



## Case Study **March 2005**

# Building Essential Skills in the Workplace Essential Skills for Multi- skilling at National Silicates

### OVERVIEW

**T**he National Silicates' Chemical Process Operator (CPO) program began in 1995 when it and four other industrial chemical companies realized a common need to upgrade the skills of their current employees and to prepare new skilled workers for success in the industry. Firms in the industry were experiencing lots of machine downtime, and skills gaps were becoming more apparent as the industry became more automated and increasingly required "strong minds" as well as "strong backs." More than ever, the quality or ability of employees was becoming a "make or break" factor in business success. Quality work requires a level of professionalism in the workforce, one high enough to enable workers to make recommendations regarding process improvement. And for that, workers require a solid foundation in essential skills, including state-of-the-art technical expertise.

When the five companies discovered that they shared similar training needs—having common production techniques, machines, and health and safety concerns—the group decided to combine their efforts and co-operate in developing a unique training program to address the generic and technical skills required by their industries.

The Education and Learning case studies examine outstanding education and lifelong learning programs and initiatives. This case study addresses best practices in developing essential skills in the workplace.

**Name of Program**  
Chemical Process Operator  
Essential Skills

**Date Established**  
1997

**Skills Developed**  
Machine operator skills  
Technical skills  
Numeracy  
Thinking skills

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The primary objective of the CPO program is to upgrade the skill levels of plant operators and to enable them to be multi-skilled and competent in all areas and on all machines within the plant operations. The CPO program is a 6,000-hour, in-house training program made up of 90 interactive CD-ROM modules and an extensive hands-on training practicum. To date, three of the plant's 19 employees have completed the CPO program; five are nearing completion; and two more will sign up shortly. Employees have increased their basic skills in numeracy, literacy, operations, health and safety, and computers; in turn, the plant is a more productive, efficient and competitive working environment.

Established in 1931, National Silicates—a subsidiary of the PQ Corporation in the United States—is a small chemical company with 93 employees across Canada. Its plants are located in Toronto, Valleyfield, Fort Frances, Whitecourt, Surrey and Parksville. National Silicates produces and distributes sodium and potassium silicates and magnesium sulphate for more than 70 product lines, including penetrating sealants and admixtures for cement and concrete. Its silicates and sulphate prevent whitish blooming, or efflorescence, and are added to detergents as cleaning and processing aids, and also act as corrosion inhibitors.

## OBJECTIVES

- The primary objectives of the CPO program are to:
- upgrade the skill levels of existing plant operators to enable them to be multi-skilled in all areas of plant operations; and
  - develop a workforce for the future with the skills, knowledge, attitudes, and motivation to respond continuously to changes in technology and legislation and thereby enhance the company's competitiveness.

## TARGET GROUP

The program is targeted at current and future machine operators at National Silicates' Toronto plant.

## ACTIVITIES

The CPO program is an approved apprenticeship program recognized by the Province of Ontario—and it is the first of its kind in Canada. The CPO program was planned and organized by the Etobicoke Liquid Process

Adjustment Committee (ELPAC), a consortium of industry, the federal and provincial governments, a local board of education, a community college, management and labour representatives, and a hired chairperson. In an initial training needs survey of all hourly employees conducted by ELPAC:

- 87 per cent of respondents said they would participate in training if its purpose was to upgrade their skills;
- 68 per cent indicated that improving their math and literacy skills would help them prepare for future training; and
- 83 per cent of respondents were interested in an apprenticeship program.

Not surprisingly, the CPO Essential Skills program developed by ELPAC and implemented at National Silicates addresses each of these issues. The needs of employees have been matched with those of the chemical companies, and an effective and valued learning program has emerged.

National Silicates pursued two complementary strategies to address the needs of current employees and new hires. Current employees pursuing apprenticeship as CPOs were tested by a local school board. National Silicates brought in the school board because the company wanted its employees to work with the education experts and be successful. National Silicates knew that where these employees exhibited gaps in math, chemistry or communication skills, essential skills training would be required. Addressing the training gaps of current employees is an ongoing process at National Silicates.

With regard to future employees, National Silicates worked closely with Mohawk College to profile the skill requirements of CPOs and to complete a training gap analysis to identify training needs. National Silicates' training strategy for new hires is threefold. First, new recruits intent on pursuing employment with National Silicates as chemical workers take a chemical operator training course, the Etobicoke Liquid Process Operators course, which is the first level of training for chemical workers in Ontario. Second, future chemical workers are expected to complete some learning on-line. And third, other skill-building for new recruits takes place at the National Silicates plant.

The CPO program consists of at least 6,000 hours of theoretical and practical training and includes:

- 90 interactive CD-ROM training modules (200 to 800 hours)—offering employees a flexible, round-the-clock, self-paced, interactive, private, and non-threatening learning environment;
- hands-on training in environment, health and safety, and responsible care procedures (600 hours);
- video training modules (200 hours);
- process unit-specific training in metso anhydrous (dry mix) operations, dissolver operations, furnace operations, utilities operations, maintenance, and laboratory and blending operations (5,200 hours); and
- testing and certification—these are rigorous and regulated parts of the CPO program; upon completion of the CPO program requirements, employees take an hour-and-a-half written theoretical test designed by the company—consisting of 60 multiple-choice questions; as well, a six- to eight-hour, hands-on, in-house practical test is given, where employees are asked to demonstrate their competence in each of the company’s functional areas of operation.

Prior to taking the CPO program, all National Silicates employees are required to take basic numeracy and language skills training through the local school board as part of the company’s workplace skills upgrading program. The company knows that employees need essential skills to be able to participate effectively in further specialized training, including the three-year CPO apprenticeship program. After graduating from basic skills training, employees are able to begin their CPO apprenticeship. Individuals who need additional numeracy or language skills training are encouraged and supported—financially and emotionally—by National Silicates.

## RESOURCES

- The CPO program requires the use of computer terminals, CD-ROMs and paid overtime (time off). The number of computer workstations needed depends on the number of employees enrolled in the CPO program. National Silicates has a computer room dedicated to training, which houses one terminal. Employees also have access to a second terminal, which is located in another control room.
- The library of interactive CD-ROM modules, purchased from NUS (Williams Learning), cost approximately \$30,000.

- The ELPAC committee incurred costs in terms of the time its members invested in the project, and in addition, an outside chair was hired to facilitate the development and implementation of the program. Funds from the federal government’s Adjustment Incentive Agreement covered the cost of this (approximately \$60,000).
- Initially, the in-house training was offered during a worker’s shift. However, this didn’t work out, as employees were often called away from their training to work on a job-related issue. National Silicates therefore decided that it was best to hold all training before or after an employee’s shift even though it would cost the company more to do so by paying employees overtime.

## INNOVATIONS

- The CPO program gives its graduates a sense of achievement as well as a certification that is recognized both within and outside of the company.
- Interestingly, the union set a passing grade of 85 per cent for the modules, although the company had suggested 75 per cent. It surprised National Silicates that its own employees’ wanted to set the pass rate high enough to weed out people who were not performing sufficiently well and to discourage individuals who were not fully committed to the CPO program. Many workers actually got marks in the 90s, even people who had not had a lot of success in school. Management assumed the responsibility of determining whether or not an employee was competent, as per the written test and testing on the functional areas of the plant.
- The training program targets the specific needs of the company and combines theory with “hands-on” learning, a strength of many workers.
- The program forged partnerships with government, education and industry.

## CHALLENGES

- In the early days, National Silicates hired a college to write curricula for the CPO program; later, at the suggestion of employees, program development was managed internally, with employees contributing their expertise to the crafting of teaching and learning materials.

- The costs associated with the development and implementation of the CPO program are fairly high. However, National Silicates regards its investment in its people as an investment in the company.
- Time is a barrier to training. Employees often find it difficult to commit to the 6,000 hours of training. As well, the day-to-day pressures of work and life outside of work often limit the amount of time that the company and employees can devote to the CPO program.
- It was difficult for the plant manager to be able to balance getting the work done with putting training on-line and scheduling training for employees.

### LESSONS LEARNED/KEYS TO SUCCESS

- National Silicates addresses its skills challenges in a collaborative way, engaging in dialogue and building solutions in conjunction with industry partners, education and government to ensure that best practices are shared, efforts not duplicated, and insights and energies fully leveraged.
- National Silicates believes that their “employees make the company.” It rewards employees who complete the CPO program with one dollar extra per hour, in addition to recognizing the skills they have.
- Managers who are real believers in employee training and have a desire to be the best are indispensable.
- Employees who actually champion and contribute content to the new program are crucial.
- It is important to stay the course, even in the face of setbacks— National Silicates’ Toronto plant had to delay the CPO program for six months at one time, but never dropped it. In hard times, most companies say they cannot afford to operate quality assurance programs such as Six Sigma or Total Quality Management, but National Silicates worked from the assumption that they could not afford *not* to have the CPO program from a quality point of view.
- National Silicates “feels justified” in making an incredible investment in the CPO program on the basis that it is the best thing for their employees—and therefore for the company.
- The curriculum is flexible and current and can be adapted to meet the industry’s changing technologies, legislation and processes.
- The CPO program is self-paced, flexible, mobile and just-in-time.
- Grades are kept confidential.

- National Silicates and ELPAC created and developed a recognized certification process (apprenticeship) for liquid chemical process operators.
- Company leaders, as well as the union and the company employees, all buy in to the program. Everyone recognizes that essential skills training brings benefits, value and rewards.

### BENEFITS

#### FOR EMPLOYEES

- become more flexible
- experience success in training
- develop a strong foundation in essential skills
- have the confidence and security that go with being highly skilled and knowledgeable
- have a sense of ownership about the organization
- set the mood in the workplace

#### FOR EMPLOYERS

- Employees take pride in being the best they can be.
- Employees now have an interest in how the business works and in doing their part to make it successful.
- Employee knowledge of the business and of how to improve operations has increased.
- “Digging in” and improving is now part of the fibre of the organization, and is expected, rather than feared.
- Potential employees line up to get into the company.
- Employees encourage the company to take challenging orders and fill them with record efficiency.

### OUTCOMES

- In the past three years, National Silicates has not experienced one voluntary turnover—trained employees do not leave; they view training as an investment in their future.
- National Silicates has reduced overtime hours, outside contractor hours and plant downtime.
- Employees have increased their skills in basic numeracy, literacy, operations, health and safety and computers.
- Employees are “multi-skilled” and can function in all areas of plant operations. Whereas the company would have needed to call in a contractor in the past to correct a problem, CPOs now do that themselves, switching between working in maintenance, operating pumps, running furnaces and overseeing dissolvers.

- Employees have a “learn for life” attitude—they are empowered to do their best, learn continuously and make operational decisions independently.
- The skills that employees gain in the CPO program are transferable and can be used in other jobs within the chemical industry, giving employees an opportunity for advancement within the process operator field or within the broader chemical industry.
- Employees are able to make more decisions independently, allowing for greater productivity.
- The work environment has improved. A happy and productive worker makes for a productive and efficient company.
- Employees who graduate from the CPO program reap higher wages (approximately \$1.25 per hour more) and have greater employment opportunities because of their transferable skills.
- The company pays less in overtime costs—a saving to the company—as the program graduates can safely and efficiently solve problems that arise within the plant. In the past, individuals who were skilled in the use of only one piece of equipment might have needed to call in a person skilled in the use of another machine to solve their problems.
- National Silicates finds that when the new breed of CPOs troubleshoots and repairs problems early, the company avoids major damage and repair bills.
- At the plant, there have been improvements in efficiency, productivity, safety and environment.

## IMPACTS

- National Silicates—and other companies that use the CPO program—has a group of highly motivated, multi-skilled, certified CPOs who are productive, innovative and dependable.
- National Silicates is better able to judge and to forecast future skills and training needs now that it has gone down the road of investing in a long-term essential skills-based solution.
- The company’s Toronto plant is considered the “plant with the can-do attitude” by sister plants throughout North America, and when one of these sister plants cannot deliver, it comes to the Toronto plant for ideas and inspiration.
- Employees now adjust much more quickly to situations; they are more engaged and involved than they were in the past.
- National Silicates has produced a cadre of “overall specialists” who can keep the equipment running by multi-tasking in what were formerly different specialty areas.

## USE AS A MODEL

Other companies have noticed the successes and benefits that National Silicates has reaped from the CPO program. Because the training program is “recognized” by the Province of Ontario and the chemical industry in general, other companies like Dofasco, Cameco, Huntsman, ICI/CIL, Cytec, and Nestlé have contacted National Silicates for information about the CPO program.

As well, the Ontario Chemical Industry Council and Lambton College in Sarnia, Ontario, use the CPO program as a model and are “carrying the torch” for the workplace literacy initiative. Currently, there are about 90 employees from companies other than National Silicates registered in Lambton College’s CPO three-year co-operative program.

### About the Education and Learning Case Studies

The Education and Learning case studies examine outstanding education and learning programs and initiatives. The case studies provide in-depth analysis of the methods used to develop, assess, implement and deliver education and lifelong learning in schools, colleges, universities, workplaces and communities. They focus on goals, activities, resource requirements, achievements and outcomes, benefits, innovations, and keys to success and challenges.

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