END-USE LOAD AND CONSERVATION ASSESSMENT PROGRAM (ELCAP)

STATUS REPORT

OCTOBER 1985

HIGHLIGHTS

ELCAP Conference to be Held. The status of ELCAP will be presented highlighting preliminary results from several of the principal investigators. The conference will be held on November 7-8 in Portland at the Nendels Inn-Airport.

ELCAP Documents to be Published. A major effort is underway to formalize the existing documentation for ELCAP and publish it soon. There will be several classes of publications including design documents, technical manuals, analytic reports, technical issue fact sheets, and collections of major contributions to other publications. Several documents will be available for distribution at the November ELCAP conference.

Residential Installations Nearly Complete. 427 of the 460 active residential sites have been installed and initial verification completed (see summary table below). Data from each of these 427 sites are being routinely collected, processed and stored. 85 of the 96 active sites in climate zone 3 (ID, MT, and WY) have been installed and initial verification completed. 13 RSDP sites in ID have not been installed because the Owner Access Agreement has not been signed. These sites will be dropped after October 11.

ELCAP-R: STUDY INSTALLATION SUMMARY

	Number of Sites				
	Targeted	Contacted	Recruited & Active	Installed	Verified
RSDP-MCS	100	131	72	75	15
TCL	30	8	8	5	0
RSDP-Control	100	72	31	29	13
Post-78 Base Study Controls	49	81	46	46	13
Base Study	350	505	244	223	32
Case Study	100	171	59	49	7

Commercial Installations Progressing Well. 37 of the 140 active base study sites in Seattle have been installed (see summary below). The verification process has been limited due to the unavailability of modems. Modems will be installed in November. The quality and efficiency of the installations has improved markedly as the contractors become more familiar with project procedures and requirements. This has resulted in significant decreases in

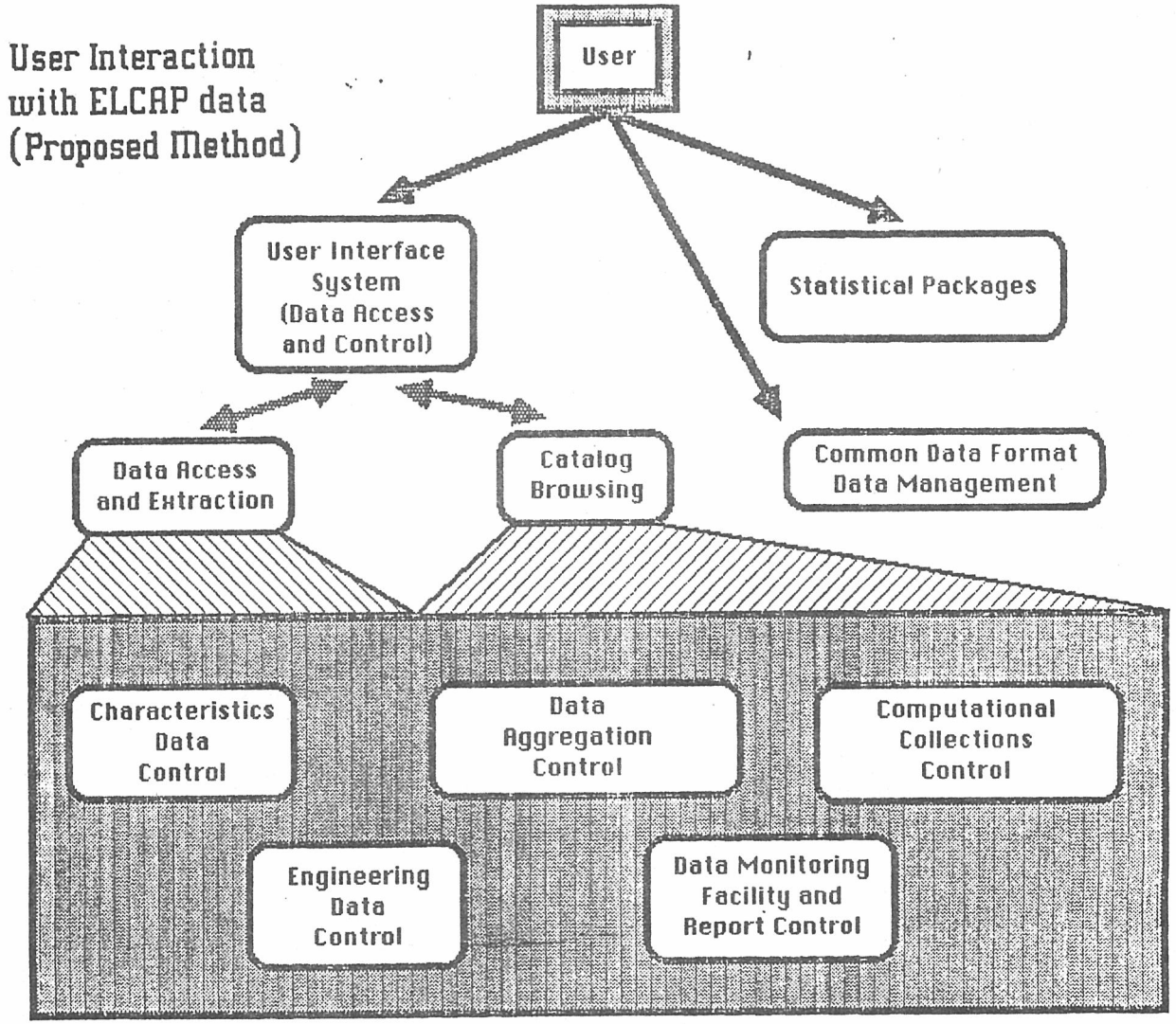
installation costs which are now at or below the planned costs. CAP installations are nearly complete with 23 of 33 active sites now installed. Of the 12 active PES sites, 4 have been installed. Improvements in installation procedures have been made to include more aesthetic and consistent placement of interior temperature sensors, attention to labeling of circuit boxes, and consultation with HVAC contractors prior to power interruption. A debriefing of project participants at the completion of installation assures that they are satisfied with the installation and know who to contact with questions or concerns. In general the data acquisition equipment is being favorably accepted by building owners and occupants.

ELCAP-C: STUDY INSTALLATION SUMMARY

	Number of Sites				
Study	Targeted	Visited	Recruited	Installed	Verified
Commercial Base	200	338	149	37	9
Purchase of Savings	20	20	12	4	0
Commercial Audit	39	87	63	23	4

Commercial Sector Studies Reviewed An issue paper was prepared by the staff at PNL describing the research agenda for ELCAP related studies in the commercial sector. The paper segments and prioritizes the scientific and programmatic thrusts of PES, CAP, and the Base Study to take advantage of synergies of the concurrent efforts. Subsequent changes in the ELCAP management plan have been made in concert with the findings of this review. The result will improve analyses and reduce costs.

DATA Base Management System Evaluated Steps were taken this quarter to ensure that all the goals for future use of the ELCAP data are met in the most cost effective way while retaining high quality. Responsibility for the data management was transferred to PNL's Computer and Information Systems staff who collectively have many years of expertise in designing efficient methods to manage and use large data bases. They have evaluated ELCAP's needs and recommended several steps to provide easy user access to the engineering and characteristics data while efficiently processing large amounts of data. The attached figure diagrams the proposed method of user interaction. In the near term, access to the ELCAP data will be limited to only high priority users with the long term objective being unlimited user friendly access both at PNL and at BPA.



(USER INTERACTION WITH ELCAP DATA (RECOMMENDED ACTION)

ELCAP-R: RESIDENTIAL SECTOR STUDIES

Installation During the last three months activity centered around the installation/repair/verification process. A total of 427 sites have completed installation and initial verification (see summary table). When a site passes initial verification it means that there are no known hardware problems associated with the site and routine data collection is officially initiated. Final verification of these sites will be completed over the next 2-3 months correcting primarily scaling and offset problems in the data base.

All RSDP sites have completed installation and initial verification except 13 sites primarily in ID which do not have signed access agreements. In all cases where the owner has not returned the agreement, PNL staff have made a second contact. To date, the return rate for these few remaining residences have been very poor. Those agreements not received by October 11 will not be installed.

Essentially all of the sites in climate zone 3 (ID, MT, & WY see attached) were installed by October 1 which marked the official start of the heating season in that zone. The few remaining sites will be completed after Nov. 1 since the other two climate zones will be emphasized in October.

Installation in the multifamily sites has begun with first phase activities (installation of CT's) in the RSDP buildings.

Data Acquisition and Management In July a committee was assigned to evaluate the ELCAP data management plan and recommend cost effective improvements. The six members of the committee represented both breadth and depth in the field of analyzing large data sets. The specific charges to the committee were:

1.) To evaluate a number of possible computational environments for the ELCAP data, and to recommend appropriate hardware and software solutions both for post-acquisition data processing, management, and analysis at PNL and for remote access to the data base from BPA,

2.) To review ELCAP data processing and data verification procedures,

3.) To review the design of the engineering and characteristics data bases, and the suitability of the data management tools employed in the project, and

4.) To consider the general question of user access to the data and to recommend a set of general specifications for the user interface.

Several general recommendations were made by the committee and are currently in various stages of adoption. The three main recommendations were:

1.) The development of the engineering and characteristics data bases should be unified. That is, they should be combined into a single project task, under common direction.

2.) A single access tool, or user interface, should be developed for all ELCAP data. Details of the distinct data structures containing the engineering and characteristics data bases should be transparent to users. The great complexity of the eventual data set will render analysis efforts quite difficult in the absence of such a unified tool.

3.) A distributed computational environment is most appropriate for the ELCAP project. A sample structure is shown in the attached figure. It consists of a VAX 11/780 computer (already located at PNL), and a MicroVAX-II computer located in Portland. The two are connected via DECNET over a leased phone line at 9600 baud. BPA's IBM PC microcomputers will access the VAX's as terminals using emulation software. Other MicroVAX-II's can be added to expand the system's capability when needed.

A draft final report was received from Columbia Research Center (CRC) in August, reflecting their completion of the Residential Occupant Survey-Telephone. The report and associated statistics are being evaluated and some inconsistencies reconciled.

Almost half of the 92 targeted utilities have been initially contacted. Utilities have been generally cooperative with some special negotiations underway with Idaho Power, Eugene Water & Electric Board, and Washington Water Power. No permanent problems are expected.

ELCAP-R: RSDP/MCS INSTALLATION SUMMARY

	Number of Sites					
	Targeted	Under Const. or Done	Recruited	Installed	Occupied & Instld.	Verified
WA	45					
WA-East		10	10	10	10	2
WA-West		20	20	20	16	6
WA-TCL**	30	8	8	5	5	0
OR	30					
OR-East		4	4	4	4	0
OR-West		12	12	12	11	2
ID	15	16*	15*	13*	13*	3
MT	10	11	11	11	10	2
TOTAL	130	81	80	75	69	15

* Includes a four-plex with all units occupied; an FDAS will go in each unit.
**Homes from the Tacoma City Light Early Adoption program, MCS related evaluation separate from RSDP.

ELCAP-R: RSDP CONTROLS

	Number of Sites					
	Targeted	Under Const.	Recruited	Installed	Occupied & Instld.	Verified
WA	45					
WA-East		3	3	3	3	2
WA-West		14	13	12	10	7
OR	30					
OR-East		0	0	0	0	0
OR-West		2	2	2	1	1
ID	15*	9*	7*	6*	6*	2
MT	10	6	6	6	6	1
TOTAL	100	34	31	29	26	13

*Includes a four-plex with all units occupied; an FDAS will go in each unit.

ELCAP-R: POST-78 BASE STUDY CONTROLS

	Number of Sites			
	Targeted+	Recruited (Active)	Installed	Verified
WA-East	11	12 (10)	10	3
WA-West	9	9 (8)	8	0
OR-East	6	6 (4)	4	3
OR-West	8*	11 (11)	11	4
ID/WY	4	6 (4)	4	3
MT	11	11 (9)	9	0
TOTAL	49*	53 (46)	46	13

*An additional supplemental sample of 14 was supplied by BPA, not included in total.
+Primary sample-as designed.

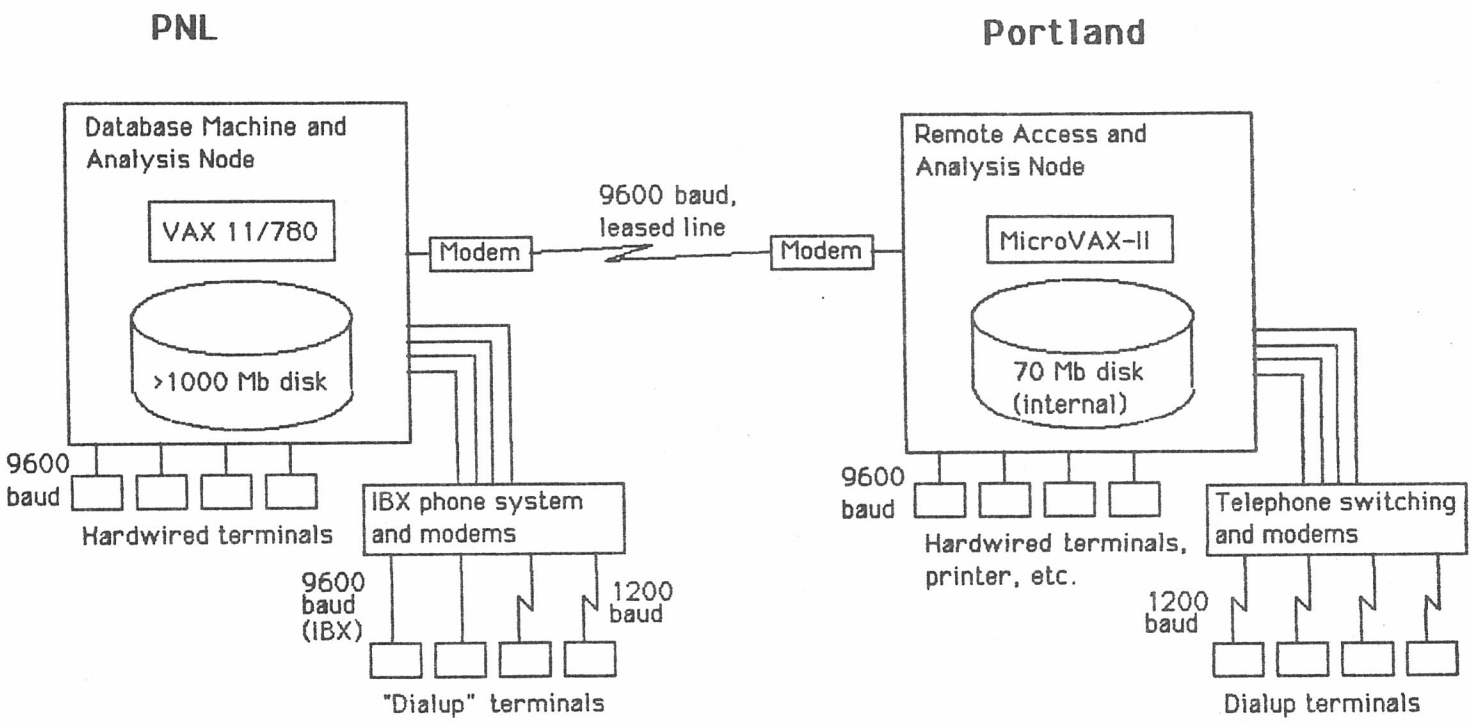
ELCAP-R: BASE STUDY

	Number of Sites			
	Targeted+	Recruited (Active)	Installed	Verified
WA	151	152 (111)	92	12
OR	116	104 (83)	79	14
ID/WY	44	39 (32)	32	8
MT	39	30 (20)	20	0
TOTAL	350	325 (246)	223	34

*Excludes any post-78 homes in original sample.
+Primary sample-as designed.

ELCAP-R: FOUR CASE STUDIES

	Number of Sites			
	Targeted	Recruited (Active)	Installed	Verified
Attached (210)	25	11 (8)	8	1
Rental (310)	25	23 (17)	13	0
Mobile (410)	25	20 (12)	10	2
Gas/Oil (510)	25	29 (22)	18	4
TOTAL	100	83 (59)	49	7



HARDWARE CONFIGURATION FOR DISTRIBUTED PROCESSING

ELCAP-C: COMMERCIAL SECTOR STUDIES

Installation Installation in the commercial sector began this quarter and is currently at its maximum rate with two installation teams. The quality and efficiency of installations increased markedly during the quarter as the contractors became more familiar with the procedures and requirements. The first sites required up to 60 days from the time of the initial site inspection to installation of the monitoring equipment. The current rate shows promise of cutting this in half. Costs for the installations have been correspondingly reduced.

Deficiencies with the initial installations were resolved and procedures have been clarified to avoid recurrence. This includes more aesthetic and consistent placement of interior temperature sensors, attention to labeling of circuit boxes, and consultation with HVAC contractors prior to power interruptions. A debriefing of project participants is now held to assure a satisfactory installation, to instruct them as to how to interrupt power to the data logger in case of emergency, and to give them a person to contact with questions or concerns.

The status of installations for all three studies is given in the summary table below. CAP and PES installations will be completed in November with the Base installations proceeding at about 1 per day. Initial verification of these sites will not take place until modems are obtained in late October. A complete summary of the installations by location for PES and CAP are attached. Also attached is a summary of the Base study installations by building type.

Data Acquisition and Management The format for the commercial audit data base has been established. Characteristics data from each of the commercial sites will be entered once the site is installed. Efforts described under the residential sector will also be used for the commercial sector.

ELCAP-C: COMMERCIAL BASE INSTALLATION SUMMARY

Building Type	Number of Sites				
	Targeted	Visited	Recruited	Installed	Verified
New Warehouse	5	12	5	4	1
New Retail	5	9	4	4	0
New Grocery	5	7	3	3	0
New Restaurant	5	11	5	2	2
New Office	10	10	10	4	1
TOTAL NEW	30	49	27	17	4
Old Warehouse	19	33	17	3	1
Old Retail	36	57	23	6	0
Old Grocery	20	37	13	3	1
Old Hotel	5	20	3	2	0
Old Restaurant	18	35	11	1	0
Old School	13	15	11	1	0
Old Health	7	11	5	0	0
Old University	7	17	4	0	0
Old Office	34	50	27	1	1
Old Other	11	14	8	3	2
TOTAL OLD	170	289	122	20	5
TOTAL ALL	200	338	149	37	9

ELCAP-C: PES SITE INSTALLATION SUMMARY

	Number of Sites					
	Targeted	Contracted	Visited	Recruited	Installed	Verified
Klamath Falls	5	4	5	2	0	0
Seattle	3	3	3	3	0	0
Spokane	8	8	8	3	3	0
Sandpoint	3	3	3	3	0	0
Olympia Bldg.	1	1	1	1	1	0
TOTAL	20	19	20	12	4	0

ELCAP-C: CAP INSTALLATION SUMMARY

	Number of Sites				
	Targeted	Visited	Recruited	Installed	Verified
Oregon					
Springfield/ Eugene	6	22	13	6	2
Newport	4	8	5	4	2
Idaho					
Idaho Falls	9	21	13	9	0
Washington					
Richland	8	21	18	0	0
Vancouver	6	0	0	0	0
Snohomish/ Everett	6	15	14	4	0
TOTAL	39	87	63	23	4

Terry Sabotes

Laws of Elcap

1. Easier to recover from bad analysis than bad data
2. 1000 >> 10.

Goals

Automation of data collection

Installation status