

Sustainable Poultry Farming
Group, Abbotsford, B.C.

Groundwater Protection Program

2000/2001 Annual Report

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**Submitted By:
Kevin Chipperfield, P.Ag.
SPFG Manager**

Groundwater Protection Program

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1.0 Introduction

The Groundwater Protection Program (GPP) was initiated in the fall of 1995 with the construction of an on-farm conveyor system, built to reduce the high costs associated with transporting manure long distances, by facilitating the loading of large trucks. This first year was dedicated to testing the workings of the conveyor and the feasibility of a program to ship manure directly from poultry farms to distant markets. Subsequent years have focused on the continual expansion of the Groundwater Protection Program.

Over the last five years, and again this year, a significant expansion has occurred (see Table 1) in the following ways:

- increase in the number of poultry and crop producers involved in shipping and purchasing manure
- increase in the volume of manure shipped
- increase in the capacity of the hauling system
- increase in the flexibility and efficiency of the loading system through some minor equipment alterations

Manure hauling was initially accomplished with little advance notice and was generally seasonal, with the majority of manure hauling occurring in the late fall and winter periods. This year there has been an increase in the amount of manure hauled out of storage facilities, rather than directly out of poultry barns.

Table 1 Increase in Distant Market Manure Shipments from Year 1 (1995/96) to Year 6 (2000/01)

<i>Year of Operation</i>	<i>Shipment Volume</i>	<i>Shipment Period</i>	<i>Increase (adjusted)*</i>	
			<i>Over Previous Year</i>	<i>Cumulative</i>
Year 1 (1995/96)	6,200 yd ³	8 months	NA	NA
Year 2 (1996/97)	18,200 yd ³	12 months	+ 96 % *	+ 96 % *
Year 3 (1997/98)	24,930 yd ³	12 months	+ 37 %	+ 67 %
Year 4 (1998/99)	23,675 yd ³	12 months	- 5 %	+ 43 %
Year 5 (1999/00)	40,640 yd ³	12 months	+ 72 %	+ 50 %
Year 6 (2000/01)	53,270 yd ³	12 months	+ 31 %	+ 46 %

* Increase adjusted to reflect the increased Shipment Period from Year 1 to Year 2

1.1 Storage Facility Hauling

This year, the amount of manure hauled out of manure storage facilities has increased substantially over previous years. As the GPP expands, storage facilities will play a more important role in the functioning of the overall system. Our experience to date indicates that hauling from storage facilities is by far the most convenient and reliable way to schedule and load trucks servicing B.C. interior markets. The process of organizing manure hauling to the

interior can be very cumbersome without use of a facility. Many difficulties and uncertainties present themselves when not hauling out of a storage facility such as:

- evaluating amount of manure available to haul
- situating conveyor optimally in a barn loading environment in order to load large trucks in an effective and timely manner
- problems with trucking companies being able to identify and access poultry farms due to the discontinuous or sporadic nature of the loading/hauling activity from a particular farm situation

1.2 Shift in GPP Pricing Policy

In the late fall of 2000, the SPFG was notified by two manure cleanout companies of an imminent manure marketing problem. This problem revolved around the inability of clean out companies to market the supply of poultry manure they would handle during the winter of 2001. In addition, the two companies felt that manure supply was so large that it could not possibly be absorbed by the current markets.

To deal with this scenario, the GPP sought to increase manure markets in the B.C. interior. It was felt that the price for delivered manure would have to be reduced somewhat to entice crop producers and ranchers to purchase the product. In order to cover the shortfall in revenue for manure, the GPP raised prices to poultry producers, the suppliers of the manure. Unfortunately, this decision resulted in significant loss of manure supply to ship to distant markets. During late winter 2001, GPP pricing policy was reversed to levels only slightly higher than before the price increase went into effect. Since the reversal, manure shipments have partially responded to the pricing shift.

2.0 Manure Hauling Activity

2.1 Manure Handling Connections

Arrangements for manure hauling connections occur in many ways. While the manure is always sourced from individual poultry farms, the method of shipping and the delivery location can vary substantially. Table 2 provides a summary of the marketing arrangements for SPFG coordinated and farmer handled manure hauling events.

Table 2 Connections for Poultry Manure Shipments

Shipping Arrangements	Distant Markets	Alternate Markets	Local Markets *			Total
			CFV	NFV	UFV	
----- Cubic yards -----						
SPFG Coordinated	53,270	100	0	670	915	54,955
Farmer Handled (with conveyor Rental)	400	3,990	1,170	0	2,020	7,580
Total	53,670	4,090	1,170	670	2,935	62,535

* CFV=central Fraser Valley, NFV=northern Fraser Valley (north of Fraser River, Coquitlam to Deroche), UFV=upper Fraser Valley (Chilliwack and areas east)

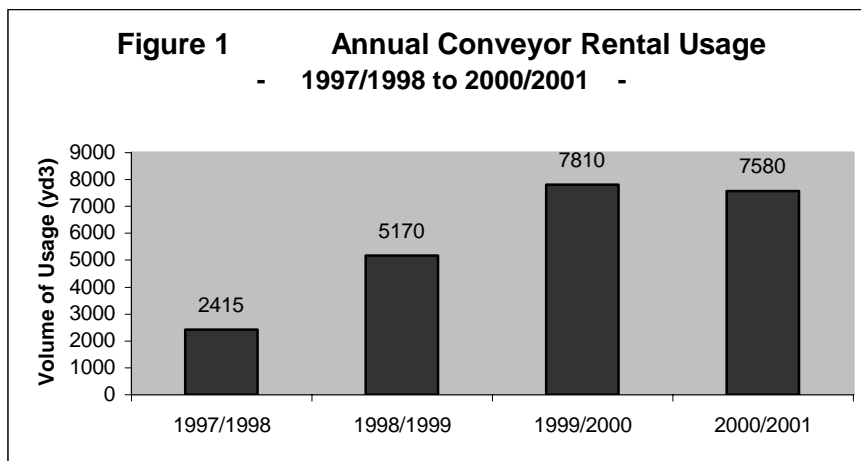
From Table 2, a total of 62,535 cubic yards of poultry manure shipments were handled through use of the Groundwater Protection Program. This amounts to an increase of about 14,375 cubic yards or 30% (48,160 in 1999/2000) over the amount handled last year.

The Soil Bioremediation industry has been a large user of manure this past year. As well, beginning in November 2000, a significant amount of manure from egg production operations has been utilized in the production of mushroom compost. This has provided a new outlet for the marketing of manure from commercial and breeder layer flocks, mostly located over the Abbotsford Aquifer. Manure shipped to these markets is included in the Distant Markets category.

GPP services, as in other years, also include connecting poultry producers with local manure markets, particularly in cases where the manure is too heavy (wet) to transport cost-effectively to distant markets. In many cases, poultry manure was shipped off the Abbotsford Aquifer to the Sumas Prairie through use of GPP conveyors.

2.2 Conveyor Rental Usage

GPP conveyors are available for rent. Poultry producers typically rent a conveyor to ship manure in more cost-effective ways i.e. to a local dairy or crop farm, or alternate market which has its own large trucks. Figure 1 below identifies the increase in use of GPP conveyors for this



purpose. From Figure 1, in the first three years, conveyor rentals have increased greater than 300 %, while this year, the amount handled remained similar to last year.

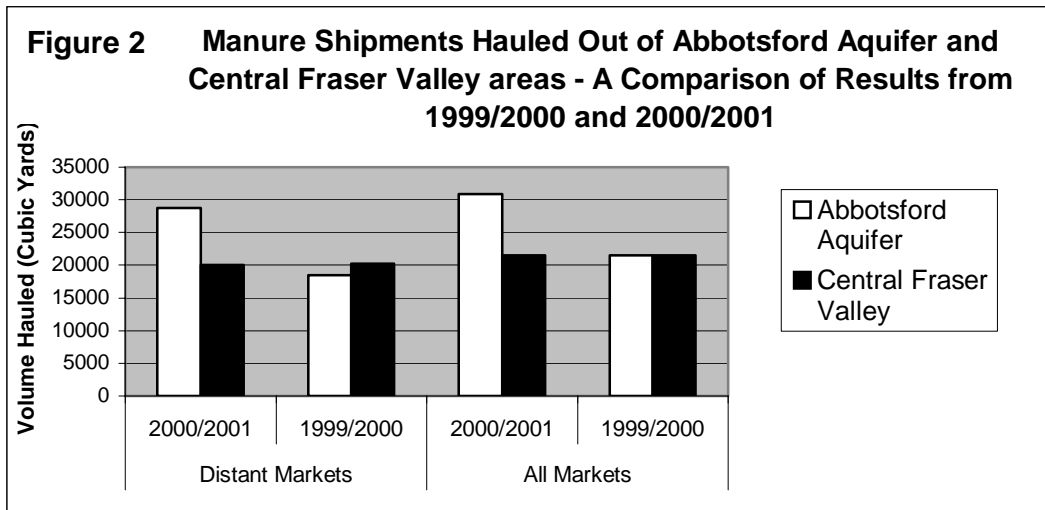
2.3 Sources of Manure Shipped During 2000/2001

As identified in Table 3, most of the poultry farms which ship manure from the Fraser Valley are either directly on the Abbotsford Aquifer (54%), or nearby within the Central Fraser Valley (37%). Together, both the Central Fraser Valley and Abbotsford Aquifer areas comprise 91% of shipments to distant markets.

Table 3 2000/2001 Manure Shipments to Distant and All Markets from Fraser Valley Areas

Source Area	Distant Markets	All Markets
	- - - Cubic yards - - -	
Abbotsford Aquifer	28,735	30,925
Central Fraser Valley	20,045	21,480
Upper Fraser Valley	200	1,450
Lower Fraser Valley	4,690	8,680
Total	53,670	62,535

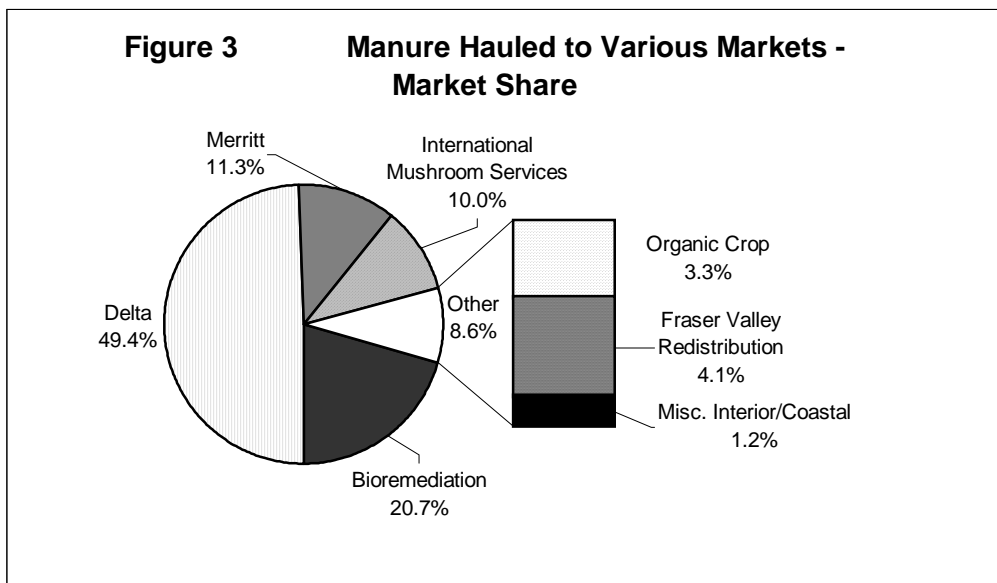
Since shipments originating in the Central Fraser Valley are considered as reducing the total amount of poultry manure spread on the aquifer area, then one could consider that 91 % of shipments to distant markets likely reduce the amount of manure stored and spread on the Abbotsford Aquifer. Compared to last year (Fig. 2), shipments hauled directly from the Abbotsford Aquifer and central Fraser Valley areas have increased.



2.4 Destination of Manure Shipments

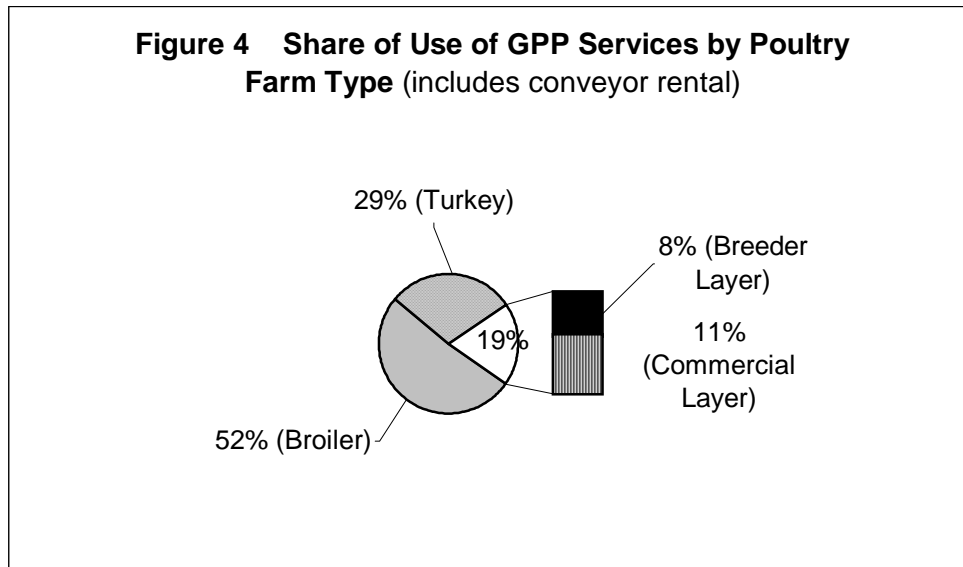
Figure 3 shows the destination market area for GPP shipments this year. As in previous years, Delta remains the largest single market. However, the market share (49.4 %) occupied by Delta this year has decreased from the 67 % value seen last year. The decrease in size and importance of Delta is considered to be a positive move since too much dependence on the Delta market is a potential problem as this market approaches saturation.

Newer markets are helping to diversify the GPP marketing program. These are Bioremediation (20.7 %) and International Mushroom Services (10.0 %). Interior markets have remained similar to last year, while redistribution within the Fraser Valley has increased in response to marketing materials sent to the dairy industry in late winter.



2.5 Use of GPP Services by Poultry Farm Type

Significant changes have occurred this year in comparison to last. Last year, the turkey category



comprised the largest proportion of users (40 %), whereas this year from Figure 4, their share has dropped to 29 %. The Chicken category has risen from 34 % last year to 52 % this year. Both Commercial Layer (11 %) and Breeder Layer (8 %) categories have decreased slightly

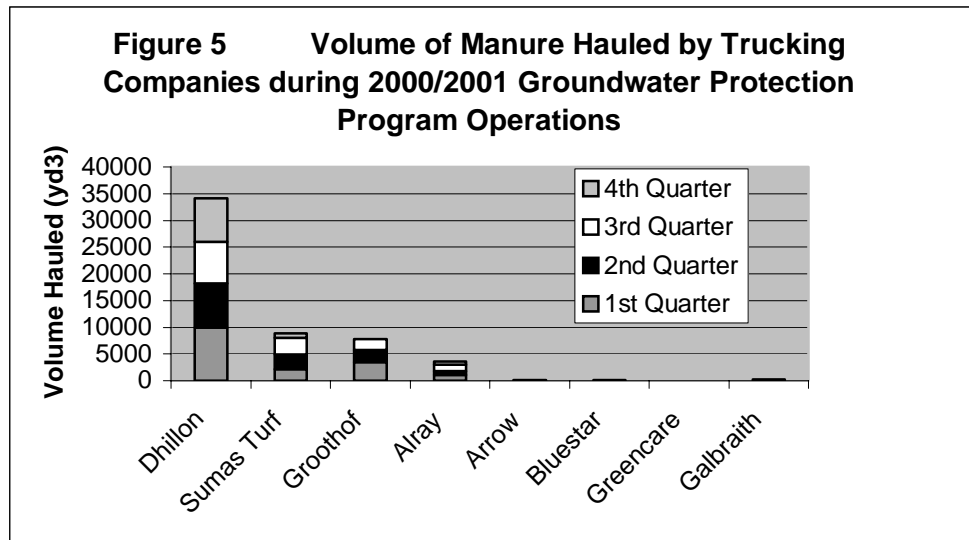
as a proportion of use of GPP services, however the amount of manure shipped as represented by each category did not likely decrease.

3.0 Manure Hauling Contractors

During 2000/2001, the GPP utilized the services of about eight trucking contractors.

As shown in Figure 5, the highest utilized for the year (similar to last year) were Dhillon Industries, Sumas Turf Farms, Groothof Trucking, and Alray Shavings. By quarter, Dhillon Industries and Groothof Trucking were highest utilized

for quarters #1 and #2, with Dhillon Industries being the single largest hauler for all quarters. During the fourth quarter, the Merritt market was filled and hauling through Groothof trucking ended.



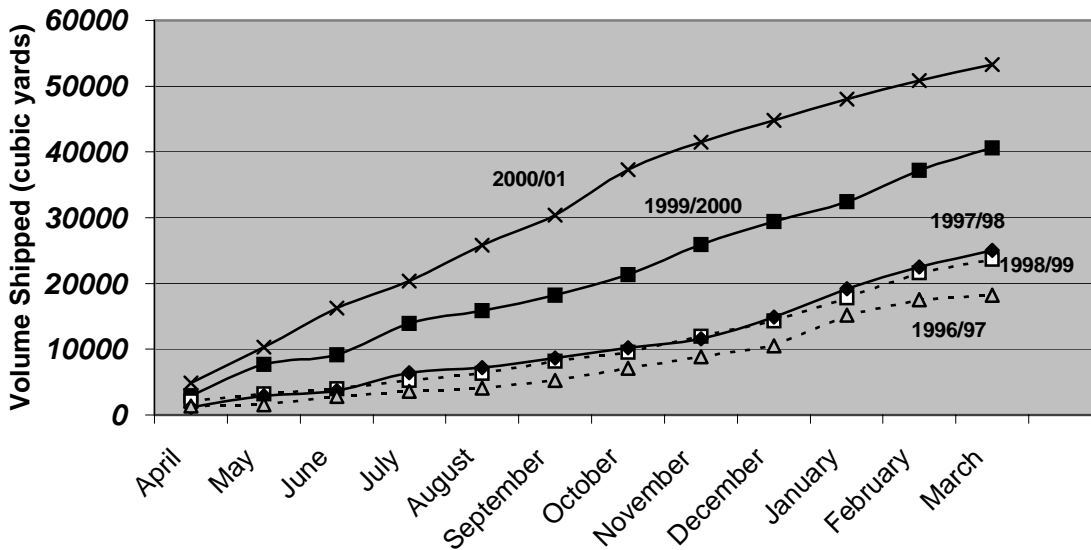
4.0 Historical Analysis

4.1 Year to Year Increase in Shipments to Distant Markets

In Figure 6, 1996/97 to 2000/2001 GPP shipments are identified and compared cumulatively. For 2000/2001, manure shipment volumes to distant markets substantially increased over the

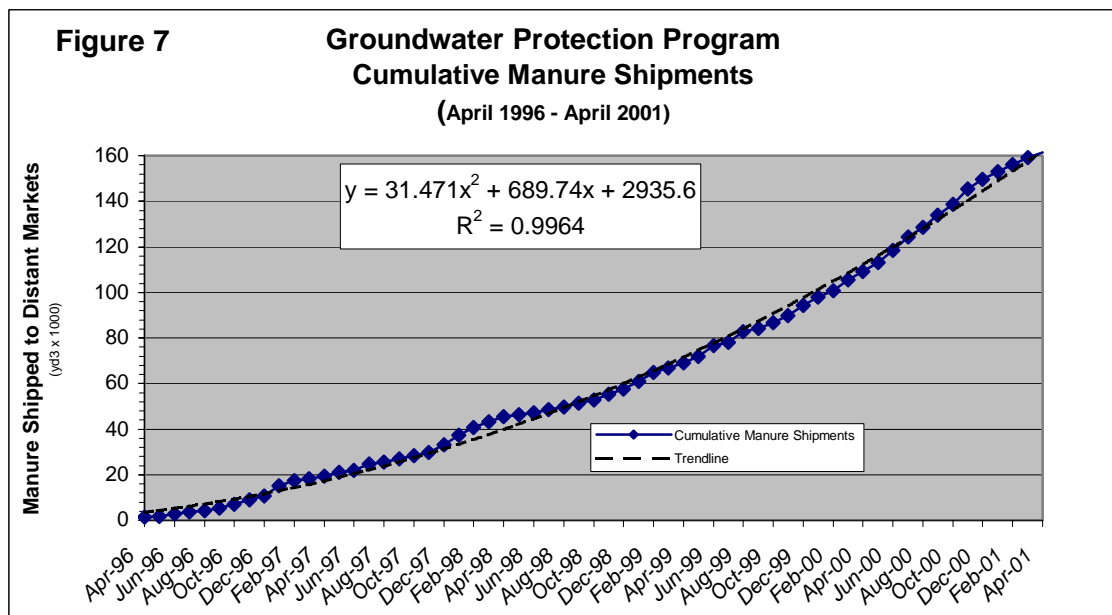
previous year (40,640 to 53,270 cubic yards – a 31% increase). This increase would likely have been greater if marketing difficulties had not been encountered in December, carrying through to the beginning of March. One effect of the marketing difficulties was that the price of hauling and conveyor services to the poultry producer was increased. This move effectively reduced manure supplied to the GPP for shipment and can be noted in the lowered volume of shipments in that period indicated in Figure 6.

Figure 6 A Comparison of Poultry Manure Shipments to Distant Markets - Years 1996/97 to 2000/01 -



4.2 Overall Four Year Increase in Manure Shipments

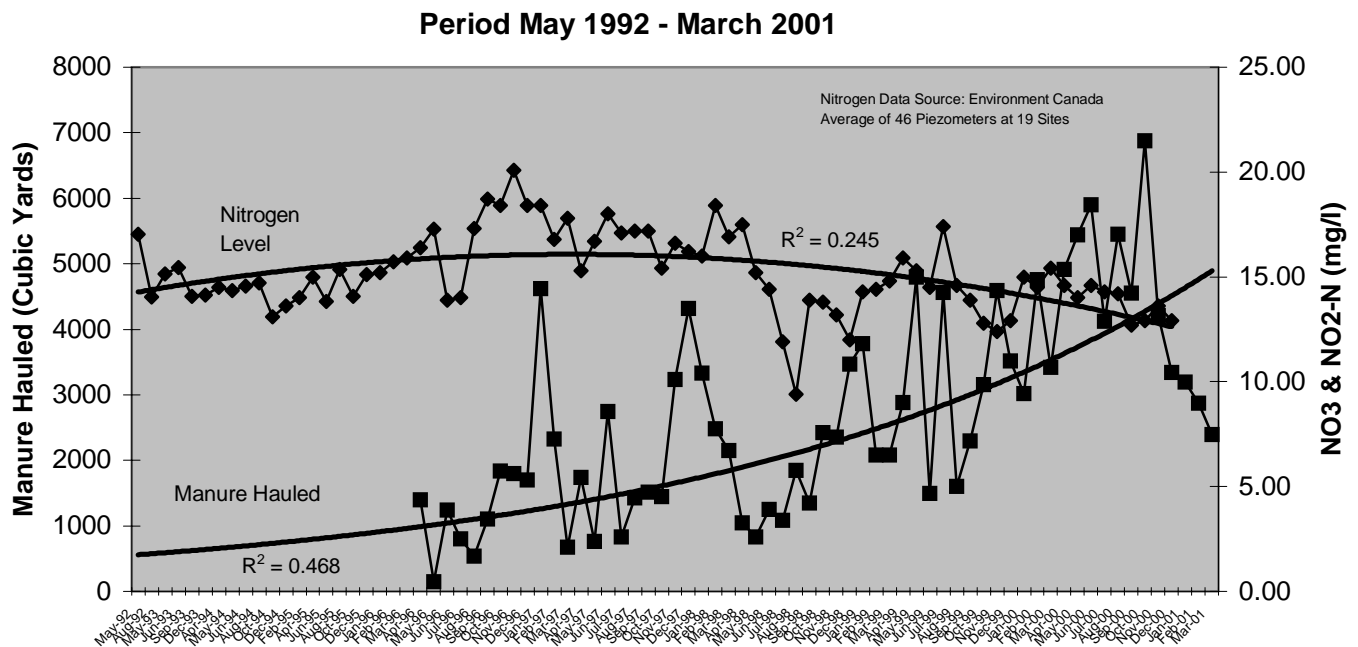
To identify the overall expansion of the manure shipment program to distant markets, data was assembled from the last five years (1996/97 to 2000/2001). While shipments occurred in 1995/96, they were limited in volume and deemed not significant for inclusion. Figure 7 shows the actual cumulative shipments for this period.



5.0 Abbotsford Aquifer - Correlating Manure Shipments with Groundwater Nitrate Levels

A compilation of groundwater sampling nitrate data (beginning May 1992) from Environment Canada and results from the amount of manure hauled under the GPP since April 1996 yielded the results shown in Figure 8. Since the original overall objective of the GPP was to resolve high nitrate levels in the Abbotsford Aquifer, it would appear at this point that the GPP is a useful tool in this quest.

Figure 8 Abbotsford Aquifer - Nitrogen Level versus Poultry Manure Volume Hauled



6.0 Projected Need for the GPP

Last year, it was suggested that there was a need for a fourth conveyor. The suggested reasons were:

- The 3 GPP Conveyors are now operating at peak efficiency
- Manure shipment trends suggest a substantial increase in conveyor usage
- Conveyor rental usage continues to increase substantially
- Should a conveyor breakdown occur, there is little reserve capacity on which to rely.

During the last quarter, manure shipment volumes have declined to a certain extent. However, with the advent of the International Mushroom Services (IMS) market, at least one and sometimes two conveyors are needed to ensure supply at all times. Since the GPP started supplying IMS, conveyors have been kept busy. At times, this situation delayed maintenance and repair operations, and reduced availability for conveyor rental. Thus, the GPP should continue to pursue building a fourth conveyor

7.0 *Summary*

The GPP continues to be successful in increasing shipments of poultry manure and in seeking distant markets to accommodate these shipments. This year, the total amount of manure shipped to distant markets has increased substantially by 13,030 cubic yards (31 %) over last year. Over the last six years, shipments show a cumulative increase of 46 % annually.

Shipments involving hauling manure off the Abbotsford Aquifer have increased this year. For the first time, data from GPP manure hauling activity has been correlated with groundwater sampling results. The results showed that increased manure shipments off the Abbotsford Aquifer correlate well with reducing groundwater nitrate levels.

This year, markets and marketing areas have increased with the market inclusion of Bioremediation and International Mushroom Services. Delta remains the largest individual market area, but efforts are underway to reduce GPP reliance on this market through diversifying market interests. This year, Delta market share was reduced to 49 % from 67 % last year. This reduction was made possible through the development of the Bioremediation market. A fourth conveyor is again suggested to meet increased demand by the International Mushroom Services market for a regular manure supply and for rental puposes.

Chicken producers (52 %) are the greatest users of the GPP and the services it provides, while turkey producers (29 %) and both commercial and hatching egg producers (19 %) used the services to a lesser extent.