

# **ALBERTA ENERGY AND UTILITIES BOARD**

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Calgary Alberta

## **DOW CHEMICAL CANADA INC. APPLICATION FOR AN ETHYLENE PLANT EXPANSION FORT SASKATCHEWAN**

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**Decision 97-4  
Application No. 960461**

### **1 INTRODUCTION**

#### **1.1 Application**

Dow Chemical Canada Inc. (Dow) has been operating an ethylene plant in Fort Saskatchewan in Sections 12 and 13, Township 55, Range 22, West of the 4th Meridian since 1994. Dow applied pursuant to section 30 of the Oil and Gas Conservation Act to amend the plant's existing Industrial Development Permit No. IDP 90-6. Its application was registered as Application No. 960461 on 14 May 1996.

The applied-for amendments include a change to the start-up date of its preapproved expansion from 1 January 1999 to 1 July 1998, an annual increase in the ethane feedstock from 3.440 million cubic metres ( $10^6 \text{ m}^3$ ) to  $4.581 \times 10^6 \text{ m}^3$ , an increase in the quantity of gas used as fuel from  $459 \times 10^6 \text{ m}^3$  to  $625 \times 10^6 \text{ m}^3$  of gas per year, and a corresponding increase in ethylene production from 979 kilotonnes to 1304 kilotonnes per year. Dow also requested an extension of the permit term from the current expiration date of 31 December 2014 to 31 December 2018.

The proposed expansion would be achieved within the existing plant area and would include five cracking furnaces (in addition to the existing six furnaces), five cooling tower cells (in addition to the existing eight cells), modifications to compressors and turbine internals, and some upgrading of other equipment.

The Alberta Energy and Utilities Board (the Board) issued the original permit for Dow's ethylene plant, (IDP No. 90-6) in October 1990, authorizing the use of ethane and natural gas for the production of ethylene. The original IDP application was advertised but did not receive any public objections. The application was considered and approved without a public hearing.

Dow's original 1989 application included plans to expand the ethylene plant by 50 per cent in 1999. The current application is for a further 50 per cent capacity increase so as to permit a doubling of the existing ethylene plant capacity.

## 1.2 Interventions

When the application was advertised for hearing on 22 October 1996, interventions expressing concern with the application were received from Mr. Dzurny et al (A. Dzurny, D. Krebs, D. Lindsay, N. and L. Demeule, T. Finch, R. Gaufr, and J. and S. Lucas), and Mr. Emslie who are residents living in the Fort Saskatchewan area. An intervention was also received from Mr. Lucey on behalf of the Confederation of Regions Party. Two letters supporting the application were received, one from the Mayor of Fort Saskatchewan and one from the Mayor of Strathcona County.

## 1.3 Hearing

The application was considered by the Board at a public hearing in Josephburg, Alberta on 5 December 1996, before F. J. Mink, P.Eng. (Presiding Member), B. T. McManus, Q.C. (Board Member), and Gordon J. Miller (Board Member). Those who appeared at the hearing are listed in Table 1.

**TABLE 1 THOSE WHO APPEARED AT THE HEARING**

Principals and Representatives (Abbreviations Used in Report)	Witnesses
Dow Chemical Canada Inc. (Dow) R. Neufeld	W. Knee, P.Eng. J. Matt G. Hansen P. Bieman  L. Frank, P.Eng. of HFP Acoustical Consultants Ltd.
A. Dzurny and N. Demeule D. Coley	A. Dzurny N. Demeule
T. Emslie	T. Emslie
City of Fort Saskatchewan	K. Hodgins
Alberta Energy and Utilities Board staff J. Spangelo, P.Eng. D. DeGagne	

## **2 BACKGROUND**

### **2.1 Project Scope**

The application noted that feedstock for the existing ethylene plant was obtained primarily from field plant ethane, while Dow expected to source some ethane feedstock from the straddle plant system for the expanded plant. Dow did not foresee a shortage of ethane and forecasted a surplus of ethane in Alberta after the plant expansion. No questions were raised by the interveners regarding issues of future availability of the energy resources.

Dow stated that its current plant was one of the most efficient plants of its type in the world. Dow had recently participated in an independent benchmarking study which included approximately 16 ethane cracking plants. For 1995, Dow's ethylene plant placed in the top quartile for lowest energy/unit production for these ethane cracking plants.

The capital investment for the expanded project would equal \$183 million dollars with \$124 million dollars spent in Alberta. The project would create 716 years of employment in the engineering, design, and construction phase with about 85 per cent of this employment occurring in Alberta. New permanent on-site employment resulting from the expansion would equal 220 years of employment over the 20-year permit term.

### **2.2 Public Consultation**

Dow announced plans for its ethylene plant expansion in the third quarter of 1995 and at that time began its public consultation program. It adopted a standard communication process which included both employee communications and external communications, in addition to monitoring and responding to concerns and issues as they were raised. External communications included letters to local neighbours, meetings with its community advisory panel and community based environmental organizations, and providing information in its community newsletter.

In October 1995 a letter was sent to immediate neighbours of the plant providing a general description of the proposed changes. In November 1995 Dow met with the Fort Saskatchewan Environmental Advisory Commission to discuss the expansion plans. Dow also met with government officials at that time. In December 1995 Dow issued a news release indicating that it would be proceeding with the design on the ethylene plant expansion.

Following the receipt of a letter of concern about the project from seven residents, Dow undertook to address the specific concerns by meeting with the group and individual residents.

In addition, Dow held several open houses in the Fort Saskatchewan area in September 1996, advertising these by notices in the Edmonton Journal and Fort Saskatchewan Record and by distributing flyers to all individuals with a Fort Saskatchewan address.

Dow also established an ongoing community awareness program for its facility. This program included a 1-800, 24-hour telephone number to handle complaints and a community newsletter published in local weekly newspapers on a regular basis. In addition, Dow provided a bi-monthly letter to its immediate neighbours and local officials.

As noted, Dow also organized a community advisory panel comprised of people representing various sectors of the community to provide a forum for the community to identify concerns and an opportunity to increase the understanding between the community and industry. Dow indicated it would welcome participation by nearby residents on this committee.

### **2.3 Board Views**

The Board notes that no concerns were expressed with respect to present and future availability of hydrocarbons. It is satisfied that the Dow expansion represents an efficient use of energy and adequate resources exist to meet the demand. The Board also believes the expansion will provide significant economic benefits to the community and the Alberta economy.

Corporate communications is an area requiring continued effort and the use of more than one type of medium is essential in providing the public with an awareness of a company's operations and future plans. The Board believes that Dow's public consultation process regarding the plant expansion was extensive and would encourage Dow to continue its dialogue with the community. The Board commends Dow for its proactive approach to public consultation in making residents aware of the company's future plans and in responding to concerns.

## **3 ISSUES**

In general, local residents did not question the technical and economic merits of the expansion. The Board notes that while wildlife was raised by one of the interveners it was not a major issue at this hearing. Serious concerns were expressed, however, with a number of environmental and social impacts associated with the expansion.

The Board has reviewed the social, economic, and environmental effects of the application and believes the following issues to be of major concern:

- noise,
- flaring,
- rail traffic,
- public safety, and
- land use.

## 4 ENVIRONMENTAL CONCERNS

### 4.1 Noise

#### 4.1.1 Views of the Participants

Noise from the existing Dow facilities, as well as the expected potential increase in noise level from the proposed expansion, was a major concern of residents in the area.

Dow noted that a major industrial complex, such as its ethylene plant, was an acknowledged source of noise from many components of the plant. Dow believed that when the ethylene plant was initially constructed it was built utilizing the best practical noise control technology. Notwithstanding that view, Dow worked to reduce the initial noise levels of its plant and demonstrated the results in a noise impact assessment. It outlined the work that had taken place to date including the monitoring and modelling assessments which were able to identify the major sources of noise. Using this and other information, Dow was able to direct noise mitigation efforts at critical noise sources. If the expansion were approved, Dow committed to take further noise mitigation steps, including installing silencers on the induced draft vent stacks for each of the five new furnaces, installing new cooling tower fan blades, installing silencers on the ethylene compressors, and adding additional acoustical insulation and jacketing as required.

Dow believed that this work would ensure the plant would more than meet the EUB Noise Control Directive (ID 94-4) and was a measure of Dow's commitment to minimize the impact of noise on its neighbours. Table 2 below compares the night-time permissible sound levels, the current sound levels from the existing plant and the predicted sound levels from the expanded plant for nearby residents (see Figure 1). Dow maintained that the results in Table 2 indicate that the predicted sound levels from its expanded project would be in compliance with provincial guidelines.

**TABLE 2**

**COMPARISON OF PERMISSIBLE SOUND LEVELS AT NEARBY RESIDENCES  
WITH THE EXISTING PLANT AND COMBINED EXPANSION PLANT  
(dB L<sub>Aeq</sub> NIGHT-TIME)**

Resident	EUB Night-Time Permissible Sound Level	Current Existing Plant Night-Time Sound Level <sup>1</sup>	Combined Expansion and Existing Plant Night-Time Sound Levels <sup>1</sup>
E. Dzurny	47	-	43
W. Procyk	55	52	53
M. Dueck	52	49	48
E. Finch	48	46	46
F. Mosey	45	-	41

<sup>1</sup> Dow monitoring data and predicted sound levels as taken from Exhibit 4.

Dow further committed to monitor post construction sound levels and to measure the effectiveness of certain noise mitigation efforts, particularly with respect to the furnaces. Dow would also investigate retrofitting the existing furnaces with new noise control equipment regardless of whether the facility was in compliance with ID 94-4. In the end, Dow believed that it was able to demonstrate that noise levels would be below the permissible sound levels established for the residents near the existing and proposed facilities. If Dow were to exceed its predicted noise levels, it stated it would take corrective action to meet those commitments.

The issue of noise was raised by Mr. Dzurny as one of the unacceptable impacts he and his neighbours had been forced to live with since the Dow plant was commissioned in 1994. Mr. Dzurny gave testimony that he had been awakened frequently at his home over the last 6 months (once per week) by noise from the existing Dow facility. Mr. Demeule indicated that although he lived further from the plant than Mr. Dzurny, he could see and hear the flare on occasion and in the summer, if his bedroom window was open, the noise would keep him awake. Mr. Emslie indicated that the area was affected by a number of noise sources including the rail lines and surrounding expanding industrial facilities. For both Mr. Dzurny and Mr. Demeule the plant noise affected indoor sound levels and quality of life.

#### **4.1.2 Views of the Board**

The Board recognizes the importance of controlling noise levels from industrial facilities to ensure that residents living near these facilities are not overly affected by them. Given the rural nature of the area, the Dow expansion would be seen as a major intrusion into the lifestyle of the community. However, the noise guidelines adopted attempt to strike a balance concerning public standards of noise in a variety of urban and rural settings. Noise guidelines acknowledge that some measure of noise impact will result from industrial development. The Board continues to believe the guidelines are a reasonable reference point to control undue noise impacts. The Board accepts that industrial noise from the Dow plant will be clearly heard at the nearby residences under certain ambient conditions, but the levels, as predicted by Dow, will be below the permissible sound levels established using ID 94-4. The Board notes the various commitments Dow made with respect to noise mitigation and expects Dow to follow through with these commitments.

## **4.2 Flaring**

### **4.2.1 Views of the Participants**

Dow stated that when the plant was originally commissioned in 1994 there was clearly an impact on local residents primarily with respect to flaring associated with offspec product and overheating of the acetylene removal reactors. Since that time, Dow indicated that it had examined the flaring problem extensively and changed the burner tip assembly on two occasions, which had resulted in reducing some of the annoying noise characteristics from the

flare which were likened to helicopter noise. In addition, Dow had worked on ways to reduce the actual flaring.

Since commissioning the plant, the average quantity of gas flared had decreased by some 20 per cent between 1995 and 1996, and by over 90 per cent between 1994 and 1996. Dow pointed out that flaring was an essential option under upset conditions to assure worker, public, and equipment safety. It noted that its facility was one of the few ethylene plants in the world that had the capability of recycling product back to the furnaces during process upsets, shutdowns, and start-ups. By recycling product, Dow was able to reduce the amount of processed gas flared by between 70 to 80 per cent compared to what would normally be flared.

Dow noted that the proposed plant expansion would include equipment to store offspec product which was previously flared, thereby reducing the number of flare events and the volume flared. Dow estimated that with this proposed change, flaring would have been eliminated in five of the flaring events that had occurred to date and would have been reduced in an additional 11 events which had occurred. The total reduction in flaring, if this offspec vessel had been in place, would have been between 40 to 45 per cent.

Dow also pointed to a study of operating conditions for similar plants which indicated that typically the average flare losses for ethane cracking plants were approximately 0.81 per cent of the total product produced, while at the Dow facility losses were 0.57 per cent for 1995. Indications were that flare losses would be further reduced to approximately 0.4 per cent for 1996. Dow indicated that it cost the company about \$27,000 per hour of flaring and that it was in its own best interest to reduce flaring as much as possible. Since start-up, flaring had cost Dow approximately \$5 million dollars in lost production, in addition to \$2.5 million dollars in lost ethane feed-stock.

Dow identified overheating in the acetylene reactors (exotherms) as the principle cause of flaring in the first year of operation. A new catalyst had since reduced the number of exotherms from 12 in the first year of operation to two in the next year. As technology continued to provide solutions, Dow undertook to incorporate these in its operations.

According to Dow, there were approximately nine significant flare events in 1996. These events lasted about 12 hours in duration on average. Dow also experienced other flaring incidents during that period that were typically less than 4 hours in duration.

The interveners were generally alarmed about flaring because of its impact on lifestyle and the fear of possible environmental impacts. Mr. Dzurny believed that the number of flare events far exceeded those that were put forward in Dow's testimony. He could not accept Dow's interpretation of what constituted a significant flare event. His definition would be one where the flame was two to three times the diameter of the flare stack with the light and noise reaching just over a mile away, and creating clear shadows within his home. Mr. Dzurny indicated that

the combination of noise and light from the flares often woke him in the middle of the night and were of such intensity that it made going back to sleep impossible.

Mr. Demeule also commented about hearing the flare noise both in his home in summer months (through open windows) and while outside. Mr. Emslie commented when cross-examining Dow that when the flare went off it rattled light fixtures and windows.

#### **4.2.2 Views of the Board**

While the Board believes excessive flaring is unacceptable, it recognizes that some amount of flaring cannot be avoided at facilities such as Dow's to protect the integrity of the plant, workers, and the public. The Board considers that flaring significant volumes of feedstock or product is not an efficient use of resources and every effort should be made to minimize the events. The Board believes this problem is being addressed to the point where the frequency of significant flare events is declining and the average volume of flaring for Dow's ethylene plant is also declining. The Board is satisfied that the proposed plant expansion offers an opportunity to address these issues further. The Board will rely on Dow's commitment to use emerging technologies as they are available to improve its processes in the future. The Board is satisfied this commitment will result in the continued reduction of flaring events.

### **4.3 Rail Traffic**

#### **4.3.1 Views of the Participants**

A number of local interveners complained about the noise caused by rail traffic in the area. Dow recognized that this problem originated from events beyond its property, but believed that as a significant customer of Canadian National Railway (CN) it might be able to exert some influence and pressure on the railway to address train movements in the nearby Scotford Switching Yard (112). Dow also offered to assist local residents in contacting CN directly.

The interveners also expressed the same general concern that the increase in industrial activity had resulted in an increase in rail traffic, producing concerns related to safety, increased noise, and traffic delays at road crossings.

#### **4.3.2 Views of the Board**

The Board notes the various concerns raised by interveners concerning rail traffic and encourages Dow to work with the interveners and to approach CN to address rail traffic issues. However, the Board has no jurisdiction to influence the activity of a federally regulated railway.

## **4.4 Public Safety**

### **4.4.1 Views of the Participants**

Mr. Demeule, Mr. Dzurny, and Mr. Emslie all stated that they were very much concerned with certain public safety issues relating to the existing plants as well as the proposed expansion. These issues concerned chemical and product releases, slippery roads, fog, and increased road and rail traffic.

Mr. Dzurny also raised a concern with the formation of a fine powder-like snow coming from the plumes and vapour vented by the ethylene plant stacks. The interveners stated that as much as 2 inches of this powder could be deposited on the ground under certain climatic conditions and they expressed concern that this material was a contaminant.

Although the interveners acknowledged that Dow had an Emergency Response Plan (ERP) they thought that it dealt mostly with safety within the plant boundaries. Intervenors were not aware of how the plan would effectively maintain public safety for the residents living near the plant or those that could be working in the area. Mr. Demeule recalled an incident in 1968 where a gas cloud from the Dow complex was able to drift across the area and the residents' only recourse was to lock themselves in their homes and hope that the cloud would pass them by.

Mr. Demeule indicated that a fire at Dow on 4 December 1996 provided an example of the community not being well enough informed of what was happening at the complex. Mr. Demeule stated that he would like to hear directly from Dow when problems were being experienced at the plant site, rather than being informed by the media. Mr. Demeule stated that it was not until 9 a.m. that Dow's call out system gave him a message well after he had listened to a media report. Dow believed that it did react in time to this particular situation given the limited potential impact off site and its potential to affect the public. Dow noted its policy was to phone residents in the area between 9 a.m. and 9 p.m. unless the residents were at risk. Dow agreed to work with the residents to improve communication and the ERP to provide the community with a greater comfort level concerning Dow's capability to ensure public safety.

Dow submitted that its ERP was effective and stated that residents would be telephoned in short order should an emergency occur. Dow was surprised that residents were concerned with the ERP.

Dow was not aware of the white powder until it received a letter in May 1996. At that time, Dow believed that the material was very likely the result of unique atmospheric conditions and water vapour from Dow's cooling towers forming snow. Dow asked to be notified by residents if the powder occurs again, and made a commitment to sample this material in order to determine the precise constituents. Given that this was a winter phenomenon, Dow had not received a call since the May 1996 letter.

With regard to the water vapour, fog, and slippery road problem, Dow submitted that in the initial design of the plant expansion, an attempt was made to keep the cooling towers as far away from the road as possible to minimize these very problems. However, the expansion would increase the amount of cooling required, thus increasing any water vapour release to the atmosphere. Under certain ambient conditions this could create a fog and slippery roads on nearby highways. In its Alberta Environmental Protection application, Dow stated that fog was expected to increase on Highway 15 by 2 hours per year over the current 12 hours per year. Dow did not provide any solutions that would address the fog problem further.

#### **4.4.2 Views of the Board**

The Board recognizes the safety concerns of local residents regarding the plant expansion. The Board notes that the facilities will operate within prescribed provincial standards and it is satisfied that Dow and the residents can work together to improve the ERP and to increase the understanding of the plan and the comfort level within the community. The Board also notes Dow's commitment to sample the white powder described by Mr. Dzurny the next time an occurrence is reported and provide these results to the affected residents. The Board recommends that at an early date, Dow brief the local community on the emergency measures in place for off-site impacts and provide community members with the opportunity to review the ERP in detail. The Board does not believe that with proper operation of the plant, there will be a material safety risk to the adjacent community.

## **5 LAND USE IN AREA**

### **5.1 Views of the Participants**

Dow acknowledged that the preponderance of issues and concerns from the community stem from impact on lifestyle as a consequence of a concentration of industry in an area that was a traditional rural environment. Dow maintained that it was logical to concentrate world scale industrial complexes, such as the chemical industry near Edmonton, in an area to take advantage of infrastructure, utilities, and transportation corridors. Dow recognized that it was also prudent to have a reasonable distance between where the industrial facilities were placed and where people in the area lived. In recognition of that, Dow submitted that it had set aside 220 acres of its own land as a buffer between the new site and adjoining neighbours. Dow considered this a generous amount. Although Dow was not aware of any buffer requirements or guidelines regarding a buffer zone, it was in favour of a process that would increase the buffer between industry and residents and believed that government involvement in this process would be important. However, Dow could not accept that it and other industrial operators in the area should be entirely responsible to resolve this growing land use conflict.

Local residents indicated that the industrial activity in the area had a severe impact on their lifestyle and the situation called for a long term solution. Given the nature of the industry, they recognized that the area surrounding their homes was likely to see further industrialization. The interveners believed that the level of industrial development currently in place, even prior to additional projects such as the Dow proposed expansion, the Bio-Clean Fuels project which has been submitted to the EUB, and possibly others that may be imminent, leads the residents to the conclusion that they should relocate. In growing measures the interveners would suffer as a result of increased industrial expansion. The interveners and their neighbours, 18 residences in total, had already approached BioClean Fuels Inc., a proposed project adjoining the Dow facilities, with a proposal for relocation. They maintained a systematic relocation would establish a more suitable buffer zone between the industrial facilities and remaining residents. The interveners indicated that they tried to involve the county given the extra money that would be collected from taxes. They stated that the 18 to 20 families in the immediate area are not a lot of families, but they had experienced enough impact from the surrounding plants. The interveners did not want any further expansions or the construction of any more plants in the area until a resolution on a buy-out was reached.

Mayor Hodgins of the City of Fort Saskatchewan spoke in favour of the Dow project. He stated that he was confident from the City's past experience with Dow that the project would be developed in a responsible manner and Dow would do what it could to address resident concerns. The Mayor stated that the City would be prepared to participate in discussions to establish an increased buffer zone around industrial facilities.

## **5.2 Views of the Board**

The Board believes that land use conflicts represent a mounting concern with further industrial growth in this area. While the Board is satisfied that Dow's expansion can be built and operated within provincial regulatory guidelines and without undue risks, it also believes Dow and other projects will be handicapped in time as the cumulative effects of growing industrial activity on the area are felt. Given the current land classification, it appears the land use for the area is ultimately destined for industrial purposes. Growing public concerns due to cumulative environmental effect and deterioration of lifestyles should be expected during this transition.

The Board is satisfied that the existing and expanded Dow operations will not represent a safety concern to the public since no compelling technical or environmental reasons exists to deny the Dow expansion. Notwithstanding that view, the Board does support the suggestion from the community that some priority be given by the various levels of government and affected industry to develop a process which would address the land use issues in the area. The absence of such a resolution could lead to ongoing regulatory delays and public conflict as pressures to add new projects in the area are considered. The Board intends to bring the concerns of the community to the attention of the government for its further consideration.

**6 DECISION**

The Board is prepared to approve Dow's Application No. 960461 subject to receiving the approval of the Lieutenant Governor in Council. The industrial development permit amendment would be subject to any terms and conditions imposed by the Lieutenant Governor in Council.

DATED at Calgary, Alberta, on 11 March 1997.

ALBERTA ENERGY AND UTILITIES BOARD

F. J. Mink, P.Eng.  
Presiding Member

B. T. McManus, Q.C.  
Board Member

Gordon J. Miller  
Board Member