



RESPONSIBLE CARE® Verification Report

NOVA Chemicals Corporation

June 15 to 19, 2015



Chemistry Industry
Association of Canada



Responsible Care®
Our commitment to sustainability.

Disclaimer

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EXECUTIVE SUMMARY

This report documents the observations and conclusions of the independent verification team tasked with conducting a Responsible Care verification of some of NOVA Chemicals Corporation's ("NOVA") facilities. The verification was undertaken from June 15 to June 19, 2015 at NOVA's Calgary and Joffre, Alberta facilities and two facilities south of Sarnia, Ontario. This was the seventh Responsible Care verification completed for NOVA. The last verification was conducted in September 2012.

While all aspects of the Responsible Care Commitments were considered during the verification, the team placed an emphasis on conducting a more in-depth examination of the company's sustainability initiative.

As a result of the examination conducted, the verification team is of the opinion that the Responsible Care Ethic and Principles for Sustainability are guiding company decisions and actions, and that a self-healing management system is in place to drive continual improvement. Further, that the company is capable of responding to the single Finding Requiring Action identified during the verification - summarized below and discussed in detail in the report. The verification is complete and no further involvement is required by the verification team.

Signed: Gerry Whitcombe
Verification Team Leader

Date: 31 July 2015

For more information on this or a previous Responsible Care Verification Report, please contact your local company site or the company's overall Responsible Care coordinator:

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Summary of Verification Team Observations

Findings Requiring Action

- To ensure near neighbours understand the actions they should take to protect themselves in the event NOVA or local authorities activate a 'shelter in place' instruction as a result of an event associated with NOVA's activities.

Works in Progress

- The implementation of the Sustainability Strategy. This initiative with its well thought through, grass roots approach brings sustainability from corporate rhetoric to employee empowerment. The team believes this effort leads the industry in involving employees in this complex undertaking.

Improvement Opportunities

- Ensure the intent of CIAC guidance for CI/BC has been met by auditing internal CI/BC plans against the CIAC checklist.
- To ensure employees have an understanding of the broader (CIAC/industry) Responsible Care perspective.
- Further engage company employees and community members in the dialogue process (CAP and near neighbour issues documented and followed through to closure, company transportation and environmental (or other) specialists making presentations, community members experiencing emergency drills and providing scenarios and community meeting topic suggestion process)
- Revise RC Standard 140 to specify a requirement to schedule the communication of hazards, risks and credible case scenarios to near neighbours and CAPs at prescribed intervals.
- Establish employee committees to engage employees (and other stakeholders) in the development and implementation of NOVA's corporate responsibility initiatives, including community funding.
- To ensure the MOC governing the closure of facilities include all operating aspects of that facility.

Successful Practices

- The use of adaptive software in the company's predictive preventative maintenance (PPM) program is a successful practice.
- The ergonomic Stand-Station initiative and the wellness 'Fit in Five' program are successful practices.
- The Industrial Hygiene Workplace Exposure Assessment Program (WEAP) is a step change in reducing potential exposures and is a successful practice.
- The speed of action and engagement with union, area contractors and other Chemical Valley companies in analyzing the recent ME scaffolding incident and the resulting renewed focus on awareness of hazards from above is a successful practice.
- In ME, Occupational Health's "Ergonomics/Human Factors Engineering Guidelines for Projects" is a step change in facility design by requiring human factors to be considered early in the engineering and design process, thereby foreseeing and addressing ergonomic issues prior to construction and is a successful practice.

1. Introduction

1.1 About Responsible Care Verification

As a member of the Chemistry Industry Association of Canada (CIAC), the most senior executive responsible for NOVA's operations in Canada attests annually to CIAC and its peers that the company's operations conform to the expectations contained in the Responsible Care Commitments and are guided by Responsible Care Ethic and Principles for Sustainability.

The Responsible Care® Ethic and Principles for Sustainability

We dedicate ourselves, our technology and our business practices to sustainability - the betterment of society, the environment and the economy. The principles of Responsible Care® are key to our business success, and compel us to:

- *work for the improvement of people's lives and the environment, while striving to do no harm;*
- *be accountable and responsive to the public, especially our local communities, who have the right to understand the risks and benefits of what we do;*
- *take preventative action to protect health and the environment;*
- *innovate for safer products and processes that conserve resources and provide enhanced value;*
- *engage with our business partners to ensure the stewardship and security of our products, services and raw materials throughout their life-cycles;*
- *understand and meet expectations for social responsibility;*
- *work with all stakeholders for public policy and standards that enhance sustainability, act to advance legal requirements and meet or exceed their letter and spirit;*
- *promote awareness of Responsible Care, and inspire others to commit to these principles.*

As an element of this commitment to Responsible Care, NOVA must, every three years, participate in an external verification intended to:

- Provide the Executive Contact with an external perspective when assessing if the company is indeed meeting the intent of the Responsible Care Commitments, along with advice on areas that may require attention;
- Identify opportunities for assisting the company when benchmarking its own practices and performance against those of its peers, thus supporting continual improvement;
- Contribute to the credibility of Responsible Care amongst company personnel and stakeholders, as well as the stakeholders of the broader industry;
- Identify successful company practices that can be promoted to peers in the CIAC membership; and
- Support the identification of areas of common weakness so that collective tools and guidance can be developed to improve performance in those areas across the CIAC membership.

Verification is conducted according to a common protocol, developed by the association's members and others, including several critics of the chemical industry. The verification is conducted by a team consisting of:

- Knowledgeable industry experts with experience in Responsible Care;
- A representative of the public at large (usually with a public interest background and with experience in Responsible Care gained from serving on the CIAC's National Advisory Panel) and
- One or more representatives of the local communities where the company's facilities are located.

Once completed, the Verification Report is made publicly available through the CIAC website (www.canadianchemistry.ca). NOVA is also expected to share the report with interested persons in its communities and other stakeholders as part of its ongoing dialogue processes.

Additional information on Responsible Care and/or the verification process can be found at the CIAC website www.canadianchemistry.ca, or by contacting the Responsible Care staff at CIAC at glaurin@canadianchemistry.ca or (613) 227-6215 extension 233.

1.2 About NOVA Chemicals

NOVA is a multinational chemical company owned by The International Petroleum Investment Company (IPIC) of the Emirate of Abu Dhabi and is headquartered in Calgary, Alberta. The company employs approximately 2600 workers with the majority of operations in Alberta and Ontario in Canada, and in Pennsylvania and Ohio in the United States. NOVA is a producer of plastics and chemicals and develops products for the consumer, industrial and packaging markets around the world.

In Canada, the company conducts research in Calgary Alberta and manufactures ethylene and a variety of polyethylene products at its facility in Joffre, Alberta (near Red Deer) and in three sites located near Sarnia, Ontario in Lambton County (Corunna, St Clair and Moore). The Joffre facility uses natural gas as raw material feed while the Corunna plant has recently switched from a crude oil feedstock to natural gas liquids (NGL) sourced from Marcellus Shale deposits in the northeast United States. The Joffre site also accepts NGLs from the Bakken oil shale formation in North Dakota. For more information visit their website at www.novachem.com

1.3 About This Verification

The verification of NOVA was conducted on June 15 to June 19, 2015 and included team visits to the Calgary, Joffre, St. Clair Township and Moore Township sites. During the course of the verification, the team had the opportunity to interact with a wide range of company personnel, as well as stakeholders external to the company. Attachment 2 contains a list of those individuals interviewed and their affiliations.

This was the seventh Responsible Care verification completed for NOVA. The last verification was conducted in September 2012.

The verification team was comprised of the following individuals.

Name	Affiliation	Representing
Gerry Whitcombe	CIAC Verifier	Industry (team leader)
Alec Robertson	CIAC Verifier	Industry
Brenda Lorenz	CIAC Verifier	Public-At-Large
Kathy Pyper	Red Deer Community	JCAP Member
Dan Hansen	Sarnia/Corunna Community	BCAP Member

2. Team Observations Concerning the Responsible Care Commitments (Codes and benchmark and Collective Expectations)

During the verification of NOVA, the verification team looked for evidence that the company was addressing the expectations documented in the Responsible Care Commitments (152 code elements plus 28 benchmark and collective expectations). While considering all aspects of the Responsible Care Commitments during the verification, the team placed an emphasis on conducting a more in-depth examination of the company's sustainability initiative.

In communicating its observations, the verification team will make repeated reference to the following categories of observations:

1. **Findings Requiring Action** document instances where the verification team observes specific company actions (or the absence of company actions) which are inconsistent with the detailed codes and benchmark and collective expectations contained in the Responsible Care Commitments. Where possible, the verification team will communicate, based on their experience and judgment, why it is inconsistent and how the observation relates back to a possible gap in the expected management system and / or the ethic and principles underpinning company actions. The team may also provide advice on how the situation might be responded to.
2. **Works in Progress** document instances where the verification team has observed the company self-initiating actions in response to identified gaps and deficiency arising from other internal or external audit and review activities, or where the company has self-initiated important improvement opportunities.
3. **Successful Practices** document instances where the team believes the company has taken actions that strongly support sustained excellence in performance, and which should be communicated throughout the CIAC membership.
4. **Improvement opportunities** identify instances where the verification team has observed company actions and decision making as being largely consistent with the expectations detailed in the Responsible Care Commitments, but for which the team is of the opinion that the company could support further improvement by considering alternate or additional benchmarks when undertaking its planning and decision making.

The verification team's observations of how the company has addressed the Responsible Care Commitments are as follows:

2.1 Team Observations Concerning Operations Code

2.1.1 Design and Construction of Facilities and Equipment

The expansion projects for Manufacturing West (MW) are progressing in accordance with the Project Development and Implementation (PD&I) process. Process Safety specialists are embedded in the project and information obtained from the new design has uncovered issues with the existing polyethylene facility (P1) prompting some corrections. An increase in contractor incidents in MW resulted in increased attention to contractor performance while in Corunna, Manufacturing East (ME) the transition from Crude Oil feedstock to Ethane gas went smoothly with no increase in injury rates.

NOVA's Occupational Health group has developed tools and training for Ergonomic/ Human Factors Engineering. The program was successfully piloted in MW and it is currently in the process of being implemented across the company, including training design specialists in the application and use of the new tools.

This is an excellent initiative which directly addresses the Human Factors components of code OP1. Please see Section 2.1.3 Safety and Security for more information.

NOVA's implementation of the Responsible Care codes for this area fully meet code implementation expectations.

2.1.2 Operations Activities

NOVA's RC Standards, procedures and practices governing activities in the four sections of this code area fully meet Responsible Care implementation expectations.

a. General Considerations

NOVA's Responsible Care Standards 230 (Facility Integrity), 330 (Management of Process Risk) and 320 (Management of Change) drive the creation and review of procedures. Specific requirements are in place

governing the frequency of review (generally three years, Process Risk Hazard Assessments are reviewed on a five year cycle), the expertise of reviewers and the level of detail necessary for a review. Tasks are governed by procedures, the Management of Change process or by an on-the-job hazard review and analysis

b. Laboratory Practice

All laboratory procedures are reviewed on a specific cycle. New analytical or testing requirements are implemented using the MOC process.

The team observed that the Corunna Laboratory was not part of the MOC governing the permanent shut down of the Crude Unit in ME. The team believes it is reasonable to expect that the cessation of lab activities associated with the shutdown should be triggered and coordinated through the master MOC. Since this is an issue that could involve any primary unit and any associated facility (e.g. it is not specific to the Lab and Crude Unit) it is noted as a Management System opportunity later in this report.

c. Transportation and Physical Distribution

Thirty percent of NOVA's polyethylene product movements are by motor carrier, and road transportation service providers are evaluated on a two year cycle by CIAC's approved service provider, QRC & Associates. Evaluation results are used in the development and implementation of motor carrier improvement initiatives.

Rail cars are routinely inspected at loading sites. An example of a recent outcome of these inspections was the identification of not-to-specification MacKenzie type valves on some rail cars. Company rail shipments may make use of Short Line rail carriers. Guidance from CIAC on member company use of these service providers is as follows:

- Know which Short Lines are involved with the movement of company product (either directly contracted or sub-contracted);
- Ask the Short Line to complete the self-assessment as per the Railway Association of Canada (RAC) / CIAC Rail Carrier Evaluation Guidelines; and
- If the Short Line is not supportive, contact CIAC's Rail Committee to raise the issue and seek resolution with RAC.

Using the Motor Carrier Evaluation as a model, some Short Lines have been evaluated for a CIAC Member by QRC & Associates under an updated protocol.

The team observed that company transportation specialists may have background and knowledge about many community rail and road related transportation issues. Connecting these specialists with the community is part of an opportunity presented in the Operating Site Community part of this report.

d. Maintenance

Maintenance procedures are reviewed on a five year basis. New procedures are generated using the MOC process or as a result of an incident investigation. Safety performance is excellent with ME currently at 27 months accident free.

Advanced adaptive software is used to support a predictive, preventative risk-based maintenance system resulting in very high plant reliability in the east and west.

Successful Practice

- The use of adaptive software in the predictive preventative maintenance (PPM) program is a successful practice.

2.1.3 Safety and Security

a. Occupational Health and Safety

Since the last verification in 2012, the company has redirected its focus towards creating an enhanced safety culture within the organization. The approach is leadership driven and behaviour based, applicable throughout the organization, forming part of NOVA's new "Taking Care" approach to Responsible Care and Sustainability and is prominent in all Responsible Care promotions.

The occupational injury rate for the company is lower since the last verification except for one particular area in MW associated with contractors involved in construction of the new Polyethylene plant. Senior leadership, safety practitioners and contractor company management are actively engaged in addressing the situation.

The team was made aware of initiatives where outstanding efforts have resulted in raising occupational health and safety performance. These are listed below as successful practices.

Monthly bulletins include tips to carry safe work practices beyond the workplace. NOVA, like some peer companies, also provides PPE for dangerous/hazardous applications at home expanding the safety culture beyond the site gate and into the community.

The Occupational Health group has developed tools and training for Ergonomic/ Human Factors Engineering and is currently training design specialists in their application and use. Once feedback has been obtained PD&I documentation will be modified to fully incorporate these principles. This is an excellent initiative which directly addresses the Human Factors components of OP1.

Successful Practices

- The ergonomic Stand-Station initiative and the wellness 'Fit in Five' program are successful practices.
- The Industrial Hygiene Workplace Exposure Assessment Program (WEAP) is a step change in reducing potential exposures and is a successful practice.
- The speed of action and engagement with union, area contractors and other Chemical Valley companies in analyzing the recent ME scaffolding incident and the resulting renewed focus on awareness of hazards from above is a successful practice.
- In ME, Occupational Health's "Ergonomics/Human Factors Engineering Guidelines for Projects" is a step change in facility design by requiring human factors to be considered early in the engineering and design process, thereby foreseeing and addressing ergonomic issues prior to construction and is a successful practice.

b. Process Safety Management

The process safety group is beginning to take the company to the next level of process safety management by developing a process safety culture using guidance from the Center for Chemical Process Safety's (CCPS) 9 element Vision 20/20 program. One of the first steps was to rewrite RC Standard 230 Equipment Integrity based on the Vision 20/20 program. Another initiative involves training on the Layers of Protection model from a "committed culture" perspective as put forward by the same CCPS program. One aspirational goal is to ensure engineering, operations and maintenance all function seamlessly under a process safety culture.

A current initiative is to have all losses of containment (including very minor ones) identified and reviewed to identify potential system deficiencies thus ensuring that all safeguards in place are effective.

The company is working with the University of Alberta and Western University to implement a risk analysis course in their Engineering programs.

c. Emergency Management

The team is of the opinion that all standards, procedures and practices for Emergency Management fully meet Responsible Care code implementation expectations. Some examples demonstrating dedication to performance in this area are:

- The recognition of the difficulty of providing emergency transportation to anyone in distress while on the newly constructed seven kilometer “Legacy Trail” in Joffre led NOVA to purchase a 6 wheeled all-terrain vehicle to assist should it ever become necessary.
- The Centre for Applied Research and the Center for Performance Applications in Calgary have “Shelter In Place” agreements with near industrial neighbours.
- A gap analysis versus the National Fire Protection Association (NFPA) Incident Command System was recently performed with the results used to improve existing systems.
- An improvement in hazardous materials training with a more rigorous evaluation of knowledge of the material covered in the courses.

NOVA strives to construct realistic emergency scenarios for tabletop exercises and emergency drills. The team suggests inviting potentially affected near neighbours to understand and possibly include their particular circumstances in one of these exercises. Please see the “Operating Site Communities” part of this report for an ‘Opportunity for Improvement’ involving this suggestion.

d. Malicious Intent

In consideration of Responsible Care code requirements the team is of the opinion that implementation expectations have been met for this area.

e. Critical Infrastructure/Business Continuity

Critical Infrastructure/Business Continuity (CI/BC) plans are integrated within emergency response and crisis management. They are audited and tested but haven’t been checked against CIAC guidance.

Opportunity for Improvement

- Ensure the intent of CIAC guidance for CI/BC has been met by auditing internal CI/BC plans against the CIAC checklist.

f. Incident Reporting and Investigation

The company’s incident reporting and investigation system has recently migrated to a new tool, the Responsible Care Learning System (RCLS). The new system will be able to deliver improved analysis thus assisting in identifying areas in need of increased focus.

2.1.4 Environmental Protection

Information on environmental protection is available from NOVA’s website at:

<http://www.novachem.com/Pages/responsible-care/responsible-care-environment-energy.aspx>

In addition, their performance relative to a select group of environmental measures is available at:

<http://www.novachem.com/Pages/responsible-care/responsible-care-performance-data.aspx>

All aspects of this area meet Responsible Care implementation expectations.

a. Emissions and Waste Reduction

The company’s approach to sustainability involves a four component “Taking Care” model. One of the components is the environment and as part of the sustainability roll-out the environmental roll-out is also under way. Called the “2020 Environmental Plan” it lays out company goals for reductions in absolute amounts of

pollutants as well as reductions in the intensity of nitrogen and sulphur compounds, volatile organic compounds as well as greenhouse gases.

Current performance and company direction in greenhouse gas emissions is available at:

http://www.novachem.com/ExWeb%20Documents/responsible-care/GHG2014_web.pdf

Noise complaints are also featured in the 2020 Environmental Plan with a targeted 50% reduction. With this in mind the team was impressed with the effort and detail applied to this area and observed that in-house experts would, potentially, be a good resource for community dialogue activity. This idea is included in an opportunity in the Operating Site Communities section of this report.

b. Handling, Treatment and Disposal of Wastes

The company has programs and practices in place for safe waste handling. Exceptional housekeeping, visible during team tours, speaks highly of a culture ensuring a clean and safe (debris free) work environment.

The “2020 Environmental Plan” promotes post-use plastic capture and recycling and to reduce waste production by greater than 50% by 2020 (based on 2010). A system for identifying waste reduction projects is currently being implemented.

2.1.5 Resource Conservation

The company has an ongoing focus on conserving resources. Water is used for cooling, protection, potable and sanitary uses but is not incorporated into company products and where possible uptake from rivers is minimized. In Joffre there is minimal river water usage partly because rainwater is collected and treated for use. There is on-site treatment to make the water potable and post-use treatment results in a discharge to the river of higher quality water than is taken in.

Efficient energy use is a design focus in every project.

The Joffre site’s co-generation unit makes optimal use of the energy required to produce electricity by recovering the steam for production use.

The recent conversion of Corunna from crude oil to shale gas has resulted in a significant energy reduction in the manufacture of ethylene as well as a switch in resource sourcing to a more local supply.

2.1.6 Promotion of Responsible Care by Name

The company takes every opportunity to externally promote Responsible Care. As an example, in Joffre the Parkland Airshed group, the Red Deer Watershed Alliance and local Plant Managers group were mentioned as recipients of Responsible Care messages from NOVA.

Internally the Responsible Care message is pervasive. There is no part of the organization that does not understand Responsible Care. This success leads to an observation that there is a small (perhaps growing) lack of employee understanding that the company is part of an industry Responsible Care perspective.

Improvement Opportunity

- To ensure employees have an understanding of the broader (CIAC/industry) Responsible Care perspective.

2.2 Team Observations Concerning Stewardship Code

2.2.1 Expectations of Companies

a. Research and Development (R&D) Expectations (85-92)

The Technology organization includes two facilities in Calgary. The Center for Applied Research (CAR) conducts research and development while the Center for Performance Applications (CPA) is the base for customer technical support. All NOVA Responsible Care requirements are applied to these facilities and their supporting organizational structure parallels the rest of the company. The result is a well-coordinated implementation that fully meets Responsible Care code implementation expectations.

The team visited the CAR facility where a comprehensive “stage gate” process for new product and process development is in place to ensure that potential risks throughout the value chain are assessed and effectively mitigated and that new products are only sold for use in approved uses. The nature of the work conducted at the facility includes:

- fundamental chemical synthesis,
- product technical support,
- manufacturing plant support,
- pipeline support and
- environmental support.

In addition, the company works closely with the Canadian Plastics Industry Association (CPIA) in the product applications area. Some examples of the effectiveness of processes in place are:

- Only two away-from-work cases (AWC) at the Center for Applied Research in the last 17 years (approx. 200 employees).
- Zero AWCs at the Center for Performance Applications in the last 30 years (approx. 75 employees).
- NOVA will not manufacture or sell product that will be converted into microbeads. (Microbeads are a plastic material often used in human health products that are not captured in wastewater treatment facilities and are discharged directly into the environment where they can end up back in food chains.)
- The company’s research in manufacturing process improvement has resulted in the development of improved cracking furnace tube technology for ethylene production. It has significantly improved the on-stream time of these units, resulting in operating cost, energy efficiency and environmental impact improvements.

Formal CAR and CPA site and annual corporate audits are conducted to ensure the effectiveness of the process is maintained on an ongoing basis.

Some examples of the company approach to “Green Chemistry” are:

- Packaging design for reducing materials, energy in production and distribution, etc.
- Green Centre Canada - sponsored by industries and government to work with universities to look for projects in energy, manufacturing and innovative products. No projects as yet have applied to the company.
- Work with universities directly on research into catalysts, products etc.
- Working with EPA on brominated flame retardant chemicals.

b. Expectations Beyond R&D (93-114)

The company’s Product Stewardship, Product Integrity, Sales and Technical Services Groups have standards and procedures that help meet code expectations for this area.

a Raw materials, Products and Services Characterization and Evaluation (93-99)

This area is primarily focused on additives that modify the polyethylene product to meet customer needs and is largely the responsibility of the Technology organization. Standards and procedures are in place, in part to direct the evaluation of 10-20 new innovative chemicals each year.

b Promotion of Responsible Care by Name (100-102)

All externally and internally focused employees have the same exposure to Responsible Care and promotion of Responsible Care is encouraged for all external interactions.

2.2.2 Expectations with Respect to Other Parties

The company carries out its obligations for these codes (ST115-ST124) through a variety of standards and procedures. RC Standard 450 Purchasing Controls sets the overall control mechanisms for purchasing goods and services whereas RC Standards 150 Contractor Responsible Care Management, 520 Transportation and Distribution (see Transportation and Physical Distribution, earlier in this report), 430 Responsible Care Communications and Program Promotion and 410 Product Risk Management specify the particulars when utilizing other parties in the supply chain. These standards fully meet Responsible Care code implementation expectations.

2.3 Team Observations Concerning Accountability Code

2.3.1 Operating Site Communities

The company effectively and efficiently manages this area under the guidance of RC Standard 140 Community Outreach. The team observed excellent examples of dialogue in the forms of Joffre's Siteline community news brochure, Sarnia/Lambton's News for Neighbours, JCAP meeting minutes and the Joffre community spring 2013 Open House. Conversations with near neighbours in the east and west demonstrate the company has developed a very positive rapport with those who live near the plants. CAP members in the east are also positive with respect to the company's interactions and involvement with their host community. In all of the team's interactions with community members there was not one indication of any reluctance or hesitation on the part of the community to contact the company about any issue and to expect timely feedback. In fact, many in the community felt they could contact the plant managers directly.

The team is of the opinion that the company has built and maintains an excellent community dialogue process.

The team feels there was a misinterpretation, discussed below, of the finding from the previous report but commends ME for providing additional technology to local neighbours to assist in the notification process should an emergency event occur.

The previous report had intended for the company to address the observation that local neighbours (in the west as well as the east) may not know what shelter in place actually requires. The finding required the company to dialogue with all near neighbours to continually assess their understanding. In team conversations with near neighbours it was determined that this has not taken place.

The team is aware that it is difficult to ensure complete compliance to the finding. That is not the intent. As with company emergency response preparedness, where it is necessary to train and drill on an on-going basis, it is also necessary to work with near neighbours on shelter-in-place preparedness.

This can be set up quickly within the existing near-neighbour community dialogue structure. All that is required is that a portion of all meetings (repetition is important) with near neighbours contain a shelter-in-place discussion. On an annual basis anyone who has not been exposed to the message can be contacted and be given the information directly. It is presented as a finding below.

As the result of our discussions with CAP members and neighbours and subsequent conversations with employees the team had the following suggestions for NOVA's dialogue process. These suggestions are:

- ensure items raised with neighbours and CAPs are documented and followed through to closure.

- consider having corporate transportation specialists dialogue with the community when issues related to carriers are raised, especially rail.
- consider having environmental specialists present noise abatement and environmental emission plans to local neighbours.
- invite local neighbours to experience an emergency drill perhaps choosing a scenario that involves a neighbour.
- improve the process that allows community members to suggest topics that would be of interest to them for discussion at JCAP and near neighbour meeting.

The team determined that hazards and risks have been communicated to the community but this communication has not been repeated. In reviewing RC Standard 140 Community Outreach the team concludes that the standard could improve in how it addresses RC code AC129 (specifically, “....covering... hazards and associated risks, up to and including worst case scenarios”) and suggests there should be direction in the standard and requirements for ongoing dialogue about manufacturing hazards and risks.

There is strong direction in place for community investments and the programs are very effectively managed. The team notes that other companies have expanded their programs to include employee participation in the allocation of funding.

Finding requiring Action

- To ensure near neighbours understand the actions they should take to protect themselves in the event NOVA or local authorities activate a ‘shelter in place’ instruction as a result of an event associated with NOVA’s activities.

Improvement Opportunities

- Further engage company employees and community members in the dialogue process (CAP and near neighbour issues documented and followed through to closure, company transportation and environmental (or other) specialists making presentations, community members experiencing emergency drills and providing scenarios and community meeting topic suggestion process)
- Revise RC Standard 140 to specify a requirement to schedule the communication of hazards, risks and credible case scenarios to near neighbours and CAPs at prescribed intervals.
- Establish employee committees to engage employees (and other stakeholders) in the development and implementation of NOVA’s corporate responsibility initiatives, including community funding.

2.3.2 Other Stakeholders

1. Public Policy

The company is engaging with new Alberta government officials to demonstrate that NOVA, through its Responsible Care management processes, adds value to society in its operations and creation of products.

2. Finance

NOVA’s owners are well aware of and supportive of Responsible Care. Responsible Care information and company performance is routinely shared in communications with debt holders, rating agencies and Insurers.

3. Consumers

NOVA works with its customers to ensure that its products do not end up in inappropriate consumer applications. It has recently decided it will not knowingly allow its product to be used in the manufacture of plastic microbeads, a consumer oriented micro abrasive typically used in personal care applications that is currently generating environmental concern.

4. Transportation Corridor

The company is very active with its pipeline community and employs a third party to conduct ongoing communications with pipeline transportation route neighbours that include risk and Responsible Care information. Its success has prompted the Joffre site to also make use of the service provider to disseminate information to neighbours near the plant site.

NOVA representatives co-chair the Ontario Region TransCAER Committee and the company fully participates in transportation outreach activities.

5. General Public

NOVA maintains an extensive 'Contact Us' page on their web site and has a general inquiry 1-866-ASK-NOVA phone line.

The company has a social media monitoring system in place and is looking for opportunities to enhance their social media strategies but they do not have a local social media presence related to emergency situations.

3. Team Observations on the Company Management System

It is a requirement of Responsible Care that companies have a documented, self-healing management system or systems capable of identifying and responding to deficiencies and otherwise supporting continual improvement across all company business units, functions, and sites and as a framework for implementing the Responsible Care Commitments.

The verification team studied NOVA's management system(s) and compared and contrasted the attributes of that system(s) to those of a self-healing overall management system as discussed in the CIAC Management System Guide. The verification team's related observations to NOVA's management system(s) are as follows:

- The company has an outstanding Responsible Care Management system. It is well structured and documented, leadership driven and contains the required accountabilities. We are of the opinion that all aspects meet Responsible Care management system implementation expectations.
- The key structural element is the Responsible Care Council, reporting to the Responsible Care Committee of the NOVA Chemicals Management Board (NCMB). This Council is made up of key company leaders and executives and each has been given responsibility for several Responsible Care functional areas (Product Stewardship, RC Culture, Incident Investigation etc). All CIAC Responsible Care code areas are covered. Each of the functional areas develops plans and goals for the upcoming year and are held accountable for achieving results. This council is paralleled by similar structures in the major functions and areas, e.g. Technology, Manufacturing East and West where a similar management council and goal setting structure is in place.
- The documented management system (CP010 Responsible Care Management System Manual) conforms to the American Chemistry Council's RC14001 requirements and allows the company to achieve verification in both the US and Canada.
- The last verification noted that the Responsible Care Council had responded to (among other drivers) CIAC's push towards sustainability with a council seat for sustainability. The team viewed this as a successful practice and an update of this evolving management system component is given in the "Ethics and Principles for Sustainability" section of this report, below.

3.1 Observations on the PLAN Step

During the PLAN Step of the management system, the company decides what the goals of the company are and how they will be met. In determining those goals, it is expected the company will look inward, across its operations, but will also look outward, considering the expectations of: stakeholders; regulatory requirements; relevant CIAC Responsible Care Commitments and supporting tools; and other industry benchmarks.

In considering the PLAN Step of NOVA's management system, the verification team observed the following:

- the company has developed an annual planning process resulting, for this year, in the corporate "2015 Responsible Care & Sustainability Plan" covering all aspects of Responsible Care. This is a comprehensive plan although parts were observed as works in progress during the team's visit.

3.2 Observations on the DO Step

During the Do Step in the management system, the company converts the decisions of the PLAN Step into action and ensures awareness and understanding by all involved. It is expected that the company will implement an organizational structure, assign responsibilities to appropriate personnel, supply sufficient training and resources to execute planned actions and develop and document standards, procedures and programs, as applicable.

In considering the DO Step of NOVA's management system, the verification team observed the following:

- excellent implementation of those items described above despite some fairly rapid change and expansion undertaken by the company.

The team did observe in ME that the crude laboratory was not part of the MOC for the closure of the Crude unit. At its broadest level the MOC should cover all units/components of a closure in much the same way as it would cover the design, construction and startup of a unit.

Improvement Opportunity

- To ensure the MOC governing the closure of facilities include all operating aspects of that facility.

3.3 Observations on the CHECK Step

During the CHECK Step in the management system, actions carried out in the DO Step are assessed to determine if they are actually being carried out according to plan, and whether they are achieving the desired outcomes and delivering continual improvement. Here, the overall management system and components will be reviewed along with employee competences for assigned responsibilities, internal and external audits will be undertaken, incidents will be assessed to identify root causes, and performance measurement will be conducted and reviewed.

In considering the Check Step of NOVA's management system, the verification team observed the following:

- A Responsible Care Functional Council member is the champion for each code area and accountability is assigned to the appropriate RC Standard owner and Responsible Care Shared Services person to ensure ongoing compliance.
- The company has two excellent programs (Responsible Care Audits and Facility Self-Assessments) covering the majority of this area.
- External review of the company audit program by a consulting group every 3-5 years, commencing in 1997 (most recent was 2012)
- Their incident investigation and analysis process has been upgraded with a new electronic tool.
- The company makes extensive use of Responsible Care dashboards to keep on top of its targets and commitments.
- An annual Management Review is conducted by the Responsible Care Functional Council prior to the submission of the annual attestation to the CIAC. The results are reported to the company's management board which includes the CEO and the signing executive.

3.4 Observations on the ACT Step

During the ACT Step in the management system, the company translates the results of the CHECK Step into corrective actions for improvement. This includes revisiting the PLAN Step to decide whether changes are needed to the company's stated goals or action plans, policies and procedures for achieving those goals. Considerations

when examining the Act Step include whether and how: audit and review findings are responded to; performance is communicated internally and externally; employee and contractor performance is rewarded and corrected, etc.

In considering the Act Step of NOVA's management system, the verification team observed the following:

- generally the company responds quickly to urgent situations (reference the successful practice noted in Occupational Health and Safety regarding a renewed focus on hazards from above).
- extensive internal reporting of performance measures.
- performance on key indicators is reported on the company's public web site.
- continual reporting of key measures to community members.
- ample evidence of continual monitoring of all aspects of Responsible Care by company leadership

4. Team Observations on the Responsible Care Ethic and Principles for Sustainability

Each CIAC member company is formally committed to the ethic of "Doing the right thing, and being seen to do the right thing." This ethic, along with the principles for sustainability are expected to guide the company's decision making and practices. In conducting the verification, the team is looking to understand how well the ethic is understood and adopted within the company, and the degree to which the principles inform the manner in which the company does its business.

The verification team carefully observed NOVA's decision making processes and actions and compared and contrasted the attributes of those with the attributes of a company guided by the Responsible care Ethic and Principles For Sustainability as discussed in the Responsible Care Commitments (Appendix E). The verification team's related observations on the company's application of the Responsible Care Ethic and Principles for Sustainability are as follows:

- In the previous verification the team concluded that the company's decision to create a Sustainability Functional Council was a successful practice. In the three years since that verification the company began the process of understanding sustainability in practical terms and developing the path forward to make it a component (if not driver) of NOVA culture.
- The company has developed a platform to bring the entire organization together to put Responsible Care in practice with a focus on sustainability. Called "Taking Care" it embodies four components - operations, communities, products and environment, which are acted upon under the balancing of the company's sustainability approach (society, environment, economy and generation).
- The company developed its strategy in 2014, is currently releasing its first internal communication to kick start the process for employee engagement and plans to sustain and improve from 2016 onward.
- The team is enthused about this initiative. It is an excellent example of bringing the complex concepts of sustainability to the shop floor. This is very early on in the program and will be a key feature of future verifications.

Work in Progress

- implementation of the Sustainability Strategy. This initiative with its well thought through, grass roots approach brings sustainability from corporate rhetoric to employee empowerment. The team believes this effort leads the industry in involving employees in this complex undertaking.

The team noted the following specific examples with regard to the eight principles for sustainability:

- work for the improvement of people's lives and the environment, while striving to do no harm;
 - Taking Care approach to Responsible Care and Sustainability
 - free issue of personal protective equipment for take home use,
 - 'site specific' safety orientation video,
 - using Ergonomic/Human Factors Engineering in new plant design
 - ergonomic Stand-Stations

- Occupational Health's 'Fit in Five' program
 - renewed focus on awareness of hazards from above
 - using guidance from the CCPS Vision 20/20 program
- be accountable and responsive to the public, especially our local communities, who have the right to understand the risks and benefits of what we do;
 - JCAP and near neighbour programs
 - Open houses
 - Community newsletters
 - Extensive and up-to-date web presence.
- take preventative action to protect health and the environment;
 - demonstrated evidence of active participation in Behavioural Based Safety Observations (BBS) at all levels (employee, small contractor, large contractor)
 - not allowing company product to be used in microbead applications
 - "Taking Care" approach to marketing
- innovate for safer products and processes that conserve resources and provide enhanced value;
 - engaging ISM (Institute for Supply Management) network to collaborate on best practices, emerging issues etc., in supply chain management
 - extensive chemical process research (Center for Applied Research)
 - extensive product research (Center for Performance Applications)
- engage with our business partners to ensure the stewardship and security of our products, services and raw materials throughout their life-cycles;
 - TRANSCAER activities
 - member of Canadian Plastics Industry Association (CPIA)
 - supplier contracts and purchasing controls
- understand and meet expectations for social responsibility;
 - have a public declaration of social responsibility on the company website
 - have extensive community support programs at Corporate headquarters in Calgary as well as Manufacturing West and East
- work with all stakeholders for public policy and standards that enhance sustainability, act to advance legal requirements and meet or exceed their letter and spirit;
 - through industry associations:
 - CIAC
 - ACC
 - CPIA
 - plant managers actively work alone or with local associations with local municipal and provincial governments to resolve issues and/or input on legislation and regulation
- promote awareness of Responsible Care, and inspire others to commit to these principles.
 - the internal adoption of the Responsible Care name empowers all employees to promote Responsible Care in all aspects of company interaction with outside parties. From the executive offices to the shop floor all employees understand and promote Responsible Care.

5 Verification Team Conclusion

As a result of the examination conducted, and in consideration of the observations communicated within this report, the verification team is of the opinion that the Responsible Care Ethic and Principles for Sustainability are guiding company decisions and actions, and that a self-healing management system is in place to drive continual improvement. The team believes that the company is capable of responding to the Finding Requiring Action identified during the verification and discussed in detail in the report. The verification is complete and no further involvement is required by the verification team. .

Company Response to Verification Team Report

On behalf of NOVA Chemicals, I have reviewed this verification report. The observations and conclusions contained in the report have been discussed with the verification team.

NOVA Chemicals appreciates the candor, enthusiasm and knowledgeable guidance offered by the verification team throughout the process. We appreciate the engagement of our local community representatives for their contribution to this verification and their ongoing involvement in our relationship with local communities. The challenging and thought-provoking discussions with the verifiers help drive continuous improvement in our programs and overall approach to Responsible Care. Similarly, the positive comments and recognition of Successful Practices provide external validation and reinforcement of our work.

NOVA Chemicals will communicate the results of the verification exercise with its CIAC peers at their next meeting and will discuss the verification results with our stakeholders, including those representing communities near our operating sites. We will give consideration to the Improvement Opportunities identified by the verification team and will assist the CIAC in communicating and sharing the identified Successful Practices to other CIAC members. Plans will be developed and implemented to respond to the Finding Requiring Action identified by the verification team. Our progress in implementing those plans will be discussed when preparing our Annual Statement of Re-Commitment to Responsible Care and communicated to the verification team at the time of our next verification.

Eric Hiddema
Responsible Care Projects & Systems Manager
NOVA Chemicals
31 July 2015

Interview Lists

A: Company Personnel Contacted During Verification Process

Name	Position	Location
<i>NOVA Chemicals Management Board (NMB) – Senior Executives</i>		
Todd Karran	President, CEO and CFO	US Corporate Center, Pittsburgh, PA
Bill Greene	Senior VP, Operations	US Corporate Center, Pittsburgh, PA
Naushad Jamani	Senior VP, Olefins & Feedstock CIAC Executive Contact	NOVA Head Office, Calgary, AB
<i>Corporate Leadership & Functional Support</i>		
Jim Dixon	Director, Responsible Care	Red Deer Office, AB
Mark Dickie	Global Director, Raw Materials	US Corporate Center, Pittsburgh, PA
Pace Markowitz	Director, Corporate Communications	US Corporate Center, Pittsburgh, PA
Debra van Holst	Director, Logistics	US Corporate Center, Pittsburgh, PA
Adrian Cassola	Team Leader, Product Integrity	Mississauga, ON
Sandy Conn	Raw Materials Quality Control & Responsible Care	US Corporate Center, Pittsburgh, PA
Kevin DeAngelis	Logistics Regulatory Compliance Manager	US Corporate Center, Pittsburgh, PA
Vince Gagner	Team Leader, Growth Projects & PMO Group	Corunna Site, ON
Fred Henselwood	Leader, Process Safety	NOVA Head Office, Calgary, AB
Eric Hiddema	Systems & Projects Manager, Responsible Care CIAC Overall Responsible Care Coordinator	NOVA Head Office, Calgary, AB
Bob Huggett	Team Leader, Responsible Care Assurance	Manufacturing East Corporate Centre, Sarnia, ON
Mark Kay	Market Group Leader, Polyethylene	US Corporate Center, Pittsburgh, PA
Shane Lamden	Senior Environmental Advisor	Joffre Site, AB
Elton Lawes	Environmental Analyst	Centre for Applied Research, Calgary, AB

Linda LeGoullon	Team Leader, Product Stewardship	US Corporate Center, Pittsburgh, PA
Wendy Lomicka	Sustainability & Citizenship Leader	US Corporate Center, Pittsburgh, PA
Dave Schwass	Manager, Environmental Affairs	Centre for Applied Research, Calgary, AB

Technology Calgary Locations – Research, Development and Customer Technical Support

Daryll Harrison	VP, Technology	Centre for Applied Research, Calgary, AB
Amy Baltimore	Responsible Care Specialist	Centre for Applied Research, Calgary, AB
Josh Cavanagh	Responsible Care Specialist	Centre for Applied Research, Calgary, AB
Rod Immel	Team Leader, Research Support Services	Centre for Applied Research, Calgary, AB
Anita Magis	Technical Scale Facility Coordinator	Centre for Applied Research, Calgary, AB
Sarah Marshall	Leader, Technical Services	Centre for Performance Applications, Calgary, AB
Mitchell Palmer	Research Technologist, Analytical Team	Centre for Applied Research, Calgary, AB
Holly Severin	Research Technologist, New Catalyst/Polymers	Centre for Applied Research, Calgary, AB

Manufacturing West (MW) – Manufacturing Operations (Joffre, Alberta)

Rick VanHemmen	Director, Regional Manufacturing	Joffre Site, AB
Chris Banbury	Safety Specialist	Joffre Site, AB
Ed Bryant	Leader, Plant Availability (Maintenance)	Joffre Site, AB
Sorin Dan	Process Safety Engineer	Joffre Site, AB
Karl Dobinson	Enviro Action Committee member	Joffre Site, AB
Lois Erichson	Leader, Operations	Joffre Site, AB
Tennielle Gilchrist	RC Promotions Committee / Human Resources	Joffre Site, AB
Roxann Good	Communications & Community	Joffre Site, AB
Jennifer Jackson	Team Leader, Responsible Care	Joffre Site, AB
Christian Lamoureux	Loss Prevention Coordinator	Joffre Site, AB
Prince Onuwaje	Process Safety Engineer	Joffre Site, AB
Randy Saponja	Safety Culture Committee member	Joffre Site, AB

<i>Manufacturing East (ME) – Manufacturing Operations (Sarnia-Lambton Area, Ontario)</i>		
Tom Thompson	Director, Regional Manufacturing	Corunna Site, ON
Susan Allan	Coordinator, Product Supply	Manufacturing East Corporate Centre, Sarnia, ON
Nancy Cardinal	Team Leader, Engineering	Corunna Site, ON
Adam Clingersmith	Safety/ER/Security Specialist	Corunna Site, ON
Ted Cooper	Leader, Maintenance Services	Corunna Site, ON
Don Cunningham	Operations Technician	St. Clair River Site, ON
Bart Derech	Lab Coordinator	Corunna Site, ON
Emilio Iacobelli	Safety & Emergency Response Specialist	Corunna Site, ON
Tracy Johnson	Communications Consultant	Corunna Site, ON
Dave Lyford	Pilot Plant Lab Coordinator	St. Clair River Site, ON
King Ma	Process Safety Engineer	Corunna Site, ON
Carrie Maxim	Distribution Specialist, Logistics	Corunna Site, ON
Sean McCarthy	Team Leader, Mechanical Reliability	Corunna Site, ON
Jim Pitt	Quality Control, Operations Lab	Moore Site, ON
Winston Ramharry	Leader, Engineering	Manufacturing East Corporate Centre, Sarnia, ON
Bill Ramsay	Team Leader, Operations (Moore Site)	Moore Site, ON
Krista Randall	Team Leader, Human Resources	Corunna Site, ON
Joe Ripepi	Rail Loader	Corunna Site, ON
Kevin Schroeter	Team Leader, Responsible Care	Corunna Site, ON
Michael Serratore	Operations Technician	Moore Site, ON
Ryan Straus	Leader, Technical Services	Corunna Site, ON
Rob Thompson	Leader, Regional Operations	Corunna Site, ON
Mike Watson	Team Leader, Operations – Olefins (Corunna Site)	Corunna Site, ON



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