed a network of clients in Quebec, Ontario, and the Northeastern U.S., its three main clients being Ford Motor Company, Bombardier, and General Motors of Canada.

NCI has annual sales of roughly $15 million and some 60 permanent employees, of whom about 50 are production staff with the balance working in sales and administration.

Novo Composites Inc.

Belleville, Quebec

Sectors: Chemicals and Surface Treatment

Source and type of plant effluent

	Discharge			
Processes	Losses to effluent	Solid residue	Hazardous residue	Atmospheric emissions
Autobody	√	√	√	√
Moulding		√		√
Casting	√	√	√	√
Thermoforming		√		
Plating	√		√	
Painting		√	√	√

NCI is sensitive to the impact of its production operations on the environment and aware of the possible savings resulting from improved management of both its manufacturing processes and waste. Wastewaters and emissions of various types and degrees of toxicity are generated by its production activities. The plant's critical points are not easily assessed or acted upon, nor are remedial measures easily introduced.

For these reasons, NCI has decided to follow the Simplified Process Audit (SPA) developed by Environment Canada to assist it in determining how best to approach the environmentally-sound management of its facilities.

PRESENT PLANT PERFORMANCE

In an effort to deal with its problems, Novo Composites Inc. has set up a team to oversee implementation of the Simplified Process Audit. The production director is the designated co-ordinator of the entire exercise.

The audit team first addresses all personnel to make them aware of the process at hand. The cohesion of production staff concerned is essential. After several information and planning meetings, an intervention timetable is drawn up in agreement with all stakeholders committed to the process.

A sound understanding of all the plant's production processes is an important first step in the SPA. To this end, the audit team undertakes to identify the raw materials (inputs) and discharges (outputs) for each production process, and to assess the volume and types of effluents they discharge (see schematic diagram of production processes below). The team seeks the assistance of a technical expert in this task.

Schematic of the Process

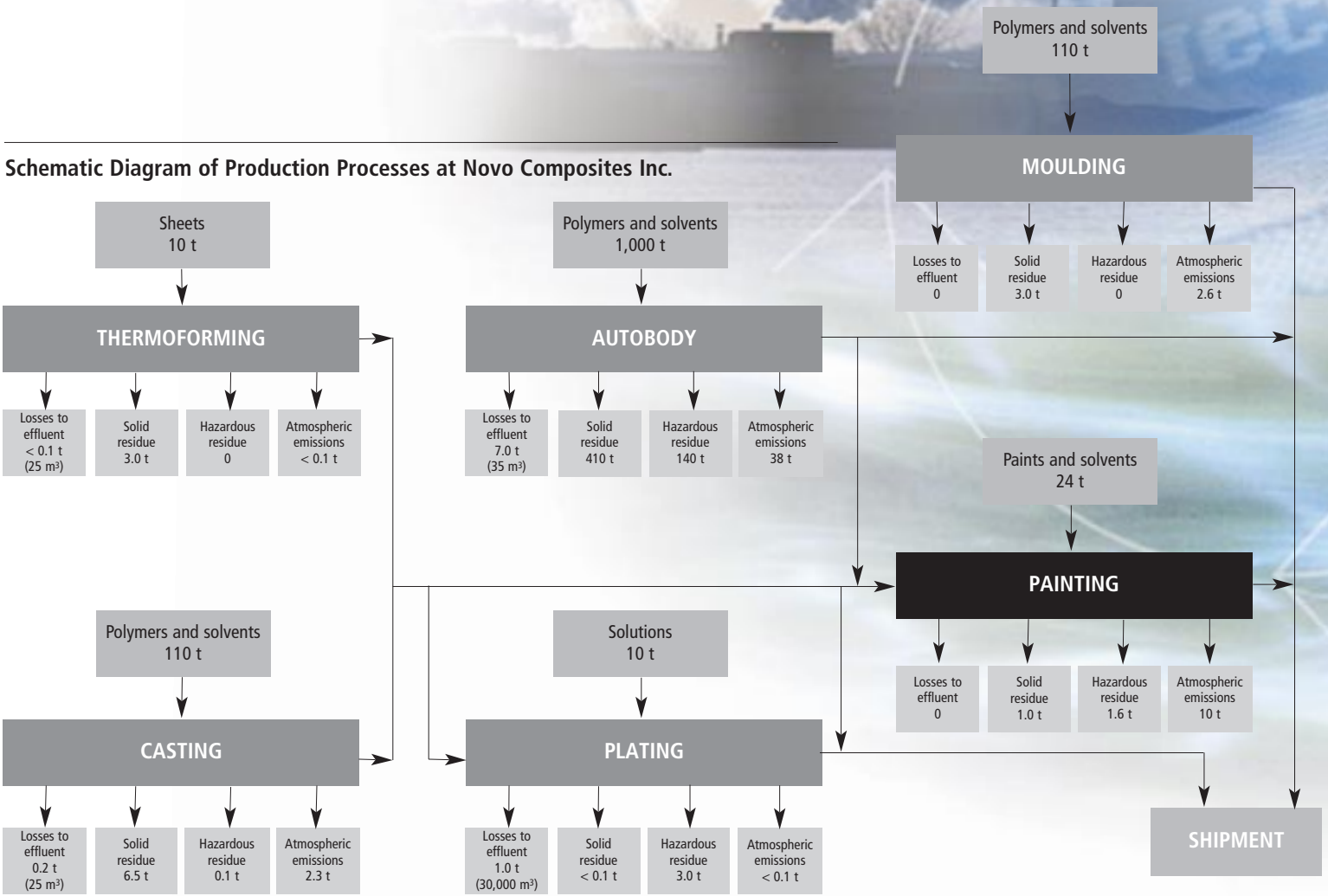
A number of processes are involved in the manufacture of fibreglass and thermoplastic components for the automobile sector. NCI's plant is made up of six production units:

- Autobody: plating of parts and fibreglass panels
- Moulding: moulding of foam seats
- Casting: manufacture of bumpers, grills and steering wheels
- Thermoforming: manufacture of hoods and panels
- Plating: application of chromium, copper or nickel on plastic parts
- Painting: application of paint on metal parts.

Mass Balance Budgets

The audit made it possible for the first time ever to overview all the effluents generated by the plant. This was accomplished with the help of a number of stakeholders at the plant and by means of characterizations of some of its production processes (sampling and measurement exercises). The goal was to quantify, by volume and type, all inputs and outputs of all the different processes. The audit team was proud of its results, even if some processes will require a more in-depth evaluation. The SPA being an evolving process, NCI could repeat the exercise as new information is acquired.

Schematic Diagram of Production Processes at Novo Composites Inc.



t: Metric ton

Performance Indicators

An understanding of mass balance budgets is essential to determining a plant's actual performance. These budgets become vitally important when they are also examined from an economic standpoint. In effect, the more efficient a process, the less effluent it discharges, hence the lower the disposal costs.

Having determined the budgets of all the different unit processes, the audit team then turns its focus to defining the environmental, economic and other indicators by which the plant's overall performance will be assessed.

The indicators adopted will serve to quantify NCI's present performance and form the basic reference against which the impact of the remedial measures eventually to be introduced by the plant will be judged.

The audit team deems it important that two other factors be added to the economic and environmental indicators to assist it in analysing the processes and in selecting the one requiring priority intervention: pollution of the surrounding area, and the level of complexity of the remedial measures (see table below).

Main Performance Indicators for Linking Process Assessment

Processes	Environmental indicators (in metric tons per year)					Economic indicators (in $000s per year)					Other	
	Raw materials lost to effluent	Solid residue	Hazardous residue	Atmospheric emissions (VOCs)	Percentage of losses of raw materials	Wastewater treatment	Losses of raw materials	Disposal of solid residue	Disposal of hazardous residue	Losses of solvents	Odour nuisance (%)	Level of complexity of interventions (scale of 1 to 6)
Autobody	7.0	410.0	140.0	38.0	60%	0	330.0	45.0	15.0	40.0	20%	6
Moulding	0	3.0	0	2.6	5%	0	3.0	0	2.0	0.5	10%	2
Casting	0.2	6.5	0.1	2.3	8%	0	8.0	0.5	0.2	4.0	10%	3
Thermoforming	< 0.1	3.0	0	< 0.1	30%	0	9.0	0.5	0.2	0.4	0%	4
Plating	1.0	< 0.1	3.0	< 0.1	40%	8.0	10.0	2.0	0.2	0	0%	5
Painting	**0**	**1.0**	**1.6**	**10.0**	**53%**	**0**	**10.0**	**12.0**	**1.0**	**8.0**	**60%**	**1**

CHOICE OF LINKING PROCESS

While the Autobody Unit would appear to be a logical place for Novo Composites Inc. to concentrate its efforts – the unit costs more than $430,000 a year in raw material losses and waste disposal – it so happens that the level of complexity, at 6 out of 6, is much too high. Further, the relationship between funds invested and expected savings shows there is no clear profit in acting at this time.

NCI understands, however, that the wastewater generated by the Autobody Unit represents a challenge to which the company will necessarily have to rise. Plant officials are of the opinion that the savings resulting from modifications to other production units in the overall manufacturing process could eventually be used to reconsider the question, and for remedial measures to be taken at that time.

For all these reasons, the audit team decides that the Painting Unit should be its first priority.

Indeed, considerable costs are tied up in losses of raw materials and waste disposal (over $31,000 a year). Moreover, one of the side benefits of taking action in this unit is a reduction in atmospheric emissions, which should consequently lead to direct reductions, perhaps even complete elimination, in the air pollution level for the adjacent neighbourhood, which accounts for 60% of the complaints against the plant.