



Agricultural Operation Practices Act

Board Decision 03-01

NRCB Board Review of:

**Goldcrest Farms Inc.
NRCB Application LA 02002**

**Public Hearing
Lomond, Alberta
October 8, 10 and 11, 2002**

**Natural Resources Conservation Board
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1 INTRODUCTION

On January 1, 2002, the Natural Resources Conservation Board (NRCB or Board) assumed responsibility for the regulation of livestock developments and manure management facilities in Alberta. Section 13(1) of the *Agricultural Operation Practices Act (AOPA)* specifies “No person shall commence construction or expansion of a confined feeding operation for which an approval or registration is required pursuant to the regulations, unless that person holds an approval or registration.” Section 20(1) of *AOPA* states that, “In considering an application for an approval or an amendment of an approval, the Approval Officer must determine whether the applicant meets the requirements of this Part and the regulations, and whether the application is consistent with the municipal development plan”.

Section 20(5) of *AOPA* provides directly affected parties with the right to request a review of an Approval Officer’s decision. Upon holding a review, under Section 25(7), the Board has jurisdiction to grant, refuse or make any other disposition of the application that the Board considers to be appropriate.

Goldcrest Farms Inc. (Goldcrest, the applicant or the company) applied on January 7, 2002, through Application LA 02002, for an approval to construct and operate a 3,000 Sow Farrow-to-Wean operation located on the E1/2 20-15-18-W4M in the Vulcan County. Goldcrest Farms is an Alberta-based company owned by a group of shareholders and managed by Elite Swine Inc (ESI), a Canadian swine production company owned by Maple Leaf Foods. The proposed development included:

- a) One 3,000 sow farrowing barn;
- b) Four 2,500 head nursery barns; and
- c) One 7.2 million gallon liquid manure storage lagoon, with an earthen liner.

Mr. Lloyd Healy, NRCB Approval Officer, deemed the application complete on April 10, 2002 and provided a copy of the application form and all supporting documents to both Vulcan County and the Municipal District of Taber, requesting their comments. In addition, he referred the application to other agencies, namely, Alberta Environment, Headwaters Health Authority, Bow River Irrigation District (BRID), and Alberta Sustainable Resource Development (Public Lands). An official public notice was placed in the Vulcan Advocate and the Vauxhall Advance, and where addresses were available, notice was sent directly to land owners within a one and a half mile radius of the proposed development.

Following the receipt and consideration of statements of concern, Mr. Healy issued his Decision Report regarding Application LA 02002, on June 21, 2002. The Approval, which was released at the same time, included a number of conditions.

Following the release of its Approval and Decision Report, the NRCB received a number of written requests for a review of both. The Board considered these requests and, in a letter dated July 26, 2002, advised the parties that it would conduct a review of the Approval Officer's decision concerning Goldcrest's application. The Board determined that a Panel Review was appropriate and a division of the Board (the Panel), consisting of Dr. Brian Bietz (Chairman), Ms. Maureen Schwab and Dr. Gordon Atkins, was assigned to conduct the review.

The Panel conducted a Procedural Meeting on August 6, 2002 in Lomond, Alberta. The meeting was held to allow parties to provide their views on the following issues:

- the NRCB process to be used in conducting a review;
- which parties were directly affected by the project and whose evidence would be relevant to the decision;
- the scope of technical information to be considered by the Panel and when that information would be made available by the parties; and,
- the timing and location for the hearing.

Following the Procedural Meeting, the Panel issued its decision regarding the review process in a letter dated August 14, 2002. First, it identified which parties it considered to be directly affected, as per the definitions in *AOPA*. Second, the Panel determined that it would hear evidence related to manure spreading technology, the availability of land for manure spreading, manure spreading on grassland, groundwater protection, and operations. Third, the Panel provided a timeline by which information would be submitted and exchanged among the parties. The schedule allowed five weeks for parties to prepare written submissions, two weeks for parties to respond to the submissions, and a further week to prepare for the hearing.

The hearing was held in Lomond, Alberta on October 8, 10 and 11, 2002. In addition to the Applicant, the Panel heard evidence from its Approval Officer, Vulcan County, the Municipal District of Taber, the Bow River Irrigation District, and the Citizens for the Protection of the Prouty Lake Environment.

On November 15, 2002, the Panel released its Decision. It noted that, although a full Decision Report would follow, the Panel believed that any additional delays in issuing its Decision would represent a significant burden for the Applicant. In its Decision, the Panel granted and upheld Approval LA 02002. This report summarizes the evidence presented at the hearing and provides the views of the Board on each of the issues raised.

2 HEARING ISSUES

Section 25(4)(k) of *AOPA* specifies that, “in conducting a review the Board must consider the effects on the environment, the economy and the community and the appropriate use of land.” In order to facilitate this, the Board identified nine specific areas that it believed relevant to these requirements of the legislation:

- The adequacy of the proposed manure spreading technologies, including the effectiveness of the AerWay system.
- The availability of land for manure spreading.
- The appropriateness of spreading manure on grasslands.
- The potential risks to groundwater, (including liner design and engineering) and the level of knowledge of groundwater conditions.
- The potential risks to surface water, including potential contaminants, the risks of run-off and the adequacy of proposed run-off controls.
- Operational and community concerns, including emergency planning, and the responsibility for long-term liabilities.
- Road use, including traffic volumes, dust control, and road use agreements.
- Odour management, including lagoon design and the use of covers, and the potential impacts on neighboring residents.
- Site selection, including the adequacy of the proposed site and the availability of alternative sites.

A summary of the evidence and the Panel’s views on each of these nine issues are provided below.

2.1 Manure Spreading Technology

In its review of the evidence presented regarding manure spreading technology, the Board considered the adequacy of the AerWay Manure Management System, concerns with nuisance odours and the potential for surface water run-off and contamination.

Views of the Approval Officer:

Mr. Healy stated that, while depositing liquid manure low to the ground can successfully reduce odours, he considered the AerWay method of manure spreading to be surface application, which, under *AOPA*, requires incorporation on cultivated land within 48 hours. Incorporation, he noted, would also reduce the potential for contamination of surface water run-off.

Mr. Healy explained that, if Goldcrest used the AerWay system, it would be restricted to spreading its manure in the spring. He said that he had observed the system being used in the fall when the ground was hard and, in his opinion, the equipment had difficulties penetrating the soil and getting the manure into the associated soil fractures. Based on his observations, he concluded that the AerWay system would be more effective in the spring as the soil would be moist, allowing effective penetration.

Mr. Healy stated that, in his opinion, the term incorporation meant working the land sufficiently to ensure that the manure was well mixed into the soil. He referenced the technical report, *Evaluation of Different Techniques for Liquid Manure Application on Grassland*,¹ which assessed five different tillage tools (disc harrows, a chisel plow with spikes, a chisel plow with sweeps, a common cultivator, and a heavy harrow), and found that the effectiveness of incorporation varied from 86 percent to 96 percent. He stated that the NRCB would expect similar percentages when evaluating the effectiveness of manure incorporation by the applicant.

With regard to surface application of liquid manure, Mr. Healy noted that he stated in his Decision Report that manure was not to be applied within 300 metres of a residence, unless it was immediately incorporated into the soil. In his opinion, immediate incorporation meant incorporation within the same working day.

Views of Goldcrest Farms:

Goldcrest Farms stated that it intended to apply manure from its operation using the AerWay system. A witness for Goldcrest, Mr. Rob Saik, President of Agri-Trend Agrology Ltd. (Agri-Trend), spoke in support of the AerWay system, stating that “it leaves the soil smooth after application” and, in addition to applying manure on cultivated ground, “it was particularly good for zero or minimum tillage, direct seeding, or forage applications”. He also agreed to comply with Mr. Healy’s requirement for incorporating manure within 48 hours after using the AerWay system. Mr. Elston Solberg, Senior Agri-Coach Manager with Agri-Trend, estimated that up to 80 or 90 percent of the manure applied using the AerWay technology could be expected to enter the soil in a very short period of time and, in his opinion, nuisance odours and run-off issues would be minimized as a result.

However, Mr. Solberg also acknowledged that this particular area of the province was typically quite dry and one potential problem with the AerWay system was that, by breaking up the ground to a depth of four inches, the seedbed tended to dry out. He added that, if the seedbed were damaged, the efficiency of nutrient management would be reduced.

Mr. Rich Smith, Manager of Engineering and Environment for Elite Swine, noted his experience dealing with both the traditional injection technology, and the AerWay system. He observed that while traditional injection technology used injection nozzles that were spaced 12, 18, and sometimes up to 20 or 24 inches apart, the AerWay system used injection nozzles that were only seven and a half inches apart. This, he suggested, would result in nutrients being more uniformly applied to the land.

¹ Y. Chen (Department of Biosystems Engineering, University of Manitoba), Q. Zhang (Department of Biosystems Engineering, University of Manitoba), D. Petkau (Prairie Agricultural Machinery Institute, Portage la Prairie, Manitoba)

Mr. Smith did note that the use of the AerWay system should not be misconstrued as a guarantee that there would be no odours from manure application, but he also noted that the majority of injection operations also leave some manure on the surface. He added that, if the AerWay system were followed by a harrowing process, a good manure/soil mix could be achieved, leaving only a small amount of material remaining on the soil.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Mr. Ed Nikkel, a directly affected landowner, expressed concern with the AerWay system, noting that changes to the application rates or adjustments to the equipment would significantly change the effectiveness of manure incorporation into the fields and could also increase the potential for run-off. He reported that, during a tour of an Elite Swine facility near Claresholm, he had observed a machine with several of its tines broken off or worn down and that the resulting fractures in the soil were not deep enough to allow for an effective penetration of the manure. He also stated that he had observed that the honey-wagon was emptied in a half-mile strip and, in his opinion, the amount of manure being applied exceeded the capacity for absorption, resulting in a residue of manure on the surface. He stated that he agreed with Vulcan County that manure incorporation following the use of the AerWay system was still necessary because, in his opinion, the AerWay machine did not do a sufficient job by itself.

Views of Vulcan County:

Councillor Rod Ruark testified that Vulcan County had provided the NRCB with comments on the Goldcrest Application in a letter dated May 3, 2002. The letter indicated that Vulcan County, at its November 14, 2001 Municipal Planning Commission meeting, had considered a similar application from Goldcrest Farms Inc., for a sow farrow-to-wean facility. The letter also stated that Vulcan County had no objections to Application LA 02002, as long as the terms and conditions of the Approval mirrored the requirements and conditions set out in the County's earlier approved Development Permit.

Councillor Ruark reiterated that the County stood firm on its position that the use of the AerWay system on its own did not satisfy the condition in its Development Permit that all liquid manure should be injected to a depth of no less than four inches.

Views of the Municipal District of Taber:

Mr. Jack Dunsmore, Director of Planning and Operations, and Councillor Cecil Weist, both stated that they had been provided an opportunity to observe the AerWay system, and both indicated that the odour resulting from the use of this technology was, in their opinion, minimal. It was their opinion that the AerWay system worked extremely well when the manure was incorporated with harrows, however they felt it did not perform as well on grasslands.

Mr. Dunsmore advised the Board that the M.D. of Taber's concerns regarding the AerWay system were now largely alleviated, as long as the manure was incorporated within 48 hours, which he asked become a condition of the Approval.

Views of the Board:

In considering the various views expressed, the Board believes that a key issue is whether the use of the AerWay system will provide acceptable levels of odour and run-off control. In general, the Board is satisfied that the AerWay system does provide for effective manure application, a view shared by both the applicant's experts and the M.D. of Taber. The Board also notes, however, that despite its increased level of comfort with the effectiveness of the AerWay system, the M.D. of Taber still believes that additional mechanical incorporation is required.

The Board also agrees with this position and accepts Mr. Healy's determination that incorporation within 48 hours after application with the AerWay system is appropriate. The Board also notes Goldcrest's commitment to meet this requirement. It is the Board's view that this will substantially reduce the risk of nuisance odours associated with manure spreading and will also decrease the potential for surface water run-off.

2.2 Availability of Land for Manure Spreading

In reviewing the evidence presented with regard to the availability of land for manure spreading, the Board considered Sections 22 through 27 of the *Standards and Administration Regulation of AOPA*. Section 24(2) specifically stipulates that, "a person must have access to sufficient land for the application of manure so that the application limits for nitrate-nitrogen in Schedule 3 are not exceeded."

Views of the Approval Officer:

Mr. Healy identified that Goldcrest Farms required a minimum of 308 hectares (760 acres) of irrigated cultivated land in order to adequately manage the manure produced by its operation. He testified that, since the Goldcrest application had listed 1,850 acres of irrigated land and 435 acres of dry land as being available through manure spreading agreements, he was satisfied that an appropriate land base for manure management had been secured. He noted that, even with Goldcrest's subsequent decision not to spread manure on grassland (see Section 2.3), he was confident that Goldcrest Farms had more than sufficient lands to adequately manage its manure. He noted, however, that if Goldcrest chose to spread manure on any other lands, manure management on these lands would be subject to the same regulations of *AOPA*, even though there was no formal requirement to obtain prior approval from the NRCB before spreading manure on such lands.

Mr. Healy confirmed that he had not consulted with a soil specialist regarding Goldcrest's nutrient management plan. He testified that, instead, he had visually evaluated the slopes on the manure spreading lands and checked the salinity maps for both Vulcan County and the M.D. of Taber, and concluded that he had no reason to consult with a soil specialist.

Views of Goldcrest Farms:

Mr. Keith Wilson, Counsel for Goldcrest Farms, clarified at the Hearing that, following discussions with the M.D. of Taber, his client had decided that it would not spread manure on the NE-8-15-18-W4M or on the pastureland located in Section 20-15-18-W4M. As a result, no grassland would be used for manure spreading. He added that, on Section 20-15-18-W4M, only the cultivated portion would be used for manure application. Mr. Wilson requested that the Board amend the Approval to reflect these changes.

Mr. Smith stated that in developing its roster of manure spreading lands, Elite Swine considered lands that were in relative proximity to its operation, lands that were currently under agricultural production, and lands upon which commercial fertilizer had typically been applied and which could be replaced with the organic fertilizers contained in manure.

Mr. Saik stated that the nutrient management plan that Agri-Trend had provided to Goldcrest Farms considered soil chemistry, plant physiology, crop nutrition, and environmental sustainability. He added that owners of lands designated to receive the manure could also hire Agri-Trend to develop nutrient strategies that would allow crops to more effectively utilize the nutrients provided by manure.

Mr. Saik testified that, as per the requirements of *AOPA*, Agri-Trend had performed a textural analysis of the designated lands to determine the amount of sand, silt, and clay in the soil in order to determine percolation rates and water infiltration rates. He acknowledged that, since nutrient leaching can be an issue, an understanding of soil texture was required to ensure that nutrient leaching or nutrient run-off would be minimized.

To monitor the effectiveness of the manure management plan, Mr. Saik noted that Agri-Trend also tested for calcium, aluminum, iron, and magnesium, as these elements are responsible for fixing phosphorus in soils. Other tests conducted by Agri-Trend include potassium (the nutrient responsible for regulating how efficiently plants utilize water and making the plant more tolerant to droughts) and electrical conductivity (salinity).

Mr. Saik noted that a Global Positioning System (GPS) would be used to ensure that soil samples were obtained from the same site each year. The manure would be sampled and tested prior to being spread on the field, and composite soil samples would also be taken once the manure had been applied. Fields receiving manure would be monitored following the crop harvest to determine the residual soil nutrient levels.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Mr. Jerry Steeves, a directly affected landowner, stated that the spreading of manure in its raw form was unacceptable to the people in the area. He noted that the feedlot industry was composting its waste so that there were no odours when the composted material was spread on the land, and he proposed that the Board consider requiring the hog industry to move in a similar direction. He supported the inclusion of the County's recommendations as conditions of the NRCB Approval.

Views of Vulcan County:

Councillor Ruark conveyed the County's support for the approval of the Goldcrest Application, subject to the conditions that were contained in the Municipal Development Permit that the County had issued to Goldcrest in the fall of 2001. These included:

- the developer shall complete a detailed manure management plan in conjunction with Alberta Agriculture, Food, and Rural Development;
- the manure management plan shall include requirements for soil testing and identify sensitive areas where manure spreading should be restricted;
- the application of manure shall be at agronomic rates suitable for appropriate crops to be grown;
- manure shall be spread in the spring and fall, with records to be checked by the operator for inspection by the appropriate agencies;
- all liquid manure shall be directly injected to a depth of no less than four inches; and,
- that manure shall only be injected on cultivated lands.

Views of the Municipal District of Taber and the Bow River Irrigation District:

Speaking on behalf of both the M.D. of Taber and the BRID, Mr. Grant Gillund, Consulting Agrologist with Kenlund Consulting Ltd., stated that a condition should be placed on the Approval that ensures that all manure be incorporated to a minimum of 10 centimetres, because this would prevent the potential for run-off of nutrient rich materials into the nearby canal system. He also requested that manure not be applied to land that was flood irrigated or tile-drained, and that manure spreading on frozen or snow-covered lands be prohibited because of the high risk for run-off in both situations.

Mr. Gillund advocated cultivating dryland soils prior to injection or surface spreading of manure, to prevent liquid manure from flowing deep into the soil particularly as in the area soils could crack to a significant depth. He expressed some concerns about spreading manure on summer fallow lands or lands that would be irrigated in the fall, because high levels of nitrogen can occur in manured fields after cropping and this may lead to increased nitrate levels. He suggested that the application of manure on land that would be fallowed the subsequent season or applied on land that has already been summer fallowed should be prohibited.

While the standards within *AOPA* focus on nitrogen, Mr. Gillund was of the opinion that, if manure were applied on a regular and continuous basis, then phosphorus levels could also increase to potentially unacceptable levels. Consequently, he requested, that the Approval include a condition ensuring a loading limit of 60 ppm phosphorus to lands receiving manure. He added that, in terms of the resulting soil phosphorus, the effects of applying commercial fertilizers were different from the effects of applying manure, because the phosphorus in manure had a higher solubility and manure application methods pose a greater risk of run-off.

Mr. Gillund also pointed out that, while the existing *AOPA* guidelines address salinity, they do not address sodicity. He explained that, for the soil types in the area, sodicity as well as salinity were of concern because manure contains salt and unless parameters were set in terms of total loading, he suggested that both soil quality and productivity could be negatively impacted by manure spreading.

Views of the Board:

The Board notes that, while Mr. Healy calculated that Goldcrest Farms required 760 acres of irrigated cultivated land in order to properly manage the manure produced by its operation, 1850 acres of irrigated land and 435 acres of dry land were indicated as being available through manure spreading agreements. Even with the subsequent withdrawal of all the grassland on the N1/2 8-15-18-W4M and Section 20-15-18-W4M, the Board agrees with Mr. Healy that more than adequate lands remain to safely and effectively manage the manure produced by Goldcrest Farms. The Board also finds that Mr. Healy's assessment of the proposed nutrient management plan as being adequate was correct.

With regards to the issue of fall spreading, the Board notes that Mr. Healy had placed a condition on his Approval directing that manure could only be spread on non-cultivated land in the spring. However, it is the Board's view that the withdrawal of all grasslands for manure spreading eliminates the need for this condition and that Goldcrest Farms should now have the option of spreading manure in either spring or fall.

The Board recognizes the concerns expressed by the M.D. of Taber regarding the additional difficulties of incorporating manure effectively in the potentially harder soil conditions that may occur in the fall. However, the Board also believes that Goldcrest recognizes its obligations under *AOPA*, to avoid either unacceptable risk to the environment or undue disturbance, and will take the necessary steps to ensure that any fall spreading is carried out responsibly. Furthermore, the Board is prepared, if necessary, to ensure that these requirements are met by Goldcrest.

The Board notes that both the M.D. of Taber and Vulcan County requested that no manure be spread on frozen, snow-covered lands. The Board believes that this issue has been adequately addressed as a result of Goldcrest's proposed manure storage capacity of fourteen months and its commitment to incorporate all manure within 48 hours of spreading.

2.3 Manure Spreading on Grassland

The Board heard mixed evidence relating to the appropriateness of spreading manure on grasslands.

Views of the Approval Officer:

Mr. Healy stated that forages and pasturelands were excellent places to utilize manure. He also testified that he had less concern with regard to run-off when liquid manure was spread on grassland, since it provided a trash buffer, which slowed down the transport of solid materials when run-off situations existed.

Views of Goldcrest Farms:

Mr. Saik stated that he supported Mr. Healy's comments that forages and pasturelands were excellent places to utilize manure, and added that these types of lands were traditionally under-fertilized. With regard to the effectiveness of grasslands or pasturelands to perform as buffers for surface movement, Mr. Saik stated that this was heavily dependent on the method of application. In his view, manure application on lands where there was an established growth, combined with some sort of soil disturbance that causes the manure to come in contact with soil, would minimize the risks of surface movement.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Ms. Marilyn Nikkel, a directly affected landowner, was not supportive of manure application on rangeland. In her view, this practice alters the species growing on the rangeland and allows weeds to increase at the expense of native species due to changes in nutrients and the introduction of weed seeds contained in the feeds. She also expressed a concern over the strong possibility of run-off from rangeland. Mr. Steeves urged the Board to not allow manure to be spread on uncultivated grasslands.

Views of Vulcan County:

Councillor Ruark confirmed the County's position that manure should only be applied on cultivated lands and should be injected.

Views of the Municipal District of Taber and the Bow River Irrigation District:

Mr. Gillund disagreed with the spreading of manure on pasture lands and stated that both the M.D. of Taber and the BRID wanted a condition placed on the Approval, that would ensure that manure would not be applied on native grassland.

Views of the Board:

It is clear to the Board that there exists a range of views with respect to the value of and risks from the spreading of manure on pasture lands in general and on native grasslands in particular. In this instance, however, the various views expressed were primarily opinions; there was little specific evidence provided by any of the hearing participants to allow the Board to reach an informed decision on the issue.

Since Goldcrest has agreed, in consultation with the M.D. of Taber, to remove all grasslands from its manure management program, the issue is somewhat moot. In the future, should Goldcrest change its views and want to designate new lands for manure spreading, the Board will expect Goldcrest to follow the same consultative process.

2.4 Groundwater Protection

In its review of evidence presented at the Hearing with regard to whether the project, as designed, would protect groundwater and shallow wells from potential contamination, the Board considered Sections 7 through 11 and 14 through 19 of the *Standards and Administration Regulation*. Section 18(1) specifically stipulates that “the owner or operator of an earthen liquid manure storage (EMS) facility must install and maintain a leakage detection system for the facility consisting of at least one monitoring well up gradient of the facility and at least two monitoring wells down gradient of the facility, of a type appropriate to monitor for contaminants”.

Views of the Approval Officer:

Mr. Healy stated that, based on his search of the water well database, he was able to confirm that the proposed manure storage structures would be located more than 800 metres from any wells and over 200 metres from any common bodies of water. As a result, he was satisfied that the proposed site met *AOPA*'s requirements for distance to springs, wells, and common bodies of water. He also noted that, after checking the bedrock geology maps for the area, he had determined that the distance to bedrock was around 150 feet and that there appeared to be no aquifers of concern.

Mr. Healy agreed at the hearing that there was often confusion when trying to differentiate between an aquifer, and the water table. He testified that in his view, an aquifer could best be defined as a source of usable amounts of water, while the water table was the first ground water encountered when drilling test wells.

Mr. Healy explained that, during the application process, applicants must drill test holes, one to two metres below the bottom of the proposed liner. He noted that this was done to determine the geology and the texture of the soils, to determine whether the natural soil material in place was sufficient to build the liner, and to ensure that the earthen manure storage facility (EMS) could be built above the aquifer. He also testified that, although the boreholes were drilled in November 2001 and the location of the water table might change by the time the EMS structure was constructed, any such changes would be taken into account by the engineering firm and the construction crew when the lagoon was being constructed.

With regard to leak detection, Mr. Healy indicated that, since the applicant had committed to installing three monitoring wells at strategic locations and to monitoring these wells annually, he was satisfied that the requirements for a leak detection system had been met. To further ensure groundwater was protected, Mr. Healy indicated that a condition had been placed in the Approval requiring that a minimum of four monitoring wells, rather than the three proposed by the applicant, be located throughout the site: one up gradient on the northeast corner, two on the northwest down slope side, and one on the south west side.

To ensure the concrete manure storage areas would protect groundwater, Mr. Healy stated that he had required that these be able to meet the minimum 28-day strength standard of 32 MPa with a maximum water/cement ratio of 0.45:1, as recommended by the Canadian Farm Builders Association for concrete exposed to moderate manure liquids. Mr. Healy specified in his Approval that joints in the concrete be sealed using waterstops or caulking compound.

Mr. Healy also confirmed that he was satisfied that the proposed two-cell EMS met the requirements of the regulations for integrity protection. This included both side slope design and bottom filling. He also indicated that the proposed EMS liner, consisting of one metre of compacted clay, would provide the same or greater protection than that required for a liner constructed of 10 metres of naturally occurring material, with a hydraulic conductivity of not more than 1×10^{-6} centimetres per second. He noted that a condition of the Approval was that, prior to Goldcrest using the EMS facility, it had to provide the NRCB with a Certificate of Completion from an engineer to verify the thickness of the liner and, that the compaction was done properly.

Mr. Healy agreed that, while EMS liners may leak, the amount of material passing through a properly designed and constructed liner would be relatively small. He calculated that, based on the compacted hydraulic conductivity that EBA Engineering had provided in its report, approximately 70 cubic metres of material per year would seep from the EMS facility. However, he noted that in comparison, approximately 200 cubic metres of water would flow through the septic field of an average home each year. He stated that another benefit of the liner in an EMS facility was that the clay acts as a filter and contains most of the particulates.

Views of Goldcrest Farms:

Mr. Tom Dance, Senior Hydrogeologist with EBA Engineering, stated that when evaluating the geologic and hydrogeologic conditions of an industrial site such as the proposed Goldcrest site, EBA typically considered two key issues:

- the suitability of the design relative to the geology and hydrogeology that exists at the site; and
- whether the site could be monitored effectively.

He explained that there were two separate types of investigations, geotechnical investigations and hydrogeological investigations, which were carried out at new developments, and that these were often confused. He stated that the purpose of a geotechnical investigation was to obtain soil and groundwater information, sufficient that a building foundation or a holding pond could be designed.

This type of investigation, he noted, did not provide suitable information for the creation of a long-term groundwater (hydrogeological) monitoring program. He explained that a hydrogeological assessment was undertaken to collect the information needed to evaluate the potential impact of the facility on local groundwater resources. The results of such an assessment usually include recommendations for the design of a long-term monitoring program, as well as changes to the facility design that might be required to reduce the risk of impacts to groundwater. Such an assessment would normally, at a minimum, characterize the soil and bedrock in terms of lateral thickness and extent of the soil units below the site, along with an identification of the usable groundwater resources.

Mr. Dance also emphasized the importance of understanding the definitional difference between an aquifer and a water table. He stated that an aquifer was a water bearing geological formation, with volume and dimensions. Water levels within the aquifer would change with respect to changing climatic conditions and local topography. He went on to state that shallow aquifers were often associated with the water table, which was the highest level to which water would naturally rise.

Mr. Dance explained that EBA was retained in November 2001, to conduct a “desktop study and site reconnaissance” of the proposed Goldcrest site to determine if a detailed hydrogeological assessment was necessary. He noted that the work involved a review of topographic information, local water well records, published geological and hydrogeological maps of the region, and data from EBA’s geotechnical study of the site. He stated that EBA also looked at the probable direction of groundwater flow, the location of domestic wells and other aquifer units that could exist in the area, and the probability of interaction, with respect to Prouty Lake and the irrigation canal, between surface water and groundwater.

Mr. Dance stated that EBA determined that the surface materials at the site were a discontinuous layer of glacial fluvial sands of approximately three metres in depth. The sands were, in the view of EBA, dry and did not have any off-site interconnection. Below this were approximately 23 metres of clays (tills), a three-metre layer of sand and gravel, and a second layer of till. The depth to bedrock was approximately 47 metres.

With respect to local water wells, EBA noted that while some were completed at shallow depths, most were located in the sand and gravel at depths of 25 metres or more. He observed that local water wells were generally protected from contamination by a 10 metre or greater layer of till. Shallow groundwater flow in the area followed the local topography and flowed to the south and southwest. He noted that there were no shallow wells in that particular direction, and so he concluded that there would be no impact on groundwater supply as a result of any effect of the proposed development on shallow aquifers.

With respect to domestic water wells, EBA reported finding none within one kilometre of the northeast quarter. However, within three kilometres, EBA found four wells from one to four metres deep, and another three domestic wells that were four to 79 metres deep. Within the next 10 kilometres EBA found 13 domestic wells, all of which were deeper than 15 metres.

With respect to interaction between surface water and groundwater, Mr. Dance testified that there would be some discharge from the shallow groundwater along the irrigation canal and that groundwater monitoring wells were needed to confirm the quality of the shallow groundwater between the site and the irrigation canal. He also acknowledged that there would be some flow from the site towards Prouty Lake, but went on to state that Prouty Lake was land locked and the water that drains into it greatly exceeds the natural drainage away from it. In his opinion, most of the water supply for Prouty Lake came from overland flow rather than from groundwater. He stated that he believed that shallow groundwater was only a small contributor to the lake so that a change in the quality of the shallow groundwater would not greatly impact the water quality of Prouty Lake.

Mr. Dance testified that he felt that the design of the various facilities would not entail any exceptional engineering efforts and that the possibility of an adverse impact on either the irrigation canal or Prouty Lake was very small. To ensure that the engineering measures were performing as designed, as well as to monitor overall groundwater quality, he stated that EBA had recommended that the canal be monitored both up gradient and down gradient of the facility. EBA also recommended that a network of four to five shallow monitoring wells, three to five metres deep, be installed to confirm that the liner was performing as designed. He went on to state that, in order to properly establish baseline conditions, the monitoring wells should be in place before the manure storage facility was used.

Mr. Dance stated that it was his understanding that the permeability testing specifications provided by the Canadian Standards Association and the American Society of Testing Materials would be met. Mr. Dance noted that it would be very important to determine the depth to the water table at the time of construction, since it would be very difficult to ensure that a clay liner constructed with saturated soils would achieve the required level of permeability. In response to questions, Mr. Dance did agree that, in cases where swelling clays are present, it was possible that the salt contained within the manure could actually cause the clays to desiccate and crack. However, he noted that swelling clays form only a small percentage of the clays present in the tills of Alberta.

In response to questions regarding why water rather than liquid manure was to be used to test the hydraulic conductivity of the liner, Mr. Dance explained that this was due in part to water's relatively low viscosity and moderate density. Since the hydraulic conductivity of manure would in fact be lower than that of pure water, the use of water represented a worst-case scenario. Furthermore, the various tests had been designed to ensure that the results were standardized and comparable, so the use of a common fluid (i.e. water) was important.

Mr. Ron Ackroyd, Senior Project Engineer and Agricultural Engineering Specialist with EBA Engineering, testified that *AOPA* required a liner that was the equivalent to 10 metres of material with a permeability rate of 10^{-6} centimetres per second. He went on to state that the time required for a drop of water to pass through such a liner would be over thirty years. Based on EBA's soil test results, he estimated that it would actually take 470 years for a drop of water to go through the liner when the soils were completely saturated. He went on to state that, since the soils normally used in liners would be unsaturated, the flow would actually be further reduced because the soil pores are compacted.

Mr. Marc Sabourin, Geotechnical Engineer with EBA Engineering, commented on the geotechnical boreholes. Mr. Sabourin noted that the fact that boreholes were drilled on two different occasions was quite typical on sites where the location of the facilities changed due to topography or other issues. He clarified that the original boreholes were drilled slightly below the elevation of the lagoon and below the footings for the structures. He added that once the decision was made to move some of the facilities, a second investigation was conducted and additional boreholes were drilled.

With respect to compliance with the regulations, Mr. Sabourin stated that EBA had taken the samples retrieved from the boreholes in the area of the lagoons, and had tested them for permeability in a laboratory situation. He reported that the results indicated that material from the site, when compacted to meet the standards, and when constructed to a depth of one meter, would surpass the requirements of *AOPA* by almost 10 times.

He explained that approximately 10 to 12 days after the boreholes were drilled, EBA had finished the boreholes by putting in a one-inch standpipe, backfilling it with auger cuttings and sealing the top surface with bentonitic clay to prevent surface water from entering. He added that EBA went back between one and two weeks later and assessed whether the water levels in the boreholes had stabilized. The water EBA encountered, Mr. Sabourin stated, was likely made up primarily of water trapped in localized sand or silt lenses.

Under questioning, Mr. Sabourin agreed that, over time, the water level at each of the borehole locations had risen above what had been observed immediately following the initial drilling. This, he suggested, may have been the result of recent rain events or even an irrigation event. In order to ensure that the regulations, regarding separation between the lagoon liner and the water table at the time of construction would be met, Mr. Sabourin suggested that the Board place a condition on the Approval that at least three test pits be dug at the time of construction. He indicated that the test pits should be dug to a depth of one and one half metres below the designed bottom invert of the pond, three days should be allowed for any groundwater present to stabilize, and then any water accumulation should be measured. Mr. Sabourin explained that, at the time of construction, any water that may seep in from the localized sand and silt seams could easily be handled by making a trench along the interior edge, and draining or pumping the water out prior to constructing the liner. He restated that based on the information that EBA had uncovered to date, it did not anticipate any problem with constructing the lagoons.

Mr. Sabourin stated that the area water table would typically rise with rainfall, such as was seen in the area over the past year. However, he submitted that the permeability of the clay liner would not be affected. He also noted, that if the water table level should rise above the base of the EMS structure, the permeability would be the same for liquid inside the lagoon attempting to flow out as it would be for any fluid on the outside of the liner attempting to flow in. He said this, in effect, would actually result in an outside pressure holding liquids inside the lagoon.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Ms. Nikkel stated that the quality of the information provided by Goldcrest in its application caused her to question the company's ability to protect local groundwater. For example, she noted that Part C of the application by Goldcrest stated that the depth to the water table and the depth to the nearest aquifer were all greater than six metres. This finding, however, was not supported by the evidence presented by Goldcrest at the Hearing, which showed the presence of water in the various boreholes at much shallower depths. She also pointed to the confusion in the various submissions with respect to both the numbers and the locations of the various boreholes.

She went on to state that Mr. Healy's Decision Report indicated that the June boreholes contained water from flood irrigation, therefore, negating their validity in terms of accurately determining the depth to the water table. She observed that the November boreholes were drilled at a time well past the seasonal high water table periods. For these reasons she concluded that none of the boreholes provided valid assessments of the depth to the water table or the depth to aquifer.

Ms. Donna Dietrich, a directly affected landowner, testified that she keeps precipitation records for Agricultural Financial Services and Alberta Hail and Crop, and that her reports indicated that, in 2001, the levels of precipitation were very low when compared to more normal years. She noted that less than three inches of rain fell in the months prior to the first test holes being drilled on June 6th, 2001. Furthermore, there were less than one-tenth of an inch of rain between that date and July 4th, when she checked. Therefore she doubted EBA's assumptions that precipitation had contributed to the water levels that they had measured in the test wells. She added that she had contacted the BRID, which had indicated that they had no record of flood irrigation on the E1/2 20-15-18-W4M, for the year 2001.

Ms. Dietrich also observed that there were no references to a high seasonal water table in either EBA's engineering report or Mr. Healy's report, and no indication that either EBA or Mr. Healy had checked on the level of recent precipitation, or for records confirming recent flood irrigation. She concluded that, because of very low precipitation and no record of flood irrigation, the evidence strongly suggested that in fact the area in question has a relatively high water table.

Views of Vulcan County:

Councillor Ruark conveyed Vulcan County's support for the approval of the Goldcrest Application, subject to the following conditions, relating to groundwater protection:

- that the sewage system and associated monitoring wells shall be designated and designed by a professional engineer;
- that manure containment lagoons and associated slurry tank shall be lined with a one metre thick clay liner;
- that the pressure of the lines from the barn to the manure lagoons shall be checked annually by a qualified individual, reporting to the appropriate agencies;
- that all water monitoring be provided to the satisfaction of Vulcan County and Alberta Agriculture, Food, and Rural Development; including, that monitoring wells around the barn and the sewage complex shall be checked annually by a qualified individual reporting to the appropriate agency; and that water monitoring of ground and surface water shall be carried out along the east side of the Enchant Drain, E1/2 20-15-18-W4M. Baseline information shall be gathered to ensure that water quality levels are not altered. The developer shall assume complete liability to establish water quality remains equal to the baseline data. Annual reports shall be submitted to the appropriate agencies; and
- that a minimum separation distance of 200 feet to be maintained between the irrigation canal or drain and the intensive livestock operation structure.

Views of the Municipal District of Taber and the Bow River Irrigation District:

Although most of their concerns related to surface water, Mr. Gillund stated that they were also concerned about groundwater contamination, simply because groundwater could enter the BRID canal system.

Views of the Board:

The Board views groundwater protection as one of the most important issues of the Hearing and, as a result, it has carefully evaluated all the evidence presented. In evaluating the risk of groundwater contamination, the Board focused primarily on the barns and the earthen manure storage areas as potential sources of contaminants. The Board notes that EBA Engineering conducted a detailed evaluation of the site and Mr. Dance indicated that EBA's evaluation considered two main points:

- the suitability of the design for the geology and hydrogeology that exists on the site, and
- whether the site can be monitored effectively.

The Board agrees that there was a great deal of confusion surrounding the location of and the purposes of the two groups of boreholes drilled at the site, as well as the interpretation of the results. The Board can appreciate how this would raise significant questions in the minds of neighbours concerned about the potential impact of the development on the safety of their water supplies. In this case, the Board is satisfied that the eventual description of both the purpose of the various test holes and their locations provided at the hearing is adequate to confirm Mr. Healy's original finding that they were sufficient to describe the suitability of the site proposed for the EMS structure.

That said, the Board wishes to advise future applicants that if public confidence in the industry is to be maintained, particular care must be taken to ensure that the information provided is complete, clear and accurate. It is incumbent on the industry to address what are clearly real and legitimate public concerns, and the receipt of decisions from Board may be delayed by the absence of such information.

The Board is comfortable that while there may be pockets of groundwater in the general area of the EMS structure, they are not sufficient to prevent the safe construction of the lagoon in accordance with the requirements set out in *AOPA*. With reference to Section 9(2) of the *Standards and Administration Regulation* states "if the liner of a manure storage facility or a manure collection area is manufactured, whether of natural or synthetic materials, the bottom of the liner must be not less than one metre above the water table of the site **at the time of construction**", the Board does agree with Goldcrest's commitment to dig three test pits at the time of construction. The pits are to be dug to a depth of one and one half metres below the designated bottom invert of the pond and allowed at least three days for any groundwater to stabilize. The Board will therefore ask Mr. Healy to place a condition on the Approval, requiring Goldcrest to conduct this manual test to determine the location of the water table at the time of construction of the lagoon. These results are to be provided to Mr. Healy for his review and comment, if required, prior to the initiation of construction of the liner.

The Board is also comfortable that the lagoon will be located sufficiently above the nearest aquifer, and that it will not pose a significant risk to local groundwater quality. Based on the information available, the Board is comfortable that the requirements of *AOPA* (i.e. that the liner of the manure storage facility will be located above the nearest aquifer) have been met. The Board, in coming to this conclusion, notes the consistency of evidence which estimated the depth to bedrock was 47 metres and that major aquifers would not likely be encountered until this depth.

While there was considerable discussion around the relative efficacy of the lagoons to retain liquid manure, the Board does not believe that there was any evidence provided that would require that additional design features be installed. The Board notes that Mr. Healy has required that four monitoring wells be established (one up gradient and three down gradient). Given the distance to the nearest water wells (i.e. greater than 800 metres), the Board believes that this will provide ample opportunity to both detect and to mitigate problems should any leakage actually occur.

The Board does agree with the findings that there is the potential for groundwater flow from the site towards the BRID irrigation canal. The Board believes that Goldcrest's commitment to monitor water quality in the canal both up and down gradient of the facility, is therefore a reasonable one and directs that it be added as one of the conditions of its Approval.

Finally, the Board believes that all of the groundwater concerns brought forth by Vulcan County and the M.D. of Taber have been addressed, except for pressure checking the manure lines from the barns to the lagoon. However, since the manure would be transported to the lagoon by gravity flow, the construction of the proposed lines must be approved before their use, and an extensive monitoring system has been directed to be installed, the Board is confident that pressure testing would not be warranted.

2.5 Surface Water Protection

In its review of the evidence presented at the Hearing with regard to potential risks to surface water, the Board considered Sections 6 and 8 of the *Standards and Administration Regulation*, which addresses issues related to surface water, control systems (run-on and run-off control) and flooded areas. Section 6 establishes that an owner or operator of a confined feeding operation or manure storage facility must construct a surface water control system for the operation or facility. Section 8 identifies that the 1:25 year maximum flood level at a manure storage facility or at a manure collection area must not be less than one metre below any part of the facility where run-on can come in contact with the stored manure.

Views of the Approval Officer:

Mr. Healy stated that the proposed liquid manure storage facility would have banks approximately four feet higher than the surrounding land surface and therefore surface water run-on was not, in his view, a concern. It was also his view that the two feet of freeboard and the thickness of the banks on the EMS structure would provide adequate protection from a run-off event. Mr. Healy stated that he had inspected the site and had confirmed that the proposed structures were also located at least two metres above the 25 year flood zone. He stated that he

had toured the surrounding lands extensively, and had found most of the slopes in the vicinity to be one percent or less on average. In his opinion, the run-off and run-on potential of the proposed site was low.

With specific reference to the NE 20-15-18-W4M, where the barns were to be located, it was his view that the BRID irrigation canals were well protected from run-off. Mr. Healy noted that natural drains and berms would protect the barn site area. He also determined that the lagoon would be located at the top of a draw, which ran down into a low spot protected by a berm adjacent to the Enchant Drain.

Views of Goldcrest Farms:

Protection of water supplies, Mr. Smith stated, was taken very seriously at Elite Swine. He said the Goldcrest operation would use water from the BRID and that it was important to ensure that the supply would be protected from contaminants. Mr. Smith indicated that the construction of a berm along the canal would protect the canal from any potential run-off. Mr. Smith also noted that Goldcrest intended to make use of a naturally occurring low area on the site as a secondary containment area should any loss of manure occur from the site.

With regards to the potential for overflow from the EMS, Mr. Smith noted that the majority of the manure would be stored below the surface of ground, eliminating the risk of surface run-off. He added that the EMS would be designed with the berm approximately four feet above the surrounding grade and its interior would extend 12 feet below grade, and its total capacity of 400 days storage was well beyond the regulations. He noted that the lagoon had been designed with two feet of freeboard and would provide more protection than required by *AOPA*.

Mr. Smith stated that Elite Swine would establish a Conveyance Agreement with the BRID and it would comply with the licensing process through Alberta Environment. With approximately nine months of water storage on site, he stated that Goldcrest would be able to withdraw water from the BRID during off-peak times. To put its water usage in perspective, he stated that the operation would use approximately nine million gallons per year, while a single quarter section irrigation pivot uses approximately 25 million gallons per year. He confirmed that Elite Swine remains confident that the site can be developed without causing any significant adverse effect on the water quality of Prouty Lake or the Enchant Drain.

Mr. Wilson stated that Goldcrest farms would be prepared to accept, as a condition in its Approval, that the surface water in the canal be tested semi-annually, both upstream and downstream of the barn location. Mr. Smith also assured the Board that Elite Swine would commit to such a condition and that it would share both its proposed testing protocol and the results with the Board.

Ms. Marie Logan, Goldcrest Farms, explained that she had generations of records that indicate that the land in the area of the proposed barn site was a dry piece of land, and that any accumulations of water that have occurred had been man made in the form of dugouts, wetlands or flood irrigation activity.

With regards to the risk of manure leaving the site following spreading, Mr. Saik testified that, once manure was applied and contacted the soil particles, the potential risk of run-off to adjoining water bodies would be minimal and comparable to the risk associated with the use of chemical fertilizers. He supported his statements by emphasizing the fact that phosphorus was negatively charged and attaches so quickly to the calcium, magnesium, iron, and aluminum in the soil that it essentially becomes immobile soon after application. Mr. Saik agreed that in the case of manure, it was possible that some of the phosphorus would remain in an organic form, which would possibly be much more mobile. He also agreed that the nitrate-nitrogen component of the manure did have the potential to move with soil water, but again argued that this risk was quite similar to risks associated with the use of commercial fertilizers.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Mr. Phil Ruggles, a directly affected landowner, summarized a submission provided by Mr. Richard Stanko a directly affected landowner, regarding the possible risks of run-off from the site into area waterways. In the submission, Mr. Stanko stated that the E1/2 20-15-18-W4M sloped to the northeast, with draws that drain toward cuts in the banks of the Enchant Canal. He went on to note that the SW 30-15-18-W4M drained into the SE 30-15-18-W4M, and run-off would travel through a draw and into the dugout of an area resident. From there, any flow would travel into the NE 19-15-18-W4M. All of these lands, Mr. Stanko observed, sloped towards Prouty Lake.

Mr. Ruggles went on to note, that Mr. Stanko's submission stated that area residents had witnessed a pivot sitting in one position in the NE 19-15-18-W4M for long periods of time, flooding the site. He noted that the quarter, which has an existing alkaline problem, slopes to the east and the northeast. He also observed that a culvert near the pivot would allow run-off from the SE 30-15-18-W4M to enter the S1/2 20-15-18-W4M and a portion of the NE 19-15-18-W4M. This, he suggested, also indicated that these lands would naturally drain towards Prouty Lake.

Mr. Ruggles stated that he and his wife live directly across the road from manure spreading lands and they opposed the proposed site in part because Prouty Lake is a natural basin for run-off water, not only for irrigation, but also for heavy rain and early spring thaws. In his research Mr. Ruggles stated that he had discovered that Prouty Lake overflowed in both 1949 and 1965, resulting in the roads around the lake being closed. He added that in the late '80s, there was another water overflow into Prouty Lake just to the south of his residence, about a mile and a half west of the proposed site, where topsoil and grass was washed from nearby fields, which are now listed for manure disposal.

Mr. Tim Mikalson, a directly affected landowner, displayed a number of pictures that he had taken to demonstrate the severe weather conditions that had been experienced in the area. He stated that wet snowstorms often lasted for days leaving roads impassable, power lines down, and causing severe flooding when the snow melted. Significant rainfalls left the ground saturated and with only a limited ability to absorb moisture. Water often pooled in low areas, near roads and fields that were designated for manure spreading. In addition, he expressed concern that potential run-off into the lake would increase weed growth and contaminate water wells in the area.

Ms Arlene Hart, a directly affected landowner, cited Vulcan County's Municipal Development Plan, By-law No. 90-014 along with the M.D. of Taber's Municipal Development Plan, By-law No. 1685, both of which described environmentally sensitive areas in the region. She believed that the Prouty Lake group had presented enough technical information to indicate the need for an environmental assessment on this development. She elaborated by stating that the facility, which borders a special area with a high water table, was being built on a gravel pit and that most of the spreading fields slope towards Prouty Lake.

Views of the Municipal District of Taber and the Bow River Irrigation District:

Mr. Gillund, on behalf of the BRID and the M.D. of Taber, stated that both had concerns related to potential pollution of surface water in the Lost Lake Drainage Basin. This basin, which was predominantly landlocked, would receive any flows from the proposed site. Mr. Gillund acknowledged that, while the land in the development area was relatively flat with little slope, the lands to the northeast and to the immediate east of the proposed development were considered sodic or solonchic, and typically had a higher vulnerability to surface run-off.

The Lost Lake Drainage Basin, he noted, historically had been subject to significant levels of nutrient loading, predominately phosphorus. He submitted reports prepared for the BRID, which indicated higher conductivity and phosphorus levels in the outflow water from the Lost Lake Drainage Basin than in the irrigation spills from the main irrigation channel. One result of this was high weed growth in the basin, and the BRID noted that it had traditionally spent significant dollars per year on measures aimed at keeping aquatic weeds out of its pump inlets.

Mr. Gillund noted that as well as irrigation flows, the BRID supplies drinking water to area farms, towns, villages, and livestock operations. He explained that because it was the major source of water in the region, the BRID irrigation system was also a major player in local wildlife enhancement projects. He testified that the BRID had already recognized concerns regarding water quality of the canal and reservoir systems within the district, and as a result, began a monitoring program in 1998.

Mr. Henry Holst, General Manager of the BRID, stated that when information collected through its monitoring sites indicates water quality concerns, the BRID attempted to locate the origin of any contamination and then determine what, if any, corrective measures could be taken. It stated that it had educated local operators about water quality issues and, where livestock were free to wander at large, it had fenced off sections of the canal.

Mr. Gillund stated that, given the existing water quality issues within the Lost Lake Drainage Basin, the BRID and the M.D. of Taber would both like to have a number of conditions attached to the Approval, to reduce the risk of further deterioration of water quality within the area. These conditions included:

1. All manure applications must be incorporated to a minimum of ten centimetres.
2. Manure was not to be applied to land that was flood irrigated.
3. No manure was to be spread on frozen or snow-covered lands.

4. The loading limits of phosphorus should be included in the nutrient management plan and the suggested level was 60 ppm.
5. Manure was not to be applied to native range.
6. Manure was not to be spread on lands with a slope greater than five percent.
7. Goldcrest farms must engage in a water quality monitoring program.
8. Dryland soils should be cultivated prior to spreading of manure.
9. Manure was not to be applied to land that was to be fallowed the subsequent season or that has already been summer fallowed.

The BRID suggested that Goldcrest Farms engage in an annual water quality monitoring program on the canal system upstream of both the development and manure-spreading areas, and downstream of the general manure-spreading lands. Mr. Gillund proposed that monitoring at three sites would be required to adequately address the area drainage system. Potential sites would include upstream somewhere along the top of the township, at the inlet area to Prouty Lake, and at the exit of Prouty Lake into the main drainage channel. However, under questioning from Mr. Wilson, Mr. Holst agreed that the agreement between BRID and Goldcrest was for testing at two locations twice per year. The BRID also encouraged the use of a protocol comparable to its present monitoring system and requested copies of any monitoring data collected.

Views of the Board:

As with groundwater, the Board considers the protection of surface water quality to be a significant issue. In this instance, the Board notes that the general concerns appeared to revolve primarily around the relative risk of run-off into the nearby irrigation canal and associated drainage system, particularly from the site and from lands receiving manure. At the Hearing, the Board heard that potential sources of surface water in the region included spring thaw, rainfall and irrigation. The potential sources of surface water contamination identified by the various participants included the potential of leakage from the lagoons and around the barn site as well as the potential for run-off from the lands used for the spreading of manure. The primary water bodies considered to be at risk from surface run-off included the nearby Enchant drain and Prouty Lake, as well as the associated BRID irrigation canals and the Lost Lake drainage basin.

With regards to the risk of surface run-off either entering the lagoon and causing it to overflow or alternatively, eroding the sides of the structure and allowing a release of manure, the Board did not hear any evidence which would suggest that Mr. Healy's original decision was incorrect. The Board notes that Mr. Healy found that the proposed banks of the storage facility were four feet above the surrounding yard. Given their height, the associated two feet of free board, and the thickness of the walls at the freeboard height (36 feet), Mr. Healy determined, and the Board concurs, that there was no significant risk of surface water contamination from this source. Furthermore, the area in question was well above the 1:25 year flood zone prescribed in *AOPA*.

The Board also notes that the barn site is engineered so as to direct manure from the facility to the lagoon. Furthermore, there is sufficient manure storage below the barns to ensure that if these flows do become blocked, there is little risk of overtopping the under barn storage. The Board also notes that the site itself has been reconfigured to take advantage of the natural drainage patterns in order to allow for surface run-off to be contained if necessary. This includes the commitment by Goldcrest to raise the height of the embankment at the Enchant Drain bridge to the same height as the remainder of the embankment.

A number of parties raised concerns about the potential for manure to migrate from the surface of the area lands where it was spread into the regional waterways. At the Hearing and through its own subsequent site visit, the Board was able to determine that while there are clearly natural drainages towards the various water bodies in the region, in fact the slopes are not substantial. The Board is prepared to accept the commitments of Goldcrest that it can manage manure application in such a manner as to reduce the risk of run-off from these lands to acceptable levels.

The Board notes that while the focus of *AOPA* is on the risk of nitrogen run-off from applied manure, there was also a significant concern raised regarding the run-off of phosphorous and its associated impacts on water quality, aquatic weed growth etc. The Board also heard concerns about sodic soils, particularly those northeast and east of the proposed facility, as having a larger potential for phosphorous run-off than other area lands.

Finally, the Board also noted that Goldcrest had agreed to a water monitoring program, both upstream and downstream of the facility with testing to be done at two sites, twice per year. The Board agrees that water quality testing is required and directs that the testing protocol be reaffirmed as a condition of the Approval. However, while the Board would encourage Goldcrest to attempt to integrate its monitoring program into that used by the BRID, the Board is not prepared to order the company to do so, since the needs of the two programs may be significantly different.

The Board is comfortable that the manure management program proposed by Goldcrest is sufficient to prevent excess phosphorous run-off from the proposed manure spreading sites. Should this not prove to be the case, however, the required surface water quality testing program should quickly identify if excess nutrient run-off is occurring and allow the issue to be addressed in a timely manner.

2.6 Operational and Community Concerns

At the Hearing, the Board heard evidence related to various operational and community concerns including the ability of Goldcrest to address emergencies and other associated public safety issues and the relative costs and benefits to the community, including long term liabilities.

The Board notes that the interveners in their original submissions to Mr. Healy only peripherally raised many of these issues and as a result, he was not required under *AOPA* to address them in his Decision or in the associated Approval. However, given the importance of these issues to the community, the Board is prepared to exercise its discretion and ensure that they are addressed. **It is important however, for participants in subsequent reviews to note that, it will be incumbent on directly affected parties to ensure that all issues of concern are clearly raised and enunciated at the outset of the review process, if they wish to ensure that the issues considered.**

Views of the Approval Officer:

Mr. Healy stated that he was satisfied that the proposed EMS would meet the requirements for safety because it would be fenced, would have a locked gate, and would have warning signs posted on the fence surrounding the site. Since Goldcrest was proposing to construct a road to the manure storage area and on the berm around the two-cell EMS, he concluded that the proposed facility would also meet the requirements for accessibility.

Views of Goldcrest Farms:

Mr. Gary Friesen, Director of Operations for Elite Swine described ESI as being an internal operating company of Maple Leaf Foods that had been in the hog management business since 1982. In Alberta, he noted that Elite Swine currently employed approximately 12 staff including veterinarians, agricultural engineers, swine specialists, market specialists, genetics experts, and other related staff. Mr. Friesen stated that close to 40 percent of their employees come from within the community and that ESI provided its employees with extensive training programs, including safety. Mr. Smith noted that the buildings would have automatic feed and watering systems, alarm systems, environmental monitoring systems, and an emergency standby power generator.

Mr. Friesen noted that the proposed 3000 head sow barn and four 2500 head nursery barns would produce approximately 65,000 pigs on an annual basis. He estimated that the sow barn, which would cost \$4.5 million dollars to construct, would employ ten full-time employees and approximately 3,150 tons of feed (which will include about 100,000 bushels of barley) would be required on an annual basis. He also estimated that the nursery units, which would cost about \$1.9 million dollars to construct, would employ an additional three to four full-time employees and would require an additional 54,000 bushels of barley per year. In addition, Mr. Friesen suggested that the manure from the operation would provide a valuable alternative to commercial fertilizer.

Mr. Friesen emphasized Goldcrest Farms' commitment to the community by stating that ESI would offer a \$1000 scholarship for students from both Lomond and Enchant entering agriculture programs in postsecondary schools. He advised that residents would be made aware of employment opportunities available during construction as well as when the barns became operational.

Ms. Logan stated that some habitat programs had expressed an interest in working with Goldcrest to create a pilot project to demonstrate how intensive livestock and wildlife could work together. She suggested that the trees planted around the new development could provide a natural link to the adjacent wetlands. Ms. Logan stated that her family had always tried to be aware of the concerns of its neighbours and had always believed in protecting the area. She noted, for example, that the Logan family had insisted from the start of the project, that the lagoon be covered.

In addressing concerns related to emergency plans, Mr. Smith stated that the barns would be equipped with backup generators, which would be checked on a monthly basis, and alarm systems that both detect and notify employees of power outages, high heat, and burglary. He added that security would also be in place while the barn would be under construction and that Elite was currently exploring the option of having a manager or an employee living within two to three miles of its site.

Mr. Smith stated that Goldcrest acknowledged the community's concerns regarding potential emergencies. However, he stated that, since emergency situations would significantly impact its production and business, it was in Goldcrest's best interest to ensure that such situations were avoided. He concluded by stating that the facility had been designed to minimize the risk of environmental problems at the site.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Ms. Nikkel suggested that while Elite Swine cited community benefits such as alternative cash flows, grain sales, local job options, and investment opportunities, she felt that in reality the effects on the economy would be small and much of the construction material would likely be shipped in. She added that upon checking grain prices last fall, she found that Landmark Feeds in Strathmore was paying less for barley than local buyers, and trucking to Strathmore was an additional expense for area farmers.

Ms. Nikkel also challenged Goldcrest's statements that it would provide employment for 12 to 14 persons, noting that the pool of available employees willing to work in an isolated community was very small. Additionally, she noted, employees would require adequate housing, which she stated was in very short supply in the community, and she felt that as a result, the impact of wages on the local economy would be limited.

Ms. Nikkel highlighted the fact that the tax revenues generated from the Goldcrest operation would be limited as it would be taxed only at agricultural rates instead of commercial rates. In her opinion, this would leave municipalities with an inadequate sum to deal with air and water pollution, the wear and tear on the roads, resource depletion, social costs, other infrastructure costs, and remediation, should the company ever leave the area.

Ms. Dietrich stated that landowners who have lived in the area for many years felt that they were being forced to vacate their homes, and she expressed concern over the potential mass emigration out of the area. This, she noted, would not contribute to community development, but rather would hasten its decline. Ms. Nikkel also expressed concern with manure agreements that were signed with absentee landowners, who do not live in the vicinity of the site or the spreading acres and would therefore not be impacted in the same manner as other area residents.

Ms. Hart stated that resident confidence in the developer would only be achieved if Elite Swine, Landmark Feeds and/or Maple Leaf Foods had an equity stake or a contingency account, held in trust by the M.D. of Taber, and a complete liability agreement with Vulcan County.

Ms. Hart also commented on Goldcrest Farm's emergency procedures by quoting Goldcrest's submission, which stated that "neighbours will be provided with a 24-hour contact number" and that "Elite Swine was developing a formal emergency management plan that will establish clear protocols for dealing with emergency situations". She suggested that it would be very difficult for the NRCB to evaluate and determine the acceptability of an emergency management plan that had not yet been developed.

Views of Vulcan County:

Councillor Ruark conveyed the County's support for approving the Goldcrest application, as long as the Approval included certain conditions relating to operational matters. The County had included the following in its earlier municipal development permit:

- all lagoons shall be fenced and carry appropriate signage;
- a cooling unit shall be installed at a building on the site for the storage of dead animals;
- a responsible employee should live on the site in order to provide site security and quick responses for any problems that may arise; and,
- that the developer shall adhere to the Government of Alberta 2000 Code of Practice for Responsible Livestock Development and Manure Management.

Views of the Board:

The Board is charged under Section 25(4) of *AOPA*, with considering the potential effects of a proposed project on "the economy and the community". It was clear from the evidence presented at the Hearing by the applicant and the interveners that the operation proposed by Goldcrest will have an impact on both. What is less clear is the relative size and direction of that impact. The Board notes that there was a clear concern raised by the area residents that the economic and community benefits of the project suggested to accrue by Goldcrest (e.g. taxes, wages and the purchases of local services such as feeds) will not outweigh the costs. However, neither party to the hearing was able to provide any clear quantification of the actual balance between these two effects.

The Board expects that economic and community impacts will continue to be an issue with future developments of this nature and feels that the concerns raised at this hearing will need to be eventually addressed. However, it is likely that a framework first needs to be established by which these effects can be compared in a more technically credible manner. This likely needs to be accomplished in a broader forum than normally provided by a single hearing, with opportunities for broader stakeholder input.

In this instance, there was no clear evidence that the impacts would be unacceptable nor that they would be so significant that they could not be managed through existing planning processes. In particular, the Board notes that no concerns with either the economic or community impacts of the project were raised by either of the two local governments, the County of Vulcan or the M.D. of Taber, the parties most likely to be directly affected by these particular issues.

The Board does believe that it is the intention of Goldcrest to carry out its operations in a manner that minimizes negative effects on the community and maximizes the benefits. The Board notes Goldcrest's commitment to a good neighbour policy, as expressed by Ms. Logan when she stated, "we have tried to be aware of concerns" and "we have always believed in protecting the area". The Board views this as evidence of the willingness of Goldcrest to operate in a manner that will minimize the impact on the community. The Board also believes that the parent companies of Goldcrest have the ability to address both unanticipated impacts, as well as any longer-term liabilities.

Substantial discussion arose on the topic of emergency response planning. Goldcrest provided details on construction features, monitoring and alarm technologies and their emergency management plan (including a 24 hour phone number), and they felt that these were all indicators of their commitment to respond quickly to any emergency. The Citizens for the Protection of the Prouty Lake Environment questioned the effectiveness of the emergency response number, requested that someone actually reside on site, and suggested that a complete liability agreement should be in place.

The Board believes that Goldcrest Farms has taken reasonable measures within their construction and management plans in anticipation of potential emergencies. However, the Board also accepts Goldcrest's commitment to prepare an "Emergency Management Plan" and directs that upon completion, it be provided to the M.D. of Taber, Vulcan County, the BRID, the affected parties, and the NRCB. This plan must be in place before hogs enter the facility and will be made a condition of the Approval.

2.7 Roads

In its review of evidence presented at the Hearing, the Board considered road use, traffic volumes, dust control, and road use agreements, as these are matters that would normally have been considered as part of an approval issued by a municipal government.

Views of the Approval Officer:

Mr. Healy determined that the proposed project would not have a significant adverse effect on roadways or dust.

Views of Goldcrest Farms:

Mr. Friesen testified that the availability of suitable haul roads to and from the site was an important issue for Goldcrest and committed to adhere to haul routes designated by both Vulcan County and the M.D. of Taber. He felt that outside traffic concerns would be minimal, as Goldcrest Farms would utilize its own equipment to move the isoweans from the sow barn to the nursery barn. In terms of total impacts on roads, Mr. Friesen estimated that, on average, its operation would require the equivalent of four semi-trailer trucks per week to deliver feed and three cattle liners to haul hogs to feeder barns, primarily on week days.

Mr. Friesen stated that Goldcrest would expect that both Vulcan County and the M.D. of Taber would designate haul routes in consultation with Goldcrest. He added that truckers for the company would be given strict instructions to adhere to approved haul roads and speed limits. Goldcrest Farms also committed to construct a new road on the undeveloped road allowance along the east side of its property, built to the standards of the M.D. of Taber.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Mr. Ed Nikkel testified that roads in the Prouty Lake area had not been graveled since 1987 and were already in horrendous shape. He expressed concern that, with the added traffic associated with the proposed Goldcrest operation, the road conditions would deteriorate even further. Ms. Marilyn Nikkel went on to suggest that the current conditions of roads near the site be evaluated by the County prior to the resolution of any road use agreements, and that discussions between Goldcrest and the municipalities regarding road use agreements should also include the directly affected residents.

Ms. Arlene Hart stated that, under normal moisture conditions such as occurred in 2002, semi-trailer trucks hauling pigs and feed would destroy the existing roads. She also recommended that the residents be included in discussions between the municipalities and Goldcrest to determine designated haul roads. She expressed concern about manure pollution on public roads and recommended that a specific condition be attached to the Approval that ensures adherence to designated haul roads and the ability to enforce conditions restricting manure pollution on public roads.

Views of Vulcan County:

Mr. Ruark explained that the County had a gravelling program in place and each year it graveled as many roads as possible. Mr. Ruark stated that the County was committed to building and maintaining roads and, if there were a need for a road to be repaired, graveled or graded, the County would do so. Mr. Ruark agreed that the County had a responsibility to maintain its public roads.

Mr. Ruark testified that, to date, there had been no negotiations with Goldcrest Farms to designate the haul roads, and explained that such discussions were contingent on the outcome of the hearing. He added that, if the NRCB were to uphold the Approval, the County would deal directly with the Applicant in deciding which roads to designate as truck routes. In terms of developing a road use agreement with Goldcrest Farms, Mr. Ruark felt that the County's main issues would be the maintenance or upgrading of the roads in the area and appropriate dust control measures.

He noted that, in the past, Municipal Development Permits had stipulated that a developer required prior County approval for truck use of roads. With the introduction of *AOPA*, the County was now requesting that the NRCB make the same stipulation. Specifically, the County was requesting that the NRCB require the operator to enter into an agreement with the M.D. of Taber and with Vulcan County regarding road use, and to give the M.D. of Taber and Vulcan County the authority to ensure adherence to the agreement. Mr. Ruark indicated that the County was reluctant to provide the NRCB with a set of conditions regarding haul roads because specific conditions might not provide the flexibility to accommodate changes in weather conditions or traffic flows.

Mr. Ruark added that the County had other concerns related to roads and that, in issuing its previous development permit to Goldcrest, the County had included conditions specifying that manure pollution on public roads was not acceptable, that all roads may be inspected at any time by Vulcan County, and requiring that the developer enter into a development agreement with the M.D. of Taber, for the purpose of construction of access roads.

Views of the Municipal District of Taber and the Bow River Irrigation District:

With regard to future discussions on a road use agreement, Mr. Gillund stated that the M.D. of Taber would also be interested in participating because they were responsible for maintaining the roads adjacent to the proposed development, and that the designated haul roads may include some roads within the M.D. of Taber.

Views of the Board:

The Board questioned both representatives of the M.D. of Taber and Vulcan County regarding road use agreements, road maintenance and dust control. The Board notes that neither jurisdiction provided terms for such agreements, indicating that they preferred to negotiate directly with Goldcrest. The Board also heard concerns raised by the Citizens for the Protection of the Prouty Lake Environment regarding road conditions, road maintenance, dust control and haul roads, all of which the Board feels were valid.

Under *AOPA*, the Board is required to address matters that had previously been considered as part of Municipal Development Permits. Clearly Road Use Agreements would potentially fall within this category, however, in the absence of any information from the relevant municipal government, it is very difficult for the Board to consider these issues effectively. For example, it is critical for the Board, if it is to be able to effectively enforce any road use requirements, to ensure that the agreements are consistent with the powers given to the NRCB under *AOPA*.

However, it is equally clear that this issue must be addressed if the Board is to protect both the interests of the applicant as well as the applicant's neighbours. Therefore, the Board is prepared to direct that Goldcrest Farms enter into negotiations with both the M.D. of Taber and Vulcan County regarding road use, including applicable dust control policies. Provided that the parties can reach consensus on the terms and conditions of the agreement, and furthermore, that the agreements are structured so as to be enforceable under *AOPA*, the Board is prepared to make these agreements conditions of the Approval. Negotiation of and entry into Road Use Agreements will be made a condition of the Board's Approval.

The Board notes that Goldcrest Farms also committed to construct a new road on the undeveloped road allowance along the east side of its property, constructed to the standards of the M.D. of Taber.

2.8 Odour Management

In its review of evidence presented at the hearing, the Board considered Sections 3, 11 and 23 of the *Standards and Administration Regulation*. Section 3 addresses minimum distance separation (MDS) as a means of minimizing the nuisance impact of confined feeding operations on neighbouring land uses (e.g. residential, commercial, or recreational). An appropriate MDS is intended to compensate for normal odour production, thereby reducing potential nuisance conflicts. Sections 11 and 23 address the adequacy of liquid manure storage and liquid manure containment, respectively.

Views of the Approval Officer:

Mr. Healy stated that he believed that there would be three main sources of odour at the proposed hog operation: the barn, the EMS facility and manure spreading.

With regards to odour from the barns and lagoons, Mr. Healy stated that, based on his calculations, the proposed Goldcrest operation required an MDS of 891 metres to the nearest residence. Since the actual distance to the nearest neighbour was 1,702 metres, he felt that the proposed development would well exceed MDS requirements.

Mr. Healy testified that, when calculating the MDS, he did not give any credit for the lagoons being covered. At the hearing, Mr. Healy referenced research from Minnesota, which indicated that odour emissions from a lagoon could be reduced by about 90 percent if covered with a negative air pressure system, such as the one proposed by Goldcrest. He stated that if he had included the effect of the cover, he would have adjusted the technology factor used in the MDS calculations. Based on an assumption that half the odour from an operation comes from the barns and half comes from the lagoons, he submitted that the technology factor could drop to 0.6. When this lower technology factor was used, he stated, the calculated MDS would be reduced from 891 metres to 714 metres.

Mr. Healy stated that he was also aware of a number of technologies that could potentially further limit odour from the barn, but he considered them generally to be uneconomical. Instead he stated that he encouraged operators to reduce odours by keeping barns clean.

Views of Goldcrest Farms:

Mr. Smith stated that, in order to reduce odours, Goldcrest intended to carefully manage its manure from the time it was excreted by the pigs, through its collection, transfer, and storage systems, to the point where it was being applied on agricultural land. Mr. Smith stated that its management process began with the design and construction of the barns, the use of reinforced concrete floors, and sealed joints between floors and walls where the manure was collected. The manure would then be collected in shallow pits beneath the barn and transferred through sealed

plastic sewer pipes to the lagoon. Mr. Smith noted that the first of the two cells in the lagoon would allow the solids to settle out and the remaining liquid would then overflow (decant) into the second cell. He submitted that, since there was no requirement for agitation of the liquid in the second cell, it could remain covered even while the first cell was being emptied.

Mr. Smith also noted that, when manure was being removed from the first cell, a pipe to the second cell would be opened to allow drainage back into the first cell where more material would settle out. He submitted that this would ensure that a very large area of the lagoon would always be covered, increasing the life of the cover and greatly reducing the surface area that creates odour.

Mr. Smith stated that he agreed with Mr. Healy's identification of odour sources, but stated that he believed that, in terms of odours that neighbors would sense, the majority of the odours would come from the lagoons rather than from the barns. He added that Goldcrest intended to control odours emitted from the barns by having good ventilation systems. He noted that the air exiting the barns was the same air that both the employees and the pigs breathe, so it was in the company's best interest to ensure that the air was as clean and fresh as possible.

Mr. Smith acknowledged that manure storage systems were a highly variable source of odour, dependant heavily on weather conditions and the biological activity in the lagoons. In an attempt to reduce odour from the lagoons, he observed that Goldcrest intended to use a negative air pressure cover system. He did acknowledge that it is difficult to keep the covers in place. He also agreed that it was fair to say that under anaerobic conditions, all manure, including human sewage, will produce potentially toxic levels of gases. In his experience, though, Elite Swine had not experienced toxic levels of these gases at any distance away from facilities, inside the facilities, or along the edge of the property line.

Mr. Smith stated that Goldcrest would prefer to spread manure once a year in the fall, which provides the longest window of time when soil conditions are suitable. However Elite Swine was also prepared to accommodate landowners who would want manure spread in the spring. He stated that, with an operational storage capacity of greater than one year, it would be able to spread manure in either the spring or the fall. He estimated that, under ideal conditions, it would take approximately 14 days to remove a year's worth of manure from the EMS structure and apply it to land. He also confirmed Goldcrest Farm's commitment not to spread manure within 300 metres of any residence unless the manure was immediately incorporated, as outlined as a condition of the Approval.

Both Mr. Friesen and Mr. Smith, noted that Goldcrest was also prepared to institute a "good neighbor policy" to further reduce the risks of unacceptable odours, ensuring through effective communications that manure spreading would not conflict with important family or community events. Mr. Smith highlighted Elite Swine's policy of notifying its neighbors before applying manure, and stated that it would accommodate situations such as a family gathering or event, by altering its days for manure spreading.

Views of the Citizens for the Protection of the Prouty Lake Environment:

A number of the members of the Citizens for the Protection of Prouty Lake Environment group suggested that there were a variety of issues associated with the management of manure at the proposed facility. In particular they noted existing health problems in the community, which in their opinion, may be aggravated by the odours associated with the proposed Goldcrest facility.

Ms. Dietrich stated that unfortunately, with regard to health issues resulting from large-scale hog operations, not many long-term studies had been done to date. However she stated, that the few that did exist refer to the fact that as many as 400 volatile organic compounds, including hydrogen sulfide, ammonia, dust, endotoxins and methane are produced and released during the anaerobic decomposition of liquid manure. In addition she stated that the studies to which she was referring, suggest that dust from these facilities, which include tiny particles from the animals, their feed, and their manure, can act as carriers for a range of pathogens. Furthermore, the practice of spreading liquid manure creates aerosols that also carry pathogens in the right conditions. She stated that health departments around the world were beginning to acknowledge the significant health risks associated with confined feeding operations. She cited the Minnesota Department of Health, which had determined that toxic gas emanating from the manure lagoon of one of the state's largest hog operations poses a potential health threat, and studies out of Iowa, which indicate that nine percent of manure lagoons in that state show traces of Hepatitis C.

Ms. Dietrich cited specific neighbours surrounding the site, whose health, due to pre-existing conditions such as asthma, would likely be affected by dust from the barns and by manure application. She suggested that absentee landowners had entered into manure application agreements without due consideration to not only their renters, but as well without due consideration of surrounding neighbours. She suggested that land adjacent to residents with health considerations should be removed from the manure spreading lands. She also suggested that Goldcrest should set up odour monitoring equipment near its barns and spreading areas.

Mr. Steeves responded to the proposed development by stating that his family had moved to the SW 18-15-18 W4M twelve years ago and since then, a 6,000-head feedlot had started just three quarters of a mile away from their property. He stated that they already experience a very pungent odour from the feedlot a number of days per year, and speculated that Goldcrest's proposed facility would further increase their exposure to nuisance odours.

He stated that he had spoken to both Mr. Friesen and Mr. Smith in October of 2001 about their desire to locate a hog barn in the area, and subsequently he toured one of their operations at Granum to observe them spreading manure. He stated that he found the odour to be unbearable, and felt strongly that all manure should be incorporated within 24 hours of application. He stated that he had returned to the site two weeks after their tour and found that the manure was still not incorporated into the soil. As a result, he expressed a lack of confidence that the Goldcrest development would be managed any differently. Ms. Marilyn Nikkel expressed her concerns about the acceptability of manure spreading directly adjacent to a residence, even with direct incorporation.

Mr. Steeves addressed health concerns by stating that risks to health may be the most important issue the Board addresses. He urged the Board to consider how people's health had been affected, particularly in those who presently live close to confined feeding operations. He suggested that many articles can be found that explain the health effects of ammonia and other gases, and of the heavy metals that are present in hog waste, and he stressed that in his opinion, there were not enough safeguards in place to protect against these effects. He added that in the best interests of all Albertans, the NRCB had a responsibility to use common sense in the location of these operations, and to consider the future impacts of confined feeding operations.

Mr. Mikalson emphasized that clean air was essential in the area, and recommended that the following conditions be placed on the Approval:

- Haul roads be restricted to Township Road #162 and Range Road #184.
- A tank be installed for manure storage, instead of a lagoon.
- Biofilters be installed on hog barns to keep nuisance odours down.
- Manure be incorporated by shanking equipment only.

Views of Vulcan County

As identified as one of the conditions of its Municipal Development Permit, issued to Goldcrest Farms in 2001, the County requested that all lagoons be covered with tarps to control odour.

Views of the Board:

In considering the issue of odour management, the Board notes that both Mr. Healy and Mr. Smith agreed that the barns, the lagoons and the spreading of manure, were the three main sources of odour.

In considering the proposed design of the Goldcrest barns and lagoons, the Board is satisfied that they meet or exceed the various requirements set under *AOPA*. The Board believes that the proposed two cell manure storage system when combined with the addition of a cover to the lagoon will have a substantial effect in further ameliorating the risks of odours or any other associated emissions from the proposed facility. The Board is also satisfied that the MDS, which in this case is more than twice that required, will adequately protect surrounding neighbours from unacceptable impacts.

The Board further notes that there was general agreement that significant odour can be produced during the spreading process and that the only effective means to control this effect was through proper management of the application and incorporation process. This issue has already been addressed in this report and the Board remains satisfied that the methods proposed by Goldcrest should, if followed in the manner proposed, provide an acceptable level of protection for surrounding neighbours.

The Board accepts the commitments made by the company to implement a "good neighbour policy" as an important step to further reduce the risk of unacceptable odour. The Board recognizes that such a policy represents an opportunity for Goldcrest Farms to address Ms. Nikkel's concern regarding manure being spread within 300 meters of a residence even with direct incorporation.

In weighing the health related evidence, the Board agrees with both Goldcrest and the Citizens for the Protection of the Prouty Lake Environment that, if improperly managed, all manure may emit a range of gases and other materials that have the potential to create health concerns. No evidence was provided in this case that would suggest, however, that the facility would be unable to address these issues with the proposed design and technology.

2.9 Site Selection

Section 25(4) of *AOPA* specifies that "in conducting a review the Board must consider the effects on the environment, the economy and the community and the appropriate use of land." In its review of evidence presented at the Hearing, the Board gave careful consideration to the site selected and whether it met the conditions of *AOPA*.

Views of the Approval Officer:

Mr. Healy found that the site selected by Goldcrest Farms for the proposed development was acceptable.

Views of Goldcrest Farms:

In its site selection process, Mr. Smith stated that Goldcrest began with an assessment of a location suggested by the landowner. He explained that they had considered the location with respect to potential impacts to the community and with respect to availability of other services required such as feed mills, processing plants, roads, power, natural gas, and telephone. ESI also considered topography, surface and groundwater, drainage patterns, the availability of water for the operation, and land for proper manure application. Mr. Smith stated that ESI eventually found the proposed Goldcrest site to be acceptable, with the most appropriate building site being along the east side of the property.

Views of the Citizens for the Protection of the Prouty Lake Environment:

Ms. Nikkel stated that she objected to the site selected, noting in particular that the proposed site was in a low-lying area known as the Lost Lake Drainage Basin, and therefore not at all suitable for a large hog development. She noted that the proposed site was also 600 metres uphill from a very important water supply, the Enchant Drain, which supplied drinking water for the communities of Vauxhall and Hays. However, she did acknowledge, in response to questioning by Mr. Wilson, that the Town of Vauxhall had not raised objections to the proposed location.

Mr. Mikalson proposed that the hog operation be moved to an alternate location, away from any body of water and far away from farm families. He suggested, for example, that the N1/2 34-15-20-W4M, would have numerous benefits over the current site.

Views of the Board:

The Board notes that *AOPA* does not require an applicant to justify the site eventually selected for a proposed development relative to other possible sites, but rather only that the proposed site is able to meet the various requirements of the legislation.

In this case, the Board is satisfied that Mr. Healy was correct in finding that the site selected by Goldcrest for development is acceptable. The Board also notes that the site selected by Goldcrest Farms is consistent with zoning as defined in the Agricultural District within the Municipal Development Plan of Vulcan County. While the Citizens for the Protection of the Prouty Lake Environment suggested that there are other sites in the region that would be potentially more appropriate, they did not present any evidence that would either confirm this view, or convincingly demonstrate that the proposed site was unacceptable.

3 DECISION OF THE BOARD

In reaching its Decision, the Board has had careful regard for the concerns raised by the various interested parties. With respect to the issues raised by the Municipal District of Taber, Vulcan County and the Bow River Irrigation District, the Board believes that the Approval Decision issued by Mr. Healy, in combination with the commitments made by the applicant, has adequately addressed the concerns that those interested parties raised. The Board is also satisfied that the Approval is consistent with the relevant Municipal Development Plans and that the proposed development will not detrimentally affect natural resources administered by other ministries, including drinking water and Prouty Lake. The Board also notes no concerns were raised with Mr. Healy's Approval by Alberta Environment, Alberta Sustainable Resource Development, and the Headwater Health Unit.

With respect to the concerns raised by the Citizens for the Protection of the Prouty Lake Environment, the Board has carefully considered these and finds that the facilities and the associated operations, as approved in Approval No. LA 02002, in association with the additional commitments made by Goldcrest at the hearing, meet or exceed all of the technical requirements set out in *AOPA*. The Board also believes that any effects on the environment, the economy, the community and the use of land both adjacent to and in the surrounding region, were adequately considered and addressed in Approval No. LA 02002 and the associated Decision Report.

In reaching these conclusions, the Board notes that the additional commitments made by the Applicant at the Review form an integral part of the Board's Decision, and the Board expects the following additional commitments to be met.

1. Goldcrest Farms will not spread manure on the NE-8-15-18-W4M or the pastureland located in Section 20-15-18-W4M. As a result, no grassland will be used for manure spreading.
2. Goldcrest Farms will test surface water semiannually, both upstream and downstream of the barn location, and will share its testing protocol and results with the Board.
3. Goldcrest Farms will dig three test pits at the time of construction.

4. Goldcrest Farms will negotiate Road Use Agreements, including applicable dust control policies, with both the M.D. of Taber and Vulcan County, and provide terms of these referenced agreements to the NRCB. Road Use Agreements must be in place before hogs enter the facility.
5. Goldcrest Farms will prepare an “Emergency Management Plan” and upon completion, will provide copies to the M.D. of Taber, Vulcan County, the BRID, the affected parties, and the NRCB. The plan must be in place before hogs enter the facility.
6. Goldcrest Farms will raise the height of the embankment of the Enchant Drain at the bridge, to the same elevation as the remainder of the embankment.

With these conditions, the Board grants and upholds Approval No. LA 02002.

DATED at Calgary, Alberta on October 21, 2022.

NATURAL RESOURCES CONSERVATION BOARD

Brian F. Bietz
Board Chair

Gordon Atkins
Board Member

Maureen Schwab
Board Member