



## Final Report: Pollution Prevention Planning and Acrylonitrile

The P2 plan for acrylonitrile has been fully implemented.

*Pollution Prevention (P2) Planning is a process by which organizations can improve their environmental performance by strategically planning to reduce or eliminate pollution.*

Last Updated: July 2009

**This P2 Planning Notice contributed to reducing releases of acrylonitrile to the environment.**

**Several P2 actions were taken by the facility to achieve release reductions, meaning that pollution was prevented at the source.**

### Information Reported for the Notice

In May 2003 Environment Canada published a Pollution Prevention (P2) Planning Notice in the *Canada Gazette*. This Notice required any person who owned or operated a facility which manufactured synthetic rubber, where the manufacturing process used acrylonitrile and resulted in releases of acrylonitrile, to prepare and implement a P2 plan to reduce the releases of acrylonitrile to the lowest possible levels.

**Table 1: LANXESS Inc.'s Reported P2 Methods and Actions**

P2 Method	Action taken
On-site Recovery, Reuse, Recycling	Optimized the stripping stage in order to maximize the amount of acrylonitrile recycled back into the process
Equipment/Process Modification	Improved instrument control technology, resulting in reduced acrylonitrile emissions
Spill and Leak Prevention	Implemented an improved site specific Leak Detection and Repair (LDAR) program for acrylonitrile in 2004
Good Operating Practices	Improved emission estimating techniques; better system operation and maintenance

*The facility reduced their total releases of acrylonitrile by 85%.*

One facility was subject to the Notice, LANXESS Inc. (formerly known as Bayer Inc.). In 2004, they prepared a P2 plan that included four different P2 techniques, outlined in Table 1 above. By implementing their P2 plan, LANXESS Inc. was able to achieve significant reductions in releases of acrylonitrile to the environment. Chart 1 displays LANXESS Inc. total acrylonitrile emissions based on the reference year 1996 up to 2006, the final year of P2 plan implementation. LANXESS Inc. continued to control emissions below 2006 levels until 2008 when, based on a business decision, the facility closed the rubber manufacturing plant.

**Chart 1: LANXESS Inc.'s total reductions in acrylonitrile releases**

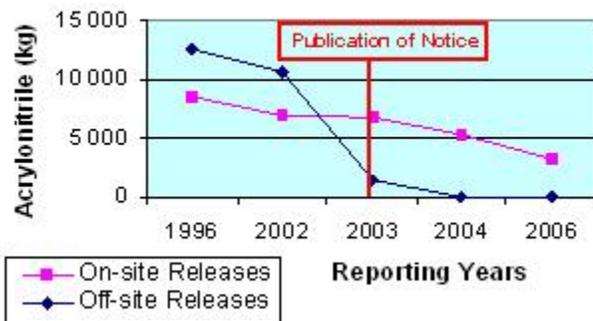
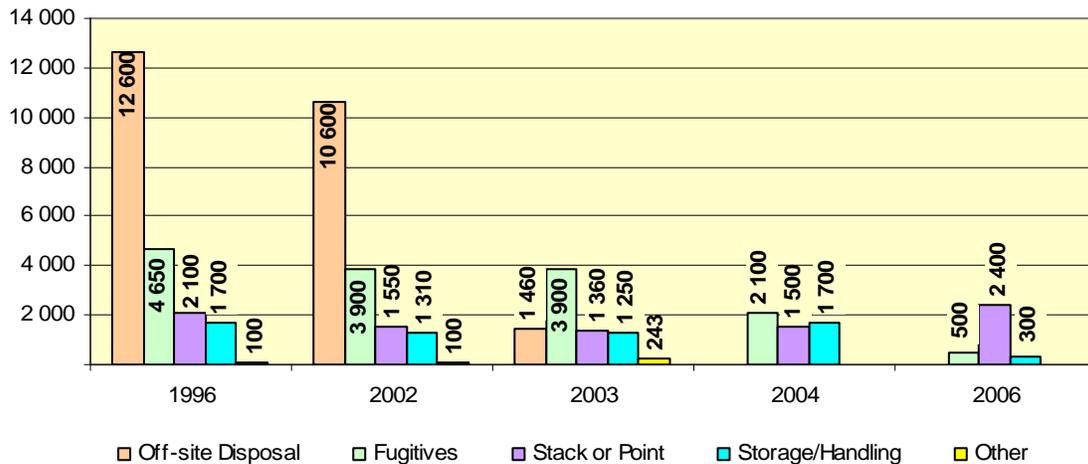


Chart 2 illustrates the total overall reduction in releases of acrylonitrile by the LANXESS Inc. facility, broken down by type of release. Fugitive releases decreased by 89%, and storage or handling releases decreased by 82%. The stack or point releases have increased by 14% compared to 1996 levels (mainly because of changes in the estimation methods). It should also be noted that LANXESS Inc. achieved 100% reduction in off-site transfers for disposal. As of 2004, the facility stopped sending acrylonitrile off-site for incineration.

**Chart 2: LANXESS Inc.'s releases of acrylonitrile by type from 1996 to 2006**



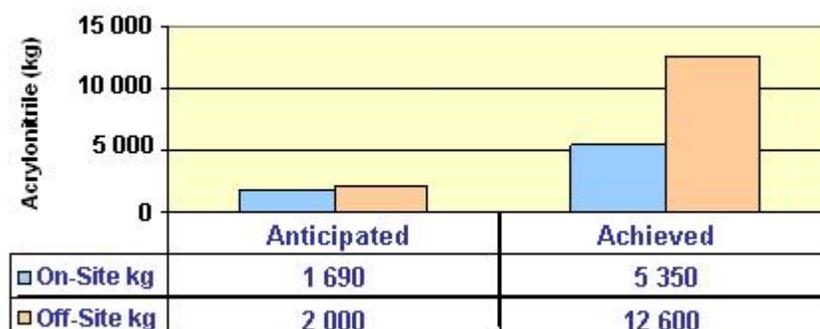
## Overall Achievements of the Notice

At the beginning of the P2 planning process, LANXESS Inc. indicated that they had already taken significant actions to reduce release levels of acrylonitrile. Through careful research and coordination with other regulatory programs and practices, LANXESS Inc. was able to achieve even greater results by optimizing their production process including better control of production, and installing better leak and spill detection technology.

***The facility originally thought no further reductions were possible; through P2 planning they managed to increase their reductions beyond expectations.***

The P2 plan prepared and implemented by LANXESS Inc. led to process and release improvements that surpassed their original expectations (see Chart 3). The P2 Planning Notice (the action taken by the government to manage the risks posed by this substance) was therefore an efficient and effective solution to reducing acrylonitrile releases to the environment.

**Chart 3: LANXESS Inc.'s reductions in releases**



### Acrylonitrile: what it is and why pollution prevention is important

Acrylonitrile is not manufactured in Canada, but imported for use in production of rubber and some polymers. In 1994, 7600 tonnes of acrylonitrile were used in Canada. There are no known natural sources of acrylonitrile.

When the P2 Planning notice was published in 2003, only one facility, located in Ontario, was required to report and accounted for 82% of the chemical manufacturing releases.

**Acrylonitrile was concluded to be toxic under CEPA 1999. The highest risks are associated with populations who are exposed to acrylonitrile in the vicinity of industrial sources.**

Acrylonitrile has been linked to tumour growth in scientific studies. There is also considerable evidence of carcinogenicity of acrylonitrile. As such, acrylonitrile was concluded to be toxic under CEPA 1999. More specifically, it was found to be entering the environment in a quantity or concentration or under conditions that may constitute a risk

to human life or health.

The recommended course of action was to reduce point source releases of acrylonitrile.

**P2 Planning was chosen because the issue was regional in scope, it has proven reporting mechanisms, and it could reference existing codes and regulations.**

These codes and regulations include the CCME guidelines for Volatile Organic Compounds (VOCs) and existing provincial regulation in Ontario, specifically the *Occupational Health and Safety Act*.

The P2 planning process was to achieve the Notice's main risk management objective of reducing releases of acrylonitrile from synthetic rubber manufacturing to lowest achievable levels by December 31, 2005. This objective and timeline was consistent with the U.S. standards, as well as with the federal government's Toxic Substance Management Policy.

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**Sources:**

- P2 Planning information for acrylonitrile ([www.ec.gc.ca/planp2-p2plan/default.asp?lang=En&n=28D7A173-1](http://www.ec.gc.ca/planp2-p2plan/default.asp?lang=En&n=28D7A173-1))
- PSL Assessment Report and Risk Management Strategy for acrylonitrile ([www.ec.gc.ca/substances/ese/eng/psap/final/acrylonitrile.cfm](http://www.ec.gc.ca/substances/ese/eng/psap/final/acrylonitrile.cfm))