FORSCOM Executive Summary
Energy Savings Verification at Fort Drum

A pilot program to quantify energy savings at Fort Drum shows that detailed engineering estimates and careful metering and monitoring of actual energy use and energy use factors are critical to accurately verify savings. As Forces Command moves to establish a broad Energy Savings Performance initiative, accurate verification will ensure that Forces Command can offer terms that attract competent ESP contractors but not overpay them because of inadequate monitoring.

The pilot program, conducted by the Pacific Northwest National Laboratory, provided engineering estimates of savings from six energy conservation projects at Fort Drum. PNNL is now in the process of measuring actual savings from each project; three are reported here and additional data is being collected on the other three.

Overall, engineering analyses predicted savings of 230 kilowatts for the three projects. Actual measurements ranged from a savings of 227 kilowatts in some weeks to an increase of 663 kilowatts in others. In general, engineering estimates of savings were higher than the measured savings, as shown in Table 1. More importantly, confounding factors, which were not anticipated when the verification metering was planned and installed, hindered analyses and prevented accurate verification of savings for two of the three projects. More accurate and accessible records about changes in building use, population, and work orders for installation of energy-using equipment might have led to more accurate analyses. Using application-specific verification protocols immediately before and after retrofit activities would have given a much clearer picture of actual savings. The measured savings of 138 average kilowatts shown in Table 1 is 60% of the predicted savings.

In early 1995 Fort Drum used FEMP funding to replace incandescent lights with efficient fixtures in entry halls on New-Post. Sixty-eight buildings were retrofitted with 648 compact fluorescent lights. In preliminary studies, engineers estimated that the new lights would reduce the electric load by 39 average kilowatts. Measurements indicate the savings were less--about 27 kilowatts. Project staff postulate that many of the incandescent lamps were burned out and that the actual load was less than the value used in original estimates of potential savings.

A second project, which began in December 1995 and ended in January 1996, retrofitted six buildings at the new airfield with more energy-efficient lighting technologies. Engineers estimated the project would save 21 average kilowatts (187 megawatt-hours per year). Measurements indicate the project saves only about 56 megawatt-hours per year. Engineers speculate lights at the airfield are getting only about 30 percent of the use they originally anticipated leading to a discrepancy between the estimated and measured savings.

A third project removed every other lamp from the New-Post streetlights. De-lamping eliminates 190 kW of connected load, or about 2% of the site's nighttime baseload. A reduction of this magnitude should be, and indeed is visible at the substation meter. The reduction in electric load was measured at 5 of the 7 feeders that serve 97% of the affected street lights. A constrained regression model of the measured data showed a statistically significant savings of 101 average kilowatts or 880 megawatt-hours per year.

This Executive Summary is provided by the FORSCOM Energy Branch. For more information, contact Adrian H. Gillespie, Program Manager, (404) 669-7268.

Table 1. Comparison of Savings by Engineering Estimate and by Analysis of Energy Use

Project	Engineering Analysis					Analysis of Measured Energy Use	
	fixture quantity	load (W) reduction	kW	% Use	MWh/yr	akW	MWh/yr
Replace New-Post Entry Incandescent Lights	684	57	39	100	342	27	240
Replace Airfield Interior T12 Lights with T8	202 685 102 730 250	16 32 35 48 64	80	27	187	10	56
De-Lamp New-Post Street Lights	644	295	190	52	867	101	880