Review of Automatic Tank Gauging for BP Oil New Zealand Limited

A thesis presented to fulfil the requirements of a Masters in Technology

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Year: 1998

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank the people and companies involved in the project. Firstly, I would like to thank my supervisors Dr. Huub Bakker and Dr. Simon Hurley for their time, effort and guidance throughout the project. I am gratefully to BP Oil New Zealand Limited and the employees, especially Mrs Jane Lenting, my company mentor, who presented a challenging project in an industrial environment and supported me throughout the project. Finally, I would like to thank Technology New Zealand for the funding I received through the GRIF scheme while completing my Masters in Technology.

CONTENTS

EXECUTIVE SUMMARY

The project was undertaken for the Commercial Division of BP Oil New Zealand Ltd (BPONZ) to investigate and evaluate the future of automatic tank gauging. The Division has over 100 customer refuelling facilities around New Zealand. Fuel monitoring and management of these facilities, mainly Truckstops, is very difficult as most of the sites are unmanned.

Automatic tank gauging systems are used to remotely measurement fuel volumes at petroleum storage facilities. The Commercial Division of BPONZ, in 1993, had approximately 100 of these systems installed at sites. They were turned off in 1994 due to their unreliability and inaccuracies.

The investigation required the trial of two tank gauge systems from Compac Industries Limited and Fuelquip Services Limited. Compac was the supplier of the first gauges installed in 1993. Other investigating issues involved in the project include financial, environmental and current BPONZ procedures and systems that dealt with fuel monitoring and management.

The main conclusion from the study is that BPONZ should not invest further capital into automatic tank gauging at its Truckstop network for at least three years. The main reason is the large capital investment required to have the existing gauges upgraded or new gauges installed. However, the study showed that automatic tank gauging is a very complete package that can deal with stock monitoring and management of unmanned sites. The accuracy of the systems proved to be higher than that of current reconciliation methods and the previous technology. This is the reason that tank gauging should not be ruled out indefinitely in the future.

Recommendations for the future include:

- developing a pump calibration program for all consignment sites.
- annually up-dating the Commercial Environmental Program.

- re-investigate tank gauging in three to five years if current systems are not improved or if new legislation requires tighter control of wetstock management or environmental protection.
- investigate the option of accurate meters on tanker outlets and have drivers record the manual tote of pumps when delivering fuel to a site.

INTRODUCTION

BP Oil New Zealand Ltd (BPONZ) has been in the New Zealand petroleum market since 1946. The company is the retail market leader within New Zealand, as of January 1998, and is always striving to keep ahead of the other three major oil companies, Shell, Caltex and Mobil. In doing so, BPONZ has to constantly invest capital into cost saving technology to sustain the small hold the company has on the market and be competitive.

One such technology investment is the remote measurement of petroleum fuel levels in Underground and Aboveground Storage Tanks (USTs and ASTs). These tanks are situated at retail (Service Stations) and commercial (Truckstops) sites around New Zealand. The tanks range in size from 20,000 to 50,000 Litres holding capacity.

The remote measurement of fuel levels in the Oil Industry is known as automatic tank gauging. Automatic tank gauging is important to BPONZ Commercial as the division has many remote unmanned sites and regular, manual dipping of the sites is uneconomical for stock control. Tank gauging is the most practical way of managing the fuel stocks at these sites, but whether it is the most feasible way is one of the questions that prompted this thesis.

The focus of the thesis was to bring together existing information and knowledge to evaluate the tank gauging systems in place within the Commercial Division of BPONZ. The project came about as a result of inaccurate and unreliable readings from the existing tank gauging systems that were introduced in 1993 and 1994.

Two outside companies, Compac Industries Limited and Fuelquip Services Limited were involved in the project, each providing a different type of automatic tank gauge. Their equipment was set up at company locations around the country as trial sites. BPONZ Commercial has had Compac tank gauging installed in Truckstops since 1993 and an upgrade took place for the trials. The aim of the trial sites was to monitor the gauging equipment for accuracy and reliability.

The thesis is set out in four main sections, Background, Suitability of Tank Gauging, Results and Discussion, and Conclusion and Recommendations. The Background section sets the platform for the thesis and includes profiles of the companies involved in the project, brief history of tank gauging and a description of tank gauging and related issues. The next section "Suitability of Tank Gauging" deals with the two automatic tank gauge systems and the experimental trials used to examine the accuracy and reliability of each system. The thesis then continues with the section on Results and Discussion. This section brings together the findings of the experiments and discusses relative information like financial and environmental issues. The final section in the thesis, Conclusion and Recommendations will conclude the major findings and present recommendations to BPONZ for future investigations and projects.

BACKGROUND

Company Profiles

BP Oil New Zealand Limited

The company's initial contact with the New Zealand petroleum market was back in 1946 when the Anglo-Iranian oil company (later renamed BP) set up in New Zealand to sell BP products. In 1972, BP and Europa Oil (New Zealand's only native oil company at the time) combined with BP acquiring the marketing and refining interests of Europa and later re-imaging all sites to conform with BP international signage.

BPONZ employs around 1600 people and is one of New Zealand's largest companies. It provides a wide range of petroleum products, from oils and lubricants to motor-spirits and aviation fuels. The product range is marketed to both the public and private sectors. The company is the market leader in petroleum products sold through service stations in New Zealand and holds approximately a third of the market share.

BPONZ commitment to all of its customers can be reflected in the company's mission statement "BP is committed to providing quality service and quality products which meet both internal and external customer requirements at all times"[1]. The company also has a high level of commitment to the environment. The Health, Safety and Environmental (HSE) goal is simple "have no accidents, do no harm to people and do no damage to the environment"[1].

Compac Industries Limited

Compac Industries Ltd commenced business back in 1983, focusing on the petrochemical industry. The company is privately owned with its Head Office in Auckland, New Zealand and Branch Offices in Sydney and Melbourne, Australia. Trained Sales and Service Agents cover New Zealand, Australia and many other countries around the world like South Africa and Sweden.

The company's product line ranges from specialist meters for LPG and CNG to fuel pumps and leak detection systems. The manufacturing plant is located on the same premises as their Head Office in Auckland. Compac manufactures products for hazardous areas, therefore independent standards authorities carry out approval and testing.

Compac is accredited with the ISO 9001 standard, which recognises the company's commitment to quality and service.

Research and Development is a continuing process at Compac and consists of two divisions, Electronic and Mechanical. Mr S Cowdell's (Compac Account Manager) facsimile dated the 31 July 1997 stated that the company recognised the importance of Research and Development and was committed to reinvesting ten percent of its turnover back into the company for future development.

Fuelquip Services Limited

Fuelquip Services Ltd is New Zealand's leading supplier of equipment and services to the petroleum and related industries. It is a privately owned company that sees the ownership equally divided between three of the management team. The company's head office is located in Wellington with two regional offices in Auckland and Christchurch.

The company employs over 200 staff, with 120 service vehicles operating out of 17 service and workshop bases throughout the North and South Island of New Zealand. Mills-Tui Ltd, situated in Rotorua is a wholly-owned subsidiary of Fuelquip specialising in the manufacture of fire appliances and airport fire rescue vehicles.

The company's commitment to providing quality and service to its customers through its staff lead Fuelquip to initiate a total quality management program in 1989. This laid the foundation for the company's progress towards formal accreditation of the Quality Assurance Standard ISO 9002 (NZS 9002). The basic focus of Fuelquip's philosophy is quality and this can be reiterated with one of the company's principles "The quality

and reliability of Fuelquip's products and services are the concern of every employee. Quality starts with the design or plan and continues through all facets of manufacture, service or construction. It also includes the quality that comes from the skill, accuracy and accumulated knowledge of the person doing the task. Every person is therefore responsible for the work they have been allocated, and to carry it out within planned estimates and at the required quality level. Consequently a "do it right first time" approach is the key to quality workmanship, cost reduction, productivity and customer satisfaction."[2].

Fuelquip is a member of the Petroleum Equipment Institute (PEI) based in America and the Institute of Petroleum in the United Kingdom. This allows the company to stay in-touch with the latest technologies on the petroleum marketplace.

Legislation Governing the Monitoring of Underground Storage Tanks

There are many Acts, Regulations and Codes of Practice oil companies have to abide by when constructing and managing a site with underground petroleum storage systems. This section will highlight the legislation that governs monitoring of underground petroleum storage systems and therefore automatic tank gauges.

The Resource Management Act (1991) has a major bearing on company operations, especially when dealing with underground storage tanks and the surrounding environment. Part II Section 5 of the Act states that "the purpose of the Act is to promote the sustainable management of natural and physical resources"[3]. Sustainable management concentrates on the use, development and protection of the country's resources for the well-being of the community while "avoiding, remedying, or mitigating any adverse effects of activities on the environment"[3]. This section of the Act is important to BPONZ as it endeavours to avoid leakage from tanks and, in the event of a leak, remedy the effect on the environment as fast as possible. Large fines of up to $200,000 and clean-up can be imposed on companies that neglect to abide by the Act. Waiuku transport company Knight and Dickey Ltd was fined $4000 and had to spend more than $200,000 to clean up a diesel spill caused by a leaking underground tank. The fine was imposed because the company had failed to operate appropriate stock control procedures (Franklin County News [Pukekohe], 26 August 1997). Due to the large costs, BPONZ makes a conscious and dedicated effort to manage, monitor and assess all of its petroleum storage facilities.

The Code of Practice for the Design, Installation and Operation of Underground Petroleum Storage Systems states that "Every storage site operator must establish and operate a sound system of stock reconciliation that will identify any losses as they occur. It must be updated regularly, at least daily on busy sites, and no less frequently than fill-to-fill or monthly, whichever is the less, on any other site"[4]. The foundation of a good stock reconciliation system is the recording of measured actual stock at the beginning of each period, record of fuel deliveries into the tanks, the sales during the period, calculated book stock and the actual measured stock at the end of the period.

Differences between the book and actual stock at the end of the period is the recorded loss or gain.

The Dangerous Goods (Class 3 - Flammable Liquids) Regulation 1985, Part 49, Means of Determining Capacity of Tank states that "Approved means of accurately determining the capacity of every tank for storage of dangerous goods of Class 3 and the quantity of dangerous goods in it shall either be fitted to the tank or kept readily available,..."[5]. This is one of the reasons why dipsticks are usually located within a tank. Tank gauging coincides with this code as the measuring device is attached to the tank and the volumes can be read from the site controller.

When dealing with sites that are remotely located, tank gauging is the most feasible solution to retrieving the information that is required for the above code and regulation. This conclusion is based solely on the ease of retrieving the data from automatic tank gauges verses the difficulty of obtaining the data through regular visits to the sites to manually dip the tanks. Costs were not examined in this conclusion. With reference to the Code of Practice, tank gauging is able to aid the operator with opening and closing stock, total sales (as the controller communicates to the pump communications) and fuel deliveries. From this information, book stock and the loss/gain calculations can be performed instantly by the controller software.

Determining the capacity of a tank on site by an operator or a tanker driver is easily achieved by taking the reading off the display of the site controller. This takes away the need and time (approximately five minutes for several tanks) spent by a person to manually dip the tanks.

Current BPONZ Procedures

Refuelling of an Underground Storage Tank

This section will discuss the process that BPONZ undertakes to refuel an underground storage tank at retail and commercial sites.

The first step in the process is to know when to refuel a site and the types and quantity of fuel to be delivered. These tasks are performed by the dispatch planners located in Auckland (covering the North Island) and Christchurch (covering the South Island). The Terminals and Distribution Manual states that "The principle requirements are to ensure that:
product is available in sufficient quantity to meet demand;
vehicles are deployed in the most efficient manner;
deliveries are made as near to the time agreed with the customer as practicable;
the appropriate sized vehicle is scheduled to best suit the customer's order and delivery constraints"[6]. These requirements should meet the customer's agreed distribution service level agreement with dispatch.

The dispatch planners use a program called the Order Prediction System (OPS). This system utilises dip and sales information from the last two deliveries to the site in question too predict the theoretical date and quantity of when the next fuel-drop should be made.

If a certain site is not on the OPS (an example is a company that buys the fuel in bulk), then the operator of the site has the responsibility to contact the appropriate dispatch office to request an order for a fuel delivery. All BPONZ Commercial Truckstop sites are on consignment, meaning the fuel in the UST is owned by BPONZ and the customers purchase the fuel from the site. Dispatch in New Zealand, has a service agreement with BPONZ Commercial to supply fuel to its Truckstops.

Once the theoretical dates and quantities are generated, the planners can then group the orders into location, and date. From the groupings, the planners are able to shuffle

the orders around to maximise the efficiency and effectiveness of the tanker fleet and drivers. The most efficient trip plan for a truck would be to make one full tanker delivery at a site. This cuts down on revisits to the site and takes away the time of having to make another delivery at a site to unload the remaining fuel in the tanker. Unfortunately UST's range in size from 20,000 to 50,000 litre holding capacity and large tankers have a capacity up to 38,000L for diesel. This size range makes it difficult for the planners to get maximum efficiency while trying to avoid dry tanks, therefore tanks are normally refilled when they are in the 10,000L to 20,000L range. Plans should be generated up to at least the end of the first shift of the next planning day. When the plans are finalised, they are entered into the network system and the appropriate Terminal offices receive the plans.

Each tanker driver receives their trip plan for their shift from the Terminal office via an On-board Vehicle Computer (OVC). The OVC is a portable computer that carries the trip plan and delivery records. The drivers load their tankers according to the plan.

The first step by a driver when they arrive at a site is to notify and verify with the customer (if site is open) that a fuel delivery is to be made. Before any product can be unloaded from the tanker, the driver, by law, must dip the customer's tank to ensure it can accommodate the planned delivery. This dip figure is entered into the OVC. The driver can unload the fuel when he/she is confident that the delivery will be contained within the UST. The driver, once again, dips the customer's tanks to confirm that all of the product has been delivered. This figure is also entered into the OVC for future reference by the customer and the planners. The customer receipt is printed using the OVC and a printer located in the truck cab. The driver then continues on with their planned shift.

At the end of a driver's shift, the OVC is connected into the computer network at the Terminal office. The information that has been obtained from the driver is up-loaded into the BPONZ network and distributed to the appropriate users (e.g. Dispatch).

Stock Control Of BPONZ Truckstops

Stock control (reconciliation's) plays a major role in any consumer oriented industry. The oil industry is aware of the consequences if an incident should occur and the company at fault does not have up-to-date stock control records. This sub-section will outline the process that BPONZ use to perform stock control of its fuel at Truckstops.

At present, the reconciliation's are calculated on a monthly basis. The author beliefs that the time between these reconciliation's is to long and a more appropriate length would be ever two weeks. The reasoning behind this is that it could take three months (three reconciliation's) before a slow constant leak is found or even investigated. The person studying the reports would have to see a constant loss pattern in the reconciliation of a Truckstop before they start investigating the reason for the losses.

The majority of the information for the reconciliation's come through the BPONZ computer system. The only information that is entered manually into the report is the tanker driver dips and this takes on average one person four hours ever reconciliation. The dip readings required are the first and last for the month. BPONZ have to use the tanker driver dips as there is no one on site to take a dip. The driver dips come from the OVC information which was down-loaded into the BPONZ computer system and printed off. Unfortunately, this information has yet to be tied automatically into the reconciliation reporting program.

Sales for the period and the amount of fuel deliveries are also required for the reconciling of stock. The sales are gathered each night (midnight close-off) by a modem link to each individual Truckstop. The computer gathers the customer transactions for the day. The fuel delivery information comes from the dispatch system.

Stock control reporting of a site is calculated by taking the first dip of the month, adding the amount of fuel delivered to the site, subtracting the sales and then weighing this figure against the dip at the end of the month. The difference between the figures is the loss/gain of fuel for the month.

The major inaccuracy with this reporting is the difference between the times of the dips and the sales information. The last dip for the month could be taken in the morning with the sales for the day recorded at midnight. This leaves numerous hours between the two for fuel transactions (sales) that the driver dip is unable to take into account. The other inaccuracies is that of the dipstick and the person taking the readings.

Brief History - Automatic Tank Gauging

Level measurement of petroleum products has been around as long as the products have been for sale. The measurement of products may have been crude with accuracy's of +5% in the 1860s. In 1866, oil producers agreed to give buyers an allowance of 2 gal for every 40 gal gauged, to cover spillage, evaporation, and measurement errors. In other words, for every 40 gal of crude oil purchased, the buyer received 42 gal (This is the origin of the 42-gal barrel)[7]. This indicates that the producers of oil were well aware of the need of a measuring system to compensate for errors in the transfer of oil to the customer.

Automatic tank gauging came into the market of the petroleum industry in the 1950's with the development of the servo gauge. The gauge was pushed into the market as a need for tighter control and monitoring of liquid stock in storage. The focus of control was on the bulk storage facilities, whilst the monitoring of underground storage systems at Service Stations and Truckstops came at a later date. Unfortunately, the instrumentation of the 1950's did not have an accuracy of less than 1-2%.

The more widely used tank gauge in the 1960's was the float and tape gauge (similar to Compac Industries tank gauge). The gauges had a resolution of about 1/16 inch. The accuracy unfortunately was in the range of 1/4 to 1/8 inch. This was due to the mechanical friction between the transmitter encoder and the tape and hysteresis when the level changed from one directional movement to the other (i.e. increasing to decreasing).

The seventies saw the introduction of new technology to the gauging market in the form of ultrasonic gauges. Unfortunately, they were released into the market ten years too soon as the technology had not been totally developed and the accuracy of the gauge was lacking. Further technological developments in the gauge saw it come back to the market in the late eighties with an accurate, but expensive package.

Hydrostatic and magnetostrictive tank gauges were developed in the seventies and eighties. Both devices had fewer moving parts than their rival tank gauges, and this

was seem as an advantage in the harsh confinements of a petroleum tank. Magnetostrictive uses a time-of flight principle to measure liquid level and hydrostatic uses density and mass readings to calculate the approximate liquid level. Mr Roland Piccone, who has been in the tank gauging industry since 1961 stated in his book that "Accuracy is not a strong feature when Hydrostatic tank gauging is used as a liquid level measuring device..." [8]. Mr Piccone's reasoning behind this statement was the fact that the gauges use mass and density calculations, and this was ideal for products transferred by weight like liquefied petroleum gas (LPG), but not accurate enough for liquid level control.

Today, sees most, if not all of the above mentioned tank gauges still in the market. There are many more out there to, each with its advantage over its competitors. They vary in accuracy, cost of purchase, installation and maintenance and moving parts.

Alternative Methods to Automatic Tank Gauging Tasks

Manual Dipping

The only alternative to automatic tank gauging when fuel volumes are required, is the physical measurement of the fuel within the UST. The Code of Practice for the Operation of Underground Petroleum Storage Systems (UPSS) stipulates that "the measurement of product quantity in each tank be taken at least daily on a busy site, and before and after each fuel delivery to the site. Less active sites require monthly dips or dips when a delivery is made, whichever is sooner"[4]. On BPONZ Commercial Truckstop sites, the measurement of product quantity is conducted by the tanker driver when making a delivery.

Each individual petroleum tank should have its own dipstick that has been calibrated to the tank's shape. The dipsticks are normally located within a dip tube in the tank. The process for dipping a tank requires the stick to be removed from the tank, checking the product level and then wiping the stick dry around the level. The next steps in the process are taken from the Code of Practice for the Design, Installation, and Operation of Underground Petroleum Storage Systems. The steps required are to "Lower the stick slowly and carefully into the dip tube. Do not plunge it in as this may create a surge in the dip tube. Pause when the stick is within 50mm of the bottom of the tank to allow any surge to die down, then slowly lower the stick until it just touches the bottom of the tank and withdraw it immediately. Read the liquid level and record it in a notebook. Wipe the stick dry at and around liquid level and repeat the measurement. Check that it agrees with the record quantity. If it does not agree, repeat the dip until a consistent result (within 1 to 2mm on the stick) is achieved."[4]. This is the process set down by the industry for the tanker drivers to follow when delivering fuel to a site.

Some tank dipsticks are hard to read due to the surrounding environment and the condition of the dipsticks themselves. If a tank's dipstick is hard to read, then a small amount of product finding paste can be spread around the face of the stick at the approximate product level. This will create a clear cut product line when the stick is dipped.

Statistical Inventory Reconciliation Analysis (SIRA™)

Manual tank dipping is the only alternative to automatic tank gauging when product levels within a tank are required, but level readings are not the only function of an automatic tank gauge. The automatic tank gauge has the ability to detect possible leaks from the tank by monitoring fuel levels constantly over a period of time. This monitoring occurs when the site has a "quiet" period and no sales occur.

An alternative to the leak detection offered by automatic tank gauging is Statistical Inventory Reconciliation Analysis (SIRA™). SIRA™ is a computerised statistical package offered by specialised companies in the petroleum industry to monitor underground storage systems. The packages are able to offer valued information on the condition of the underground storage system. Statistical reports produced have the potential to identify different types of losses. These losses may indicate a leakage, discrepancies in deliveries, dispenser errors, effects of temperature, theft and dip measurement errors. All of these reports can be generated from the normal reconciling data that is gathered by manned sites.

The more consecutive daily data that is made available to SIRA™ companies, the greater the chance of accurately detecting a leak. The package utilises daily sales, deliveries and dip information; therefore, it can be run in conjunction with tank gauging. Unfortunately, the package requires thirty days of data for reports to be generated and an initial three to six month start-up phase before consistent information on the status of tanks is produced.

Monitoring and Observation Wells

Monitoring and observation wells are used to assist in the conformation of a suspected leak at sites with underground petroleum storage tanks. A monitoring well, when installed at a distance from the UPSS is able to monitor the spread of hydrocarbons through the ground should a leak occur. Observation wells detect the presents of hydrocarbons in the ground, indicating the possibility of a leak.

Important Aspects of Automatic Tank Gauging

General

Tank gauging equipment does not measure volume, as many people believe, it actually measures the height of the liquid within a tank. The height is obtained using a precise form of measuring device. The height is the basis for computing the volumetric quantity of the liquid. The site controller uses strapping tables to convert reference height markings of a cylindrical tank into volumetric readings.

Automatic tank gauging will require a small amount of supervision from a network computer administrator. Their responsibility will be to monitor all the sites. With little supervision, the tank gauging is ideal for unmanned sites. Constant monitoring of the stock on-site is easily accessible by taking the readings from the digital display of the site controller.

It is the author's belief that automatic tank gauging can best be described as a continuous stock control monitoring system. From the continual monitoring of the product level in a tank and the communication link with the pump controller, the tank gauge is able to provide assistance with stock control (reconciliations), environmental monitoring and other site issues like low stock warnings and alarms.

Stock control is an important function within the oil industry. Reconciliations are performed weekly, or monthly, depending on site volume throughput to 'balance the books' and highlight any anomalies at a site such as product loss. Reconciliations of Truckstops currently use the dipstick level reading before a tanker fueldrop and the pump sales figures that come from the Fuelcard (swipe card used to purchase fuel at unmanned sites) transactions to balance the book stock against the physical stock. This method of reconciliation is dependent on tanker deliveries; therefore, reconciliations can only be performed after a delivery and cannot be performed accurately for a fixed period (eg. 20th of each month, or midnight each Sunday). Automatic tank gauging is able to perform reconciliations over any fixed period of

time. The system takes a 'snap-shot' of the tank levels, pump totals and recorded fueldrops to produce a report.

Leaks from underground storage tanks are difficult to detect and can take months to discover due to the nature of the leak. Some types of tank gauges have the ability to alert the user to a possible leak through their continuous monitoring of product levels. When the underground storage system is not in use and the system is set in leak detection mode, a tank leak test can be conducted. The accuracy of the test is usually related to the period of time the equipment is in the leak detection mode. This test will take in the range of 2-6 hours, depending on the type of equipment. A fuel sale will normally cause the equipment to terminate the leak test.

Most manufacturers of tank gauges follow the United States Environmental Protection Agency (EPA) standards. These standards describe the minimum factors leak detection equipment need to possess before they can pass the EPA criteria. The main standard manufacturers follow is the EPA standard for detecting a leak. The EPA states that the equipment must meet the performance standard of detecting a leak of 0.2 USgph (0.76 lph) with a probability of a detection of at least 95% and a probability of a false alarm of no more than 5%[9]. Certain laboratories around the world conduct the EPA tests on behalf of the manufacturers. Unfortunately, the tank gauging is not tested over the total capacity of tank and the environment is controlled.

Reports and Alarms

Reports and alarms produced by the tank gauge systems portray a picture of the status of a site. The software manipulates the height and temperature data received from the probe and produces informative end user reports. Reports can be used to inspect and control the petroleum fuel stock (known as wetstock) requirements and environment. Software is typically Windows™ based with development towards Local Area Network for the larger company.

The main types of reports available are:

- Sales (Reconciliation) - This report gives a breakdown of the volume in the tank(s) and the sales that pass through the pump(s). It can range from an hour-by-hour report to a daily or monthly report depending on the software.
- Fueldrop (Deliveries) – This is able to give the level within a tank before and after a fueldrop was made, and the amount of fuel that was delivered. Sales during the fueldrop are also included.
- Leak Report - The report is able to give indications of whether a leak is occurring within a storage tank. Expansion of fuel from temperature differences can affect the viability of the leak report and further investigation is generally required.
- History Event - All events that have occurred at a site are listed in this report. This report can include alarms, reports generated and filling of tanks. The date, time and a reference number are normally associated with each event in the report.
- Site - Each site that is on the system has its own site report. Information contained in this report includes site name, address, contact and polling number. Other details can include number of tanks and pumps and the type of fuel within each tank.

Alarms are one the most important function of the tank gauging. They are the first sign that a site may have a problem. The alarms are set through the software using variables, for example, a product low alarm can be set at any level, 2000 Litres or 10,000 Litres. When an alarm is triggered, the central controller on site will report the condition via modem to the main computer. The dialling in of non-critical alarms can be delayed, saving the company high telephone expenses. The most common types of alarms are:

- Product low and high alarms
- Dry tank alarm - Product stock out
- Overfill alarm - Amount of product exceeds tank volume
- Cocktail alarm – A mixture of fuel types in a tank which occurs when a driver enters a delivery to one tank into the site controller and then actually delivers the product to another tank.
- High Leak alarm
- Theft alarm - Product loss with no pump sales.
- High water alarm

- Site tamper alarm - Someone is accessing the site controller.
- Power failure - No power to the site controller.

Alarms that are sent to the main computer will normally be accentuated by bold text and/or a flashing window on the computer screen to indicate the importance of the alarm. The site controller also has the ability to activate a local audible alarm.

Calibration of the Tank Gauges

This is one of, if not the, most important aspects of commissioning a tank gauge within an underground tank. The calibration of the gauge to the tank will determine future level measurements in relation to a reference measurement set at the time of commissioning.

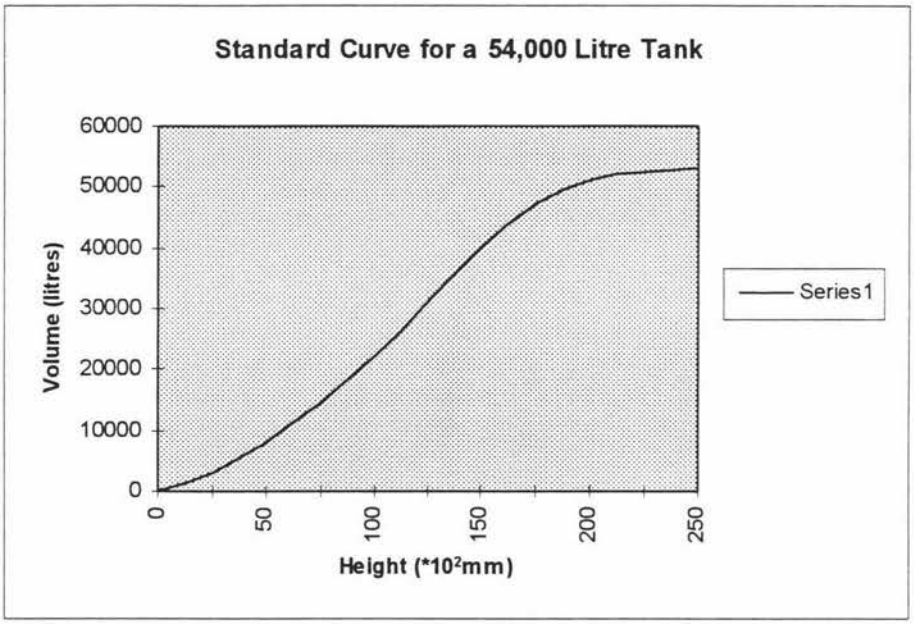
There are four calibration methods available for commissioning tank gauging.

1. Strapping table
2. Standard curve
3. Auto calibration
4. Flood fill

The strapping table (also known as the calibration table) for a tank shows the capacities, or volumes in a tank corresponding to various liquid levels measured from a reference point[8]. The strapping table information is normally gathered from the tank's dipstick. Each dipstick is unique to the tank shape and size.

A standard curve can be generated for a tank by taking the main parameters of the tank. These main parameters are diameter and length. Figure 1 illustrates the standard curve when plotted on a graph. Unfortunately, tanks placed underground tend to distort in shape (bow outwards on the bottom) from the surrounding environment and the amount of fuel within the tank. This will cause an error in the standard curve for the tank.

Fig. 1 Example of a Standard Curve



The third method of calibrating a tank gauge is to leave the gauge to automatically monitor the fuel level over a period of time in normal use. The gauge will create its own strapping table from the monitoring. This is achieved by entering a reference height-volume level in the gauge controller, and leaving the gauge to monitor sales through the pump against movements of fuel within the tank. To create a full strapping table the tank needs to be filled to its maximum and left to empty before refilling the tank and repeating the process. This method will give the true tank shape but does; however, rely on the accuracy of the pump meters and amount of fuel used to fill the tank. It is therefore imperative that pump meters be calibrated on a regular basis.

The final method of calibration is flood filling. Flood filling requires the tank to be full. A master meter is connected to the pump and the site controller. The fuel is then pumped out of the tank, while being measured through the master meter. The information is gathered in the site controller and a curve can be generated.

Automatic tank gauge systems that have the ability to utilise all calibrating methods give the customer the opportunity to compare the curves and decide on the 'best fit' curve. Certain types of tank gauging software also allow the user to manually adjust

the tank curves for a refined shape. This may be used if abnormalities are occurring in the tank shape.

Types of Automatic Tank Gauging Equipment

This sub-section examines the types of automatic tank gauging equipment on the world market today. The first two types are those involved in the Truckstop trials and the first four are the main types offered to petrochemical companies in New Zealand. The number of different types marketed within New Zealand are growing as companies gain the licence to sell tank gauges from overseas tank gauging companies.

Automatic tank gauging systems are predominantly made up of three parts, the probe, site controller and the software package. The probe is used to measure the fuel height within the tank. The probe head is normally attached to the tank top with the probe extending down through the product to the bottom of the tank. The site controller is the 'brains' behind the probe. The controller takes the signals received from the probe head and converts them into product heights and volumes. The software package manipulates the data received from the site controller and generates informative reports for the customer.

The manufacturers of tank gauging equipment claim that their gauges are accurate to +/-0.1mm for fuel heights and +/-1mm for water heights. The accuracy ranges slightly depending on the manufacturer and the type of measuring sensor used.

Linear Float Gauge

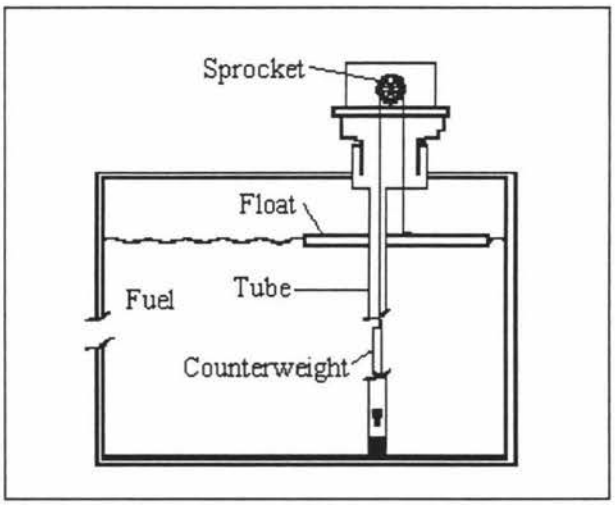
This type of automatic tank gauge has been around since the late 1950's. The principle of measurement has stayed the same, but with technology advances, changes have occurred within the mechanics of the system.

The probe has three main components, the float, counterweight and the linear encoder (transducer). Without one of these components, or if one is slightly out, then measurements taken from the probe would be inaccurate and meaningless.

The float is designed to rest on the surface of the petroleum product with the aid of a precisely weighted counterweight. The two are attached by a stainless steel perforated tape which runs over a friction-less sprocket. A guide tube is placed through the

middle of the float to stop sideways movement of the float. The counterweight is located inside the guide tube along with temperature sensors to record the average temperature of the product. Figure 2 shows the gauge and its components.

Fig. 2 Linear Float Probe[1]



Attached to the sprocket is a linear encoder. The encoder, using incremented measurements is able to record changes in the float position. The measurements are relayed to the gauge software. From a known reference point within the tank, the software is able to calculate the exact height from the encoder's data.

The software in the site controller converts the height readings into volumes with the aid of the strapping table. The accuracy of this system relates back to the resolution of the encoder and the stability of the float.

Companies that produce or service this type of probe are Compac Industries Ltd (New Zealand), Gauging Systems (America), L & J Technologies (America) and Whessoe Varec (America and England).

Magnetostrictive Gauge

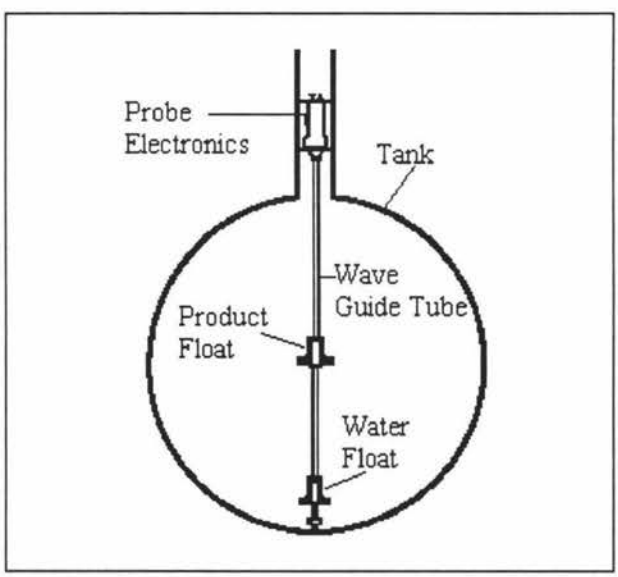
The gauge relies on a time-of-flight principle to gain level measurements and puts the magnetostrictive Weidemann effect to practice. This effect is the combination and

[1] Figure sourced from Compac Industries Ltd.

interaction between two magnetic fields that creates a helical field that produces a slight dynamic twist in a wire [8].

The gauge has only two moving parts, and both of these are precisely weighted floats with magnets embedded in the top of each. One float is used for fuel levels and the other is used for water measurements. The floats encompass a guide tube extending the height of the tank. Inside the tube is a current carrying wire (known as a waveguide) which is able to be excited by the probe electronics. Figure 3 shows the floats and the guide-tube. The excitations produce a magnetic field around the waveguide. This magnetic field interacts with the magnetic field around the floats. The interaction generates a torsion strain pulse in the waveguide. The strain is propagated up the waveguide to the probe head and down to the bottom of the tank where it is dissipated.

Fig. 3 Magnetostrictive Probe



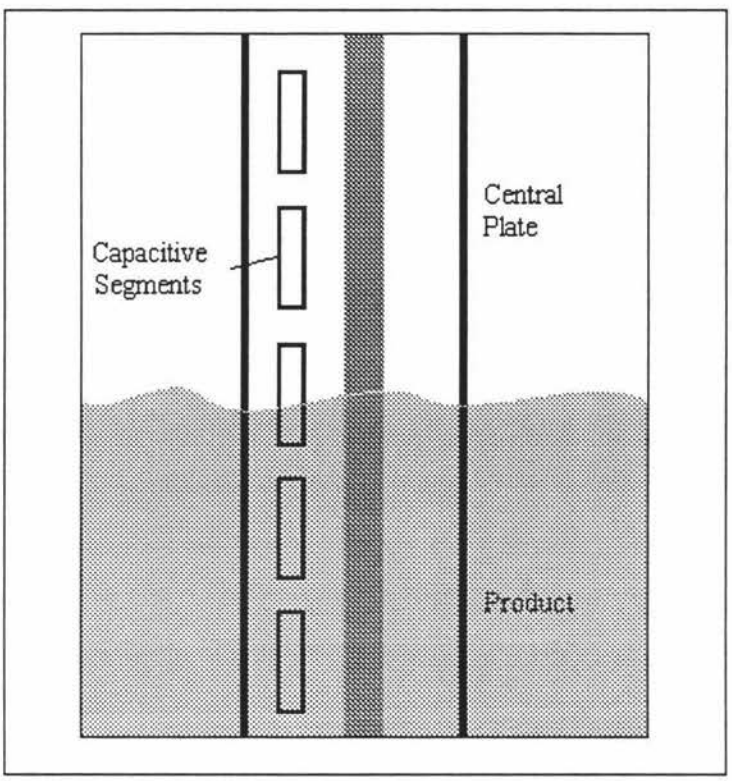
The probe head sends the data of the time taken between the release of the current till the strain pulse reaches the probe to the gauge's controller. The controller is able to calculate the height of the float using its software.

This gauge is manufactured by many companies including Fuelquip Services Ltd (New Zealand) and Veeder Root (Netherlands). Veeder Root are the market leaders in automatic tank gauging with a seventy percent market share in Europe alone.

Capacitance Gauge

The advantage of this gauge is that it has no moving parts. The length of the probe is made up of an array of small capacitive segments attached to a main capacitive plate (Figure 4.). The plate extends the full vertical length of the tank.

Fig. 4 Capacitance Probe



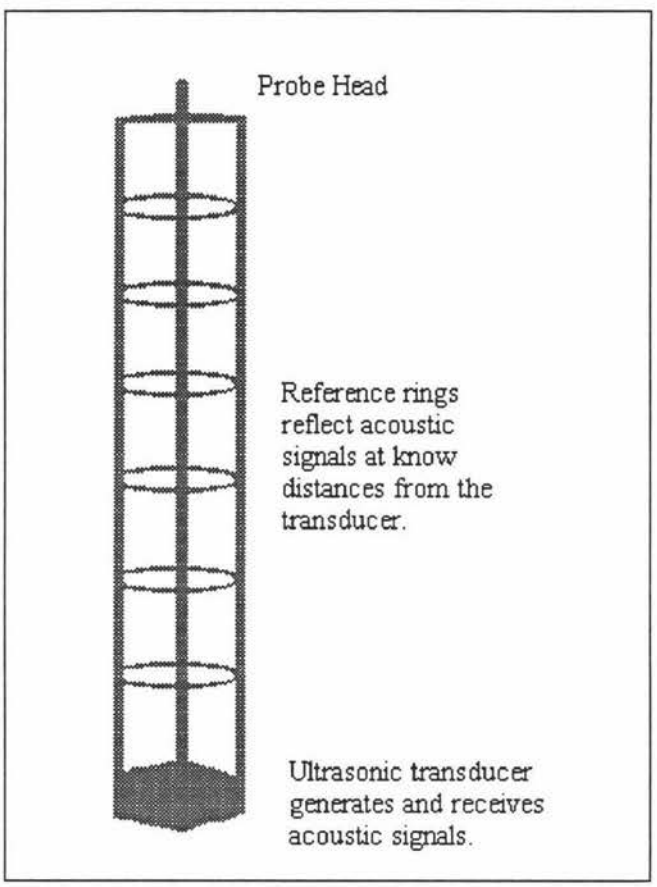
The probe is able to acquire measurements by exploiting the differences in the dielectric constant of fuels and vapours. The dielectric constant of fuels is greater than that of its vapour; therefore, the segments immersed in the fuel will have a higher capacitive value than those in vapour. The probe head performs this task by examining the capacitive segment that interfaces with the fuel/vapour level and the immediate segments either side of this interface. From this examination, and relating the points back to the known reference point, the controller can find the exact height and hence the volume.

Companies that manufacture capacitance probes include Fuelquip Services Ltd (New Zealand) and Enraf B.V. (The Netherlands).

Ultrasonic Gauge

This is another gauge to use the time-of-flight principle to gain the height and volume data. Like the capacitance probe, this probe has no moving parts. The body of the probe is made up of precisely distanced reference rings, a current carrying wire and a transducer which is located at the bottom of the probe on the tank floor (Figure 5.).

Fig. 5 Ultrasonic Probe



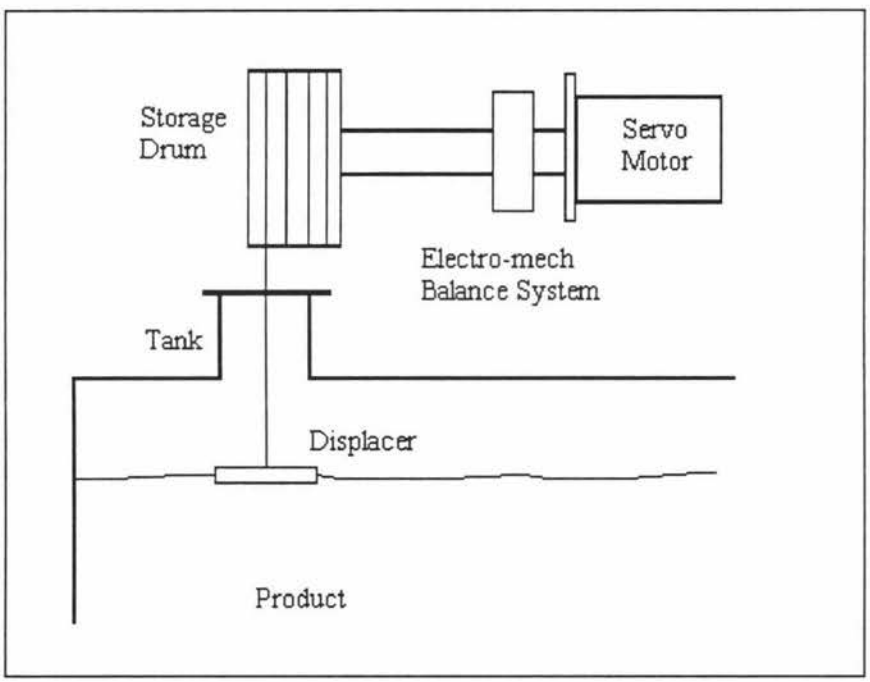
The probe head sends an alternating voltage at ultrasonic frequency down the wire to the transducer. The transducer converts this voltage into ultrasonic (acoustic) signals. These signals are pulsated upwards towards the reference rings and fuel/vapour interface level. Both the rings and interface level reflect the signals back downwards towards the transducer where they are picked up and converted back into electrical signals. The signals are sent upwards to the probe head. The information is transferred to the site controller. The travel time of the sound-waves is used to calculate the product height and volume.

Major companies around the world that manufacture ultrasonic probes are Arizona Instruments Incorporated (America) and Red Jacket Petroleum Products (America).

Servo Gauge

Developed back in the late Fifties, the servo gauge was built to the accuracy requirements of the European companies. The European companies required a higher level of accuracy than there American counterparts at that time. The gauge consists of a weighted displacer, fine wire tape, servo motor, electro-mechanical balance system and a storage drum (Figure 6.).

Fig. 6 Servo Probe



The displacer is lowered into the tank from the storage drum by the servo motor. The motor keeps a moderate tension on the wire tape. Once the displacer penetrates the liquid surface of the product, the tension in the wire slackens off. The tension change is picked up by the electro-mechanical balancing system which reverses the servo motor to find an equilibrium for the displacer and product. Having found the equilibrium position, the servo motor will attempt to track the liquid surface by raising the displacer as liquid level rises and conversely lowering the displacer as liquid level falls[8].

Disadvantages of this gauge include having AC power at the tank top, numerous moving components and having the storage drum magnetically coupled to the servo motor drive shaft as it is operating within a hazardous area.

Enraf B.V. (The Netherlands) manufacturers servo-gauges.

Company Interest in Tank Gauging

BPONZ has been involved with tank gauging for many years. In 1993-94 BPONZ Commercial installed approximately 100 Compac tank gauging systems into its Networked Truckstop and Marine sites around the country. The main reason for the installation was to develop a Just-in-Time refuelling system for Dispatch. This would lessen the number of tanker visits to the site and improve delivery economies. The system should have given sufficient warning of product lows, thus, eliminating the chances of tanks running out of product. However, the accuracy and reliability of the tank gauge systems proved to be insufficient to cater for the needs of the company and the decision was made in late 1994 to have the tank gauge systems de-activated. The systems have not been maintained since installation and many have been removed from their sites.

The present BPONZ interest in tank gauging centres on knowing the status of its tank gauging network, company and industry wide, and whether the company should persist with tank gauging in the near future for wetstock management and environmental protection. The environmental interest is stronger today than in the past because of current legislation.

The future requirements and expectations of tank gauging will be decided after the completion of this thesis. Management at BPONZ will make a decision based on the findings and recommendations of this thesis.

Automatic Tank Gauge Profiles

This part looks at the profiles of the tank gauges produced by Compac Industries Ltd and Fuelquip Services Ltd.

Compac Industries Tank Gauging System

Compac Industries tank gauging system is an integral part of their site monitoring system for Retail and Commercial sites. The Compac Tank Gauging was designed to not only monitor pump sales, price changes, pump problems, but to also monitor and measure the amount of fuel within an underground storage tank. The Compac Tank Gauging uses linear float technology to measure the fuel within the tanks.

Installation of the tank gauge system requires approximately half a day if there are no technical difficulties with the tank fittings and communication links between the pumps, probe and controller.

The Compac Tank Gauging system consists of three main components:

1. The Probe (Linear Float technology)
2. The Central Controller on site with printer
3. The PC NETBASE software

Product Specification

The probe specifications of the Compac Tank Gauging as outlined by Compac Industries Ltd are listed in Table 1.

Table 1 Compac Tank Gauging Specifications

Probe Specification	**Linear Probe**
Maximum probe length	
Standard	5m
Custom	Cut to length
Temperature sensors	Optional extra
Temperature resolution	+/-0.2 Degrees Celsius
Product accuracy	+/-0.2mm
Product accuracy in middle of 50,000 litre tank	+/-4L
Product resolution	+/-0.1mm
Water sensing	Optional extra

Water accuracy	+/-2mm
Water resolution	
Distance from Controller	100m

The temperature and water sensors are optional extras. They are not included in the price schedule. Water sensing has an important part to play in tank gauging. It alerts the administrator to the level of water within a tank, which can effect the quality of fuel if too high.

Alarms offered by the system include:

- Low or High Tank Level
- Buffer 90% full (This is the transaction buffer on the card reader)
- Pump/Tank error
- Leak Detected
- Theft Detected
- Site Tamper

These alarms are recorded in the Event's Log when the site controller is in Event Monitoring mode. The Event's Log details the site's activities, for example, pumps going off-line, pump transactions lost and pass-codes entered into the controller.

Component Pricing Schedule

The price schedule was prepared especially for the author and BPONZ. It must be noted that the pricing is only an indication given to the author and is not a formal quotation. The first price list (Table 2.) is a summary for an upgrade of the processor in the Futra[2] pumps at sites. The old processors are not able to support the new probe. The list also includes a credit for existing tank gauging equipment. A breakdown of the equipment required in the first price schedule can be seen in the Appendix (page 78). There are approximately 47 Futra sites in the Truckstop Network. The prices for

[2] Futra is a generic name for software that is produced by Compac Industries to manage their pumps and card readers at sites.

upgrading an existing site that does not run off a Futra system are shown in the second price schedule (Table 3.).

Table 2 Compac Price Schedule No.1

First Price Schedule: Futra Site Upgrade	
Equipment Required	**Price**
New software/hardware required for upgrade (except probe)	$8,430.00
New Tank Gauge Probe	$2,000.00
TOTAL	**$10,430.00**
Total Credit for an existing Futra site	**-$2,100.00**
Equipment Upgrade Cost per site	**$8,330.00**

Table 3 Compac Price Schedule No. 2

Second Price Schedule: Tank Gauging Based On "*X*" Number Of Tanks	
X New Tank Probes	$2,000.00*X*
Credit on *X* existing Tank Probes (Full purchase price)	-$900.00*X*
Total	**$1,100.00*X***

The above prices do not include installation, commissioning or GST.

Compac are prepared to offer BPONZ a comprehensive monitoring service. The cost per site per month is $50.00. The equipment carries a Compac Industries Ltd Year 2000 Guarantee (see Appendix, page 73).

Fuelquip Services "Fuelgage" Tank Gauging System

Fuelquip Services Ltd tank gauging system, the "Fuelgage" has the ability to use to different type of gauge technologies. The magnetostrictive and the capacitance probes can both be fitted to the Fuelgage system depending on the customer's requirements and budget. This thesis; however, concentrated on the magnetostrictive probe as it has a higher level of accuracy.

Fuelquip developed the system "as a platform to meet the needs of organisations that store and distribute large volumes of petroleum type products"[10]. For BPONZ, this meant focusing on the wetstock management of the unmanned sites and the environmental protection that is of primary importance to these sites.

The Fuelgage system is able to be set up to cater for differing roles at a site. The basic role is supporting as a site totals monitoring system with the ability to provide reconciliation reports. The more advanced role is a site management system capable of alerting the network operator to abnormalities with the site. Three different components make up the Fuelgage system. They are:

1. The Probe (Magnetostrictive or Capacitive)
2. The Integrated Site Controller (I.S.C.)
3. The Inventory Management System (I.M.S.) software

The system can be installed on site in less than half a day if there are no technical problems.

Product Specification

The specifications of the Magnetostrictive and Capacitive probe as outlined by Fuelquip Services Ltd are shown below in Table 4.

Table 4 Fuelquip Probe Specifications

Probe Specifications	**Capacitive**	**Magnetostrictive**
Maximum probe length		
Standard	2.5m	2.5m
Custom	5m	5m
Temperature sensors	4	5
Temperature resolution	0.01 Degree Celsius	0.01 Degree Celsius
Product accuracy	+/-0.5mm	+/-0.03mm
Product accuracy in middle of 50,000 litre tank	+/-1.5L	+/-0.9L

Product resolution	+/-0.05mm	+/-0.0013mm
Water sensing	Yes	Yes
Water accuracy	+/-1mm	+/-0.3mm
Water resolution	+/-0.1mm	+/-0.3mm
Distance from I.S.C	200m/probe	200m/probe

The table highlights the greater reported level of accuracy and resolution of the magnetostrictive probe over the capacitive probe. This was why the magnetostrictive probe was the Fuelquip probe chosen for the investigate.

The integrated site controller is the controller for the Fuelgage probe. It continually receives the data from the probe and translates it into information that can be used for reports and general monitoring of the site. The alarm conditions the integrated site controller is able to monitor are listed below:

- Product Low Alarm
- Tank Dry Alarm
- Water High Alarm
- Cocktail Alarm
- Potential overfill
- Overfill
- Catastrophic leak

Component Pricing Schedule

The pricing schedule was prepared especially for BPONZ for this project in a proposal titled "BP Oil A.T.G. Outline For Retail & Commercial Applications" dated the 7th of November 1997[10]. Two types of pricing schedules are shown in this section. The first set of prices (Table 5.) is a per unit price based on BPONZ installing tank gauging into at least fifty network sites. The second price (Table 6.) set is the amount for a one off purchase from Fuelquip. The author would like to make the reader aware that, as of the 7th of November 1997, the first set of prices were valid for ninety days.

Table 5 Fuelquip Price Schedule No. 1

Description	Unit Price
Integrated Site Controller (ISC) including (One per site)	$4,150.00
2.5m Magnetostrictive probe including - (One per tank) OR 2.5m Capacitive probe including - (One per tank)	$2,286.00 $980.00
One time I.M.S. license fee for use by BPONZ Additional copies for use by BPONZ	$5,450.00 $1,250.00

Standard one off unit prices for the Fuelgage package.

Table 6 Fuelquip Price Schedule No. 2

Description	Unit Price
Integrated Site Controller (ISC) - (One per site) (Does not include leak detection module)	$4,700.00
2.5m Magnetostrictive probe - (One per site) OR 2.5m Capacitive probe - (One per site)	$2,550.00 $1,275.00

Fuelquip would offer two months free support and backup monitoring on all sites if BPONZ were to go ahead with the installation of the Fuelgage package. This offer is only valid if Fuelquip are linked to the I.M.S. From the monitoring, Fuelquip would be able to prepare a detailed proposal for future monitoring. Two calibration reviews on each probe/tank would also be included in the offer. The full price schedule can be seen in the Appendix (page 79).

SUITABILITY OF AUTOMATIC TANK GAUGING

The investigation into the suitability of tank gauging can be broken up into four different parts, each playing an important role in the outcome and recommendations of this project. The four parts included:

- investigating the two tank gauge systems,
- finding the number, frequency and volume of dry tanks at truckstops,
- finding the value and location of the existing tank gauging equipment at truckstops,
- producing a delivery cost model to include tank gauging.

Tank Gauge Trial Site Experiment

Aim

The aim of the trial was to find out the accuracy and reliability of the two systems in relation to the measurements taken from each tank dipstick and book stock. Eight trial sites were required in total, four hosting Compac tank gauging and four hosting Fuelquip tank gauging. All of the trial sites were to be monitored for a period of at least three months. This would give enough time for data collection.

Method

The first step in the experiment was to identify the trial sites. Due to the confidential nature of this project, the site names will not be disclosed in this thesis. The criteria for the sites were; location, sales volume and whether the site already had existing tank gauging installed. The Commercial Transport Development Manager would be used to help locate the sites. Each site had to be checked to see if tank gauging was compatible with the site and the installation costs were not going to be extreme.

Once installed, each tank gauge was given time to calibrate. This was a critical part of the trial as calibration has a major bearing on the results gathered from the tank gauges.

It was envisaged that the author would monitor both systems from Head Office. Software and management training would be given by Fuelquip and Compac technicians. The data required for analysis was;

- the daily, weekly and monthly reconciliations of the each system,
- the automatic tank gauge daily dip and the dip prior to each delivery,
- the driver dip recorded on the OVC before each delivery,
- the amount of fuel that was delivered to the sites, and
- the pump sales (daily and between each delivery) from the tank gauge's and the BPONZ computer system.

The stock reconciliation information from the two systems would be transferred into daily and weekly tables. The tables (Table 7 & 8) would highlight each system's loss/gain variances and percentage variances.

Table 7 Daily Reconciliation Figures

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Dec	-1123	8134	7046	0	-0.43
23-Dec	22869	4087	26956	0	0.00
24-Dec	-2387	2425	0	0	1.57
25-Dec	-217	220	0	0	1.36
26-Dec	-739	716	0	0	-3.21
27-Dec	3561	1068	4597	0	3.00
28-Dec	-852	837	0	0	-1.79
TANK TOTALS	21112	17487	38599	0	**0.00**

Table 8 Weekly Reconciliation Figures

December	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	8987	9709	18618	78	0.80
Week 2	-3658	31786	27927	201	0.63
Week 3	-13762	36807	22897	148	0.40
Week 4	21112	17487	38599	0	0.00
Week 5 (3 days)	-7542	7529	0	-13	-0.17
MONTH TOTALS	5137	103318	108041	414	**0.40**

The monthly percentage variances would be compared with the industry standard of 0.4% for a one month period. Continuous monthly variances greater than 0.4% should be investigated by the oil company.

The volume change and pump sales in the above tables are taken directly from the ATG reports. The fueldrop volume is taken from the tanker driver's OVC. The net variance and percentage variance is calculated using the following formulas:

Net Variance

Volume Change + Pump Sales - Fueldrop = Net Variance

Percentage Variance

(Net Variance / Pump Sales) x 100 = Percentage Variance

A comparison between the monthly reconciliations of the tank gauging systems and the BPONZ system reconciliations would be performed. This comparison would highlight the monthly gain/losses of each system against the BPONZ system and the accuracy/inaccuracy of the systems (including BPONZ current stock reconciliation system).

Dipstick accuracy can be compared with that of the tank gauge dips. The purpose is to find out if the accuracy of the tank gauging dips is higher than that of the dipstick. An example table is set out below.

Table 9 Comparison of Dip Readings

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	T/G Error	Dip Error
4 Dec 97	5968	6400	22500	31850	0.52	3.71
5 Dec 97	17626	17500	19500	10751	-0.12	-2.58
10-Dec-97						

The tank gauge dip (T/G Dip) is the fuel volume prior to the delivery. The driver dip is the 'before' dipstick reading entered into the OVC by the tanker driver. The fueldrop volume is identical to the fueldrops in the above two tables. The pump sales column is the amount of sales between each fueldrop period. The percentage tank gauge errors (T/G Error) and dipstick errors (Dip Error) are calculated in the following ways:

Percentage T/G Error

(T/G Dip + Fueldrop - Pump Sales as recorded at next delivery - T/G Dip as recorded at next delivery) / T/G Dip as recorded at next delivery x 100 = Percentage T/G Error
Example using the figures in the above table:
(5968 + 22500 - 10751 - 17626) / 17626 x 100 = 0.52%

Percentage Dip Error (same as Percentage T/G Error except using Driver Dip figures)
(Driver Dip + Fueldrop - Pump Sales as recorded at next delivery - Driver Dip as recorded at next delivery) / Driver Dip as recorded at next delivery x 100 = Percentage Dip Error
Example using the figures in the above table:
(6400 + 22500 - 10751 - 17500) / 17500 x 100 = 3.71%

The final comparison of the trial sites was between the recorded fueldrop amounts of the tank gauging systems and the driver delivery figures. For the purpose of the comparison, the author was using the tanker driver figures as the controlled known amount and the tank gauging as the perceived amount. The variances (actual and percentage) between the two delivery figures were calculated.

A late inclusion into the trial was the "rubbing" of dipsticks. The aim was to identify any anomalies with the dipsticks. Abnormalities could be unclear markings, inaccurate markings and disproportionate markings where an imperial measured tank has had its dipstick converted to metric units. Each tank's dipstick was superimposed onto paper tape. The tape would then be checked to see if the dipstick was calibrated to the tank shape. The rubbings can also show the difficulties tanker drivers have at certain sites reading dipsticks. A summary report of ever tank dipstick would be produced.

Dry Tank Records

The aim of acquiring dry tank records was to find out how many truckstops had run dry of product in the past two years, for how long and the reason behind the tank(s) running dry. Analysing two years would incorporate seasonal off-takes and any other fluctuations in off-take from the site. The information would then be used to find out the total loss in volume and profit to BPONZ Commercial in one year due to tanks running short of product.

The total loss in volume would be calculated by multiplying the hours the tanks were dry by the average hourly throughput of the truckstop where the dry tank occurred. This figure would be very conservative as it does not take into account if the tank was run dry during a busy period. The loss in monetary value to BPONZ would be found by multiplying the average margin between wholesale and resale price (approximately ten cents) by the total volume. The calculation would not take into account expenses and loss of customers to alternative fuel suppliers.

Value and Location of Existing Tank Gauge Assets

Finding out the book value of Compac's existing tank gauging would give the author an indication of the importance of the equipment. For example, if the book value of the equipment was high, and the Compac trial sites met BPONZ needs, then more consideration would be given to restoring the equipment.

Each truckstop's assets would be searched to find the location of the existing equipment. The procedure for this includes:

1. Opening BPONZ Customer Management System (CMS) program.
2. Locating all of the Truckstops in Commercial's Network.
3. Listing the assets of each Truckstop.
4. Searching the assets for reference to tank gauging.
5. Summarising the costs (historical and book value) of tank gauging assets.

Delivery Cost Model

The purpose of modelling the delivery costs would be to gauge the cost benefits, if any, in using tank gauging to assist with dispatch planning. Tank gauging would give the planners continuous monitoring of fuel stocks at a site, therefore, enabling them to schedule fueldrops when the volume at the site has reached a set refuelling point. This point would most probably be set at 10,000L on the tank gauge with a product low alarm at 8000L. The benefits of this include making fewer trips to a site with a larger delivery volume, thus cutting the average delivery cost per litre. This model will give an indication as to if the delivery benefits outweigh the costs of installation.

The model would be set out using 1996 figures for the current system. These would be compared to figures if the site were to only have full tanker deliveries to the site. The data required for the nine truckstops includes the average annual trip cost, the fueldrop size, annual volume for the year and the number of trips to the truckstop in the year.

RESULTS

The results section will convey the findings of the material set out in the above section. Sub-headings will break up the section to give the reader a clearer understanding of the results.

Trial Site Results

From discussions with BP's Commercial Transport Development Manager, Fuelquip Services Ltd, and Compac Industries Ltd, the author was able to set up nine Truckstop sites around New Zealand for the trials. Fuelquip had five installations (F1 to F5) and Compac four installations (C1 to C4). The profiles of each site are in the Appendix (pages 81-82). It can be seen from the profiles that three of the four Compac sites have a siphoned system, i.e. two or more tanks are connected to each other via a siphon pipe. Only one of the tanks has a pump for off-takes. Generally, siphoned systems are less accurate than a single tank as more time is required for the tanks to reach equilibrium after a delivery and after the pumps have been used. The choice of sites unfortunately lead to a disproportionate sample of siphoned systems for Compac. Factors did limit the choice of sites and these included location, existing tank gauging installations and the budget of the project.

The five Fuelquip sites were up and running by mid-September 1997. Sites, F1 and F2 were commissioned in April 1997, F4 in August and F3 and F5 in September of the same year. Compac sites were commissioned in early November 1997. Installation problems were, in part, responsible for the late commissioning of the Compac sites. All of the identifiable problems are listed in the Appendix (page 158). The author also believes that Compac Industries did not view the project as a major priority for the company. The reasoning behind this statement is that tasks took a long time to complete and some were not completed at all. An example of this was when the author asked, on four separate occasions, for the trial software from Compac to test but never received it.

Training was given in the use of the two-tank gauge management systems. Technicians from each company held a one-day course. Fuelquip's Inventory

Management System was installed in April 1997. The author had full responsibility to monitor the sites F1-F5. Fuelquip's Help-desk also monitored the sites but did not act on the alarms and reports produced, at the request of the author (since this was a trial). Since the Compac tank gauging software is part of a package to manage the total site operations, it was decided that Compac monitor the tank gauge system and send the appropriate data to BPONZ. As mentioned above, the software for Compac's system was never installed on the dedicated computer located in BP's Head Office. The purpose of acquiring the software was to test its suitability and "user friendliness".

The author was very impressed with the calibration of the two-tank gauge systems. Calibration is one of the most crucial parts of commissioning the tank gauging. All of the tank gauges were calibrated within one week of installation. One of the tank gauges, F1, had to be re-calibrated at the start of November. This was required since the daily and weekly reconciliations were high. Fuelquip thought the high reconciliations were a result of the tank "floating" within its external bund, causing the tank to distort and/or move the probe out of alignment. Modifications to the tank curves were performed during the year on the Fuelquip sites using their software. The modifications were performed at the bottom and top of the curves where calibration is difficult.

Data gathering with the Fuelquip software was very simple. The system was set to dial each site early in the morning and retrieve the daily information for analysis. The cost of calling sites is less in the early hours of the day compared to during working hours, thus, saving on telephone expenses. Communication would also be at a minimum at the site as throughputs would be low. The Compac system was set up in the same manner. It dialled up the first Compac site at midnight each night. No human intervention was required for this task for either system.

It was thought more in-depth statistical tests (e.g. Random Walk Test) could be performed on the data that was gathered; unfortunately, there were too many variables that could not be measured. These included the precise amount of fuel that was delivered to the tank, the effect of ground-water on the tank and the actual shape of

the tank. Without these variables an accurate, in-depth data analysis could not be performed; therefore, simple analysis of the data was performed.

The data gathered from Compac was slightly different from the prepared tables. This was not a big problem and the tables were altered slightly to allow for the difference. Essentially this was due to the fact that Compac used total volumes instead of volume change. Volume change could be found by subtracting one day's total against the previous day's total. Compac were unable to provide daily reconciliations on a regular basis until mid January and this is why they were not been included in the result's section.

The daily and weekly results from the Fuelquip sites were very pleasing. Site F1 was the only site that was consistently giving negative variances (between -1% and -3%), which meant, the site was losing fuel somewhere. The loss was not caused by a leak as the tank is above ground and product would be visible on the ground. The only reason Fuelquip and the author could come up with as to why the daily, weekly and monthly variances were negative, was the problem that occurred with the tank moving in the bund. This could have moved the probe off-centre and/or distorted the tank shape. As mentioned earlier, the tank curve was adjusted to give improved results in reconciliations.

The most accurate site in the Fuelquip trial was F2. This is quite astounding as the tank is above ground and temperature has a major effect on the expansion and contraction of the fuel. Eight of the nine months were under the 0.4% variance for fuel reconciliations. This figure is the industry standard for product reconciliations over a period of one month. The monthly percentage variance ranged from -0.27% to 0.44%.

Site F3 had three months of reconciliations. The percentage variance range was from 0.28% to 0.48%. The site was improving with time, but due to an upgrade in December, site records were unable to be taken and analysed.

Site F4's variance range was from -0.63% (first month) to 0.43%. Again, the site was improving over time. These results were extremely pleasing as the reasonably high daily reconciliations showed the balance between negative variances one day and positive the next day. This is a very common occurrence in tank gauging and manual reconciliations where one period is normally offset by the next period. A reason for the high daily variances could be that the site's throughput is not as high as the other trial sites and a loss/gain of 25 Litres produced a higher percentage variance.

Site F5 had a variance range from -1.63% to 7.55%. These results do not, in the author's opinion, do the site justice. The cause of the high variances was from two fuel deliveries (one in October and one in December) not being indicated as a fueldrop by the tank's probe. A problem with communication between the pumps and the site controller on the 8th and 9th of October was also the cause of the high variance of 7.55%. With these "glitches" aside, the site was producing good reconciliations as can be seen with the weekly reports and the monthly variance of 0.12% for November. All of the above daily, weekly and monthly reconciliation reports are shown in the Appendix (see pages 98-152).

The Compac trial results were not quite as good as the Fuelquip sites. The main reasons for the higher reconciliations indicated by Compac were:

- the tanks ran on a siphon system (expect C3), and
- the tanks were calibrated as one.

Compac suggested calibrating each siphoned tank separately by blocking the pipe-work between the two tanks. This would give a tank curve for each tank rather than a curve for the whole system. Site C1 was calibrated using this method and the difference can be seen in the reconciliations for the site. Site C1 had monthly variances ranging from 0.01% to 3.33% and weekly variances ranging from 0.35% to 19.32%. The high weekly variance of 19.32% was due to the initial calibration of the probe and hence resulted in November's variance of 3.33%. This site is a high volume site and the weekly and monthly results were extremely good. The last two months of monitoring had a variance of well under the tolerated industry standard of 0.4%.

Site C2 had a variance range from 3.03% to 19.41%. Again, the high variance was in the initial calibration month and the results improved over time. This can be seen in the improved weekly variances of 2-3%. These results are still high, but this is partly because three tanks are involved in the reconciliation. If the single tank was isolated, then the author feels the reconciliations would have been more accurate; however, the results are above the industry standard.

Site C3's reconciliation data and results were not included in this thesis as the tank gauging was not connected to all the pumps. After the first week of monitoring, Compac noticed that the Retail site next to the Truckstop was drawing off the diesel tank for their diesel pump. The Compac site controller could not track this amount as it was not connected to the Retail pump. The cost to have the Retail pump connected was considered too high for the project's budget and length of trial. If connected, the site would have had only one month of full monitoring.

Site C4's monthly reconciliation ranged from 1.47% to 10.32%. The weekly range was from 0.66% to 28.57%. The high reconciliations were in the first month when the tank was being calibrated. The site's weekly variances fluctuated from time to time, but when settled was producing variances in the range of 0.66% to 2%.

Compac Industries technicians were extremely pleased with the results produced from sites C1, C2 and C4. These sites were all running siphoned systems. The Compac daily, weekly and monthly tables are in the Appendix (see pages 83-97).

A comparison of monthly reconciliations could be made between the tank gauging and the current BP Commercial method. The comparison was to highlight whether the accuracy of the tank gauging reconciliations is greater than that of the current system. Table 10 summarizes the total loss/gain percentage variance of the sites over the trial. The complete table can be viewed in the Appendix (see page 157).

Table 10 Summary of ATG and Manual Monthly Reconciliations

Site Name	Total Loss/Gain in Litres		% Loss/Gain	
	BP	ATG	BP	ATG
C1	18,030	2,136	0.83	0.10
C2	-10,099	16,965	-1.29	2.16
C3	-6,267	No value	-1.59	No Value
C4	-8,277	28739	-0.83	2.87
Average	**-6,613**	**47,840**	**-0.15**	**1.10**
F1	-21,760	-8,144	-3.71	-1.39
F2	10,450	1,030	1.79	0.18
F3	-7,129	419	-4.13	0.24
F4	2,934	598	-0.57	0.11
F5	-8,658	612	-2.99	0.21
Average	**-24,163**	**-5,494**	**-1.13**	**-0.26**

Reference: BP - BP Oil stock reconciliation

ATG - Automatic Tank Gauging

From examining the above table, it is clear that the Fuelquip tank gauge reconciliations have a higher accuracy over consecutive monthly periods. Site C1 displays extremely good test results, indicating that siphoned systems can produce excellent results if calibrated accurately. There is no value for site C3 as the tank gauge results showed enormous losses due to the retail diesel pump drawing from the tank. Sites' C2 and C4 produced high monthly reconciliations due to some high weekly reconciliations. The Fuelquip sites showed exceptional results, only F1 was above 0.2% loss/gain, and this may have been due to the problem that occurred with the tank. The loss to BP Commercial per litre of diesel is approximately twenty-five cents. Calculating the loss of revenue of the current system for the above sites totals $7694.00.

The table prepared to compare the accuracy of the dipstick with that of the tank gauge could not be used for the Compac tank gauging. This was because the tank gauging only takes "snap shots" of the tank ever hour. The system records the deliveries but not the pump sales immediately; therefore, pump sales between the delivery and the next "snap shot" would not be recorded in the "snap shot report". The time lag would make the tables inaccurate. The Fuelquip gauge was able to catch all of the required data for this table. The table is a manipulated reconciliation table working on fill-to-fill variances. The aim was to highlight the accuracy of the driver dips versus the tank gauge dips at the same time. Again, the industry reconciliation standard of +/-0.4% fuel variance could be used as a "controlled" value.

All of the Fuelquip sites highlighted the greater accuracy of the tank gauge over the driver's reading of the dipstick. The only site that was recording percentage errors constantly over 0.4% was site F1. The cause can only be contributed to the reasoning set out above in the reconciliation trial. Even so, the tank gauge error was below that of the driver dip error for more than 80% of readings. All other sites recorded higher percentages of tank gauge dips below that of the driver dips, namely; Site F2 - 93%, F3 - 88%, F4 - 91% and F5 - 96%. The full set of results can be viewed in the Appendix under each site's dip results.

The last set of data to analyse was the accuracy when measuring the volume of the fueldrop into the tanks and comparing this with the readings from the dispatch records. The dispatch records show the amount of product that entered the tanker at the Bulk Fuel Terminal. The accuracy of the meters at the terminals is approximately 0.04% at 1600L/min throughput. The limitations on this test are the accuracy of the meters and output volume of fuel delivered into the tanks. The second limitation was of greatest concern to the accuracy of this test. An oil company is never going to be exactly sure of the amount delivered into each tank unless a meter is measuring the volume exiting the tanker. It is not uncommon for litreage to differ from leaving the terminal to when entering the site's tank(s). The differences can be due to:

- heat transfer in the trucks tanks. This happens when the truck is in motion. The air movements along the tanks will cause the steel to change temperature, thus changing the temperature of the fuel inside the tanks. This temperature change will cause the fuel to expand or contract.
- tanker drivers shutting the exit valve before all the product has emptied into the underground tank.
- tanker driver theft which is extremely unlikely, but cannot be ruled out.
- small spill of fuel on-site.

The results of this test are tabled in the Appendix under the headings of "Delivery Results" for each site. A summary of the percentage variance between the dispatch fueldrop records and the tank gauge recordings are displayed in Table 11 below.

Table 11 Summary of Differences between Tanker and ATG Fueldrops.

Site	% Range	Comments
C1	-3.99 to 2.12	This is the best Compac site with a siphon system by far. Many of the percentage variance figures were within +/-1%.
C2	-0.59 to 5.17	The main variance range was between 1% and 4%.
C3	-1.77 to 1.26	The site has only one tank. Fifty percent of results were between 1% and 2%.
C4	-3.37 to 2.87	No comments.
F1	-5.79 to 5.89	Approximately sixty-five percent of results were within +/-1%.
F2	-0.89 to 1.22	The best results by far and the tank is an above ground installation.
F3	-0.88 to 1.24	Sixty percent of results were within +/-0.4% standard.
F4	-2.55 to 2.91	Sixty-five percent of results were within +/-1%.
F5	-1.17 to 1.14	Seventy-four percent of results were within the +/-0.4% standard.

Note: Table excludes percentage variances that were extremely abnormal (high).

The table shows that the precise measurement of a fueldrop is difficult to gauge. Measuring a fueldrop into siphoned tanks is harder than single tanks due to the time required for the tanks to return to equilibrium. Again, the Fuelquip system displayed a higher accuracy, when measuring volume, than the Compac system.

As explained above, these results are only accurate if the metered amount measured at the terminal actually was the amount that was delivered into the tank(s). It was; therefore, the author's view that this test was not comprehensive enough to test the accuracy of the tank gauges measuring fuel deliveries. To obtain comprehensive results, a meter (of accuracy of approximately +/-0.01) would have to be attached to the tanker outlets to meter the volume of fuel exiting the truck tanks.

The results of the dipstick rubbings were very interesting and varied. The table below summarises each tank and comments on its dipstick.

Table 12 Dipstick Recordings from each Trial Site Tank

Site	Tank No.	Comments
C1	1	Dipstick max. limit - 54,100L; Markings ever 500L above the 5000L mark; Markings ever 200L below 5000L. Perfect match when tape is folded in half at 27050L.
	2	Dipstick max. limit - 50,000L; Markings ever 200L over whole dipstick. Dipstick is out by approximately 500-600L.
C2	1	Imperial tank with dipstick made in metric. Dipstick limit - 31472; No even markings over dipstick; therefore difficult to read between markings. Out by 170L which is still good.
	2	Dipstick limit - 31472; Imperial tank with dipstick made in metric. No even markings on dipstick; therefore difficult to read between markings. Dipstick out by approximately 100L.
	3	Dipstick max. limit - 43,300; Markings ever 500L above the 5000L mark; Markings ever 200L below 5000L. Dipstick out by approximately 300L.
C3	1	Dipstick max limit - 50,000L; Markings ever 200L over whole dipstick. Dipstick is out

		by approximately 500-600L.
C4	1	Dipstick max. limit - 54,100L; Markings ever 500L above the 5000L mark; Markings ever 200L below 5000L. Perfect match when tape is folded in half at 27050L.
	2	Dipstick max. limit - 50,000L; Markings ever 200L over whole dipstick. Dipstick is out by approximately 500-600L.
F1	1	Dipstick SFL limit - 38,000L; Markings ever 500L above the 2000L mark; Markings ever 200L below 2000L. Tank is exactly the same as F2, therefore dipstick should be a 40,000L stick.
F2	1	Dipstick SFL limit - 40,000L; Markings ever 250L over whole of dipstick. Dipstick only shows markings to safe fill level.
F3	1	Dipstick max. limit - 54,100L; Markings ever 500L above the 5000L mark; Markings ever 200L below 5000L. Perfect match when tape is folded in half at 27050L.
F4	1	Dipstick max. limit - 54,100L; Markings ever 500L above the 5000L mark; Markings ever 200L below 5000L. Perfect match when tape is folded in half at 27050L.
F5	1	Dipstick max. limit - 40,000L; Markings ever 200L over the whole dipstick. Dipstick is out by approximately 100L.

Note: SFL - Safe Fill Limit

The above table can give the reader insight into the many different types of dipsticks. Some of the dipsticks have been converted to metric after being built in imperial measurements. Other dipsticks do not show the maximum fill limit, only the safe fill limit, therefore, tanker drivers are unable to know how many litres are above the safe fill limit. These dipsticks are unable to be tested by folding the tape in half. It is apparent from the table above that F1's dipstick is not the correct one for the tank. This was found out by going back to the manufacturers of the tank and acquiring the tank details. Site C1, Tank 2 and C4, Tank 2 are two tanks that have a discrepancy in their dipsticks. This shows that dipsticks are not accurate and are only indications to the volume of fuel in a tank.

Dry Tank Findings

The period used to examine the amount of dry tanks was from February 1995 to February 1997. BP's new computer system (installed in March 1997) does not have a function for capturing dry tank information; therefore, 1997 information could not be used. Currently, dry tank information is manually recorded on forms by the Dispatch Planners.

In the two years investigated, one hundred and ninety-seven dry tanks were recorded from approximately 60 sites. From the records, the number that were actually dry (i.e. pump not working) was one hundred and thirty-four from 56 sites. The other 63 'dry tanks' were still pumping fuel when the tanker driver arrived on site with a delivery.

The major reason for the dry tanks was an unpredictable increase in off-take from the sites. The increases were normally within twenty to thirty percent of the site's throughput. The full table can be viewed in the Appendix (pages 153-156).

The calculation to find the cost of dry tanks was very crude, but it did give an indication of the cost to BPONZ. One cost variable that the calculation could not take into account, but was of great importance, was the loss of customers to other fuel suppliers. The total number of hours dry for all sites in the period was calculated to be 602 with a total loss in fuel volumes of 73,352 litres. The loss in profit from this amount is $7,335.20. This is a very conservative figure and the author believes the cost could be at least three times this amount. Even so, the amount is not that substantial over a period of two years. The major cost to BPONZ would come from the loss of customers and the damage to the company's reputation that would result as a consequence.

It is therefore imperative that BPONZ strives to minimise the amount of tanks running dry for two reasons, the first is the loss of profit while the tank is dry and the second, which is of greater importance to the continuing goal, the loss of customers.

Existing Tank Gauging Assets

The examination of existing tank gauging assets was performed for two reasons, one, to find the location of the assets for BPONZ and two, to find the value of these assets. The value of the assets could have a bearing on the upgrade of the Compac equipment. The Compac tank gauging was installed in tanks around the country in 1993 and 1994. Approximately one hundred sites had tank gauging installed from Networked Truckstop sites to Marine Facilities. BP's Customer Management System was searched for any site that had reference to tank gauging. Only fifty-four sites were listed with tank gauging as an asset. The total net book value of these sites was approximately $95,000. The historical cost of the assets was approximately $480,000. The assets have depreciated almost $400,000 in the four to five years since installation.

Due to the confidential nature of the project, the locations of assets are not disclosed in this thesis.

Delivery Cost Modelling

The delivery cost modelling of the nine Truckstops was performed to compare the present cost delivery data with theoretical modelling of deliveries with tank gauging. Assumptions made in the model were:

- that the cost per site to set up tank gauging would be $10,000,
- the life expectancy of tank gauging was 10 years,
- the maintenance costs would start up $300 per annum and increase at a rate of 10% per year,
- the administrative savings would be fixed at $100 per annum.

The results from each Truckstop can be viewed in the Appendix under the headings of "Delivery Cost Model" for each site.

Five of the nine Truckstop sites gave a negative net present value (NVP) of the 10-year analysis. The values ranged from -$1,424 for site F2 to -$6,290 for site F4. The internal rate of return (IRR) of these five sites was positive except for site F4, even so, the figures were below the NPV of 15% that BPONZ Commercial aims to achieve with assets. All of the sites, except C2, had an annual throughput volume of less than 1.8 million litres.

Four Truckstops produced a positive NVP from the model. The range was from $1,323 to $2,857. All of these sites had an annual throughput volume of more than 1.8 million litres.

DISCUSSION

This part of the section will bring together all of the above results and findings along with other factors that will influence the outcome of the thesis. The discussion will be divided into sub-headings of Financial, Environmental, Legislation, Stock Control, Dispatch and Other.

Financial

The initial capital investment required from BPONZ to install tank gauging into all of its networked Truckstop sites would be at least $800,000 for the Fuelquip magnetostrictive tank gauging and $940,000 for the Compac linear tank gauging. The exact figures of each installation are shown in the Appendix (page 80). The initial investment is extremely high and justifications for the installations would have to indicate large financial savings for the company.

Environmental

Tank gauging offers a leak detection option for environmental requirements. The problem with the option is that the leak threshold rate is site dependent. Rates have to be set differently at sites due to ground-water and tidal effects, site location (i.e. next to a highway) and settling periods. Therefore, leak parameters have to be regularly revised so the site does not constantly produce false alarms. The Fuelquip system is able to change the leak threshold rate. The Compac system is unable to change this rate and is set at 0.4 litres per hour. This is a disadvantage of the Compac system when the site is affected by large noise disturbances.

BPONZ Commercial is already taking a proactive stance with a sound environmental program (called Risk Ranking). The program monitors and manages the condition of underground tanks and the surrounding environment. An external company or BP engineer evaluates the sites using a ranking schedule (see Appendix, pages 159-160). A high-risk site will have appropriate action taken against it to mitigate the risk of damage to the environment from potential leaks. Leak detection systems (i.e. Observation wells) are also being installed in new Truckstop sites and the new tanks are fitted with secondary containment.

BP Commercial spent approximately $31,000 on response to spills in 1997. Unfortunately, not enough is known and calculated about the total loss to the company as a result of the spills to include in the final outcome. Most of the spills were a result of driver error when refilling a tank, and thus, tank gauging would have not reduced the effect or alerted users to the situation.

Legislation

As mentioned in the Background section, BP is currently conforming with New Zealand legislation in the monitoring and management of its petroleum storage facilities. However, if New Zealand was to follow legislation introduced by the Environmental Protection Agency (EPA) of the United States then we might see more stringent laws passed in three to five years. By the end of 1998 all owners of petroleum storage tanks in the United States have to comply with EPA regulations or face closure of their non-complying fuelling facilities. The regulations state that fuel facilities require at least one type of leak detection system for protection against spills, overfills and corrosion. If followed, BPONZ will have to decide which leak detection method to install on its sites. The company is already installing observation wells in its new sites. Observation wells conform with the new EPA legislation.

Stock Control

The stock reconciliations within Commercial are inaccurate and need to be improved. Presently, the inaccuracies in obtaining data are far too high to run an effective stock control system. An example of these inaccuracies is the difference in time between the last dip of the month and the pump sales transactions. The results of the Fuelquip tank gauging proved that they were of a higher accuracy than the current method. Compac results were less satisfactory.

Two options would be for the tanker drivers to record the manual 'tote' readings on the pumps when they make a delivery and metering the fuel outlets of the tanker. The manual 'tote' figure might be able to be entered into the driver's OVC. The benefits from this include:

- Volume and sales readings taken at the same point in time.

- Higher accuracy of delivered fuel volumes (only if meter is as accurate as the meters at the terminals).
- Frequency of reconciling stock could increase.

Dispatch

Running the delivery cost model produced mixed results as can be seen in the above section. The results pointed to the fact that it would not be beneficial for tank gauging equipment to be installed in all of the Truckstops. Some Truckstops do benefit from the installation of tank gauging, but then the whole monitoring and management system of the equipment would not be utilised to its greatest potential. Dispatch planners would have to monitor and run two different computer systems causing confusion and time delays.

The occurrence of tanks running out of fuel at a site is a problem that Dispatch takes seriously. The cost of dry tanks over the last two years has been minimal to the company. Unfortunately, they do not take into account the loss of customers wanting fuel when the tanks are dry and deciding to use a competitor's refuelling site.

Other

The tank gauge prices outlined above in 'Financial' are only installation costs and do not include long-term operation and maintenance costs. These costs are hard to calculate and would require contracts with the supplying companies. Operation costs include monitoring of sites and Compac supplied a price for the monitoring. The price was $50.00 per site per month based on a network of fifty sites. Fuelquip would prepare a monitoring proposal once requirements with BPONZ were discussed. Having the outside companies monitor the system would not help BPONZ with its Just-in-Time scheduling.

BPONZ Commercial delivery fuel to both bulk and consignment customers. Bulk customers are charged on delivery of fuel while consignments are charged on fuel off-take from the sites. An offer to large bulk customers in the future could be that BPONZ manage and monitor the customer's fuel stocks. Tank gauging could be a very useful tool in this type of situation to perform the monitoring, but only if the site's

pumps have been calibrated accurately. The customer contract could specify the service provided and for what period of time. Obviously, BPONZ would have to gain some type of benefit from the service. The benefit could be in the form of a monthly monitoring fee and/or an extended supply contract. The customer benefits from not having the responsibility of monitoring and managing the petroleum stock on-site.

Compac advised the author in January 1998 that they had obtained the licence to supply Magnetostrictive Probes from Veeder Root Inc. Veeder Root are the worldwide market leaders in tank gauging and probes would be available from the second quarter of 1998. A price summary of the probe would be interesting to compare with that of the Fuelquip probe as the accuracy of the two probes would be very similar.

CONCLUSION

Automatic tank gauging has improved considerably in the last five years. This can be seen from the results achieved in the trials compared with studies BPONZ has undertaken in the past (refer to Safe, G 1994, Tank Gauging Report, BP Oil Internal Report).

The trail found that the accuracy of the tank gauges was higher than that of the dipsticks. The Magnetostrictive tank gauge produced by Fuelquip Services Ltd had the higher accuracy of the two tank gauges, even though the trials were not exactly identical. Fuelquip's tank gauging overall was superior to that of Compac's for the following reasons:

- Accuracy of tank gauge
- Installation cost
- Informative reports
- 24 Hour Helpdesk (Compac was only working hours, 8:00am to 5:30pm)
- Technicians country-wide to deal with maintenance and technical problems
- Minimal moving parts on probe
- New LAN type software available from April 1998

There is no doubt in the author's mind that automatic tank gauging is an excellent tool for the use in the petroleum industry, especially at unmanned sites. The diversity and features of the system are superior to that of any other that monitors and manages fuel stock.

However, the biggest factor that influenced the author's decision in answering the question "What should BPONZ do with tank gauging?" was the large initial capital investment. At the present time, the investment is not warranted; therefore, the main conclusion is that BPONZ should not invest in tank gauging for at least three years. A time factor was included in the conclusion as new regulations and opportunities might warrant another investigation into future tank gauging systems.

RECOMMENDATIONS

The recommendations for BPONZ from this thesis are outlined below:

- At the present time, BPONZ should not invest any more money into tank gauging on any of its sites.
- Develop a program to have all pumps calibrated on a regular basis (Six months for high usage sites and one year for others).
- For improvements in present Truckstop reconciliations, BPONZ should have the drivers entering the manual tote from the pumps into the OVC; therefore, only requiring the card transactions as a back-up to stock reconciliations. This should be performed in conjunction with the point above.
- Investigate the installation of accurate meters on the tanker outlets. The OVC could also be used to record the metered volume.
- Continually enhance the current environmental program to gain maximum benefit.
- Re-investigate the need for automatic tank gauging in three to five years if:
    1. The cost of tank gauging has not increased.
    2. New legislation requires tighter control of environmental monitoring.
    3. Current stock reconciliation system has not improved.
- Have all dipsticks checked to ascertain if they are the correct ones for their tank. Networked sites can possibly be checked when routine maintenance is carried out at the sites.
- Develop a "satellite" in the new BPONZ information system to capture dry tank information.

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GLOSSARY

Above-ground Storage Tank (AST) - A tank capable of storing hydrocarbon products that is installed above the surface of the ground and enclosed inside a bund (shell).

Bulk Terminal - Company site where hydrocarbon products are stock piled before delivery to reseller sites.

Bund - A wall surrounding a tank to contain product in the event of a major leak or spill.

Fueldrop - The delivery of fuel into a storage tank.

Observation Wells - Wells installed within the UPSS excavation to allow any hydrocarbons in the ground to be detected[4].

On-board Vehicle Computer (OVC) - Hand-held computer located in the cab of a fuel tanker vehicle that displays trip plan and delivery records.

Reconciliations - The process of balancing the book stock against the physical stock.

Strapping Table - A table, often referred to as a tank table or calibration table, showing the capacities, or volumes in a tank corresponding to various liquid levels measured from a reference point[8].

Underground Storage Tank (UST) - A tank capable of storing hydrocarbon products which is installed below the surface of the ground and entirely covered with backfill, and as defined in the Dangerous Goods Regulations[4].

Underground Petroleum Storage System (UPSS) - The whole system used to store and dispense hydrocarbon products from an underground storage tank including pipe-work and pumps.

Wetstock - An industry term for hydrocarbon stocks.

APPENDIX

CONTENTS

Compac Netbase Reports

Relevant Reports that the Compac Netbase system produce include the following:

- Product Reconciliation Report
- Site Shift Report
- Site Status Report
- Site Trend Report
- Adding/Viewing Tank Drops

Product Reconciliation Report

This report compares the tank levels at the start and end of a period, together with automatically metered fills and the total product of the tank during that period. Any thefts or leaks detected are also taken into account for the final total. The difference is shown as an absolute quantity (litres) and as a percentage difference.

An example of this report is as follows:

Fig. 7 Compac Product Reconciliation Report

Product Reconciliation Report

Date Printed: 25/01/98 Time Printed: 12:30

Page Number 1

Site Number 0000123 Trial Site Name

Tank No 01 Diesel

Start Volume at 01/01/98 12:00	15553
Drop Made 03/01/98 at 15:36 of	20056
Drop Made 08/01/98 at 01:58 of	4995
Drop Made 12/01/98 at 10:10 of	12005
Finish Volume at 15/01/98 13:00	33285

Total Throughput

Diesel Totals

Start Volume at 01/01/98 12:00

Drop Total

Finished Volume at 15/01/98 13:00

Total Throughput

Total Sales

Net Loss of

End of Report

NB. The above report is only an example. This is also the case for the following example reports.

Site Shift Report

This report includes pump and product totals followed by the product reconciliation for a period defined by date and time. An example of the report is as follows:

Fig. 8 Site Shift Report

Shift Report

Site Number: 000752
Trial Site Name

Start	13/01/1998	03:00
Finish	20/01/1998	03:00
First snapshot:	13/01/1998	03:00
Last Snapshot:	20/01/1998	03:00

Product	Pump	Hose	Dollars	Litres	Tank T/put	Gain/Loss
Diesel	P1	H1	22189.90	10013.61		
Diesel	P2	H1	18576.28	37152.50		
Diesel	P3	H1	11213.77	11213.77		
Diesel	P4	H1	83238.65	83238.65		
Diesel	P5	H1	15790.57	15790.57		
Diesel	P6	H1	9904.11	9904.11		
			160913.28	167313.21		

Tank Reconciliation Data

Diesel

Tank 1	Normal Operation	Tank 2	Normal Operation
	Litres	Litres	
Capacity	54400	50941	
Start Level	33059	35293	
Finish Level	40892	39746	
Throughput	-7833	-4453	

Diesel Product Throughput

Tank(s)	Pump(s)	Gain/Loss	
164427	167313	2886	1.73%

End Of Report

Site Status Report

This displays the pump and tank details for each of the specified sites, with the date that the data was received. Included is the product non resetable totals and status for each assigned pump and hose, and the product, litres, ullage, average daily use and status of each tank.

Site Trend Report

This report gives the product reconciliation for intervals of specified length followed by the total product reconciliation for the whole period. The report is based on data obtained from snapshots.

Fig. 9 Site Trend Report

Site Trend Report

Date Printed: 09/01/98 Time Printed: 12:30

Page Number 1

Site Number: 00002
Site Trial Name

Date/Time Range 01/01/98 12:00 to 09/01/98 12:00

Reconciliation Period End Date	Product	Period Reconciliation Percentage
03/01/98	Diesel	- 0.29%
05/01/98	Diesel	- 1.23%
07/01/98	Diesel	+ 1.00%
09/01/98	Diesel	- 0.01%

Reconciliation 01/01/98 12:00 to 09/01/98 12:00
Diesel - 0.19%

Adding/Viewing Tank Drops

This option displays the drops, when they occurred and how much fuel was dropped, for all the tanks of the entered site. It includes a status field which tells the nature of the drop. Figure 10 gives an example of the display.

Fig. 10 Add/View Drop Details

Add / View Drop Details

Site Number 000002 Trial Site Name

Date	Time	Site No	Tank No	Litres	Status
09/01/1998	20:27	000002	02	24616	Normal
10/01/1998	17:11	000002	02	9031	Normal
12/01/1998	01:20	000002	02	30998	Normal
14/01/1998	01:22	000002	02	42741	Normal
14/01/1998	16:24	000002	02	27870	Normal
15/01/1998	17:01	000002	02	34962	Normal
16/01/1998	21:18	000002	02	17797	Normal
17/01/1998	08:27	000002	02	26953	Normal
19/01/1998	20:48	000002	02	26390	Normal

Last Drop on File for Site

Others

Other reports and options the Compac Netbase system is able to offer include: Site Price Adjust, View Product Totals, Viewing Tank Curves, View Tank Details and the Events Log.

All of the above descriptions of reports were compiled with the aid of Compac's Netbase System Manual

Year 2000 Compliance Guarantee

Compac Industries Ltd warrants that each hardware, software, and firmware product manufactured by Compac Industries Ltd and delivered under this contract shall be able to accurately process date data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, including leap year calculations, when used in accordance with the product documentation provided by Compac industries Ltd, provided that all listed or unlisted products (e.g. hardware, software, firmware) used in combination with such listed item properly exchange date data with it. If the contract requires that specific listed products must perform as a system in accordance with the foregoing warranty, then that warranty shall apply to those listed products as a system. The duration of this warranty and remedies for breach of this warranty shall be as defined in, and subject to, the terms and limitations of Compac Industries Ltd standard commercial warranty, provided that notwithstanding any provision to the contrary in such commercial warranty or warranties, the remedies available under this warranty shall include repair or replacement of any listed product whose non-compliance is discovered and made know to Compac Industries Ltd in writing within ninety (90) days after acceptance. Nothing in this warranty shall be construed to limit any rights or remedies the Purchaser may otherwise have under this contract with respect to defects other than Year 2000 performance (Facsimile from Stuart Cowdell, 14 January 1998).

Fuelquip I.M.S. Reports

Relevant reports that the I.M.S. produces are as follows:

- Daily Reconciliation Report (Detailed and Summary)
- Fueldrop Report
- Fill to Fill Report
- Leak Report

Daily Reconciliation Report (Detailed and Summary)

Detailed

This reconciliation option gives a hour by hour summary of the volume change in the tank, pump sales, fueldrops and calculates the net and percent variance between the volume change and the pump sales. The totals for the period are highlighted at the bottom of the report. An example of the report is as follows:

Fig. 11 Detailed Reconciliation Report

Site : Trial Site F4
Description : Truckstop

Tank No.	Product Grade	Date	Time Range	Volume Change (l)	Total Sales (l)	Fueldrop (l)	Variance Nett (l)	Variance Percent (%)
1	Diesel	Starting Volume 26876 Litres						
		02-12-97	04:00-05:00	-244	240	0	-4	
		02-12-97	05:00-06:00	0	0	0	0	
		02-12-97	06:00-07:02	-673	670	0	-3	
		02-12-97	07:02-08:00	-202	201	0	-1	
		02-12-97	08:00-09:00	-1	0	0	-1	
		02-12-97	09:00-10:00	-283	280	0	-4	
		02-12-97	10:00-11:00	-171	172	0	1	
		02-12-97	11:00-12:00	0	0	0	0	
		02-12-97	12:00-13:00	-124	124	0	0	
		02-12-97	13:00-14:03	-982	984	0	2	
		02-12-97	14:03-15:00	-750	746	0	-4	
		02-12-97	15:00-16:00	-770	767	0	-3	
		02-12-97	16:00-17:00	-406	410	0	4	
		02-12-97	17:00-18:00	-1487	1494	0	8	
		02-12-97	18:00-19:00	-431	438	0	7	
		02-12-97	19:00-20:00	-272	276	0	3	
		02-12-97	20:00-20:28	-11	0	0	-11	
		02-12-97	20:28-20:51	14125	0	14125	FUELDROP	
		02-12-97	20:51-21:00	0	0	0	0	
		02-12-97	21:00-22:00	-447	443	0	-4	
		02-12-97	22:00-23:00	0	0	0	0	
		02-12-97	23:00-00:00	-238	238	0	0	
		03-12-97	00:00-01:00	-235	236	0	1	
		03-12-97	01:00-02:00	0	0	0	0	
		03-12-97	02:00-03:00	-366	365	0	-1	
		03-12-97	03:00-04:00	-308	307	0	-1	
	TOTALS:			5724	8391	14125	-10	
	FINAL TANK VOLUME:			32600				
	RECONCILIATION VARIANCE:							-0.12

TANK TOTALS:	5724	8391	14125	-10	-0.12

Summary

The Summary Report takes the daily data (Totals) captured and produces a report for a known period of days. Figure 12 is an example of the Summary Report.

Fig. 12 Summary Reconciliation Report

Site : BP Trial Site F4
Description : Truckstop

Tank No.	Product Grade	Date	Time Range	Volume Change (l)	Total Sales (l)	Fueldrop (l)	Variance Nett (l)	Variance Percent (%)
1	Diesel	STARTING VOLUME 24528 Litres						
		29-12-97	04:00-04:00	-4098	4110	0	13	0.30
		30-12-97	04:00-04:00	15699	3809	19473	35	0.92
		31-12-97	04:00-04:00	-5216	5235	0	19	0.35
		01-01-98	04:00-04:00	-276	280	0	4	1.42
		02-01-98	04:00-04:00	-313	311	0	-2	-0.56
		03-01-98	04:00-04:00	-1886	1885	0	-1	-0.04
		TANK TOTALS:		3911	15630	19473	68	0.43
		FINAL TANK VOLUME:		28439				

Fueldrop Report

The Fueldrop Report displays the volume prior to the drop, the sales during the drop and the finished volume. If the tanker volume is entered into either the I.M.S. or I.S.C. then the final volume is adjusted and the variance between the measured and adjusted volumes is calculate. An example of the report is as follows:

Fig. 13 Fueldrop Report

Site : BP Trial Site
Description: Truckstop Phone: ##########

Tank Number	Product Grade	Date	Start Time Finish Time	Tanker Reading (Litres)	. . . . .	Litres
1	Diesel	15-12-97	21:55	16600	Start Volume	16078
			22:21		Finish Volume	32656
					Pump Sales	0
					Adjusted Volume	32656
					Measured F'Drop	16578
					Variance	-22

Fill to Fill Report

The report provides reconciliation details of daily tank volume changes, including details of sales and fuel deliveries over a selected time range. Figure 14 shows an example of the report with the description of the fields.

Fig. 14 Fill to Fill Report

Site : BP Trial Site F2
Description : Truckstop Phone: ########

Tank : 1
Product grade: Diesel

DESCRIPTION OF FIELDS

Volume Change = previous Stock Before Delivery minus current Stock Before Del
Tank Throughput = Volume Change + previous Driver Volume.
(If no Driver Volume then Fuelguage rise Volume is used)
Tote before fueldrop = Sum of pump totes after Fueldrop minus
pump sales during.
Pump sales = previous Tote Before Fueldrop minus current Tote Before Fueldrop
Variance- NETT = Tank Throughput - Pump Sales.
Variance- %Sales = NETT / Pump sales.
Note: Calculations are based on start of one fill to start of next.

Date of fill	Stock before delvry	FUELDROP Driver vol	FUELDROP Fuelge vol	Volume chge	Tank through -put	Tote before fueldr	Pump sales	VARIANCE Individual NETT	VARIANCE Individual %Sales	VARIANCE TOTAL NETT	VARIANCE TOTAL %Sales
01-11	END OF MONTH					342260					
01-11	25628	9000	8965	934	934	343193	933	1	0.07	1	0.07
03-11	30890	7900	7872	-5263	3737	346929	3736	2	0.05	3	0.05
08-11	6840	20000	20015	24050	31950	378906	31977	-27	-0.08	-24	-0.06
11-11	12756	27000	26965	-5916	14084	392984	14078	6	0.03	-19	-0.03
13-11	29137	8700	8677	-16381	10619	403659	10675	-56	-0.52	-75	-0.12
17-11	24344	15800	15726	4793	13493	417143	13484	9	0.06	-65	-0.08
19-11	26106	12000	11958	-1762	14038	431190	14047	-9	-0.06	-74	-0.08
21-11	27082	12100	12023	-977	11023	442232	11042	-19	-0.17	-93	-0.09
26-11	21516	17000	16921	5566	17666	459871	17639	27	0.15	-66	-0.05
29-11	18559	11000	10957	2958	19958	479894	20023	-65	-0.32	-131	-0.09

Leak Report

The I.S.C. conducts leak tests whenever the tank is settled sufficiently. This report details the results of the test(s), giving the statistical possibility of an apparent leak. An example of the report is as follows:

Fig. 15 Leak Report

```
Site          : BP Trial Site
Description   : Truckstop
Product       : Diesel
Tank Capacity : 42464       (Litres)
Threshold (LO): 0.20        (Litres per Hour)
--------------------------------------------------------------------------------

 Leak Report Started at:          01-08-97 09:13:31
 Overall Status:                  Possible Leak
 Number of Indvidual Leak Tests:  6
 Number of Valid Tests:           5
 Number of Possible Leaks:        3

  ****************** INDIVIDUAL TESTS ************************

   Test time:                97-08-01 09:44:25 - 97-08-01 11:32:45
   End Reason:               Pump Transaction
   Test Statistic:           -18.4645
   Apparent Leak Rate:       -4.8795     Litres per hour
   Status:                   No Leak Detected
   99% Confidence Interval:  -5.68 to -4.07 Litres per hour
   95% Confidence Interval:  -5.47 to -4.29 Litres per hour
   Standard Error:           0.5072
   Height:                   1475.251   mm
   Volume:                   27930.415  litres
```

Other Reports

Reports that are also of interest include the Site Details Report, Tank Status Report and the Pump Status Report.

The Site Details report gives an overview of the site. Included in the report are details on the name, address, phone number, contact name/number/phone, site description and software version. The main tank details include the capacity and overfill limits, fuel type and high water level. A list of the available fuel types at the site are given. Types of alarms and there importance are shown in this report.

The Tank and Pump Status Reports give the details of the tank's contents and pump totals at a defined point of time.

Component Price Schedule

Compac

The table below gives a breakdown of the total cost of installing Compac tank gauging.

Table 13 Compac Price Schedule

First Price Schedule: Futra Site Upgrade	
Equipment Required	**Price**
New pump software	$200.00
New lid for Master pump	$120.00
Stainless steel cabinet housing	$2,000.00
COMMUNICATOR Controller basic unit	$2,000.00
700 Hot Cards, 1400 transactions	$2,000.00
COMMUNICATOR Module CCOMMI Modem Interface	$650.00
28,800 Baud Rate Modem	$960.00
Electrical wiring	$500.00
Tank Gauging	
New Tank Probe	$2,000.00
TOTAL	**$10,430.00**
Credit on existing equipment	
Futra Memory Module	-$875.00
Futra Modem Interface	-$325.00
Existing Tank Probe (Full purchase price)	-$900.00
Total Credit for an existing Futra site	**-$2,100.00**
Equipment Upgrade Cost per site	**$8,330.00**

Fuelquip

The table below gives a breakdown of the components received in the unit price.

Table 14 Fuelquip Price Schedule

Description	**Unit Price**
Integrated Site Controller (ISC) including (One per site) CPU Power Supply Hazardous Area LAN interface Forecourt communications loop interface 2400 baud rate modem 250kb memory card Keypad and display Battery back-up Operators manual	$4,150.00
2.5m Magnetostrictive probe including - (One per tank) High resolution Water detection Leak Analysis	$2,286.00
OR	
2.5m Capacitive probe including - (One per tank) Water detection	$980.00
Inventory Management System (IMS) - (Min. one per network) One time I.M.S. license fee for use by BPONZ Additional copies for use by BPONZ	 $5,450.00 $1,250.00

Cost of Installing/Upgrading Tank Gauging

The costs below are for the install/upgrade of tank gauging into 100 of Commercial's Networked sites. The prices below include a fixed installation cost of $1,500.00. This price has been fixed as the cost of installation is site dependent. Each pricing schedule has also only allowed for a single tank at each site (i.e. one tank gauge per site). The prices below; therefore, are only an estimate and not an official quote from the suppliers to give the reader an idea of the cost of installing new tank gauging technology.

Fuelquip Tank Gauging Cost A	
Intergrated Site Controller (100 units)	$415,000.00
Magnetostrictive Probe (100 probes)	$228,600.00
Inventory Management System License Fee	$5,450.00
Installation Cost	$150,000.00
Total Cost	**$799,050.00**

This second set of prices includes the latest version of Fuelquip's Inventory Management System (Release date approximately March 1998). The price for this system is approximately $15,000.00.

Fuelquip Tank Gauging Cost B	
Intergrated Site Controller (100 units)	$415,000.00
Magnetostrictive Probe (100 probes)	$228,600.00
New Inventory Management System License Fee	$15,000.00
Five additional copies @$1,250.00	$6,250.00
Installation Cost	$150,000.00
Total Cost	**$814,850.00**

The Compac set of prices are based on 48 existing sites being upgraded and 52 sites having new technology installed. Forty five sites were chosen for upgrade as this is the number of sites with tank gauging assets and running the Compac Futra system.

Compac Tank Gauging	
Equipment Upgrade for 48 sites	$399,840.00
New Tank Gauging for 52 sites	$542,360.00
Total Cost	**$942,200.00**

NB. All price sets do not include the cost for a maintenance plan.

Site Profiles

Compac Trial Sites

Site C1

Tank Type	Under-ground Tank
Number of Tanks	2
Total Capacity of Tank(s)	100,000 Litres
Comments: Two 50,000L on a siphoned system.	

Site C2

Tank Type	Under-ground Tank
Number of Tanks	3
Total Capacity of Tank(s)	100,000 Litres
Comments: Two 30,000L tanks on a siphoned system, one 40,000L tank separate.	

Site C3

Tank Type	Under-ground Tank
Number of Tanks	1
Total Capacity of Tank(s)	50,000 Litres
Comments: Retail forecourt pump drawing off the Commercial tank.	

Site C4

Tank Type	Under-ground Tank
Number of Tanks	2
Total Capacity of Tank(s)	100,000 Litres
Comments: Two 50,000L on a siphoned system.	

Fuelquip Trial Sites

Site F1

Tank Type	Above-ground Tank
Number of Tanks	1
Total Capacity of Tank(s)	40,000 Litres
Comments:	

Site F2

Tank Type	Above-ground Tank
Number of Tanks	1
Total Capacity of Tank(s)	40,000 Litres
Comments:	

Site F3

Tank Type	Under-ground Tank
Number of Tanks	1
Total Capacity of Tank(s)	50,000 Litres
Comments:	

Site F4

Tank Type	Under-ground Tank
Number of Tanks	1
Total Capacity of Tank(s)	50,000 Litres
Comments:	

Site F5

Tank Type	Under-ground Tank
Number of Tanks	1
Total Capacity of Tank(s)	40,000 Litres
Comments: Undergone a site upgrade in September 1997.	

NB. The capacities of tanks described above are only approximations as defined by BPONZ.

Results From the Trials

Site C1

Weekly Reports

November	*Tank 1 Vol.*	*Tank 2 Vol.*	Total Vol.	Pump tote	Fueldrop	% Variance
Week 2 (17/11)	35228	36814	72042	143158.59	153870	19.32
Week 3 (24/11)	44698	44344	89042	313063.03	186221	0.35
Week 4 (1/12)	37914	39302	77216	497108.36	178947	
Monthly						**3.33**

December	*Tank 1 Vol.*	*Tank 2 Vol.*	*Total Vol.*	*Pump tote*	*Fueldrop*	*% Variance*
Week 1 (8/12)	42238	42504	84742	182104.84	182146	0.91
Week 2 (14/12)	45374	45283	90657	181022.43	188946	1.02
Week 3 (24/11)						
Week 4 (31/12)						
Monthly						**0.01**

Weeks 3 & 4 accidentally deleted by Compac.

January	*Tank 1 Vol.*	*Tank 2 Vol.*	Total Vol.	Pump tote	Fueldrop	% Variance
Week 1 (8/1)	17320	21229	38549	111447.81	123449	0.52
Week 2 (14/1)	38368	39178	77546	158379.95	177155	0.69
Week 3 (21/1)	39024	40499	79523	163744.84	164127	1.34
Week 4 (27/1)	29865	31400	61265	148061.81	133961	2.86
Monthly (till 31/1)						**0.05**

Delivery Results

Date	Time	CPM	Tank Gauging	Variance	% Variance
12-Nov	08:37	29506	29502	-4	-0.01
12-Nov	17:50		29242	29242	#DIV/0!
13-Nov	18:32	31000	30786	-214	-0.69
15-Nov	04:03	35000	34682	-318	-0.91
16-Nov	08:33	28000	27720	-280	-1.00
17-Nov	17:53	29000	29036	36	0.12
19-Nov	06:44	30140	29932	-208	-0.69
19-Nov	15:08	32000	31835	-165	-0.52
20-Nov	17:37	35026	34826	-200	-0.57
22-Nov	08:15	31000	30648	-352	-1.14
22-Nov	11:31	30000	29944	-56	-0.19
24-Nov	07:23	18000	18071	71	0.39
25-Nov	15:31	35000	34828	-172	-0.49
27-Nov	15:35	35000	34720	-280	-0.80
28-Nov	14:39	22000	21775	-225	-1.02

30-Nov	06:25	35003	34516	-487	-1.39
30-Nov	10:51	35000	35037	37	0.11
2-Dec	09:05		34877	34877	#DIV/0!
2-Dec	18:26	28000	27635	-365	-1.30
4-Dec	08:49	26900	26641	-259	-0.96
4-Dec	23:24	31000	30437	-563	-1.82
7-Dec	06:18	35000	34611	-389	-1.11
7-Dec	08:28	28000	27945	-55	-0.20
8-Dec	14:47	35000	35066	66	0.19
10-Dec	15:15	31000	30722	-278	-0.90
10-Dec	16:24	35000	35006	6	0.02
12-Dec	01:58		24105	24105	#DIV/0!
13-Dec	10:03	35000	34806	-194	-0.55
13-Dec	10:32	29000	29241	241	0.83
15-Dec	12:13	26976	27549	573	2.12
16-Dec	17:22	26000	25463	-537	-2.07
17-Dec	21:51	35000	34607	-393	-1.12
18-Dec	17:34	32000	31746	-254	-0.79
23-Dec	22:57	23003	22889	-114	-0.50
2-Jan	13:35	23010	22791	-219	-0.95
3-Jan	14:52	31008	30819	-189	-0.61
6-Jan	03:52	35003	34780	-223	-0.64
7-Jan	06:21	35022	35059	37	0.11
9-Jan	10:37	35006	34710	-296	-0.85
9-Jan	20:27	25000	24616	-384	-1.54
10-Jan	17:11	9006	9031	25	0.28
12-Jan	01:20	31008	30998	-10	-0.03
14-Jan	01:22	43181	42741	-440	-1.02
14-Jan	16:24	28000	27870	-130	-0.46
15-Jan	17:01	35200	34962	-238	-0.68
16-Jan	21:18	18000	17797	-203	-1.13
17-Jan	08:27	27000	26953	-47	-0.17
19-Jan	20:48	31000	26390	-4610	-14.87
20-Jan	15:25	31024	30155	-869	-2.80
21-Jan	16:40	35000	35082	82	0.23
22-Jan	20:46	29012	28809	-203	-0.70
23-Jan	17:34	35002	34785	-217	-0.62
25-Jan	16:04	35000	35285	285	0.81
28-Jan	19:45	32000	31806	-194	-0.61
31-Jan	00:53	35000	33602	-1398	-3.99

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site C1	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	27,599	$0.0053	253	$147.49	$37,314.73
Full Load	34,000	$0.0048	205	$163.20	$33,456.00
Benefit		$0.0005			$3,858.73
Annual Volume	6,962,826				
post-tax Benefit per annum					$2,585.35

PERPETUITY - unlikely as unit will not last forever

Site C1	NPV	
NPV Benefit into Perpetuity	$17,235.67	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$5,175.06	

10 year analysis Site C1	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$12,975.27		$2,585.35	$2,585.35	$2,585.35	$2,585.35	$2,585.35	$2,585.35	$2,585.35	$2,585.35	$2,585.35	$2,585.35
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**$1,323.95**	-$10,000.00	$2,385.35	$2,355.35	$2,322.35	$2,286.05	$2,246.12	$2,202.20	$2,153.88	$2,100.73	$2,042.27	$1,977.97
IRR	**18.5%**											

NB. Tanker is a 38m3 artic carrying 34,000L diesel

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site C2

Weekly Results

November	Total Vol. Of 3 Tanks	Pump Sales	Fueldrop	% Variance
Week 2 (17/11)	62668	51593.32	84191	44.13
Week 3 (24/11)	75504	108660.73	71579	3.04
Monthly				**19.41**

December	Total Vol. Of 3 Tanks	Pump Sales	Fueldrop	% Variance
Week 1 (8/12)	51801	66793.83	59432	23.35
Week 2 (14/12)	70461	66422.96	50884	51.49
Week 3 (24/11)				
Week 4 (31/12)				
Monthly				**4.01**

Weeks 3 & 4 were accidentally deleted by Compac.

January	Total Vol. Of 3 Tanks	Pump Sales	Fueldrop	% Variance
Week 1 (8/1)	55328	36094.95	32992	3.32
Week 2 (14/1)	60587	57414.83	44868	2.76
Week 3 (20/11)	60229	64598.96	50310	3.04
Week 4 (28/1)	67186	53477.02	62140	3.20
Monthly				**3.03**

Delivery Results

Date	Time	CPM	Tank Gauging	Variance	% Variance
14-Nov	21:23	18000	18854	854	4.74
18-Nov	08:45	9985	10379	394	3.95
20-Nov	07:32	26000	26607	607	2.33
23-Nov	20:20	33998	34593	595	1.75
24-Nov	15:41	7001	7307	306	4.37
26-Nov	12:02	16513	17220	707	4.28
27-Nov	21:00	29000	29394	394	1.36
30-Nov	15:35	20000	20899	899	4.50
3-Dec	14:24	19000	19490	490	2.58
7-Dec	18:46	3000	3131	131	4.37
7-Dec	23:36	35000	36811	1811	5.17
11-Dec	11:38	31000	32566	1566	5.05
12-Dec	14:28		97	97	#DIV/0!
14-Dec	18:24	18000	18221	221	1.23
16-Dec	08:22	15001	14913	-88	-0.59
16-Dec	12:00		1442	1442	#DIV/0!
17-Dec	14:57	13012	13636	624	4.80
23-Dec	15:43		11134	11134	#DIV/0!
23-Dec	19:28		27685	27685	#DIV/0!

1-Jan	20:05	11000	11549	549	4.99
4-Jan	03:09	18006	18506	500	2.78
6-Jan	12:12	2850	2937	87	3.05
11-Jan	13:09	34000	34571	571	1.68
13-Jan	10:02	10000	10297	297	2.97
15-Jan	08:13	18000	18714	714	3.97
18-Jan	13:25	35004	20157	-14847	-42.42
20-Jan	02:18	11000	11439	439	3.99
22-Jan	15:22	13000	13550	550	4.23
24-Jan	13:47	35074	36665	1591	4.54
25-Jan	10:08	12011	11925	-86	-0.72
29-Jan	11:35	25014	25294	280	1.12

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site C2	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	19,170	$0.0134	157	$256.00	$40,191.40
Full Load	34,000	$0.0125	89	$425.00	$37,825.00
Benefit		$0.0009			$2,366.40
Annual Volume	3,001,040				
post-tax Benefit per annum					$1,585.49

PERPETUITY - unlikely as unit will not last forever

Site C2	NPV	
NPV Benefit into Perpetuity	$10,569.92	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	-$1,490.68	

10 year analysis Site C2	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$7,957.20		$1,585.49	$1,585.49	$1,585.49	$1,585.49	$1,585.49	$1,585.49	$1,585.49	$1,585.49	$1,585.49	$1,585.49
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**-$3,694.12**	-$10,000.00	$1,385.49	$1,355.49	$1,322.49	$1,286.19	$1,246.26	$1,202.34	$1,154.02	$1,100.87	$1,042.41	$978.10
IRR	**3.8%**											

NB. Tanker is a 38m3 artic carrying 34,000L Diesel

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site C3

Weekly Results

Weekly results were not included in the Appendix as the site was not monitoring all the pumps. The Retail pump that was drawing off the tank had not been connected to the site controller. The cost to have this pump connected was deemed to expensive for the remaining time involved in the trial.

Delivery Results

Date	Time	CPM	Tank Gauging	Variance	% Variance
16-Nov	07:51	28047	28401	354	1.26
24-Nov	09:12	16906	17052	146	0.86
30-Nov	15:35	19000	19092	92	0.48
4-Dec	17:21	27000	27293	293	1.09
14-Dec	19:40	31000	31314	314	1.01
3-Jan	14:28	3000	3050	50	1.67
10-Jan	15:21	22007	22404	397	1.80
21-Jan	15:50	13000	12770	-230	-1.77
28-Jan	19:28	9005	6707	-2298	-25.52
30-Jan	01:47	32011	32064	53	0.17

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site C3	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	17,737	$0.0071	135	$125.86	$16,991.34
Full Load	34,000	$0.0053	71	$180.20	$12,794.20
Benefit		$0.0018			$4,197.14
Annual Volume	2,386,548				
post-tax Benefit per annum					$2,812.08

PERPETUITY - unlikely as unit will not last forever

Site C3	NPV	
NPV Benefit into Perpetuity	$18,747.21	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$6,686.60	

10 year analysis Site C3	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$14,113.19		$2,812.08	$2,812.08	$2,812.08	$2,812.08	$2,812.08	$2,812.08	$2,812.08	$2,812.08	$2,812.08	$2,812.08
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**$2,461.86**	-$10,000.00	$2,612.08	$2,582.08	$2,549.08	$2,512.78	$2,472.85	$2,428.93	$2,380.61	$2,327.47	$2,269.00	$2,204.70
IRR	**21.4%**											

NB. Tanker is a 38m3 artic carrying 34,000L diesel

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site C4

Weekly Results

November	*Tank 1 Vol.*	*Tank 2 Vol.*	Total Vol.	Pump Sales	Fueldrop	% Variance
Week 2 (17/11)	39701	42165	81866	72882	110678	28.57
Week 3 (24/11)	42162	44402	86564	92014	95527	0.99
Week 4 (1/12)	42162	44402	86564	99820	110496	#REF!
Monthly						**10.32**

December	*Tank 1 Vol.*	*Tank 2 Vol.*	*Total Vol.*	*Pump Sales*	*Fueldrop*	*% Variance*
Week 1 (8/12)	38463	41515	79978	94339.93	74716	1.19
Week 2 (14/12)	36761	40195	76956	107513	118028	2.02
Week 3 (24/11)						
Week 4 (1/12)						
Monthly						**1.47**

Weeks 3 & 4 were accidentally deleted by Compac.

January	*Tank 1 Vol.*	*Tank 2 Vol.*	Total Vol.	Pump Sales	Fueldrop	% Variance
Week 1 (8/1)	29088	33521	62609	62870.52	42136	5.62
Week 2 (14/1)	38113	41432	79545	101288.02	70788	12.38
Week 3 (20/1)	47086	47511	94597	83092	96745	1.60
Week 4 (28/1)	32239	36605	68844	83025.15	56717	0.66
Monthly						**5.48**

Delivery Results

Date	Time	BPM	Tank Gauge	Variance	% Variance
12-Nov	19:41	9006	8903	-103	-1.14
14-Nov	18:04	31000	30468	-532	-1.72
16-Nov	07:50	10016	9834	-182	-1.82
16-Nov	14:55	31020	30626	-394	-1.27
17-Nov	11:57	15000	14910	-90	-0.60
17-Nov	20:50	5006	5022	16	0.32
19-Nov	19:59	22000	21677	-323	-1.47
20-Nov	11:39	4000	3970	-30	-0.75
21-Nov	02:17	3004	3001	-3	-0.10
22-Nov	15:59	18000	17778	-222	-1.23
23-Nov	11:34	28040	27775	-265	-0.95
23-Nov	12:48	1400	1394	-6	-0.43
24-Nov	20:24	22022	21981	-41	-0.19
25-Nov	13:27	14372	14301	-71	-0.49
28-Nov	19:20	3000	2899	-101	-3.37
29-Nov	10:03	10500	10237	-263	-2.50
30-Nov	12:01	27000	26586	-414	-1.53
30-Nov	16:21	35000	34492	-508	-1.45

2-Dec	19:48	5480	5441	-39	-0.71
3-Dec	20:18	31002	30708	-294	-0.95
4-Dec	19:19	8000	7902	-98	-1.23
7-Dec	13:09	31000	30665	-335	-1.08
10-Dec	10:49	1182	1099	-83	-7.02
11-Dec	09:51		95	95	#DIV/0!
11-Dec	11:56	33129	32230	-899	-2.71
12-Dec	19:40	35000	34389	-611	-1.75
14-Dec	10:54	31000	30525	-475	-1.53
14-Dec	20:27	4000	3987	-13	-0.33
15-Dec	03:37	4915	4826	-89	-1.81
15-Dec	19:17	11000	10877	-123	-1.12
17-Dec	10:38	20000	19708	-292	-1.46
19-Dec	17:57	34910		-34910	-100.00
20-Dec	11:17	35794		-35794	-100.00
23-Dec	15:43	11330	11134	-196	-1.73
23-Dec	19:28	28000	27685	-315	-1.13
1-Jan	17:01	3000	3086	86	2.87
3-Jan	12:38	3528	3605	77	2.18
3-Jan	15:36	2000	2038	38	1.90
6-Jan	07:27	6006	5948	-58	-0.97
6-Jan	18:12	24612	24469	-143	-0.58
8-Jan	04:20	3000	2990	-10	-0.33
10-Jan	12:25	3032	3002	-30	-0.99
10-Jan	17:02	31006	30422	-584	-1.88
11-Jan	14:02		1600	1600	#DIV/0!
12-Jan	00:12	4000	3937	-63	-1.58
13-Jan	00:23	32042	31827	-215	-0.67
14-Jan	03:05	20002	19708	-294	-1.47
16-Jan	11:01	28006	27687	-319	-1.14
16-Jan	21:40	3452	3418	-34	-0.98
19-Jan	05:33	4005	3883	-122	-3.05
19-Jan	15:05	28001	27926	-75	-0.27
20-Jan	13:02	9006	9001	-5	-0.06
20-Jan	20:22	5000	5122	122	2.44
21-Jan	11:09	3000	2985	-15	-0.50
23-Jan	10:15	35024	34737	-287	-0.82
25-Jan	17:58	9904	9857	-47	-0.47
26-Jan	05:06	4000	4048	48	1.20
26-Jan	23:54	5004	5090	86	1.72
28-Jan	04:01	4001	3962	-39	-0.97
28-Jan	19:26	7002	6905	-97	-1.39
29-Jan	03:10	28092	27749	-343	-1.22

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site C4	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	13,800	$0.0041	173	$57.04	$9,867.12
Full Load	34,000	$0.0023	71	$78.20	$5,552.20
Benefit		$0.0018			$4,314.92
Annual Volume	2,386,548				
post-tax Benefit per annum					$2,891.00

PERPETUITY - unlikely as unit will not last forever

Site C4	NPV	
NPV Benefit into Perpetuity	$19,273.33	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$7,212.72	

10 year analysis Site C4	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$14,509.26		$2,891.00	$2,891.00	$2,891.00	$2,891.00	$2,891.00	$2,891.00	$2,891.00	$2,891.00	$2,891.00	$2,891.00
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**$2,857.93**	-$10,000.00	$2,691.00	$2,661.00	$2,628.00	$2,591.70	$2,551.77	$2,507.85	$2,459.53	$2,406.38	$2,347.92	$2,283.61
IRR	**22.4%**											

NB. Tanker is a 38m3 artic carrying 34,000L diesel

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site F1

Daily Results

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
21-Apr	4638	6483	11200	-67	-1.03
22-Apr	-6432	6390	0	-42	-0.66
23-Apr					
24-Apr					
25-Apr	10894	180	11000	-73	-40.49
26-Apr	-832	838	0	6	0.77
27-Apr	-2983	2897	0	-86	-2.97
TANK TOTALS	5285	16788	22200	-262	**-1.56**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
28-Apr	-6081	5991	0	-90	-1.50
29-Apr	5445	5562	11000	-131	-2.35
30-Apr	-5708	5598	0	-110	-1.96
TANK TOTALS	-6344	17151	11000	-331	**-1.93**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-May	7303	6694	14000	-3	-0.04
2-May	-5845	5675	0	-170	-3.00
3-May	-2944	2891	0	-53	-1.83
4-May	-2623	2588	0	-35	-1.35
5-May	-4758	4702	0	-56	-1.19
6-May					
7-May					
TANK TOTALS	-8867	22550	14000	-317	**-1.41**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-May					
9-May	-3178	3150	0	-28	-0.89
10-May	-2832	2773	0	-59	-2.13
11-May	-2147	2107	0	-40	-1.90
12-May	15790	6380	23000	-830	-13.01
13-May	-5001	4851	0	-150	-3.09
14-May	-5448	5358	0	-90	-1.68
TANK TOTALS	-2816	24619	23000	-1197	**-4.86**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-May	-4150	4081	0	-69	-1.69
16-May	13625	4408	18000	33	0.75
17-May	-1954	1905	0	-49	-2.57
18-May	-1702	1638	0	-64	-3.91
19-May	-6398	6293	0	-105	-1.67
20-May	5628	4393	10000	21	0.48
21-May	-3342	3280	0	-62	-1.89

TANK TOTALS	1707	25998	28000	-295	**-1.13**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-May	-5950	5854	0	-96	-1.64
23-May	12690	3445	16150	-15	-0.44
24-May	-499	487	0	-12	-2.46
25-May	-1520	1482	0	-38	-2.56
26-May	-1348	6262	5000	-86	-1.37
27-May	7299	6649	14325	-377	-5.67
28-May	-2094	2023	0	-71	-3.51
TANK TOTALS	8578	26202	35475	-695	**-2.65**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-May	-7618	7488	0	-130	-1.74
30-May					
31-May	-3126	3073	0	-53	-1.72
TANK TOTALS	-10744	10561	0	-183	**-1.73**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Jun	-1311	1280	0	-31	-2.42
2-Jun	-3391	3351	0	-40	-1.19
3-Jun	-5822	5766	0	-56	-0.97
4-Jun	18184	4734	23000	-82	-1.73
5-Jun	-4472	4376	0	-96	-2.19
6-Jun	-160	3696	3580	-44	-1.19
7-Jun	-1456	1428	0	-28	-1.96
TANK TOTALS	1572	24631	26580	-377	**-1.53**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Jun	-1392	1389	0	-3	-0.22
9-Jun	-3882	3869	0	-13	-0.34
10-Jun	16967	5165	22000	132	2.56
11-Jun	-4653	4497	0	-156	-3.47
12-Jun	-3207	3110	0	-97	-3.12
13-Jun	2574	3638	6260	-48	-1.32
14-Jun	-1170	1140	0	-30	-2.63
TANK TOTALS	5237	22808	28260	-215	**-0.94**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Jun	-581	580	0	-1	-0.17
16-Jun	-4569	4508	0	-61	-1.35
17-Jun	2756	3699	6524	-69	-1.87
18-Jun	-5007	4905	0	-102	-2.08
19-Jun	-4806	4727	0	-79	-1.67
20-Jun	12311	2688	15008	-9	-0.33
21-Jun	-1187	1193	0	6	0.50
TANK TOTALS	-1083	22300	21532	-315	**-1.41**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Jun	-1285	1254	0	-31	-2.47

23-Jun	6864	5193	12000	57	1.10
24-Jun	-4173	4018	0	-155	-3.86
25-Jun	-3821	3717	0	-104	-2.80
26-Jun	-3927	3834	0	-93	-2.43
27-Jun	-2699	2669	0	-30	-1.12
28-Jun	-1135	1136	0	1	0.09
TANK TOTALS	-10176	21821	12000	-355	**-1.63**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Jun	-1027	1018	0	-9	-0.88
30-Jun	18093	4001	22000	94	2.35
TANK TOTALS	17066	5019	22000	85	**1.69**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Jul	-4070	3924	0	-146	-3.72
2-Jul	-3040	2948	0	-92	-3.12
3-Jul	-4552	4462	0	-90	-2.02
4-Jul					
5-Jul					
6-Jul	-473	461	0	-12	-2.60
7-Jul	-5433	5396	0	-37	-0.69
TANK TOTALS	-17568	17191	0	-377	**-2.19**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Jul	-942	4040	3165	-67	-1.66
9-Jul	2448	3903	6250	101	2.59
10-Jul	3027	3905	7000	-68	-1.74
11-Jul	3172	3336	6565	-57	-1.71
12-Jul	1762	1210	3000	-28	-2.31
13-Jul	-872	848	0	-24	-2.83
14-Jul	-3912	3847	0	-65	-1.69
TANK TOTALS	4683	21089	25980	-208	**-0.99**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Jul	-3375	3313	0	-62	-1.87
16-Jul	16232	3792	20000	24	0.63
17-Jul	2925	3107	6000	32	1.03
18-Jul	-3507	3394	0	-113	-3.33
19-Jul	-1763	1713	0	-50	-2.92
20-Jul	-706	683	0	-23	-3.37
21-Jul	1886	4718	6707	-103	-2.18
TANK TOTALS	11692	20720	32707	-295	**-1.42**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Jul	-4219	4158	0	-61	-1.47
23-Jul	-3360	3305	0	-55	-1.66
24-Jul	10666	3344	14000	10	0.30
25-Jul	-5205	5042	0	-163	-3.23
26-Jul	-1607	1567	0	-40	-2.55
27-Jul	-1213	1205	0	-8	-0.66

28-Jul	-4032	4002	0	-30	-0.75
TANK TOTALS	-8970	22623	14000	-347	**-1.53**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Jul	-4006	3982	0	-24	-0.60
30-Jul	192	3731	4000	-77	-2.06
31-Jul	4918	4013	9000	-69	-1.72
TANK TOTALS	1104	11726	13000	-170	**-1.45**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Aug	-3627	3568	0	-59	-1.65
2-Aug	-1090	1079	0	-11	-1.02
3-Aug	5378	1266	6700	-56	-4.42
4-Aug	1552	4776	6400	-72	-1.51
5-Aug	-560	4290	4000	-270	-6.29
6-Aug	6095	3864	10000	-41	-1.06
7-Aug	-5258	5194	0	-64	-1.23
TANK TOTALS	2490	24037	27100	-573	**-2.38**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Aug	-3177	3138	0	-39	-1.24
9-Aug	-1440	1438	0	-2	-0.14
10-Aug	-1118	1138	0	20	1.76
11-Aug	13061	4493	17500	54	1.20
12-Aug	-4261	4169	0	-92	-2.21
13-Aug	-5610	5504	0	-106	-1.93
14-Aug	-1456	5460	4100	-96	-1.76
TANK TOTALS	-4001	25340	21600	-261	**-1.03**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Aug	-2637	2628	0	-9	-0.34
16-Aug	-2294	2280	0	-14	-0.61
17-Aug	-1665	1666	0	1	0.06
18-Aug	15904	4997	20900	1	0.02
19-Aug	-3912	3797	0	-115	-3.03
20-Aug	-3940	3846	0	-94	-2.44
21-Aug	6597	4827	11505	-81	-1.68
TANK TOTALS	8053	24041	32405	-311	**-1.29**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Aug	1843	2185	4135	-107	-4.90
23-Aug	-1247	1221	0	-26	-2.13
24-Aug	-1370	1377	0	7	0.51
25-Aug	-5590	5538	0	-52	-0.94
26-Aug	-4647	4601	0	-46	-1.00
27-Aug	151	4789	5000	-60	-1.25
28-Aug	13330	4355	17700	-15	-0.34
TANK TOTALS	2470	24066	26835	-299	**-1.24**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance

29-Aug	-3255	3204	0	-51	-1.59
30-Aug	-1198	1200	0	2	0.17
31-Aug	-1995	1957	0	-38	-1.94
TANK TOTALS	-6448	6361	0	-87	**-1.37**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Sep	-2461	5394	3000	-67	-1.24
2-Sep	-4930	4876	0	-54	-1.11
3-Sep	-4145	4068	0	-77	-1.89
4-Sep	16282	3672	20000	-46	-1.25
5-Sep	-3632	3526	0	-106	-3.01
6-Sep	-1135	1094	0	-41	-3.75
7-Sep	-1104	1094	0	-10	-0.91
TANK TOTALS	-1125	23724	23000	-401	**-1.69**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Sep	-4674	4637	0	-37	-0.80
9-Sep	10761	3268	14000	29	0.89
10-Sep	3699	2652	6300	51	1.92
11-Sep	-4672	4536	0	-136	-3.00
12-Sep					
13-Sep	-1450	1432	0	-18	-1.26
14-Sep	-1156	1120	0	-36	-3.21
TANK TOTALS	2508	17645	20300	-147	**-0.83**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Sep	-4175	4115	0	-60	-1.46
16-Sep	12086	3931	16000	17	0.43
17-Sep	-4285	4191	0	-94	-2.24
18-Sep	-5028	4964	0	-64	-1.29
19-Sep	-3210	3208	0	-2	-0.06
20-Sep	-1217	1198	0	-19	-1.59
21-Sep	-1106	1085	0	-21	-1.94
TANK TOTALS	-6935	22692	16000	-243	**-1.07**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Sep	-3251	3217	0	-34	-1.06
23-Sep	11052	5358	16500	-90	-1.68
24-Sep	-5711	5653	0	-58	-1.03
25-Sep	8935	4014	13000	-51	-1.27
26-Sep	-2216	2200	0	-16	-0.73
27-Sep	-1551	1557	0	6	0.39
28-Sep	-995	1017	0	22	2.16
TANK TOTALS	6263	23016	29500	-221	**-0.96**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Sep	-3529	3451	0	-78	-2.26
30-Sep	5874	3181	9175	-120	-3.77
TANK TOTALS	2345	6632	9175	-198	**-2.99**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Oct	4832	3846	9000	-322	-8.37
2-Oct	-5721	5666	0	-55	-0.97
3-Oct	-4016	3973	0	-43	-1.08
4-Oct	10614	1352	12000	-34	-2.51
5-Oct	-1602	1517	0	-85	-5.60
6-Oct	-4980	4850	0	-130	-2.68
7-Oct	1911	5755	7800	-134	-2.33
TANK TOTALS	1038	26959	28800	-803	**-2.98**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Oct	-5499	5498	0	-1	-0.02
9-Oct	-5409	5425	0	16	0.29
10-Oct	2493	4162	6800	-145	-3.48
11-Oct	-455	482	0	27	5.60
12-Oct	4836	1459	6300	-5	-0.34
13-Oct	-1591	4551	3000	-40	-0.88
14-Oct	-3502	3458	0	-44	-1.27
TANK TOTALS	-9127	25035	16100	-192	**-0.77**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Oct	-4439	4430	0	-9	-0.20
16-Oct	18223	5542	24000	-235	-4.24
17-Oct	-4228	4228	0	0	0.00
18-Oct	-1645	1589	0	-56	-3.52
19-Oct	-1362	1330	0	-32	-2.41
20-Oct	-5487	5450	0	-37	-0.68
21-Oct	13332	5904	19530	-294	-4.98
TANK TOTALS	14394	28473	43530	-663	**-2.33**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Oct	-4349	4443	0	94	2.12
23-Oct	-5993	5950	0	-43	-0.72
24-Oct	-4460	4235	0	-225	-5.31
25-Oct	12439	1387	13900	-74	-5.34
26-Oct	-1530	1492	0	-38	-2.55
27-Oct	-1213	1216	0	3	0.25
28-Oct	9533	4613	14500	-354	-7.67
TANK TOTALS	4427	23336	28400	-637	**-2.73**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Oct	-4635	4742	0	107	2.26
30-Oct					
31-Oct	-4066	4056	0	-10	-0.25
TANK TOTALS	-8701	8798	0	97	**1.10**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Nov	-1189	1162	0	-27	-2.32
2-Nov	-669	686	0	17	2.48
3-Nov	-5747	5724	0	-23	-0.40

4-Nov	19574	4932	24800	-294	-5.96
5-Nov	-6000	5957	0	-43	-0.72
6-Nov	-5929	5878	0	-51	-0.87
7-Nov	-4982	4994	0	12	0.24
TANK TOTALS	-4942	29333	24800	-409	**-1.39**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Nov	-414	1331	985	-68	-5.11
9-Nov	-1287	1268	0	-19	-1.50
10-Nov	19591	6986	27000	-423	-6.05
11-Nov	-5357	5431	0	74	1.36
12-Nov	2189	5717	8000	-94	-1.64
13-Nov	-6089	6032	0	-57	-0.94
14-Nov	-2269	2269	0	0	0.00
TANK TOTALS	6364	29034	35985	-587	**-2.02**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Nov	-1508	1479	0	-29	-1.96
16-Nov	-2098	2072	0	-26	-1.25
17-Nov	-5297	5305	0	8	0.15
18-Nov	16710	5035	22000	-255	-5.06
19-Nov	-675	5871	5300	-104	-1.77
20-Nov	-5504	5555	0	51	0.92
21-Nov	-5448	5403	0	-45	-0.83
TANK TOTALS	-3820	30720	27300	-400	**-1.30**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Nov	-2127	2108	0	-19	-0.90
23-Nov	-2561	2593	0	32	1.23
24-Nov	15312	4809	20400	-279	-5.80
25-Nov	-4651	4650	0	-1	-0.02
26-Nov	-5735	5771	0	36	0.62
27-Nov	-5228	5245	0	17	0.32
28-Nov	11459	3559	15210	-192	-5.39
TANK TOTALS	6469	28735	35610	-406	**-1.41**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Nov	-1546	1540	0	-6	-0.39
30-Nov					
TANK TOTALS	-1546	1540	0	-6	**-0.39**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Dec					
2-Dec					
3-Dec	9582	5224	14829	-23	-0.44
4-Dec	-5124	5041	0	-83	-1.65
5-Dec	4350	5574	9925	-1	-0.02
6-Dec	-2313	2258	0	-55	-2.44
7-Dec	-1734	1718	0	-16	-0.93
TANK TOTALS	4761	19815	24754	-178	**-0.90**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Dec	-5902	5915	0	13	0.22
9-Dec	-6676	6676	0	0	0.00
10-Dec	13311	5413	19000	-276	-5.10
11-Dec	-5097	21576	0	16479	76.38
12-Dec	-4777	4812	0	35	0.73
13-Dec	-2418	2398	0	-20	-0.83
14-Dec	-1321	18030	0	16709	92.67
TANK TOTALS	-12880	64820	19000	32940	**50.82**

Fueldrop was missed on the 11/12 and the 14/12.

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Dec	22995	5909	29100	-196	-3.32
16-Dec	-5883	5833	0	-50	-0.86
17-Dec	-5843	5822	0	-21	-0.36
18-Dec	-6805	6802	0	-3	-0.04
19-Dec	2916	4962	8000	-122	-2.46
20-Dec	-2246	2183	0	-63	-2.89
21-Dec				0	#DIV/0!
TANK TOTALS	5134	31511	37100	-455	**-1.44**

No data for the week starting the 22/12

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Dec	-2548	2510	0	-38	-1.51
30-Dec	9712	3179	13000	-109	-3.43
31-Dec	-2060	-14763	-4	-16819	113.93
TANK TOTALS	5104	-9074	12996	-16966	**186.97**

Weekly Reports

April	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1					
Week 2					
Week 3	4763	35201	38550	-534	-1.52
Week 4	5285	16788	22200	-262	-1.56
Week 5 (2 days)	-6344	17151	11000	-331	-1.93
MONTHLY TOTALS	3704	69140	71750	-1127	**-1.63**

May	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-8867	22550	14000	-317	-1.41
Week 2	-2816	24619	23000	-1197	-4.86
Week 3	1707	25998	28000	-295	-1.13
Week 4	8578	26202	35475	-695	-2.65
Week 5 (3 days)	-10744	10561	0	-183	-1.73
MONTHLY TOTALS	-12142	109930	100475	-2687	**-2.44**

June	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	1572	24631	26580	-377	-1.53

Week 2	5237	22808	28260	-215	-0.94
Week 3	-1083	22300	21532	-315	-1.41
Week 4	-10176	21821	12000	-355	-1.63
Week 5 (2 days)	17066	5019	22000	85	1.69
MONTHLY TOTALS	12616	96579	110372	-1177	**-1.22**

July	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-17568	17191	0	-377	-2.19
Week 2	4683	21089	25980	-208	-0.99
Week 3	11692	20720	32707	-295	-1.42
Week 4	-8970	22623	14000	-347	-1.53
Week 5 (3 days)	1104	11726	13000	-170	-1.45
MONTHLY TOTALS	-9059	93349	85687	-1397	**-1.50**

August	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	2490	24037	27100	-573	-2.38
Week 2	-4001	25340	21600	-261	-1.03
Week 3	8053	24041	32405	-311	-1.29
Week 4	2470	24066	26835	-299	-1.24
Week 5 (3 days)	-6448	6361	0	-87	-1.37
MONTHLY TOTALS	2564	103845	107940	-1531	**-1.47**

September	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-1125	23724	23000	-401	-1.69
Week 2	2508	17645	20300	-147	-0.83
Week 3	-6935	22692	16000	-243	-1.07
Week 4	6263	23016	29500	-221	-0.96
Week 5 (2 days)	2345	6632	9175	-198	-2.99
MONTHLY TOTALS	3056	93709	97975	-1210	**-1.29**

October	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	1038	26959	28800	-803	-2.98
Week 2	-9127	25035	16100	-192	-0.77
Week 3	14394	28473	43530	-663	-2.33
Week 4	4427	23336	28400	-637	-2.73
Week 5 (3 days)	-8701	8798	0	97	1.10
MONTHLY TOTALS	2031	112601	116830	-2198	**-1.95**

Large weekly variances due to large variances on days with fueldrops.

November	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-4942	29333	24800	-409	-1.39
Week 2	6364	29034	35985	-587	-2.02
Week 3	-3820	30720	27300	-400	-1.30
Week 4	6469	28735	35610	-406	-1.41
Week 5 (2 days)	-1546	1540	0	-6	-0.39
MONTHLY TOTALS	2525	119362	123695	-1808	**-1.51**

Large weekly variances due to large variances on days with fueldrops.

December	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	4761	19815	24754	-178	-0.90

Week 2	-12880	64820	19000	32940	50.82
Week 3	5134	31511	37100	-455	-1.44
Week 4	0	0	0	0	#DIV/0!
Week 5 (3 days)	5104	-9074	12996	-16966	186.97
MONTHLY TOTALS	2119	107072	93850	15341	**14.33**

Fueldrop missed on the 11/12 and 14/12. Inaccurate fueldrop and pump sales on the 31/12

Dip Results

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
15-Apr-97	12210	11000	14150		2.39	1.08
18-Apr-97	10857	9800	10000	15244	0.23	5.71
18-Apr-97	19513	17500	3400	1300	-0.08	-0.86
18-Apr-97	22851	21000	2000	80	1.83	-6.27
21-Apr-97	11483	10500	11200	13158	-129.67	-136.25
29-Apr-97	24786	23000	11000	30037	#DIV/0!	#DIV/0!

Fueldrop missed between 21/4 and the 29/4

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
1 May 97	29517	24000			#VALUE!	#VALUE!
12 May 97	18713	16500	22400	45219	-81.78	-92.88
20 May 97	21134	23000	10000	37262	-57.74	-47.05
26 May 97	27533	25500	5000	19499	0.11	#DIV/0!
27 May 97	29683		8000	2818	0.18	-85.53
27 May 97	34254	32000	6325	3368	#DIV/0!	#DIV/0!

Fueldrop missed between the 1/5 & 12/5. Driver dip not recorded on the 27/5

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
4 Jun 97	15891	14500	23000		-18.46	-17.74
10-Jun-97	17848	16000	22000	24338	-23.02	-25.57
17-Jun-97	26087	24500	6490	19765	-53.34	-56.47
23-Jun-97	27658	26000	12000	19672	1.79	1.05
30-Jun-97	18505	17000	22000	20822	#DIV/0!	#DIV/0!

Fueldrops were recorded in the reconciliation report but not in other I.M.S reports.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
8 Jul 97	16287	15000	3165		0.42	-0.48
9 Jul 97	15156	14000	1750	4232	-0.78	0.45
10-Jul-97	14326	13000	4500	2692	0.22	-22.60
10-Jul-97	15071	17800	7000	3722	-26.84	-5.62
12-Jul-97	24007	21500	3000	4508	1.15	-6.48
16-Jul-97	15885	14500	20000	10939	-0.12	3.14
17-Jul-97	34845	32400	6000	1082	0.65	16.82
21-Jul-97	29126	23000	6707	11531	0.83	-20.43
24-Jul-97	23436	22000	14000	12202	1.78	3.34
31-Jul-97	17148	15500	4000	19983	0.09	1.39
31-Jul-97	20894	19000	9000	235	#DIV/0!	#DIV/0!

Big difference between driver and ATG dip on the 17/7 & 21/7.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
3 Aug 97	20028	18000	6700		0.43	#DIV/0!

4 Aug 97	22418		6400	4214	0.06	#DIV/0!
5 Aug 97	28027		4000	774	1.04	-103.21
6 Aug 97	26927	25500	10000	4819	0.61	3.55
11-Aug-97	19429	17500	17500	17379	0.60	-1.18
14-Aug-97	25491	24000	4100	11284	0.81	-2.98
18-Aug-97	13509	12500	20900	15973	1.26	4.34
21-Aug-97	21604	20000	11505	12533	-22.96	-28.15
27-Aug-97	16818	15800	5000	20152	0.43	3.79
29-Aug-97	17550	16000	17700	4193	#DIV/0!	#DIV/0!

No driver dip recorded on the 4/8 & 5/8.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
1 Sep 97	23484	22000	3000		0.95	2.01
4 Sep 97	16627	15000	20000	9699	1.13	2.61
9 Sep 97	19871	18000	14000	16531	-0.02	0.42
10-Sep-97	30999	29000	6300	2878	1.23	0.22
16-Sep-97	19300	17500	16000	17762	2.60	-12.75
24-Sep-97	10258	10000	16500	24775	0.75	8.61
25-Sep-97	17180	15700	13000	9449	0.56	#DIV/0!
30-Sep-97	20372		9175	9693	#DIV/0!	#DIV/0!

Big difference between driver and ATG dip on the 16/9 & 25/9.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
1 Oct 97	23328	21500	9000		0.42	-0.47
4 Oct 97	22137	20500	12000	10097	1.18	-10.51
7 Oct 97	24348	25700	4300	9502	-0.08	11.94
7 Oct 97	28670	26800	3500	0	0.50	#DIV/0!
10-Oct-97	16437		6800	15650	0.41	-88.77
12-Oct-97	18271	17000	6300	4891	0.15	3.37
13-Oct-97	21396	19500	3000	3143	0.85	-4.48
16-Oct-97	14193	13000	24000	10083	1.88	4.13
21-Oct-97	19569	18000	15000	18256	0.48	2.37
21-Oct-97	34163	32000	4530	241	1.45	-3.01
25-Oct-97	18385	17000	13900	20042	0.75	1.14
28-Oct-97	24664	23200	14500	7435	#DIV/0!	#DIV/0!

Big difference between dips throughout month.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
5 Nov 97	9727	8500	24800		2.63	4.46
8 Nov 97	16463	15000	985	17631	-0.17	-8.50
11-Nov-97	8798	8000	27000	8665	1.52	5.41
12-Nov-97	28820	27000	8000	6539	1.44	-6.72
18-Nov-97	14209	13500	22000	22407	0.72	5.47
19-Nov-97	28140	26200	5300	7866	1.27	-13.77
25-Nov-97	10005	9500	20400	23308	1.91	12.08
28-Nov-97	12813	11200	15210	17347	#DIV/0!	#DIV/0!

Big difference between dips throughout month.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
4 Dec 97	17686	17000	15000		0.81	5.20
5 Dec 97	24160	22500	10000	8331	1.37	-0.50

10-Dec-97	14398	13000	19000	19565	1.64	-0.73
15-Dec-97	9677	8500	29100	23562	1.94	6.35
19-Dec-97	18890	17000	8000	19520	10.58	11.02
30-Dec-97	20283	18500	13000	4462	#DIV/0!	#DIV/0!

Delivery Results

Date	Time	CPM Tank Gauge		Variance	% Variance
15-Apr	19:45	14150	14120	-30	-0.21
18-Apr	6:43	10000	9991	-9	-0.09
18-Apr	10:27	3400	3396	-4	-0.12
18-Apr	14:38	2000	1996	-4	-0.20
21-Apr	23:40	11200	11189	-11	-0.10
29-Apr	13:05	11000	11138	138	1.25
1-May	8:43	---	10262	#VALUE!	#VALUE!
12-May	8:37	22400	22383	-17	-0.08
20-May	18:14	10000	10069	69	0.69
26-May	15:40	5000	5041	41	0.82
27-May	6:51	8000	8110	110	1.38
27-May	16:58	6325	6138	-187	-2.96
4-Jun	6:19	23000	23084	84	0.37
10-Jun	21:58	22000	22181	181	0.82
17-Jun	13:34	6490	6524	34	0.52
23-Jun	16:54	12000	12150	150	1.25
30-Jun	15:21	22000	22211	211	0.96
8-Jul	13:06	3165	3123	-42	-1.33
9-Jul	14:22	1750	1853	103	5.89
10-Jul	3:06	4500	4485	-15	-0.33
10-Jul	17:37	7000	6958	-42	-0.60
12-Jul	10:20	3000	3003	3	0.10
16-Jul	17:02	20000	79	-19921	-99.61
17-Jul	6:37	6000	6141	141	2.35
21-Jul	15:40	6707	6726	19	0.28
24-Jul	19:18	14000	4068	-9932	-70.94
31-Jul	0:51	4000	3987	-13	-0.33
31-Jul	6:47	9000	8981	-19	-0.21
3-Aug	19:09	6700	6667	-33	-0.49
4-Aug	18:26	6400	6406	6	0.09
5-Aug	4:29	4000	3828	-172	-4.30
6-Aug	6:39	10000	10047	47	0.47
11-Aug	18:28	17500	17603	103	0.59
14-Aug	7:47	4100	4106	6	0.15
18-Aug	18:41	20900	20935	35	0.17
21-Aug	19:12	11505	11521	16	0.14
27-Aug	23:07	5000	4992	-8	-0.16
29-Aug	0:43	17700	17753	53	0.30
1-Sep	23:33	3000	2995	-5	-0.17
4-Sep	6:22	20000	20034	34	0.17
9-Sep	18:06	14000	14049	49	0.35
10-Sep	19:09	6300	6383	83	1.32
16-Sep	17:56	16000	16061	61	0.38

24-Sep	1:43	16500	16451	-49	-0.30
25-Sep	22:44	13000	12989	-11	-0.08
30-Sep	11:34	9175	9117	-58	-0.63
1-Oct	21:44	9000	9029	29	0.32
4-Oct	7:36	12000	12058	58	0.48
7-Oct	12:42	4300	4324	24	0.56
7-Oct	13:00	3500	3486	-14	-0.40
10-Oct	10:55	6800	6690	-110	-1.62
12-Oct	21:22	6300	6252	-48	-0.76
13-Oct	17:30	3000	2986	-14	-0.47
16-Oct	9:08	24000	23661	-339	-1.41
21-Oct	7:27	15000	14829	-171	-1.14
21-Oct	9:24	4530	4281	-249	-5.50
25-Oct	11:43	13900	13814	-86	-0.62
28-Oct	23:13	14500	14204	-296	-2.04
5-Nov	0:58	24800	24453	-347	-1.40
8-Nov	10:44	985	928	-57	-5.79
11-Nov	0:54	27000	26479	-521	-1.93
12-Nov	7:05	8000	7829	-171	-2.14
18-Nov	6:01	22000	21664	-336	-1.53
19-Nov	18:04	5300	5193	-107	-2.02
25-Nov	1:52	20400	20122	-278	-1.36
28-Nov	13:55	15210	15060	-150	-0.99
4-Dec	1:40	15000	14829	-171	-1.14
5-Dec	16:52	10000	9925	-75	-0.75
10-Dec	6:33	19000	18813	-187	-0.98
15-Dec	23:54	29100	28826	-274	-0.94
19-Dec	6:51	8000	7889	-111	-1.39

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site F1	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	13,832	$0.0140	112	$193.50	$21,671.53
Full Load	32,000	$0.0119	49	$380.80	$18,659.20
Benefit		$0.0021			$3,012.33
Annual Volume	1,540,138				
post-tax Benefit per annum					$2,018.26

PERPETUITY - unlikely as unit will not last forever

Site F1	NPV	
NPV Benefit into Perpetuity	$13,455.10	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$1,394.49	

10 year analysis Site F1	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$10,129.20		$2,018.26	$2,018.26	$2,018.26	$2,018.26	$2,018.26	$2,018.26	$2,018.26	$2,018.26	$2,018.26	$2,018.26
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**-$1,522.12**	-$10,000.00	$1,818.26	$1,788.26	$1,755.26	$1,718.96	$1,679.03	$1,635.11	$1,586.80	$1,533.65	$1,475.19	$1,410.88
IRR	**10.7%**											

NB. Tanker is a 38m3 artic carrying 32000L diesel

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site F2

Daily Results

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Apr	-3299	3303	0	4	0.12
2-Apr	-6074	6096	0	22	0.36
3-Apr	7051	4432	11500	-17	-0.38
4-Apr	-5170	5219	0	49	0.94
5-Apr	4424	3577	8000	1	0.03
6-Apr	-967	955	0	-12	-1.26
7-Apr	-2880	2877	0	-3	-0.10
TANK TOTALS	-6915	26459	19500	44	**0.17**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Apr	-5137	5129	0	-8	-0.16
9-Apr	16162	5766	22000	-72	-1.25
10-Apr	-4922	4936	0	14	0.28
11-Apr	2725	5330	8100	-45	-0.84
12-Apr	-766	749	0	-17	-2.27
13-Apr	-527	499	0	-28	-5.61
14-Apr	3358	3614	7000	-28	-0.77
TANK TOTALS	10893	26023	37100	-184	**-0.71**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Apr	-3915	6108	2200	-7	-0.11
16-Apr	-4958	4925	0	-33	-0.67
17-Apr	-4635	4664	0	29	0.62
18-Apr	-5739	5765	0	26	0.45
19-Apr	-3084	3054	0	-30	-0.98
20-Apr	-1044	1033	0	-11	-1.06
21-Apr	-923	3918	3000	-5	-0.13
TANK TOTALS	-24298	29467	5200	-31	**-0.11**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Apr	837	6167	7000	4	0.06
23-Apr					
24-Apr					
25-Apr	14356	612	15000	-32	-5.23
26-Apr	-2041	2056	0	15	0.73
27-Apr	-825	831	0	6	0.72
28-Apr	-4299	4330	0	31	0.72
TANK TOTALS	8028	13996	22000	24	**0.17**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Apr	-5335	5326	0	-9	-0.17
30-Apr	19410	4464	23900	-26	-0.58
TANK TOTALS	14075	9790	23900	-35	**-0.36**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-May	-4808	4840	0	32	0.66
2-May	3817	3156	7000	-27	-0.86
3-May	-2385	2404	0	19	0.79
4-May	-1305	1316	0	11	0.84
5-May	4222	4770	9000	-8	-0.17
6-May					
7-May					
TANK TOTALS	-459	16486	16000	27	**0.16**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-May				0	#DIV/0!
9-May	-3759	3752	0	-7	-0.19
10-May	8069	1947	10000	16	0.82
11-May	-1213	1207	0	-6	-0.50
12-May	10488	4476	15000	-36	-0.80
13-May	-4509	4508	0	-1	-0.02
14-May	7696	5271	13000	-33	-0.63
TANK TOTALS	16772	21161	38000	-67	**-0.32**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-May	-4856	4847	0	-9	-0.19
16-May	4764	3192	8000	-44	-1.38
17-May	-1779	1788	0	9	0.50
18-May	-1420	1412	0	-8	-0.57
19-May	-1697	5377	3650	30	0.56
20-May	-3671	3713	0	42	1.13
21-May	8941	6987	16000	-72	-1.03
TANK TOTALS	282	27316	27650	-52	**-0.19**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-May	-3519	3511	0	-8	-0.23
23-May	414	2571	3000	-15	-0.58
24-May	-1708	1713	0	5	0.29
25-May	-1088	1097	0	9	0.82
26-May	-3297	3311	0	14	0.42
27-May	8919	4411	13400	-70	-1.59
28-May	-5413	5435	0	22	0.40
TANK TOTALS	-5692	22049	16400	-43	**-0.20**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-May	3626	4373	8000	-1	-0.02
30-May	-2613	5292	2700	-21	-0.40
31-May	-2211	2236	0	25	1.12
TANK TOTALS	-1198	11901	10700	3	**0.03**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Jun	-53	28	0	-25	-89.29
2-Jun	-1708	1689	0	-19	-1.12
3-Jun	-3512	3506	0	-6	-0.17

4-Jun	-4923	4903	0	-20	-0.41
5-Jun	17920	5017	23000	-63	-1.26
6-Jun	-867	4354	3500	-13	-0.30
7-Jun	-2971	2974	0	3	0.10
TANK TOTALS	3886	22471	26500	-143	**-0.64**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Jun	-1122	1132	0	10	0.88
9-Jun	7265	4105	11400	-30	-0.73
10-Jun	-4944	4972	0	28	0.56
11-Jun	5003	4773	9800	-24	-0.50
12-Jun	-3194	3192	0	-2	-0.06
13-Jun	-3101	3113	0	12	0.39
14-Jun	-2933	2941	0	8	0.27
TANK TOTALS	-3026	24228	21200	2	**0.01**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Jun	-507	513	0	6	1.17
16-Jun	6353	2627	9000	-20	-0.76
17-Jun	4537	4421	9000	-42	-0.95
18-Jun	-5281	5254	0	-27	-0.51
19-Jun	-2752	2755	0	3	0.11
20-Jun	5722	2244	8000	-34	-1.52
21-Jun	-2168	2190	0	22	1.00
TANK TOTALS	5904	20004	26000	-92	**-0.46**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Jun	-730	729	0	-1	-0.14
23-Jun	-3801	3826	0	25	0.65
24-Jun	-4257	4256	0	-1	-0.02
25-Jun	13483	5424	19000	-93	-1.71
26-Jun	-3788	3762	0	-26	-0.69
27-Jun	-2414	3327	900	13	0.39
28-Jun	-2865	2895	0	30	1.04
TANK TOTALS	-4372	24219	19900	-53	**-0.22**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Jun	-797	815	0	18	2.21
30-Jun	-2320	2337	0	17	0.73
TANK TOTALS	-3117	3152	0	35	**1.11**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Jul	-4599	4615	0	16	0.35
2-Jul	10070	4879	15000	-51	-1.05
3-Jul	2803	2176	5000	-21	-0.97
4-Jul					
5-Jul	-1917	1912	0	-5	-0.26
6-Jul	-555	555	0	0	0.00
7-Jul	-3627	3638	0	11	0.30
TANK TOTALS	2175	17775	20000	-50	**-0.28**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Jul	3656	4331	8000	-13	-0.30
9-Jul	-5824	5862	0	38	0.65
10-Jul	-2880	2886	0	6	0.21
11-Jul	6740	3229	10000	-31	-0.96
12-Jul	-2355	2364	0	9	0.38
13-Jul	-1694	1685	0	-9	-0.53
14-Jul	-3287	3281	0	-6	-0.18
TANK TOTALS	-5644	23638	18000	-6	**-0.03**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Jul	17236	3398	20700	-66	-1.94
16-Jul	-5855	5886	0	31	0.53
17-Jul	-4508	4550	0	42	0.92
18-Jul	5914	4053	10000	-33	-0.81
19-Jul	-3673	3680	0	7	0.19
20-Jul	-1122	1129	0	7	0.62
21-Jul	-4054	4066	0	12	0.30
TANK TOTALS	3938	26762	30700	0	**0.00**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Jul	3687	4420	8100	7	0.16
23-Jul	7532	3813	11400	-55	-1.44
24-Jul	3832	4129	8000	-39	-0.94
25-Jul	-3941	3931	0	-10	-0.25
26-Jul	-3487	3499	0	12	0.34
27-Jul	3093	2095	5200	-12	-0.57
28-Jul	-4120	4144	0	24	0.58
TANK TOTALS	6596	26031	32700	-73	**-0.28**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Jul	-4310	4344	0	34	0.78
30-Jul	10748	5185	16000	-67	-1.29
31-Jul	-5213	5225	0	12	0.23
TANK TOTALS	1225	14754	16000	-21	**-0.14**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Aug	-2196	2194	0	-2	-0.09
2-Aug	-1939	1949	0	10	0.51
3-Aug	-1396	1382	0	-14	-1.01
4-Aug	-1445	1448	0	3	0.21
5-Aug	6999	4959	12000	-42	-0.85
6-Aug	-5959	6000	0	41	0.68
7-Aug	-6112	6120	0	8	0.13
TANK TOTALS	-12048	24052	12000	4	**0.02**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Aug	-3533	3537	0	4	0.11
9-Aug	-2138	2133	0	-5	-0.23

10-Aug	23226	575	23800	1	0.17
11-Aug	-3152	3170	0	18	0.57
12-Aug	-4873	4889	0	16	0.33
13-Aug	-4698	4716	0	18	0.38
14-Aug	12281	4618	17000	-101	-2.19
TANK TOTALS	17113	23638	40800	-49	**-0.21**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Aug	-4699	4718	0	19	0.40
16-Aug	-1987	2030	0	43	2.12
17-Aug	-947	974	0	27	2.77
18-Aug	5651	3413	9036	28	0.82
19-Aug	-5285	5311	0	26	0.49
20-Aug	2444	3809	6300	-47	-1.23
21-Aug	-2755	2723	0	-32	-1.18
TANK TOTALS	-2755	22978	15336	64	**0.28**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Aug	7232	2742	10011	-37	-1.35
23-Aug	-2085	2096	0	11	0.52
24-Aug	-776	806	0	30	3.72
25-Aug	-2937	2978	0	41	1.38
26-Aug	-5010	5041	0	31	0.61
27-Aug	6737	4541	11300	-22	-0.48
28-Aug	9126	5040	14200	-34	-0.67
TANK TOTALS	12287	23244	35511	20	**0.09**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Aug	-5101	5123	0	22	0.43
30-Aug	-2066	2090	0	24	1.15
31-Aug	-1340	1350	0	10	0.74
TANK TOTALS	-8507	8563	0	56	**0.65**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Sep	-2683	2714	0	31	1.14
2-Sep	11334	4218	15600	-48	-1.14
3-Sep	-4624	4607	0	-17	-0.37
4-Sep	-1144	5972	4800	28	0.47
5-Sep	-3193	3163	0	-30	-0.95
6-Sep	-1760	1753	0	-7	-0.40
7-Sep	-1229	1233	0	4	0.32
TANK TOTALS	-3299	23660	20400	-39	**-0.16**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Sep	-3245	3277	0	32	0.98
9-Sep	-4406	4440	0	34	0.77
10-Sep	-4407	4420	0	13	0.29
11-Sep	-4935	4899	0	-36	-0.73
12-Sep	2399	5635	8000	34	0.60
13-Sep	-1691	1678	0	-13	-0.77
14-Sep	-2047	2034	0	-13	-0.64

TANK TOTALS	-18332	26383	8000	51	**0.19**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Sep	-4015	3973	0	-42	-1.06
16-Sep	27992	5364	33300	56	1.04
17-Sep	-4393	4417	0	24	0.54
18-Sep	2037	5850	7900	-13	-0.22
19-Sep	-4115	4146	0	31	0.75
20-Sep	-2916	2933	0	17	0.58
21-Sep	-676	688	0	12	1.74
TANK TOTALS	13914	27371	41200	85	**0.31**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Sep	2643	3676	6300	19	0.52
23-Sep	-3842	3829	0	-13	-0.34
24-Sep	19205	5691	25000	-104	-1.83
25-Sep	-5451	5471	0	20	0.37
26-Sep	-4401	4438	0	37	0.83
27-Sep	-2576	2616	0	40	1.53
28-Sep	-162	214	0	52	24.30
TANK TOTALS	5416	25935	31300	51	**0.20**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Sep	-3476	3488	0	12	0.34
30-Sep	3229	5739	9000	-32	-0.56
TANK TOTALS	-247	9227	9000	-20	**-0.22**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Oct	-4586	4613	0	27	0.59
2-Oct	9666	5330	15000	-4	-0.08
3-Oct	-3601	3630	0	29	0.80
4-Oct	-2261	2229	0	-32	-1.44
5-Oct	4390	800	5200	-10	-1.25
6-Oct	-4189	4175	0	-14	-0.34
7-Oct	-4702	4738	0	36	0.76
TANK TOTALS	-5283	25515	20200	32	**0.13**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Oct	10797	5174	16000	-29	-0.56
9-Oct	-5484	5524	0	40	0.72
10-Oct	-4626	4646	0	20	0.43
11-Oct	-2654	2682	0	28	1.04
12-Oct	-2416	2461	0	45	1.83
13-Oct	-3569	3581	0	12	0.34
14-Oct	3156	5860	9000	16	0.27
TANK TOTALS	-4796	29928	25000	132	**0.44**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Oct	20728	6195	27000	-77	-1.24
16-Oct	-6501	6535	0	34	0.52

17-Oct	-5354	5501	0	147	2.67
18-Oct	-3488	3482	0	-6	-0.17
19-Oct	-998	990	0	-8	-0.81
20-Oct	-4440	4448	0	8	0.18
21-Oct	-4883	4854	0	-29	-0.60
TANK TOTALS	-4936	32005	27000	69	**0.22**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Oct	18587	4660	23000	247	5.30
23-Oct	-1312	6709	5400	-3	-0.04
24-Oct	-4367	4419	0	52	1.18
25-Oct	-2309	2338	0	29	1.24
26-Oct	-676	667	0	-9	-1.35
27-Oct	3070	2209	5300	-21	-0.95
28-Oct	7070	5006	12100	-24	-0.48
TANK TOTALS	20063	26008	45800	271	**1.04**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Oct	-4524	4536	0	12	0.26
30-Oct	3554	4965	8500	19	0.38
31-Oct	-3984	4008	0	24	0.60
TANK TOTALS	-4954	13509	8500	55	**0.41**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Nov	6413	2549	9000	-38	-1.49
2-Nov	-973	1011	0	38	3.76
3-Nov	2854	5033	7900	-13	-0.26
4-Nov	-6618	6650	0	32	0.48
5-Nov	-6053	6059	0	6	0.10
6-Nov	-8651	8662	0	11	0.13
7-Nov	13760	6237	20000	-3	-0.05
TANK TOTALS	732	36201	36900	33	**0.09**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Nov	-1958	1949	0	-9	-0.46
9-Nov	-1676	1659	0	-17	-1.02
10-Nov	-5124	5114	0	-10	-0.20
11-Nov	21104	5860	27000	-36	-0.61
12-Nov	-6728	6772	0	44	0.65
13-Nov	946	7760	8700	6	0.08
14-Nov	-2571	2609	0	38	1.46
TANK TOTALS	3993	31723	35700	16	**0.05**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Nov	-1762	1765	0	3	0.17
16-Nov	-1433	1419	0	-14	-0.99
17-Nov	9942	5786	15800	-72	-1.24
18-Nov	-5452	5486	0	34	0.62
19-Nov	4534	7476	12000	10	0.13
20-Nov	-6090	6146	0	56	0.91

21-Nov	6723	5267	12100	-110	-2.09
TANK TOTALS	6462	33345	39900	-93	**-0.28**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Nov	-2525	2510	0	-15	-0.60
23-Nov	-1672	1698	0	26	1.53
24-Nov	-5432	5508	0	76	1.38
25-Nov	-5950	5963	0	13	0.22
26-Nov	9633	7346	17000	-21	-0.29
27-Nov	-5713	5803	0	90	1.55
28-Nov	-5889	5894	0	5	0.08
TANK TOTALS	-17548	34722	17000	174	**0.50**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Nov	5840	5128	11000	-32	-0.62
30-Nov	-2519	2533	0	14	0.55
TANK TOTALS	3321	7661	11000	-18	**-0.23**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Dec	2733	4449	7164	18	0.40
2-Dec	-5833	5873	0	40	0.68
3-Dec	3329	-3310	0	19	-0.57
4-Dec					
5-Dec					
6-Dec					
7-Dec	8758	2697	11454	1	0.04
TANK TOTALS	8987	9709	18618	78	**0.80**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Dec	-3554	3577	0	23	0.64
9-Dec	8114	5887	13960	41	0.70
10-Dec	-596	4562	3986	-20	-0.44
11-Dec	-6887	6928	0	41	0.59
12-Dec	4170	5867	9981	56	0.95
13-Dec	-3381	3405	0	24	0.70
14-Dec	-1524	1560	0	36	2.31
TANK TOTALS	-3658	31786	27927	201	**0.63**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Dec	-5442	5518	0	76	1.38
16-Dec	7847	6439	14253	33	0.51
17-Dec	-5451	5482	0	31	0.57
18-Dec	-5850	5899	0	49	0.83
19-Dec	1672	6966	8644	-6	-0.09
20-Dec	-3812	3782	0	-30	-0.79
21-Dec	-2726	2721	0	-5	-0.18
TANK TOTALS	-13762	36807	22897	148	**0.40**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Dec	-1123	8134	7046	-35	-0.43

23-Dec	22869	4087	26956	0	0.00
24-Dec	-2387	2425	0	38	1.57
25-Dec	-217	220	0	3	1.36
26-Dec	-739	716	0	-23	-3.21
27-Dec	3561	1068	4597	32	3.00
28-Dec	-852	837	0	-15	-1.79
TANK TOTALS	21112	17487	38599	0	**0.00**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Dec	-3600	3565	0	-35	-0.98
30-Dec	-2493	2495	0	2	0.08
31-Dec	-1449	1469	0	20	1.36
TANK TOTALS	-7542	7529	0	-13	**-0.17**

Weekly Results

April	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	-6915	26459	19500	44	0.17
Week 2	10893	26023	37100	-184	-0.71
Week 3	-24298	29467	5200	-31	-0.11
Week 4	8028	13996	22000	24	0.17
Week 5 (3 days)	14075	9790	23900	-35	-0.36
MONTHLY TOTALS	1783	105735	107700	-182	**-0.17**

May	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-459	16486	16000	27	0.16
Week 2	16772	21161	38000	-67	-0.32
Week 3	282	27316	27650	-52	-0.19
Week 4	-5692	22049	16400	-43	-0.20
Week 5 (3 days)	-1198	11901	10700	3	0.03
MONTHLY TOTALS	9705	98913	108750	-132	**-0.13**

June	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	3886	22471	26500	-143	-0.64
Week 2	-3026	24228	21200	2	0.01
Week 3	5904	20004	26000	-92	-0.46
Week 4	-4372	24219	19900	-53	-0.22
Week 5 (3 days)	-3117	3152	0	35	1.11
MONTHLY TOTALS	-725	94074	93600	-251	**-0.27**

July	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	2175	17775	20000	-50	-0.28
Week 2	-5644	23638	18000	-6	-0.03
Week 3	3938	26762	30700	0	0.00
Week 4	6596	26031	32700	-73	-0.28
Week 5 (3 days)	1225	14754	16000	-21	-0.14
MONTHLY TOTALS	8290	108960	117400	-150	**-0.14**

August	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*

Week 1	-12048	24052	12000	4	0.02
Week 2	17113	23638	40800	-49	-0.21
Week 3	-2755	22978	15336	64	0.28
Week 4	12287	23244	35511	20	0.09
Week 5 (3 days)	-8507	8563	0	56	0.65
MONTHLY TOTALS	6090	102475	103647	95	**0.09**

September	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-3299	23660	20400	-39	-0.16
Week 2	-18332	26383	8000	51	0.19
Week 3	13914	27371	41200	85	0.31
Week 4	5416	25935	31300	51	0.20
Week 5 (3 days)	-247	9227	9000	-20	-0.22
MONTHLY TOTALS	-2548	112576	109900	128	**0.11**

October	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-5283	25515	20200	32	0.13
Week 2	-4796	29928	25000	132	0.44
Week 3	-4936	32005	27000	69	0.22
Week 4	20063	26008	45800	271	1.04
Week 5 (3 days)	-4954	13509	8500	55	0.41
MONTHLY TOTALS	94	126965	126500	559	**0.44**

November	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	732	36201	36900	33	0.09
Week 2	3993	31723	35700	16	0.05
Week 3	6462	33345	39900	-93	-0.28
Week 4	-17548	34722	17000	174	0.50
Week 5 (3 days)	3321	7661	11000	-18	-0.23
MONTHLY TOTALS	-3040	143652	140500	112	**0.08**

December	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	8987	9709	18618	78	0.80
Week 2	-3658	31786	27927	201	0.63
Week 3	-13762	36807	22897	148	0.40
Week 4	21112	17487	38599	0	0.00
Week 5 (3 days)	-7542	7529	0	-13	-0.17
MONTHLY TOTALS	5137	103318	108041	414	**0.40**

Dip Report

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
11-Apr	29553	29000	8100		-21.70	-21.93
15-Apr	31862	31250	2200	12704	0.51	-1.53
21-Apr	11875	11500	3000	22126	0.03	1.24
22-Apr	10698	10200	7000	4174	-199.33	#DIV/0!
30-Apr	12543		22000	30157	0.09	-37.26
30-Apr	33030	32700	1900	1484	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
5-May	22997	22500	9000		0.45	-1.98
10-May	11228	11000	10000	20718	-0.06	2.13
12-May	14024	13500	15000	7213	0.01	1.33
14-May	20786	20000	13000	8235	0.22	-0.59
16-May	24294	23700	8000	9439	0.14	-0.57
19-May	26408	26000	3650	5849	-0.20	0.79
21-May	23133	22500	5000	6972	0.06	0.03
21-May	22826	22200	11000	5293	0.22	-0.49
23-May	28428	28000	3000	5336	-0.04	#DIV/0!
27-May	22928		5400	8510	0.11	-87.34
27-May	26128	25500	8000	2171	-0.05	-1.49
29-May	24283	24000	8000	9858	0.09	2.31
30-May	26346	25500	2700	5912	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
5-Jun	15047	14500	23000		0.09	0.16
6-Jun	29566	29000	3500	8453	0.03	-0.05
9-Jun	24795	24250	11400	8263	0.03	-0.89
11-Jun	27790	27500	9800	8396	0.07	0.72
16-Jun	25453	25000	9000	12120	0.03	0.40
17-Jun	29060	28500	9000	5385	0.29	0.23
20-Jun	28539	28000	8000	9437	-0.17	1.32
25-Jun	18911	18100	19000	17661	0.43	1.10
27-Jun	31762	30750	900	6012	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
2-Jul	20058	19500	15000		0.16	0.52
3-Jul	30161	29500	5000	4848	-0.02	-1.31
8-Jul	20405	20000	8000	14761	0.00	-0.78
11-Jul	15288	15000	10000	13117	0.20	2.23
15-Jul	16610	16000	8700	8644	-0.02	#DIV/0!
15-Jul	23438		12000	1876	-0.18	-108.91
18-Jul	21587	21200	10000	13889	0.18	0.78
22-Jul	18193	17700	8100	13362	-0.07	0.83
23-Jul	22690	22000	11400	3618	0.16	-0.45
24-Jul	29016	28500	8000	5028	0.13	0.06
27-Jul	28196	27700	5200	8784	-0.12	-0.46
30-Jul	20428	20000	16000	12992	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
5-Aug	20458	20000	12000		-0.25	-1.79
10-Aug	10305	10000	23800	22179	-0.09	1.13
15-Aug	16501	16000	17000	17619	-0.25	-0.01
18-Aug	21552	21000	9036	12002	-0.01	0.18
20-Aug	21592	21000	6300	8998	0.29	0.34
22-Aug	23103	22500	10011	4723	-0.30	0.62
27-Aug	20788	20000	8000	12388	0.16	1.53
27-Aug	28155	27000	3300	588	-0.31	-3.04
28-Aug	24210	23700	14200	7321	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
2 Sep 97	22731	22000	15600		0.15	-0.34
4 Sep 97	29787	29200	4800	8500	1.10	4.88
12-Sep	3900	3200	8000	30644	1.72	#VALUE!
16-Sep	2037		27000	9828	-0.45	#VALUE!
17-Sep	25168	24500	6300	3983	0.03	1.00
18-Sep	25102	24200	7900	6359	-0.35	-2.03
22-Sep	18848	18250	6300	14220	0.10	0.57
24-Sep	17677	17000	10000	7453	-0.02	-0.80
24-Sep	24193	23700	15000	3489	-0.26	1.27
30-Sep	22121	21300	9000	17129	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
2 Oct 97	20750	21000	15000		0.00	0.35
6 Oct 97	24235	24400	5200	11515	-0.36	4.71
8 Oct 97	15598	15000	16000	13893	-0.51	0.09
14-Oct	9655	9000	9000	21992	-0.28	-0.79
15-Oct	11600	11000	27000	7087	-1.04	-3.82
22-Oct	7701	7300	23000	30979	-1.21	-5.25
23-Oct	23425	24000	5400	7559	-0.27	5.81
27-Oct	19051	18500	5300	9825	0.06	-0.93
29-Oct	19363	19000	12100	4977	0.18	1.61
30-Oct	25720	25000	8500	5697	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
1-Nov	25628	25000	9000		0.01	-0.77
3-Nov	30890	30500	7900	3736	-0.39	-1.18
8-Nov	6840	6500	20000	31977	0.05	3.52
11-Nov	12756	12000	27000	14078	-0.19	1.16
13-Nov	29137	28000	8700	10675	0.04	-2.04
17-Nov	24344	23700	15800	13484	-0.03	-0.18
19-Nov	26106	25500	12000	14047	-0.07	-0.16
21-Nov	27082	26500	12100	11042	0.13	1.26
26-Nov	21516	20700	17000	17639	-0.36	-1.79
29-Nov	18559	18000	11000	20023	#DIV/0!	#DIV/0!

Date	T/G Dip	Driver Dip	Fueldrop	Pump Sales	% T/G Error	% Dip Error
1 Dec 97	18755	19200	7200		-110.77	-108.73
7 Dec 97	21167	21000	11500	28234	-0.13	1.48
9 Dec 97	23741	23200	14000	8956	0.22	-0.09
11-Dec	32440	32000	4000	5229	-0.05	0.36
12-Dec	27953	27400	10000	8502	-1.07	-0.63
16-Dec	19644	19000	10300	18520	0.04	#DIV/0!
16-Dec	27633		4000	2300	-0.13	-150.33
19-Dec	18598	18000	8700	13060	1.64	-1.33
22-Dec	6413	6000	7000	20780	-0.52	-0.43
24-Dec	9423	9000	27000	4039	0.09	0.50
27-Dec	32854	32300	4600	3540	#DIV/0!	#DIV/0!

Delivery Report

Date	Time	CPM	Tank Gauging	Variance	% Variance
3-Apr	20:37	11500	11473	-27	-0.23
5-Apr	9:25	8000	7968	-32	-0.40
10-Apr	0:52	22000	21929	-71	-0.32
10-Apr	1:45	---	649	#VALUE!	#VALUE!
11-Apr	8:37	8100	8086	-14	-0.17
15-Apr	16:02	2200	2186	-14	-0.64
21-Apr	8:25	3000	3014	14	0.47
22-Apr	6:09	7000	7013	13	0.19
30-Apr	5:40	22000	21953	-47	-0.21
30-Apr	11:32	1900	1917	17	0.89
5-May	19:29	9000	8969	-31	-0.34
10-May	8:37	10000	10026	26	0.26
12-May	23:22	15000	14979	-21	-0.14
14-May	18:30	13000	12962	-38	-0.29
16-May	22:10	8000	7967	-33	-0.41
19-May	16:11	3650	3642	-8	-0.22
21-May	6:34	5000	4972	-28	-0.56
21-May	20:19	11000	10958	-42	-0.38
23-May	6:30	3000	2985	-15	-0.50
27-May	8:34	5400	5362	-38	-0.70
27-May	17:00	8000	7966	-34	-0.43
29-May	17:05	8000	7977	-23	-0.29
30-May	17:12	2700	2689	-11	-0.41
5-Jun	5:35	23000	22930	-70	-0.30
6-Jun	18:40	3500	3487	-13	-0.37
9-Jun	20:11	11400	11355	-45	-0.39
11-Jun	18:00	9800	9713	-87	-0.89
16-Jun	12:27	9000	8977	-23	-0.26
17-Jun	17:24	9000	8970	-30	-0.33
20-Jun	6:02	8000	7963	-37	-0.46
25-Jun	21:09	19000	18912	-88	-0.46
27-Jun	12:27	900	911	11	1.22
2-Jul	5:36	15000	14948	-52	-0.35
3-Jul	11:38	5000	4983	-17	-0.34
8-Jul	19:05	8000	7973	-27	-0.34
11-Jul	19:07	10000	9984	-16	-0.16
15-Jul	15:05	8700	8710	10	0.11
15-Jul	21:27	12000	11948	-52	-0.43
18-Jul	17:06	10000	9956	-44	-0.44
22-Jul	19:53	8100	8111	11	0.14
23-Jul	18:08	11400	11349	-51	-0.45
24-Jul	22:54	8000	7953	-47	-0.59
27-Jul	17:36	5200	5183	-17	-0.33
30-Jul	17:58	16000	15938	-62	-0.39
5-Aug	8:19	12000	11948	-52	-0.43
10-Aug	18:12	23800	23790	-10	-0.04
15-Aug	2:54	17000	16916	-84	-0.49
18-Aug	23:11	9036	9016	-20	-0.22
20-Aug	19:51	6300	6273	-27	-0.43

22-Aug	15:56	10011	9968	-43	-0.43
27-Aug	5:21	8000	7958	-42	-0.53
27-Aug	8:45	3300	3296	-4	-0.12
28-Aug	17:41	14200	14150	-50	-0.35
2-Sep	18:27	15600	15537	-63	-0.40
9-Sep	14:58	4800	4798	-2	-0.04
12-Sep	17:31	8000	8083	83	1.04
16-Sep	11:15	27000	27090	90	0.33
17-Sep	2:05	6300	6269	-31	-0.49
18-Sep	11:20	7900	7867	-33	-0.42
22-Sep	13:55	6300	6306	6	0.10
24-Sep	7:23	10000	9970	-30	-0.30
24-Sep	21:38	15000	14923	-77	-0.51
30-Sep	6:15	9000	8957	-43	-0.48
2-Oct	5:52	15000	14937	-63	-0.42
6-Oct	1:08	5200	5195	-5	-0.10
8-Oct	22:43	16000	15938	-62	-0.39
14-Oct	13:34	9000	9050	50	0.56
15-Oct	17:52	27000	26946	-54	-0.20
22-Oct	17:13	23000	23254	254	1.10
23-Oct	23:31	5400	5367	-33	-0.61
27-Oct	18:52	5300	5274	-26	-0.49
29-Oct	2:05	12100	12042	-58	-0.48
30-Oct	5:58	8500	8465	-35	-0.41
1-Nov	6:48	9000	8965	-35	-0.39
3-Nov	7:35	7900	7872	-28	-0.35
8-Nov	1:37	20000	20015	15	0.08
11-Nov	19:09	27000	26965	-35	-0.13
13-Nov	15:15	8700	8677	-23	-0.26
17-Nov	13:08	15800	15726	-74	-0.47
19-Nov	23:58	12000	11958	-42	-0.35
21-Nov	16:36	12100	12023	-77	-0.64
26-Nov	5:04	17000	16921	-79	-0.46
29-Nov	7:03	11000	10957	-43	-0.39
1-Dec	22:46	7200	7164	-36	-0.50
7-Dec	22:56	11500	11454	-46	-0.40
9-Dec	19:17	14000	13960	-40	-0.29
11-Dec	1:33	4000	3986	-14	-0.35
12-Dec	8:18	10000	9981	-19	-0.19
16-Dec	14:32	10300	10264	-36	-0.35
16-Dec	20:03	4000	3989	-11	-0.28
19-Dec	7:15	8700	8644	-56	-0.64
22-Dec	21:58	7000	7046	46	0.66
24-Dec	0:01	27000	26956	-44	-0.16
27-Dec	10:39	4600	4597	-3	-0.07

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site F2	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	13,517	$0.0057	105	$76.97	$8,081.41
Full Load	32,000	$0.0035	45	$112.00	$5,040.00
Benefit		$0.0022			$3,041.41
Annual Volume	1,410,549				
post-tax Benefit per annum					$2,037.74

PERPETUITY - unlikely as unit will not last forever

Site F2	NPV	
NPV Benefit into Perpetuity	$13,584.96	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$1,524.35	

10 year analysis Site F2	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$10,226.97		$2,037.74	$2,037.74	$2,037.74	$2,037.74	$2,037.74	$2,037.74	$2,037.74	$2,037.74	$2,037.74	$2,037.74
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**-$1,424.36**	-$10,000.00	$1,837.74	$1,807.74	$1,774.74	$1,738.44	$1,698.51	$1,654.59	$1,606.28	$1,553.13	$1,494.67	$1,430.36
IRR	**11.0%**											

NB. Tanker is a 38m3 artic carrying 32,000L

Key: NVP - Net Present Value

IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.

BPONZ return on assets is 15% per year.

Site F3

Daily Reports

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
17-Sep	4886	6159	10960	85	1.38
18-Sep	171	5847	6021	-3	-0.05
19-Sep	-9153	9212	0	59	0.64
20-Sep	-2192	2206	0	14	0.63
21-Sep	-2432	2439	0	7	0.29
TANK TOTALS	-8720	25863	16981	162	**0.63**

No data for week 22/9.

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Sep	24732	7262	32017	-23	-0.32
30-Sep	-6101	6150	0	49	0.80
TANK TOTALS	18631	13412	32017	26	**0.19**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Oct	-6798	6826	0	28	0.41
2-Oct	308	7736	8000	44	0.57
3-Oct	3242	8742	12000	-16	-0.18
4-Oct	-2797	2852	0	55	1.93
5-Oct	-2290	2311	0	21	0.91
6-Oct	7643	8319	16000	-38	-0.46
7-Oct	-5913	5953	0	40	0.67
TANK TOTALS	-6605	42739	36000	134	**0.31**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Oct	-7152	7199	0	47	0.65
9-Oct	20701	6289	27000	-10	-0.16
10-Oct	-7306	7339	0	33	0.45
11-Oct	-3178	3154	0	-24	-0.76
12-Oct	-746	756	0	10	1.32
13-Oct	10461	6555	17000	16	0.24
14-Oct	-7520	7568	0	48	0.63
TANK TOTALS	5260	38860	44000	120	**0.31**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Oct	-6740	6795	0	55	0.81
16-Oct	7483	5497	13000	-20	-0.36
17-Oct	9022	5993	15000	15	0.25
18-Oct	-1577	1579	0	2	0.13
19-Oct	-1921	1897	0	-24	-1.27
20-Oct	11142	6913	18000	55	0.80
21-Oct	-8801	8813	0	12	0.14
TANK TOTALS	8608	37487	46000	95	**0.25**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*

22-Oct	-8760	8783	0	23	0.26
23-Oct	-9372	9436	0	64	0.68
24-Oct	28383	3665	32000	48	1.31
25-Oct	-892	881	0	-11	-1.25
26-Oct	-2457	2479	0	22	0.89
27-Oct	2898	3579	6500	-23	-0.64
28-Oct	-8078	8105	0	27	0.33
TANK TOTALS	1722	36928	38500	150	**0.41**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Oct	-5363	5337	0	-26	-0.49
30-Oct					
31-Oct	-6988	7007	0	19	0.27
TANK TOTALS	-12351	12344	0	-7	**-0.06**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Nov	-3519	3581	0	62	1.73
2-Nov	-2378	2385	0	7	0.29
3-Nov	13674	10333	24000	7	0.07
4-Nov	11134	6939	18000	73	1.05
5-Nov	-7270	7276	0	6	0.08
6-Nov	-6649	6656	0	7	0.11
7-Nov	-8025	8035	0	10	0.12
TANK TOTALS	-3033	45205	42000	172	**0.38**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Nov	18126	3927	22000	53	1.35
9-Nov	-1722	1701	0	-21	-1.23
10-Nov	-6034	5979	0	-55	-0.92
11-Nov	-5246	5279	0	33	0.63
12-Nov	-6411	6461	0	50	0.77
13-Nov	23287	7733	31000	20	0.26
14-Nov	-6203	6224	0	21	0.34
TANK TOTALS	15797	37304	53000	101	**0.27**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Nov	-4485	4448	0	-37	-0.83
16-Nov	-766	759	0	-7	-0.92
17-Nov	-650	8654	8000	4	0.05
18-Nov	-6359	6381	0	22	0.34
19-Nov	-8873	8948	0	75	0.84
20-Nov	-7777	7800	0	23	0.29
21-Nov	20398	5626	26000	24	0.43
TANK TOTALS	-8512	42616	34000	104	**0.24**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Nov	-4903	4879	0	-24	-0.49
23-Nov	-2645	2693	0	48	1.78
24-Nov	1834	7150	9000	-16	-0.22
25-Nov	-7234	7313	0	79	1.08

26-Nov	25753	6238	32000	-9	-0.14
27-Nov	-6946	6932	0	-14	-0.20
28-Nov	-6919	6961	0	42	0.60
TANK TOTALS	-1060	42166	41000	106	**0.25**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Nov	-3482	3460	0	-22	-0.64
30-Nov	-1868	1898	0	30	1.58
TANK TOTALS	-5350	5358	0	8	**0.15**

No December results as site was being upgraded.

Weekly Results

September	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	0	0	0	0	#DIV/0!
Week 2	0	0	0	0	#DIV/0!
Week 3	-8720	25863	16981	162	0.63
Week 4	0	0	0	0	#DIV/0!
Week 5 (3 days)	18631	13412	32017	26	0.19
MONTHLY TOTALS	9911	39275	48998	188	**0.48**

October	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	-6605	42739	36000	134	0.31
Week 2	5260	38860	44000	120	0.31
Week 3	8608	37487	46000	95	0.25
Week 4	1722	36928	38500	150	0.41
Week 5 (3 days)	-12351	12344	0	-7	-0.06
MONTHLY TOTALS	-3366	168358	164500	492	**0.29**

November	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-3033	45205	42000	172	0.38
Week 2	15797	37304	53000	101	0.27
Week 3	-8512	42616	34000	104	0.24
Week 4	-1060	42166	41000	106	0.25
Week 5 (3 days)	-5350	5358	0	8	0.15
MONTHLY TOTALS	-2158	172649	170000	491	**0.28**

Dip Results

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
2 Oct 97	17779	18700	8000		-0.25	1.41
3 Oct 97	17377	18000	12000	8446	-0.54	-1.73
7 Oct 97	15182	16000	16000	14277	-0.21	-0.57
9 Oct 97	14625	15500	27000	16588	-0.19	-0.34
14 Oct 97	21091	22000	17000	20575	-0.14	0.22
16 Oct 97	23676	24500	13000	14447	0.00	0.42
18 Oct 97	25687	26400	15000	10989	-0.08	0.03
20 Oct 97	31822	32500	18000	8891	-0.61	-1.13
24 Oct 97	19215	20000	32000	30725	-0.19	0.34
27 Oct 97	42946	43500	6500	8350	#DIV/0!	#DIV/0!

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
3 Nov 97	22466	23300	8000		-0.19	-0.73
4 Nov 97	21044	22000	16000	9461	-0.05	0.36
4 Nov 97	30172	31000	18000	6887	-0.18	0.42
8 Nov 97	25326	26000	22000	22891	-0.26	-0.75
13-Nov-97	21217	22000	31000	26165	0.05	-0.29
17-Nov-97	35592	36500	8000	16607	-1.37	-1.48
21-Nov-97	9568	10500	26000	34155	-0.48	-0.48
24-Nov-97	19563	20500	9000	16098	-0.51	1.63
27-Nov-97	14381	15000	32000	14255	#DIV/0!	#DIV/0!

Delivery Results

Date	Time	CPM	Tank Gauging	Variance	% Variance
2-Oct	22:13	8000	7969	-31	-0.39
3-Oct	23:46	12000	11925	-75	-0.63
7-Oct	3:38	16000	15887	-113	-0.71
9-Oct	14:10	27000	26956	-44	-0.16
14-Oct	1:22	17000	16928	-72	-0.42
16-Oct	4:25	13000	12918	-82	-0.63
18-Oct	0:59	15000	15004	4	0.03
20-Oct	18:11	18000	18012	12	0.07
24-Oct	13:34	32000	32078	78	0.24
27-Oct	23:40	6500	6443	-57	-0.88
3-Nov	5:09	8000	7974	-26	-0.33
4-Nov	0:04	16000	15969	-31	-0.19
4-Nov	19:06	18000	18019	19	0.11
8-Nov	4:42	22000	21989	-11	-0.05
13-Nov	12:52	31000	31105	105	0.34
17-Nov	5:02	8000	8099	99	1.24
21-Nov	16:48	26000	26006	6	0.02
24-Nov	18:13	9000	8930	-70	-0.78
27-Nov	1:03	32000	31908	-92	-0.29

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site F3	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	13,985	$0.0059	110	$82.58	$9,083.96
Full Load	34,000	$0.0040	45	$136.00	$6,120.00
Benefit		$0.0019			$2,963.96
Annual Volume	1,525,681				
post-tax Benefit per annum					$1,985.85

PERPETUITY - unlikely as unit will not last forever

Site F3	NPV	
NPV Benefit into Perpetuity	$13,239.01	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$1,178.40	

10 year analysis Site F3	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$9,966.53		$1,985.85	$1,985.85	$1,985.85	$1,985.85	$1,985.85	$1,985.85	$1,985.85	$1,985.85	$1,985.85	$1,985.85
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**-$1,684.80**	-$10,000.00	$1,785.85	$1,755.85	$1,722.85	$1,686.55	$1,646.62	$1,602.70	$1,554.38	$1,501.24	$1,442.77	$1,378.47
IRR	**10.2%**											

NB. Tanker is a 38m3 artic carrying 34,000L of diesel

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site F4

Daily Results

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Aug	2477	1992	4401	68	3.41
16-Aug	-2260	2196	0	-64	-2.91
17-Aug	29101	4393	33208	286	6.51
18-Aug	-4965	5053	0	88	1.74
19-Aug	748	4548	5301	-5	-0.11
20-Aug	-6151	6141	0	-10	-0.16
21-Aug					
TANK TOTALS	18950	24323	42910	363	**1.49**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Aug	-3840	3789	0	-51	-1.35
23-Aug	17653	683	18305	31	4.54
24-Aug	-3515	3600	0	85	2.36
25-Aug	-4796	4794	0	-2	-0.04
26-Aug	-5313	5261	0	-52	-0.99
27-Aug	-4291	4231	0	-60	-1.42
28-Aug	27977	5161	33259	-121	-2.34
TANK TOTALS	23875	27519	51564	-170	**-0.62**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Aug	-3601	3722	0	121	3.25
30-Aug	-719	745	0	26	3.49
31-Aug	4802	3878	8599	81	2.09
TANK TOTALS	482	8345	8599	228	**2.73**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Sep	-6937	7099	0	162	2.28
2-Sep	-5132	5198	0	66	1.27
3-Sep	-3908	6379	2401	70	1.10
4-Sep	-5375	5307	0	-68	-1.28
5-Sep	-2481	2470	0	-11	-0.45
6-Sep	16200	646	16912	-66	-10.22
7-Sep	-2867	2908	0	41	1.41
TANK TOTALS	-10500	30007	19313	194	**0.65**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Sep	-7445	7528	0	83	1.10
9-Sep	-3293	3256	0	-37	-1.14
10-Sep	-7414	7338	0	-76	-1.04
11-Sep	13815	3440	17105	150	4.36
12-Sep	-2455	2464	0	9	0.37
13-Sep	-1082	1071	0	-11	-1.03
14-Sep	-4104	4053	0	-51	-1.26
TANK TOTALS	-11978	29150	17105	67	**0.23**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Sep	21748	5080	27005	-177	-3.48
16-Sep	-3442	3573	0	131	3.67
17-Sep	-5039	5102	0	63	1.23
18-Sep	-4787	4883	0	96	1.97
19-Sep	-2508	2537	0	29	1.14
20-Sep	7342	974	8419	-103	-10.57
21-Sep	-4425	4516	0	91	2.02
TANK TOTALS	8889	26665	35424	130	**0.49**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Sep	-5010	5026	0	16	0.32
23-Sep	11175	5885	17104	-44	-0.75
24-Sep	-5910	6012	0	102	1.70
25-Sep	-4091	4123	0	32	0.78
26-Sep	3084	1412	4501	-5	-0.35
27-Sep	-1472	1499	0	27	1.80
28-Sep	-5176	5122	0	-54	-1.05
TANK TOTALS	-7400	29079	21605	74	**0.25**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Sep	-4988	4946	0	-42	-0.85
30-Sep	11597	5535	17014	118	2.13
TANK TOTALS	6609	10481	17014	76	**0.73**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
1-Oct	-4949	8132	3200	-17	-0.21
2-Oct	11293	5634	17005	-78	-1.38
3-Oct	-2428	2464	0	36	1.46
4-Oct	-1541	1577	0	36	2.28
5-Oct	-3688	3750	0	62	1.65
6-Oct	-7629	7562	0	-67	-0.89
7-Oct	8090	5905	13902	93	1.57
TANK TOTALS	-852	35024	34107	65	**0.19**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
8-Oct	-6821	6762	0	-59	-0.87
9-Oct	23126	5657	28808	-25	-0.44
10-Oct	-2931	3031	0	100	3.30
11-Oct	-1220	1262	0	42	3.33
12-Oct	-5632	5717	0	85	1.49
13-Oct	-5073	5160	0	87	1.69
14-Oct	-7449	7411	0	-38	-0.51
TANK TOTALS	-6000	35000	28808	192	**0.55**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
15-Oct	10949	5203	16203	-51	-0.98
16-Oct	-5168	5256	0	88	1.67
17-Oct	13331	3255	16802	-216	-6.64

18-Oct	-449	471	0	22	4.67
19-Oct	3936	4244	8304	-124	-2.92
20-Oct	-6761	6967	0	206	2.96
21-Oct	-5346	5402	0	56	1.04
TANK TOTALS	10492	30798	41309	-19	**-0.06**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Oct	6832	4087	11000	-81	-1.98
23-Oct	-4553	4617	0	64	1.39
24-Oct	-3560	3620	0	60	1.66
25-Oct	-148	152	0	4	2.63
26-Oct	-1046	1070	0	24	2.24
27-Oct	-5367	5380	0	13	0.24
28-Oct	-5507	5406	0	-101	-1.87
TANK TOTALS	-13349	24332	11000	-17	**-0.07**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Oct	12361	5142	17503	0	0.00
30-Oct	-4693	4758	0	65	1.37
31-Oct	13700	2818	16702	-184	-6.53
TANK TOTALS	21368	12718	34205	-119	**-0.94**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Nov	-908	936	0	28	2.99
2-Nov	-1666	5109	3401	42	0.82
3-Nov	-4469	4498	0	29	0.64
4-Nov	-5866	5970	0	104	1.74
5-Nov	-5314	5252	0	-62	-1.18
6-Nov	-6702	6636	0	-66	-0.99
7-Nov	14397	2636	16905	128	4.86
TANK TOTALS	-10528	31037	20306	203	**0.65**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Nov	-533	543	0	10	1.84
9-Nov	-6127	6098	0	-29	-0.48
10-Nov	4498	5937	10353	82	1.38
11-Nov	-5472	5416	0	-56	-1.03
12-Nov	-5815	5774	0	-41	-0.71
13-Nov	20143	6849	27009	-17	-0.25
14-Nov	-2845	2867	0	22	0.77
TANK TOTALS	3849	33484	37362	-29	**-0.09**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Nov	-1389	1411	0	22	1.55
16-Nov	-4251	4334	0	83	1.92
17-Nov	-2188	5537	3365	-16	-0.29
18-Nov	-5328	5337	0	9	0.17
19-Nov	-7310	7297	0	-13	-0.18
20-Nov	28819	4672	33419	72	1.54
21-Nov	-3012	2985	0	-27	-0.90

TANK TOTALS	5341	31573	36784	130	**0.41**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Nov	-618	619	0	1	0.16
23-Nov	-3791	3770	0	-21	-0.56
24-Nov	-6704	6702	0	-2	-0.03
25-Nov	-1888	1892	0	4	0.21
26-Nov	20886	5774	26607	53	0.92
27-Nov	-2123	4513	2400	-10	-0.22
28-Nov	-3307	3282	0	-25	-0.76
TANK TOTALS	2455	26552	29007	0	**0.00**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Nov	-656	654	0	-2	-0.31
30-Nov	-5516	5489	0	-27	-0.49
TANK TOTALS	-6172	6143	0	-29	**-0.47**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Dec	-6582	6583	0	1	0.02
2-Dec	-4397	4411	0	14	0.32
3-Dec	-6319	6304	0	-15	-0.24
4-Dec	22237	4701	26949	-11	-0.23
5-Dec	-2837	2831	0	-6	-0.21
6-Dec	-521	524	0	3	0.57
7-Dec	-6572	6577	0	5	0.08
TANK TOTALS	-4991	31931	26949	-9	**-0.03**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Dec	-5156	5172	0	16	0.31
9-Dec	-5096	5086	0	-10	-0.20
10-Dec	10949	4915	15847	17	0.35
11-Dec	-6505	6525	0	20	0.31
12-Dec	-2201	2201	0	0	0.00
13-Dec	-1468	1469	0	1	0.07
14-Dec	22701	4363	27073	-9	-0.21
TANK TOTALS	13224	29731	42920	35	**0.12**

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Dec	-5852	5821	0	-31	-0.53
16-Dec	-9636	9639	0	3	0.03
17-Dec	-6914	6909	0	-5	-0.07
18-Dec	-6254	6250	0	-4	-0.06
19-Dec	16309	3209	19505	13	0.41
20-Dec	-2023	2031	0	8	0.39
21-Dec	-5351	5372	0	21	0.39
TANK TOTALS	-19721	39231	19505	5	**0.01**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
22-Dec	11715	5295	17020	-10	-0.19
23-Dec	55	3439	3507	-13	-0.38
24-Dec	-377	381	0	4	1.05
25-Dec	-928	932	0	4	0.43
26-Dec	-3019	3016	0	-3	-0.10
27-Dec	-672	678	0	6	0.88
28-Dec	-3205	3215	0	10	0.31
TANK TOTALS	3569	16956	20527	-2	**-0.01**

Date	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
29-Dec	-2903	2906	0	3	0.10
30-Dec	-3526	3525	0	-1	-0.03
31-Dec	-602	596	0	-6	-1.01
TANK TOTALS	-7031	7027	0	-4	**-0.06**

Weekly Results

August	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	0	0	0	0	#DIV/0!
Week 2	-14004	13770	0	-234	-1.70
Week 3	18950	24323	42910	363	1.49
Week 4	23875	27519	51564	-170	-0.62
Week 5 (3 days)	482	8345	8599	228	2.73
MONTHLY TOTALS	29303	73957	103073	187	**0.25**

September	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	-10500	30007	19313	194	0.65
Week 2	-11978	29150	17105	67	0.23
Week 3	8889	26665	35424	130	0.49
Week 4	-7400	29079	21605	74	0.25
Week 5 (3 days)	6609	10481	17014	76	0.73
MONTHLY TOTALS	-14380	125382	110461	541	**0.43**

October	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	-852	35024	34107	65	0.19
Week 2	-6000	35000	28808	192	0.55
Week 3	10492	30798	41309	-19	-0.06
Week 4	-13349	24332	11000	-17	-0.07
Week 5 (3 days)	21368	12718	34205	-119	-0.94
MONTHLY TOTALS	11659	137872	149429	102	**0.07**

November	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1	-10528	31037	20306	203	0.65
Week 2	3849	33484	37362	-29	-0.09
Week 3	5341	31573	36784	130	0.41

Week 4	2455	26552	29007	0	0.00
Week 5 (3 days)	-6172	6143	0	-29	-0.47
MONTHLY TOTALS	-5055	128789	123459	275	**0.21**

December	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-4991	31931	26949	-9	-0.03
Week 2	13224	29731	42920	35	0.12
Week 3	-19721	39231	19505	5	0.01
Week 4	3569	16956	20527	-2	-0.01
Week 5 (3 days)	-7031	7027	0	-4	-0.06
MONTHLY TOTALS	-14950	124876	109901	25	**0.02**

Dip Results

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
13-Aug-97	13957	13000	9503		2.07	0.82
16-Aug-97	8247	7400	4401	15042	1.41	8.02
18-Aug-97	6161	5000	33208	6400	-1.71	-2.72
20-Aug-97	30380	29500	5301	9509	0.61	1.73
24-Aug-97	19884	18800	18305	15675	0.03	-0.09
29-Aug-97	19063	18000	33259	19121	#DIV/0!	#DIV/0!

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
1 Sep 97	40509	39500	8765		-0.50	0.60
4 Sep 97	31851	30500	2401	17583	0.29	-0.62
7 Sep 97	23843	22700	16912	10341	0.44	1.46
12-Sep-97	17301	16000	17105	23378	-0.52	-1.97
16-Sep-97	24565	23600	27005	9969	-0.44	0.24
21-Sep-97	31174	30000	8419	20533	0.24	1.91
24-Sep-97	23537	22000	17104	15999	-0.49	-2.83
27-Sep-97	30254	29400	4501	10535	0.33	1.12
30-Sep-97	22017	21000	17014	12666	#DIV/0!	#DIV/0!

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
1 Oct 97	33210	32000	3200		0.17	0.00
3 Oct 97	27664	26500	17005	8699	0.18	-0.87
8 Oct 97	20854	19900	13902	23778	-0.21	0.34
10-Oct-97	22073	21000	28808	12730	-1.08	0.00
16-Oct-97	26356	25000	16203	24809	-0.11	-0.87
18-Oct-97	32123	31000	16802	10472	0.25	0.33
20-Oct-97	41751	40600	8304	7068	-0.18	-0.30
23-Oct-97	36110	35000	11000	14010	0.13	1.83
29-Oct-97	23991	22500	17503	23089	#DIV/0!	#DIV/0!

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
1 Nov 97	31185	30000	16702		0.24	0.83
3 Nov 97	39403	38000	3401	8388	0.07	-0.79
8 Nov 97	20239	19000	16905	22551	-0.28	-1.30
11-Nov-97	22521	21500	10353	14685	-0.01	2.93
14-Nov-97	19240	17700	27009	13635	-0.32	-1.82

18-Nov-97	28633	27500	3365	17709	-0.23	0.24
21-Nov-97	18214	17000	16612	13825	-0.03	-0.18
21-Nov-97	30669	29500	16807	4166	#DIV/0!	#DIV/0!

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
5 Dec 97	18471	17500	26869		-0.40	-0.62
11-Dec-97	19933	19000	15903	25486	0.15	1.70
15-Dec-97	20327	19100	27008	15479	-0.17	-0.63
20-Dec-97	16657	15500	19503	30706	-0.14	-2.07
23-Dec-97	23715	23000	17001	12478	-0.03	-0.45
24-Dec-97	35568	35000	3503	5157	#DIV/0!	#DIV/0!

Delivery Results

Date	Time	CPM	Tank Gauging	Variance	% Variance
13-Aug	18:53	9503	9649	146	1.54
16-Aug	7:51	4401	4529	128	2.91
18-Aug	14:10	33208	33627	419	1.26
20-Aug	16:30	5301	5262	-39	-0.74
24-Aug	6:16	18305	18305	0	0.00
29-Aug	0:11	33259	32923	-336	-1.01
1-Sep	13:40	8765	8599	-166	-1.89
4-Sep	12:41	2401	2384	-17	-0.71
7-Sep	6:12	16912	16822	-90	-0.53
12-Sep	12:18	17105	17250	145	0.85
16-Sep	6:27	27005	26672	-333	-1.23
21-Sep	4:53	8419	8305	-114	-1.35
24-Sep	19:29	17104	17120	16	0.09
27-Sep	5:52	4501	4467	-34	-0.76
30-Sep	21:34	17014	17017	3	0.02
1-Oct	23:51	3200	3131	-69	-2.16
3-Oct	5:59	17005	16874	-131	-0.77
8-Oct	14:09	13902	14012	110	0.79
10-Oct	12:06	28808	28547	-261	-0.91
16-Oct	0:16	16203	16099	-104	-0.64
18-Oct	0:56	16802	16502	-300	-1.79
20-Oct	20:11	8304	8092	-212	-2.55
23-Oct	9:07	11000	10809	-191	-1.74
29-Oct	23:01	17503	17443	-60	-0.34
1-Nov	0:51	16702	16446	-256	-1.53
3-Nov	18:25	3401	3383	-18	-0.53
8-Nov	0:06	16905	16971	66	0.39
11-Nov	18:10	10353	10475	122	1.18
14-Nov	10:57	27009	26911	-98	-0.36
18-Nov	14:42	3365	3413	48	1.43
21-Nov	1:50	16612	16589	-23	-0.14
21-Nov	18:19	16807	16868	61	0.36
27-Nov	11:09	26607	26616	9	0.03
28-Nov	13:35	2400	2396	-4	-0.17
5 -Dec	8:12	26869	26949	80	0.30
11-Dec	12:06	15903	15847	-56	-0.35

15-Dec	14:47	27008	27073	65	0.24
20-Dec	0:02	19503	19505	2	0.01
23-Dec	9:54	17001	17020	19	0.11
24-Dec	10:28	3503	3507	4	0.11

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site F4	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	15,437	$0.0074	81	$114.42	$9,267.94
Full Load	34,000	$0.0061	37	$207.40	$7,673.80
Benefit		$0.0013			$1,594.14
Annual Volume	1,243,698				
post-tax Benefit per annum					$1,068.08

PERPETUITY - unlikely as unit will not last forever

Site F4	NPV	
NPV Benefit into Perpetuity	$7,120.50	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	-$4,940.10	

10 year analysis Site F4	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$5,360.42		$1,068.08	$1,068.08	$1,068.08	$1,068.08	$1,068.08	$1,068.08	$1,068.08	$1,068.08	$1,068.08	$1,068.08
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**-$6,290.90**	-$10,000.00	$868.08	$838.08	$805.08	$768.78	$728.85	$684.92	$636.61	$583.46	$525.00	$460.69
IRR	**-6.8%**											

NB. Tanker is a 20m3+20m3(Dog) carrying 34,000L diesel.

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Site F5

Daily Results

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
10-Sep	-6767	5323	0	-1444	-27.13
11-Sep	16809	7063	23800	72	1.02
12-Sep	-5921	5837	0	-84	-1.44
13-Sep	-1551	1537	0	-14	-0.91
14-Sep	-695	688	0	-7	-1.02
TANK TOTALS	1875	20448	23800	-1477	-7.22

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Sep	-6516	6537	0	21	0.32
16-Sep	-6642	6712	0	70	1.04
17-Sep	17586	7086	24700	-28	-0.40
18-Sep	-5681	5647	0	-34	-0.60
19-Sep	-4691	4697	0	6	0.13
20-Sep	-1550	1564	0	14	0.90
21-Sep	19059	1126	20000	185	16.43
TANK TOTALS	11565	33369	44700	234	0.70

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Sep	-7263	7092	0	-171	-2.41
23-Sep	-6526	6498	0	-28	-0.43
24-Sep	12970	6923	0	19893	287.35
25-Sep	-6433	6306	0	-127	-2.01
26-Sep	-7349	7333	0	-16	-0.22
27-Sep	-818	822	0	4	0.49
28-Sep	-716	724	0	8	1.10
TANK TOTALS	-16135	35698	0	19563	54.80

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Sep	14998	6128	21189	-63	-1.03
30-Sep	-5892	5777	0	-115	-1.99
TANK TOTALS	9106	11905	21189	-178	-1.50

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Oct	-6745	6709	0	-36	-0.54
2-Oct	5965	12898	0	18863	146.25
3-Oct					
4-Oct	-1011	1004	0	-7	-0.70
5-Oct	-1332	1324	0	-8	-0.60
6-Oct	2079	5843	7901	21	0.36
7-Oct	-7884	7872	0	-12	-0.15
TANK TOTALS	-8928	35650	7901	18821	52.79

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Oct	10920	2638	16000	-2442	-92.57

9-Oct	-1908	2144	5000	-4764	-222.20
10-Oct	-6343	6325	0	-18	-0.28
11-Oct	-778	770	0	-8	-1.04
12-Oct	-1498	1511	0	13	0.86
13-Oct	14000	7831	21803	28	0.36
14-Oct	-1564	6279	6009	-1294	-20.61
TANK TOTALS	12829	27498	48812	-8485	-30.86

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Oct	-6617	6615	0	-2	-0.03
16-Oct	8786	6217	15000	3	0.05
17-Oct	-6194	6213	0	19	0.31
18-Oct	3365	1536	4912	-11	-0.72
19-Oct	-592	593	0	1	0.17
20-Oct	3381	5823	9200	4	0.07
21-Oct	-5779	5793	0	14	0.24
TANK TOTALS	-3650	32790	29112	28	0.09

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Oct	-6828	6809	0	-19	-0.28
23-Oct	10372	6653	17000	25	0.38
24-Oct	-4725	4735	0	10	0.21
25-Oct	-1167	1166	0	-1	-0.09
26-Oct	-441	439	0	-2	-0.46
27-Oct	6402	2111	8500	13	0.62
28-Oct	-7062	7058	0	-4	-0.06
TANK TOTALS	-3449	28971	25500	22	0.08

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Oct	-7252	7267	0	15	0.21
30-Oct					
31-Oct	-5491	5482	0	-9	-0.16
TANK TOTALS	-12743	12749	0	6	0.05

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Nov	-3045	3054	0	9	0.29
2-Nov	-1013	1009	0	-4	-0.40
3-Nov	-4962	5004	0	42	0.84
4-Nov	4644	7318	12000	-38	-0.52
5-Nov	9696	7325	17000	21	0.29
6-Nov	-6801	6791	0	-10	-0.15
7-Nov	-5878	5919	0	41	0.69
TANK TOTALS	-7359	36420	29000	61	0.17

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Nov	-1762	1777	0	15	0.84
9-Nov	16208	741	17000	-51	-6.88
10-Nov	-6780	6785	0	5	0.07
11-Nov	-6962	6998	0	36	0.51
12-Nov	4545	8937	13500	-18	-0.20

13-Nov	8568	5858	14400	26	0.44
14-Nov	-7324	7297	0	-27	-0.37
TANK TOTALS	6493	38393	44900	-14	-0.04

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
15-Nov	-1674	1678	0	4	0.24
16-Nov	-2088	2099	0	11	0.52
17-Nov	9842	7175	17000	17	0.24
18-Nov	-7223	7210	0	-13	-0.18
19-Nov	-7268	7317	0	49	0.67
20-Nov	18224	8844	27100	-32	-0.36
21-Nov	-8327	8346	0	19	0.23
TANK TOTALS	1486	42669	44100	55	0.13

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	% Variance
22-Nov	-2421	2411	0	-10	-0.41
23-Nov	3701	2287	6000	-12	-0.52
24-Nov	-7882	7914	0	32	0.40
25-Nov	11839	9184	21000	23	0.25
26-Nov	-7250	7237	0	-13	-0.18
27-Nov	-7347	7415	0	68	0.92
28-Nov	-1905	7927	6000	22	0.28
TANK TOTALS	-11265	44375	33000	110	0.25

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Nov	23076	1913	25000	-11	-0.58
30-Nov	-1445	1444	0	-1	-0.07
TANK TOTALS	21631	3357	25000	-12	-0.36

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
1-Dec	-8274	8263	0	-11	-0.13
2-Dec	5724	8391	14125	-10	-0.12
3-Dec	-6630	6617	0	-13	-0.20
4-Dec	-8738	8768	0	30	0.34
5-Dec	-3815	7332	0	3517	47.97
6-Dec	-2972	3008	0	36	1.20
7-Dec	-1734	1752	0	18	1.03
TANK TOTALS	-26439	44131	14125	3567	8.08

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
8-Dec	14595	7828	22396	27	0.34
9-Dec	11847	7701	19499	49	0.64
10-Dec	-6719	6724	0	5	0.07
11-Dec	2032	10411	12445	-2	-0.02
12-Dec	-5585	5568	0	-17	-0.31
13-Dec	-1328	1320	0	-8	-0.61
14-Dec	-2069	2073	0	4	0.19
TANK TOTALS	12773	41625	54340	58	0.14

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*

15-Dec	10680	5945	16578	47	0.79
16-Dec	-6615	6617	0	2	0.03
17-Dec	2931	7594	10502	23	0.30
18-Dec	-6873	6910	0	37	0.54
19-Dec	9206	8316	17470	52	0.63
20-Dec	-1870	1874	0	4	0.21
21-Dec	-1899	1894	0	-5	-0.26
TANK TOTALS	5560	39150	44550	160	0.41

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
22-Dec	-7198	7206	0	8	0.11
23-Dec	12721	6286	18952	55	0.87
24-Dec	-6031	6042	0	11	0.18
25-Dec	-9	0	0	-9	#DIV/0!
26-Dec	-143	140	0	-3	-2.14
27-Dec	-801	796	0	-5	-0.63
28-Dec	-1056	1060	0	4	0.38
TANK TOTALS	-2517	21530	18952	61	0.28

Date	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
29-Dec	-4098	4110	0	12	0.29
30-Dec	15699	3809	19473	35	0.92
31-Dec	-5216	5235	0	19	0.36
TANK TOTALS	6385	13154	19473	66	0.50

Weekly Results

September	Vol. Change	Pump Sales	Fueldrop	Net Variance	% Variance
Week 1					
Week 2					
Week 3	4763	35201	40498	-534	-1.52
Week 4	5285	16788	22337	-262	-1.56
Week 5 (2 days)	-6344	17151	11138	-331	-1.93
MONTHLY TOTALS	3704	69140	73973	-1127	**-1.63**

October	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-8928	35650	7901	18821	52.79
Week 2	12829	27498	48812	-8485	-30.86
Week 3	-3650	32790	29112	28	0.09
Week 4	-3449	28971	25500	22	0.08
Week 5 (3 days)	-12743	12749	0	6	0.05
MONTHLY TOTALS	-15941	137658	111325	10392	**7.55**

Fueldrop of 19000L on the 2/10 was not acknowledged by the I.S.C. Pump sales were not acknowledged on the 8/10 & 9/10.

November	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-7359	36420	29000	61	0.17
Week 2	6493	38393	44900	-14	-0.04
Week 3	1486	42669	44100	55	0.13
Week 4	-11265	44375	33000	110	0.25

Week 5 (3 days)	21631	3357	25000	-12	-0.36
MONTHLY TOTALS	10986	165214	176000	200	**0.12**

December	*Vol. Change*	*Pump Sales*	*Fueldrop*	*Net Variance*	*% Variance*
Week 1	-26439	44131	14125	3567	8.08
Week 2	12773	41625	54340	58	0.14
Week 3	5560	39150	44550	160	0.41
Week 4	-2517	21530	18952	61	0.28
Week 5 (3 days)	6385	13154	19473	66	0.50
MONTHLY TOTALS	-4238	159590	151440	3912	**2.45**

Fueldrop of 3500L on the 5/12 was not acknowledged by the I.S.C.

Dip Results

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
11-Sep	11454	12400	23800		-0.12	0.16
17-Sep	11086	12000	24700	24181	1.51	5.29
21-Sep	16732	17000	20000	18801	-102.15	#DIV/0!
29-Sep	19332		2689	37147	-0.03	-103.56
29-Sep	18660	19000	18500	3366	#VALUE!	#VALUE!

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
6-Oct	24298	24600	7901	25131	-0.07	-0.62
8-Oct	19985	20400	16000	12228	36.35	34.81
9-Oct	26392	27000	5000		-0.41	0.93
13-Oct	14997	15400	21803	16457	0.05	-0.45
14-Oct	32829	33400	6009	3954	6.01	7.52
16-Oct	21774	22000	15000	15755	-0.06	-0.73
18-Oct	28381	28800	4912	8411	0.00	0.28
20-Oct	27658	28000	9200	5634	-0.22	-1.63
23-Oct	17404	18000	17000	19493	0.07	1.16
27-Oct	25485	25800	8500	8902	#DIV/0!	#DIV/0!

Pump totes reset to zero on the 9/10.

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
4 Nov 97	8940	9200	12000	16000	0.40	-0.61
5 Nov 97	13601	14000	17000	7285	-0.05	-0.68
9 Nov 97	14307	14800	17000	16301	0.01	1.47
12 Nov 97	16147	16400	13500	15159	0.16	-0.87
13 Nov 97	21521	22000	14400	8092	-0.13	0.78
17 Nov 97	18088	18400	17000	17856	-1.80	-10.33
20 Nov 97	7718	8800	27100	27509	0.53	4.26
23 Nov 97	22362	22600	6000	12338	-0.98	-0.69
25 Nov 97	10592	10800	21000	17874	-0.86	-2.99
29 Nov 97	8597	9000	6000	23069	0.31	2.26
29 Nov 97	11628	11800	25000	2933	#DIV/0!	#DIV/0!

Big difference between driver and ATG dip on the 20/11

Date	*T/G Dip*	*Driver Dip*	*Fueldrop*	*Pump Sales*	*% T/G Error*	*% Dip Error*
2-Dec	20069	20400	14100		-61.14	-58.59

8-Dec	5968	6400	22500	31850	0.52	3.71
9-Dec	17626	17500	19500	10751	-0.12	-2.58
11-Dec	19633	20000	12400	17516	-0.43	-3.67
15-Dec	16078	17000	16600	16024	0.01	3.56
17-Dec	18752	19000	10500	13924	-0.65	-9.59
19-Dec	14129	15800	17500	15215	-0.28	7.79
24-Dec	13782	14300	19000	17886	0.12	0.65
30-Dec	17578	18000	19500	15183	#DIV/0!	#DIV/0!

Delivery on the 5/12 was not acknowledged. Big difference in dips on the 19/12.

Delivery Results

Date	Time	BPM	Tank Gauging	Variance	% Variance
11-Sep	20:33	23800	23867	67	0.28
17-Sep	11:03	24700	24777	77	0.31
21-Sep	20:07	20000	20172	172	0.86
29-Sep	11:22	2689	2665	-24	-0.89
29-Sep	21:35	18500	18468	-32	-0.17
6-Oct	15:01	7901	7975	74	0.94
8-Oct	12:01	16000	16183	183	1.14
9-Oct	21:24	5000	5013	13	0.26
13-Oct	23:56	21803	21780	-23	-0.11
14-Oct	13:06	6009	4691	-1318	-21.93
16-Oct	21:51	15000	14992	-8	-0.05
18-Oct	12:37	4912	4906	-6	-0.12
20-Oct	23:10	9200	9204	4	0.04
23-Oct	22:28	17000	16995	-5	-0.03
27-Oct	19:32	8500	8531	31	0.36
4-Nov	22:11	12000	11864	-136	-1.13
5-Nov	20:32	17000	16958	-42	-0.25
9-Nov	20:25	17000	16939	-61	-0.36
12-Nov	9:05	13500	13482	-18	-0.13
13-Nov	11:30	14400	14422	22	0.15
17-Nov	8:38	17000	16998	-2	-0.01
20-Nov	20:21	27100	26970	-130	-0.48
23-Nov	8:36	6000	6001	1	0.02
25-Nov	20:55	21000	20941	-59	-0.28
29-Nov	0:00	6000	5930	-70	-1.17
29-Nov	17:55	25000	24971	-29	-0.12
2-Dec	20:28	14100	14125	25	0.18
8-Dec	13:21	22500	22396	-104	-0.46
9-Dec	20:20	19500	19499	-1	-0.01
11-Dec	20:32	12400	12445	45	0.36
15-Dec	21:55	16600	16578	-22	-0.13
17-Dec	23:40	10500	10502	2	0.02
19-Dec	19:17	17500	17470	-30	-0.17
24-Dec	3:04	19000	18952	-48	-0.25
30-Dec	21:17	19500	19473	-27	-0.14

Delivery Cost Model

Perpetual Growth	0.0%
Maintenance into perpetuity	4.0%
10-yr life Maintenance Growth	10.0%
NPV rate	15.0%

Site F5	Drop	Cost	Trips	Trip Cost	Annual Cost
Current Deliver Cost	16,989	$0.0219	110	$372.43	$40,967.61
Full Load	34,000	$0.0197	55	$669.80	$36,839.00
Benefit		$0.0022			$4,128.61
Annual Volume	1,856,500				
post-tax Benefit per annum					$2,766.17

PERPETUITY - unlikely as unit will not last forever

Site F5	NPV	
NPV Benefit into Perpetuity	$18,441.14	
Cost for Site	-$10,000.00	
Maintenance Cost	-$2,727.27	-$300.00 per annum
Admin / Monitoring saving	$666.67	$100.00 per annum
TOTAL NPV BENEFIT	$6,380.54	

10 year analysis Site F5	NPV	0	1	2	3	4	5	6	7	8	9	10
Benefit - Drop Size	$13,882.78		$2,766.17	$2,766.17	$2,766.17	$2,766.17	$2,766.17	$2,766.17	$2,766.17	$2,766.17	$2,766.17	$2,766.17
Benefit - Admin	$501.88		$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Cost - Maintenance	-$2,153.20		-$300.00	-$330.00	-$363.00	-$399.30	-$439.23	-$483.15	-$531.47	-$584.62	-$643.08	-$707.38
Cost - ATG System	-$10,000.00	-$10,000.00										
NPV	**$2,231.45**	-$10,000.00	$2,566.17	$2,536.17	$2,503.17	$2,466.87	$2,426.94	$2,383.02	$2,334.70	$2,281.56	$2,223.09	$2,158.79
IRR	**20.8%**											

NB. Tanker is a 20m3+20m3(Dog) carrying 34,000L diesel.

Key: NVP - Net Present Value
IRR - Internal Rate of Return

Assumptions: Maintenance costs increase by 10% per year.
BPONZ return on assets is 15% per year.

Summary of Total Dry Tanks

The information provided below is only a summary of the dry tanks for the period February 1995 to February 1997. The Truckstop names are not listed for confidentiality reasons.

Site No.	DeliveryTime	BeforeDip	HoursDry	DryExplaination
1	19-Oct-95	300	1	45 % INCREASE
2	27-May-95	5800	6	INCORRECT CUTOFF QUANTITY SPOKE TO SITE MANAGER-CUTS AT 2000
	08-Dec-95	4500	1	CUT OFF SET @ 6000 NOW CHANGED
	24-Feb-96	4900	1	STILL PUMPING ON ARRIVAL 25% INCREASE OFFTAKE
3	30-Nov-95	400	14	CHANGE OF OWNERSHIP OF SITE.- NO MORE OASIS JIM!!!!
	30-Nov-95	700	14	CHANGE OF OWNERSHIP.
	27-Dec-95	400	4	INCREASE 25%
4	03-Mar-95	100	2	43%
	31-Aug-95	100	2	UNABLE TO DELIVER EARLIER NO DIP STICK.
5	08-May-95	900	4	INCREASE OFFTAKE
	23-Dec-95	500	2	INCREASE 19%
6	09-Apr-95	2500	2	43 %
	31-Mar-96	3000	6	NOT DRY
	02-May-96	300	2	75 %
7	05-Apr-95	100	1	7000 SOLD 5/4/95 77 % INCREASE
	03-Aug-95	300	2	DELIVERY SCHEDULED EARLIER TWICE .BUT DRIVER AND VEHICLE BOTH BROKE DOWN
	19-Aug-95	500	2	DESPATCHED EARLIER BUT VEHICLE BROKE DOWN. 22% INCREASE DIDNT HELP EITHER
	03-Jul-96	600	1	DELIVERY STRETCHED
	25-Sep-96	400	1	OVERSIGHT
	12-Feb-97	300	1	61 % INCREASE
8	28-Feb-95	800	6	DELIVERY CAPACITY STRECHED
	04-Mar-95	800	7	40 %
	08-Mar-95	800	2	DELIVERY CAPACITY STRECHED
	30-May-95	800	22	OFFTAKE INCREASED BY 42%
	06-Dec-96	900	12	68% INCREASE
	16-Dec-96	800	6	PRODUCT SHORTAGE
	17-Dec-96	800	3	81% INCREASE PRODUCT SHORTAGE
	14-Feb-97	2000	2	40% INCREASE

9	10-Dec-96	0	3	
10	21-Feb-95	3000	3	
11	01-May-96	2000	2	67 % INCREASE
12	28-Feb-96	1000	1	DRIVERS REARRANGED TRIPS
13	27-Oct-95	500	11	INCREASE IN OFFTAKE 189%
14	27-Feb-95	1500	3	
15	13-Dec-96	100	9	SITE RUN DOWN FOR NEW PUF CONVERSION WHICH IS NOT ABOUT TO HAPPEN FOR THE SECOND TIME.
16	14-Jun-96	0	26	PUMP OUT MOBIL SUPPLIED WET DIESEL
17	19-Feb-96	800	7	55% INCREASE
18	12-Sep-96	1000	2	INC OFFTAKE 23%
19	11-May-95	600	8	
	06-Sep-96	400	3	50 % INC IN OFFTAKE/PENDING PORT STOCKOUT/LACK OF RESOURCE
	16-Jan-97	700	8	152% INC IN OFFTAKE MR BLEEKERTOOK 10000L WITHOUT NOTIFICATION TO BP
20	28-Feb-96	400	1	OFFTAKE INCREASED 26%
21	12-Mar-95	800	3	NEW DRIVER
	23-Jun-95	600	5	114 %__INCREASE
	24-Jul-95	600	1	PREVIOUS DELIVERY ON FRIDAY NOT ACTIONED AS PLANNED
	03-Aug-95	0	2	56 % INCREASE
	01-Oct-95	500	4	29 % INCREASE NO LOW LEVEL ALARM FITTED TO TANK
	17-Jan-96	1000	1	41 %
	25-Jan-96	1000	3	
	05-Jul-96	100	2	REPORTED IN ERROR-PREDIP WAS 10000LITRES
22	12-Mar-95	1200	4	28 % NO ADVISE THAT TANK WAS LOW RECIEVED BY US
	15-Dec-95	1000	1	30 % INCREASE
23	11-May-96	8200	3	NOT DRY
24	16-Nov-95	500	11	INCREASE 35%
25	27-Mar-96	900	7	DELIVERY STRETCHED DUE TO LACKOF RESOURCE
	04-May-96	1000	2	61 %
	10-Jul-96	800	1	REPORTED IN ERROR-INCORRECT PREDIP SHOULD BE 8000
	21-Oct-96	600	1	43% INCREASE
26	15-Nov-95	750	2	INCRESED OFFTAKE 41%. DELIVERY ATTEMPTED ON WED
	26-Nov-96	500	1	35% INC IN OFFTAKE
	15-Dec-96	700	1	91% INC IN OFFTAKE
	07-Jan-97	500	3	56% INC IN OFFTAKE
27	03-Aug-95	1000	2	STILL PUMPING WHEN TRUCK ARRIVED
	12-Oct-95	1000	1	33 % INCREASE

	25-Jan-96	800	1	DELIVERY PREVIOUS SHIFT MISSED
	24-Feb-96	1000	1	25 %
	15-Mar-96	900	1	36% INCREASE
	30-Aug-96	800	3	59%_INCREASE
	24-Oct-96	1000	1	650 % INCREASE
	06-Dec-96	800	2	18 % INCREASE
28	20-May-95	1900	3	VERY LOW PORT STOCKS CAUSED THIS STOCKOUT
	16-Jan-96	1250	5	NOT DRY
29	07-Dec-95	150	2	CHANGED TO CONSIGNMENT STOCK
30	15-Mar-95	100	1	
31	22-Mar-96	1500	2	STILL PUMPING ON ARRIVAL DELIVERY STRETCHED DUE TO ULP
32	01-May-95	2400	4	
	08-Jan-96	1000	15	INCREASE 63%.DELIVERY MADE FRIDAY
	11-Jun-96	1100	4	46% INC IN OFFTAKE
33	10-Oct-96	250	3	REFILLING TANK AFTER PUMPOUT CHANGE FROM SUPER TO PULP
	30-Jan-97	300	4	94% INC IN OFFTAKE
34	16-Feb-96	300	1	27% INCREASE
	20-Feb-96	300	4	46% INCREASE
	01-Nov-96	300	3	DELIVERY STRETCHED TO CATER FOR OTHER CREDIT CLIENTS IN THE AREA
35	08-May-95	1200	2	CUSTOMER DIPPED TANK AT 30000L WAS ACTUALLY 3000L !!!
	15-Dec-95	2900	3	STILL PUMPING. ENDEVOURING TO LOAD ADF OUT OF FREEMANS BAY DUE TO SHORTAGE AT WOSL
	21-Mar-96	5000	4	
	14-Jun-96	3000	1	46% INCREASE STILL PUMPING ON ARRIVAL
	21-Jun-96	2000	6	STILL PUMPING 29% INCREASE
36	15-Sep-95	1000	1	46 % INCREASE
	15-Jan-96	100	3	QUIET PERIOD FOLLOWED BY BUSY START UP .
	07-Nov-96	1000	1	52% INCREASE
37	22-Mar-95	600	8	215 % BIG GAME FISHING BOATS JUST ARRIVED AND DRAINED THETANK
	11-Nov-96	700	1	INC OFFTAKE 43% CUSTOMER NORMALLY RINGS AT CRITICAL LEVEL
	16-Dec-96	500	15	59 % INCREASE
	17-Feb-97	500	11	OFFTAKE INC 94%-FISHING COMP
38	10-May-95	4000	1	ALSO 17 % INCREASE
	21-Jun-96	3600	1	NOT DRY-SPOKE TO S/S
39	28-Jun-95	2000	2	75% INCREASE OFFTAKE
	21-Dec-95	2000	1	37% INCREASE
	20-Feb-96	2000	4	

	22-Feb-96	2000	1	53% INCREASE
	30-Mar-96	2000	1	DELIVERY PLANNED PREVIOUS PM NOT COMPLETED
	04-Apr-96	1800	4	23 %
40	10-Jun-96	0	4	ACCESS NOT AVAILABLE 9/6/96 DIP B4 9000
41	16-Mar-95	6200	2	
	18-May-95	1400	5	37 %
42	08-Oct-96	200	2	21% INCREASE
43	09-Nov-95	900	102	CHANGE IN OFFTAKE OF 205% SINCE LAST FILL
44	11-Jun-96	500	4	DIP 5500 9/6 PM REQ ULLAGE FORVEH BRAKE TESTING
45	24-Aug-95	500	11	NOT DRY
46	27-Jan-97	1000	1	44% INC OFFTAKE - SITE NOT DRY
47	06-Apr-95	200	4	63% INCREASE
	17-Feb-96	800	2	33% INCREASE
	14-Jun-96	800	3	175 % INCREASE DELIVERY PLANNED FOR DAY OF RUN OUT
48	18-Mar-95	300	1	74 %
49	05-May-95	5000	1	CUTOUT SET TOO HIGH. DELIVERY LATE THOUGH DUE TO PORT STOCKOUT AT MOUNT.
	08-May-95	3000	2	19 % ALSO PORT STOCKOUT AT MOUNT
	20-Dec-96	1200	10	100 % INCREASE
50	23-Feb-95	4300	4	DELIVERY STRETCHED DUE TO RESOURCE BEING STRETCHED
51	12-Jan-96	7800	6	QUIET PERIOD FOLLOWED BY BUSY START UP
52	18-Mar-95	3600	2	UNSURE IF TANK HAD CUT.PREVIOUSLY CUT OUT AT 3800L.TANK LATER CUT AT 800L
	19-Mar-95	3500	3	UNSURE IF TANK HAD ACTUALLY CUT BUT STILL TOO LOW.PREVIOUSLY CUT AT 3800L
	25-Mar-95	800	6	46% INCREASE IN OFFTAKE
	08-Jan-96	3600	5	IN ERROR
	09-Jan-96	3200	3	90 %
	17-Jan-96	1000	4	PLANNER RANG 16-1-96 FOR DIP
	05-Feb-96	3500	4	
	04-Mar-96	3600	2	ASSUMED WEEKEND SALES DOWN.
53	09-Oct-95	1900	3	139% INCREASE TANK STILL PUMPING ON ARRIVAL
54	17-Jan-97	200	3	54% INC IN OFFTAKE
55	15-Feb-95	11000	1	
	13-Jun-96	0	9	PUMP OUT MOBIL SUPPLIED WET DIESEL
56	30-Mar-95	500	9	

Monthly Reconciliation Comparison

Name	July		August		October		November		December		Total		Throughput	% L/G	
Fuelquip Trial	**CPM**	**ATG**	**CPM**	**ATG**	**CPM**	**ATG**	**CPM**	**ATG**	**CPM**	**ATG**	**CPM**	**ATG**		**CPM**	**ATG**
F1	-6,583	-1,397	-2,761	-1,531	-4,601	-1,210	-2,237	-2,198	758	-1,808	-21,760	-8,144	587,057	-3.71	-1.39
F2	9,881	-150	-316	95	1,679	559	-3,469	112	2,059	414	10,450	1,030	583,046	1.79	0.18
F3							-7,129	419			-7,129	419	172,576	-4.13	0.24
F4			195	187	-660	102	3,682	275	-283	25	2,934	589	514,440	0.57	0.11
F5							-6592	200	-2066	412**	-8658	612	289,615	-2.99	0.21
											-24,163	**-5,494**	**2,146,734**	**-1.13**	**-0.26**
Compac Trial					**November**		**December**		**January**						
C1					-12277	1739	4626	69	25,681	328	18,030	2,136	2,168,277	0.83	0.10
C2					830	5,365	-2,190	9,336	-8,739	2,264	-10,099	16,965	785,685	-1.29	2.16
C3					-2,267		1,807		-5,807		-6,267	0	394,248	-1.59	
C4					-15094	2620	-7785	5514	14,602	20,605	-8,277	28,739	1,002,891	-0.83	2.87
											-6,613	**47,840**	**4,351,101**	**-0.15**	**1.10**

Key: CPM - Consignment Product Movements
ATG - Automatic Tank Gauge readings

NB. Site F5 had a fueldrop on the 5/12 included into its December reconciliation.

Installation Problems with Sites

Fuelquip Sites

Site F5

Was planned to be commissioned in July, but delays in the site upgrade of the whole Truckstop meant it was not running until September.

Site F4

Required a new telephone line to be installed for the site controller situated in the Retail building. This was required for the communication between the site controller and the inventory management system in Head Office, Wellington.

Compac Sites

Site C1

Required a new telephone line to be installed for data communication between the site controller and Compac Industries in Auckland.

Site C2

Required a new telephone line to be installed. Was out of service for one month due to site works.

Site C3

Required a new telephone line to be installed. Telephone line was installed in wrong place and had to be removed and reposition in the correct cabinet. This was a Telecom error.

Site C4

A site upgrade delayed proceedings. There were no spare sockets to install the tank gauge probe on. The solution was to block off one of the delivery tubes and use the inwards socket into the tank for the tank gauging. The problem took two weeks to rectify.

ENGINEERING RISK REVIEW -UNDERGROUND TANKS

ASSESSOR: _____ DATE:

SITE: _____ TANK NO: _____ MNMC:

Add up the scores, divide by 3.5 and round to the nearest single decimal point. Place ranking score in the box provided. Complete form for each tank in the storage system.

CRITERIA	POINTS					SCORE	COMMENTS State Information Source and Other Relevant Details
	1	2	3	4	5		
UST Capacity (Size)	<500L	5-20kL	21-60kL	41-60kL	>60kL		
Age of UST	<5 years	5-10 years	11-15 years	16-20 years	>20 years		
Soil Corrosivity	pH >6.5 Non-Acidic to Weakly Acidic		pH 5.5-6.5 Moderately Acidic (Default)		pH <5.5 Strongly Acidic		
UST Cathodically Protected?	Yes				No		When was CP last checked? Pass/Fail?
Historical Leaks/Overfills/Known Spills from System	No			(Defaults)	Yes		
Ground-water Monitoring	Regular		Done in Past		None		
Effluent Sampling	Regular		Done in Past		None		
					RANKING		

ENVIRONMENTAL SENSITIVITY RANKING

ASSESSOR: _____ STATE:

DATE: _____ SITE:

TANK NO: _____ MNMC:

Add up the scores, divide by 4.5 and round to the nearest single decimal point. Place ranking score in the box provided. Complete form for each tank in the storage system.

CRITERIA	POINTS					SCORE	COMMENTS State Information Source and Other Relevant Details
	1	2	3	4	5		
Land Use Adjacent to Site (If a mix of land use, average scores and round up to integer)	Dist Owned/(Likely to remain) Undeveloped	Industrial	Commercial	Rural/Agriculture/ Recreation	Residential/School/ Hospital		
General Land Use Within 1km of Site (If a mix of land use, average scores and round up to integer)	Dist Owned/(Likely to remain) Undeveloped	Industrial	Commercial	Rural/Agriculture/ Recreation	Residential/School/ Hospital		
Soil Type/Permeability	Tight Clay/Virgin Bedrock	Silts & Clays/ Jointed Bedrock	Silty Sand (Default)	Sandy	Gravelly/Karst Limestone		
Depth to Ground-water	>30m	15-30m	7-15m	3-7m (Default)	<3m		
Ground-water Quality	Poor-Naturally		Poor-Contaminated (Not from Site)	(Default)	Potable		
Is Ground-water used for Water Supply?	No	Non-Potable	Non-Potable Major Use	Potable Minor Use	Potable Major Use		
Are there any Registered Bores within a 1km radius of the site?	No		Yes-Industrial	Yes - gardens	Yes - Potable		
Distance to nearest Surface Water in Catchment	>3km	1.5-3km	1-1.5km	<1km	Adjacent		
Surface Water Use	Not Utilised	Shipping	Industrial	Irrigation/Stock/ Boating/Wetlands	Drinking/ Aquaculture/ Swimming		
					RANKING		

Reference from Terminals Manual

10.3 VEHICLE DESPATCH

10.3.1 PLANNING

10.3.1.1 Efficiencies

Within reason, despatch should be carried out to meet both the customer's requirements and agreed distribution service level agreements . The principle requirements are to ensure that:

- product is available in sufficient quantity to meet demand;
- vehicles are deployed in the most efficient manner;
- deliveries are made as near to the time agreed with the customer as practicable;
- the appropriate sized vehicle is scheduled to best suit the customer's order and delivery constraints.

10.3.1.2 Resource Disposition

A detailed forward plan should be prepared to maximise fleet and driver utilisation except where vehicular activity is minimal where such a plan may be simply stated.

Vehicle scheduling should always be planned at least one shift in advance; ad hoc scheduling is inefficient and costly.

In New Zealand distribution plans should be produced for 2 shifts a day, 7 days a week by planners normally working Monday to Friday. Plans should be produced each planning day for all shifts up to the end of shift 1 of the next planning day. Each delivery area should be the responsibility of an individual planner.

Reference: http://austral.bpweb.bp.com/td_tom/TDManual/TOM/section10/tom10_3.htm