SUMMARY OF OPERATIONS: TRUCK STOP ELECTRIFICATION FACILITIES ON THE NEW YORK STATE THRUWAY

Final Report

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THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
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NOTICE

This report was prepared by ANTARES based on preliminary operational data provided by IdleAire Technologies Corporation (hereinafter "IdleAire" or "Subcontractor"). ANTARES has not verified the accuracy of the data reported by the Subcontractor. Therefore, conclusions drawn from this report should not be represented as precise and should be construed as an evaluation of the available data.

This is a Final Report issued by NYSERDA, and the other Project Sponsors, on January 27, 2005. All comments received as of this date have been incorporated into this Final Report. Should additional comments be received at a future date, they will be issued as an Addendum to the Final Report.

ABSTRACT

This report contains a summary of operations for the Subcontractor's Truck Stop Electrification (TSE) demonstration facilities at the DeWitt and Chittenango Service Areas on the New York State Thruway (I-90) near Syracuse, New York. To date, the Subcontractor has installed a total of three TSE facilities in New York State. The first was at the Hunts Point Market in the Bronx, the second at the DeWitt Service Area, and the third at the Chittenango Service Area. ANTARES managed the installation and analyzed operations at both the DeWitt and Chittenango facilities. The DeWitt TSE facility started commercial operations in mid-June 2002, with the first complete month of operations in July 2002. The Chittenango TSE facility opened for commercial operations at the end of April 2003; however, the first complete month of operation was May 2003.

This report includes data and analysis of the one year DeWitt TSE facility demonstration beginning July 2002 through June 2003. Also included is the Chittenango site data and analysis of a one year period for this facility beginning May 2003 through April 2004.

Parameters recorded and reported by the Subcontractor included: system hours of use, number of users, energy consumption, and ambient weather conditions. ANTARES used data provided by the Subcontractor to analyze the operations of the two New York State Thruway TSE systems at the DeWitt and Chittenango Service Areas. Operating issues were identified, benefits were quantified and results were documented in monthly reports. In addition, sufficient operational experience was gained to support a recommendation on whether to continue the operation of the two facilities after completion of the demonstration.

ACKNOWLEDGEMENT

ANTARES would like to extend their sincere gratitude towards the New York State Energy Research and Development Authority (NYSERDA), the New York State Thruway Authority (NYSTA) and Niagara Mohawk Power Company, a National Grid Company, (NMPC) for providing funding for the two Syracuse, New York area TSE demonstration projects. The cooperation between the organizations was excellent and provided the basis for the successful completion of this unique demonstration project. ANTARES would also like to thank IdleAire for supplying the hardware and operational data to enable the completion of this report.

ANTARES would also like to individually thank the following pioneers for having the foresight and leadership to deploy pre-commercial idle reduction technologies in the State of New York: Joseph Tario and Richard Drake of NYSERDA, David Devendorf of NMPC, and Donald Hutton and John Gurniak of NYSTA. Together, their dedication and efforts have helped reduce truck idling emissions, noise and fuel consumption, resulting in safer highways and healthier communities.

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SUMMARY

Diesel-powered truck engine idling is now recognized as a growing problem across the United States. This is especially the case within the heavily populated air quality non-attainment areas that are also adjacent to major interstate highway corridors. Unnecessary engine idling wastes diesel fuel, pollutes the air, and generates unwelcome noise. According to a study conducted by Argonne National Laboratory (ANL), the average sleeper cab tractor idles for 1,830 hours annually, consuming on average approximately one gallon of diesel fuel per hour. Truck Stop Electrification (TSE) not only has the potential to improve environmental conditions at truck stops, rest areas and nearby communities but also save the trucking industry significant money in fuel and maintenance costs.

New York State is leading the nation in research, development and deployment of TSE and was the first state to install commercial TSE infrastructure. A feasibility study conducted by ANTARES Group Inc. and completed in January 2001 indicated that TSE was in fact a viable commercial approach to reducing truck engine idling. Based upon this study, the New York State Energy Research and Development Authority (NYSERDA), with co-funding provided by Niagara Mohawk Power Company (NMPC) and the New York State Thruway Authority (NYSTA) implemented Phase 2 of this TSE project which led to the deployment of two off-board TSE facilities at New York State Thruway Service Areas along I-90 near Syracuse, NY. As part of this project, forty-five truck parking spaces were equipped with TSE connections. In addition, one complete year of commercial operational data were collected for both facility locations to assess the performance of these facilities.

During this demonstration project, several issues hindered the progression of the I-90 TSE deployment activities. Most issues were not directly related to the performance or utilization of the system. It was determined that the facility size and layout can considerably affect the utilization of a TSE system since TSE berths were occupied with vehicles that were not connected to the TSE service and drivers wanting to use the service were often unable to find an open TSE parking space. This was easily traced back to the overall truck parking that was available at the two demonstration sites. New York winter weather coupled with construction that impacted the majority of truck parking spaces at both sites lead to scheduling issues and problems and in some cases a stretch out in the construction schedule. The demonstration used first generation commercial hardware and changes in the design of the equipment occurred during the first site installation. The supplied second generation hardware was better for demonstration purposes, but it did delay the desired system operational date at the first demonstration site. The DeWitt site was an excellent cold weather living laboratory for second generation hardware that was installed. Moreover, technical performance was not the only key issue of this demonstration. The TSE system was new technology being introduced to an industry that has shown a great reluctance to change and the idling habit for providing

sleeper cab heating and cooling is very much ingrained. The developmental nature of the hardware as well as the issue of truck driver acceptance both were key concerns during this demonstration effort.

From this demonstration project, several outcomes have become apparent. Significant cost and fuel saving can be obtained through the use of TSE to provide the necessary within cab comfort to truck operators. To successfully deploy off-board TSE, there are several issues that should be addressed. These include adequate facility size, marketing of service to users and decision makers on the basis of overall cost savings, and basic system improvements. All are needed to successfully deploy the TSE technology in the commercial marketplace. The Subcontractor, IdleAire, did a good job of addressing all the issues within their control during the demonstration and upgraded their installed hardware during the course of the demonstration. In essence, the TSE demonstration became, in many ways, part of the Subcontractor's on-going hardware development and testing program. In addition, the end-user feedback from truck drivers helped drive the improvements to the in-cab system and feedback from the New York State Thruway Authority led to the implementation of an upgraded installation approach and hardware for the TSE demonstration at the second site, the Chittenango Service Area.

Section 1
INTRODUCTION

Truck engine idling is increasingly recognized as an aesthetic and environmental problem across the United States. Long-haul truck drivers typically idle their engines to heat or cool sleeper cab compartments, and to maintain vehicle battery charge while electrical appliances such as televisions and microwaves are in use. In colder climates, idling also keeps engine oil and fuel warm enough to prevent engine starting and operating problems.

According to a study conducted by Argonne National Laboratory, the average sleeper cab tractor idles for 1,830 hours annually, consuming approximately one gallon of diesel fuel per hour. This results in the consumption of an estimated 838 million gallons of fuel annually. At an average price of $1.70 per gallon of diesel fuel, this represents an expenditure of over $3,000 per year for the average individual truck driver, and into the millions of dollars for large fleets. Additionally, service and maintenance costs are typically estimated by maintenance personnel to be directly proportional to the hours an engine operates; including idling. LP Tardif & Associates Inc. found that an additional $0.92 is spent on service, maintenance and repairs for every hour the truck spends idling (Environmental Awareness and Outreach Measures to Reduce GHG Emissions, from the Trucking Sector, L-P Tardif & Associates Inc., 1999). Combined with the fuel costs, the overall cost to operators is $2.62 for each hour of idling. This equates to nearly $4,800 a year for the average truck driver. Beyond the additional fuel and maintenance costs, extensive engine idling has drawbacks including pollutant emissions, noise pollution, driver discomfort and health-related issues. Key emissions attributed to diesel engine idling include:

- Carbon dioxide (CO_2);
- Carbon monoxide (CO);
- Particulate matter (PM); and
- Oxides of nitrogen (NOx).

Idling increases localized CO concentrations that can cause headaches, dizziness and nausea, and can negatively affect driver health and job performance. Noise pollution generated by idling trucks may exacerbate sleep loss, which partially negates the targeted safety benefit of the newly revised Federal truck driver hours-of-service regulation, which took effect on January 4, 2004 (Hours of Service of Drivers; Driver Rest and Sleep for Safe Operations, Final Rule, U.S. Department of Transportation, Federal Motor Carrier Safety Administration, 49 CFR Parts 385, 390, and 395, Docket No. FMCSA-97-2350, RIN 2126-AA23, Federal Register, Volume 68, Number 81, Rules and Regulations, Pages 22455-22517, April 28, 2003.). Noise pollution is especially problematic at large truck stops, where there may be dozens of idling trucks.

Heavy truck engine idling can be almost eliminated at TSE-equipped locations. TSE thus has the potential to improve environmental conditions at truck parking areas and in the communities that surround them. Heavy truck idling is also attracting increased attention from state and municipal governments. Twenty states including the District of Columbia now have anti-idling laws in place (http://www.atri-online.org/research/results/idling_chart.pdf). Historically, drivers have viewed these regulations as punitive, and enforcement has been difficult due to a lack of alternatives to engine idling. Gradual commercial market penetration of anti-idling devices and technologies promotes stricter enforcement and increased ticketing for idling violations. Enforcement, in turn, encourages truck manufacturers, fleets, owner-operators, and drivers to consider alternatives to truck engine idling. Moreover, educated drivers and fleets know that idle reduction technologies can also save them money.

Available anti-idling options include auxiliary power units (APUs) that provide heating, cooling and electric power to the sleeper cab. However, these diesel engine-powered units are heavy and expensive, and also generate noise and pollution. In the future, fuel cell-powered APUs may become available. Fuel cells are more efficient, can use a variety of fuels, and have lower emissions than internal combustion engine APUs. Currently available fuel cells; however, are heavier and significantly more expensive than their diesel-engine counterparts. Thermal storage for cab heating is also an option, but this approach is expensive, the equipment is heavy and this approach does not supply electric power to the sleeper cab. Inverters and battery packs are also used as an idling alternative. Inverters convert 12-Volt direct current (DC) power from the batteries to 120-Volt alternating current (VAC) power for accessories and cab appliances. However, most inverter-battery packages do not have the capacity to power devices such as electric heaters and air conditioners for extended periods. Additional battery capacity is required to operate these devices for longer periods, adding weight to the tractor and increasing costs to the owner/operator. Periodic maintenance and replacement of the batteries is also necessary.

One anti-idling option that addresses many truck operator, government, and citizen concerns is Truck Stop Electrification, or TSE. TSE can be installed at truck stops, service plazas, or rest areas to provide electric power to truck parking areas. Truckers park, connect their trucks to a convenient power source, and use existing grid-supplied electricity. TSE allows drivers to operate on-board systems (sleeper cab heating and cooling, microwave ovens, refrigerators, televisions, telephones, personal computers, and other small appliances) while parked without idling their engines.

For purposes of distinction, TSE systems can be classified as either "truck-board" or "off-board," depending on the location of the heating, ventilation and air conditioning (HVAC) unit. The former is typically referred to as “shore power.” The latter is an external system that connects to the truck cab, typically through a window, but can also be fitted to an access port such as a hatch on the side of the truck in the sleeper compartment. An integrated off-board system consists primarily of a HVAC subsystem (heating/cooling/thermal transfer duct work) mounted off-board the tractor. This system may also provide

120-Volt AC (VAC) electrical power outlets as well as an entertainment package (i.e., Internet, telephone and cable television connections).

The TSE system used in this demonstration is an integrated off-board system and represented the state of the art in this type of hardware. The subcontractor, IdleAire, was selected because they offered this system in an almost commercial state during the planning for this demonstration. Moreover, this type of system could be used by any commercial truck that stopped at the two NYSTA demonstration sites with the only requirement being an easily fitted window template/adapter.

Section 2
BACKGROUND

New York State is leading the nation in research, development and deployment of Truck Stop Electrification and was the first state to install commercial TSE infrastructure. This includes the installation of the first three off-board TSE facilities and the design and installation of the first prototype commercial shorepower facility. Both system designs include credit card readers, cable television, and a communication interface. In addition, New York State initiated the corridor approach to Truck Stop Electrification deployment and conducted the first Corridor TSE Workshop in June 2002, targeting the sixteen states along the I-95 corridor. New York also recently hosted the National Idling Reduction Planning Conference in May 2004.

Phase I of this project, co-funded by the New York State Energy Research and Development Authority (NYSERDA) and Niagara Mohawk Power Corporation (NMPC), delivered a Truck Stop Electrification (TSE) feasibility study for the upstate New York area. This feasibility study was completed by the ANTARES Group Inc. in January 2001 and included a market study, preliminary TSE design and cost estimate, along with a quantification of the energy and environmental implications of TSE implementation.

In the context of this project, TSE consists of providing electric power, heat, and air conditioning at truck rest areas/truck stops for sleeper cab long-haul truck operators to access. This access allows the truck operators to shut down their engines, rather than idling the truck tractor diesel engine to supply their own power, heat and air conditioning. The following report details the follow-on Phase II of the project, which involved a one-year demonstration of a proprietary commercial off-board TSE system developed by the IdleAire Corporation, an analysis of the issues encountered, an analysis of the operational performance and user survey data collected, an analysis of the business case for these installations, the project outcomes, and finally relevant conclusions and recommendations.

NEW YORK INTERSTATE 90 TSE DEMONSTRATION

Two off-board TSE demonstration sites were constructed on the New York State Thruway (I-90) east of Syracuse, New York. The first, at the DeWitt Service Area (**Figure 1**) on eastbound I-90, was completed for commercial operation in June 2002. The second site at the Chittenango Service Area (**Figure 2**) on westbound I-90 was completed in April 2003. Development time and modifications to the original design delayed installation of each of the facilities. Both facilities are now fully functional and have been in operation for over one year.

Figure 1. DeWitt Service Area TSE Facility - May 15, 2003

Figure 2. Chittenango Service Area TSE Facility – January 6, 2004

The off-board system installed at the Syracuse TSE facilities was supplied and installed by the IdleAire Corporation. The primary advantage of the off-board system is that it requires no additional on-board componentry for use with the tractor. The system includes heating, cooling, AC electrical outlets, phone and cable television connections, a touch screen monitor, and Internet access. The HVAC system is mounted above the parked truck on an overhead truss where the wiring and ductwork originate (**Figure 3**). The ductwork apparatus, including the supporting tether for the head unit and the electrical wiring, drop down to the truck window in a protective, flexible shield which supports the integrated computer service console (**Figure 4**). The service console is connected to the tractor through the passenger-side door window, or to an access port such as a hatch on the side of the truck in the sleeper compartment, by a mounting template that can be purchased at the facilities for $10. A credit card reader mounted on each

Figure 3. Truss mounted HVAC system and ducting

Figure 4. Computer service console with outlets, internet & cable connections, card reader, and conditioned air delivery system

service console provides for in-cab payment for the TSE service. Currently IdleAire charges $1.25 per hour for registered fleets and $1.50 per hour to others for basic services. Basic services provided as part of the hourly fee include basic satellite television programming, basic phone service, conditioned air and 120-VAC electric plug-ins; however, use of the telephone service requires the driver's own telephone. High speed Internet service and premium movie channels can be purchased for an additional fee and accessed through the touch screen (or the driver's own computer/television). On-line truck driver education and training courses were added as a for fee service during the course of the demonstration.

Both the DeWitt Service Area facility, with 21 TSE-equipped spaces, and the Chittenango Service Area facility, with 24 TSE-equipped spaces, encountered all of the seasonal climatic variations typical of the Syracuse area during their one year demonstration periods. The DeWitt facility began operation ten months prior to the Chittenango, so the one-year of demonstration data collected from each site only slightly overlaps as shown in **Table 1**.

Table 1. TSE Data Collection and Monitoring Periods

			2002							2003												2004			
	Begin Date	End Date	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
DeWitt Operational	6/15/2002		●																						
DeWitt Monitoring	7/1/2002	6/30/2003		—	—	—	—	—	—	—	—	—	—	—	—										
Chittenango Operational	4/30/2003												●												
Chittenango Monitoring	5/1/2003	4/30/2004												—	—	—	—	—	—	—	—	—	—	—	—

Section 3
ISSUES

There were many issues that hindered the progression and success of the I-90 TSE deployment activities, which are unrelated to the performance or utilization of the system. The facility size and layout can considerably affect the occupancy rates of a TSE system. Unless anti-idling is to be strictly enforced, there must be enough parking for drivers wishing to use the TSE system as well as those who do not wish to use the system. The two demonstration sites had truck parking constraints and almost the entire truck parking area at both locations were outfitted with the TSE equipment. Only the tandem truck parking areas were not equipped with the TSE hardware. Construction times must be reasonable to decrease the impact on facility operations and the equipment should be readily available for installation. Once the stationary infrastructure is in place, it must perform well; especially a new product entering an industry with well entrenched habits. And finally, in order to accurately evaluate a new technology, operational data should be readily available and delivered in an easily readable format. Accurate and timely evaluation of data allows the system operators to modify, rectify or enhance underperforming characteristics of the system. Operational data also allow the TSE system provider to increase utilization based on analysis of the data and end user input and changes in operation or service approach.

FACILITY

The two major barriers were related to the site specific layout of the two demonstration service areas and the fact that TSE is a new and emerging technology. First, nearly every parking space at both facilities is TSE equipped. There are 21 TSE parking spaces at Dewitt and 24 TSE spaces at Chittenango. (**Figures 5** and **6**) Since all designated parking spaces are occupied every night, drivers arriving late in the evening must either illegally park on the entrance and exit ramps of the facility or travel to an alternate parking facility. Although a late arriving driver had every intention to use the TSE system, he was not able since all spaces were occupied, many with idling trucks not using the service. Therefore, many truck operators are prevented from using the TSE system.

With only 2 TSE facilities in all of upstate New York, neither the Subcontractor nor the NYSTA are limiting the parking area to TSE customers only. The Subcontractor has proposed to give priority to TSE customers in the future, but has not been given the authority by NYSTA at this time. Utilization would likely be higher if the TSE parking spaces were reserved for those desiring to use the system or if the parking area was large enough to permit sufficient parking of all vehicles. A larger parking area would allow those not using the system to park in non-TSE equipped stalls, therefore freeing up the TSE equipped spaces for those who wish to connect.

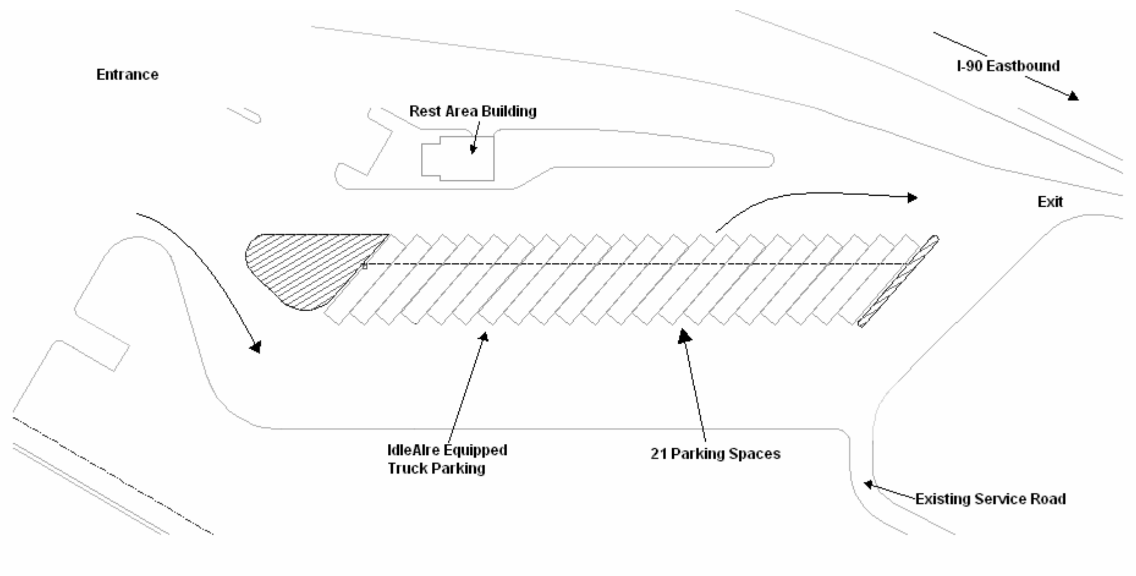

Figure 5 - DeWitt Service Area parking configuration

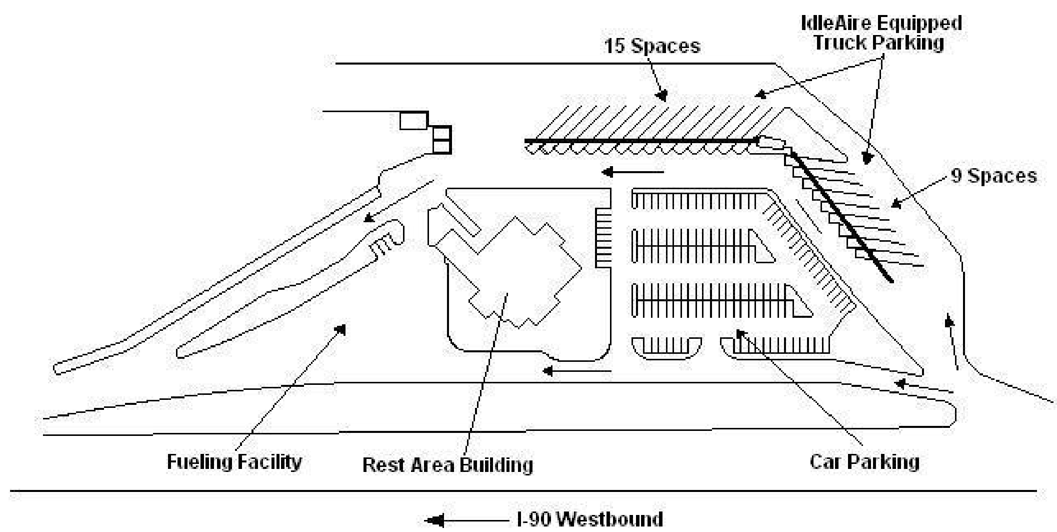

Figure 6 - Chittenango Service Area parking configuration

Other facility-related issues are also related to the selection of small, shorter-term parking facilities for both demonstration sites. Both DeWitt and Chittenango Service Areas were initially determined to be ideal sites for TSE due to the high traffic volume on I-90 and their proximity to major U.S. and Canadian cities. However, facilities with over a hundred parking spaces are better suited for this type of system due to high initial tailored design, permitting, electrical connection upgrades, and construction mobilization costs. These are the types of costs that are best spread out over more parking spaces to arrive a lower price per installed TSE parking space. The Syracuse TSE facilities are New York State Thruway Authority operated rest areas with restaurant and restroom facilities, but have fewer than 30 truck parking spaces. This compares to the larger fully equipped commercial truck stops that typically accommodate over a hundred tractor-trailers and offer services such as truck scales, showers and maintenance facilities that the state rest areas do not. Many of the trucks that stop at the two Syracuse TSE facilities stay only for short periods, because they prefer the additional services for longer stays. Larger truck stops sustain a larger proportion of overnight occupants and therefore most likely will see higher TSE utilization.

DATA AVAILABILITY

To analyze trends on a near real-time basis, ANTARES was required to collect operational data and report on a monthly basis to the project sponsors. This period of reporting was initially planned to ensure data collection over a full year at both locations. Utilization and operational data were compiled, summarized and graphed in each report for the previous month. A summary of activities and construction status was also included as part of the reports. The monthly progress reports were highly dependant on the data provided by the Subcontractor. If data were not available, the reports were sometimes delayed or submitted without the previous month's data. The data were presented to the project sponsors, similar to the summary data charts and graphs shown in **Appendix A** and **B**.

A vast majority of the data and information contained in this report came directly from the Subcontractor. No third party entity was used to verify the content or accuracy of the data. Very few problems were reported with the hardware; however, it should be noted that undeclared problems may have occurred during the course of the demonstration. It should be noted that IdleAire did its best to ensure the uptime of the equipment once it was installed and made operational. This must be stated to indicate the possibility that some issues may have been unreported to ANTARES or any of the sponsors.

It should also be noted that the method of recording utilization data may have affected the system utilization analysis and the presented utilization rates. The system utilization data included periods when the system was operating for service and maintenance. These periods were not removed by the Subcontractor and may have resulted in slightly higher utilization rates. We believe these instances were not significant. However, each occurrence could not be identified and they may have an impact on several elements of the data analysis. In addition, the majority of the system utilization, at least during the early months of the demonstration, was due in most part to the subcontractor offering complementary or free service. This is typical of new facility promotions; however, system utilization would have been lower without these activities. The complementary service impacted driver savings (which was actually higher than reported) and the Subcontractor revenue (which may be lower than reported). However, we believe the lower revenues generated by the complementary service unfairly taints the analysis in a negative direction; therefore the analysis that was performed did not incorporate this negative implication within the study.

CONSTRUCTION DELAYS

Delays in construction occurred due to several factors which included the Subcontractor not having an adequate hardware inventory or supply and to a lesser degree, construction personnel available for the scheduled construction period. The Subcontractor's original design was pre-commercial, which required subsequent modifications to ensure successful commercial operation. The DeWitt Service Area facility opened in June 2002, with its first complete month of operations in July 2002, and the Chittenango facility opened in April 2003, with its first full month of operations in May 2003.

Both facilities were intended to be operational within one year of the contract initiation date (May 2001). However, due to the contractor construction delays, the Chittenango facility did not open for business until nearly a year later. ANTARES originally intended to complete a one year operational study by the end of 2003; however, in order to assess a full year of operational data from both facilities, data collection continued through April 2004.

Part of the construction delay is attributable to the difficulties of winter construction in New York State and the lack of experience within the IdleAire team regarding level of engineering drawing detail, codes, permits, and approvals. Originally, construction was to be managed by an out-of state-firm hired by IdleAire to undertake the effort with subcontracts going to local construction and electrical firms in the Syracuse area. This was later changed to an IdleAire employee that took on the task of construction management and this improved the level of communications between the host site and IdleAire. Local firms did the bulk of the actual construction with IdleAire staff doing the final install, checkout and startup of their head-end equipment.

HARDWARE EVOLUTION

Initially, the Subcontractor developed a square headed console (**Figure 7**), which was subsequently redesigned into the round head configuration displayed below in **Figure 8**.

Figure 7. Square Head Second Generation Connection Console

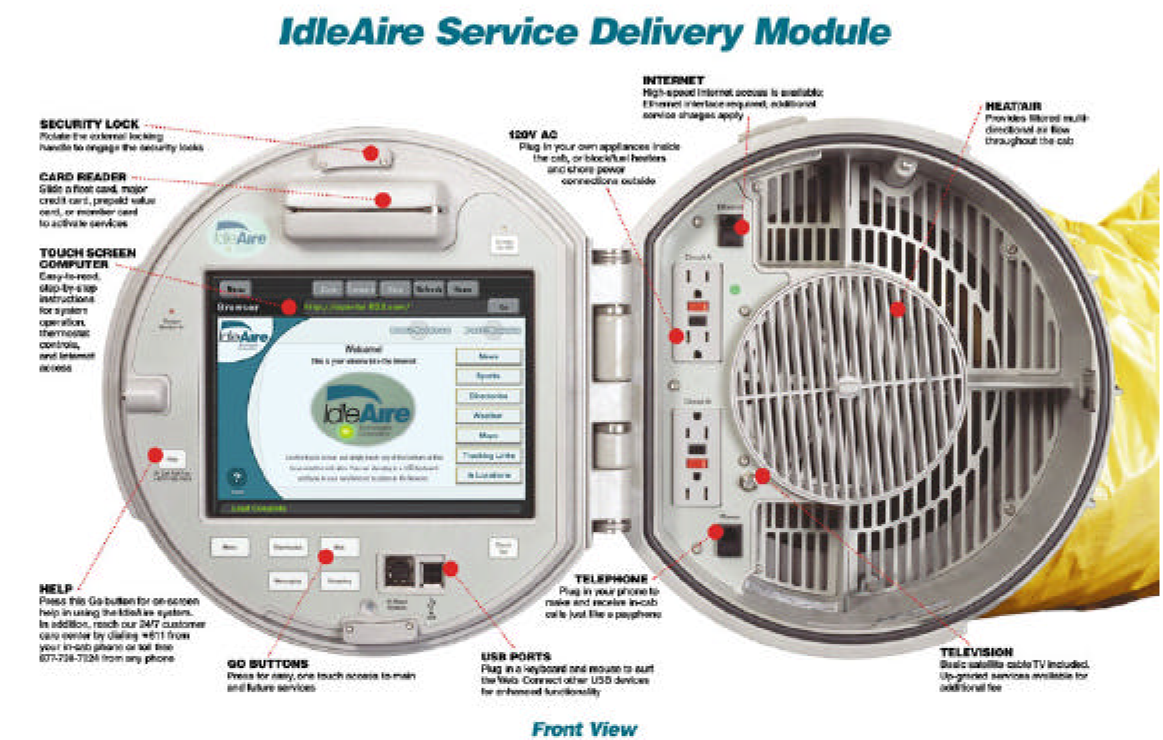

Figure 8. Round Head Third Generation Connection Console

As expected with any new product, there were some issues with the early designs. The first round head console design suffered from moisture leakage, requiring replacement or repair to heads at the DeWitt facility. There were also problems ramping up production to meet the needs of the facilities under construction. This was noted as one of the issues delaying the operation of the Chittenango facility. The third generation round head design performed fairly well in the harsh winter climate encountered in upstate New York. However, it was not without issue; for instance, there was an occasional complaint regarding heating performance when temperatures dropped below freezing. Syracuse summers are characteristically mild, but the winter months are colder than the U.S. average. Part of this may be attributed to the design of the conditioned air inlet, and its location. The air inlet and outlet are both located on the console head; therefore, some of the conditioned air returns immediately back into the inlet. Also, the console head is usually mounted to the passenger's side window opening; therefore, a high quantity of the conditioned air remains at the front of the cab, blocked by the driver and passenger seats. Also, the HVAC unit and ducting are located outdoors and exposed to ambient temperature and wind conditions. Therefore, overall thermal efficiency is lower than an onboard system because of these duct thermal losses. The subcontractor is investigating approaches to improve the performance of the system. Modifications that are being considered include adding insulation to the ducting or installing a diverter to direct more conditioned air to the bunk area of the sleeper cab. Upgrading the output of the HVAC system was also investigated.

Section 4

DATA COLLECTION AND ANALYSIS

DATA COLLECTED AND APPROACH

During the nearly two years in which data were collected, the Subcontractor supplied ANTARES with monthly operational and data reports. The format of the data sets evolved over the data analysis period; however, the data collected consistently included the following key elements: weather, minutes of use, number of users, and energy use. Upon receipt of the data, ANTARES utilized its own algorithms to analyze the data, and the results of this monthly analysis were reported to NYSERDA and other project sponsors/partners for review. The terms being referenced in this discussion are defined in **Appendix C** and the mathematical definitions can be found in **Appendix D.**

The Weather Files contained ambient conditions at the Service Areas at 15 minute intervals. Temperature, humidity, barometric pressure, rainfall, wind speed and direction are all included in the Weather Files each month. When weather data were not available from the Subcontractor, data from Syracuse Airport and an ANTARES' weather station (located at the Chittenango Service Area) was used to "fill-in the gaps." *Daily Average Temperature*, defined as the calculated average outside temperature recorded at the Service Area, was used to correlate TSE usage rates to outdoor temperatures.

The connection minutes of use at each berth (parking stall) were included in the Minutes of Use data from the Subcontractor. Usage totals (in minutes) for each individual berth as well as the entire facility were recorded on a daily basis. Using the *Number of Minutes per Day*, the *Total Utilization* was calculated, which is defined as the number of hours the TSE system was used each day. Subsequently, *Total Utilization* is used to determine the *Average Power per Truck, Diesel Fuel Saved, Engine and Maintenance Cost, TSE Service Cost*, and the amount of emissions reduction at the facility and at each TSE berth. These parameters were estimated using generally accepted costs/coefficients commonly used in the industry. Details on the calculations and the basis for the factors are described later in this report.

The number of users or "members" that used the TSE system were also recorded by the Subcontractor and sent to ANTARES. *Total Users* describes the number of customers using the TSE facility each day, while *New Users* is the number of first-time customers. *Total Users* and *New Users* are reported by the Subcontractor, and together, these data are used to calculate the percentage of repeat customers, or *Repeat Rate*. *Total Users* is also required to determine the *Facility Utilization* and the *Average Duration per Visit*.

As with the weather data, *Energy Use* data were recorded at approximately 15-minute increments. *Energy Use* was recorded with a running meter; therefore, energy used during a 15-minute time period must be subtracted from the previous reading to determine the energy used during a 15-minute period. The power used over any given time period can be determined by dividing Energy Use by time. Hence, *Energy Use* is used to calculate the *Average Power per Truck*, *Energy Cost*, and develop the *24-Hour Power Consumption* curve.

Diesel Fuel Cost is calculated using the average monthly diesel price at each Service Area. Each week, the New York State Thruway Authority transmitted the posted diesel fuel price at the Sunoco fuel stations located at Chittenango and DeWitt Service Areas to ANTARES. The average monthly diesel price at each individual Service Area was computed using this information. *Diesel Fuel Cost* is necessary to determine the *Fuel Cost Savings*. The average diesel fuel consumption rate of idling trucks (*Idle Consumption Rate*) was determined to be approximately 1 gallon per hour (EPA, ORNL, IdleAire). The *Idle Consumption Rate* was used to compute the amount of diesel fuel saved from idling.

The *Energy Rate* is determined based on Niagara Mohawk – National Grid power bills, as supplied by the Subcontractor. The power bills include any demand surcharges, which are applied by Niagara Mohawk – National Grid whenever electric energy consumption exceeds 2,000 kWh per month. By multiplying the *Energy Rate* by the *Energy Use*, the total *Energy Cost* was determined.

Average hourly emission factors were obtained from a collaborative study conducted by the U.S. Environmental Protection Agency and Oak Ridge National Laboratory on Heavy-Duty Diesel Truck Idling. The factors were used to compute the emissions reduced at the Service Areas by utilizing the TSE facilities.

Service and Maintenance Costs include many factors that may affect the direct cost of idling and engine wear. By decreasing truck engine idle time, truck drivers and fleets reduce service and maintenance costs. Tune-ups and oil changes can be extended to longer intervals if engine run time is decreased. Some believe that engine wear from an hour of idling is equivalent to driving the vehicle for one hour. The true cost of idling is a controversial subject which has been difficult to accurately determine. ANTARES has found a number of studies that claim anywhere from $0.12 to $2.50 per hour of idling (ORNL, TMC/Tardif, IdleAire). Factors that may affect the direct cost of idling and engine wear include: idle speed, fuel quality, ambient conditions, accessory loads (especially air conditioning), and lubricant quality. Other factors that may affect cost calculations and make it difficult to determine the true cost of idling include: maintenance schedule, labor rates, vehicle turnover rate, percentage of idle time, vehicle routes traveled, load, driver behavior, etc. Because all the above mentioned factors can contribute to engine wear and costs incurred by the fleet owner or driver, it is very difficult to determine the portion of costs directly attributable to idling. Actual idling costs can vary from truck to truck. Hence, *Service and Maintenance Costs* were calculated to be $0.92 per hour of idling at DeWitt, as determined by the Truck Maintenance Council (TMC) of the American Trucking Associations (ATA) in the paper entitled <u>Environmental Awareness and Outreach Measures to Reduce GHG Emissions from the Trucking Sector</u> by L.P. Tardif &

Associates, 1999. Upon further review, *Service and Maintenance Costs* were recalculated to be $0.78 per hour of idling at Chittenango, based on The Fleet Managers Guide to Fuel Economy published by TMC. The reason for this difference in *Service and Maintenance Costs* represents the on-going debate concerning the method for calculating the actual costs of engine idling. Methods based on engine wear due to revolutions per minute result in higher *Service and Maintenance Cost*, whereas those based on fuel consumption result in a significantly lower *Service and Maintenance Cost*.

Using the supplied data, ANTARES developed algorithms and analysis tools to calculate: usage rates at each berth and each facility, emissions reduction estimates, and cost savings for fleets and truck owners using the TSE facilities.

Section 5
RESULTS

The utilization and environmental benefits of the two demonstration sites have been recorded since the DeWitt Service Area facility opened for commercial operation. Utilization data were collected to determine the number of users and hours each user is connected to the system. Based on these numbers, fuel savings, end user costs, and environmental benefits have been estimated and are discussed in detail.

PRO FORMA BUSINESS ANALYSIS

This section discusses the economic and technical results of the TSE demonstration sites at DeWitt Service Area and Chittenango Service Area. The economics section discusses the *pro forma* analysis performed by ANTARES including the assumptions, methodology, and the results. The technical section discusses the performance of the TSE demonstration sites based on information provided to ANTARES by the Subcontractor.

ECONOMIC ANALYSIS

The economic viability of the Subcontractor's TSE system at both the DeWitt and Chittenango Service Areas was measured by comparing the actual revenue generated to the levelized revenue requirement to meet all expenses. The revenue generated is estimated by multiplying the base rate hourly service charge by the annual number of hours that TSE service has been used. This was calculated on an annual basis since the performance analysis data were collected for a 12 month period for both sites. The levelized revenue requirement is calculated by first determining the revenue required to meet all expenses and financial obligations that the project will incur (i.e. capital, maintenance, taxes, overhead labor, etc.) in each year of the project life. Next, the net present value of all revenue requirements for each year of the project life is calculated at the rate of the weighted cost of capital[1]. Then, the net present value of all revenue requirements is annualized or "levelized" over the life of the project at the rate of the weighted cost of capital. The resulting annualized cost is the levelized revenue requirement. It should be noted that other revenue sources, such as pay-per-view movies, were not included in this analysis and will significantly impact the Subcontractor's hourly service charge required to reach break-even operations.

In addition, ANTARES measured the systems economic performance by comparing the levelized hourly service charge to the base rate service charge. The levelized hourly service charge is calculated by dividing the levelized annual requirement by the total number of hours that the each TSE site is used annually. This comparison demonstrates the hourly surplus or deficit of the Subcontractor's economic structure at both TSE sites during the demonstration period. Alternatively, a total number of <u>hours</u> required to reach the

[1] The weighted cost of capital used for this analysis was 7.3%, which considers a 10.0% return on equity and an inflation rate of 2.5%.

operational breakeven point will be determined based on the stated assumptions and current parking configuration.

As stated in the previous paragraphs, the expenses for both TSE sites need to be accurately accounted for in the analysis. The expenses for each TSE site include (1) capital, (2) maintenance, (3) replacement, (4) overhead labor, (5) electricity, and (6) insurance. Other financial issues that were considered in the analysis include return on equity, return on debt, and income taxes. The next two subsections will discuss both the expenses and the financial obligations related to the project and the assumptions that ANTARES used in the project *pro forma*. After the discussion on the expenses and financial obligation, other factors influencing the analysis will be discussed.

ECONOMIC ASSUMPTIONS

The assumptions for the six expenses are shown in **Table 2**. The rationale for these assumptions is explaining in the ensuing paragraphs.

Table 2. Estimated Expenses for both Chittenango and DeWitt Service Areas

Expense	Value
Capital ($/space)	$10,000
Maintenance ($/space/yr)	$100
Replacement rate (%/yr)	0%
Overhead labor ($/yr)	$105,120
Electricity cost ($/kWh)	$0.163
Insurance cost ($/space/yr)	$25

ANTARES Group and the program sponsors contracted with the Subcontractor to install the off-board TSE system at a cost of $10,000 per installed parking berth for this demonstration project. However, based on estimated hardware costs and the *Means Construction Cost Data* guides, actual costs may be higher. In fact, the Subcontractor now charges between $12,000 and $20,000 per parking berth for the installation of their equipment. Nevertheless, for this analysis, the contracted capital cost of $10,000 per parking berth is being used to determine economic viability. Capital costs include, but are not limited to: engineering, drawings, materials, equipment, permitting, and civil and electrical construction.

Although routine maintenance and cleaning can be handled by the on-site personnel, technical problems require the labor of dedicated technicians. This is estimated to cost $100 per berth annually. The replacement rate is the estimated percent of units that will need to be replaced annually due to equipment failures. For the purposes of this analysis, it was assumed that none of these units would need to be replaced during the first ten years.

Overhead labor is the largest annual expense, totaling an estimated 59.0% of the Subcontractor's yearly expenses. On-site personnel are stationed at both the DeWitt and Chittenango Service Areas between the hours of 6:00 AM through 2:00 AM (20 hours a day); however, more than one employee is often located on-site for about 4 hours per day with an overlap during the evening hours of 5:00 PM and 9:00 PM (this is the time period that most of the trucks stop for the night at these two NYSTA service plazas). Therefore, ANTARES estimated that on average one employee is stationed at each TSE site 24 hours per day to educate potential customers of the benefits of using the TSE system, explain the operation of the system, assist as needed with connecting the service interface module to the tractor (including cutting a window template for new customers), and maintaining the system. Labor costs were calculated assuming these employees are compensated at $8 per hour with an estimated 1.5 multiplier for benefits for a conservative loaded rate of $12 per hour. This overhead labor cost does not include any off site labor at the Subcontractor's corporate offices in Knoxville, TN, which would increase the overhead labor cost. The labor cost was calculated by multiplying the single employee by 8,760 hours per year, the total labor hours by all on-site employees, by the loaded rate of $12 per hour, which totals $105,120.

ANTARES collected the DeWitt facility power bills from the electricity provider, Niagara Mohawk - National Grid. The electricity bills covered the period from July 1, 2002 to June 30, 2003 and included all electricity costs and any associated demand surcharges. A total of 14,918 utilization hours or a daily average of 2.0 hours per parking berth during the one year demonstration period was recorded for the 21 spaces available at DeWitt. The TSE system had consumed 56,078 kWh[2] of electricity at a cost of $9,133 ($0.163/kWh) over the one year period. The resulting average hourly electrical demand was determined to be 3.76 kW (56,078 kWh / 14,918 hr). In the 10 year *pro forma*, ANTARES assumed a constant electrical demand at 3.8 kW and the base cost of electricity at $0.163/kWh.

ANTARES also collected the Chittenango TSE power bills from the electricity provider, Niagara Mohawk - National Grid. The electricity bills covered the period from May 1, 2003 to April 30, 2004 and included all electricity costs and any associated demand surcharges. A total of 18,435 utilization hours or a daily average of 2.1 hours per parking berth during the one year demonstration period was recorded for the 24 spaces available at Chittenango. The TSE system had consumed 72,204 kWh[2] of electricity at a cost of $12,023 ($0.167/kWh) over the one year period. The resulting average hourly electrical demand was determined to be 3.92 kW (72,204 kWh / 18,435 hr). In the 10 year *pro forma*, ANTARES assumed a constant electrical demand at 3.9 kW and the base cost of electricity at $0.167/kWh.

ANTARES also assumed that each TSE facility would incur some insurance expenses annually. These insurance expenses would cover any accidental damage to the capital equipment and the facilities in case of a truck or trailer colliding with the equipment and a general liability policy. ANTARES assumed that this expense would be approximately $25 per space.

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[2] This value includes power used by overhead lights and loads from IdleAire's on-site office; therefore, it does not represent actual electricity consumed by the trucks. The calculated power per truck is representative of total grid load required to power the TSE system.

FINANCIAL ASSUMPTIONS

To complete the economic assessment, financial terms for capital acquisition must be determined. For this analysis, ANTARES has assumed that all needed capital was obtained by funds obtained from the Subcontractor's equity investors, and none of the capital was financed. ANTARES assumed that these equity investors would expect a modest 10.0% annual return on their investment over the life of the project in addition to having their funds used for capital investment reimbursed fully to them by the end of the tenth year of operation. ANTARES has also assumed that the project life will be ten (10) years and that the capital investment can use a 5-year MACRS (Modified Accelerated Cost Recovery System) accelerated depreciation schedule. Also, a 2.5% inflation rate was used in the analysis. These assumptions are shown in **Table 3**.

Table 3. Other ANTARES Financial Assumptions

Assumption	Value
Rate of Return on equity (%/yr)	10.0%
Federal + State Tax Rate (%/yr)	40.0%
Book Life (Capital Recovery Period)	3 years
Accelerated Depreciation Schedule	5 year MACRS
Equity Percent	100%
Debt Percent	0%
Project Life	10 years
Weighted Cost of Capital (constant dollars)	7.3%
Inflation Rate	2.5%

The series of equations below were used to calculate the annual revenue requirement.

Book Depreciation = Capital Cost / Book Life

Accelerated Depreciation = Capital Cost x Depreciation Percentage[3]

Deferred Taxes = (Accel. Depr. – Book Depr.) x Tax Rate

Capital Recovery = Deferred Taxes + Book Depreciation

Return on Equity = Equity Percent x Rate of Return on Equity x Capital Cost

Income Tax = (Return on Equity + Capital Recovery – Accel. Depr.) x Tax Rate / (1 – Tax Rate)

Carrying Charges = Income Tax + Return on Equity + Capital Recovery + Insurance Cost

O&M Cost = Electricity Cost + Maintenance Cost + Replacement Cost + Labor Cost

Ancillary Revenue = Emissions Credits + Ethernet, Phone, & TV Revenue

Required Revenue = O&M Cost + Carrying Charges – Ancillary Revenue

[3] In the MACRS 5 year depreciation schedule, 35.0% of the value is recovered in year 1, followed by 26.0%, 15.6%, 11.01%, 11.01%, and 1.38% in years 2 through 6.

OTHER FACTORS INFLUENCING THE PRO FORMA ANALYSIS

This analysis used the ancillary revenue data supplied by the Subcontractor which was for the first year $0.02 per hour for the DeWitt SA and $0.46 per hour for the Chittenango SA. However, some of these ancillary sources could provide significant revenues in years 2 to 10. In the *pro forma*, ANTARES assumes that the ancillary sources would provide another $1.00 per hour of revenue in years 2 to 10. Nitrogen Oxide emission credits, pay-per-view movies and on-screen advertisements could provide considerable revenue streams outside of the hourly service charge. However, much of the Subcontractor's proprietary information was not made available and our analysis only includes ancillary revenue reports summarizing only pay-per-view television revenues. The Subcontractor reported that between July 2002 and June 2003, their ancillary revenue totaled $315, for average monthly revenue of $28.64 or $0.17 per eight hour stay at the DeWitt SA. The ancillary revenue obtained from Chittenango TSE facility between November 2003 and April 2004[4] was a total of $4,174, for average monthly revenue of $695.63 or $3.68 per eight hour stay at the Chittenango SA. Also, revenue received from the sales of templates was also deemed negligible. This assumption is justifiable since the cost of design, development and manufacture of the window templates for all on-road tractors should exceed the total revenue obtained from each $10.00 sale.

There are a number of costs associated with the development, marketing and management of the Subcontractor's technology that were not included as part of this analysis. These items include: outside marketing costs other than what is provided by the on-site employees, upper management salaries and benefits, research and development, corporate facility expenses in Knoxville, Tennessee, executive travel, off-site data collection and analysis, and costs associated with the off-site call center. (The off-site call center is available to customers who need help or have questions 24 hour a day, 365 days per year.)

To determine the levelized hourly service charge, the actual number of hours each berth was used is required. The Subcontractor provided "Minutes of Use" data for each individual berth as well as the entire facility on a daily basis. Over the first year's operation, the Subcontractor's system at DeWitt provided 14,918 hours of service to the 21 berths for an average of 710 hours per berth for the first year. The Subcontractor's system at Chittenango provided 18,435 hours of service to the 24 berths for an average of 768 hours per berth annually. ANTARES used these utilization rates of 710 and 768 hours per berth for the first year in the 10 year DeWitt and Chittenango *pro formae respectively*. ANTARES assumed a gradually linear increase in utilization starting in year 2 to 4,380 hours per berth in year 8. The assumed utilization for both DeWitt and Chittenango for years 2 through 10 are shown in **Table 4** at the top of the next page.

[4] Ancillary revenue data was not made available to ANTARES for May 2003 to October 2003 at the Chittenango Service Area.

Table 4. Assumed TSE Utilization in Years 2 through 10

Year #	Berth Utilization (hrs/yr)
2	1,226
3	1,751
4	2,277
5	2,803
6	3,329
7	3,854
8	4,380
9	4,380
10	4,380
10 yr Levelized Avg	2,648

Many of the hours in year 1 were complementary and may have artificially increased the system utilization rates. That being said, we still feel that these utilization rates are low and four factors were identified that may have influenced this low rate:

1. TSE is a relatively new concept being implemented at truck stops; therefore, most truckers have not been exposed to the technology. As more truckers become aware of the many benefits of TSE, it is anticipated that greater numbers will use the system.
2. The diesel fuel price during most of the data collection period did not provide a direct and significant monetary incentive to use the TSE system which costs truckers $1.50 per hour of use. In some cases, the cost of fuel used for idling may be equal to or less than the cost of the TSE system on a per hour basis. As diesel fuel prices increase or stay at the current level, the financial incentive for TSE increases over the observed time period.
3. Also, anti-idle laws exist in New York State that prohibits idling for more than 5 minutes during moderate temperatures. Currently, this law is rarely enforced and has little effect on reducing truck idling.
4. Nearly every parking space at the Chittenango and DeWitt Service Areas are equipped with a TSE service module connection. These service areas are small (21 and 24 truck parking spaces) compared to larger commercial truck stops and travel plazas that can have several hundred parking spaces. The DeWitt Service Area fills up quickly each night with truckers who may not wish to use the TSE system, which could prevent truckers who would like to use the TSE system to do so.

RESULTS OF PRO FORMA ANALYSES

With the assumptions and estimates described in the previous sections, **Table 5** below illustrates the required revenue for each year of operation to meet all expenses incurred at both DeWitt and Chittenango.

The detailed *pro forma* data can be found in **Appendix A** and **Appendix B.** As stated previously, the required revenue is equal to the sum of the carrying charges and the operation and maintenance expenses less the ancillary revenue. The first three years have higher required revenues than the following seven, since the project is attempting to reclaim its capital investment within the first three years. From years 4 to 10, the required revenue escalates slightly due to inflation.

Table 5. Required Revenue for Years 1 to 10 at TSE Demonstration Sites

Year	Required Revenue at DeWitt SA	Required Revenue at Chittenango SA
1	$179,980	$192,156
2	$175,345	$186,520
3	$172,462	$182,879
4	$181,975	$193,395
5	$185,124	$196,630
6	$188,352	$199,946
7	$191,661	$203,344
8	$195,053	$206,828
9	$198,529	$210,398
10	$202,092	$214,058
NPV @ 7.3%	$1,282,705	$1,362,474
Levelized @ 7.3%	$185,314	$196,839

The levelized required revenue for these ten years at DeWitt and Chittenango is $185,314 and $196,839 respectively, assuming constant dollars. The actual revenue from the TSE facility at DeWitt for basic services was equal to $2,431[5]. If the Subcontractor was able to receive $1.50 per hour using the 14,918 hours recorded at the DeWitt Service Area site, the potential revenue would have been $22,377. The potential revenue at Chittenango Service Area would have been $27,653. The Subcontractor offered many customers complementary services, which accounts for the $19,946 difference at DeWitt SA between the actual revenue and the potential revenue. However, for the economic viability analysis, the actual revenue was used. Subtracting the levelized required revenue from the actual revenue resulted in a deficit for the DeWitt TSE site after the first year of $182,883. The difference between the required revenue and the potential revenue was $169,186 for DeWitt.

If the levelized required revenue is divided by the 10 year average of 2,648 hours per year that both facilities sold TSE services over the ten years of operation, the levelized hourly service charge would be $3.33 for DeWitt and $3.09 for Chittenango. However, it should be noted that the Subcontractor charged several connection rates for their TSE service, $0.00 per hour for complimentary service, $1.25 per hour for registered fleets and promotions (fleet discount rate), and $1.50 per hour for unregistered fleets (standard rate). For this reason, it is best to use the potential revenue to calculate the levelized hourly service charge. Subtracting the base rate of $1.50 (potential revenue) from the levelized hourly service charge resulted in a

[5] Revenue from basic services was not available to ANTARES for the entire 12 month reporting period for the Chittenango SA.

maximum hourly deficit of $2.08 for DeWitt and $1.85 for Chittenango. If the Subcontractor was able to obtain $1.00 per hour from ancillary sources, the hourly deficit would be $1.08 for DeWitt and $0.85 for Chittenango.

In attempting to determine the total number of hours the Subcontractor would be required to sell in order to break even, it was found that a positive net profit was not possible based solely on revenue generated from basic service. **Figure 9** shows that the required service charge never reaches $1.50 for the DeWitt TSE site[6]. At 8,760 hours (24 hours per day, 365 days per year) of utilization per berth annually, the Subcontractor would be required to charge $1.58 per hour at DeWitt and $1.54 at Chittenango with the current number of electrified parking spaces. The TSE facility would require over 100% utilization annually in order to break even. However if the Subcontractor were able to obtain additional revenues from premium services at a rate of $0.50 per hour, either TSE site could breakeven with an approximate 62% utilization.

The incremental increase in electricity costs is a major influence in the curve shown in **Figure 9**. Since system utilization is directly proportional to energy use, overhead (energy) costs increases as utilization increases. This calculation is based upon the average per kilowatt-hour rate of $0.163 incurred by the Subcontractor at the DeWitt SA over the one year demonstration period. Actual average energy costs could be higher if factoring an increased demand surcharge.

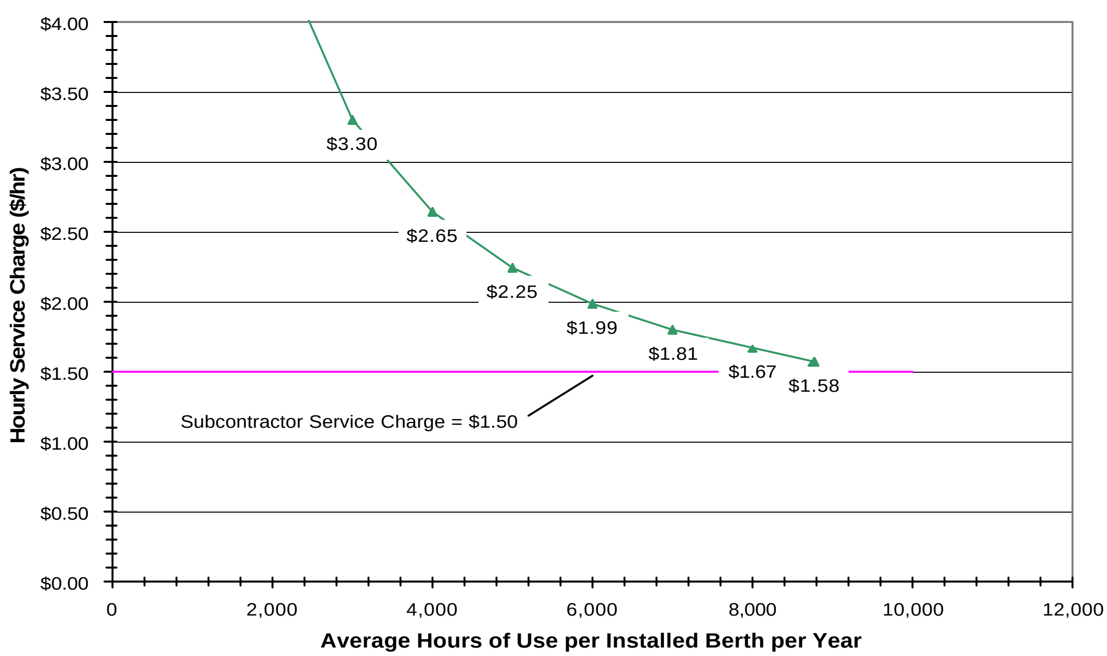

Figure 9. Hourly Service Charge Required to Reach Break Even at DeWitt Service Area

[6] The breakeven curve for the Chittenango TSE site has the same shape and approximately the same values for a given utilization as those shown in Figure 9.

Lower overhead costs, an increase in ancillary revenue, or an increase in the number of installed berths would be required for the Subcontractor to make this a profitable venture. **Figure 10** illustrates the scenario at DeWitt with $0 overhead labor costs and shows that the business would break even with a TSE utilization rate around 2,800 hours per year (7.7 hours per day per berth)[7]. The Subcontractor could potentially reduce labor costs by cutting back the number of on-site employee hours. As truckers become familiar with the technology, the necessity for full-time on-site personnel may diminish.

The breakdown of levelized required revenue for return on equity, capital recovery, income taxes, electricity costs, maintenance costs, labor costs, and insurance is shown for the DeWitt and Chittenango TSE sites respectively in both **Table 6** and **Table 7**. The percentages of the required revenue streams for the DeWitt and Chittenango TSE sites respectively are illustrated in **Figure 11** and **Figure 12**. Both **Figure 11** and **Figure 12** show that most of the cost (between 63.4% and 67.0%) to operate the facility is attributed to the labor cost. The second highest expense is the capital recovery between 13.4% and 14.5%, and the remaining five expense categories total between 19.6% and 22.1% of the total.

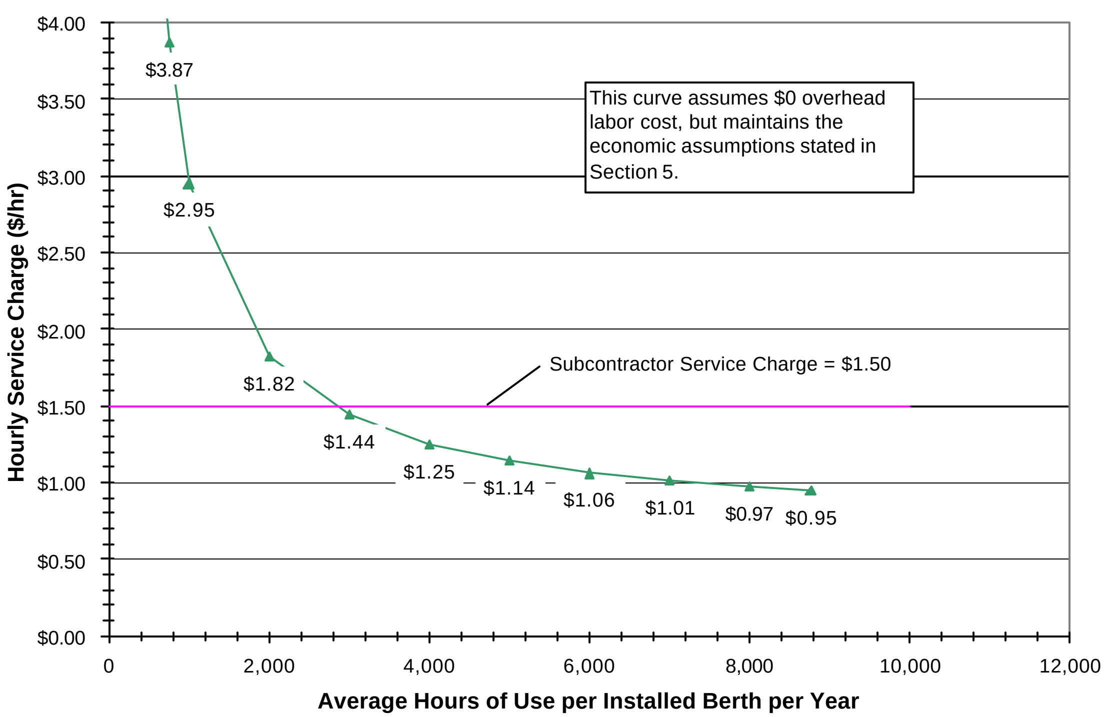

Figure 10. Hourly Service Charge Required to Reach Break Even at DeWitt Service Area ($0 labor)

[7] The breakeven curve for the Chittenango TSE site has the same shape and approximately the same values for a given utilization as those shown in Figure 10.

Table 6. Required Revenue for DeWitt TSE Facility by Expense Category

Expense Category	Levelized Required Revenue ($/yr)	Levelized Hourly Service Charge ($/hr)
Overhead Labor	$116,096	$1.82
Capital Recovery	$22,885	$0.41
Return on Equity	$21,000	$0.38
Electricity	$10,200	$0.18
Income Taxes	$12,234	$0.22
Maintenance	$2,319	$0.04
Insurance	$580	$0.01
Total Cost	**$185,314**	**$3.33**

Table 7. Required Revenue for Chittenango TSE Facility by Expense Category

Expense Category	Levelized Required Revenue ($/yr)	Levelized Hourly Service Charge ($/hr)
Overhead Labor	$116,096	$1.82
Capital Recovery	$26,154	$0.41
Return on Equity	$24,000	$0.38
Electricity	$13,293	$0.21
Income Taxes	$13,982	$0.22
Maintenance	$2,651	$0.04
Insurance	$663	$0.01
Total Cost	**$196,839**	**$3.09**

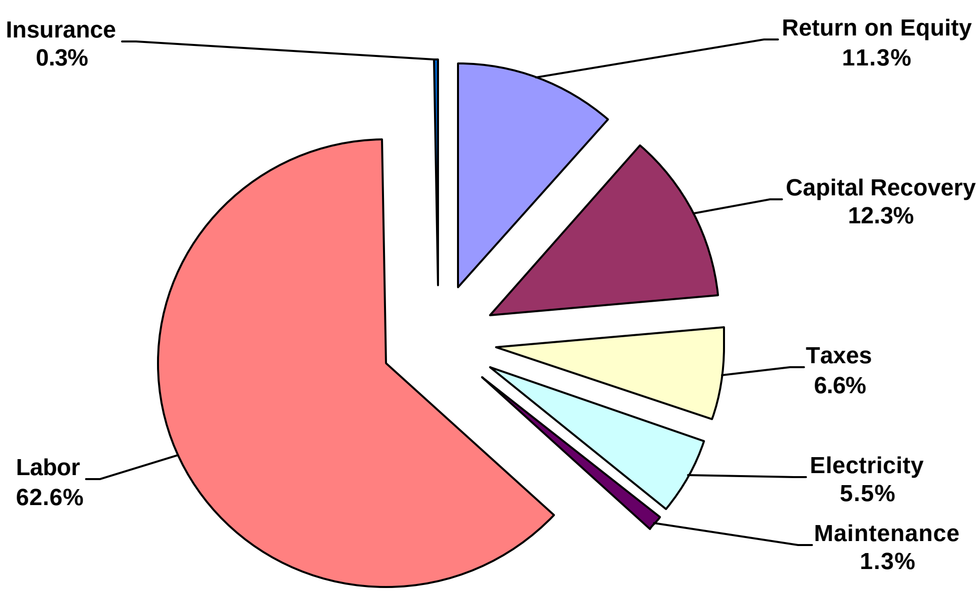

Figure 11. Required Revenue for DeWitt TSE Facility by Expense Category

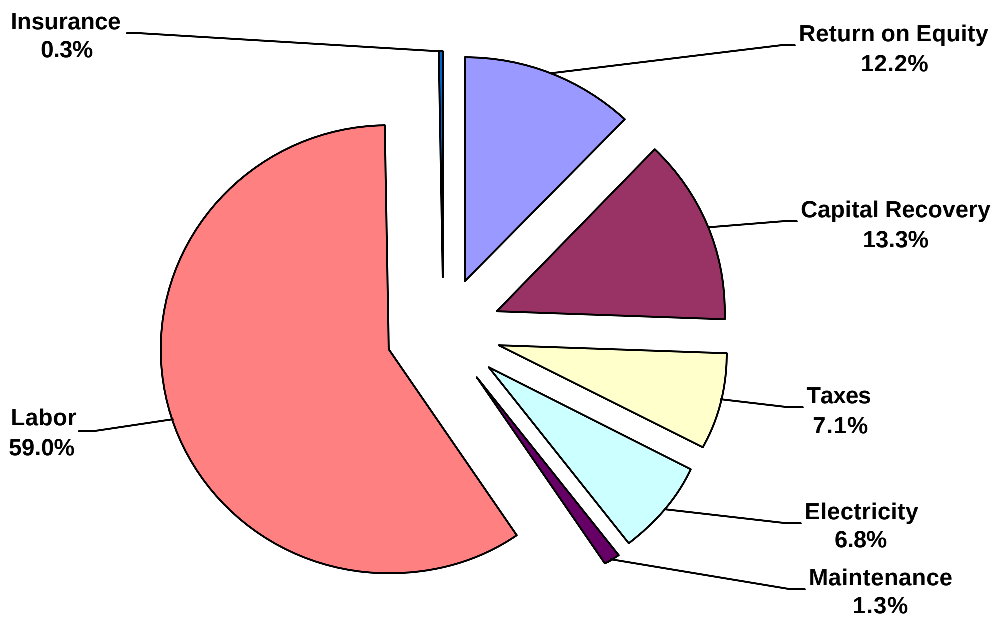

Figure 12. Required Revenue for Chittenango TSE Facility by Expense Category

CONCLUSIONS FROM THE PRO FORMA ANALYSES

Reviewing the results from the *pro forma* analyses, several conclusions can be reached that are listed below:

- The hourly service charge of $1.50 per hour that the Subcontractor charges for its basic services at either the DeWitt Service Area or the Chittenango Service Area is lower than the anticipated $3.33 or $3.09 per hour that is needed to pay for the expenses incurred over the projected ten years of operation. (Note: This economic situation was not unexpected given the limited number of TSE units installed at either site. This was a demonstration project and the two host sites were less than optimal for a true commercial scale installation, given that the TSE units require on-site attendants to assist with providing the service as well as a small building to house the attendants.)

- Utilization rates must increase at both the DeWitt and Chittenango TSE sites to increase the revenue generated by the facilities. This would result in reducing the net operating deficit. Possible approaches to accomplish this include installing more parking spaces without TSE to accommodate truck drivers who do not wish to use the services, thus allowing other truck drivers wanting to use the service to have access to the TSE equipped berths. Also, installing more parking spaces with TSE capability may be worthwhile, if demand increases. (Note: After the data collection period significant increases in diesel fuel prices have occurred, which make the TSE hook up much more attractive to both fleets and owner/operators.)

- A significant reduction of on-site manpower at both sites should be considered in order to reduce costs. The calculated overhead labor revenue requirement is estimated between 59.0% and 62.6% of all operational expenses. If the overhead labor was eliminated at the DeWitt and Chittenango Service Areas and if utilization was at 2,920 hrs per berth per year, both the DeWitt and Chittenango sites would break even. In this scenario, the required hourly service charge in order to break even is $1.46 per hour at DeWitt and $1.50 per hour at Chittenango, which is equal to or lower than the $1.50 per hour rate charged by the Subcontractor. Figure 10 illustrates the break even hourly service charge for various TSE utilization rates with $0 overhead labor expenses.

- The capital cost of $10,000 per berth seems to be prohibitive in making this a successful commercial venture. Outside funding opportunities to lower the capital cost will help increase net operating revenues. Additional value engineering of the TSE system should also be considered to reduce the capital cost. (Note: The subcontractor has integrated product improvements into their hardware design over the brief period of this demonstration, including a more cost effective control system, an improved head unit, and a simplified support truss assembly. Since ANTARES was not able to access any additional cost numbers for these new proprietary designs, it is difficult to forecast any potential reductions in the Subcontractor's system installed cost.)

- It is anticipated that parking restrictions and increased enforcement of anti-idling laws will increase utilization of the TSE services. Additionally, designating the electrified parking berths as, "Reserved for TSE Users Only" may increase utilization. Drivers caught idling for more than five minutes or parking without using the TSE service would be ticketed and fined or required to move on to another parking area.

- Based on the current assumptions and parking configuration at either the DeWitt Service Area or the Chittenango Service Area, a viable and profitable TSE business is not possible at a service rate of $1.50 per hour. Actual costs may in fact be higher, making profitable commercial venture even less likely. However, other revenue streams may supplement the revenue collected from the user and allow this venture to reach break even or even show a profit, even with the limited number of parking spots available. If the labor cost is eliminated, the business venture may be possible with reasonable utilization averaging 8 hours per day per berth. (Note: The current Federal Motor Carrier Safety Administration's Hours of Service regulations dictate longer layovers, a minimum of ten hours stopped for an overnight rest period, and the Subcontractor has indicated in recent public meetings that they are seeing longer duration stops at their newer, larger truck stop locations.)

SYSTEM PERFORMANCE ANALYSIS

Potential benefits from using the TSE system were calculated by ANTARES based on the number of hours the TSE system was used and include fuel savings, cost savings, and emissions displaced. Emission factors were derived from a cooperative study between the U.S. Environmental Protection Agency and Oak Ridge National Laboratory. A wide range of truck models and years were emission tested in Aberdeen Test Center's climate-controlled chamber to determine the hydrocarbon, NOx, CO_2, CO, and PM emissions. Testing was done at several temperatures simulating hot, moderate, and cold climates. This was done to capture the effect of extreme temperatures on the generated exhaust emissions. The results were averaged to formulate hourly emissions factors. These factors were used to estimate the total emissions displaced through the use of the off-board TSE facilities during the demonstration. The benefits obtained from the emission reductions through the use of TSE only affect the local area, therefore improves only the air quality local to the service area. This does not take into consideration emissions produced from electricity generation required to power the TSE system. However, electricity power generation and distribution in the United States is much more efficient and cleaner than idling heavy-duty truck engines to obtain a relatively small amount of power.

In determining the fuel savings, an average diesel fuel consumption rate of 1 gallon per hour (EPA, ORNL, IdleAire) was used. Therefore, the total volume of diesel fuel saved can be estimated to be approximately equal to the number of hours the two TSE systems were used. As stated previously, diesel price data was collected from the Chittenango and DeWitt Sunoco fuel stations on a weekly basis to determine monthly average diesel fuel costs. This data was used to calculate fuel cost savings to the truckers.

Total savings to the fleets and drivers was determined by summing the *Fuel Cost Savings* and *Engine and Maintenance Costs* savings and then subtracting the *TSE Service Costs*. The registered fleet rate of $1.25 per hour was used as the *TSE Service Costs* in calculating the overall savings. All calculated benefits are shown in **Table 8** below.

Table 8. Benefits from the Demonstration Period
July 2002 - April 2004

	Units	DeWitt Statistics		Chitt. Statistics		Overall	
		1-Year Totals	Monthly Average	1-Year Totals	Monthly Average	Grand Total	Monthly Average
Hours of Use	hours	**14,918**	1,243	**18,435**	1,536	**33,353**	1,390
Diesel Fuel Savings	gallons	**14,918**	1,243	**18,435**	1,536	**33,353**	1,390
Diesel Fuel Savings	dollars	$24,656	$2,055	$31,616	$2,635	$56,272	$2,345
Service & Maint. Saving	dollars	$13,725	$1,144	$14,379	$1,198	$28,104	$1,171
TSE Service Costs	dollars	$22,377	$1,865	$23,044	$1,920	$45,421	$1,893
Overall User Savings	dollars	**$16,003**	$1,334	**$22,952**	$1,913	**$38,955**	$1,623
PM	kg	**58.2**	4.8	**71.9**	6.0	**130**	5.4
NOx	kg	**2,297**	191	**2,839**	237	**5,136**	214
CO	kg	**1,158**	96	**1,431**	119	**2,589**	108
HC	kg	**656**	55	**811**	68	**1,467**	61
CO_2	kg	**141,364**	11,780	**174,689**	14,557	**316,053**	13,169

The figures below show TSE system statistics and utilization data graphically, throughout the demonstration period. All charts are based on data provided by the Subcontractor for both the DeWitt and Chittenango facilities; averages of the two facilities are also displayed. **Table 8** shows *Monthly Facility Utilization* of both facilities, which is defined as the total number of daily users divided by the number of TSE parking spaces at the given TSE facility. So, if more than one customer uses each parking berth each day, greater than 100% *Facility Utilization* could be recorded. *Facility Utilization* averaged over 30% during the demonstration period and peaked in the Fall (October and November) months. This is shown in **Figure 13.**

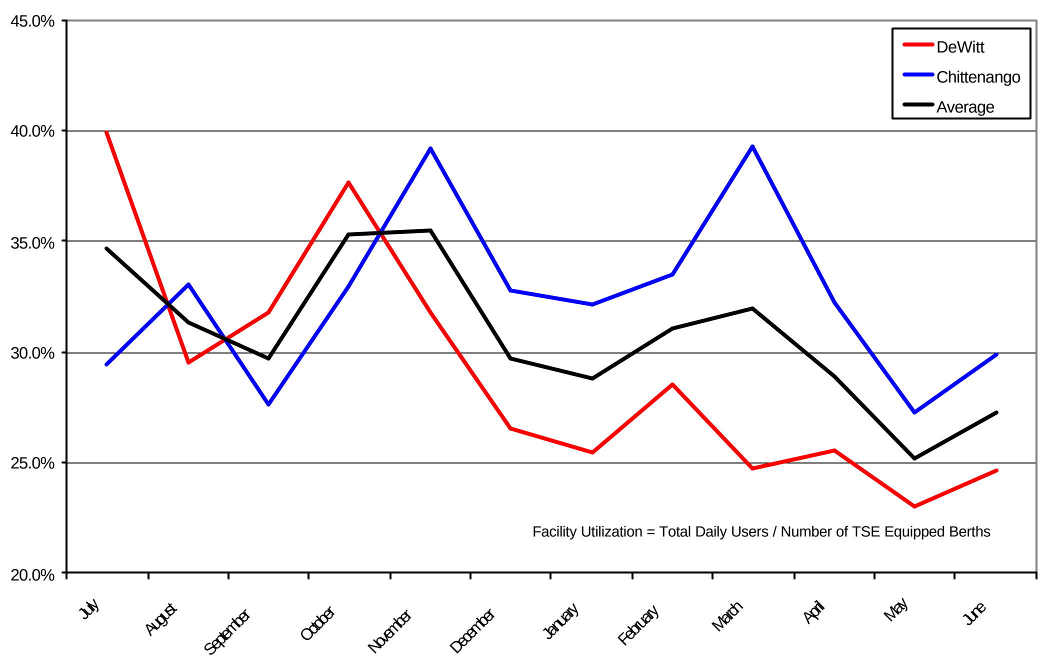

Figure 13. Monthly Facility Utilization

Although over 30% facility utilization may first appear relatively low, it is important to note several factors that may have directly impacted this utilization rate. TSE is a relatively new concept being imple mented at truck stops; therefore, most truckers have not been exposed to the technology. As more truckers become aware of the many benefits of TSE, it is anticipated that greater numbers will use the system. Another driving factor is diesel fuel costs. Over the past twelve months, fuel prices have continued to increase at extraordinarily high rates. As diesel fuel prices hover over $1.70 per gallon, the financial incentive to use the TSE system increases. Truckers currently pay $1.25 per hour to use the TSE system; thus, there is a significant monetary incentive to use the TSE system rather than idling the engine. Also, anti-idle laws exist in New York State that prohibits idling for more than 5 minutes during moderate temperatures. Due to the lack of viable alternatives, this law is rarely enforced and provides little regulatory incentive to reducing idling time. Another major factor influencing utilization rates at the Service Areas is the fact that nearly every truck parking space is equipped with TSE service. These rest areas are small compared to larger commercial truck stops and travel plazas that can accommodate several hundred trucks. The Chittenango Service Area fills up quickly each night which may not allow truckers who would like to use the TSE system to do so if all spaces are occupied. Utilization may increase if a reservation system could be implemented for the TSE equipped parking spaces, thus 'holding' the spaces for those who would like to use the TSE system.

Average monthly energy costs were calculated based on Niagara Mohawk – National Grid power bills and include demand surcharges. Demand Surcharges are applied by Niagara Mohawk – National Grid whenever electric energy consumption exceeded 2,000 kWh per month. Energy use is closely correlated to the ambient temperature. Peak loads occurred in the winter months due to high heating loads. Conversely, energy loads can also increase in the summer due to air conditioning requirements, particularly in warmer climates. The energy use values contained in this report include power used by overhead lights and loads from the Subcontractor's on-site office; therefore, the average energy used by each truck may be slightly higher than the actual demand per truck. The calculated power per truck is representative of total grid load required to power the entire TSE system divided by the number of hours the system was used.

The average electrical energy consumption of each truck is estimated from the total facility energy consumption. Utilization hours are divided by the total energy use to determine the average energy use by each truck. This method for determining the estimated energy usage per truck results in higher values than actually occur because the background energy used by the facility support equipment is included in the calculation. Background loads included: the Subcontractor's office HVAC, lights, computer, television, radio, security equipment and power tools used for repair and maintain the system.

Monthly Average Energy Use of both installations is shown in **Figure 14**. This graph shows the total average power consumption for each month of the year, versus average monthly temperatures. As expected, peak energy demand came in the winter when high levels of heating are required to maintain comfortable cab temperatures and power block heaters since heating is generally the highest energy load for the trucks throughout the year, and particularly in the Syracuse, New York region. Air conditioning in the summer is also a significant draw, but relatively minor in the Syracuse climate. A small up-tick is shown in July and August when average temperatures increased over 70 degrees Fahrenheit.

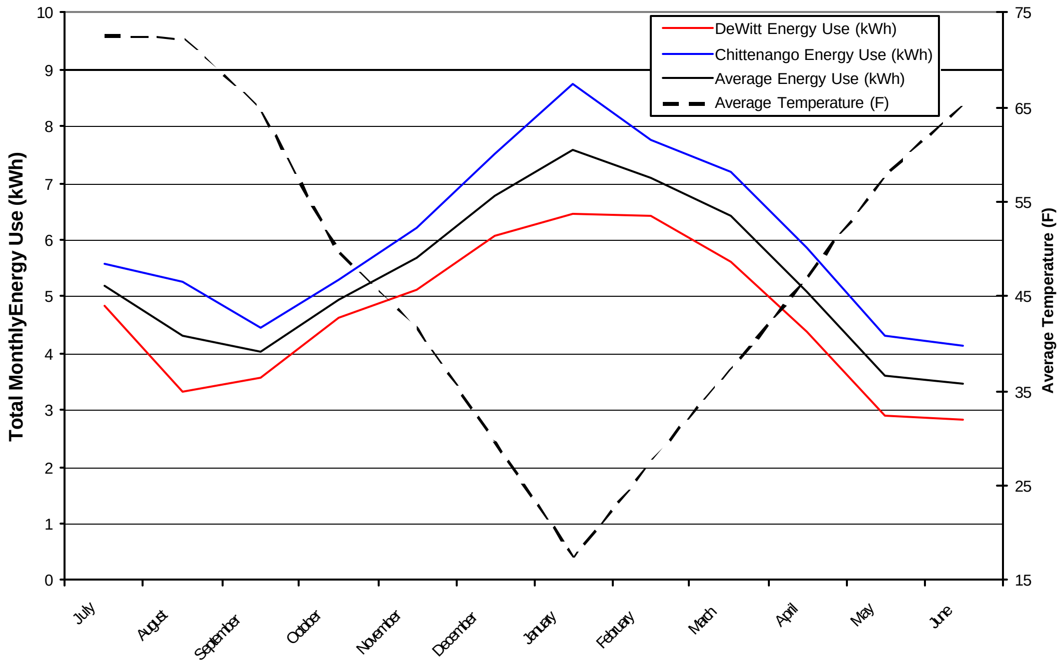

Figure 14: Monthly Average Energy Usage and Temperatures

The *Percentage of Repeat Clients* is shown in **Figure 15** for both facilities along with the average repeat rate. The repeat rate increased throughout the demonstration period indicating customers are satisfied with the services and reuse the system after their initial trial. When investigating the graphs, note that Data analysis of the DeWitt and Chittenango facilities began in July 2002 and May 2003 respectively. All monthly charts in **Figures 13** through **19** begin with July 2002, or the first month of analysis of the DeWitt facility.

Monthly Berth Utilization is shown in **Figure 16** for both facilities. Overall, *Berth Utilization* averaged over 80% which indicates the average duration per visit was over 6.5 hours.

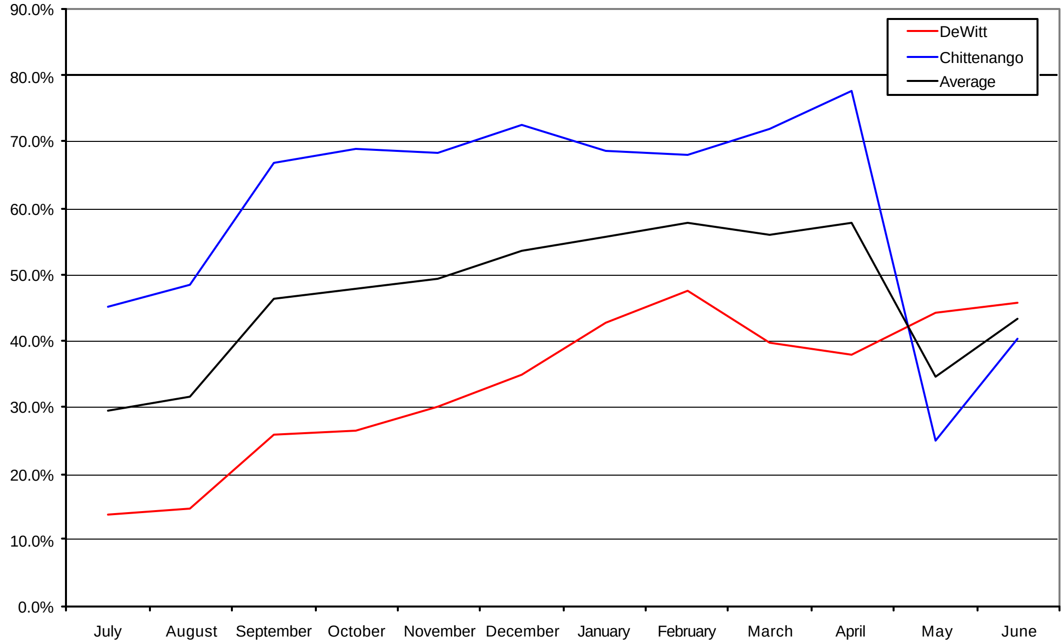

Figure 15. Percentage of Repeat Clients

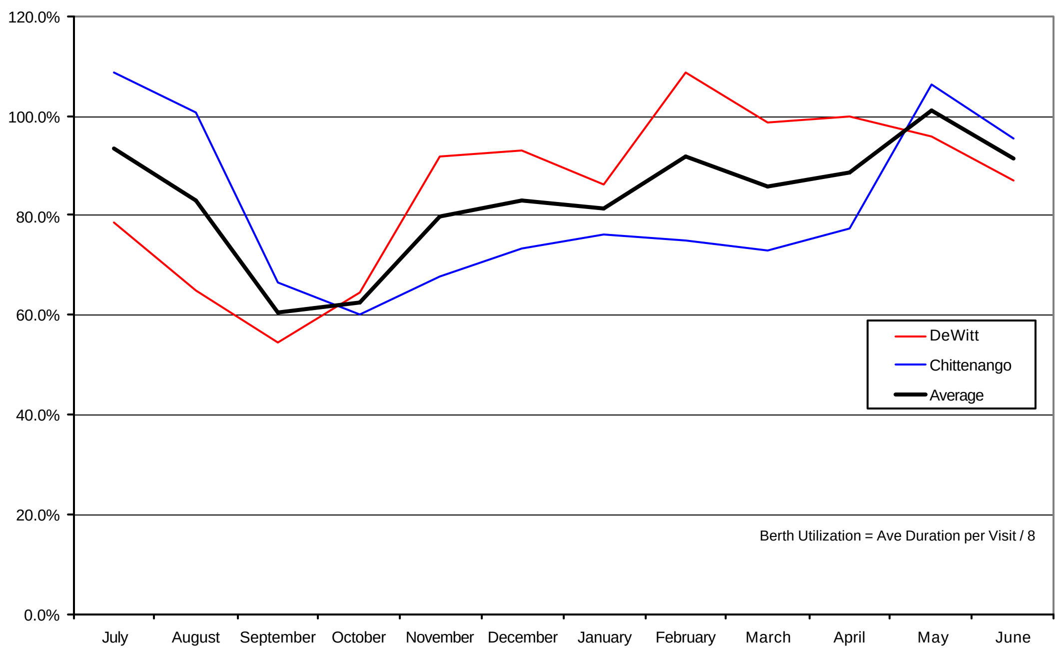

Figure 16. Monthly Berth Utilization

The *Average Power Consumption* per truck versus temperature and number of combined heating and cooling degree days are shown in **Figures 17** and **18** respectively. Energy use is closely correlated to the ambient temperature. Peak loads occurred in the winter months due to high heating loads. Conversely, energy loads can also increase in the summer due to air conditioning requirements (as discussed earlier), particularly in warmer climates. Since the energy use values contained in this report include power used by overhead lights and loads from the Subcontractor's on-site office, the average energy used by each truck shown in the charts is higher than the actual per truck demand. The calculated power per truck is representative of total grid load required to power the entire TSE system divided by the number of hours the system was used.

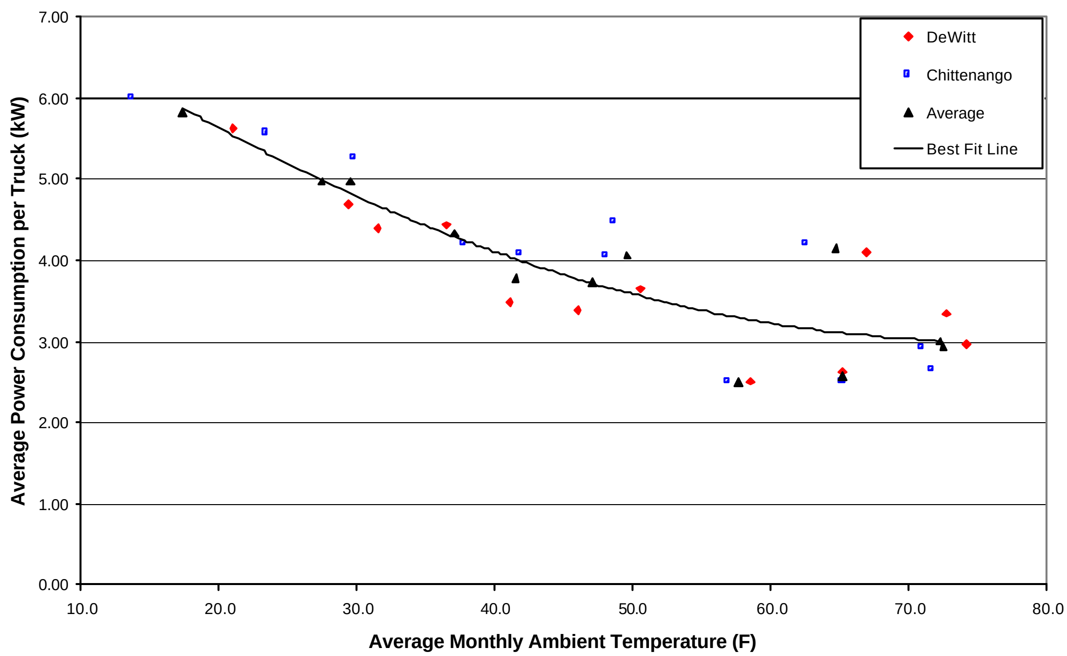

Figure 17. Average Power Consumption at TSE Service Areas

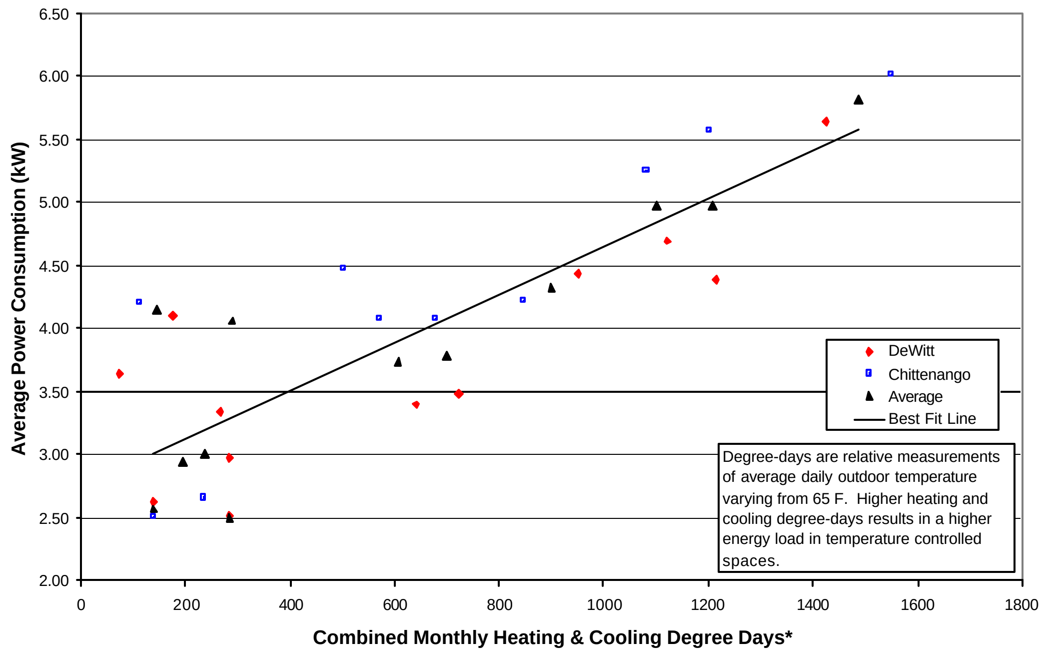

Figure 18. Average Power Consumption per Number of Monthly Degree Days

The *Monthly Hours of Utilization* are recorded in **Figure 19** and includes an average of both facilities for each month of the year. The hours used each month are fairly random; therefore, no conclusion can be drawn from the graph. However, the high number of hours used in July at the DeWitt facility is likely due to testing and maintenance, not actual utilization by drivers. **Figure 20** shows the *Average TSE Facility Utilization by Day of Week*. This graph indicates that there are fewer trucks traveling on the weekends.

The final graph shows *Average Power Consumption over 24 hours*. The average hourly power consumption for each hour of the demonstration period is shown in **Figure 21**. The chart clearly shows higher power consumption at night and in the early morning because more drivers prefer to rest during this time and are using the TSE service. Also during these hours, the heating demand is higher as solar gains are not occurring. In a high cooling demand area such as the southwestern United States, this slope may in fact be more flat, as cooling demand would be higher during the day even if there were fewer users.

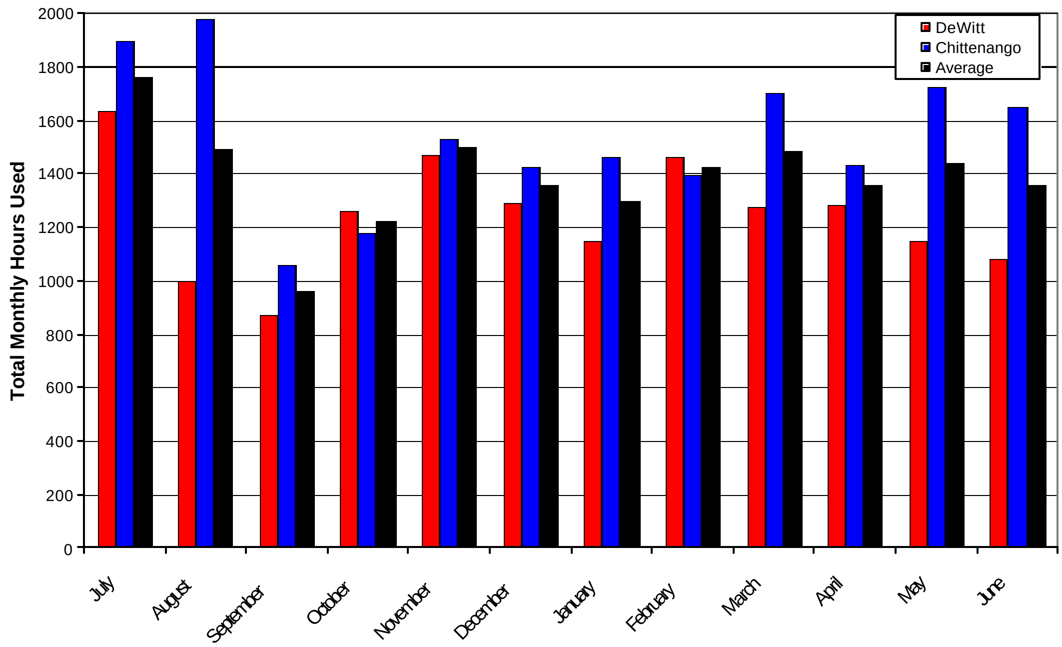

Figure 19. TSE Monthly Hours of Utilization

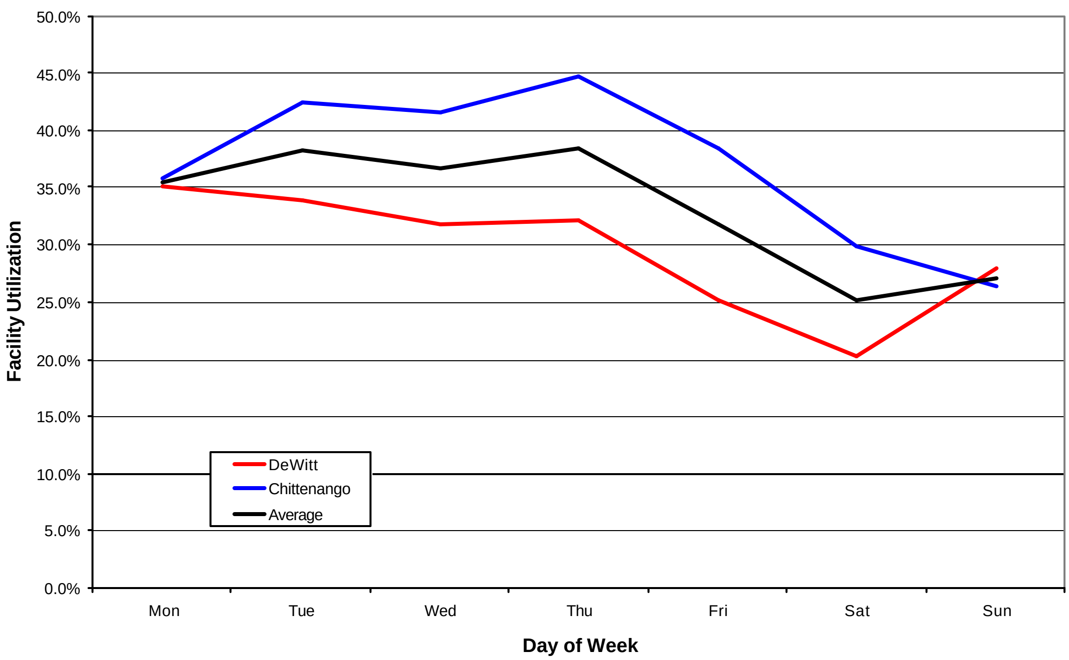

Figure 20. Average TSE Facility Utilization by Day of Week

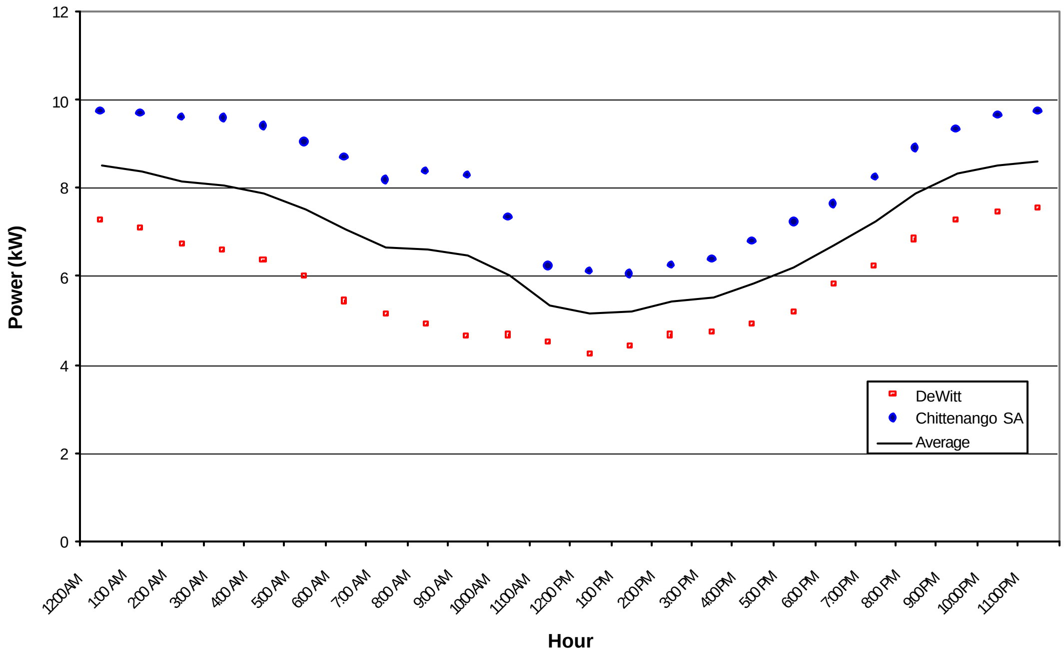

Figure 21. Average Power Consumption over 24 Hours

Section 6
OUTCOMES

From this demonstration project, several outcomes have become apparent. To successfully deploy TSE, and more specifically off-board TSE, several issues should be resolved. The facility size should be adequate for the deployment of this technology, strategic marketing of the service is critical to the successful deployment of TSE (or any new and different technology), and system improvements are needed to improve performance of the off-board TSE system.

OPTIMAL FACILITY SIZE AND LAYOUT FOR TSE APPLICATIONS MUST BE DEVELOPED

Through the experience of the two NYSTA service areas, the Subcontractor learned that, in the absence of enforcement, facility size and percentage of electrified TSE parking spaces can affect the overall business success of an individual TSE facility. The overall ratio of TSE-equipped spaces to non-TSE-equipped spaces is critical during the early stages of deployment. There should be enough truck parking in the truck stop to ensure that TSE-equipped spaces are available to those who wish to utilize the service. Therefore, electrifying nearly every parking space within any given facility is not recommended at this time. Larger travel plazas appear to be better suited for TSE deployment at this juncture of its deployment. The Subcontractor has now stated that their minimum installation size is 50 parking spaces. This was clearly done to improve their ability to recoup the infrastructure and overhead costs of the facility.

If the number of parking spaces is limited, the TSE provider should consider implementing a reservation system for the parking spaces, enforcing idle regulations in the TSE-equipped parking spaces or mandate truckers connect to the system when occupying a TSE-equipped berth.

The facility design is also important to the success of the deployment. The parking area equipped with TSE should be separated from the conventional truck parking. This approach can be used to establish a “no idle zone” where truckers using the system are not disturbed by nearby trucks idling their engines. Also, facilities can provide truck operators that use the TSE system “premium parking” where they are located near the restaurant, entrance to the parking lot or other “premium” location.

PRODUCT MARKETING NEEDED TO IMPROVE FACILITY UTILIZATION

Many factors influence the decision of a driver to use the TSE system. These factors include habit, preference, convenience, and the resistance to change. That said, many drivers have embraced truck stop electrification for the cost savings (fuel, maintenance, and wear factors), convenience, value added services, and environmental and health concerns. To date, drivers have been more willing to utilize TSE services if their fleet reimburses them for the use of the system. It is expected that the facility utilization will increase as more facilities install TSE and truckers become aware of its many benefits.

The Subcontractor is doing a commendable job of introducing the technology to fleets and drivers. As of this writing, the Subcontractor has 20 functioning TSE facilities throughout the United States as shown on the map in **Figure 22**. Each facility employs several full time representatives to introduce new drivers to the system, aid with connections to the service modules, provide site security, and perform repairs and maintenance. The Subcontractor also has an informative website (http://www.idleaire.com/) and displays brochures at each of their locations. Currently the brochures advertise a promotional rate of $1.25 per hour for using the off-board TSE system at both the DeWitt and Chittenango Service Areas.

Due to the size and configuration of the two demonstration service areas, 100% utilization may be difficult to achieve. An extensive marketing effort may not be enough to make these facilities profitable. The Subcontractor may need to implement some facility-related modification mentioned previously, utilize local law enforcement to enforce idle restrictions, or require drivers who park in the TSE equipped parking spaces to use the system. This approach would increase utilization; however, some drivers may move on to the next truck stop or rest area. If the anti-idling regulations are to be enforced, they should be enforced at all truck parking areas, not just at the DeWitt and Chittenango Service Areas. Otherwise some drivers may resist the adoption of idle-reduction technologies in protest to the laws.

Figure 22. Location of operational IdleAire facilities (green dots show operational sites)

OFF BOARD TSE SYSTEM IMPROVEMENTS ARE NEEDED TO REDUCE COST AND IMPROVE PERFORMANCE

Based on the data presented to ANTARES, the overall system performance was satisfactory and extremely beneficial to both the drivers as well as the local community. The TSE projects resulted in lower noise and emission levels at both the DeWitt and Chittenango facilities. Surveys completed by the drivers also indicate a high consumer satisfaction, which are reinforced by a high repeat user rate. Drivers using the system had an increased probability of reusing the system again in the future.

Although the majority of customers were satisfied with the Subcontractor's off-board TSE service, the following issues were noted. Some users could not easily install the console into the window template and the assistance of a second person was required. Since the Subcontractor's staff is normally available to aid drivers when needed, this may not be a significant issue. However, some drivers prefer to not request help and injuries may result in poor conditions (low light, snow/ice, wet weather). In addition, by having the Subcontractor's service personnel available to assist users increases overhead and labor costs. Reducing the number of onsite employees may help increase the business viability of the off-board TSE system; however, user satisfaction may decrease if assistance is not available.

Some users indicated that the heating and cooling capacity was not sufficient during more extreme temperature periods. The heating capacity is of particular concern in the colder Syracuse, New York region. An upgraded heating system or efficiency improvements are recommended. The exposed HVAC system and ducting could benefit from increased insulation or relocation of the head unit to the sleeper compartment of the truck. This could pose an increased challenge when connecting the system to the truck as the additional weight and stiffness of the insulation may make it more difficult for users to connect. Although the capacity of the HVAC units could be increased, it would reduce the overall energy, and emission benefits of the TSE system. Some drivers also pointed out in these surveys that residual odors were present from previous users. Typically cigarette smoke was the main component of the odor complaint which indicates that the users may be exposed to poor air quality via second hand smoke. This detection of odors occurs because the off-board HVAC system recirculates air from the sleeper cab. The Subcontractor is addressing this issue and has developed a design to improve the air quality by using a charcoal filter in conjunction with ultra-violet (UV) lighting to reduce residual odors and other airborne contaminants.

System efficiency improvements could also be realized by separating the air intake away from the conditioned supply air. Because the incoming air duct is located adjacent to the supply air, conditioned air is allowed to circulate back through the system; therefore, it may never reach the occupants. Additionally, while the console vent is located at the front of the tractor cab, the users normally occupy the rear of the sleeper cab. An extendible duct or attachable duct system should be considered to direct the conditioned air to the back of the sleeper cab.

In addition, a high number of drive-aways have also been reported, wherein the trucks have either collided with the console heads (resulting in damage to the console), or the users exited the TSE parking berth with the console head still attached to their window. Collisions with the console heads could be reduced if a retractable ducting system is installed. This approach would elevate the console heads above the trucks when they are not in use.

Overall, the off-board TSE hardware has performed well given the circumstances. As a demonstration project, the Chittenango and DeWitt facilities had issues that are common to the introduction of new technology and services. Up-time has been exceptionally high given the fact that these two TSE facilities were two of the earliest commercial facilities installed by the Subcontractor. Incremental improvements have been made as necessary and when cost effective. The Subcontractor has done a reasonable job of addressing the user concerns and balancing them with cost and logistical issues.

Section 7

CONCLUSIONS AND RECOMMENDATIONS

As part of the TSE demonstration project final report, ANTARES was tasked to provide the project Sponsors with conclusions and recommendations regarding two specific issues of interest:

(1) system improvements and

(2) project continuation.

Addressing the first issue, three recommendations were identified which can be implemented by the Subcontractor in future TSE commercial installations.

- **Optimize TSE Facility Installation Size, Layout and Operations:** It is critical during early TSE deployment that a proper balance be established between TSE-equipped spaces and other truck parking at the travel plaza or rest area. TSE-equipped berths should be available to those truck operators wishing to utilize the service. This could also be accomplished by requiring all truck operators that occupy the TSE-equipped berths to utilize the service. (This was not possible at the two TSE demonstration sites chosen for this project). However, this approach may contradict travel center policy and may not be possible to implement nationally. Also, a minimum number of spaces (50-100) should be equipped at each travel plaza to improve the financial viability of each TSE commercial location. (It has been noted in the body of the report that the sites chosen for the demonstration were not optimal from an installation size standpoint. Larger parking areas would have been better and may have led to better system utilization. Moreover, a larger number of electrified parking spaces would have helped cover the cost of the attendant labor that the Subcontractor's TSE system required).

- **Idle Elimination Benefits should be Evaluated by an Independent but Industry Affiliated Organization:** The many benefits of TSE must be adequately promoted to the trucking industry using accepted information distribution channels. The savings from TSE use include reduced diesel fuel costs, reduced engine maintenance costs, and the costs associated with engine accessory system wear. The fuel savings are obvious; however, the other benefits are more difficult to quantify. These other benefits are very necessary to help build a complete and compelling case for TSE. The non-fuel cost savings or benefits have not been promoted effectively as claims made by the Subcontractor have yet to be fully substantiated. A comprehensive assessment of the full spectrum of TSE benefits should be performed by a respected, unbiased entity that is trusted by the trucking industry (e.g. American Trucking Associations' Technology and Maintenance Council). Trucking fleets and owner/operators may never totally accept any of the Subcontractor's cost savings claims; however, they would be willing to accept a third party performing the savings analysis based on real-world testing with the results published in the trucking industry trade press or in ATA's *Transport Topics*, their weekly trade publication which has special topic issues from time to time.

- **<u>System Improvements are Still Needed</u>:** The TSE hardware used in this TSE demonstration is representative of the Subcontractors current hardware but there are differences in the systems that are now being installed at other locations in the U.S. In general, the Subcontractor has been working on reducing operational costs and improving system performance. This trend has been evident throughout the NYSERDA TSE demonstration project. However, improvements to the off-board TSE system should be continued including (1) ease of head system connection and installation by shorter or women drivers, (2) improvement in heating and cooling performance within the cab and sleeper area due to duct losses in cold weather and in truck air circulation, (3) improve cab air quality (this is currently being addressed by the Subcontractor using a ultraviolet light or light array and a spray deodorizer applied by maintenance staff after each head system use), (4) improve HVAC system efficiency (the concern is the location of the HVAC system leads to duct heat losses or heat gains as well as an increase in overall energy required for air circulation), and (5) minimize drive-aways and truck collisions with console/head units. Although there are no significant barriers to overcome, it is important that these areas continue to be addressed so that the subcontractor can supply a commercial product that can meet the needs of truck operators anywhere in the North American Free Trade Agreement (NAFTA) zone.

Project continuation is a question that needs to be addressed by both the Subcontractor and the demonstration host site sponsor. As the two demonstration sites have systems that are each too small in size to truly be considered commercial under the Subcontractor's existing business model, the question of continuation must be left up to the Subcontractor. It may be possible to treat the two systems together as a single commercial installation thereby allowing the Subcontractor to consolidate on-site staffing over time, making the two sites self-sustaining. To date, the off-board TSE equipment has been and is anticipated to continue to be fully operational. The TSE system has functioned well, and has been available to truck drivers/operators when needed. With this said, it is our recommendation that these two TSE-equipped facilities continue to operate as commercial sites. Therefore the host site sponsor, the New York State Thruway Authority, should continue to allow the Subcontractor to operate these two TSE facilities, as long as the Subcontractor can honor its on-going contract commitments and operate the systems in a well maintained and safe manner.

APPENDIX A

ONE YEAR SUMMARY OF OPERATIONS AT THE DEWITT SERVICE AREA TSE FACILITY

Summary Report

Prepared for

THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
Albany, New York

Joseph D. Tario, P.E.
Project Manager

Prepared by

ANTARES GROUP INC.
Landover, Maryland

November 2003

NOTICE

This report was prepared by ANTARES Group Inc. (hereafter "ANTARES") in the course of performing work contracted for and sponsored by the New York State Energy Research and Development Authority, the New York State Thruway Authority, the U.S. Environmental Protection Agency, Niagara Mohawk – National Grid, and the Northeast States for Coordinated Air Use Management (hereafter the "Sponsors"). The opinions expressed in this report do not necessarily reflect those of the Sponsors and ANTARES, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, the Sponsors and ANTARES make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. The Sponsors and ANTARES make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

The data and analysis contained in this report is proprietary information and should not be distributed without consent of IdleAire Technologies Corporation (hereafter "IdleAire" or the "Subcontractor"), ANTARES, and the Sponsors. This report was prepared by ANTARES Group Inc. based on preliminary operational data provided by IdleAire Technologies. ANTARES has not verified the numbers reported by the Subcontractor. Therefore, conclusions drawn from this report should not be represented as accurate.

ABSTRACT

This report contains a summary of operations at IdleAire's Truck Stop Electrification (TSE) facility at the DeWitt Service Area on the New York State Thruway (I-90) near Syracuse, New York. Tables and charts are provided as a "quick" reference and summary of operations.

IdleAire has installed a total of three TSE facilities in New York State. The first was at Hunts Point, the second at the DeWitt Service Area, and the third at the Chittenango Service Area. ANTARES managed the installation and analyzed operations at both the DeWitt and Chittenango facilities. The DeWitt TSE facility opened for commercial operations in June 2002; however, the first complete month of operations was July 2002. This report includes data and analysis of the one year period beginning July 2002 through June 2003.

Parameters recorded by IdleAire included: system hours of use, number of users, energy consumption, and ambient weather conditions. ANTARES used data provided by IdleAire to determine the benefits of the TSE system at the DeWitt Service Area. Quantified benefits include emissions displaced, fuel savings and cost savings to the end user.

ACKNOWLEDGEMENTS

ANTARES would like to take this opportunity to thank the New York State Energy Research and Development Authority (NYSERDA,) the New York State Thruway Authority (NYSTA) and Niagara Mohawk – National Grid (NM-NG) for providing funding for the two TSE demonstration projects in the Syracuse, New York area. ANTARES would also like to thank IdleAire for their assistance. We would like to especially thank David Rose for providing the data to us in a usable format which enabled us to complete this report.

ANTARES would also like to thank the following pioneers to deploying idle reduction technologies in the state of New York: Joe Tario and Richard Drake of NYSERDA, and Don Hutton and John Gurniak of the NYSTA, who's devotion and effort has shown true progress to reducing truck emissions, fuel consumption and making our highways safer to travel.

Michael T. Panich
Thomas L. Perrot
Jeffrey C. Kim

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SUMMARY

Truck Stop Electrification (TSE) can benefit local air quality, reduce noise, decrease fuel consumption, and lower operational costs to truck drivers and fleets. ANTARES managed the installation of an IdleAire TSE demonstration project at a rest area in the Syracuse, New York region. The TSE facility is located at the DeWitt Service Area off the New York State Thruway (I-90.) ANTARES has conducted preliminary analysis based on data obtained from the Subcontractor, IdleAire for the period beginning July 2002 through June 2003.

The data shows the TSE system has been used for nearly 15,000 hours displacing approximately 58 kilograms (130 pounds) of PM, 2300 kilograms (2.5 tons) of NOx, 1200 kilograms (1.3 tons) of CO, 660 kilograms (0.7 tons) of HC and 140,000 kilograms (156 tons) CO_2 emissions. Approximately 15,000 gallons of diesel fuel have been saved by truckers using the TSE system rather than idling their engines. By saving fuel and engine maintenance costs, truckers have saved a net total of approximately $16,000 dollars during the one-year monitoring period. Average power consumption per truck (including overhead / system energy use) was 3.8 kilowatts for the one-year demonstration period.

1-Year DeWitt TSE Statistics

July 2002 - June 2003

	Units	Actual		1-Year Projected	
		1-Year Totals	Monthly Average	At 80% Utilization	At 100% Utilization
Hours of Use	hours	**14,918**	1,243	49,056	61,320
Diesel Fuel Savings	gallons	**14,918**	1,243	49,056	61,320
Diesel Fuel Savings	dollars	$24,656	$2,055	$83,395	$104,244
Service & Maint. Savings	dollars	$13,725	$1,144	$45,132	$56,414
TSE Service Costs	dollars	$22,377	$1,865	$73,584	$91,980
Overall User Savings	dollars	**$16,003**	$1,334	$54,943	$68,678
PM	kg	**58.2**	5	191	239
NOx	kg	**2,297**	191	7,555	9,443
CO	kg	**1,158**	96	3,807	4,758
HC	kg	**656**	55	2,158	2,698
CO_2	kg	**141,364**	11,780	464,855	581,068

During the one-year monitoring period, the average duration per visit and number of repeat customers has increased. This is an indication that many of the truckers have become comfortable using the TSE system. Projected numbers are also shown in the table above, based on 80 and 100% utilization; 100% utilization is defined by 8 hours of use for each of the 21 parking spaces (365 days per year) at the DeWitt Service Area.

As should be expected, total energy use is dependent on the number of users and ambient temperature. Peak power usage occurred in the cold winter months. For a more detailed operational analysis of the TSE system installed at the DeWitt Service Area, tables and charts are provided in the Tables and Figures section of this report.

Section 1
PROJECT DESCRIPTION

ANTARES and the Sponsors (NYDERDA, NYSTA, and NM-NG) worked together with IdleAire, the Subcontractor to install two TSE demonstration projects in the Syracuse, New York region. The first is located at DeWitt Service Area (SA), accessible from the eastbound direction of the New York State Thruway, and the second is located at the Chittenango SA on the westbound direction of the Thruway.

The TSE technology developed by the Subcontractor is mounted on an overhead truss assembly (shown in left picture below) and includes a computer controlled touch-screen console unit that provides heating, air conditioning, electrical convenience outlets, telephone, TV cable, and internet connections. This technology allows truckers to maintain comfort and engine warmth while stopped at truck stops and rest areas without idling their engines. Each user must obtain an IdleAire supplied template ($10) to use the system which is mounted to the passenger side door window opening, as shown below right. The main advantage to this approach is that virtually any long-haul sleeper cab can be connected to the system. IdleAire charges a base rate of $1.50 to drivers and $1.25 to registered fleets.

DeWitt Service Area TSE System

IdleAire Service Console Unit

ANTARES responsibility in this demonstration project is to oversee all activities related to the project, provide the sponsors with monthly progress reports, and analyze the business viability and operational data provided by IdleAire. This report summarizes the operations and benefits of the DeWitt Service Area TSE system from July 2002 through June 2003, one full year of operation.

Section 2
DATA TRANSFER AND REPORT FORMAT

IdleAire supplied ANTARES with monthly operational and data reports. The format of the data sets has evolved over the one-year long data analysis period. The data collected include: weather, minutes of use, number of users and energy use.

The Weather files contain ambient conditions at the DeWitt SA at 15 minute increments. Temperature, humidity, barometer, rainfall, wind speed and direction are all included in the Weather Files each month. When weather data were not available from the Subcontractor, data from the Syracuse Airport and ANTARES' weather station (located at the Chittenango SA) were used to "fill-in the gaps."

The minutes used at each berth (parking stall) were included in the Minutes of Use data from the Subcontractor. Minute totals for each individual berth as well as the entire facility were recorded on a daily basis. The number of users or "members" that used the TSE system were also recorded and sent to ANTARES. The member data also includes the number of "New Members" (customers who are using the system for the first time) each day.

As with the weather data, Energy use data were recorded at approximately 15-minute increments. Energy use was recorded with a running meter; therefore, energy used during a 15-minute time period must be subtracted from the previous reading to determine the energy used during a 15-minute period. The power used over any given time period can be determined by dividing energy use by time (energy use/time.) An instantaneous power reading was not obtainable; therefore, average power over time was calculated.

ISSUES

Customers are can purchase the TSE services in two ways; either using a credit card or fleet member card. Depending on the method of payment, some minutes logged by the system may be recorded for the day the transaction ends, and others may be recorded on the day the transaction begins. Therefore, if a customer stays overnight to the next calendar day, all minutes are not necessarily recorded on the same date. For this reason, the daily minute totals may not be accurate. This method of data recording holds true for the number of users each day.

The Subcontractor used multiple recording procedures over the one-year analysis period. Early numbers included time used for maintenance, repair and testing. These minutes do not represent time that customers were using the system. Additionally, non-paying customers that used the TSE system as a complementary service are included in the member and minute totals. The benefits shown in the Summary, Data Analysis, and Tables and Figures sections of this report are based on the total number of hours reported by the Subcontractor.

Section 3
DATA ANALYSIS

Once data were received from the Subcontractor, ANTARES analyzed, formatted and submitted a data summary to NYSERDA on a monthly basis. Reports were completed within two weeks after ANTARES received the data from the Subcontractor.

Tables and charts summarizing the one-year operational history of the DeWitt TSE facility are shown in the Tables and Figures section of this report. **Table 1** displays utilization data, energy use data, and the calculated benefits of the TSE system on a daily basis. Each month, as well as the one-year totals, are also shown in **Table 1**. Descriptions of the table headings are shown at the bottom of table on A-14 under *Notes*.

Diesel fuel savings and emissions reductions are based on the number of hours the TSE system was used. Nearly 15,000 hours of use have been logged on the system through June 2003. Based on emission factors obtained from the study conducted by the U.S. Environmental Protection Agency and Oak Ridge National Laboratory on idling trucks, approximately 58 kilograms (130 pounds) of PM, 2300 kilograms (2.5 tons) of NOx, 1200 kilograms (1.3 tons) of CO, 660 kilograms (0.7 tons) of HC and 140,000 kilograms (156 tons) CO_2 emissions have been displaced as a result of TSE system usage at the DeWitt SA. These emission reductions benefit the local air shed and do not take into consideration emissions produced from electricity generation required to power the TSE system.

The average diesel fuel consumption rate of idling trucks was determined to be approximately 1 gallon per hour (EPA, ORNL, IdleAire.) Therefore, the total volume of diesel fuel saved by using the TSE system at the DeWitt SA was estimated to be 15,000 gallons.

ANTARES collected diesel price data from the DeWitt Sunoco fuel station on a weekly basis to determine monthly average diesel fuel costs. These data were used to calculate fuel cost savings to the truckers. Total fuel costs displaced during the one-year period was approximately $25,000. Truckers and fleets also reduce service and maintenance costs by reducing engine idle time. There are many costs that have been associated with engine idling. Tune-ups and oil changes can be reduced if engine run time is decreased. Some believe that engine wear from an hour of idling is equivalent to driving the vehicle for one hour. The true cost of idling is a controversial subject which has been difficult to accurately determine. ANTARES has found a number of studies that claim anywhere from $0.12 to $2.50 per hour of idling (ORNL, TMC, IdleAire.) Some factors that may affect the direct cost of idling and engine wear include: idle speed, fuel quality, ambient conditions, accessory loads, and lubricant quality. Other factors that may affect cost calculations and make it difficult to determine the true cost of idling include: maintenance schedule, labor rates, vehicle turnover rate, percentage of idle time, vehicle routes traveled, load, driver behavior, etc. Because all the above mentioned factors can contribute to engine wear and costs incurred by the fleet owner or driver, it is very difficult to determine the portion of costs directly attributable to idling. Actual idling costs can vary from truck to truck. Engine and Maintenance costs of $0.92 per hour of idling were used in this report, which was reported by the Truck Maintenance Council (TMC) of the American Trucking Association (ATA) in the paper entitled <u>Environmental Awareness and Outreach Measures to Reduce GHG Emissions from the Trucking Sector</u> by L.P. Tardif & Associates, 1999.

Totaling *Fuel Cost Savings* and Engine *and Maintenance Costs* minus the *TSE Service Cost*, customers have saved over $16,000 during the one-year monitoring period. ANTARES used the non-discounted rate of $1.50 per hour of use for the *Overall Savings* calculations. Savings to the customers would be even greater if the registered fleet rate of $1.25 per hour was used.

Table 1 also shows *Average Duration per Visit* in hours; this is the average length of time each customer uses the TSE system. One-hundred percent *Berth Utilization* is recorded when a customer uses the system for exactly 8 hours. Therefore, greater than 100% *Berth Utilization* can be recorded. **Figure 2** shows the average monthly *Berth Utilization*. Average *Berth Utilization* for 2003 is near 100% indicating customers are comfortable with the TSE system and are using it for longer periods of time.

Facility Utilization and *Repeat Rate* are also shown in **Table 1** and **Figure 2**. *Facility Utilization* is calculated by dividing the total number of daily users by the number of TSE parking spaces at the DeWitt SA (21 parking spaces.) *Facility Utilization* has averaged 30% during the one year demonstration period. *Repeat Rate* describes the percentage of users that have previously used the TSE system. The general trend of increasing *Repeat Rate* indicates that customers are satisfied with the system after their initial introduction.

Although the 30% utilization may first appear relatively low, it is important to note several factors that may have directly impacted utilization. TSE is a relatively new concept being implemented at truck stops; therefore, most truckers have not been exposed to the technology. As more truckers become aware of the many benefits of TSE, it is anticipated that greater numbers will use the system. Another driving factor is diesel fuel prices. The current diesel fuel price does not provide a direct and significant monetary incentive to use the TSE system which costs truckers $1.50 per hour of use. In some cases, the cost of fuel used for idling may be near or less than the cost of the TSE system on a per hour basis. As diesel fuel prices increase, financial incentives will also increase. Also, anti-idle laws exist in New York State that prohibits idling for more than 5 minutes during moderate temperatures. Currently, this law is rarely enforced and provides little regulatory incentive to reducing idling time. Another major factor influencing utilization rates at the DeWitt Service Areas is that nearly every truck parking space is equipped with TSE service.

This rest area is small (21 truck parking spaces) compared to larger commercial truck stops and travel plazas that can have several hundred parking spaces. The DeWitt Service Area fills up quickly each night which may not allow truckers who would like to use the TSE system to do so if all spaces are occupied. Utilization may increase if a reservation system could be implemented for the TSE equipped parking spaces, thus ‘holding’ the spaces for those who would like to use the TSE system.

Average monthly energy costs were calculated based on Niagara Mohawk - National Grid (NM-NG) power bills and include any demand surcharges. Demand Surcharges are applied by NM-NG whenever electric energy consumption exceeds 2,000 kWh per month. As shown in **Figure 1**, energy use closely correlates the ambient temperature. Peak loads occurred in the winter months due to high heating loads. The Syracuse, New York region has characteristically cold winters and relatively mild summers. Conversely, energy loads can also increase in the summer due to air conditioning requirements, particularly in warmer climates. **Figures 5** and **6** show average power consumption per truck based on ambient temperature and number of combined heating and cooling degree days respectively. The average power demand per truck was 3.8 kilowatts during the one-year demonstration period. This value includes power used by overhead lights and loads from the Subcontractor’s on-site office; therefore, it does not represent actual demand per truck. The calculated power per truck is representative of total grid load required to power the TSE system.

Facility Utilization (number of users) by day of week at the DeWitt TSE facility has consistently seen peak utilization early in the week (Sunday through Wednesday,) and a decrease in utilization on Friday and Saturday. This can be attributed to truckers adhering to a just-in-time work week delivery schedule.

TABLES AND FIGURES

Table 1 - DeWitt Data Summary Report

												Trucker's Costs				Direct Emission Reduction[9]					
Date	Total Utilization hours	Average Per Space Utilization hours	Average Duration Per Visit hours	Berth Utilization of 8 hrs[1] %	Facility[2] Utilization %	Total Users #	Repeat Rate[3] %	Energy Use kWh	Average Power per Truck kW	Energy Cost[4] $	Diesel[5] Fuel Saved Gallons	Fuel Cost Savings[6] $	Engine & Maint. Cost[7] $	TSE Service Cost[8] $	Overall Savings $	PM kg	NOx kg	CO kg	HC kg	CO2 kg	Daily Average Temp F
07/01/03	61.5	2.9	10.2	128.0%	28.6%	6	16.7%	177.1	2.9	$22.18	61.5	$92.18	$56.53	$92.18	$56.53	0.240	9.5	4.8	2.7	582	80.7
07/02/03	58.8	2.8	7.4	91.9%	38.1%	8	0.0%	169.5	2.9	$21.22	58.8	$88.20	$54.10	$88.20	$54.10	0.229	9.1	4.6	2.6	557	84.6
07/03/03	20.8	1.0	4.2	52.1%	23.8%	5	0.0%	60.1	2.9	$7.52	20.8	$31.25	$19.17	$31.25	$19.17	0.081	3.2	1.6	0.9	197	83.8
07/04/03	38.3	1.8	12.8	159.4%	14.3%	3	0.0%	110.3	2.9	$13.81	38.3	$57.40	$35.21	$57.40	$35.21	0.149	5.9	3.0	1.7	363	81.3
07/05/03	19.8	0.9	9.9	123.5%	9.5%	2	0.0%	57.0	2.9	$7.13	19.8	$29.65	$18.19	$29.65	$18.19	0.077	3.0	1.5	0.9	187	66.6
07/06/03	11.0	0.5	5.5	68.8%	9.5%	2	50.0%	31.7	2.9	$3.97	11.0	$16.50	$10.12	$16.50	$10.12	0.043	1.7	0.9	0.5	104	68.6
07/07/03	12.6	0.6	2.5	31.6%	23.8%	5	40.0%	36.4	2.9	$4.56	12.6	$18.95	$11.62	$18.95	$11.62	0.049	1.9	1.0	0.6	120	72.5
07/08/03	38.1	1.8	4.2	52.9%	42.9%	9	11.1%	109.7	2.9	$13.74	38.1	$57.10	$35.02	$57.10	$35.02	0.148	5.9	3.0	1.7	361	76.2
07/09/03	57.3	2.7	6.4	79.5%	42.9%	9	0.0%	165.0	2.9	$20.66	57.3	$85.88	$52.67	$85.88	$52.67	0.223	8.8	4.4	2.5	543	69.5
07/10/03	41.1	2.0	10.3	128.5%	19.0%	4	0.0%	118.5	2.9	$14.84	41.1	$61.68	$37.83	$61.68	$37.83	0.160	6.3	3.2	1.8	390	64.6
07/11/03	12.2	0.6	12.2	152.1%	4.8%	1	0.0%	35.1	2.9	$4.39	12.2	$18.25	$11.19	$18.25	$11.19	0.047	1.9	0.9	0.5	115	62.5
07/12/03	3.2	0.2	1.6	20.1%	9.5%	2	0.0%	9.3	2.9	$1.16	3.2	$4.83	$2.96	$4.83	$2.96	0.013	0.5	0.2	0.1	30	66.1
07/13/03	46.5	2.2	7.7	96.8%	28.6%	6	0.0%	134.0	2.9	$16.77	46.5	$69.73	$42.76	$69.73	$42.76	0.181	7.2	3.6	2.0	440	71.3
07/14/03	74.7	3.6	7.5	93.4%	47.6%	10	0.0%	215.3	2.9	$26.96	74.7	$112.05	$68.72	$112.05	$68.72	0.291	11.5	5.8	3.3	708	74.6
07/15/03	114.7	5.5	7.2	89.6%	76.2%	16	12.5%	330.7	2.9	$41.40	114.7	$172.08	$105.54	$172.08	$105.54	0.447	17.7	8.9	5.0	1087	74.7
07/16/03	66.5	3.2	7.4	92.4%	42.9%	9	11.1%	191.7	2.9	$24.00	66.5	$99.78	$61.20	$99.78	$61.20	0.259	10.2	5.2	2.9	630	70.7
07/17/03	16.9	0.8	2.4	30.1%	33.3%	7	14.3%	48.7	2.9	$6.09	16.9	$25.33	$15.53	$25.33	$15.53	0.066	2.6	1.3	0.7	160	78.1
07/18/03	67.4	3.2	4.2	52.7%	76.2%	16	43.8%	194.3	2.9	$24.33	67.4	$101.13	$62.02	$101.13	$62.02	0.263	10.4	5.2	3.0	639	77.1
07/19/03	37.3	1.8	4.7	58.2%	38.1%	8	25.0%	107.4	2.9	$13.45	37.3	$55.90	$34.29	$55.90	$34.29	0.145	5.7	2.9	1.6	353	71.7
07/20/03	21.0	1.0	3.0	37.5%	33.3%	7	0.0%	60.5	2.9	$7.58	21.0	$31.50	$19.32	$31.50	$19.32	0.082	3.2	1.6	0.9	199	72.4
07/21/03	86.9	4.1	6.7	83.5%	61.9%	13	0.0%	250.3	2.9	$31.34	86.9	$130.28	$79.90	$130.28	$79.90	0.339	13.4	6.7	3.8	823	76.3
07/22/03	121.0	5.8	7.1	88.9%	81.0%	17	29.4%	348.7	2.9	$43.65	121.0	$181.45	$111.29	$181.45	$111.29	0.472	18.6	9.4	5.3	1146	82.6
07/23/03	90.1	4.3	15.0	187.6%	28.6%	6	0.0%	280.2	3.1	$36.32	90.1	$135.08	$82.85	$135.08	$82.85	0.351	13.9	7.0	4.0	853	73.3
07/24/03	55.0	2.6	7.9	98.2%	33.3%	7	28.6%	171.0	3.1	$22.17	55.0	$82.45	$50.57	$82.45	$50.57	0.214	8.5	4.3	2.4	521	65.9
07/25/03	64.7	3.1	4.6	57.8%	66.7%	14	7.1%	201.2	3.1	$26.09	64.7	$97.03	$59.51	$97.03	$59.51	0.252	10.0	5.0	2.8	613	69.5
07/26/03	24.1	1.1	4.8	60.3%	23.8%	5	60.0%	75.0	3.1	$9.73	24.1	$36.18	$22.19	$36.18	$22.19	0.094	3.7	1.9	1.1	229	69.3
07/27/03	24.5	1.2	4.1	50.9%	28.6%	6	0.0%	76.1	3.1	$9.86	24.5	$36.68	$22.49	$36.68	$22.49	0.095	3.8	1.9	1.1	232	76.5
07/28/03	85.2	4.1	5.7	71.0%	71.4%	15	13.3%	265.1	3.1	$34.37	85.2	$127.80	$78.38	$127.80	$78.38	0.332	13.1	6.6	3.7	807	78.2
07/29/03	77.1	3.7	5.5	68.8%	66.7%	14	7.1%	239.8	3.1	$31.09	77.1	$115.60	$70.90	$115.60	$70.90	0.301	11.9	6.0	3.4	730	82.7
07/30/03	99.4	4.7	5.8	73.1%	81.0%	17	11.8%	309.1	3.1	$40.08	99.4	$149.03	$91.40	$149.03	$91.40	0.387	15.3	7.7	4.4	941	79.1
07/31/03	84.0	4.0	7.6	95.4%	52.4%	11	18.2%	261.3	3.1	$33.88	84.0	$125.98	$77.26	$125.98	$77.26	0.328	12.9	6.5	3.7	796	79.5
Jul 2002 Total	1631	77.7	6.3	78.4%	39.9%	260	13.8%	4840	3.0	$614	1631	$2,447	$1,501	$2,447	$1,501	6.4	251	127	72	15458	74.2
8/1/2003	15.8	0.8	2.3	28.2%	33.3%	7	14.3%	49.2	3.1	$6.38	15.8	$23.73	$14.55	$23.73	$14.55	0.062	2.4	1.2	0.7	150	80.6
8/2/2003	11.3	0.5	11.3	141.3%	4.8%	1	0.0%	35.2	3.1	$4.56	11.3	$16.95	$10.40	$16.95	$10.40	0.044	1.7	0.9	0.5	107	80.1
8/3/2003	0.9	0.0	0.0	0.0%	0.0%	0	0.0%	2.7	3.1	$0.36	0.9	$1.33	$0.81	$1.33	$0.81	0.003	0.1	0.1	0.0	8	75.0
8/4/2003	5.3	0.3	1.8	21.9%	14.3%	3	0.0%	16.3	3.1	$2.12	5.3	$7.88	$4.83	$7.88	$4.83	0.020	0.8	0.4	0.2	50	76.6
8/5/2003	32.2	1.5	5.4	67.2%	28.6%	6	33.3%	100.3	3.1	$13.00	32.2	$48.35	$29.65	$48.35	$29.65	0.126	5.0	2.5	1.4	305	76.8
8/6/2003	32.7	1.6	4.7	58.4%	33.3%	7	28.6%	101.7	3.1	$13.19	32.7	$49.05	$30.08	$49.05	$30.08	0.128	5.0	2.5	1.4	310	63.8
8/7/2003	28.8	1.4	4.8	59.9%	28.6%	6	16.7%	89.5	3.1	$11.60	28.8	$43.15	$26.47	$43.15	$26.47	0.112	4.4	2.2	1.3	273	65.6
8/8/2003	50.8	2.4	25.4	317.7%	9.5%	2	0.0%	158.1	3.1	$20.51	50.8	$76.25	$46.77	$76.25	$46.77	0.198	7.8	3.9	2.2	482	67.2
8/9/2003	18.8	0.9	6.3	78.4%	14.3%	3	0.0%	58.5	3.1	$7.59	18.8	$28.23	$17.31	$28.23	$17.31	0.073	2.9	1.5	0.8	178	69.3
8/10/2003	20.6	1.0	10.3	128.8%	9.5%	2	0.0%	64.1	3.1	$8.31	20.6	$30.90	$18.95	$30.90	$18.95	0.080	3.2	1.6	0.9	195	73.9
8/11/2003	25.1	1.2	4.2	52.3%	28.6%	6	16.7%	78.0	3.1	$10.12	25.1	$37.63	$23.08	$37.63	$23.08	0.098	3.9	1.9	1.1	238	76.7
8/12/2003	106.4	5.1	7.1	88.7%	71.4%	15	13.3%	331.1	3.1	$42.93	106.4	$159.65	$97.92	$159.65	$97.92	0.415	16.4	8.3	4.7	1009	79.9
8/13/2003	69.1	3.3	5.8	72.0%	57.1%	12	8.3%	215.0	3.1	$27.87	69.1	$103.65	$63.57	$103.65	$63.57	0.269	10.6	5.4	3.0	655	81.2
8/14/2003	60.5	2.9	6.1	75.6%	47.6%	10	10.0%	188.2	3.1	$24.40	60.5	$90.75	$55.66	$90.75	$55.66	0.236	9.3	4.7	2.7	573	85.6
8/15/2003	37.8	1.8	3.1	39.3%	57.1%	12	25.0%	117.5	3.1	$15.23	37.8	$56.65	$34.75	$56.65	$34.75	0.147	5.8	2.9	1.7	358	79.7
8/16/2003	28.5	1.4	7.1	88.9%	19.0%	4	25.0%	88.5	3.1	$11.48	28.5	$42.68	$26.17	$42.68	$26.17	0.111	4.4	2.2	1.3	270	82.4
8/17/2003	13.2	0.6	4.4	54.8%	14.3%	3	0.0%	40.9	3.1	$5.30	13.2	$19.73	$12.10	$19.73	$12.10	0.051	2.0	1.0	0.6	125	77.2
8/18/2003	60.1	2.9	6.0	75.2%	47.6%	10	10.0%	187.1	3.1	$24.26	60.1	$90.20	$55.32	$90.20	$55.32	0.235	9.3	4.7	2.6	570	77.5
8/19/2003	64.8	3.1	8.1	101.3%	38.1%	8	12.5%	201.7	3.1	$26.15	64.8	$97.23	$59.63	$97.23	$59.63	0.253	10.0	5.0	2.9	614	70.3
8/20/2003	38.0	1.8	5.4	67.9%	33.3%	7	28.6%	118.3	3.1	$15.34	38.0	$57.05	$34.99	$57.05	$34.99	0.148	5.9	3.0	1.7	360	70.1
8/21/2003	11.8	0.6	1.3	16.4%	42.9%	9	0.0%	36.7	3.1	$4.76	11.8	$17.70	$10.86	$17.70	$10.86	0.046	1.8	0.9	0.5	112	70.3
8/22/2003	26.5	1.3	3.3	41.5%	38.1%	8	12.5%	82.5	3.1	$10.70	26.5	$39.80	$24.41	$39.80	$24.41	0.103	4.1	2.1	1.2	251	74.1
8/23/2003	19.2	0.9	2.7	34.2%	33.3%	7	0.0%	77.6	4.1	$10.23	19.2	$28.73	$17.62	$28.73	$17.62	0.075	2.9	1.5	0.8	181	69.7
8/24/2003	28.5	1.4	5.7	71.3%	23.8%	5	20.0%	115.6	4.1	$15.23	28.5	$42.78	$26.24	$42.78	$26.24	0.111	4.4	2.2	1.3	270	62.3
8/25/2003	50.8	2.4	7.3	90.7%	33.3%	7	28.6%	205.9	4.1	$27.15	50.8	$76.23	$46.75	$76.23	$46.75	0.198	7.8	3.9	2.2	482	67.6
8/26/2003	26.5	1.3	6.6	82.7%	19.0%	4	25.0%	107.2	4.1	$14.13	26.5	$39.68	$24.33	$39.68	$24.33	0.103	4.1	2.1	1.2	251	69.5
8/27/2003	30.4	1.4	5.1	63.3%	28.6%	6	16.7%	123.1	4.1	$16.23	30.4	$45.58	$27.95	$45.58	$27.95	0.118	4.7	2.4	1.3	288	67.2
8/28/2003	42.1	2.0	3.8	47.9%	52.4%	11	9.1%	170.7	4.1	$22.50	42.1	$63.18	$38.75	$63.18	$38.75	0.164	6.5	3.3	1.9	399	64.5
8/29/2003	14.5	0.7	7.2	90.4%	9.5%	2	50.0%	58.6	4.1	$7.73	14.5	$21.70	$13.31	$21.70	$13.31	0.056	2.2	1.1	0.6	137	62.3
8/30/2003	15.8	0.8	7.9	98.4%	9.5%	2	0.0%	63.8	4.1	$8.41	15.8	$23.63	$14.49	$23.63	$14.49	0.061	2.4	1.2	0.7	149	66.5
8/31/2003	11.4	0.5	1.6	20.3%	33.3%	7	14.3%	46.1	4.1	$6.08	11.4	$17.08	$10.47	$17.08	$10.47	0.044	1.8	0.9	0.5	108	71.5
Aug 2002 Total	998	47.5	5.2	65.0%	29.5%	192	14.6%	3330	3.3	$434	998	$1,497	$918	$1,497	$918	3.9	154	77	44	9457	72.7
09/01/02	14.1	0.7	4.7	58.8%	14.3%	3	66.7%	57.2	4.1	$7.54	14.1	$21.06	$12.99	$21.18	$12.87	0.055	2.2	1.1	0.6	134	67.8
09/02/02	22.4	1.1	3.7	46.7%	28.6%	6	50.0%	90.9	4.1	$11.98	22.4	$33.47	$20.64	$33.65	$20.46	0.087	3.5	1.7	1.0	213	69.4
09/03/02	15.5	0.7	5.2	64.7%	14.3%	3	33.3%	63.0	4.1	$8.30	15.5	$23.18	$14.29	$23.30	$14.17	0.061	2.4	1.2	0.7	147	73.6
09/04/02	21.4	1.0	2.7	33.5%	38.1%	8	25.0%	86.9	4.1	$11.45	21.4	$31.98	$19.72	$32.15	$19.55	0.084	3.3	1.7	0.9	203	70.8
09/05/02	27.7	1.3	4.6	57.7%	28.6%	6	50.0%	112.2	4.1	$14.79	27.7	$41.30	$25.47	$41.53	$25.25	0.108	4.3	2.1	1.2	262	64.2
09/06/02	27.3	1.3	3.4	42.7%	38.1%	8	25.0%	110.8	4.1	$14.60	27.3	$40.78	$25.15	$41.00	$24.93	0.107	4.2	2.1	1.2	259	63.3
09/07/02	12.9	0.6	2.6	32.1%	23.8%	5	20.0%	52.1	4.1	$6.86	12.9	$19.17	$11.82	$19.28	$11.72	0.050	2.0	1.0	0.6	122	69.4
09/08/02	28.3	1.3	5.7	70.8%	23.8%	5	40.0%	114.8	4.1	$15.13	28.3	$42.25	$26.05	$42.48	$25.82	0.110	4.4	2.2	1.2	268	73.4
09/09/02	64.8	3.1	5.4	67.5%	57.1%	12	16.7%	262.8	4.1	$34.63	64.8	$96.73	$59.65	$97.25	$59.13	0.253	10.0	5.0	2.9	614	74.6
09/10/02	49.4	2.4	4.9	61.8%	47.6%	10	30.0%	200.2	4.1	$26.39	49.4	$73.70	$45.45	$74.10	$45.05	0.193	7.6	3.8	2.2	468	76.1
09/11/02	48.2	2.3	5.4	66.9%	42.9%	9	11.1%	195.1	4.1	$25.72	48.2	$71.84	$44.30	$72.23	$43.91	0.188	7.4	3.7	2.1	456	63.3
09/12/02	42.6	2.0	4.3	53.3%	47.6%	10	10.0%	172.6	4.1	$22.76	42.6	$63.56	$39.19	$63.90	$38.85	0.166	6.6	3.3	1.9	404	59.8
09/13/02	30.3	1.4	3.4	42.1%	42.9%	9	22.2%	122.8	4.1	$16.19	30.3	$45.21	$27.88	$45.45	$27.63	0.118	4.7	2.4	1.3	287	70.8
09/14/02	7.8	0.4	2.6	32.5%	14.3%	3	33.3%	31.6	4.1	$4.17	7.8	$11.64	$7.18	$11.70	$7.11	0.030	1.2	0.6	0.3	74	69.2
09/15/02	12.9	0.6	3.2	40.3%	19.0%	4	50.0%	52.2	4.1	$6.88	12.9	$19.22	$11.85	$19.33	$11.75	0.050	2.0	1.0	0.6	122	73.0
09/16/02	30.5	1.5	5.1	63.4%	28.6%	6	16.7%	123.4	4.1	$16.27	30.5	$45.43	$28.01	$45.68	$27.77	0.119	4.7	2.4	1.3	289	64.7
09/17/02	49.7	2.4	5.0	62.1%	47.6%	10	10.0%	201.4	4.1	$26.55	49.7	$74.15	$45.72	$74.55	$45.33	0.194	7.7	3.9	2.2	471	63.8
09/18/02	40.3	1.9	5.0	63.0%	38.1%	8	25.0%	163.5	4.1	$21.55	40.3	$60.18	$37.11	$60.50	$36.78	0.157	6.2	3.1	1.8	382	65.7
09/19/02	39.3	1.9	3.3	40.9%	57.1%	12	8.3%	159.1	4.1	$20.98	39.3	$58.59	$36.13	$58.90	$35.81	0.153	6.0	3.0	1.7	372	72.4
09/20/02	4.6	0.2	1.5	19.2%	14.3%	3	33.3%	18.7	4.1	$2.47	4.6	$6.89	$4.25	$6.93	$4.21	0.018	0.7	0.4	0.2	44	78.0
09/21/02	18.3	0.9	3.1	38.2%	28.6%	6	16.7%	76.5	4.2	$13.65	18.3	$27.33	$16.85	$27.48	$16.70	0.071	2.8	1.4	0.8	174	73.3
09/22/02	41.9	2.0	6.0	74.8%	33.3%	7	28.6%	174.9	4.2	$31.21	41.9	$62.49	$38.53	$62.83	$38.20	0.163	6.5	3.3	1.8	397	69.5
09/23/02	20.0	1.0	5.0	62.4%	19.0%	4	50.0%	83.4	4.2	$14.89	20.0	$29.82	$18.38	$29.98	$18.22	0.078	3.1	1.6	0.9	189	59.3
09/24/02	43.0	2.0	4.3	53.7%	47.6%	10	20.0%	179.3	4.2	$32.01	43.0	$64.08	$39.51	$64.43	$39.17	0.168	6.6	3.3	1.9	407	58.8
09/25/02	42.5	2.0	5.3	66.4%	38.1%	8	25.0%	177.4	4.2	$31.67	42.5	$63.41	$39.10	$63.75	$38.76	0.166	6.5	3.3	1.9	403	59.3
09/26/02	25.6	1.2	3.2	40.0%	38.1%	8	25.0%	106.9	4.2	$19.09	25.6	$38.22	$23.57	$38.43	$23.36	0.100	3.9	2.0	1.1	243	61.8
09/27/02	26.8	1.3	13.4	167.6%	9.5%	2	100.0%	112.0	4.2	$19.99	26.8	$40.01	$24.67	$40.23	$24.46	0.105	4.1	2.1	1.2	254	58.4
09/28/02	2.1	0.1	2.1	26.0%	4.8%	1	100.0%	8.7	4.2	$1.55	2.1	$3.11	$1.92	$3.13	$1.90	0.008	0.3	0.2	0.1	20	57.8
09/29/02	15.3	0.7	2.2	27.3%	33.3%	7	28.6%	63.7	4.2	$11.38	15.3	$22.78	$14.05	$22.90	$13.92	0.060	2.4	1.2	0.7	145	57.4
09/30/02	45.9	2.2	6.6	81.9%	33.3%	7	28.6%	191.4	4.2	$34.17	45.9	$68.41	$42.18	$68.78	$41.82	0.179	7.1	3.6	2.0	434	67.5
Sep 2002 Total	871	41.5	4.4	54.5%	31.7%	200	26.0%	3565	4.1	$525	871	$1,300	$802	$1,307	$795	3.4	134	68	38	8256	66.9

Table 1 (cont.) - DeWitt Data Summary Report

Date	Total Utilization hours	Average Per Space Utilization hours	Average Duration Per Visit hours	Berth Utilization of 8 hrs[1] %	Facility[2] Utilization %	Total Users #	Repeat Rate[3] %	Energy Use kWh	Average Power per Truck kW	Energy Cost[4] $	Diesel[5] Fuel Saved Gallons	Trucker's Costs: Fuel Cost Savings[6] $	Trucker's Costs: Engine & Maint.Cost[7] $	Trucker's Costs: TSE Service Cost[8] $	Trucker's Costs: Overall Savings $	Direct Emission Reduction[9]: PM kg	Direct Emission Reduction[9]: NOx kg	Direct Emission Reduction[9]: CO kg	Direct Emission Reduction[9]: HC kg	Direct Emission Reduction[9]: CO2 kg	Daily Average Temp F
10/01/02	42.0	2.0	3.8	47.8%	52.4%	11	27.3%	175.5	4.2	$31.33	42.0	$63.05	$38.67	$63.05	$38.67	0.164	6.5	3.3	1.8	398	73.1
10/02/02	37.8	1.8	2.2	27.8%	81.0%	17	5.9%	157.7	4.2	$28.16	37.8	$56.68	$34.76	$56.68	$34.76	0.147	5.8	2.9	1.7	358	73.3
10/03/02	42.5	2.0	4.2	53.1%	47.6%	10	30.0%	177.4	4.2	$31.66	42.5	$63.73	$39.08	$63.73	$39.08	0.166	6.5	3.3	1.9	403	60.3
10/04/02	33.0	1.6	4.1	51.6%	38.1%	8	12.5%	137.9	4.2	$24.62	33.0	$49.55	$30.39	$49.55	$30.39	0.129	5.1	2.6	1.5	313	64.7
10/05/02	36.4	1.7	7.3	91.0%	23.8%	5	20.0%	151.9	4.2	$27.11	36.4	$54.58	$33.47	$54.58	$33.47	0.142	5.6	2.8	1.6	345	62.7
10/06/02	34.6	1.6	34.6	432.7%	4.8%	1	0.0%	144.5	4.2	$25.80	34.6	$51.93	$31.85	$51.93	$31.85	0.135	5.3	2.7	1.5	328	57.4
10/07/02	49.1	2.3	3.5	43.8%	66.7%	14	21.4%	204.8	4.2	$36.55	49.1	$73.58	$45.13	$73.58	$45.13	0.191	7.6	3.8	2.2	465	58.6
10/08/02	53.1	2.5	5.9	73.7%	42.9%	9	11.1%	221.5	4.2	$39.55	53.1	$79.60	$48.82	$79.60	$48.82	0.207	8.2	4.1	2.3	503	48.2
10/09/02	39.4	1.9	9.9	123.1%	19.0%	4	25.0%	164.5	4.2	$29.36	39.4	$59.10	$36.25	$59.10	$36.25	0.154	6.1	3.1	1.7	373	53.0
10/10/02	29.8	1.4	3.7	46.5%	38.1%	8	25.0%	124.3	4.2	$22.20	29.8	$44.68	$27.40	$44.68	$27.40	0.116	4.6	2.3	1.3	282	59.5
10/11/02	24.8	1.2	6.2	77.4%	19.0%	4	50.0%	103.5	4.2	$18.47	24.8	$37.18	$22.80	$37.18	$22.80	0.097	3.8	1.9	1.1	235	56.8
10/12/02	12.1	0.6	6.1	75.8%	9.5%	2	0.0%	50.7	4.2	$9.04	12.1	$18.20	$11.16	$18.20	$11.16	0.047	1.9	0.9	0.5	115	58.5
10/13/02	21.7	1.0	2.2	27.1%	47.6%	10	20.0%	90.4	4.2	$16.13	21.7	$32.48	$19.92	$32.48	$19.92	0.084	3.3	1.7	1.0	205	56.0
10/14/02	16.5	0.8	8.2	103.0%	9.5%	2	50.0%	68.8	4.2	$12.28	16.5	$24.73	$15.16	$24.73	$15.16	0.064	2.5	1.3	0.7	156	43.2
10/15/02	38.0	1.8	3.8	47.5%	47.6%	10	10.0%	158.6	4.2	$28.31	38.0	$56.98	$34.94	$56.98	$34.94	0.148	5.8	2.9	1.7	360	46.8
10/16/02	48.5	2.3	6.1	75.8%	38.1%	8	50.0%	202.5	4.2	$36.14	48.5	$72.75	$44.62	$72.75	$44.62	0.189	7.5	3.8	2.1	460	47.3
10/17/02	58.6	2.8	4.5	56.4%	61.9%	13	38.5%	244.7	4.2	$43.68	58.6	$87.93	$53.93	$87.93	$53.93	0.229	9.0	4.5	2.6	555	47.3
10/18/02	31.2	1.5	7.8	97.4%	19.0%	4	75.0%	130.1	4.2	$23.23	31.2	$46.75	$28.67	$46.75	$28.67	0.122	4.8	2.4	1.4	295	47.0
10/19/02	26.4	1.3	8.8	109.9%	14.3%	3	66.7%	110.1	4.2	$19.65	26.4	$39.55	$24.26	$39.55	$24.26	0.103	4.1	2.0	1.2	250	51.3
10/20/02	14.1	0.7	2.8	35.2%	23.8%	5	20.0%	58.8	4.2	$10.50	14.1	$21.13	$12.96	$21.13	$12.96	0.055	2.2	1.1	0.6	133	47.0
10/21/02	54.8	2.6	6.1	76.2%	42.9%	9	33.3%	228.9	4.2	$40.86	54.8	$82.25	$50.45	$82.25	$50.45	0.214	8.4	4.3	2.4	520	42.0
10/22/02	47.6	2.3	5.3	66.1%	42.9%	9	22.2%	198.7	4.2	$35.47	47.6	$71.40	$43.79	$71.40	$43.79	0.186	7.3	3.7	2.1	451	38.7
10/23/02	46.9	2.2	4.7	58.6%	47.6%	10	40.0%	129.2	2.8	$24.43	46.9	$70.38	$43.16	$70.38	$43.16	0.183	7.2	3.6	2.1	445	39.5
10/24/02	44.6	2.1	4.1	50.6%	52.4%	11	36.4%	122.7	2.8	$23.20	44.6	$66.83	$40.99	$66.83	$40.99	0.174	6.9	3.5	2.0	422	40.0
10/25/02	47.5	2.3	15.8	198.0%	14.3%	3	33.3%	130.9	2.8	$24.74	47.5	$71.28	$43.72	$71.28	$43.72	0.185	7.3	3.7	2.1	450	41.7
10/26/02	24.2	1.2	4.0	50.3%	28.6%	6	16.7%	66.6	2.8	$12.58	24.2	$36.25	$22.23	$36.25	$22.23	0.094	3.7	1.9	1.1	229	45.8
10/27/02	72.4	3.4	6.6	82.3%	52.4%	11	27.3%	199.3	2.8	$37.69	72.4	$108.58	$66.59	$108.58	$66.59	0.282	11.1	5.6	3.2	686	47.8
10/28/02	64.1	3.1	8.0	100.2%	38.1%	8	25.0%	176.6	2.8	$33.38	64.1	$96.18	$58.99	$96.18	$58.99	0.250	9.9	5.0	2.8	608	41.8
10/29/02	21.9	1.0	4.4	54.8%	23.8%	5	20.0%	60.3	2.8	$11.40	21.9	$32.85	$20.15	$32.85	$20.15	0.085	3.4	1.7	1.0	208	39.3
10/30/02	59.5	2.8	5.4	67.6%	52.4%	11	36.4%	163.9	2.8	$30.99	59.5	$89.28	$54.76	$89.28	$54.76	0.232	9.2	4.6	2.6	564	37.6
10/31/02	92.9	4.4	6.6	82.9%	66.7%	14	21.4%	255.7	2.8	$48.35	92.9	$139.30	$85.44	$139.30	$85.44	0.362	14.3	7.2	4.1	880	40.5
Oct 2002 Total	1266	60.3	5.2	64.6%	37.6%	245	26.5%	4611	3.6	$837	1266	$1,899	$1,165	$1,899	$1,165	4.9	195	98	56	11994	50.5
11/01/02	60.3	2.9	20.1	251.3%	14.3%	3	33.3%	203.6	3.4	$38.49	60.3	$94.01	$55.48	$90.45	$59.03	0.235	9.3	4.7	2.7	571	38.9
11/02/02	33.7	1.6	5.6	70.1%	28.6%	6	33.3%	155.5	4.6	$29.40	33.7	$52.49	$30.97	$50.50	$32.96	0.131	5.2	2.6	1.5	319	33.6
11/03/02	61.1	2.9	6.8	84.8%	42.9%	9	22.2%	188.8	3.1	$35.70	61.1	$95.18	$56.17	$91.58	$59.77	0.238	9.4	4.7	2.7	579	33.9
11/04/02	33.8	1.6	6.8	84.4%	23.8%	5	60.0%	152.1	4.5	$28.75	33.8	$52.62	$31.05	$50.63	$33.04	0.132	5.2	2.6	1.5	320	39.3
11/05/02	46.7	2.2	4.7	58.4%	47.6%	10	20.0%	157.4	3.4	$29.77	46.7	$72.86	$42.99	$70.10	$45.75	0.182	7.2	3.6	2.1	443	40.4
11/06/02	51.0	2.4	4.6	58.0%	52.4%	11	27.3%	191.5	3.8	$36.20	51.0	$79.53	$46.94	$76.53	$49.95	0.199	7.9	4.0	2.2	483	37.9
11/07/02	41.9	2.0	6.0	74.7%	33.3%	7	57.1%	184.4	4.4	$34.87	41.9	$65.24	$38.50	$62.78	$40.97	0.163	6.4	3.2	1.8	397	32.6
11/08/02	25.0	1.2	3.6	44.7%	33.3%	7	28.6%	99.8	4.0	$18.88	25.0	$39.03	$23.03	$37.55	$24.51	0.098	3.9	1.9	1.1	237	54.8
11/09/02	34.2	1.6	6.8	85.6%	23.8%	5	20.0%	86.5	2.5	$16.36	34.2	$53.37	$31.49	$51.35	$33.51	0.134	5.3	2.7	1.5	324	60.1
11/10/02	54.7	2.6	6.8	85.5%	38.1%	8	75.0%	105.5	1.9	$19.94	54.7	$85.30	$50.34	$82.08	$53.57	0.213	8.4	4.2	2.4	518	63.7
11/11/02	43.5	2.1	14.5	181.3%	14.3%	3	66.7%	94.8	2.2	$17.93	43.5	$67.84	$40.04	$65.28	$42.60	0.170	6.7	3.4	1.9	412	59.3
11/12/02	47.7	2.3	5.3	66.2%	42.9%	9	22.2%	141.8	3.0	$26.81	47.7	$74.31	$43.85	$71.50	$46.67	0.186	7.3	3.7	2.1	452	47.9
11/13/02	52.4	2.5	4.8	59.5%	52.4%	11	27.3%	176.1	3.4	$33.30	52.4	$81.61	$48.16	$78.53	$51.25	0.204	8.1	4.1	2.3	496	43.4
11/14/02	89.3	4.3	8.1	101.5%	52.4%	11	27.3%	205.2	2.3	$38.79	89.3	$139.27	$82.19	$134.00	$87.46	0.348	13.8	6.9	3.9	847	51.1
11/15/02	68.1	3.2	17.0	212.8%	19.0%	4	25.0%	180.1	2.6	$34.05	68.1	$106.17	$62.65	$102.15	$66.67	0.266	10.5	5.3	3.0	645	44.0
11/16/02	47.7	2.3	7.9	99.3%	28.6%	6	33.3%	203.1	4.3	$38.41	47.7	$74.31	$43.85	$71.50	$46.67	0.186	7.3	3.7	2.1	452	32.0
11/17/02	55.8	2.7	6.2	77.5%	42.9%	9	22.2%	172.0	3.1	$32.53	55.8	$86.97	$51.32	$83.68	$54.61	0.218	8.6	4.3	2.5	529	34.8
11/18/02	71.9	3.4	9.0	112.4%	38.1%	8	25.0%	269.1	3.7	$50.87	71.9	$112.12	$66.16	$107.88	$70.41	0.280	11.1	5.6	3.2	681	35.0
11/19/02	72.9	3.5	14.6	182.3%	23.8%	5	40.0%	298.0	4.1	$56.34	72.9	$113.68	$67.08	$109.38	$71.39	0.284	11.2	5.7	3.2	691	38.5
11/20/02	47.1	2.2	5.9	73.5%	38.1%	8	25.0%	174.1	3.7	$32.91	47.1	$73.35	$43.29	$70.58	$46.06	0.183	7.2	3.7	2.1	446	46.4
11/21/02	63.1	3.0	7.9	98.6%	38.1%	8	12.5%	187.4	3.0	$34.10	63.1	$98.42	$58.08	$94.70	$61.81	0.246	9.7	4.9	2.8	598	47.2
11/22/02	33.9	1.6	8.5	105.9%	19.0%	4	50.0%	122.6	3.6	$22.32	33.9	$52.82	$31.17	$50.83	$33.17	0.132	5.2	2.6	1.5	321	42.3
11/23/02	17.2	0.8	8.6	107.3%	9.5%	2	50.0%	126.5	7.4	$23.02	17.2	$26.76	$15.79	$25.75	$16.81	0.067	2.6	1.3	0.8	163	32.8
11/24/02	64.1	3.1	4.9	61.6%	61.9%	13	15.4%	173.6	2.7	$31.59	64.1	$99.91	$58.96	$96.13	$62.74	0.250	9.9	5.0	2.8	607	40.8
11/25/02	78.8	3.8	11.3	140.7%	33.3%	7	28.6%	206.8	2.6	$37.64	78.8	$122.82	$72.48	$118.18	$77.13	0.307	12.1	6.1	3.5	747	39.9
11/26/02	52.2	2.5	6.5	81.5%	38.1%	8	12.5%	225.5	4.3	$41.05	52.2	$81.35	$48.01	$78.28	$51.09	0.204	8.0	4.0	2.3	494	35.9
11/27/02	41.9	2.0	10.5	130.8%	19.0%	4	25.0%	230.7	5.5	$41.98	41.9	$65.24	$38.50	$62.78	$40.97	0.163	6.4	3.2	1.8	397	25.9
11/28/02	27.1	1.3	13.5	169.1%	9.5%	2	100.0%	152.6	5.6	$27.77	27.1	$42.17	$24.89	$40.58	$26.48	0.105	4.2	2.1	1.2	256	26.3
11/29/02	16.0	0.8	8.0	99.8%	9.5%	2	0.0%	108.3	6.8	$19.71	16.0	$24.89	$14.69	$23.95	$15.63	0.062	2.5	1.2	0.7	151	35.2
11/30/02	38.7	1.8	7.7	96.7%	23.8%	5	20.0%	147.2	3.8	$26.79	38.7	$60.31	$35.59	$58.03	$37.87	0.151	6.0	3.0	1.7	367	39.2
Nov 2002 Total	1471	70.1	7.4	92.0%	31.7%	200	30.0%	5121	3.5	$956	1471	$2,294	$1,354	$2,207	$1,441	5.7	227	114	65	13943	41.1
12/01/02	45.6	2.2	9.1	114.0%	23.8%	5	0.0%	202.5	4.4	$36.85	45.6	$71.09	$41.95	$68.40	$44.64	0.178	7.0	3.5	2.0	432	23.6
12/02/02	32.1	1.5	6.4	80.3%	23.8%	5	0.0%	171.0	5.3	$31.12	32.1	$50.04	$29.53	$48.15	$31.43	0.125	4.9	2.5	1.4	304	23.7
12/03/02	56.0	2.7	7.0	87.5%	38.1%	8	37.5%	288.3	5.1	$52.46	56.0	$87.28	$51.50	$83.98	$54.81	0.218	8.6	4.3	2.5	530	12.5
12/04/02	43.7	2.1	7.3	91.0%	28.6%	6	50.0%	237.3	5.4	$43.19	43.7	$68.10	$40.19	$65.53	$42.77	0.170	6.7	3.4	1.9	414	22.2
12/05/02	39.8	1.9	8.0	99.4%	23.8%	5	20.0%	203.5	5.1	$37.04	39.8	$62.00	$36.59	$59.65	$38.93	0.155	6.1	3.1	1.7	377	23.1
12/06/02	21.4	1.0	4.3	53.5%	23.8%	5	80.0%	169.5	7.9	$30.84	21.4	$33.39	$19.70	$32.13	$20.97	0.084	3.3	1.7	0.9	203	27.7
12/07/02	28.9	1.4	4.1	51.6%	33.3%	7	42.9%	149.8	5.2	$27.25	28.9	$45.03	$26.57	$43.33	$28.28	0.113	4.4	2.2	1.3	274	30.7
12/08/02	103.0	4.9	7.9	99.0%	61.9%	13	38.5%	362.0	3.5	$65.88	103.0	$160.58	$94.76	$154.50	$100.84	0.402	15.9	8.0	4.5	976	30.8
12/09/02	32.4	1.5	32.4	404.4%	4.8%	1	0.0%	215.0	6.6	$39.14	32.4	$50.43	$29.76	$48.53	$31.67	0.126	5.0	2.5	1.4	307	15.6
12/10/02	25.0	1.2	2.5	31.3%	47.6%	10	10.0%	140.3	5.6	$25.53	25.0	$38.98	$23.00	$37.50	$24.48	0.098	3.9	1.9	1.1	237	26.9
12/11/02	70.3	3.3	7.0	87.9%	47.6%	10	20.0%	246.8	3.5	$44.91	70.3	$109.62	$64.69	$105.48	$68.84	0.274	10.8	5.5	3.1	666	27.1
12/12/02	87.1	4.1	14.5	181.4%	28.6%	6	33.3%	294.9	3.4	$53.67	87.1	$135.71	$80.09	$130.58	$85.22	0.339	13.4	6.8	3.8	825	34.6
12/13/02	29.8	1.4	14.9	186.0%	9.5%	2	100.0%	145.4	4.9	$26.46	29.8	$46.41	$27.39	$44.65	$29.14	0.116	4.6	2.3	1.3	282	35.4
12/14/02	0.0	0.0	0.0	0.0%	0.0%	0	0.0%	72.2	0.0	$13.14	0.0	$0.00	$0.00	$0.00	$0.00	0.000	0.0	0.0	0.0	0	36.6
12/15/02	45.2	2.2	5.0	62.8%	42.9%	9	11.1%	171.0	3.8	$31.12	45.2	$70.49	$41.60	$67.83	$44.27	0.176	7.0	3.5	2.0	428	36.3
12/16/02	75.7	3.6	10.8	135.1%	33.3%	7	28.6%	309.2	4.1	$56.28	75.7	$117.94	$69.60	$113.48	$74.06	0.295	11.7	5.9	3.3	717	24.1
12/17/02	33.4	1.6	6.7	83.5%	23.8%	5	20.0%	223.7	6.7	$40.71	33.4	$52.07	$30.73	$50.10	$32.70	0.130	5.1	2.6	1.5	316	19.7
12/18/02	30.5	1.5	3.4	42.4%	42.9%	9	33.3%	175.7	5.8	$31.97	30.5	$47.55	$28.06	$45.75	$29.86	0.119	4.7	2.4	1.3	289	20.6
12/19/02	42.4	2.0	7.1	88.3%	28.6%	6	66.7%	170.6	4.0	$31.05	42.4	$66.05	$38.98	$63.55	$41.48	0.165	6.5	3.3	1.9	401	35.3
12/20/02	47.1	2.2	9.4	117.6%	23.8%	5	40.0%	125.8	2.7	$22.89	47.1	$73.35	$43.29	$70.58	$46.06	0.183	7.2	3.7	2.1	446	44.8
12/21/02	39.4	1.9	19.7	246.5%	9.5%	2	50.0%	165.0	4.2	$20.61	39.4	$61.48	$36.28	$59.15	$38.61	0.154	6.1	3.1	1.7	374	36.1
12/22/02	42.4	2.0	8.5	106.0%	23.8%	5	20.0%	176.8	4.2	$22.09	42.4	$66.13	$39.02	$63.63	$41.53	0.165	6.5	3.3	1.9	402	38.9
12/23/02	44.3	2.1	11.1	138.3%	19.0%	4	75.0%	206.5	4.7	$25.79	44.3	$68.99	$40.71	$66.38	$43.32	0.173	6.8	3.4	1.9	419	33.4
12/24/02	24.3	1.2	8.1	101.0%	14.3%	3	66.7%	162.4	6.7	$20.28	24.3	$37.81	$22.31	$36.38	$23.74	0.095	3.7	1.9	1.1	230	29.4
12/25/02	53.1	2.5	13.3	166.0%	19.0%	4	50.0%	210.2	4.0	$26.26	53.1	$82.81	$48.87	$79.68	$52.00	0.207	8.2	4.1	2.3	503	26.3
12/26/02	27.6	1.3	3.4	43.0%	38.1%	8	25.0%	199.7	7.2	$24.94	27.6	$42.95	$25.35	$41.33	$26.97	0.107	4.2	2.1	1.2	261	29.1
12/27/02	58.8	2.8	14.7	183.8%	19.0%	4	50.0%	231.5	3.9	$28.91	58.8	$91.67	$54.10	$88.20	$57.57	0.229	9.1	4.6	2.6	557	30.4
12/28/02	13.3	0.6	4.4	55.3%	14.3%	3	33.3%	132.4	10.0	$16.53	13.3	$20.68	$12.21	$19.90	$12.99	0.052	2.0	1.0	0.6	126	30.2
12/29/02	37.1	1.8	6.2	77.4%	28.6%	6	16.7%	163.7	4.4	$20.45	37.1	$57.89	$34.16	$55.70	$36.35	0.145	5.7	2.9	1.6	352	33.6
12/30/02	44.7	2.1	5.6	69.8%	38.1%	8	50.0%	225.8	5.1	$28.20	44.7	$69.64	$41.09	$67.00	$43.73	0.174	6.9	3.5	2.0	423	30.2
12/31/02	15.1	0.7	7.6	94.5%	9.5%	2	100.0%	96.8	6.4	$12.09	15.1	$23.57	$13.91	$22.68	$14.80	0.059	2.3	1.2	0.7	143	43.3
Dec 2002 Total	1289	61.4	7.5	93.1%	26.6%	173	34.7%	6045	4.7	$988	1289	$2,010	$1,186	$1,934	$1,262	5.0	199	100	57	12216	29.4
Jul-Dec 2002	7527	358	6.0	74.6%	32.9%	1270	24.3%	27512	3.7	$4,354	7527	$11,446	$6,925	$11,290	$7,081	29.4	1159	584	331	71325	55.8

Table 1 (cont.) - DeWitt Data Summary Report

												Trucker's Costs				Direct Emission Reduction[9]					
Date	Total Utilization hours	Average Per Space Utilization hours	Average Duration Per Visit hours	Berth Utilization of 8 hrs[1] %	Facility[2] Utilization %	Total Users #	Repeat Rate[3] %	Energy Use kWh	Average Power per Truck kW	Energy Cost[4] $	Diesel[5] Fuel Saved Gallons	Fuel Cost Savings[6] $	Engine & Maint.Cost[7] $	TSE Service Cost[8] $	Overall Savings $	PM kg	NOx kg	CO kg	HC kg	CO2 kg	Daily Average Temp F
01/01/03	37.3	1.8	6.2	77.7%	28.6%	6	33.3%	193.5	5.2	$24.17	37.3	$61.48	$34.30	$55.93	$39.86	0.145	5.7	2.9	1.6	353	33.8
01/02/03	60.4	2.9	7.5	94.3%	38.1%	8	37.5%	271.7	4.5	$33.94	60.4	$99.54	$55.54	$90.55	$64.53	0.235	9.3	4.7	2.7	572	21.5
01/03/03	34.8	1.7	11.6	145.1%	14.3%	3	33.3%	208.6	6.0	$26.06	34.8	$57.41	$32.03	$52.23	$37.22	0.136	5.4	2.7	1.5	330	24.7
01/04/03	25.8	1.2	6.5	80.7%	19.0%	4	25.0%	141.8	5.5	$17.71	25.8	$42.60	$23.77	$38.75	$27.62	0.101	4.0	2.0	1.1	245	27.7
01/05/03	57.8	2.8	7.2	90.3%	38.1%	8	37.5%	211.8	3.7	$26.46	57.8	$95.26	$53.15	$86.65	$61.75	0.225	8.9	4.5	2.5	547	27.5
01/06/03	88.3	4.2	11.0	138.0%	38.1%	8	50.0%	300.9	3.4	$37.59	88.3	$145.61	$81.24	$132.45	$94.39	0.344	13.6	6.9	3.9	837	27.9
01/07/03	43.6	2.1	6.2	77.8%	33.3%	7	28.6%	219.9	5.0	$27.47	43.6	$71.87	$40.10	$65.38	$46.59	0.170	6.7	3.4	1.9	413	22.1
01/08/03	69.5	3.3	6.9	86.9%	47.6%	10	50.0%	207.4	3.0	$25.90	69.5	$114.58	$63.92	$104.23	$74.28	0.271	10.7	5.4	3.1	658	33.9
01/09/03	80.2	3.8	8.9	111.4%	42.9%	9	55.6%	277.0	3.5	$34.60	80.2	$132.25	$73.78	$120.30	$85.73	0.313	12.4	6.2	3.5	760	30.9
01/10/03	25.5	1.2	8.5	106.4%	14.3%	3	66.7%	189.4	7.4	$23.66	25.5	$42.10	$23.49	$38.30	$27.30	0.100	3.9	2.0	1.1	242	23.7
01/11/03	24.4	1.2	4.9	60.9%	23.8%	5	60.0%	99.6	4.1	$12.44	24.4	$40.15	$22.40	$36.53	$26.03	0.095	3.7	1.9	1.1	231	22.8
01/12/03	32.0	1.5	6.4	80.0%	23.8%	5	20.0%	139.3	4.3	$17.39	32.0	$52.80	$29.46	$48.03	$34.23	0.125	4.9	2.5	1.4	303	25.8
01/13/03	67.9	3.2	7.5	94.3%	42.9%	9	55.6%	327.2	4.8	$40.86	67.9	$111.91	$62.44	$101.80	$72.55	0.265	10.5	5.3	3.0	643	24.1
01/14/03	25.2	1.2	3.6	45.1%	33.3%	7	42.9%	172.5	6.8	$21.55	25.2	$41.61	$23.21	$37.85	$26.97	0.098	3.9	2.0	1.1	239	19.4
01/15/03	64.7	3.1	5.9	73.5%	52.4%	11	45.5%	267.3	4.1	$33.38	64.7	$106.66	$59.51	$97.03	$69.15	0.252	10.0	5.0	2.8	613	18.3
01/16/03	23.4	1.1	7.8	97.4%	14.3%	3	66.7%	204.3	8.7	$25.52	23.4	$38.56	$21.51	$35.08	$25.00	0.091	3.6	1.8	1.0	222	19.9
01/17/03	8.7	0.4	4.4	54.6%	9.5%	2	50.0%	126.7	14.5	$15.83	8.7	$14.40	$8.03	$13.10	$9.34	0.034	1.3	0.7	0.4	83	10.9
01/18/03	14.0	0.7	4.7	58.2%	14.3%	3	66.7%	134.1	9.6	$16.75	14.0	$23.03	$12.85	$20.95	$14.93	0.054	2.2	1.1	0.6	132	12.5
01/19/03	32.6	1.6	5.4	68.0%	28.6%	6	33.3%	231.2	7.1	$28.87	32.6	$53.78	$30.01	$48.93	$34.87	0.127	5.0	2.5	1.4	309	21.7
01/20/03	37.6	1.8	37.6	470.4%	4.8%	1	100.0%	261.1	6.9	$32.61	37.6	$62.06	$34.62	$56.45	$40.23	0.147	5.8	2.9	1.7	357	17.0
01/21/03	24.8	1.2	6.2	77.6%	19.0%	4	25.0%	186.4	7.5	$23.28	24.8	$40.92	$22.83	$37.23	$26.53	0.097	3.8	1.9	1.1	235	8.9
01/22/03	49.8	2.4	7.1	88.9%	33.3%	7	14.3%	278.3	5.6	$34.76	49.8	$82.07	$45.79	$74.65	$53.20	0.194	7.7	3.9	2.2	472	5.7
01/23/03	43.3	2.1	10.8	135.3%	19.0%	4	50.0%	300.8	6.9	$37.57	43.3	$71.40	$39.84	$64.95	$46.29	0.169	6.7	3.4	1.9	410	2.7
01/24/03	18.6	0.9	3.7	46.6%	23.8%	5	40.0%	193.8	10.4	$25.93	18.6	$30.73	$17.14	$27.95	$19.92	0.073	2.9	1.4	0.8	177	10.3
01/25/03	25.3	1.2	12.7	158.3%	9.5%	2	100.0%	185.9	7.3	$24.87	25.3	$41.77	$23.31	$38.00	$27.08	0.099	3.9	2.0	1.1	240	23.1
01/26/03	13.1	0.6	2.6	32.6%	23.8%	5	0.0%	137.2	10.5	$18.36	13.1	$21.52	$12.01	$19.58	$13.95	0.051	2.0	1.0	0.6	124	25.0
01/27/03	44.1	2.1	8.8	110.1%	23.8%	5	40.0%	311.6	7.1	$41.69	44.1	$72.64	$40.53	$66.08	$47.09	0.172	6.8	3.4	1.9	417	7.4
01/28/03	9.9	0.5	2.5	30.9%	19.0%	4	25.0%	151.0	15.3	$20.21	9.9	$16.30	$9.09	$14.83	$10.57	0.039	1.5	0.8	0.4	94	14.0
01/29/03	27.5	1.3	5.5	68.7%	23.8%	5	40.0%	169.5	6.2	$22.68	27.5	$45.29	$25.27	$41.20	$29.36	0.107	4.2	2.1	1.2	260	27.5
01/30/03	34.5	1.6	5.8	71.9%	28.6%	6	66.7%	209.9	6.1	$28.09	34.5	$56.95	$31.77	$51.80	$36.92	0.135	5.3	2.7	1.5	327	26.8
01/31/03	2.3	0.1	2.3	28.5%	4.8%	1	100.0%	147.5	64.6	$19.73	2.3	$3.77	$2.10	$3.43	$2.44	0.009	0.4	0.2	0.1	22	34.8
Jan 2003 Total	1147	54.6	6.9	86.4%	25.5%	166	42.8%	6457	5.6	$820	1147	$1,891	$1,055	$1,720	$1,226	4.5	177	89	50	10867	21.0
2/1/2003	12.2	0.6	6.1	76.4%	9.5%	2	50.0%	87.0	7.1	$11.65	12.2	$22.60	$11.24	$18.33	$15.52	0.048	1.9	0.9	0.5	116	44.1
2/2/2003	20.4	1.0	6.8	85.1%	14.3%	3	33.3%	137.7	6.7	$18.43	20.4	$37.80	$18.80	$30.65	$25.95	0.080	3.1	1.6	0.9	194	51.2
2/3/2003	37.5	1.8	4.2	52.1%	42.9%	9	66.7%	173.6	4.6	$23.22	37.5	$69.34	$34.48	$56.23	$47.60	0.146	5.8	2.9	1.6	355	52.5
2/4/2003	29.7	1.4	5.0	61.9%	28.6%	6	33.3%	225.9	7.6	$30.23	29.7	$54.95	$27.32	$44.55	$37.72	0.116	4.6	2.3	1.3	281	53.5
2/5/2003	49.7	2.4	6.2	77.7%	38.1%	8	25.0%	203.3	4.1	$27.20	49.7	$91.95	$45.72	$74.55	$63.12	0.194	7.7	3.9	2.2	471	46.7
2/6/2003	59.0	2.8	8.4	105.4%	33.3%	7	28.6%	262.6	4.4	$35.14	59.0	$109.21	$54.31	$88.55	$74.97	0.230	9.1	4.6	2.6	559	48.7
2/7/2003	15.6	0.7	7.8	97.6%	9.5%	2	50.0%	135.2	8.7	$18.09	15.6	$28.89	$14.37	$23.43	$19.83	0.061	2.4	1.2	0.7	148	48.4
2/8/2003	44.8	2.1	11.2	139.9%	19.0%	4	50.0%	233.6	5.2	$31.25	44.8	$82.82	$41.19	$67.15	$56.85	0.175	6.9	3.5	2.0	424	48.0
2/9/2003	28.8	1.4	9.6	120.1%	14.3%	3	0.0%	187.3	6.5	$25.06	28.8	$53.34	$26.53	$43.25	$36.62	0.112	4.4	2.2	1.3	273	47.4
2/10/2003	59.1	2.8	6.6	82.0%	42.9%	9	33.3%	258.8	4.4	$34.62	59.1	$109.27	$54.34	$88.60	$75.01	0.230	9.1	4.6	2.6	560	45.5
2/11/2003	173.5	8.3	21.7	271.0%	38.1%	8	50.0%	245.8	1.4	$32.89	173.5	$320.91	$159.59	$260.20	$220.30	0.677	26.7	13.5	7.6	1644	26.4
2/12/2003	81.4	3.9	5.8	72.7%	66.7%	14	42.9%	335.0	4.1	$44.82	81.4	$150.62	$74.90	$122.13	$103.40	0.318	12.5	6.3	3.6	772	16.7
2/13/2003	72.8	3.5	10.4	130.0%	33.3%	7	100.0%	329.5	4.5	$44.08	72.8	$134.71	$66.99	$109.23	$92.48	0.284	11.2	5.7	3.2	690	11.1
2/14/2003	200.5	9.5	66.8	835.4%	14.3%	3	66.7%	256.6	1.3	$34.34	200.5	$370.93	$184.46	$300.75	$254.64	0.782	30.9	15.6	8.8	1900	12.5
2/15/2003	11.0	0.5	0.0	0.0%	0.0%	0	0.0%	171.4	15.6	$22.93	11.0	$20.35	$10.12	$16.50	$13.97	0.043	1.7	0.9	0.5	104	4.6
2/16/2003	11.8	0.6	2.4	29.5%	23.8%	5	20.0%	275.8	23.4	$36.91	11.8	$21.80	$10.84	$17.68	$14.96	0.046	1.8	0.9	0.5	112	2.6
2/17/2003	63.4	3.0	7.9	99.0%	38.1%	8	25.0%	327.0	5.2	$43.76	63.4	$117.23	$58.30	$95.05	$80.48	0.247	9.8	4.9	2.8	600	14.4
2/18/2003	52.9	2.5	6.6	82.6%	38.1%	8	62.5%	245.9	4.6	$32.90	52.9	$97.83	$48.65	$79.33	$67.16	0.206	8.1	4.1	2.3	501	27.6
2/19/2003	62.6	3.0	6.3	78.3%	47.6%	10	50.0%	205.7	3.3	$27.52	62.6	$115.87	$57.62	$93.95	$79.54	0.244	9.6	4.9	2.8	594	37.1
2/20/2003	57.2	2.7	14.3	178.7%	19.0%	4	100.0%	214.5	3.8	$28.70	57.2	$105.79	$52.61	$85.78	$72.62	0.223	8.8	4.4	2.5	542	36.6
2/21/2003	16.7	0.8	3.3	41.8%	23.8%	5	40.0%	124.2	7.4	$16.61	16.7	$30.96	$15.39	$25.10	$21.25	0.065	2.6	1.3	0.7	159	40.3
2/22/2003	32.8	1.6	16.4	205.1%	9.5%	2	50.0%	134.1	4.1	$17.95	32.8	$60.71	$30.19	$49.23	$41.68	0.128	5.1	2.5	1.4	311	38.0
2/23/2003	36.4	1.7	9.1	113.6%	19.0%	4	25.0%	184.2	5.1	$24.64	36.4	$67.28	$33.46	$54.55	$46.19	0.142	5.6	2.8	1.6	345	30.9
2/24/2003	31.7	1.5	6.3	79.3%	23.8%	5	100.0%	214.3	6.8	$33.43	31.7	$58.68	$29.18	$47.58	$40.28	0.124	4.9	2.5	1.4	301	18.5
2/25/2003	40.9	1.9	3.7	46.5%	52.4%	11	18.2%	348.7	8.5	$54.39	40.9	$75.73	$37.66	$61.40	$51.99	0.160	6.3	3.2	1.8	388	12.7
2/26/2003	52.0	2.5	7.4	92.9%	33.3%	7	57.1%	375.6	7.2	$58.59	52.0	$96.26	$47.87	$78.05	$66.08	0.203	8.0	4.0	2.3	493	12.3
2/27/2003	54.7	2.6	6.1	76.0%	42.9%	9	55.6%	304.1	5.6	$47.44	54.7	$101.23	$50.34	$82.08	$69.49	0.213	8.4	4.2	2.4	518	21.5
2/28/2003	52.6	2.5	10.5	131.5%	23.8%	5	80.0%	209.0	4.0	$32.60	52.6	$97.31	$48.39	$78.90	$66.80	0.205	8.1	4.1	2.3	498	32.0
Feb 2003 Total	1462	69.6	8.7	108.8%	28.6%	168	47.6%	6406	4.4	$889	1462	$2,704	$1,345	$2,193	$1,857	5.7	225	113	64	13852	31.5
3/1/2003	31.3	1.5	15.7	195.6%	9.5%	2	50.0%	145.9	4.7	$27.01	31.3	$61.04	$28.80	$46.95	$42.88	0.122	4.8	2.4	1.4	297	35.1
3/2/2003	71.7	3.4	17.9	224.0%	19.0%	4	25.0%	199.7	2.8	$36.96	71.7	$139.78	$65.95	$107.53	$98.21	0.280	11.0	5.6	3.2	679	34.5
3/3/2003	40.2	1.9	6.7	83.7%	28.6%	6	66.7%	241.2	6.0	$44.64	40.2	$78.33	$36.95	$60.25	$55.03	0.157	6.2	3.1	1.8	381	3.9
3/4/2003	19.6	0.9	2.2	27.2%	42.9%	9	33.3%	199.2	10.2	$36.87	19.6	$38.16	$18.00	$29.35	$26.81	0.076	3.0	1.5	0.9	185	26.6
3/5/2003	74.7	3.6	18.7	233.5%	19.0%	4	50.0%	208.6	2.8	$38.62	74.7	$145.73	$68.75	$112.10	$102.38	0.291	11.5	5.8	3.3	708	35.7
3/6/2003	23.4	1.1	3.3	41.7%	33.3%	7	28.6%	204.8	8.8	$37.91	23.4	$45.57	$21.50	$35.05	$32.01	0.091	3.6	1.8	1.0	221	20.8
3/7/2003	22.6	1.1	11.3	141.3%	9.5%	2	50.0%	268.3	11.9	$49.66	22.6	$44.07	$20.79	$33.90	$30.96	0.088	3.5	1.8	1.0	214	23.1
3/8/2003	15.7	0.7	7.9	98.1%	9.5%	2	0.0%	113.9	7.3	$21.09	15.7	$30.62	$14.44	$23.55	$21.51	0.061	2.4	1.2	0.7	149	39.9
3/9/2003	30.8	1.5	6.2	77.0%	23.8%	5	20.0%	213.0	6.9	$39.42	30.8	$60.09	$28.35	$46.23	$42.22	0.120	4.7	2.4	1.4	292	23.6
3/10/2003	55.7	2.7	4.6	58.0%	57.1%	12	58.3%	439.3	7.9	$81.31	55.7	$108.62	$51.24	$83.55	$76.31	0.217	8.6	4.3	2.5	528	14.9
3/11/2003	76.2	3.6	12.7	158.8%	28.6%	6	33.3%	330.2	4.3	$61.13	76.2	$148.66	$70.13	$114.35	$104.44	0.297	11.7	5.9	3.4	722	26.0
3/12/2003	42.1	2.0	14.0	175.3%	14.3%	3	33.3%	202.8	4.8	$37.53	42.1	$82.06	$38.72	$63.13	$57.65	0.164	6.5	3.3	1.9	399	36.6
3/13/2003	34.5	1.6	5.7	71.8%	28.6%	6	33.3%	184.8	5.4	$34.21	34.5	$67.24	$31.72	$51.73	$47.24	0.134	5.3	2.7	1.5	327	24.6
3/14/2003	70.4	3.4	10.1	125.7%	33.3%	7	28.6%	277.0	3.9	$51.27	70.4	$137.22	$64.74	$105.55	$96.40	0.274	10.8	5.5	3.1	667	23.2
3/15/2003	55.4	2.6	18.5	230.6%	14.3%	3	0.0%	187.9	3.4	$34.78	55.4	$107.93	$50.92	$83.03	$75.83	0.216	8.5	4.3	2.4	524	40.1
3/16/2003	63.0	3.0	7.0	87.5%	42.9%	9	22.2%	136.2	2.2	$25.21	63.0	$122.79	$57.93	$94.45	$86.26	0.246	9.7	4.9	2.8	597	50.1
3/17/2003	82.5	3.9	10.3	128.9%	38.1%	8	50.0%	197.1	2.4	$36.49	82.5	$160.91	$75.92	$123.78	$113.05	0.322	12.7	6.4	3.6	782	53.8
3/18/2003	28.9	1.4	14.5	180.6%	9.5%	2	50.0%	112.1	3.9	$20.75	28.9	$56.36	$26.59	$43.35	$39.59	0.113	4.5	2.2	1.3	274	45.0
3/19/2003	42.7	2.0	6.1	76.2%	33.3%	7	28.6%	152.6	3.6	$28.24	42.7	$83.17	$39.24	$63.98	$58.43	0.166	6.6	3.3	1.9	404	39.5
3/20/2003	16.8	0.8	8.4	104.7%	9.5%	2	50.0%	227.8	13.6	$42.17	16.8	$32.66	$15.41	$25.13	$22.95	0.065	2.6	1.3	0.7	159	37.7
3/21/2003	7.0	0.3	1.7	21.7%	19.0%	4	75.0%	31.3	4.5	$5.80	7.0	$13.55	$6.39	$10.43	$9.52	0.027	1.1	0.5	0.3	66	46.3
3/22/2003	20.7	1.0	4.1	51.8%	23.8%	5	0.0%	108.9	5.3	$20.16	20.7	$40.40	$19.06	$31.08	$28.38	0.081	3.2	1.6	0.9	196	46.3
3/23/2003	55.5	2.6	7.9	99.2%	33.3%	7	42.9%	164.8	3.0	$30.51	55.5	$108.29	$51.09	$83.30	$76.08	0.217	8.6	4.3	2.4	526	42.5
3/24/2003	53.9	2.6	9.0	112.4%	28.6%	6	66.7%	175.0	3.2	$32.40	53.9	$105.17	$49.62	$80.90	$73.89	0.210	8.3	4.2	2.4	511	45.6
3/25/2003	35.1	1.7	7.0	87.6%	23.8%	5	60.0%	103.6	3.0	$24.09	35.1	$68.35	$32.25	$52.58	$48.02	0.137	5.4	2.7	1.5	332	56.9
3/26/2003	49.8	2.4	8.3	103.8%	28.6%	6	33.3%	139.6	2.8	$32.45	49.8	$97.14	$45.83	$74.73	$68.25	0.194	7.7	3.9	2.2	472	43.9
3/27/2003	35.8	1.7	5.1	64.0%	33.3%	7	71.4%	155.5	4.3	$36.14	35.8	$69.84	$32.95	$53.73	$49.07	0.140	5.5	2.8	1.6	339	43.7
3/28/2003	24.8	1.2	12.4	155.1%	9.5%	2	100.0%	107.4	4.3	$24.96	24.8	$48.39	$22.83	$37.23	$34.00	0.097	3.8	1.9	1.1	235	56.1
3/29/2003	6.4	0.3	6.4	80.4%	4.8%	1	100.0%	70.9	11.0	$16.49	6.4	$12.55	$5.92	$9.65	$8.81	0.025	1.0	0.5	0.3	61	53.0
3/30/2003	27.7	1.3	3.5	43.3%	38.1%	8	-25.0%	155.0	5.6	$36.03	27.7	$54.05	$25.50	$41.58	$37.97	0.108	4.3	2.2	1.2	263	33.0
3/31/2003	56.6	2.7	14.1	176.7%	19.0%	4	75.0%	176.0	3.1	$40.91	56.6	$110.27	$52.03	$84.83	$77.47	0.221	8.7	4.4	2.5	536	29.7
Mar 2003 Total	1271	60.5	7.9	98.7%	24.7%	161	39.8%	5631	4.4	$1,085	1271	$2,479	$1,170	$1,907	$1,742	5.0	196	99	56	12047	36.5

Table 1 (cont.) - DeWitt Data Summary Report

Date	Total Utilization hours	Average Per Space Utilization hours	Average Duration Per Visit hours	Berth Utilization of 8 hrs[1] %	Facility[2] Utilization %	Total Users #	Repeat Rate[3] %	Energy Use kWh	Average Power per Truck kW	Energy Cost[4] $	Diesel[5] Fuel Saved Gallons	Fuel Cost Savings[6] $	Engine & Maint.Cost[7] $	TSE Service Cost[8] $	Overall Savings $	Direct Emission Reduction[9] PM kg	NOx kg	CO kg	HC kg	CO2 kg	Daily Average Temp F
04/01/03	43.7	2.1	5.5	68.3%	38.1%	8	50.0%	187.1	4.3	$43.49	43.7	$78.69	$40.22	$65.58	$53.33	0.17	6.7	3.4	1.9	414	29.4
04/02/03	41.9	2.0	8.4	104.6%	23.8%	5	40.0%	185.2	4.4	$43.03	41.9	$75.33	$38.50	$62.78	$51.06	0.16	6.4	3.2	1.8	397	36.8
04/03/03	50.4	2.4	6.3	78.7%	38.1%	8	75.0%	179.9	3.6	$41.81	50.4	$90.69	$46.35	$75.58	$61.47	0.20	7.8	3.9	2.2	477	36.5
04/04/03	38.7	1.8	12.9	161.3%	14.3%	3	100.0%	166.8	4.3	$38.78	38.7	$69.69	$35.62	$58.08	$47.23	0.15	6.0	3.0	1.7	367	32.5
04/05/03	48.0	2.3	9.6	120.0%	23.8%	5	40.0%	180.1	3.8	$41.86	48.0	$86.37	$44.14	$71.98	$58.54	0.19	7.4	3.7	2.1	455	36.5
04/06/03	39.9	1.9	20.0	249.6%	9.5%	2	100.0%	185.9	4.7	$43.20	39.9	$71.88	$36.74	$59.90	$48.72	0.16	6.1	3.1	1.8	378	27.9
04/07/03	19.6	0.9	3.3	40.7%	28.6%	6	16.7%	162.8	8.3	$37.84	19.6	$35.19	$17.99	$29.33	$23.85	0.08	3.0	1.5	0.9	185	27.6
04/08/03	65.5	3.1	5.0	63.0%	61.9%	13	46.2%	233.9	3.6	$54.35	65.5	$117.96	$60.29	$98.30	$79.95	0.26	10.1	5.1	2.9	621	32.7
04/09/03	84.9	4.0	9.4	117.9%	42.9%	9	44.4%	267.3	3.1	$62.12	84.9	$152.85	$78.12	$127.38	$103.60	0.33	13.1	6.6	3.7	805	36.5
04/10/03	72.1	3.4	8.0	100.1%	42.9%	9	0.0%	172.2	2.4	$40.01	72.1	$129.75	$66.32	$108.13	$87.94	0.28	11.1	5.6	3.2	683	42.5
04/11/03	57.9	2.8	11.6	144.8%	23.8%	5	40.0%	225.7	3.9	$52.45	57.9	$104.22	$53.27	$86.85	$70.64	0.23	8.9	4.5	2.5	549	41.9
04/12/03	29.4	1.4	7.4	91.9%	19.0%	4	25.0%	123.9	4.2	$28.80	29.4	$52.92	$27.05	$44.10	$35.87	0.11	4.5	2.3	1.3	279	48.2
04/13/03	28.2	1.3	7.0	88.0%	19.0%	4	50.0%	124.2	4.4	$28.86	28.2	$50.67	$25.90	$42.23	$34.34	0.11	4.3	2.2	1.2	267	40.6
04/14/03	44.6	2.1	5.0	61.9%	42.9%	9	22.2%	101.2	2.3	$23.53	44.6	$80.28	$41.03	$66.90	$54.41	0.17	6.9	3.5	2.0	423	54.4
04/15/03	127.1	6.1	7.9	99.3%	76.2%	16	18.8%	118.7	0.9	$27.58	127.1	$228.78	$116.93	$190.65	$155.06	0.50	19.6	9.9	5.6	1204	73.9
04/16/03	100.0	4.8	12.5	156.3%	38.1%	8	25.0%	176.0	1.8	$40.91	100.0	$180.06	$92.03	$150.05	$122.04	0.39	15.4	7.8	4.4	948	52.4
04/17/03	36.3	1.7	18.2	227.1%	9.5%	2	50.0%	174.8	4.8	$40.64	36.3	$65.40	$33.43	$54.50	$44.33	0.14	5.6	2.8	1.6	344	40.8
04/18/03	5.0	0.2	2.5	31.4%	9.5%	2	50.0%	112.6	22.5	$26.18	5.0	$9.03	$4.62	$7.53	$6.12	0.02	0.8	0.4	0.2	48	49.7
04/19/03	17.3	0.8	17.3	216.3%	4.8%	1	0.0%	78.8	4.6	$18.33	17.3	$31.14	$15.92	$25.95	$21.11	0.07	2.7	1.3	0.8	164	54.1
04/20/03	23.7	1.1	11.8	147.8%	9.5%	2	50.0%	71.2	3.0	$16.54	23.7	$42.57	$21.76	$35.48	$28.85	0.09	3.6	1.8	1.0	224	64.4
04/21/03	11.5	0.5	3.8	48.1%	14.3%	3	66.7%	69.6	6.0	$16.18	11.5	$20.76	$10.61	$17.30	$14.07	0.04	1.8	0.9	0.5	109	59.1
04/22/03	41.4	2.0	5.9	74.0%	33.3%	7	57.1%	150.5	3.6	$34.99	41.4	$74.55	$38.10	$62.13	$50.53	0.16	6.4	3.2	1.8	392	50.4
04/23/03	40.4	1.9	5.1	63.1%	38.1%	8	25.0%	169.0	4.2	$34.65	40.4	$72.72	$37.17	$60.60	$49.29	0.16	6.2	3.1	1.8	383	35.5
04/24/03	54.2	2.6	13.5	169.3%	19.0%	4	50.0%	155.9	2.9	$31.98	54.2	$97.53	$49.85	$81.28	$66.10	0.21	8.3	4.2	2.4	513	42.9
04/25/03	35.5	1.7	17.8	221.9%	9.5%	2	50.0%	138.5	3.9	$28.41	35.5	$63.90	$32.66	$53.25	$43.31	0.14	5.5	2.8	1.6	336	50.8
04/26/03	6.2	0.3	3.1	38.6%	9.5%	2	0.0%	80.6	13.0	$16.54	6.2	$11.13	$5.69	$9.28	$7.54	0.02	1.0	0.5	0.3	59	51.4
04/27/03	31.3	1.5	31.3	390.8%	4.8%	1	0.0%	115.5	3.7	$23.68	31.3	$56.28	$28.77	$46.90	$38.15	0.12	4.8	2.4	1.4	296	52.4
04/28/03	12.3	0.6	2.0	25.6%	28.6%	6	33.3%	65.0	5.3	$13.34	12.3	$22.11	$11.30	$18.43	$14.99	0.05	1.9	1.0	0.5	116	65.4
04/29/03	51.4	2.4	12.9	160.6%	19.0%	4	50.0%	100.1	1.9	$20.53	51.4	$92.52	$47.29	$77.10	$62.71	0.20	7.9	4.0	2.3	487	57.1
04/30/03	25.1	1.2	8.4	104.4%	14.3%	3	33.3%	83.7	3.3	$17.16	25.1	$45.12	$23.06	$37.60	$30.58	0.10	3.9	1.9	1.1	238	57.4
Apr 2003Total	1283	61.1	8.0	99.6%	25.6%	161	37.9%	4,357	3.4	$988	1283	$2,310	$1,181	$1,925	$1,566	5.0	198	100	56	12161	46.0
05/01/03	16.9	0.8	3.4	42.2%	23.8%	5	80.0%	70.9	4.2	$14.54	16.9	$29.88	$15.53	$25.33	$20.09	0.07	2.6	1.3	0.7	160	67.6
05/02/03	17.6	0.8	5.9	73.3%	14.3%	3	100.0%	78.6	4.5	$16.12	17.6	$31.15	$16.19	$26.40	$20.94	0.07	2.7	1.4	0.8	167	54.4
05/03/03	10.2	0.5	3.4	42.6%	14.3%	3	33.3%	81.2	7.9	$16.64	10.2	$18.11	$9.41	$15.35	$12.18	0.04	1.6	0.8	0.5	97	50.2
05/04/03	21.4	1.0	7.1	89.0%	14.3%	3	33.3%	89.3	4.2	$18.32	21.4	$37.79	$19.64	$32.03	$25.41	0.08	3.3	1.7	0.9	202	54.2
05/05/03	39.8	1.9	10.0	124.5%	19.0%	4	75.0%	106.0	2.7	$21.74	39.8	$70.51	$36.65	$59.75	$47.40	0.16	6.1	3.1	1.8	377	51.4
05/06/03	43.2	2.1	6.2	77.1%	33.3%	7	57.1%	122.4	2.8	$25.10	43.2	$76.41	$39.71	$64.75	$51.37	0.17	6.6	3.3	1.9	409	58.7
05/07/03	31.2	1.5	2.8	35.4%	52.4%	11	45.5%	104.4	3.4	$21.42	31.2	$55.14	$28.66	$46.73	$37.07	0.12	4.8	2.4	1.4	295	59.8
05/08/03	79.1	3.8	7.9	98.9%	47.6%	10	30.0%	114.9	1.5	$23.58	79.1	$139.98	$72.76	$118.63	$94.11	0.31	12.2	6.1	3.5	749	56.9
05/09/03	68.9	3.3	13.8	172.3%	23.8%	5	40.0%	151.6	2.2	$31.08	68.9	$122.01	$63.42	$103.40	$82.03	0.27	10.6	5.3	3.0	653	58.0
05/10/03	28.6	1.4	28.6	357.1%	4.8%	1	100.0%	82.2	2.9	$16.85	28.6	$50.56	$26.28	$42.85	$33.99	0.11	4.4	2.2	1.3	271	62.8
05/11/03	30.2	1.4	3.8	47.2%	38.1%	8	37.5%	65.0	2.2	$13.34	30.2	$53.45	$27.78	$45.30	$35.94	0.12	4.7	2.3	1.3	286	61.2
05/12/03	44.2	2.1	14.7	184.2%	14.3%	3	66.7%	93.7	2.1	$19.22	44.2	$78.23	$40.66	$66.30	$52.60	0.17	6.8	3.4	1.9	419	53.5
05/13/03	39.2	1.9	4.9	61.2%	38.1%	8	37.5%	124.9	3.2	$25.62	39.2	$69.33	$36.03	$58.75	$46.61	0.15	6.0	3.0	1.7	371	48.4
05/14/03	39.5	1.9	9.9	123.3%	19.0%	4	25.0%	124.4	3.2	$25.52	39.5	$69.83	$36.29	$59.18	$46.95	0.15	6.1	3.1	1.7	374	52.5
05/15/03	28.6	1.4	7.2	89.4%	19.0%	4	25.0%	100.4	3.5	$20.58	28.6	$50.62	$26.31	$42.90	$34.03	0.11	4.4	2.2	1.3	271	58.9
05/16/03	5.9	0.3	3.0	37.0%	9.5%	2	50.0%	86.3	14.6	$17.69	5.9	$10.47	$5.44	$8.88	$7.04	0.02	0.9	0.5	0.3	56	58.3
05/17/03	25.2	1.2	25.2	314.6%	4.8%	1	100.0%	74.5	3.0	$15.28	25.2	$44.55	$23.15	$37.75	$29.95	0.10	3.9	2.0	1.1	238	59.2
05/18/03	28.7	1.4	14.4	179.5%	9.5%	2	0.0%	69.9	2.4	$14.33	28.7	$50.83	$26.42	$43.08	$34.17	0.11	4.4	2.2	1.3	272	64.9
05/19/03	50.3	2.4	5.0	62.9%	47.6%	10	60.0%	89.3	1.8	$18.32	50.3	$89.00	$46.26	$75.43	$59.84	0.20	7.7	3.9	2.2	476	67.9
05/20/03	77.4	3.7	11.1	138.1%	33.3%	7	71.4%	107.0	1.4	$21.95	77.4	$136.91	$71.16	$116.03	$92.05	0.30	11.9	6.0	3.4	733	68.5
05/21/03	38.5	1.8	12.8	160.3%	14.3%	3	66.7%	98.8	2.6	$20.27	38.5	$68.12	$35.40	$57.73	$45.80	0.15	5.9	3.0	1.7	365	52.4
05/22/03	22.8	1.1	7.6	95.0%	14.3%	3	0.0%	78.1	3.4	$12.95	22.8	$40.36	$20.98	$34.20	$27.13	0.09	3.5	1.8	1.0	216	57.3
05/23/03	19.7	0.9	9.8	123.0%	9.5%	2	0.0%	82.9	4.2	$13.76	19.7	$34.84	$18.11	$29.53	$23.42	0.08	3.0	1.5	0.9	187	60.8
05/24/03	3.6	0.2	1.2	15.0%	14.3%	3	66.7%	56.3	15.6	$9.34	3.6	$6.37	$3.31	$5.40	$4.28	0.01	0.6	0.3	0.2	34	56.1
05/25/03	49.2	2.3	16.4	204.9%	14.3%	3	33.3%	85.2	1.7	$14.14	49.2	$87.05	$45.25	$73.78	$58.53	0.19	7.6	3.8	2.2	466	60.4
05/26/03	75.4	3.6	15.1	188.5%	23.8%	5	20.0%	87.6	1.2	$14.52	75.4	$133.49	$69.38	$113.13	$89.75	0.29	11.6	5.9	3.3	715	56.9
05/27/03	70.7	3.4	7.1	88.4%	47.6%	10	40.0%	113.2	1.6	$18.77	70.7	$125.14	$65.04	$106.05	$84.13	0.28	10.9	5.5	3.1	670	60.9
05/28/03	70.9	3.4	8.9	110.7%	38.1%	8	0.0%	78.8	1.1	$13.08	70.9	$125.40	$65.18	$106.28	$84.31	0.28	10.9	5.5	3.1	671	60.3
05/29/03	45.1	2.1	7.5	93.9%	28.6%	6	33.3%	93.7	2.1	$15.54	45.1	$79.77	$41.46	$67.60	$53.63	0.18	6.9	3.5	2.0	427	64.0
05/30/03	17.3	0.8	5.8	71.9%	14.3%	3	100.0%	119.8	6.9	$19.87	17.3	$30.53	$15.87	$25.88	$20.53	0.07	2.7	1.3	0.8	163	63.3
05/31/03	12.7	0.6	4.2	52.9%	14.3%	3	33.3%	57.9	4.6	$9.60	12.7	$22.48	$11.68	$19.05	$15.11	0.05	2.0	1.0	0.6	120	56.7
May 2003 Total	1152	54.8	7.7	96.0%	23.0%	150	44.0%	2,889	2.5	$559	1152	$2,038	$1,059	$1,727	$1,370	4.5	177	89	51	10912	58.6
06/01/03	39.8	1.9	8.0	99.5%	23.8%	5	20.0%	166.4	4.2	$27.60	39.8	$66.07	$36.62	$59.70	$42.98	0.16	6.1	3.1	1.8	377	50.3
06/02/03	25.0	1.2	5.0	62.6%	23.8%	5	80.0%	166.9	6.7	$27.68	25.0	$41.56	$23.03	$37.55	$27.04	0.10	3.9	1.9	1.1	237	54.4
06/03/03	15.2	0.7	7.6	95.0%	9.5%	2	0.0%	131.1	8.6	$21.74	15.2	$25.23	$13.98	$22.80	$16.42	0.06	2.3	1.2	0.7	144	57.5
06/04/03	31.6	1.5	7.9	98.8%	19.0%	4	50.0%	97.3	3.1	$16.13	31.6	$52.48	$29.09	$47.43	$34.15	0.12	4.9	2.5	1.4	300	62.9
06/05/03	37.2	1.8	4.6	58.0%	38.1%	8	50.0%	69.1	1.9	$11.46	37.2	$61.67	$34.18	$55.73	$40.12	0.14	5.7	2.9	1.6	352	58.2
06/06/03	29.9	1.4	10.0	124.7%	14.3%	3	66.7%	74.2	2.5	$12.31	29.9	$49.69	$27.54	$44.90	$32.33	0.12	4.6	2.3	1.3	284	61.9
06/07/03	23.8	1.1	4.8	59.6%	23.8%	5	80.0%	85.0	3.6	$14.10	23.8	$39.56	$21.93	$35.75	$25.74	0.09	3.7	1.8	1.0	226	61.5
06/08/03	32.1	1.5	8.0	100.4%	19.0%	4	0.0%	87.0	2.7	$14.44	32.1	$53.31	$29.55	$48.18	$34.69	0.13	4.9	2.5	1.4	304	67.9
06/09/03	22.3	1.1	5.6	69.7%	19.0%	4	75.0%	89.6	4.0	$14.86	22.3	$37.05	$20.53	$33.48	$24.10	0.09	3.4	1.7	1.0	211	67.1
06/10/03	51.1	2.4	6.4	79.8%	38.1%	8	12.5%	128.5	2.5	$21.32	51.1	$84.77	$46.98	$76.60	$55.15	0.20	7.9	4.0	2.2	484	63.8
06/11/03	29.8	1.4	14.9	186.5%	9.5%	2	100.0%	91.1	3.1	$15.12	29.8	$49.52	$27.45	$44.75	$32.22	0.12	4.6	2.3	1.3	283	70.1
06/12/03	14.4	0.7	7.2	89.9%	9.5%	2	50.0%	116.8	8.1	$19.37	14.4	$23.88	$13.23	$21.58	$15.53	0.06	2.2	1.1	0.6	136	65.3
06/13/03	5.2	0.2	5.2	65.0%	4.8%	1	0.0%	76.8	14.8	$12.73	5.2	$8.63	$4.78	$7.80	$5.62	0.02	0.8	0.4	0.2	49	65.3
06/14/03	10.6	0.5	5.3	66.5%	9.5%	2	50.0%	82.5	7.8	$13.69	10.6	$17.65	$9.78	$15.95	$11.48	0.04	1.6	0.8	0.5	101	63.3
06/15/03	50.3	2.4	5.0	62.8%	47.6%	10	40.0%	92.6	1.8	$15.35	50.3	$83.44	$46.25	$75.40	$54.29	0.20	7.7	3.9	2.2	476	63.9
06/16/03	49.4	2.4	7.1	88.2%	33.3%	7	57.1%	80.5	1.6	$13.34	49.4	$81.98	$45.43	$74.08	$53.33	0.19	7.6	3.8	2.2	468	61.7
06/17/03	32.0	1.5	6.4	80.0%	23.8%	5	60.0%	87.2	2.7	$14.46	32.0	$53.09	$29.42	$47.98	$34.54	0.12	4.9	2.5	1.4	303	68.8
06/18/03	40.8	1.9	4.5	56.7%	42.9%	9	44.4%	78.3	1.9	$12.99	40.8	$67.78	$37.57	$61.25	$44.10	0.16	6.3	3.2	1.8	387	64.1
06/19/03	55.3	2.6	9.2	115.2%	28.6%	6	33.3%	81.8	1.5	$13.57	55.3	$91.83	$50.89	$82.98	$59.74	0.22	8.5	4.3	2.4	524	62.2
06/20/03	30.9	1.5	0.0	0.0%	0.0%	0	0.0%	81.8	2.7	$13.57	30.9	$51.21	$28.38	$46.28	$33.32	0.12	4.8	2.4	1.4	292	62.0
06/21/03	0.0	0.0	0.0	0.0%	4.8%	1	100.0%	81.8	0.0	$13.57	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0.0	0.0	0.0	0	59.6
06/22/03	34.6	1.6	4.3	54.1%	38.1%	8	37.5%	81.8	2.4	$13.57	34.6	$57.49	$31.86	$51.95	$37.40	0.14	5.3	2.7	1.5	328	63.7
06/23/03	55.3	2.6	6.9	86.4%	38.1%	8	37.5%	81.8	1.5	$13.57	55.3	$91.83	$50.89	$82.98	$59.74	0.22	8.5	4.3	2.4	524	68.6
06/24/03	69.7	3.3	5.4	67.1%	61.9%	13	46.2%	81.8	1.2	$9.44	69.7	$115.76	$64.15	$104.60	$75.31	0.27	10.7	5.4	3.1	661	72.2
06/25/03	87.5	4.2	9.7	121.5%	42.9%	9	55.6%	121.1	1.4	$13.97	87.5	$145.25	$80.50	$131.25	$94.50	0.34	13.5	6.8	3.9	829	76.1
06/26/03	79.5	3.8	8.8	110.4%	42.9%	9	33.3%	124.0	1.6	$14.30	79.5	$131.97	$73.14	$119.25	$85.86	0.31	12.2	6.2	3.5	753	80.1
06/27/03	43.2	2.1	14.4	179.8%	14.3%	3	66.7%	80.5	1.9	$9.29	43.2	$71.63	$39.70	$64.73	$46.60	0.17	6.6	3.3	1.9	409	70.2
06/28/03	18.4	0.9	6.1	76.6%	14.3%	3	66.7%	62.7	3.4	$7.24	18.4	$30.53	$16.91	$27.58	$19.85	0.07	2.8	1.4	0.8	174	70.3
06/29/03	29.3	1.4	4.9	60.9%	28.6%	6	50.0%	72.4	2.5	$8.35	29.3	$48.56	$26.91	$43.88	$31.59	0.11	4.5	2.3	1.3	277	75.0
06/30/03	32.2	1.5	10.7	134.2%	14.3%	3	33.3%	73.6	2.3	$8.49	32.2	$53.45	$29.62	$48.30	$34.78	0.13	5.0	2.5	1.4	305	68.9
June 2003 Total	1076	51.3	6.9	86.8%	24.6%	155	45.8%	2,826	2.6	$438	1076	$1,787	$990	$1,615	$1,163	4.2	166	84	47	10200	65.2
2003 Total	7391	351.4	7.7	96.0%	25.3%	961	43.0%	28566	3.8	$4,779	7391	$13,210	$6,800	$11,087	$8,923	28.8	1138	574	325	70039	43.2
1-Year Total	14918	710.4	6.8	85.3%	29.1%	2231	33.6%	56078	3.8	$9,133	14918	$24,656	$13,725	$22,377	$16,003	58.2	2297	1158	656	141364	49.5

Trucker's Costs: Fuel Cost Savings, Engine & Maint. Cost, TSE Service Cost, Overall Savings.

Notes:

[1] Berth Utilization equals Average Duration per Visit divided by 8 hours. 100% Berth Utilization occurs when the Average Duration per visit is exactly 8 hours.

[2] Facility Utilization is calculated by dividing Total Users by the number of berths per facility. 100% Facility Utilization equals an average of one user per parking space per day.

[3] Percentage of customers who have used the service previously.

[4] Energy rates are based on monthly energy bills and include any demand surcharge.

[5] Based on an average fuel consumption of 1.0 gallon per hour.

[6] Based on average monthly Diesel fuel cost per gallon at the Dewitt and Chittenango Service Areas.

[7] Service and maintenance costs are estimated at $0.92 per hour of idling, from ANTARES TSE Market Study.

[8] TSE Service Costs are based on the non-discounted hourly rate of $1.50 per hour.

[9] Average hourly emission factors are from the EPA - Oak Ridge National Laboratory Heavy-Duty Diesel Idling Study.

Figure 1 - DeWitt Monthly Average Temperature, Energy & Hours of Use

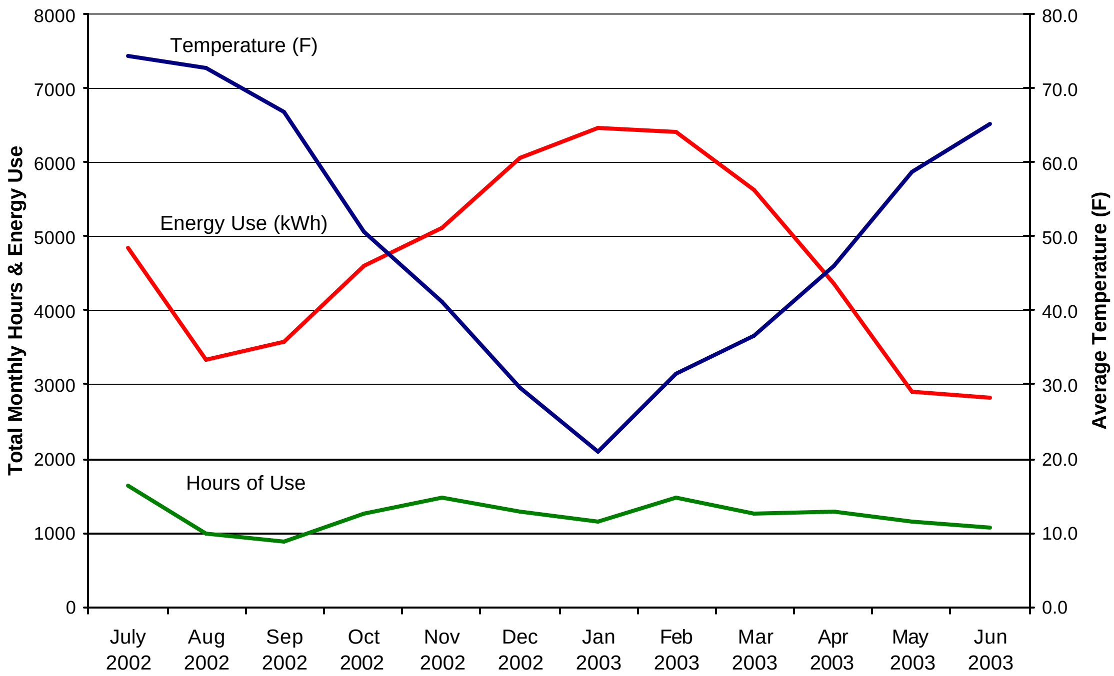
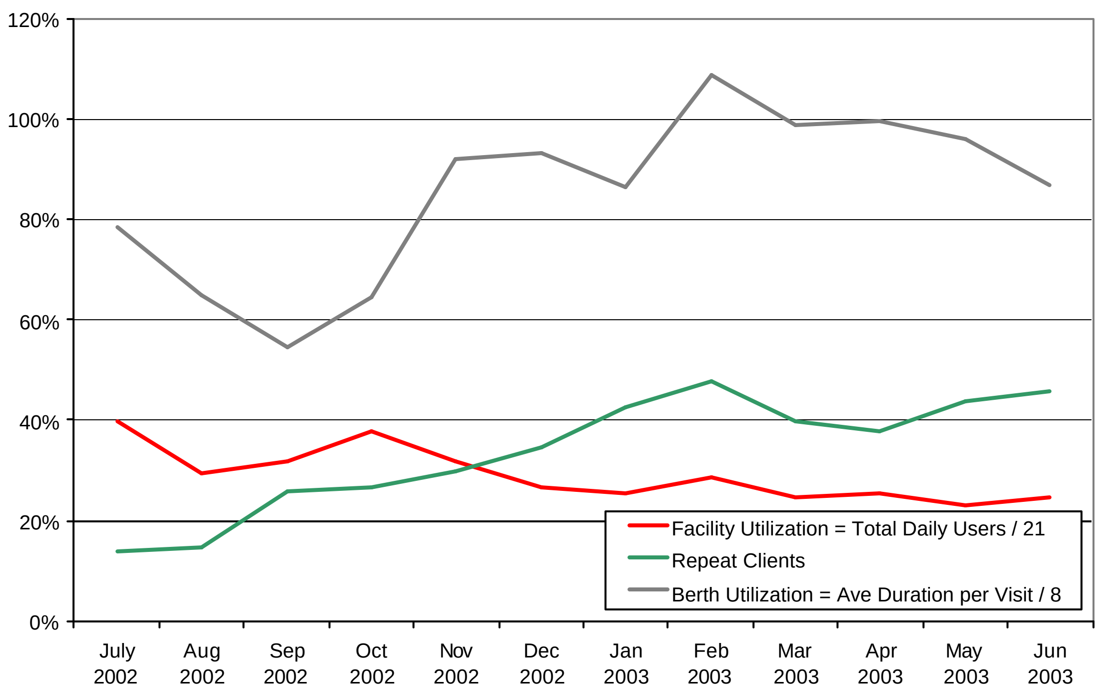


Figure 2 - DeWitt TSE Monthly Utilization



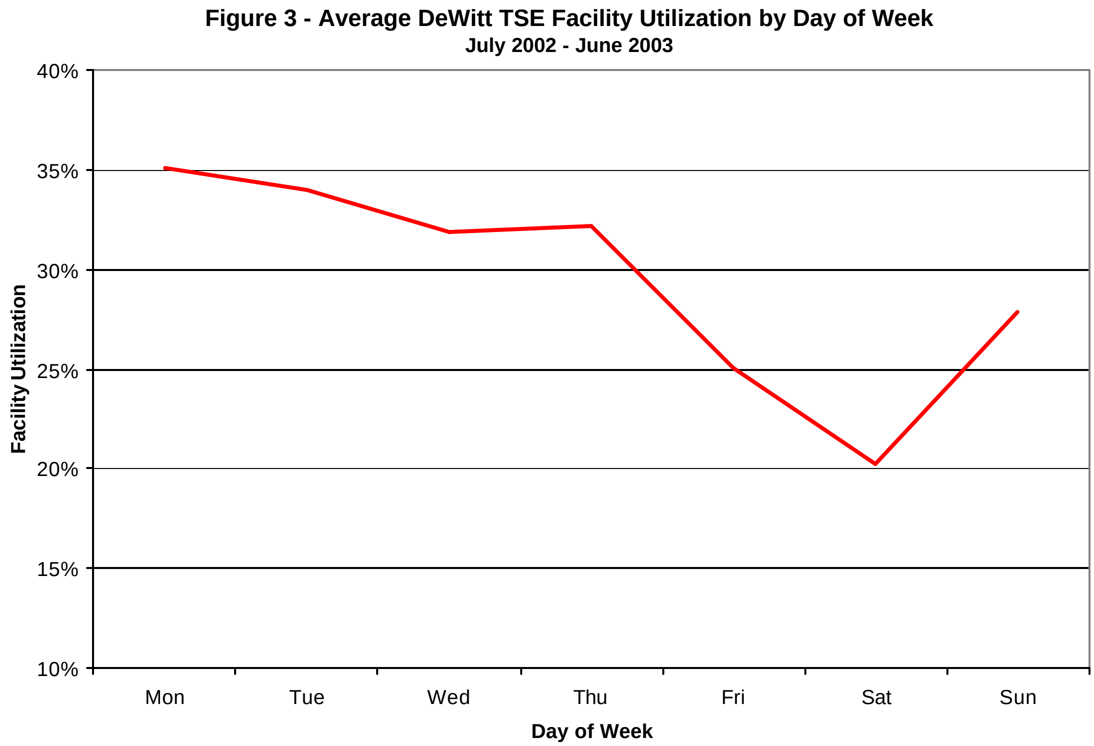


Figure 3 - Average DeWitt TSE Facility Utilization by Day of Week
July 2002 - June 2003
Facility Utilization
40%
35%
30%
25%
20%
15%
10%
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week

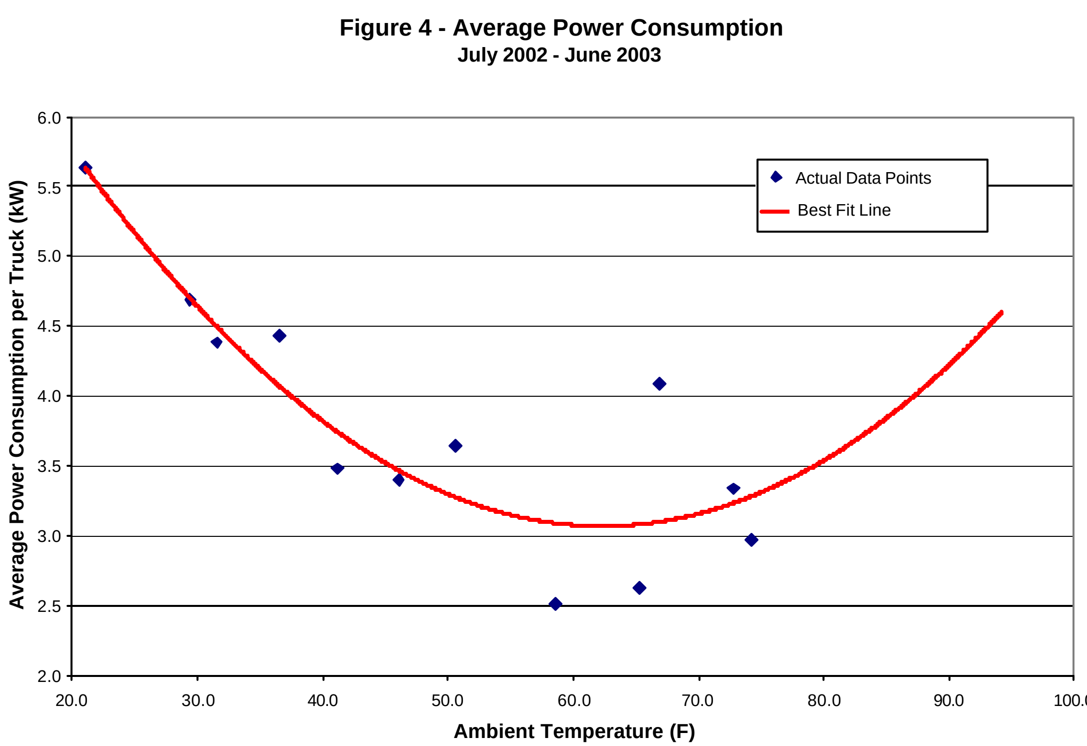


Figure 4 - Average Power Consumption
July 2002 - June 2003
Average Power Consumption per Truck (kW)
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
Ambient Temperature (F)
Actual Data Points
Best Fit Line

Figure 5 - Average Power Consumption per Number of Monthly Degree Days

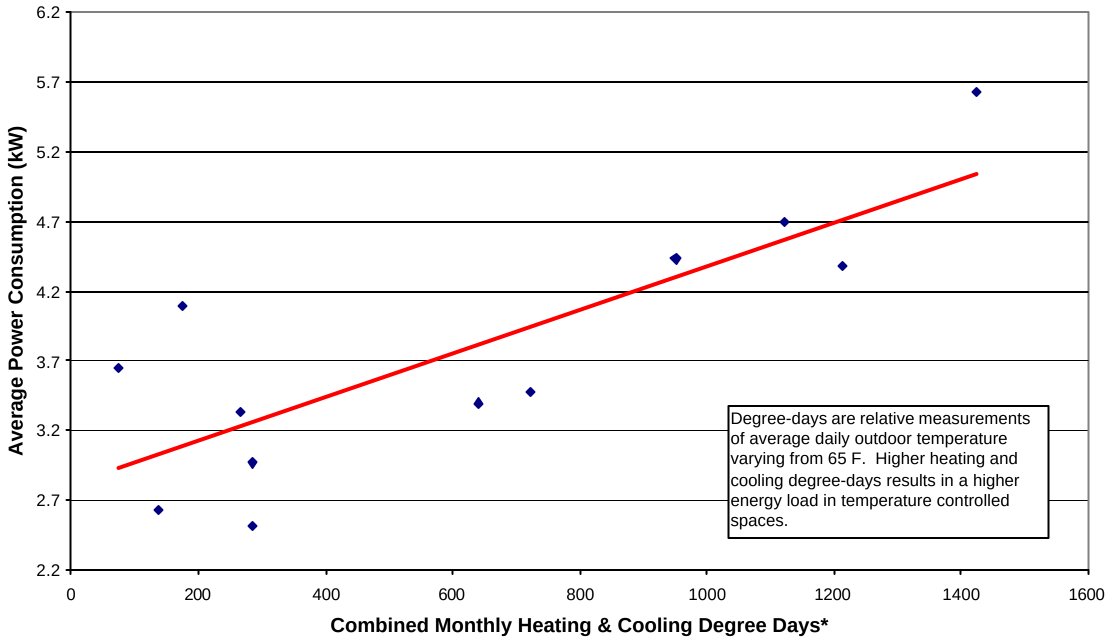
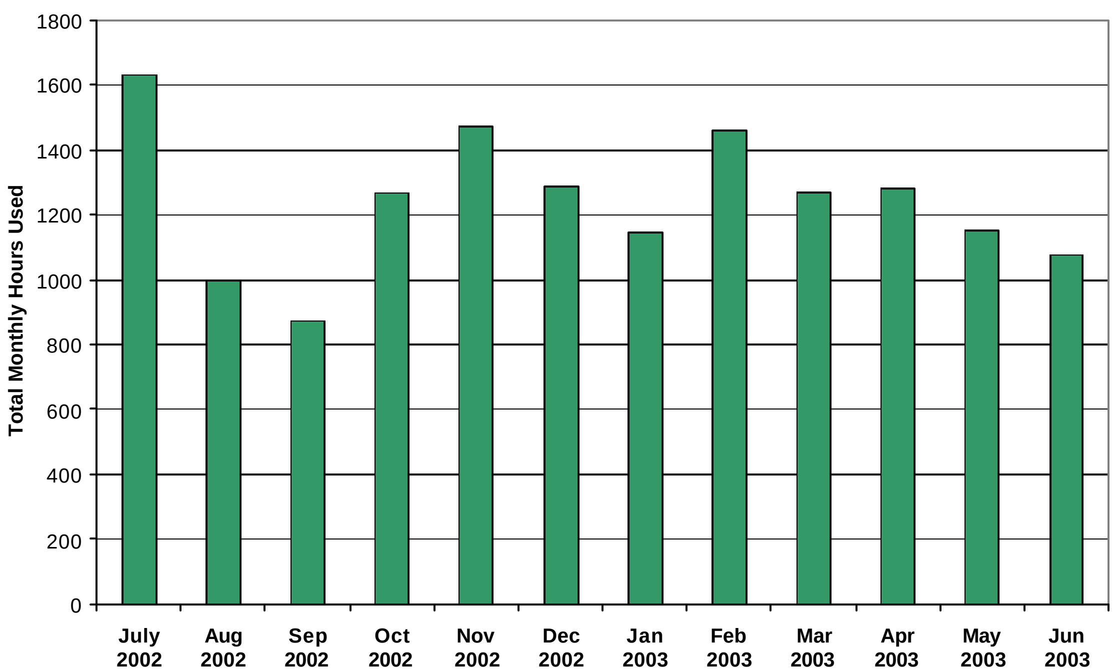


Figure 6 - DeWitt Service Area TSE Monthly Utilization



Year #	0	1	2	3	4	5	6	7	8	9	10
Capital Cost	$ 210,000										
Book Depreciation		$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000
Accel Tax Deprec.		$ 73,500	$ 54,600	$ 32,760	$ 23,121	$ 23,121	$ 2,898	$ -	$ -	$ -	$ -
Deferred Taxes		$ 21,000	$ 13,440	$ 4,704	$ 848	$ 848	$ (7,241)	$ (8,400)	$ (8,400)	$ (8,400)	$ (8,400)
Capital Recovery		$ 42,000	$ 34,440	$ 25,704	$ 21,848	$ 21,848	$ 13,759	$ 12,600	$ 12,600	$ 12,600	$ 12,600
Carrying Charges		$ 63,525	$ 55,978	$ 50,112	$ 56,565	$ 56,580	$ 56,594	$ 56,609	$ 56,624	$ 56,640	$ 56,656
Insurance Cost		$ 525	$ 538	$ 552	$ 565	$ 580	$ 594	$ 609	$ 624	$ 640	$ 656
Return on Equity		$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000	$ 21,000
Return on Debt		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Income Tax		$ -	$ -	$ 2,856	$ 13,152	$ 13,152	$ 21,241	$ 22,400	$ 22,400	$ 22,400	$ 22,400
O&M Cost		$ 116,455	$ 119,367	$ 122,351	$ 125,410	$ 128,545	$ 131,758	$ 135,052	$ 138,429	$ 141,889	$ 145,437
Replacement Cost		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Overhead Labor		$ 105,120	$ 107,748	$ 110,442	$ 113,203	$ 116,033	$ 118,934	$ 121,907	$ 124,955	$ 128,079	$ 131,280
Maintenance		$ 2,100	$ 2,153	$ 2,206	$ 2,261	$ 2,318	$ 2,376	$ 2,435	$ 2,496	$ 2,559	$ 2,623
Electricity Cost		$ 9,235	$ 9,466	$ 9,703	$ 9,945	$ 10,194	$ 10,449	$ 10,710	$ 10,978	$ 11,252	$ 11,534
Required Revenue		$ 179,980	$ 175,345	$ 172,462	$ 181,975	$ 185,124	$ 188,352	$ 191,661	$ 195,053	$ 198,529	$ 202,092

Figure 7 DeWitt SA 10 Year Pro Forma

APPENDIX B

ONE YEAR SUMMARY OF OPERATIONS AT THE CHITTENANGO SERVICE AREA TSE FACILITY

Summary Report

Prepared for

THE NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
Albany, New York

Joseph D. Tario, P.E.
Project Manager

Prepared by

ANTARES GROUP INC.
Landover, Maryland

June 2004

NOTICE

This report was prepared by ANTARES Group Inc. (hereafter "ANTARES") in the course of performing work contracted for and sponsored by the New York State Energy Research and Development Authority, the New York State Thruway Authority and Niagara Mohawk – National Grid (hereafter the "Sponsors"). The opinions expressed in this report do not necessarily reflect those of the Sponsors or the State of New York, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, the Sponsors and the State of New York make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. The Sponsors, the State of New York, and the contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

The data and analysis contained in this report is proprietary information and should not be distributed without consent of IdleAire Technologies Corporation (hereafter "IdleAire" or the "Subcontractor"), ANTARES, and the Sponsors. This report was prepared by ANTARES Group Inc. based on preliminary operational data provided by IdleAire Technologies. ANTARES has not verified the numbers reported by IdleAire. Therefore, conclusions drawn from this report should not be represented as accurate.

ABSTRACT

This report contains a summary of operations at IdleAire's Truck Stop Electrification (TSE) facility at the Chittenango Service Area on the New York State Thruway (I-90) near Syracuse, New York. Tables and charts are provided as a "quick" reference and summary of operations.

IdleAire has installed a total of three TSE facilities in New York State. The first was at Hunts Point, the second at the DeWitt Service Area, and the third at the Chittenango Service Area. ANTARES managed the installation and analyzed operations at both the DeWitt and Chittenango facilities. The Chittenango TSE facility opened for commercial operations in April 2003; however, the first complete month of operations was May 2003.

This report includes data and analysis of the one year period beginning May 2003 through April 2004.

Parameters recorded by IdleAire, the Subcontractor included: system hours of use, number of users, energy consumption, and amb ient weather conditions. ANTARES used data provided by the Subcontractor to determine the benefits of the TSE system at the Chittenango Service Area. Quantified benefits include emissions displaced, fuel savings and cost savings to the end user.

ACKNOWLEDGEMENTS

ANTARES would like to take this opportunity to thank the New York State Energy Research and Development Authority (NYSERDA,) the New York State Thruway Authority (NYSTA) and Niagara Mohawk – National Grid (NM-NG) for providing funding for the two TSE demonstration projects in the Syracuse, New York area. ANTARES would also like to thank IdleAire for their assistance. We would like to especially thank David Rose for providing the data to us in a usable format which enabled us to complete this report.

ANTARES would also like to thank the following pioneers to deploying idle reduction technologies in the state of New York: Joe Tario and Richard Drake of NYSERDA, and Don Hutton and John Gurniak of the NYSTA, who's devotion and effort has shown true progress to reducing truck emissions, fuel consumption and making our highways safer to travel.

Michael T. Panich
Thomas L. Perrot
Jeffrey C. Kim

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SUMMARY

Truck Stop Electrification (TSE) can benefit local air quality, reduce noise, decrease fuel consumption, and lower operational costs to truck drivers and fleets. ANTARES managed the installation of an IdleAire TSE demonstration project at a rest area in the Syracuse, New York region. The TSE facility is located at the Chittenango Service Area off the New York State Thruway (I-90.) ANTARES has conducted preliminary analysis based on data obtained from IdleAire , the Subcontractor for the period beginning May 2003 through April 2004.

The data shows the TSE system has been used for nearly 18,500 hours displacing approximately 72 kilograms (160 pounds) of PM, 2850 kilograms (3.1 tons) of NOx, 1400 kilograms (1.6 tons) of CO, 800 kilograms (0.9 tons) of HC and 175,000 kilograms (193 tons) CO2 emissions. Approximately 18,500 gallons of diesel fuel have been saved by truckers using the TSE system rather than idling their engines. By saving fuel and engine maintenance costs, truckers have saved a net total of approximately $23,000 dollars during the one-year monitoring period. Average power consumption per truck (including overhead / system energy use) was 4.0 kilowatts for the one-year demonstration period.

1-Year Chittenango TSE Statistics
May 2003 - April 2004

		Actual		1-Year Projected	
	Units	1-Year Totals	Monthly Average	At 80% Utilization	At 100% Utilization
Hours of Use	hours	**18,435**	1,536	56,064	70,080
Diesel Fuel Savings	gallons	**18,435**	1,536	56,064	70,080
Diesel Fuel Savings	dollars	$31,616	$2,635	$95,869	$119,837
Service & Maint. Savings	dollars	$14,379	$1,198	$43,730	$54,662
TSE Service Costs	dollars	$23,044	$1,920	$70,080	$87,600
Overall User Savings	dollars	**$22,952**	$1,913	$69,519	$86,899
PM	kg	**71.9**	6.0	219	273
NOx	kg	**2,839**	237	8,634	10,792
CO	kg	**1,431**	119	4,351	5,438
VOC	kg	**811**	68	2,467	3,084
CO_2	kg	**174,689**	14,557	531,262	664,078

During the one-year monitoring period, the number of repeat customers has increased. This is an indication that many of the truckers have become comfortable using the TSE system.

Projected numbers are also shown in the table above, based on 80 and 100% utilization; 100% utilization is defined by 8 hours of use for each of the 24 parking spaces (365 days per year) at the Chittenango Service Area.

As should be expected, total energy use is dependent on the number of users and ambient temperature. Peak power usage occurred in the cold winter months. For a more detailed operational analysis of the TSE system installed at the Chittenango Service Area, tables and charts are provided in the Tables and Figures section of this report.

Section 1
PROJECT DESCRIPTION

ANTARES and the Sponsors (NYDERDA, NYSTA, and NM-NG) have worked together with IdleAire to install two TSE demonstration projects in the Syracuse, New York region. The first is located at DeWitt Service Area (SA), accessible from the eastbound direction of the New York State Thruway, and the second is located at the Chittenango SA on the westbound direction of the Thruway.

The TSE technology developed by IdleAire is mounted on an overhead truss assembly (shown in left picture below) and includes a computer controlled touch-screen console unit that provides heating, air conditioning, electrical convenience outlets, telephone, TV cable, and internet connections. This technology allows truckers to maintain comfort and engine warmth while stopped at truck stops and rest areas without idling their engines. Each user must obtain an IdleAire supplied template ($10) to use the system which is mounted to the passenger side door window opening, as shown below right. The main advantage to this approach is that virtually any long-haul sleeper cab can be connected to the system. IdleAire, the Subcontractor charges a base rate of $1.50 to drivers and $1.25 to registered fleets; currently, a promotional rate of $1.25 is charged to all customers to encourage usage of the technology.

Chittenango Service Area TSE System

IdleAire Service Console Unit

ANTARES responsibility in this demonstration project is to oversee all activities related to the project, provide the sponsors with monthly progress reports, and analyze the business viability and operational data provided by IdleAire. This report summarizes the operations and benefits of the Chittenango Service Area TSE system from May 2003 through April 2004, one full year of operation.

Section 2

DATA TRANSFER AND REPORT FORMAT

IdleAire supplied ANTARES with monthly operational and data reports. The format of the data sets has evolved over the one-year long data analysis period. The data collected includes: weather, minutes of use, number of users and energy use.

The Weather Files contain ambient conditions at the Chittenango SA at 15 minute increments. Temperature, humidity, barometric pressure, rainfall, wind speed and direction are all included in the Weather Files each month. When weather data was not available from IdleAire, data from the Syracuse Airport and ANTARES' weather station (located at the DeWitt SA) was used to "fill-in the gaps."

The minutes used at each berth (parking stall) were included in the Minutes of Use data from IdleAire, the Subcontractor. Minute totals for each individual berth as well as the entire facility were recorded on a daily basis. The number of users or "members" that used the TSE system were also recorded and sent to ANTARES. The member data also includes the number of "New Members" (customers who are using the system for the first time) each day.

As with the weather data, Energy Use data was recorded at approximately 15-minute increments. Energy Use was recorded with a running meter; therefore, energy used during a 15-minute time period must be subtracted from the previous reading to determine the energy used during a 15-minute period. The power used over any given time period can be determined by dividing Energy Use by time (Energy Use/time). An instantaneous power reading was not obtainable; therefore, average power over time was calculated.

ISSUES

Customers can purchase the TSE services in two ways; either using a credit card or fleet member card. Depending on the method of payment, some minutes logged by the system may be recorded for the day the transaction ends, and others may be recorded on the day the transaction begins. Therefore, if a customer stays overnight to the next calendar day, all minutes are not necessarily recorded on the same date. For this reason, the daily minute totals may not be accurate. This method of data recording holds true for the number of users each day.

The Subcontractor used multiple recording procedures over the one-year analysis period. Early numbers included time used for maintenance, repair and testing. These minutes do not represent time that customers were using the system. Additionally, non-paying customers that used the TSE system as a complementary service are included in the member and minute totals. The benefits shown in the Summary, Data Analysis, and Tables and Figures, on pages B-6, B-10, and B-13 respectively are based on the total number of hours reported by the Subcontractor.

Section 3
DATA ANALYSIS

Once the data was received from IdleAire, ANTARES analyzed, formatted and submitted a data summary report to NYSERDA on a monthly basis. Each monthly report was completed within two weeks after ANTARES received the data from the Subcontractor.

Tables and charts summarizing the one-year operational history of the Chittenango TSE facility are shown in Appendix A. **Table 1**, on page B-14, displays utilization data, energy use data, and the calculated benefits of the TSE system on a daily basis. Each month's data, as well as the one-year totals, are also shown in **Table 1**. Descriptions of the table headings are shown at the bottom of table on page B-14 under *Notes*.

Diesel fuel savings and emissions reductions are based on the number of hours the TSE system was used. Nearly 18,500 hours of use have been logged on the system, beginning in May 2003 through April 2004. Based on emission factors obtained from the study conducted by the U.S. Environmental Protection Agency and Oak Ridge National Laboratory on idling trucks, approximately 72 kilograms (160 pounds) of PM, 2850 kilograms (3.1 tons) of NOx, 1400 kilograms (1.6 tons) of CO, 800 kilograms (0.9 tons) of HC and 175,000 kilograms (193 tons) CO2 emissions have been displaced as a result of TSE system usage at the Chittenango SA. These emission reductions benefit the local air shed and do not take into consideration emissions produced from electricity generation required to power the TSE system.

The average diesel fuel consumption rate of idling trucks was determined to be approximately 1 gallon per hour (EPA, ORNL, IdleAire.) Therefore, the total volume of diesel fuel saved by using the TSE system at the Chittenango SA was estimated to be 18,500 gallons.

ANTARES collected diesel price data from the Chittenango Sunoco fuel station on a weekly basis to determine monthly average diesel fuel costs. This data was used to calculate fuel cost savings to the truckers. Total fuel costs displaced during the one-year period was approximately $32,000. Truckers and fleets also reduce service and maintenance costs by reducing engine idle time. There are many costs that have been associated with engine idling. Tune-ups and oil changes can be reduced if engine run time is decreased. Some believe that engine wear from an hour of idling is equivalent to driving the vehicle for one hour. The true cost of idling is a controversial subject which has been difficult to accurately determine. ANTARES has found a number of studies that claim anywhere from $0.12 to $2.50 per hour of idling (ORNL, TMC, IdleAire.) Some factors that may affect the direct cost of idling and engine wear include: idle speed, fuel quality, ambient conditions, accessory loads, and lubricant quality. Other factors that may affect cost calculations and make it difficult to determine the true cost of idling include: maintenance schedule, labor rates, vehicle turnover rate, percentage of idle time, vehicle routes traveled, load, driver behavior, etc. Because all the above mentioned factors can contribute to engine wear and costs incurred by the fleet owner or driver, it is very difficult to determine the portion of costs directly attributable to idling. Actual idling costs can vary from truck to truck. Engine and Maintenance costs of $0.78 per hour of idling were used in this report, based on The Fleet Managers Guide to Fuel Economy by the Truck Maintenance Council (TMC) of the American Trucking Association (ATA).

Totaling *Fuel Cost Savings* and Engine *and Maintenance Costs* minus the *TSE Service Cost*, customers have saved nearly $23,000 during the one-year monitoring period. ANTARES used the non-discounted rate of $1.25 per hour of use for the *Overall Savings* calculations.

Table 1 also shows *Average Duration per Visit* in hours; this is the average length of time each customer uses the TSE system. One-hundred percent *Berth Utilization* is recorded when a customer uses the system for exactly 8 hours. Therefore, greater than 100% *Berth Utilization* can be recorded. **Figure 2** on page B-15 shows the average monthly *Berth Utilization*. Average *Berth Utilization* for the one year duration was over 80%, indicating customers are comfortable with the TSE system and are using it for longer periods of time.

Facility Utilization and *Repeat Rate* are also shown in **Table 1** and **Figure 2**. *Facility Utilization* is calculated by dividing the total number of daily users by the number of TSE parking spaces at the Chittenango SA (24 parking spaces.) *Facility Utilization* has averaged 37% during the one year demonstration period. *Repeat Rate* describes the percentage of users that have previously used the TSE system. The general trend of increasing *RepeatRate* indicates that customers are satisfied with the system after their initial introduction.

Although the 37% utilization may first appear relatively low, it is important to note several factors that may have directly impacted utilization. TSE is a relatively new concept being implemented at truck stops; therefore, most truckers have not been exposed to the technology. As more truckers become aware of the many benefits of TSE, it is anticipated that greater numbers will use the system. Another driving factor is diesel fuel costs. Over the past twelve months, fuel prices have continued to increase at extraordinarily high rates. As diesel fuel prices hover at $1.70 per gallon, the financial incentive to use the TSE system increases. Truckers currently pay $1.25 per hour to use the TSE system; thus, there is a significant monetary incentive to use the TSE system rather than idle the engine. Also, anti-idle laws exist in New York State that prohibit idling for more than 5 minutes during moderate temperatures. Currently, this law is rarely enforced and provides little regulatory incentive to reducing idling time. Another major factor influencing utilization rates at the Chittenango Service Areas is that nearly every truck parking space is equipped with TSE service. This rest area is small (24 truck parking spaces) compared to larger commercial truck stops and travel plazas that can have several hundred parking spaces. The Chittenango Service Area fills up quickly each night which may not allow truckers who would like to use the TSE system to do so if all spaces are occupied. Utilization may increase if a reservation system could be implemented for the TSE equipped parking spaces, thus 'holding' the spaces for those who would like to use the TSE system.

Average monthly energy costs were calculated based on Niagara Mohawk - National Grid (NM-NG) power bills and include any demand surcharges. Demand Surcharges are applied by NM-NG whenever electric energy consumption exceeds 2,000 kWh per month. As shown in **Figure 1** on page B-14, energy use closely correlates the ambient temperature. Peak loads occurred in the winter months due to high heating loads. The Syracuse, NewYork region has characteristically cold winters and relatively mild summers. Conversely, energy loads can also increase in the summer due to air conditioning requirements, particularly in warmer climates. **Figures 5** and **6,** on pages B-16 and B-17 respectively, show average power consumption per truck based on ambient temperature and number of combined heating and cooling degree days respectively. The average power demand per truck was 4.0 kilowatts during the one-year demonstration period. This value includes power used by overhead lights and loads from IdleAire's on-site office; therefore, it does not represent actual demand per truck. The calculated power per truck is representative of total grid load required to power the TSE system.

Facility Utilization (number of users) by day of week at the Chittenango TSE facility has consistently seen peak utilization early in the week (Monday through Friday,) and a decrease in utilization on Saturday and Sunday. This can be attributed to truckers adhering to a just-in-time work week delivery schedule.

Power Consumption is shown in **Figure 7** on page B-17 and describes the typical energy demand in a 24 hour time period. Using the Energy Use data supplied by the Subcontractor, the average amount of energy used during each hour of the day is calculated. Subsequently, this data is compiled over the course of one year and is used to develop a power consumption curve at the fuel station. This curve details the average energy demand during each hour of the day. Note that demand climbs throughout the evening hours and is highest during the night, as expected for trucks resting at the service area.

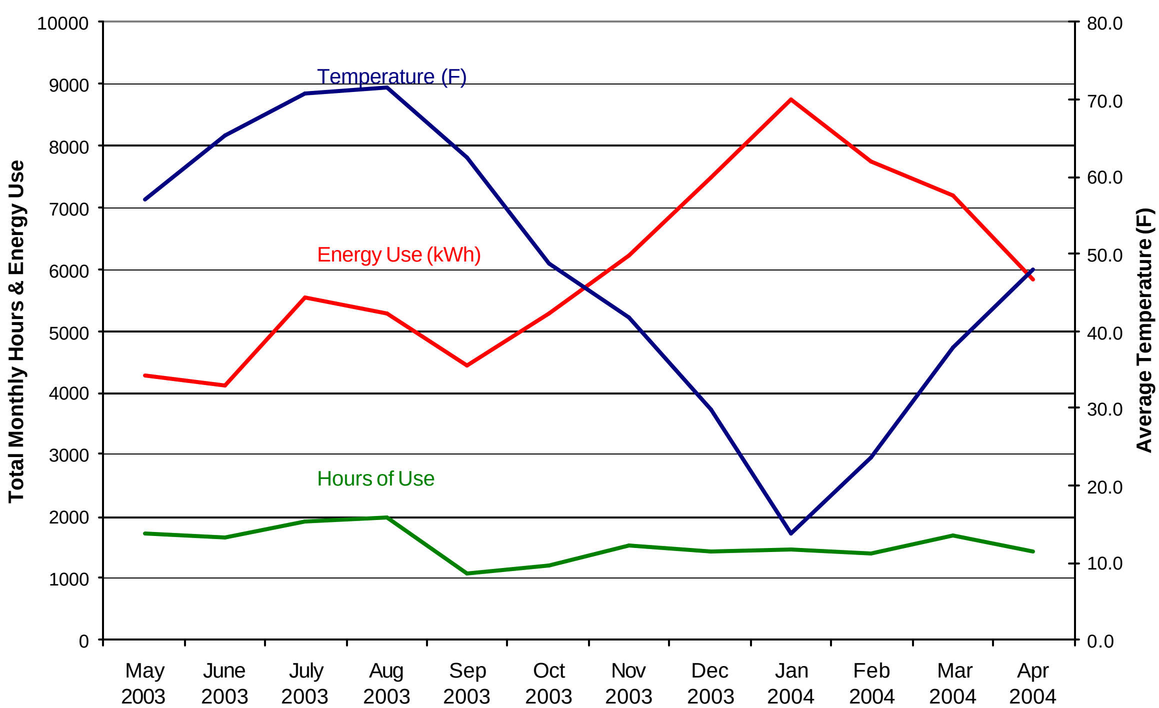
TABLES AND FIGURES

Table 1 – Chittenango Data Summary Report

Date	Total Utilization hours	Average Per Space Utilization hours	Average Duration Per Visit hours	Berth Utilization of 8 hrs[1] %	Facility[2] Utilization %	Total Users #	Repeat Rate[3] %	Energy Use kWh	Average Power per Truck kW	Energy Cost[4] $	Diesel[5] Fuel Saved Gallons	Trucker's Costs: Fuel Cost Savings[6] $	Trucker's Costs: Engine & Maint.Cost[7] $	Trucker's Costs: TSE Service Cost[8] $	Trucker's Costs: Overall Savings $	Direct Emission Reduction[9]: PM kg	Direct Emission Reduction[9]: NOx kg	Direct Emission Reduction[9]: CO kg	Direct Emission Reduction[9]: HC kg	Direct Emission Reduction[9]: CO2 kg	Daily Average Temp F
May Total	1724	71.8	8.5	106.2%	27.3%	203	25.1%	4,286	2.5	$638	1724	$3,128	$1,345	$2,155	$2,317	6.7	266	134	76	16339	56.9
June Total	1645	68.5	7.6	95.6%	29.9%	215	40.5%	4,115	2.5	$619	1645	$2,983	$1,283	$2,056	$2,210	6.4	253	128	72	15585	65.2
July Total	1900	79.2	8.7	108.4%	29.4%	219	45.2%	5,561	2.9	$722	1,900	$3,078	$1,482	$2,375	$2,185	7.4	293	147	84	18003	70.9
August Total	1981	82.5	8.1	100.7%	33.1%	246	48.4%	5,266	2.7	$699	1,981	$3,207	$1,545	$2,476	$2,276	7.7	305	154	87	18771	71.7
Sept Total	1059	44.1	5.3	66.5%	27.6%	199	66.8%	4,450	4.2	$604	1,059	$1,725	$826	$1,324	$1,227	4.1	163	82	47	10036	62.5
Oct Total	1179	49.1	4.8	60.1%	32.9%	245	69.0%	5,276	4.5	$893	1,179	$1,892	$919	$1,473	$1,338	4.6	182	91	52	11169	48.7
Nov Total	1529	63.7	5.4	67.8%	39.2%	282	68.4%	6,228	4.1	$1,321	1,529	$2,449	$1,192	$1,911	$1,730	6.0	235	119	67	14485	41.9
Dec Total	1429	59.6	5.9	73.2%	32.8%	244	72.5%	7,501	5.2	$1,497	1,429	$2,297	$1,115	$1,787	$1,625	5.6	220	111	63	13545	29.8
Jan Total	1457	60.7	6.1	76.2%	32.1%	239	68.6%	8,750	6.0	$1,629	1,457	$2,563	$1,137	$1,821	$1,878	5.7	224	113	64	13807	13.7
Feb Total	1394	58.1	6.0	74.8%	33.5%	233	67.8%	7,756	5.6	$1,331	1,394	$2,556	$1,087	$1,742	$1,901	5.4	215	108	61	13207	23.5
March Total	1705	71.1	5.8	73.0%	39.2%	292	71.9%	7,186	4.2	$1,100	1,705	$3,141	$1,330	$2,132	$2,340	6.7	263	132	75	16161	37.7
April Total	1433	59.7	6.2	77.2%	32.2%	232	77.6%	5,828	4.1	$935	1,433	$2,597	$1,118	$1,792	$1,924	5.6	221	111	63	13582	48.0
1-Year Total	**18435**	**64.0**	**6.5**	**81.6%**	**32.4%**	**2849**	**60.2%**	**72204**	**4.0**	**$11,989**	**18,435**	**$31,616**	**$14,379**	**$23,044**	**$22,952**	**71.9**	**2839**	**1431**	**811**	**174689**	**47.6**

Notes:
[1]Berth Utilization equals Average Duration per Visit divided by 8 hours. 100% Berth Utilization occurs when the Average Duration per visit is exactly 8 hours.
[2]Facility Utilization is calculated by dividing Total Users by the number of berths per facility. 100% Facility Utilization equals an average of one user per parking space per day.
[3]Percentage of customers who have used the service previously.
[4]Energy rates are based on monthly energy bills and include any demand surcharge.
[5]Based on an average fuel consumption of 1.0 gallon per hour.
[6]Based on average monthly Diesel fuel cost per gallon at the Chittenango Service Area Sunoco fuel station.
[7]Engine and maintenance costs were calculated to be $0.78 per hour of idling, based on The Fleet Managers Guide to Fuel Economy by TMC.
[8]TSE Service Costs are based on the hourly rate of $1.25 per hour.
[9]Average hourly emission factors are from the EPA - Oak Ridge National Laboratory Heavy-Duty Diesel Idling Study.

Figure 1 - Chittenango Monthly Average Temperature, Energy & Hours of Use



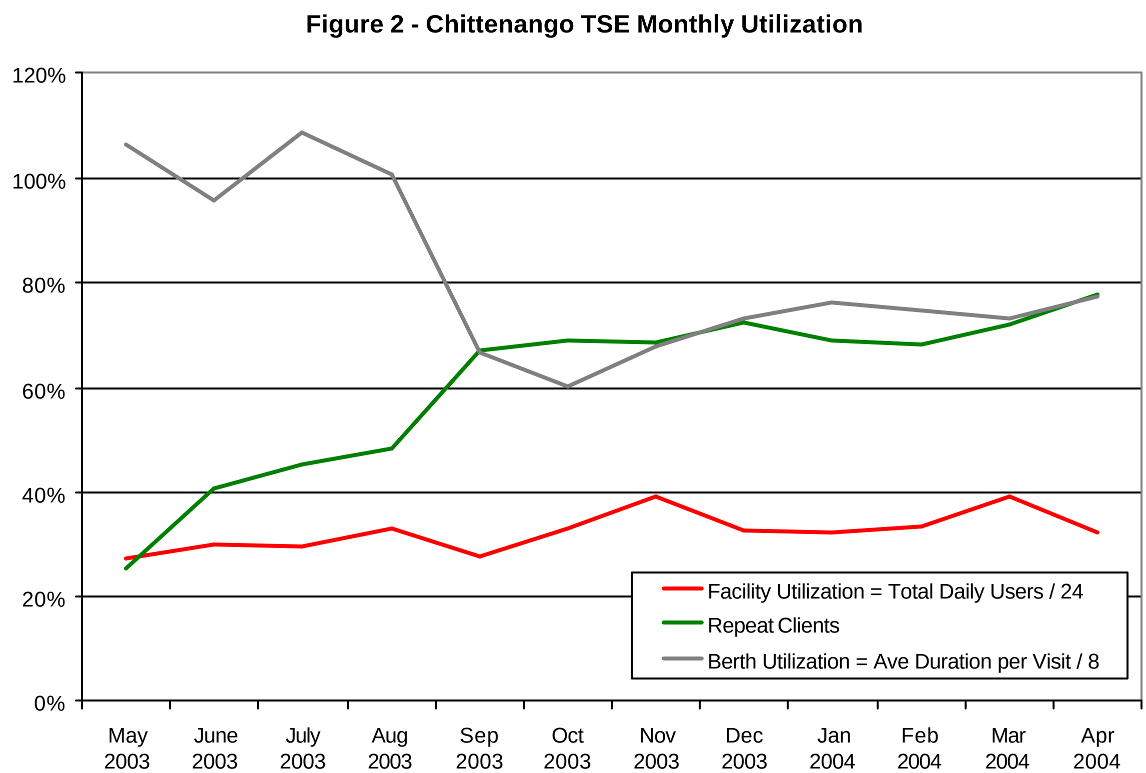


Figure 2 - Chittenango TSE Monthly Utilization
120%
100%
80%
60%
40%
20%
0%
May 2003
June 2003
July 2003
Aug 2003
Sep 2003
Oct 2003
Nov 2003
Dec 2003
Jan 2004
Feb 2004
Mar 2004
Apr 2004
Facility Utilization = Total Daily Users / 24
Repeat Clients
Berth Utilization = Ave Duration per Visit / 8

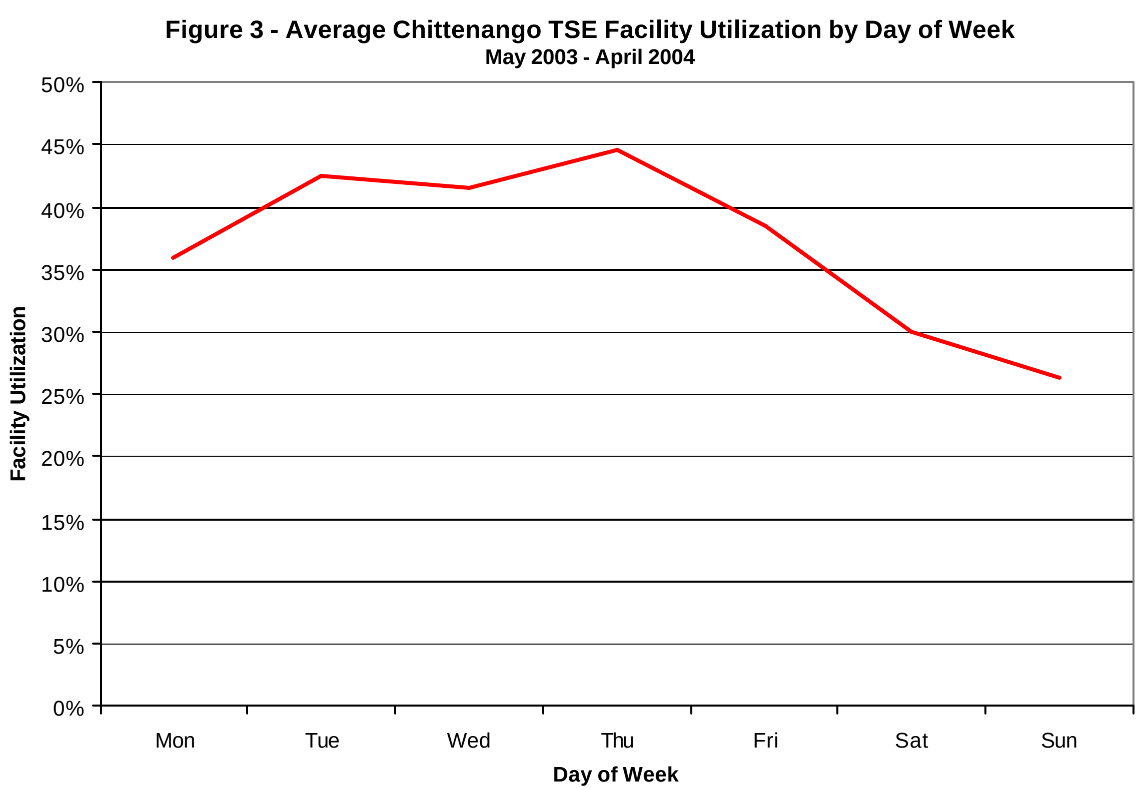


Figure 3 - Average Chittenango TSE Facility Utilization by Day of Week
May 2003 - April 2004
Facility Utilization
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Day of Week

Figure 4 - Average Power Consumption at Chittenango
May 2003 - April 2004

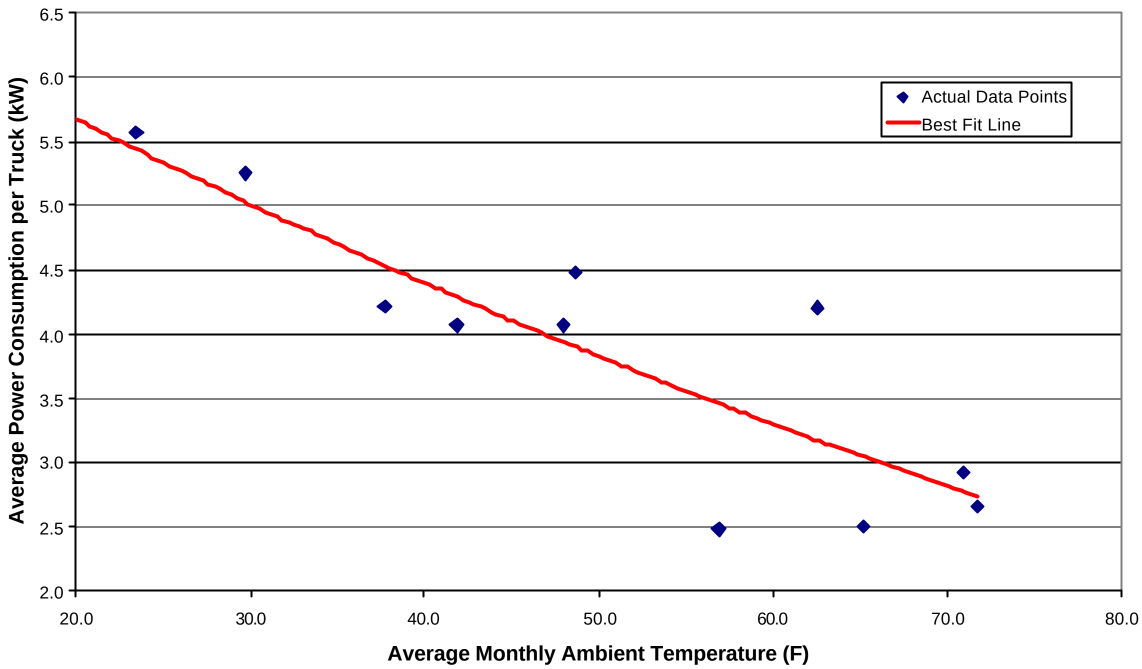


Figure 5 - Average Power Consumption per Number of Monthly Degree Days

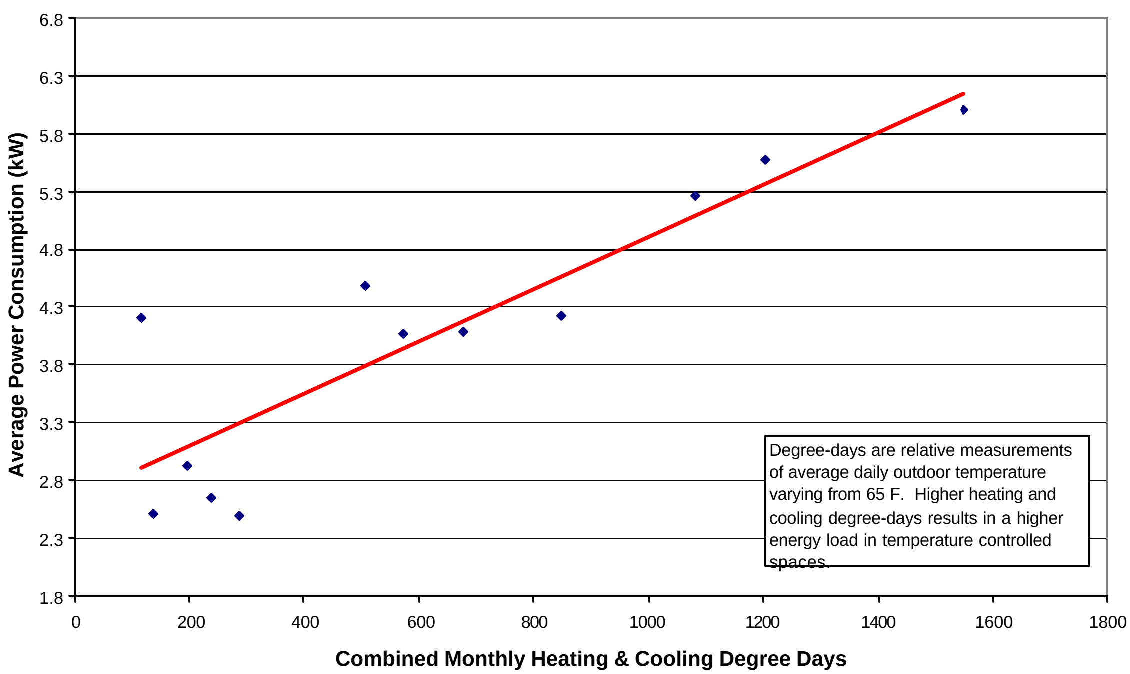


Figure 6 - Chittenango Service Area TSE Monthly Utilization

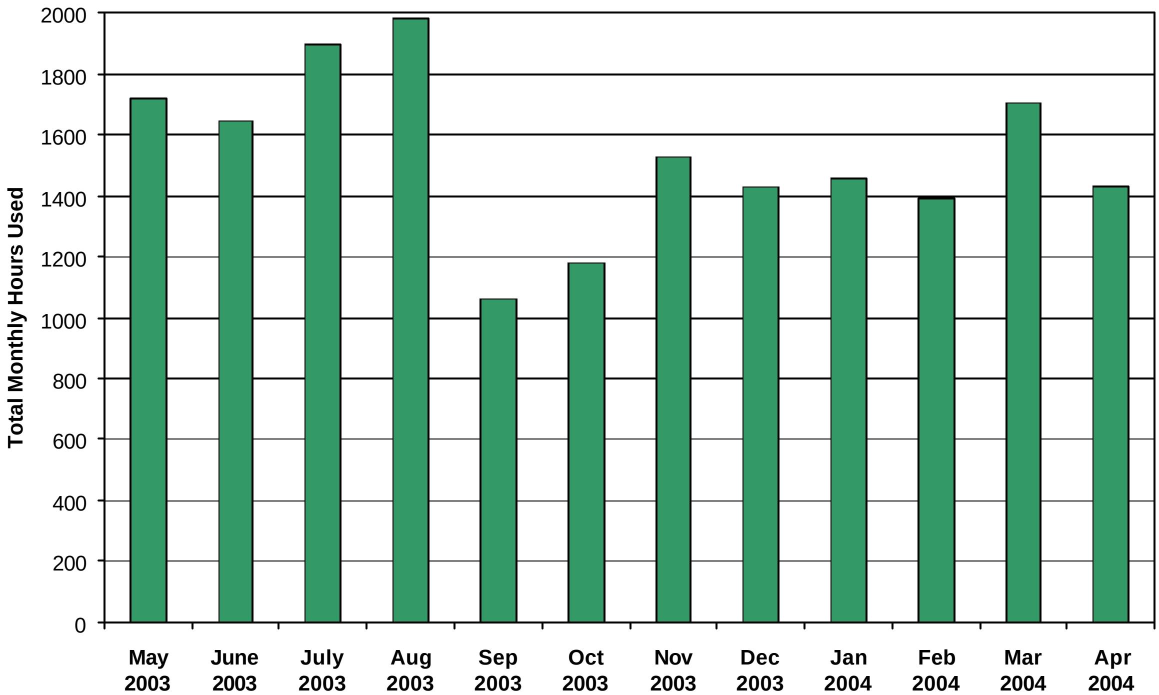
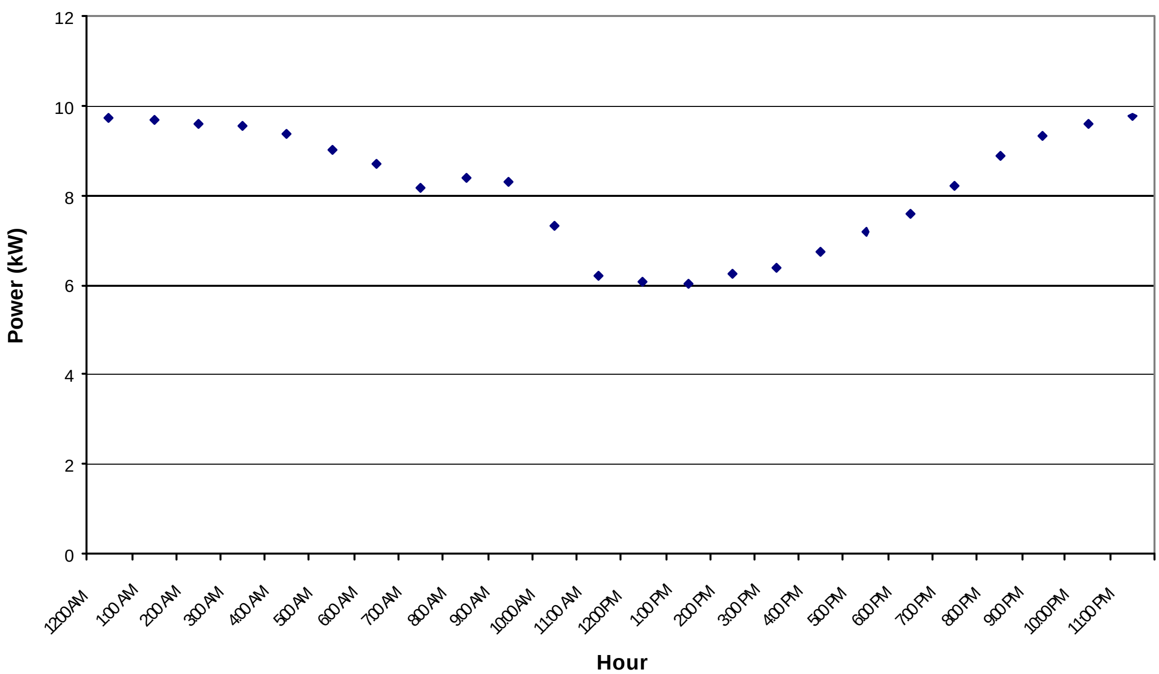


Figure 7 - Average Power Consumption over 24 Hours at Chittenango
May 2003 - April 2004



Year #	0	1	2	3	4	5	6	7	8	9	10
Capital Cost	$ 240,000										
Book Depreciation		$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000
Accel Tax Deprec.		$ 84,000	$ 62,400	$ 37,440	$ 26,424	$ 26,424	$ 3,312	$ -	$ -	$ -	$ -
Deferred Taxes		$ 24,000	$ 15,360	$ 5,376	$ 970	$ 970	$ (8,275)	$ (9,600)	$ (9,600)	$ (9,600)	$ (9,600)
Capital Recovery		$ 48,000	$ 39,360	$ 29,376	$ 24,970	$ 24,970	$ 15,725	$ 14,400	$ 14,400	$ 14,400	$ 14,400
Carrying Charges		$ 72,600	$ 63,975	$ 57,270	$ 64,646	$ 64,662	$ 64,679	$ 64,696	$ 64,713	$ 64,731	$ 64,749
Insurance Cost		$ 600	$ 615	$ 630	$ 646	$ 662	$ 679	$ 696	$ 713	$ 731	$ 749
Return on Equity		$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000	$ 24,000
Return on Debt		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Income Tax		$ -	$ -	$ 3,264	$ 15,030	$ 15,030	$ 24,275	$ 25,600	$ 25,600	$ 25,600	$ 25,600
O&M Cost		$ 119,556	$ 122,545	$ 125,609	$ 128,749	$ 131,967	$ 135,267	$ 138,648	$ 142,115	$ 145,667	$ 149,309
Replacement Cost		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Overhead Labor		$ 105,120	$ 107,748	$ 110,442	$ 113,203	$ 116,033	$ 118,934	$ 121,907	$ 124,955	$ 128,079	$ 131,280
Maintenance		$ 2,400	$ 2,460	$ 2,522	$ 2,585	$ 2,649	$ 2,715	$ 2,783	$ 2,853	$ 2,924	$ 2,997
Electricity Cost		$ 12,036	$ 12,337	$ 12,645	$ 12,961	$ 13,286	$ 13,618	$ 13,958	$ 14,307	$ 14,665	$ 15,031
Required Revenue		$ 192,156	$ 186,520	$ 182,879	$ 193,395	$ 196,630	$ 199,946	$ 203,344	$ 206,828	$ 210,398	$ 214,058

Figure 8. Chittenango SA 10 year Pro Forma

APPENDIX C

DATA ANALYSIS TERMS

Total Utilization is the number of hours the TSE system is used each day. The Number of Minutes Used is data supplied by IdleAire. Total Utilization equals the Number of Minutes Used on a given day divided by 60 minutes.

Average per Space Utilization describes the average number of hours that each TSE equipped parking space is used at the fuel station. At the Chittenango Service Area Sunoco fuel station, there are 24 parking spaces; 21 TSE-equipped parking spaces exist at the DeWitt Service Area Sunoco fuel station. Average per Space Utilization equals Total Utilization divided by the number of parking spaces at the fuel station.

Average Duration per Visit is the average amount of time each customer uses the TSE system. The Average Duration per Visit equals the Total Utilization divided by the Total Users. The number of Total Users is data supplied by the Subcontractor.

Berth Utilization measures the frequency that a TSE-equipped parking space is used eight hours per day. One-hundred percent Berth Utilization occurs when a customer uses the system for exactly 8 hours. Hence, greater than 100% Berth Utilization can be recorded for a maximum daily Berth Utilization of 300%. Berth Utilization equals Average Duration per Visit divided by 8 hours.

Facility Utilization describes the amount of activity at the TSE facility, and it is calculated by dividing the total number of daily users by the number of TSE parking spaces at the facility. One hundred percent Facility Utilization equals an average of one user per parking space per day.

Repeat Rate describes the percentage of users that have previously used the TSE system. The general trend of increasing Repeat Rate indicates that customers are satisfied with the system after their initial introduction. Repeat Rate is calculated by subtracted New Users from Total Users, and dividing this figure by the Total Users.

Average Power per Truck equals the Energy Use divided by the Total Utilization. Energy Use is data supplied by the Subcontractor, which includes power used by overhead lights and loads from IdleAire's on-site office. Thus, the Average Power demand per Truck does not represent the actual demand per truck while using TSE services; instead, the calculated power per truck is representative of total grid load required to power the TSE system.

Energy Cost equals Energy Use multiplied by the Energy rate. Average monthly energy costs are calculated based on Niagara Mohawk – National Grid (NM-NG) power bills and include any demand surcharges. Demand Surcharges are applied by NM-NG whenever electric energy consumption exceeds 2,000 kWh per month.

Diesel Fuel Saved is the number of gallons of diesel fuel which are not consumed while idling the truck engine; rather, electricity is used to meet the truck cabin's demands for heating, air conditioning, and powering sleeper cab appliances (TV, refrigerator, microwave, etc.) while resting at the truck stop. Diesel Fuel Saved is calculated by multiplying Total Utilization hours by the Idle Fuel Consumption rate.

Fuel Cost Savings represents the financial savings by employing TSE, rather than using diesel fuel to idle the engine. Fuel Cost Savings is based on Diesel Fuel Saved multiplied by the Diesel Fuel Cost, per gallon. Diesel Fuel Cost is based on average monthly Diesel fuel cost per gallon at the specific fuel station.

Engine and Maintenance Cost equals Total Utilization multiplied by Service and Maintenance Cost per hour of idling. By reducing truck engine idle time, truck drivers and fleets reduce service and maintenance costs. There are many costs that have been associated with engine idling. Tune-ups and oil changes can be reduced if engine run time is decreased. Some believe that engine wear from an hour of idling is equivalent to driving the vehicle for one hour. The true cost of idling is a controversial subject which has been difficult to accurately determine. ANTARES has found a number of studies that claim anywhere from $0.12 to $2.50 per hour of idling (ORNL, TMC, IdleAire). Some factors that may affect the direct cost of idling and engine wear include: idle speed, fuel quality, ambient conditions, accessory loads, and lubricant quality. Other factors that may affect cost calculations and make it difficult to determine the true cost of idling include: maintenance schedule, labor rates, vehicle turnover rate, percentage of idle time, vehicle routes traveled, load, driver behavior, etc. Because all the above mentioned factors can contribute to engine wear and costs incurred by the fleet owner or driver, it is very difficult to determine the portion of costs directly attributable to idling. Actual idling costs can vary from truck to truck.

TSE Service Cost is the total cost to use the TSE facility and is based on the number of hours the TSE system was used. TSE Service Costs are based on the non-discounted hourly rate of $1.25 per hour at the Chittenango Service Area Sunoco fuel station. At the DeWitt Service Area Sunoco fuel station, TSE Service Costs are based on the non-discounted hourly rate of $1.50 per hour. TSE Service Cost equals the hourly rate multiplied by Total Utilization.

Overall Savings is the total of Fuel Cost Savings and Engine and Maintenance Costs, minus TSE Service Cost. Overall savings represents the total amount saved by using the TSE facility, rather than idling the truck's engine. The Overall Savings is based on the number of hours the TSE system was used.

Average hourly emission factors are obtained from the study conducted by the U.S. Environmental Protection Agency and Oak Ridge National Laboratory Heavy-Duty Diesel Idling Study. The factors are as follows: PM: 0.0039 kg/hr; NOx: 0.154 kg/hr; CO: 0.0776 kg/hr; HC: 0.044 kg/hr; CO_2: 9.476 kg/hr.

Daily Average Temperature is the average temperature recorded by the Subcontractor at the fuel station. Energy use closely correlates with the ambient temperature. Peak loads occurred in the winter months due to high heating loads. The Syracuse, New York region has characteristically cold winters and relatively mild summers. Conversely, energy loads can also increase in the summer due to air conditioning requirements, particularly in warmer climates.

Power Consumption describes the typical energy demand in a 24 hour time period. Using the Energy Use data supplied by the Subcontractor, the average amount of energy used during each hour of the day is calculated. Subsequently, this data is compiled over the course of one year and is used to develop a power consumption curve at the fuel station. This curve details the average energy demand during each hour of the day.

APPENDIX D

MATHEMATICAL DEFINITIONS

Variable	Formulation
Total Utilization (hours)	Numbers of minutes used per day (data from IdleAire) / 60
Average per Space Utilization (hours)	(Total Utilization) / (Number of parking spaces at truck stop)
Average Duration per Visit (hours)	Total Utilization / Total Users
Berth Utilization of 8 hrs (%)	Average Duration per Visit / 8
Facility Utilization (%)	(Total Users) / (Number of parking spaces at truck stop)
Total Users (#)	Data supplied by IdleAire
Repeat Rate (%)	(Total Users – New Users) / Total Users
Energy Use (kWh)	Data supplied by IdleAire
Average Power per Truck (kW)	Energy Use / Total Utilization
Energy Cost ($)	(Energy Use)*(Energy Cost per kWh)
Diesel Fuel Saved (Gallons)	(Total Utilization) * (Idle Fuel Consumption)
Fuel Cost Savings ($)	(Diesel Fuel Saved) * (Diesel Fuel Cost, per gallon)
Engine & Maintenance Cost ($)	(Total Utilization) * (Service & Maintenance Cost per hour of idling)
TSE Service Cost ($)	(Total Utilization) * $1.25
Overall Savings ($)	(Fuel Cost Savings + Engine & Maintenance Cost) – (TSE Service Cost)
PM (kg)	(Total Utilization) * (PM Average Emissions)
NOx (kg)	(Total Utilization) * (NOx Average Emissions)
CO (kg)	(Total Utilization) * (CO Average Emissions)
HC (kg)	(Total Utilization) * (HC Average Emissions)
CO2 (kg):	(Total Utilization) * (CO2 Average Emissions)
Daily Average Temperature (^{0}F)	Data supplied by IdleAire
Diesel Fuel Cost	Average cost of diesel fuel during specified month at particular truck stop
Idle Fuel Consumption	1.0 gallons/hr
PM Average Emissions	0.0039 kg/hr
NOx Average Emissions	0.154 kg/hr
CO Average Emissions	0.0776 kg/hr
HC Average Emissions	0.044 kg/hr
CO_2 Average Emissions	9.476 kg/hr