ENERGY ENGINEERING ANALYSIS

FORT DEVENS
SENECA ARMY DEPOT
LETTERKENNY ARMY DEPOT

CONTRACT NO. DACA65-80-C-0003

INTERIM REPORT

SENECA ARMY DEPOT
NEW YORK

July 1981

Reynolds, Smith and Hills
Architects-Engineers-Planners,
Incorporated

FINAL SUBMITTAL

ATTACHED ARE COMMENTS AND RESPONSES MADE ON THE INTERIM SUBMITTAL OF INCREMENTS A AND B - ECIP'S, PDB'S AND INTERIM REPORT; AND THE PRELIMINARY SUBMITTAL OF INCREMENT E

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 30 Mar 81		Description of Project Seneca Army Depot - EEAP DRCIS-RI-IU	Branch Facilities
Date of Response May 81		RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM DARCOM Reference: CMT 1, DRCIS-C	Type Review Reviewed By W.H. Polchow

NO.	REFER.	COMMENTS/RESPONSES
a	General PDB	Comment -- Concerning the EMCS, further evaluation of the study conclusion must be conducted. The use of the new EMCS guide specification should reduce initial construction costs to where a central EMCS will be cost competitive with the micro-processor selected by the AE. It is felt a central EMCS, if the economics are improved, will be of greater value to DARCOM than the system proposed by the AE. Accordingly, the PDB and project descriptions are being retained for pending further review and comments. Response -- No action is required concerning this comment.
b-1	PDB Vapor Barrier for Dehumid. Ware.	Comment -- The narrative description noted is sufficiently detailed for execution of subject proposal. Seneca Army Depot should, however, define which doors can be sealed and which doors must remain active. Response -- Noted.
b-2		Comment -- The need for a PDB for the limited scope of work for this project is not warranted. Since the check-list on Page A-8 adequately defines interfacing and support data (this data should also be verified by Seneca Army Depot), the preparation of a bid package can proceed directly. It appears that sufficient engineering investigation has already been conducted and that design efforts are not required. A functional specification for the weatherproofing material can be prepared directly, or performance criteria can be drafted. Response -- Since the PDB is completed, it will remain in the document.
b-3		Comment -- General provisions for construction contractor project office, parking, supporting utilities (lights), badging, and security restrictions, etc. should be defined. This data should be readily available from Seneca Army Depot personnel. Required data should be submitted in accordance with the format in TM 5-800-3, paragraph 4. Response -- PDB's were prepared in accordance with

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 30 Mar 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP DRCIS-RI-IU RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM DARCOM Reference: CMT 1, DRCIS-C	Branch Facilities Type Review Reviewed By W.H. Polchow
NO.	REFER.	COMMENTS/RESPONSES	
		instructions form the Norfolk District. Conformance to TM5-800-3 was not required.	
c-1	PDB Instal. of EMCS System	Comment -- Since the project has been developed from a comprehensive study, all elements of the study which meet the ECIP qualifying thresholds should be defined. The base data should include energy profiles and anticipated costs of EMCS interfacing controls. The designer can then further initiate design and insure at the concept design stage that all elements defined are qualifying. Response -- Energy savings for specific EMCS applications are shown for each building. Likewise, cost of control equipment for each building is documented. This is sufficient to permit the designer to evaluate sub-portions of the total system.	
c-2		Comment -- The PDB outline provided is unacceptable, insofar as it does not adequately define all required design elements. Data should be submitted to conform to the outline provided in TM 5-800-3, Project Development Brochure, paragraphs 2a, b, c, d, e, and f; paragraphs 3, 4, 5a(1), (2), (3), (4), (5), and (6); paragraph 6i; paragraphs 8, 9, and 11. In particular, the availability of existing communication wiring at each facility should be well defined. Response -- PDB's were prepared in accordance with Norfolk District instructions. Conformance with TM 5-800-3 was not required.	
c-3		Comment -- The proposals in the supporting study for the EMCS evaluation must be further reviewed. Although initial indications note that local micro-processors are the most cost effective system, additional evaluation of central computer costs, FID/MUX estimates, redundance requirements for control feeders and expandability of the base computer must be made. Central EMCS, as defined in guide specification CEGS 13947-13950, should be used as a guide in future evaluation of a project. New small system computers appear to be suitable for the noted application, and are cost competitive with the other systems in the study.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 30 Mar 81		Description of Project Seneca Army Depot - EEAP DRCIS-RI-IU	Branch Facilities
Date of Response May 1981		RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM DARCOM Reference: CMT 1, DRCIS-C	Type Review Reviewed By W.H. Polchow

NO.	REFER.	COMMENTS/RESPONSES
		Response -- The Facilities Engineer at SEAD at a previous meeting indicated a preference for local controllers over the centralized computer version. He felt it would be impossible to find personnel to adequately operate and maintain a centralized system
d	Interim Comments	Comment -- There is need to consider stack heat recovery for all building heating plants.
		Response -- Stack heat recovery was considered for buildings but experiences at other facilities have indicated that this idea did not produce projects which meet the ECIP criteria.
	A-12 A-13 A-19	Comment -- In Buildings 117, 118 and 127 - Need to consider if hi-bay lighting (mercury vapor) would be feasible.
		Response -- This idea was considered in the non-qualifying project G, Miscellaneous Lighting Replacements (See ECIP Project Descriptions). The results indicate that ECIP criteria would not be met.
	A-24	Comment -- In Buildings 316, 317, and 318 - Need to consider insulation for steam lines. Need to consider heat recovery from paint booth exhaust air.
		Response -- The insulated steam lines are inside buildings in heated spaces. Heat losses from these lines serve to heat the buildings most of the time. The small savings from insulating lines combined with a small construction cost prevent this idea from meeting ECIP project criteria. Paintbooth project would not meet the min. funding limit.
	A-26 A-29 A-31	Comment -- In Buildings 320 and 323 - Need to consider hi-bay lighting. In Buildings 339, 341, 342, 345 and 346 Need to consider air locks for doors to be used. Also need to consider hi-bay lighting.
		Response -- These ideas were considered in the non-qualifying project G, Miscellaneous Lighting Replacements (See ECIP Project Descriptions). The results indicate that ECIP criteria would not be met.

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 30 Mar 81	Description of Project Seneca Army Depot - EEAP DRCIS-RI-IU		Branch Facilities
			Type Review
Date of Response May 1981	RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM DARCOM Reference: CMT 1, DRCIS-C		Reviewed By W.H. Polchow

NO.	REFER.	COMMENTS/RESPONSES
d cont	A-39 d	Comment -- Building 701 - Need to consider using A/C condenser reject heat to preheat water used in building. Response -- This idea would not meet the ECIP project funding limitation.
	A-41 A-42	Comment -- Building 702 - Recommendation should address installation/replacement of storm windows. Response -- Replacement of storm windows would not solve the problem of window panes being removed and not replaced. This is an administrative or maintenance problem.
	A-44 A-45	Comment -- Buildings 704 and 708 - Recommendation should address removable/operable solar screens for east/west exposure. This may be more economical than reducing window area. This would allow "passive" solar heating at times in winter, but screen out solar heat in summer. Response -- These buildings are not cooled. No savings from screening out solar heat in summer are possible.
	A-50	Comment -- Building 706 - Reduce heating O/A to minimum required instead of 50 percent if actual is per drawings. Response -- This idea was not considered because it would not meet ECIP project criteria.
	A-53	Comment -- Building 720 - Reduce 100 percent O/A to office space to minimum required. Install air to air heat exchanger on vehicle exhaust system and return preheated air to room. Response -- 100 percent outside air and vehicle exhaust system are no longer used. Text has been changed to account for these facts.
	A-57	Comment -- Building 724 - Reduce 100% O/A to minimum required Response -- Text has been corrected to recommend reduction of outside air volume.

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 30 Mar 81 Date of Response May 1981	Description of Project Seneca Army Depot - EEAP DRCIS-RI-IU RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM DARCOM Reference: CMT 1, DRCIS-C		Branch Facilities Type Review Reviewed By W.H. Polchow

NO.	REFER.	COMMENTS/RESPONSES
d cont'd	A-58	Comment -- Building 731 - Apparently the 12 KW heating associated with the A/C system is reheat for humidity/temperature control. Recommend it be disconnected unless specific reasons for retention are indicated. If reheat is absolutely necessary, use steam coil. Should indicate or determine if exhaust system (range, hood, or other) heat can be replaced. Response -- Text has been corrected to include disconnection of 12 KW heating. Exhaust heat recovery was not considered because it would not have met ECIP project criteria.
	A-61	Comment -- Building 804 - Inspection should be allowed. Response -- Noted.
	A-70	Comment -- Building 810 - Need for A/C in dehumid. storage should be re-assessed. Desiccant type unit may be more economical. Response -- A/C is used primarily for cooling an automatic data processing facility. This idea was not considered because it would not meet ECIP project criteria.
	A-77	Comment -- Error: 62 x 124 = 7688, not 2500 - Design of A/C system needs evaluating - doubtful that this much reheat is needed for humidity control with a proper A/C coil used in the dehumidification process. Response -- Text has been corrected.
	General	Comment -- There seems to be no consideration for upgrading the control systems for air-conditioning systems throughout this study. It is felt that various types of control modes, such as enthalpy control should be considered. Response -- In general, cooling at SEAD is so limited that enthalpy controls as well as other ECO's involving cooling were not considered viable. That is, they would not meet the ECIP project criteria.

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 28 Jan 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP RESPONSES TO PRELIMINARY SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS	Branch Type Review Mechanical Reviewed By Smith/jb/ 5480
NO.	REFER.	COMMENTS/RESPONSES	
1	General	Comment -- This study as reflected by this report does not satisfy the requirements of the standard scope of work for EEAP studies. Response -- The scope of work for this project is site-specific and has been satisfied.	
2	Interim Report P. 2	Comment -- All heating or cooling usage buildings need to be analyzed in the report. Therefore, family housing, airfield and munitions storage areas should be addressed. The entire base needs to be analyzed for energy usage based on typical building/function criteria. With this information, the base energy consumption/demand can be determined based on these typical buildings. Response -- Certain areas were specifically excluded from the scope of work. This includes the Lake Area Housing and munitions storage areas. All areas included in scope were analyzed for energy usage.	
3	A-I-2	Comment -- If the structural support can be repaired under another project, the cost of repair does not need to be added to the vapor barrier ECIP project. If not, the structure support repair cost needs to be added in the vapor barrier ECIP project. This information needs to be conveyed in the report. Response -- SEAD Engineering advises that roof repairs have been made (or are programmed) and that water in the walls is no longer a problem. Based on this fact and the new vapor barrier's ability to adhere in a wet environment, a roof repair estimate is unnecessary. Text has been revised.	
4	A-V-1	Comment -- Use a three year interval period in determining the average temperature. Response -- Temperature readings were available for only the most recent 13 month period. This fact has been noted in the calculation.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 28 Jan 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP RESPONSES TO PRELIMINARY SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS - Continued	Branch Type Review Mechanical Reviewed By Smith/jb/ 5480
NO.	REFER.	COMMENTS/RESPONSES	
5	A-V-13	Comment -- Furnish more detail in determining the building infiltration. Explain why blocked doors, and louvers, have negligible crack widths. Furnish ASHRAE factor for cinder block wall with vapor barrier. Response -- Detailed explanation of infiltration calculation appears on pages A-VII-10 and 11. Explanation of negligible factors has been added to text.	
6.	A-V-14	Comment -- Furnish methodology of determining the grains per pound of air in the table. Response -- Methodology is contained on pages A-V-4 to A-V-9. This fact has been added to page A-V-14.	
7	A-V-15	Comment -- Supply the source of the manual and reference the manual for future use. Response -- Source and stock number noted in text.	
8	A-V-19	Comment -- The efficiencies of the different plants need to be incorporated in the calculation. Response -- The referenced calculation predicts the $/Mega Btu for a system which does not now exist. The efficiency assumed represents a conservative value.	
9	B-V-1	Comment -- An assumption of similar occupancy schedule for all the buildings is required to sum the product of U-values and surface areas to obtain fuel consumption. This needs to be discussed in the report. Response -- Similar occupancy was not assumed. Annual heat loss is the sum of products of U-values, areas and heat loss factors plus the product of cfm (infiltration) and heat loss factor. The heat loss factors for each building take hours of occupancy into consideration. This fact has been added to the text.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS

Date of Comment	Description of Project	Branch
28 Jan 81	Seneca Army Depot -- EEAP	Type Review Mechanical
Date of Response	RESPONSES TO PRELIMINARY SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS - Continued	Reviewed By Smith/jb/ 5480
May 1981		

NO.	REFER.	COMMENTS/RESPONSES
10	B-V-3	Comment -- Furnish more detail information on the in-house computer program, such as required input, methodology of calculations used, and assumptions. Response -- Narrative has been added to text.
11	B-V-4	Comment -- Explain in detail the purpose of the graph and information it is conveying. Response -- Existing description has been expanded for clarification.
12	B-V-39	Comment -- Furnish methodology of determining the estimate annual fuel for Buildings 117 and 118. Response -- Explanation has been added to text.
13	B-V-53	Comment -- Furnish narrative in explaining the economic analysis approach used in this study. Response -- Narrative has been added to the text.
14	PDB	Comment -- Delete reference to a specific product. Use standard PDB format to devlop the PDB. The PDB is not complete as reflected by this submittal. Response -- PDB's were prepared in accordance with instructions from the Norfolk District. Conformance to TM5-800-3 was not required.

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 28 Jan 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP RESPONSES TO PRELIMINARY SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS	Branch Type Review EMCS Reviewed By Holland/jb/ 5480/ED-ME
NO.	REFER.	COMMENTS/RESPONSES	
1	PDB & Interim Report	Comment -- Recommend use of Army Manual TM 5-815-2. Response -- This document was not available to RS&H during investigative period of this study.	
2	ECIP Project Descrip. Sect. B	Comment -- Recommend use of Army Manual TM 5-815-2. Delete reference to Interagency Guide Specification and replace with reference to Corps of Engineers Guide Specifications CEGS 13947-50. Response -- The COE Guide Specification was not available to RS&H during investigative period of this study.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS

Date of Comment	Description of Project	Branch
10 Mar 81	Seneca Army Depot - EEAP	Type Review
Date of Response	RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS	Electrical
May 1981		Reviewed By
		Brewer/ct
		5480/ED-ME

NO.	REFER.	COMMENTS/RESPONSES
1	General	Comment -- Electrical power portions of subject study have been reviewed. Response -- Noted.
2	PDB EMCS System	Comment -- The new thermostat shown on Schematic No. 3, page B-9 appears to override the field interface device. Revise as required. Response -- Diagram has been corrected.
3	General	Comment -- PDB's are not prepared in accordance with TM 5-800-3. Differences are too numerous to list. Response -- PDB's were prepared in accordance with instructions from the Norfolk District. Conformance to TM 5-800-3 was not required.

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 16 Mar 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS	Branch Type Review Estimating Reviewed By Hilyer/Daniel/McKissack
NO.	REFER.	COMMENTS/RESPONSES	
1	General	Comment -- Even for rehab work, cost estimate appears high. Response -- Special considerations, remote location, etc. make cost high.	
	General	Comment -- AE is applying design fee to CWE rather than construction cost. Response -- Text has been corrected.	
2	Mech & Elec	Comment -- The mechanical estimate should be structured as follows: 1. (Number Units) This is the actual number of prescribed articles. 2. (Unit Measure) The unit measure for the described article (each, feet, etc.) 3. (Labor per Unit) Manhours per unit. 4. (Labor Total) Manhours per unit multiplied by the Unit of Measure. 5. Each page is subtotaled for labor total and material total. 6. Each page total is brought to a summary sheet and totaled. 7. Then a labor rate and markup is applied. 8. The cost growth is determined by reference to AR 415-17 9. After applying the cost growth the total is used on the DD 1391. Response -- Estimate format has been determined to be sufficient for this study. Comment -- 10. The milestones used to determine the cost growth are entered on the DD 1391. Response -- Date of estimate and escalation rate will be added to Form 1391.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 24 Mar 81 Date of Response May 1981	Description of Project Seneca Army Depot - EEAP RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS		Branch Type Review Mechanical Reviewed By Wilson/jb 5480/ED-ME

NO.	REFER.	COMMENTS/RESPONSES
1	P. 13	Comment -- Give reason for excluding barracks from the EMCS project. Response -- Barracks were excluded from the EMCS project based upon the nature of their use. The most significant energy savings results from temperature setback during unoccupied heat periods. Barracks are generally occupied during heating priods and are thus poor candidates for justifying an EMCS installation.
2	General	Comment -- Calculations and ECIP evaluation for insulation project should be done assuming that the EMCS project is not incorporated. This data may be useful to the facility in the event the EMCS is not approved. It is not however necessary to prepare project documents if the E/C ratio meets the criteria. Response -- The EMCS system has a very high E/C and is extremely cost-effective when compared to insulation. The EMCS approach is superior.
3	P. 17	Comment -- All past energy projects initiated by the facility should be indicated in the report. This will help verify that all possible opportunities (family housing) have been considered. Response -- All projects initiated by the facility will be listed in the report.
4	General	Comment -- Suggest the lengthy descriptions of all the buildings in the south and north areas be condensed into a table showing all buildings and required items in the Scope of Work. Response -- Buildings which underwent detailed analysis will be described in tabular form.
5	General	Comment -- An executive summary should be submitted with the pre-final submission. Response -- A separately bound executive summary will be submitted.

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 24 Mar 81 Date of Response May 1981		Description of Project Seneca Army Depot - SEAD - EEAP RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS - Continued	Branch Type Review Mechanical Reviewed By Wilson/jb 5480/ED-ME
NO.	REFER.	COMMENTS/RESPONSES	
6	General	Comment -- It is recommended that the report be organized as follows: Executive Summary (Separately Bound) Volume I Energy Plan for Buildings Energy Plan for Dist. Systems Solid Waste and Central Boiler Plant Projects Volume II Appendix or Support Data Volume III 1391, PDB's, and etc. Response -- A separately bound executive summary will be prepared. The balance of the report is presently organized in the proposed format. The titles of the individual books, however, differ from those used in the proposed format.	
7	General	Comment -- The final report should include as a minimum the following items which were not evident in this submission. Comment 1 -- Site description to include mission, population, etc. Response -- This information will be included in text. Comment 2 -- Demolition and new construction planned. Response -- This information will be included in text. Comment 3 -- Present fuel costs and projected fuel costs to FY 85. Response -- The present fuel cost included in the report will be extrapolated. Comment 4 -- Projected energy use (FY 85) by building category. Response -- To the extent that available data permits, energy use by building category will be extrapolated.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 24 Mar 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT CORPS OF ENGINEERS - Continued	Branch Type Review Mechanical Reviewed By Wilson/jb 5480/ED-ME
NO.	REFER.	COMMENTS/RESPONSES	
		Comment 5 -- Present metering and recommended metering plan. Response -- A metering plan will be included in the report. Comment 6 - ECO's identified including solar. Response -- All energy conservation opportunities identified are discussed in the building descriptions. Comment 7 -- Minor MCA and O&M projects recommended. Response -- Minor projects are identified in present report. Comment 8 -- Conclusions and recommendations to include energy policy changes, energy and monetary saving, etc. Response -- Included in present report.	
8	Incr. E	Comment -- Survey of coal availability and types of coal required should be assessed. Response -- A coal availability survey will be added to the report.	

REYNOLDS, SMITH AND HILLS RESPONSES TO COMMENTS			
Date of Comment 2 Apr 81 Date of Response May 1981		Description of Project Seneca Army Depot - EEAP RESPONSES TO INTERIM SUBMITTAL COMMENTS RECEIVED FROM HUNTSVILLE DISTRICT, CORPS OF ENGINEERS	Branch Type Review Controls & Ins. Reviewed By Savage (ED-ME)
NO.	REFER.	COMMENTS/RESPONSES	
1	ECIP - EMCS Maint.	Comment -- Cost of maintenance appears excessive. Normally contractor maintenance can be obtained for 10 percent of the EMCS capital equipment costs per year. Response -- Cost of maintenance is based upon cost of outside maintenance at 10 percent of installed cost plus wages and burden for FE personnel for inspection and diagnosis.	
2	EMCS	Comment -- Consideration should be given to assuming the functions of the Delta 2000 system located in Building 714 with a new computer based EMCS conforming to CEGS 13947, 8, 9 or 50 for Large, Medium, Small and Micro EMCS or expanding the existing EMCS to provide a single centralized control of equipment. Response -- There was no evidence that additional energy would be saved if functions of Delta 2000 system were assumed by the central EMCS.	
3	EMCS	Comment -- Proposed EMCS projects should be based on TM 5-815-2, a pre-publication copy of the TM is available from the Instrumentation and Control Section. Response -- The reference document was not available during the period of data collection and evaluation.	

TABLE OF CONTENTS

INTRODUCTION

In February 1980, the Norfolk District Corps of Engineers initiated Contract No. DACA65-80-C-0003 with Reynolds, Smith and Hills of Jacksonville, Florida. This contract called for the performance of Energy Engineering Analysis Programs of three U.S. Army installations: Fort Devens, Massachusetts; Letterkenny Army Depot, Pennsylvania; and Seneca Army Depot, New York. The objective of these Programs was the identification, evaluation, and development of programming documents for energy conservation projects which meet the criteria of the Army's Energy Conservation Investment Program (ECIP).

The work under this contract was performed in three phases. The first phase consisted of site surveys to inspect the major energy consuming buildings and systems, and collect data required for the identification and evaluation of potential ECIP projects. The detailed evaluation of the potential projects took place in the second phase and the development of the necessary documents in the third phase.

This Interim Report presents the results of Increments A, B, and E of the Energy Engineering Analysis Program performed at Seneca Army Depot.

BASELINE DATA

1. Description of the Installation

Seneca Army Depot (SEAD) is a distribution/storage facility for general supply items, ammunitions, critical materials and engineering equipment. It occupies a site that lies on relatively flat land midway between Seneca and Cayuga Lakes, the approximate center of Seneca County and near the geographical center of New York State. The nearest city is Geneva, located approximately 15 miles north of the installation. SEAD abuts the village of Romulus.

SEAD is essentially broken down into two major areas separated by approximately six miles. The administrative area or south base consists primarily of administrative buildings, maintenance shops, warehouses, and family housing units. The troop area or north base consists primarily of a high security, special weapons area called the Q Area and troop billeting with related support facilities such as commissary, PX, theater, library, mess hall, gymnasium, etc. In addition to these two major areas of activity, there is a family housing area on Seneca Lake, an airfield, and a munitions storage area. SEAD's total civilian and military population is approximately 1,900.

2. Energy Consumption

Primary energy sources for building use at SEAD are electricity and fuel oil. No. 2 and No. 6 fuel oils are used at SEAD with No. 6 being used in the three central heating plants and No. 2 being used in all the other boilers or furnaces.

Over the period of 1975 through 1979, the consumption of electricity at SEAD has increased steadily. The electrical consumption in FY 79 was 18% higher than it was in FY 75. The consumption of fuel oil changed very

little over the same period with the FY 79 consumption less than 1% higher than the FY 75 consumption (See Figure No. 1). During this period the breakdown of fuel use by type remained very constant with No. 2 fuel oil accounting for between 37 and 40% of the total fuel use.

The cost of these energy sources has risen steadily over the FY 75 and FY 79 period. The annual expenditure for electricity in FY 79 was 91% higher than it was in FY 75. The annual expenditure for fuel oil in FY 79 was 23% higher than it was in FY 75 (See Figure No. 2). The combined expenditure for the two energy sources has risen by 48% since FY 75.

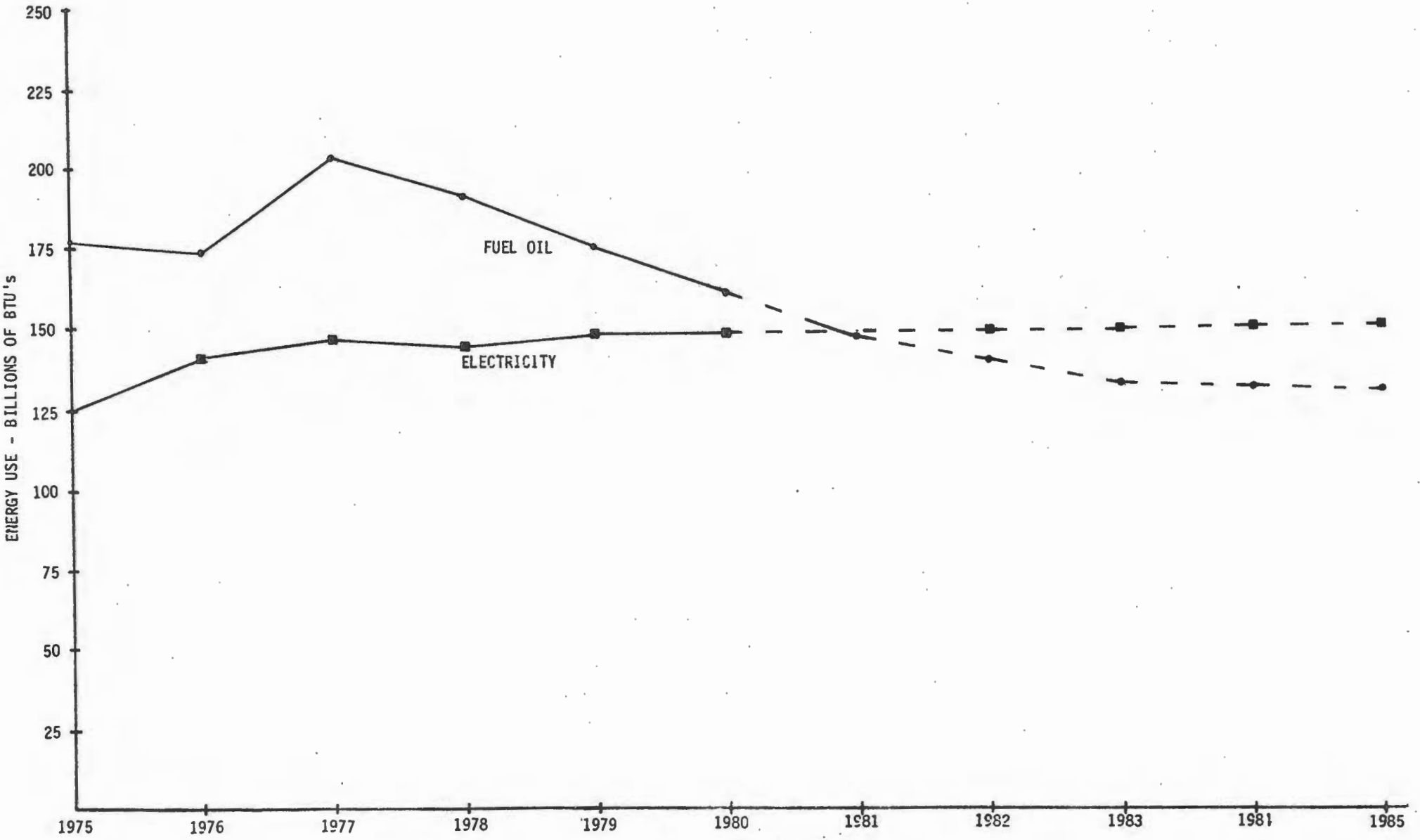
2.1 Electricity

Electricity for SEAD is supplied by New York State Electric and Gas Corporation. SEAD currently pays approximately $0.0274 per kilowatt hour for energy plus fuel adjustment and $3.51 per kilowatt for demand.

The consumption and demand for electricity at SEAD is highest during the heating season. The base electrical consumption which occurs during the non-heating/non-cooling months is approximately one million kilowatt hours a month (See Figure No. 3). This base load is primarily lighting, cooking, laundry, refrigeration, warehouse dehumidification, and shop related activities. The additional electrical consumption during the heating season is primarily from the motor driven auxiliaries, i.e., pumps, fans, for the heating systems.

2.2 Fuel Oil

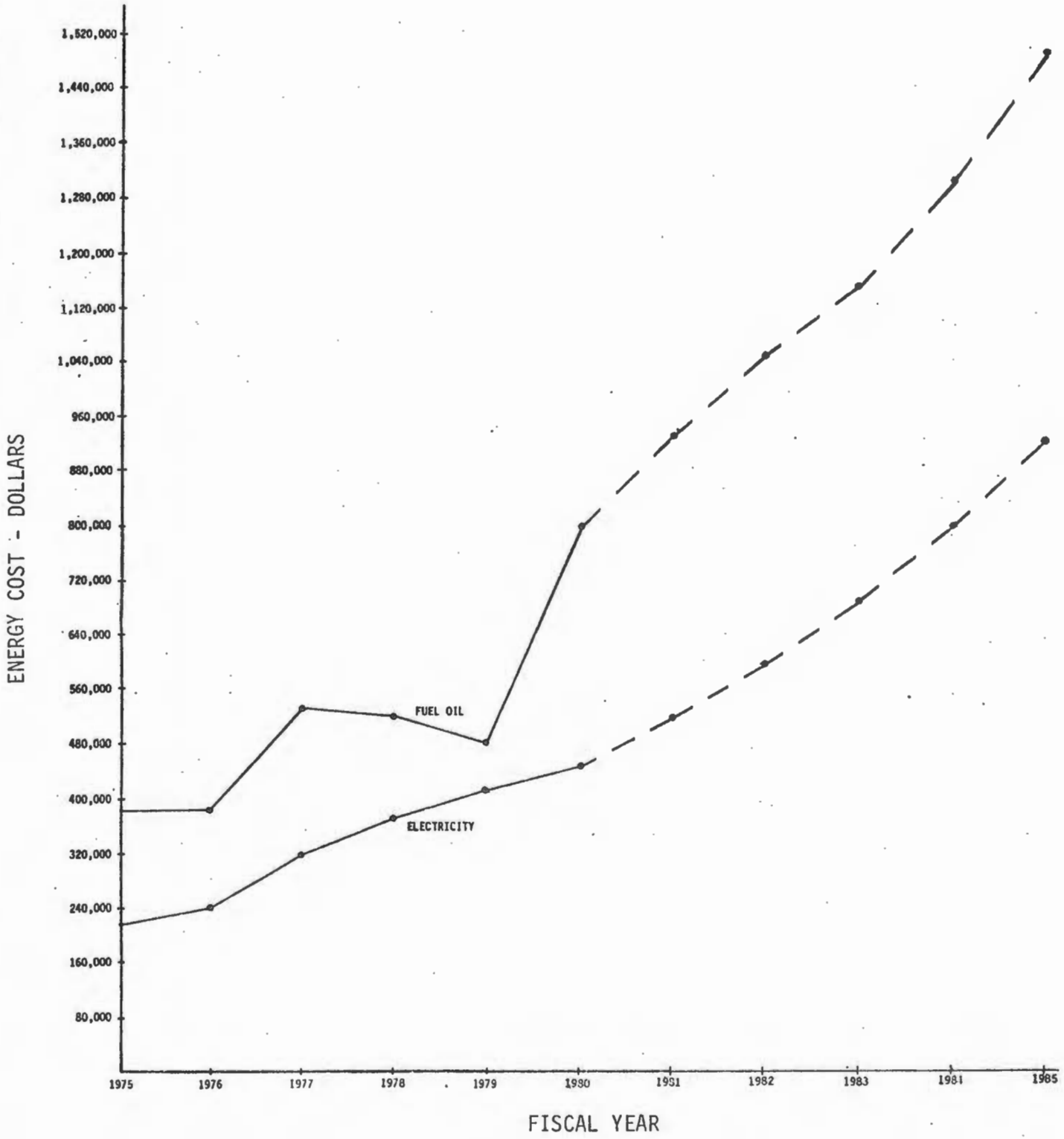
Fuel oil for SEAD is supplied by various different contractors. The present cost of fuel oil at SEAD is approximately $0.9675 per gallon for No. 2 fuel oil ($6.93 per MBtu) and $0.5182 per gallon for No. 6



SENECA ARMY DEPOT

ANNUAL ENERGY CONSUMPTION

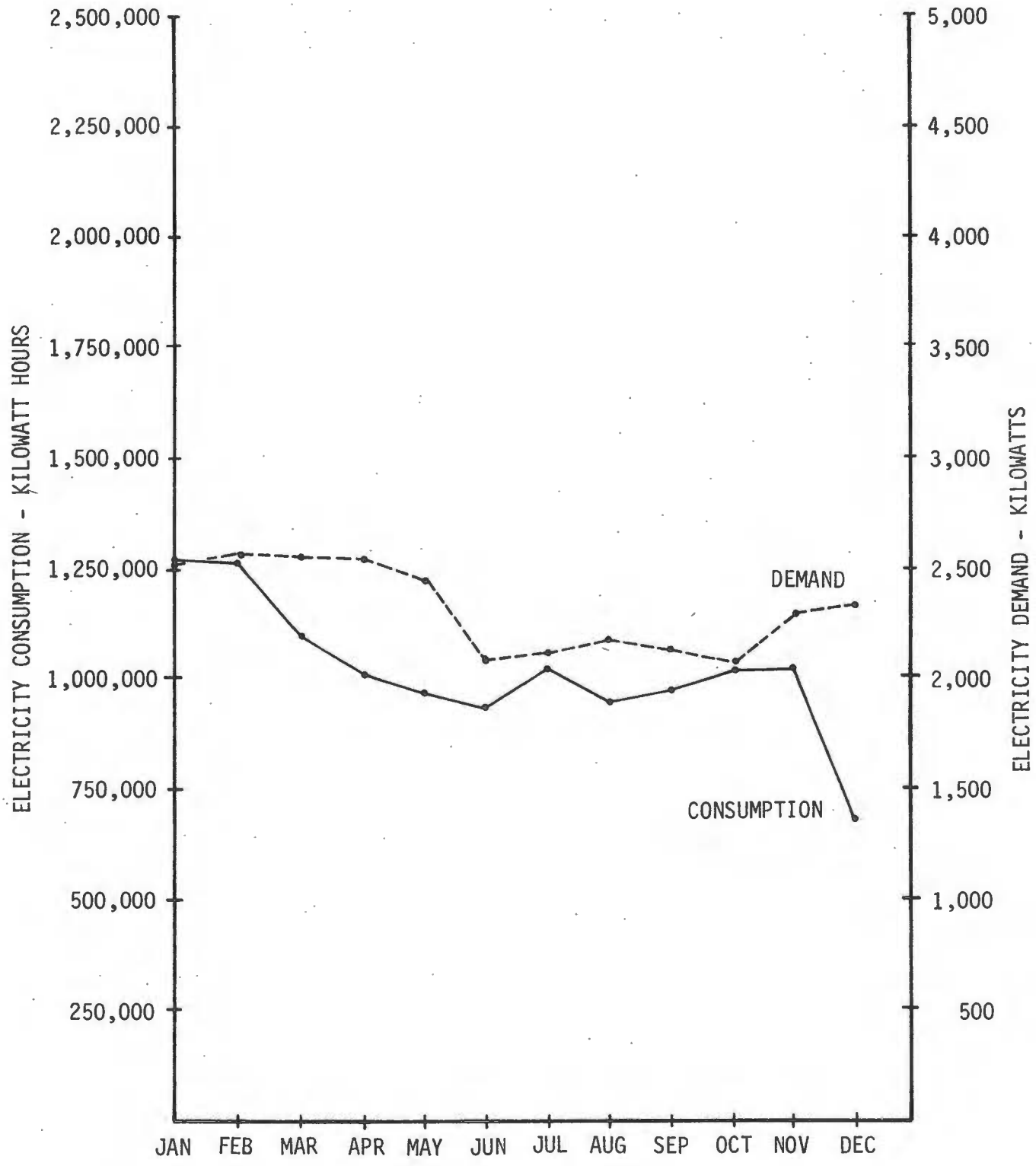
FIGURE NO. 1



SENECA ARMY DEPOT

ANNUAL ENERGY COSTS

FIGURE NO. 2



SENECA ARMY DEPOT

1979 MONTHLY ELECTRIC

CONSUMPTION AND DEMAND

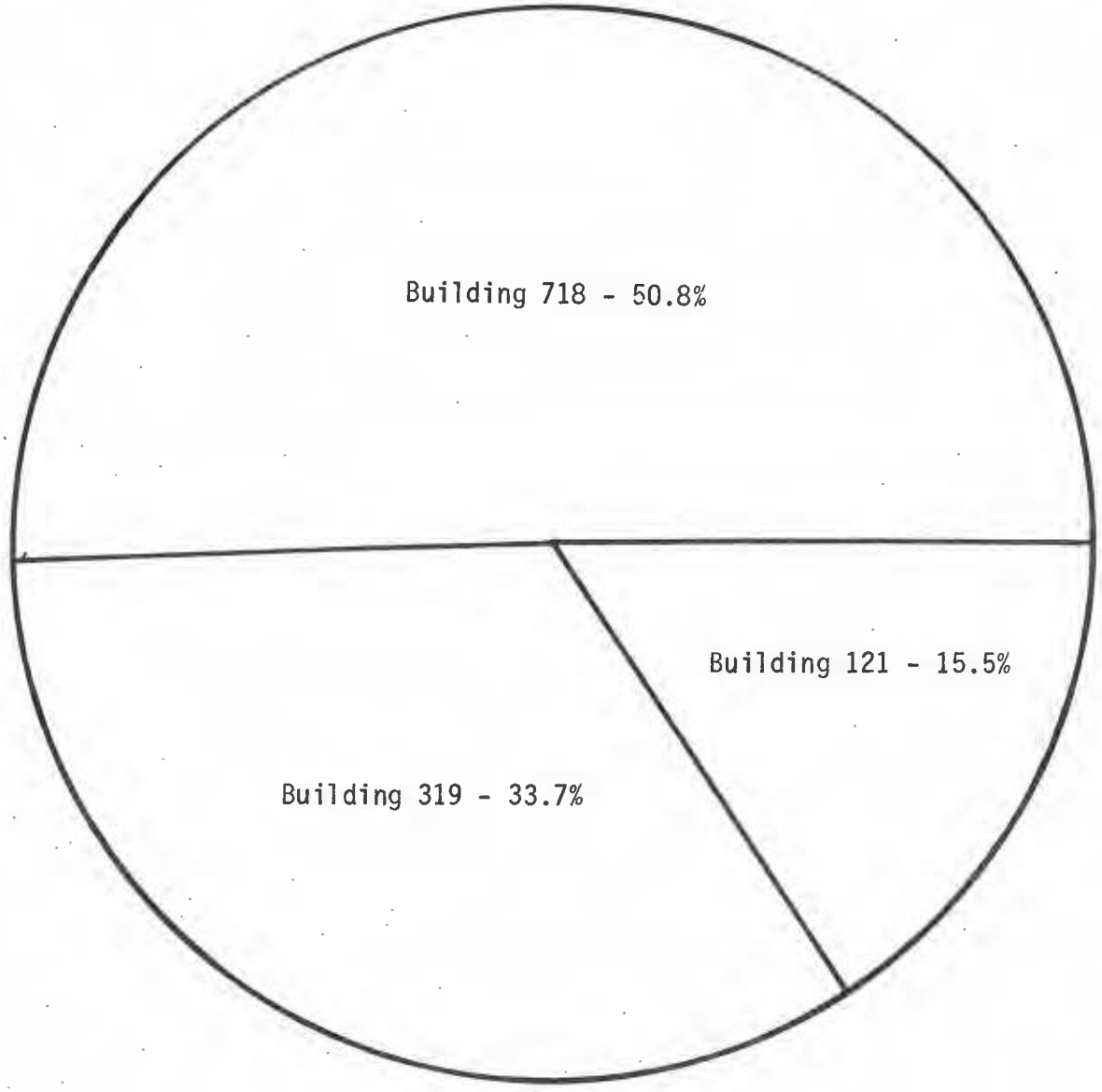
FIGURE NO. 3

fuel oil ($3.45/MBtu).

There are three central heating plants at SEAD which account for all the No. 6 fuel oil use. The largest plant, Building No. 718, serves almost the entire north base excluding the Q Area and accounts for about 51% of the total No. 6 fuel oil usage. The next largest building, No. 319, serves the maintenance and warehouse area of the south base and accounts for about 34% of the No. 6 usage. The third plant, Building No. 121, serves many of the buildings in the administrative area of the south base and accounts for the remaining 15% (See Figure No. 4). This breakdwon of No. 6 fuel oil usage among the three central heating plants has remained virtually the same over the past five years (See Figure No. 5).

No. 2 fuel oil is used in all the buildings not supplied by the central heating plants. This consists primarily of the two family housing areas and the Q Area. These three areas account for over 57% of the total No. 2 fuel oil use at SEAD (See Figure No. 6).

These three areas combined with the three central heating plants account for almost 82% of the combined total fuel oil use at SEAD (See Figure 7).



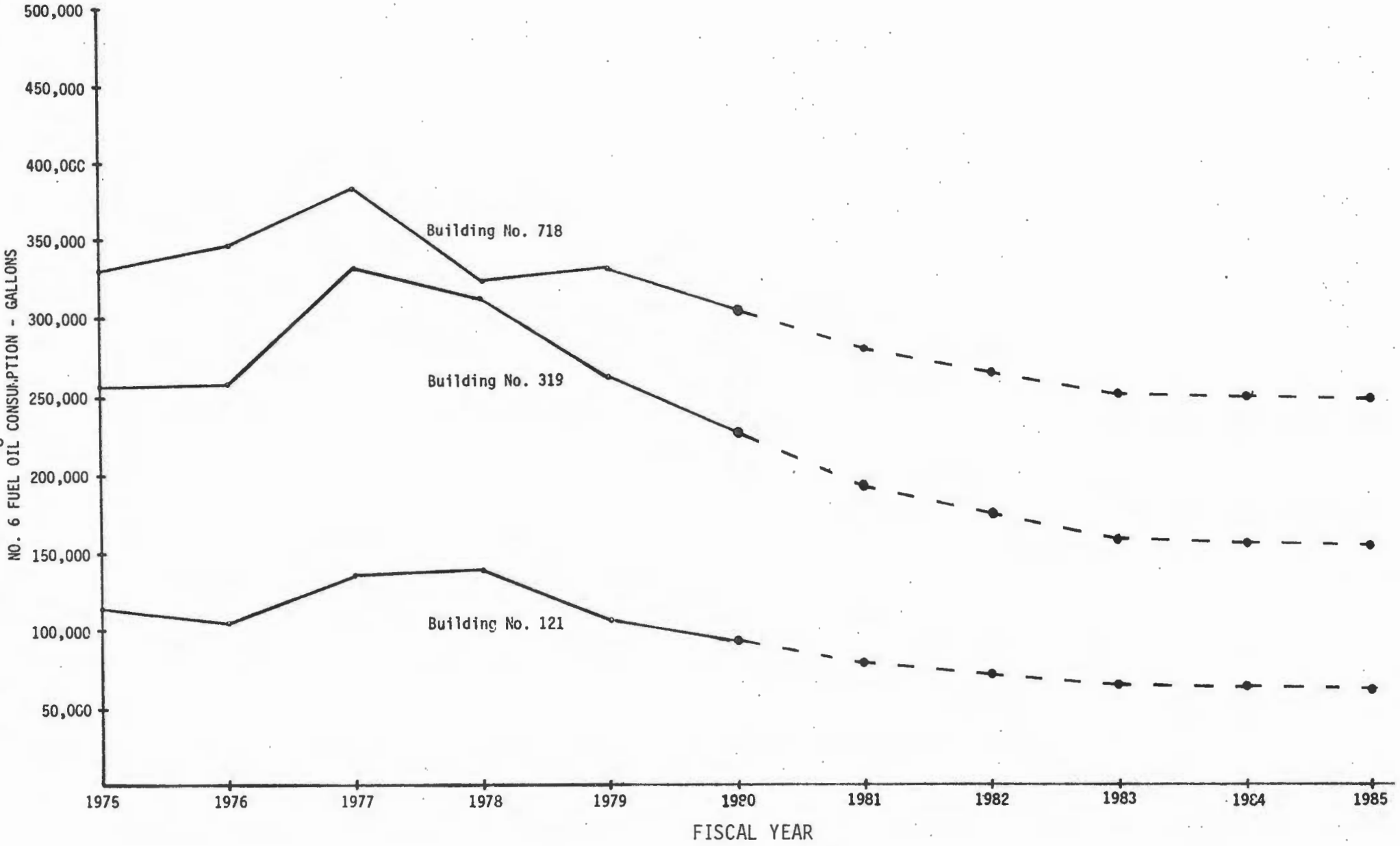
Total Consumption - 606,668 Gallons

SENECA ARMY DEPOT

NO. 6 FUEL OIL USE

DISTRIBUTION - FY 80

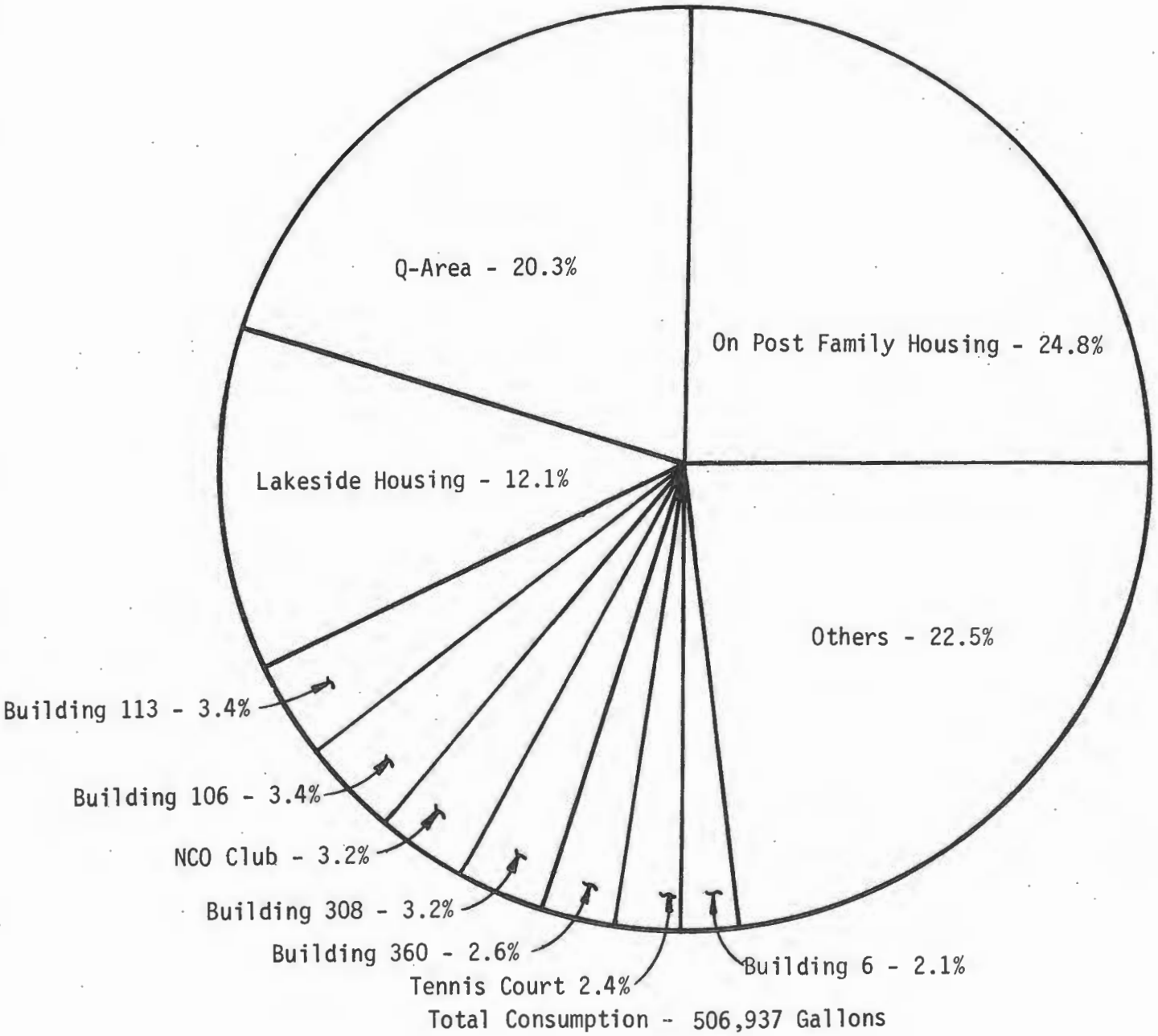
FIGURE NO. 4



SENECA ARMY DEPOT

OIL CONSUMPTION - CENTRAL HEATING PLANTS

FIGURE NO. 5

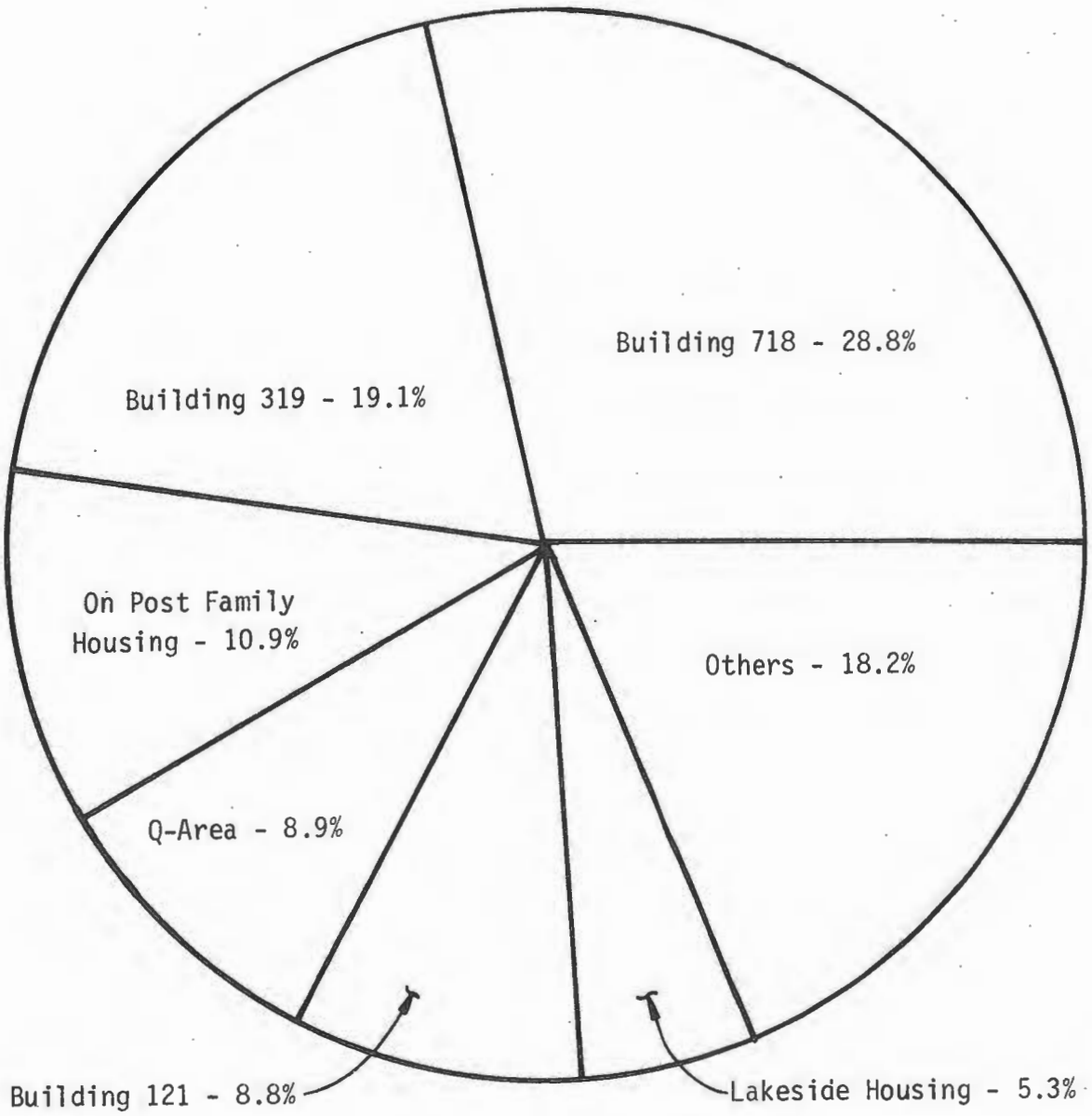


SENECA ARMY DEPOT

NO. 2 FUEL OIL USE

DISTRIBUTION - FY 80

FIGURE NO. 6



TOTAL CONSUMPTION - 160,731 Million Btu

SENECA ARMY DEPOT
TOTAL FUEL OIL USE
DISTRIBUTION - FY 80

FIGURE NO. 7

STUDY RESULTS

1. Field Surveys

Field surveys were conducted of the major buildings or groups of buildings included in the scope of work. The purpose of these surveys was to obtain data relative to the buildings' construction, occupancy, functional use, energy consumption, completed or programmed energy conservation or other modifications, and energy consuming equipment and systems. This data was then used to identify candidate ECIP projects and potential operating and maintenance improvements.

Building survey data is summarized in the Appendix to this report. Observations made during the field surveys are included as well as recommendations for energy savings. Where an ECIP analysis was made on a potential energy saving project, the results of that analysis are indicated. Other indicated recommendations for potential energy savings were considered operating or maintenance measures, or were capital improvement projects which were considered too small for qualification as ECIP projects.

2. ECIP Projects

2.1 EMCS

After surveying the buildings at SEAD and analyzing the data collected, it became readily apparent that the most effective method of reducing fuel consumption at SEAD would be to provide a means of maintaining the buildings at their authorized temperatures during working hours and setting the temperature back during unoccupied hours.

For the most part, the existing heating system controls do not provide adequate control of the space temperature in the area they are supposed to be controlling. Many buildings had thermostats set

at 65 or 68° F but the actual space temperature was considerably higher. Other buildings had thermostats set higher because the occupants indicated that some areas of the building were always several degrees colder than the area near the thermostat. Thus, even though energy conscious authorized temperatures have been established for the buildings at SEAD, in most cases they cannot be properly maintained with the existing temperature controls.

In addition to preventing many of the buildings from being maintained at their authorized temperatures during occupied hours, the present heating system controls make it difficult to effectively setback the building temperatures during unoccupied hours. As such, only a few buildings are presently setback during unoccupied hours and most of these are done manually and only 5 to 10 degrees. When you consider that, with the exception of family housing and the barracks,* almost every other building at SEAD has limited hours of use, the potential for energy savings by significantly reducing the temperature of these buildings during unoccupied hours is substantial. The list of potential candidates includes every building served by Central Heating Plants 121 and 319, and the Q Area buildings. All of the buildings in these three areas are basically only used Monday to Friday from 0730 to 1600. Many of the buildings served by Central Heating Plant No. 718 are candidates as well, although their hours of use are more varied.

In view of the above, major emphasis and effort was placed on the development and analysis of a project which would first modify the building temperature control systems as required to allow accurate control ability; second, provide remote monitoring and control of the building temperatures to ensure that the authorized temperatures were not being exceeded during occupied periods; and, third; to provide automatic temperature setback during unoccupied periods. The result was a project which is essentially an EMCS together with the necessary building heating system modifications. The project will require a capital investment of $ 293,000 , an annual expenditure

*Barracks already have local temperature setback controls.

of $106,278 for operating and maintenance labor and materials, and will provide annual energy savings of 8,226 MBtu of No. 2 oil and 30,528 MBtu of No. 6 oil. This represents a 12% reduction in current consumption of No. 2 fuel oil and a 33% reduction in current consumption of No. 6 fuel oil.

2.2 Building Shell Modifications

Numerous buildings at SEAD have already had shell modifications made to reduce heat loss/heat gain. Insulation has been added in walls and ceilings, window areas have been reduced, and storm windows have been installed on many buildings with more of the same type of work programmed or underway.

Other potential building shell projects not yet considered by SEAD personnel were identified and evaluated as part of this study. The results of this evaluation indicate that if the EMCS project is implemented, the additional energy which would be saved by insulation or other shell modifications is not enough to produce acceptable E/C ratios. Thus, no qualifying ECIP projects for building shell modifications were identified.

2.3 Electrical

The electrical load at SEAD is widely dispersed. As such, the opportunity for a single large ($100,000 or more) project which will significantly reduce electrical consumption is limited. Two such projects were identified and evaluated.

The first, replacement of existing street lighting with high pressure sodium lighting, had initially been developed and submitted by SEAD personnel. The project had been rejected for funding. A re-evaluation was performed as part of this study in order to determine if the proposed project could be improved sufficiently to qualify as an ECIP. The re-evaluation concluded that the street lighting replacement would not qualify.

The other potential ECIP project to reduce electrical consumption was the addition of a vapor barrier to the dehumidified warehouses. This vapor barrier would reduce moisture infiltration through the walls, thereby reducing the load on the electrically regenerated desiccant dehumidifiers. The cost of the vapor barriers was determined to be $429,034 and they will produce an annual energy savings of 13,322 MBtu. This represents a 9 percent reduction in the present annual electrical consumption for SEAD.

Miscellaneous lighting replacement projects were investigated on a first cut basis. The details of the investigation are presented after the Non-Qualifying Projects, as the results indicate that the projects are not economically viable. The projects were analyzed individually but the results shown in the project summary are approximate combined values.

2.4 Alternate Energy Sources

The evaluation of several alternate sources of energy was performed under Increment B of this study.

The first alternate fuel considered was natural gas because SEAD is located on sedimentary rock formations which have natural gas production potential. Several producing wells are in operation in the area. To determine the feasibility of obtaining natural gas from wells drilled on the SEAD property, a local Consulting Geologist was retained. His report indicated that producing sufficient natural gas from on-site wells to fuel a central heating plant was not practical. A natural gas well to supply fuel to an individual building also was considered but was not found to be sufficiently attractive enough to warrant a speculative investment. Natural gas from wells at SEAD is therefore not a viable alternate source of energy.

Solid waste also was evaluated as a potential alternate source of energy. A modular incinerator equipped with a heat recovery boiler and sized for the on-Post generated solid waste was found to be

unattractive. The major impediment to such a project is the lack of a sufficiently high year-round demand for steam. As such, the energy available from the solid waste can only be utilized during part of the year. Thus, the fuel oil savings accrue over only part of each year and it takes too many years to recover the initial capital investment.

The Study Team was requested to look into waste oils as a possible boiler fuel. The results of a preliminary investigation indicate that waste oils cannot be recommended as an alternate energy source for the following reasons:

1. The long-term effect on the boiler from the various additives and other components of these oils is unknown, and

2. There is an increasing trend toward recovering and recycling these waste oils. Reclamation centers are being opened all over the country. The market for these waste oils will therefore be highly competitive and it is doubtful that a long-term, economical supply of these waste oils could be secured.

The evaluation of coal-fired central plants, including supplemental firing of wood was investigated. The evaluation of coal-fired central plants, including supplemental firing of wood, was investigated under Increment E of this study. The results indicate that there is no clear-cut economic advantage to burning coal in a centralized boiler plant over continuing with petroleum-based methods at existing local boiler plants. This conclusion was reached by comparing life cycle costs of four alternatives against the "base" (existing petroleum) method.

Since SEAD is divided into two geographic areas (North and South Base), four central plant concepts for each area were developed. In addition,

the life cycle costs were predicted under the different assumptions of a 25 versus 40 year escalation rate.

2.5 Family Housing

Family Housing accounts for 36.9 percent of all No. 2 oil consumption. Normally, a large family housing area represents an ideal opportunity for ECIP projects because of the numbers and similarities of units. At SEAD most of the good candidate energy conservation projects* have already been implemented or have been programmed by Facilities Engineering. As such, no additional work was investigated as part of this study.

2.6 Central Heating Plants

As is the case with family housing, Facilities Engineering at SEAD has already implemented or programmed the most attractive central heating plant ECIP projects. This includes the installation of air-atomized burners in place of the mechanical atomized burners on the boilers in Building No. 718, and the replacement of the condensate return piping and repair of the steam pipe insulation for Building Nos. 718 and 121.

Central Heating Plant No. 319 has a unique situation in that it has a new boiler which is considerably oversized for present loads and will be even more oversized as other programmed or proposed energy conservation projects are implemented on the buildings supplied by No. 319. As such, the boiler can only be operated during the coldest weather and then only at partial loads. In order to alleviate this condition, SEAD can either downsize the burner in the existing boiler to match the boiler capacity to actual demand, or a new, properly sized boiler can be purchased. The only

---

*SEAD projects are listed in the Appendix.

advantage of these choices was performed and the clear economic choice is to downsize the burner in the existing boiler. (See description of Central Heating Plant No. 319 in Appendix.)

3. Summary of ECIP Projects

The number of potential ECIP projects for SEAD is limited by the work already implemented or programmed by Facilities Engineering and by the limited hours of use for all but the living quarters. This limited use provides excellent conditions for the implementation of temperature controls via an EMCS, but once these controls are implemented, other measures cannot be justified. Thus, the summary table of ECIP projects which follows is very short compared to the similar tables for other Army installations studied as part of this contract. However, the qualifying ECIP projects will produce the following reductions in the current energy consumption levels at SEAD:

No. 2 Fuel Oil	-	12 Percent
No. 6 Fuel Oil	-	33 Percent
Electricity	-	9 Percent

It should be noted that the above savings represents an 11 percent reduction from FY-75 energy consumption.

SENECA ARMY DEPOT

ECIP PROJECT SUMMARY

ECIP Project	CWE ($)	B/C	E/C	Payback Period (Years)	Annual Energy Savings (MBtu)	Annual Dollar Savings ($)
QUALIFYING PROJECTS:						
B. Installation of Energy Monitoring and Control System	293,000	9.4	132.2	2.0	38,754	143,056
A. Vapor Barrier for Dehumidified Warehouses	429,034	2.3	31.1	9.5	13,322	45,070
TOTALS:	722,034				52,076	188,126
NON-QUALIFYING PROJECTS:						
C. Installation of Natural Gas Wells	210,739	2.14	11.4	9.6	2,400	22,053
D. Building Shell Insulation	212,300	1.21	9.8	19.7	2,075	10,790
E. Street Lighting Modification	78,662	0.75	8.24	17.2	648	4,565
F. Heat Recovery Incineration	1,073,851	0.023	2.77	--	2,972	(16,884)
G. Miscellaneous Lighting Replacements*	100,000	0.5	8.0	--	850	2,000

*These values are preliminary results.

APPENDIX

SOUTH BASE AREA

SENECA ARMY DEPOT

HEADQUARTERS - BUILDING NO. 101

Construction - Brick veneer on tile and concrete block.

Size - Two story "L" shaped flat roof with heated basement. Outside dimensions are 94 feet x 66 feet x 36 feet. Roof plans area is 4,788 square feet. Wall area, including windows and doors, is 11,520 square feet.

Windows - All windows are double glassed through some leak around frame. Front doors is double leading into a heated vestibule. Rear doors is single and leads into an unheated vestibule.

Heating - Heating is accomplished with a hydronic system with area thermostats controlling "radiator" flow. All thermostats are connected to a pneumatic system which provides temperature setback during specified periods. Heat to the system is provided by a furnace located in the basement.

Cooling - The building contains four window air conditioning units. Two of these serve the telephone exchange and equipment area, one serves the reproduction area located in the basement and the fourth serves the basement conference/training room.

Hot Water - The headquarters building has an electrical powered domestic water heater. The unit is cylinderical; 17½ inches in diameter and 58 inches in height.

Other - No "other" loads suitable for energy management and control were identified in this building.

Occupancy Schedule - Office section of the building is occupied 0730 to 1600, Monday through Friday. The separate room containing the telephone exchange is occupied on a 24 hour basis.

Discussion -

Usage, Hours of Operation -

This building is operated on a normal office schedule with little or no evening or weekend activity. One area, housing the telephone exchange and equipment, does operate on a 24 hour basis.

Condition -

The building is in good condition. However, the heating system has several problems that should be corrected. When inspected, one area of the basement, beneath the telephone equipment room was not receiving heat from the hydronic system. To compensate, an adjoining room was being overheated. The hydronic system serving the second floor bay area was not adequately controlled by existing "radiator" control valves. Excessive amounts of heat were being conducted from the uninsulated heat water supply pipes.

Observations -

Throughout the building, the frames of the double glazed windows leaked cold outside air. Several employees had attempted to reduce this infiltration with tape, paper wadding, and plastic overlays.

FIRE STATION - BUILDING 103

Construction - Brick veneer on tile block.

Size - Two story rectangular flat roof building with heated basement. Outside dimensions are 123 feet x 34 feet x 28 feet. This includes a single story vehicle storage room located on one end, measuring 46 feet by 34 feet. Excluding the vehicle storage area, roof area of the building is 2,618 square feet. Total wall area, including windows and doors is 8,792 square feet.

Windows - All windows are double glassed and sealed well at the frame junction. The doors to the office section leads to a vestibule. The doors to the fire station area is protected by an aluminum storm door and leads directly into an entrance hall. There are two other entrances to the fire station area, a single door from the vehicle area and a single door from the rear of the building.

Heating - Heating is accomplished with a hydronic system with individual radiator thermostats controlling radiator flow. Heat to the system is provided by a furnace located in the basement. Number 2 fuel oil is used as the fuel. The conference/training room has additional heating from the package A/C-heating unit.

Cooling - The conference/training room located on the second floor is heated and air conditioned by a package unit located on the building roof. The unit can provide 50,170 b/hr heating and 60,000 b/hr cooling capacity.

Hot Water - Domestic hot water is supplied by a 50 gallon electric heating tank located in the basement.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - The office section of this building is occupied during normal working hours Monday through Friday. The fire station portion, which represents approximately 90 percent of floor area, is occupied on a 24 hour per day basis.

Discussion -

Usage, Hours of Operation -
The continuous occupancy of this building makes it a poor candidate for temperature setback.

Condition -
The building is in relatively good condition.

Observations -
The new double glazed windows are reducing air infiltration. Windows in the basement area should be weather sealed and door seals checked.

HEALTH CLINIC - BUILDING 106

Construction - Brick on concrete block.

Size - Single story flat roof rectangular building measuring 167 feet by 64 feet. Exposed wall height is 11 feet. Total floor plan area is 10,688 square feet. Total exposed wall area, including windows and doors is 5,082 square feet.

Windows - Total window are is estimated to be 665 square feet. Windows are fixed double pane with aluminum frame.

Heating - Heating is accomplished by a combination forced air - hydronic system. Number 2 fuel oil is fired in a furnace to provide a hot water source to the system. A portion of the hot water is used by the hydronic system for heating peripherial walls and entry ways. The remainder of the water is used to heat air flowing through the hot deck of the multizone forced air system.

Cooling - The multizone forced air system also provides cooling for the building. A Chrysler Airtemp package unit provides the chilling to the cold deck of the multizone forced air system. The reciprocating compressor is driven by a 50 HP motor.

Hot Water - Domestic hot water is supplied by a 100 gallon heating tank using Number 2 fuel oil as fuel.

Other - No "other" loads suitable for energy management and control were identified in this building.

Occupancy Schedule - This building is occupied during normal working hours, Monday through Friday. The building is not normally occupied evenings and weekends.

Discussion -

Usage, Hours of Operation -

The occupancy schedule of this building would normally make it a viable candidate for A/C shutoff and temperature setback. However, the use of the building as a health facility complicates matters. Discussions with personnel employed in the building indicated that some of the materials, equipment and drugs were temperature sensitivity. The staff may wish to consider grouping temperature sensitive items into one or two air zones so that the remaining zones could be setback and contribute to energy savings.

Condition -

The building was of recent construction and in excellent condition. The humidifier was not working at the time of inspection and one zone mixing damper was disconnected.

Observations -

The lighting level, provided by florescent lights was high. Consideration should be given to lowering lighting levels in non critical areas and in installing energy efficient tubes and ballast units as a maintenance item.

CARPENTER SHOP - BUILDING 113

Construction - Same as Buildings 320 and 321.

Size - Single story - 16,000 ft^2

Windows - Single hung, metal frame double pane.

Heating - Unit heaters with individual thermostats controlling fans. (Control problems see Building 323 write-up).

Boiler: Crane Company - 80 Series
Mod. # 80-1350-2, Serial # 81042
No. 2 oil - 11.9 gal/hr

Cooling - None

Hot Water - 50 gallon electric water heater - 2.5 kW

Discussion - Building 113 is a carpentry shop. Offices are located in the east one-third of the building. The remaining area is used for wood cutting, etc. Operation hours are 0730 - 1600.

Recommendations - Building 113 has same control problems as Buildings 320, 321, 323 and is part of basewide EMC ECIP. Building shell insulation cannot be recommended due to low E/C value (See Building 323 write-up).

STORAGE - RECREATION SERVICE - BUILDING 114

Construction - Same as Building 321, plus walls are covered with stucco on exterior.

Size - Single story - 12,000 ft^2

Windows - None

Heating - Two oil furnaces, forced-air with thermostats for rifle range and small offices.

Furnace:

Office - 50,000 Btu/hr #2 Fuel Oil
Range - 500,000 Btu/hr #2 Fuel Oil

Cooling - None

Discussion - Building 114 contains a rifle range in the west end which is used and heated Monday and Tuesday 1700 - 2000. A small office in the SE corner is also heated Monday through Friday (1200 - 1630). The remainder of the building is used for storage and is unheated.

Recommendations - Temperature control problems here are minimal because of forced air system. Because of limited operation hours no projects are recommended for study.

ADMINISTRATION - BUILDING 115

Construction - 8" concrete block with 4" brick facing - Built up roof on 1" sheathing trusses covered with celotex. Accoustical tile ceiling suspended below.

Size - Single story - 13,600 ft^2

Windows - Steel casement single pane with single pane storm on outside - poor condition.

Heating - Steam-fed perimeter fin tube radiation. Thermostat control motorized steam valves. Boiler located in Building 121 (See Building 121 write-up).

Cooling - Computer facility in north west corner is only area cooled.

Chiller: Westinghouse - 10 ton
Mod. # SRØ 08/010
Carrier Heat Pump - 5 ton
Mod. # 40GQ00630D

Hot Water - 50 Gallon electric water heater

Other - Seven vending machines, microwave and cold water fountain in breakroom

Discussion - Building 115 is an office building that is heated only except for the computer facility. Building operation hours are 0730 - 1600. Computer facility is conditioned 24/da, 7 da/wk.

Recommendations - Building insulation was studied for SEAD buildings and rejected for office type buildings because of low E/C values (see project write-up, "building shell insulation").

Building 115 has adequate heating system controls but changes in building floor plan has separated thermostats from fin tube radiations they control.

Building 115 is included in the basewide EMCS ECIP.

OFFICES: HOUSING, TRANSPORTATION, ETC., BUILDING 116

Construction - Walls are same as Building 115. Ceiling/roof system is identical to Building 113.

Size - Single story - 12,000 ft^2

Windows - Non-openable, single-pane

Heating - Forced-air, oil-fired furnace

Furnace: 500,000 Btu/hr output; No. 2 Fuel Oil.

Cooling - None

Discussion - Slightly more than half of Building 116 (west end) is unheated storage. The east end is made up of two separated modular office areas on either side of a large open warehouse area. The furnace and thermostat is located in the open area between the two offices. Approximately 25 people occupy this building 0730 - 1600.

Recommendations - No building shell projects studied for same reason mentioned in Building 115 write-up. Building 116 is included in basewide EMCS ECIP.

VEHICLE MAINTENANCE SHOP - BUILDING 117

Construction - Cinder block with stucco on exterior. Ceiling similar to 113.

Size - Single story - 19,000 ft^2

Windows - Metal frame, double pane windows

Heating - Steam-fed, unit heaters with individual thermostats controlling fans. Control problems (see Building 323 write-up). Boiler located in Building 121.

Cooling - None

Hot Water - 42 Gallon electric water heater in restroom

Discussion - Building 117 is a motor vehicle maintenance shop with large open bays and 2 small partitioned offices. There is a battery-recharging room in the southeast corner. Has vehicle exhaust ventilation system. Operation hours are 0730 - 1600.

Recommendations - Same as Building 323. Also battery recharging shop should be isolated to draw outside air for ventilation instead of heated building air as is present practice. Part of basewide EMCS ECIP.

VEHICLE MAINTENANCE SHOP - BUILDING 118

Construction - Same as Building 117

Size - Single story - 19,000 ft^2

Windows - Metal frame, double pane

Heating - Same as Building 117

Cooling - None

Hot Water - 42 Gallon electric water heater in restroom

Discussion - Building 118 is a motor vehicle maintenance shop with large open bays and several small offices and storage areas. It has vehicle exhaust ventilation system. Operation hours are 0730 - 1600.

Recommendations - Same as Building 323. Part of Basewide EMCS ECIP.

POST ENGINEERING - BUILDING 122

Construction - Brick veneer on clay tile block.

Size - Single story - high ceiling rectangular building, measuring 162 feet x 75 feet. Roof is shallow sloped bi-level, 28 feet at peak and 18 feet at eaves. Total floor plan area is 12,312 square feet. Total wall area, including windows and doors is 12,528 square feet.

Windows - Windows on side walls of building and on high bay are double pane. Windows on end walls are single pane.

Heating - Unit space heaters with circulation fans were suspended from the ceiling. Steam supply pipes are insulated. Heating energy is supplied by boiler plant in Building 121.

Cooling - No cooling (air conditioning) systems were located in this building.

Hot Water - Domestic hot water is supplied by a 40 gallon electric heating tank located in the locker room area.

Other - No "other" loads suitable for energy management and control were identified in this building.

Occupancy Schedule - This building is occupied during normal working hours, Monday through Friday. The building is not normally occupied evenings or weekends.

Discussion -

Usage, Hours of Operation -
The occupancy schedules for this building makes it a good candidate for energy savings by temperature setback.

Condition -

The building has been renovated and appears to be in good condition.

Observations -

The energy usage reduction/renovation projects should be continued. Both ends of the building are in need of weather sealing improvements. Wind curtains should be considered for the service (roll-up) doors if they are opened frequently during the winter months.

FACILITIES ENGINEERING ADMINISTRATION - BUILDING 123

Construction - Same as Building 115.

Size - Single story - 4,400 ft^2

Windows - Metal frame, double pane

Heating - Perimeter fin tube radiation with single thermostat controlling motorized steam valve. Control problems only in breakroom which is manually operated. Boiler located in Building 121.

Cooling - None

Hot Water - 50 Gallon electric water heaters in restrooms.

Discussion - Building 123 is an office building for the SENECA base Facilities Engineering. Operation hours are 0730 - 1600.

Recommendations - No building shell projects recommended here (see Building 115 write-up). Building 123 is also part of basewide EMCS ECIP (see Building 323 write-up).

FACILITIES ENGINEERING PAINT SHOP - BUILDING 124

Construction - Similar to Building 115 except there is no suspended ceiling.

Size - Single story - 1,600 ft^2

Windows - Metal frame, double pane

Heating - Steam-fed, unit heaters with individual thermostats controlling unit heater fans. Same control problems mentioned in Building 323 write-up. Boiler located in Building 121.

Cooling - None

Hot Water - Electric water heater in restroom.

Discussion - Building 124 is a paint shop. Operation hours are 0730 - 1600.

Recommendations - Part of basewide EMCS system (see Building 323 write-up).

ADMINISTRATION (QA) - BUILDING 125

Construction - Same as Building 123 plus interior wood panelling on outside walls.

Size - Single story - 1,600 ft^2

Windows - Metal frame, double-pane

Heating - Steam-fed, perimeter baseboard heating with single thermostat and motorized steam valve. Boiler located in Building 121.

Cooling - None

Hot Water - 15 Gallon electric water heater in restroom

Discussion - Building 125 is an office building operated 0730 - 1600.

Recommendations - Part of basewide EMCS ECIP (see Building 323 write-up)

LOCOMOTIVE STORAGE - BUILDING 127

Construction - Similar to Building 115 except there is no suspended ceiling.

Size - Single story - 6,600 ft^2

Windows - Non-operable, metal frame, single pane

Heating - Same as Building 124. Boiler located in Building 121.

Cooling - None

Hot Water - None

Discussion - Building 127 is used for locomotive storage and is generally unoccupied.

Recommendations - Building 127 is part of the basewide EMCS ECIP (see Building 323 write-up).

NCO CLUB - BUILDING S-142

Construction - Wooden Frame Structure

Size - Single story irregular "L" shaped building measuring 118 feet x 146 feet. Leg widths are 57 feet and 26 feet respectively. Height at eaves is estimated to be 9 feet. Floor plan area is approximately 9,800 square feet. Wall area, including windows and doors is approximately 4,750 square feet.

Windows - Windows throughout this building were originally single pane double hung units. Many of these have been replaced by double pane units. Doors throughout open directly into the heated interior spaces. The main door, however, does enter into a foyer.

Heating - Heating is accomplished with a hydronic system including both wall units and space heaters suspended from the ceiling. Heat to the system is provided by a furnace located in an appendaged structure. Number 2 fuel oil is used as a fuel.

Cooling - The building contains no cooling (air conditioning) equipment.

Hot Water - Domestic hot water is supplied by a 90 gallon tank using Number 2 fuel oil. Hot water for the dish washer unit is generated at the dish washer by steam taken from the building's hydronic heat system.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - This building is utilized from 0730 to 2100 Monday through Friday. It is not normally occupied on Saturdays and Sundays.

Discussion -

Usage, Hours of Operation -

The non-occupancy of the building during the weekend makes it a likely candidate for temperature setback, despite its relatively short (10 hours) non occupancy period during week nights.

Condition -

The building is in fair condition and appears structurally sound. Winterization efforts should be continued with the remaining single pane windows being replaced by double pane units. Weather stripping around doors should be checked and replaced where necessary.

Observations -

During the lunch period, the door entering into the cafeteria portion of the NCO Club received frequent use allowing heat to escape and cold air to flow into the room. Consideration should be given to blocking the door or construction of an exterior vestibule. A second set of doors could be added to the main entrance to create a vestibule out of the entrance hall.

YOUTH ACTIVITIES - BUILDING S-220

Construction - Wooden frame structure.

Size - Two story rectangular building measuring 120 feet by 30 feet. Roof is a simple "V" shape. Building height is estimated at 18 feet at the eaves and 24 feet at ridge. Total area of a single floor is 3,600 square feet. Total wall area, including windows and doors, is estimated to be 5,580 square feet.

Windows - Windows are single panes double hung style that allow significant infiltration. There are 46 windows in the building. There are two doors at each end of the building and a set of double doors on each side.

Heating - Heat supplied by a hydronic system using Number 2 fuel oil.

Cooling - No cooling (air conditioning) systems were located in this building.

Hot Water - Domestic hot water was supplied by a 30 gallon electric heating tank.

Other - No "other" loads suitable for energy monitoring and control were observed in this building.

Occupancy Schedule -

Monday through Thursday	1600 to 2100
Friday	1600 to 2300
Saturday	1430 to 2300
Sunday	1430 to 2100

Occupied occasionally Wednesday and Thursday - 0900 to 1600

Discussion -

Usage, Hours of Occupancy -

The use of the building on a daily basis reduces the savings available through energy setback. The building manager stated that the heating system was manually setback during unoccupied periods.

Condition -

The building was judged to be in poor condition. Sizable gaps existed around windows at frames and some siding was missing from building. The roof appeared to be in good condition.

Observations -

Facilities Engineering advises that this structure is scheduled for demolition; hence, energy conservation measures should not be considered.

PROCESS SHOPS - BUILDINGS 316, 317, 318

Construction - Sheet metal on metal frame.

Size - Single story high bay rectangular building measuring 302 feet by 60 feet. Roof is sloped bi-level, 41 feet at peak and 18 feet at eaves. Total floor plan area is 18,120 square feet. Total wall area, including windows and doors is 14,412 square feet.

Windows - Windows in single pane in fired metal frames account for approximately 630 square feet of surface. A few double hung exists in Buildings 316 and 317. Personnel doors at side enter through exterior vestibules. Personnel doors at end enter directly into the high bay area. The side walls contain a series of roll-up service doors. In Building 318, all but 4 of these had been sealed or winterized.

Heating - Unit space heaters with circulation fans were suspended from the ceiling. Steam supply pipes were not insulated. Heating energy is supplied by boiler plant in Building 319.

Cooling - No cooling (air conditioning) systems were located in this building.

Hot Water - Domestic hot water is supplied by an electric heating tank located in the restroom area. Building 316 has a 42 gallon tank. Buildings 317 and 318 have 52 gallon tanks.

Other - The only substantial "other" loads observed in these buildings was welding equipment and paint booth ventilation fans. As these are both necessary for work processing, they were judged to be poor candidates for connection to an energy monitoring and control system.

Occupancy Schedule - The buildings are occupied during normal working hours, Monday through Friday. The buildings are not normally occupied evenings or weekends.

Discussion -

Usage, Hours of Occupancy -
The occupancy schedule for these buildings make them good candidates for energy savings by temperature setback.

Condition -
Building 318 has recently been reconditioned. Work included insulation of walls and ceilings, sealing of windows and doors and repainting for better light utilization. Buildings 316 and 317 have projects out for bid on similar reconditioning work.

Observations -
Energy savings opportunities in these buildings include recapturing condensate exhaust, installing storm windows, using more efficient light fixtures and painting ceiling a light color to enhance reflectivity.

WAREHOUSE - BUILDING 320

Construction - Same as 321.

Size - Single story - 12,000 ft^2

Windows - Wood-frame, single-pane, double hung

Heating - Steam fed unit heaters throughout with individual thermostats controlling fans. Perimeter fin tube radiation in south end offices. Boiler located in Building 319. Same control problems mentioned in Building 323 write-up.

Cooling - None.

Discussion -

Building 320 was not occupied at time of visit. Machine shop from Building 318 are scheduled to move to 320 in early 1981. Operation hours will probably be 0730 - 1600.

Recommendations -

Building shell insulation was studied and rejected for Building 320 because of low E/C value. The building has the same control problems mentioned in Building 323 write-up. The basewide EMCS ECIP is recommended as a viable project (E/C 30) that should remedy this problem as well as save energy with nighttime and weekend temperature set backs.

WAREHOUSE - BUILDING 321

Construction - Same as 323 except underside of ceiling trusses are covered with homosote building board.

Size - Single story - 12,000 ft^2

Windows - None

Heating - Three large unit heaters mounted on floor. Steam fed by boilers located in Building 319. Individual thermostats control unit heater fans. Same overheating problem mentioned in Building 323 write -up.

Cooling - A/C serves only the calibration lab module in center of building.

Chillers: Carrier - 5 Ton
Mod. # 38BQ006310

Hot Water - 40 Gallon electric water heater in restroom.

Discussion - Building 321 is divided in three sections. The south end is a general warehouse plus cleaning area for serviced instruments. The central portion contains an instruments calibration modular lab and offices. The north end is used for work involving radioactive materials - used once a week. The building is occupied by 2-5 people from 0730 - 1600.

Recommendations - Insulation for 321 was studied and rejected because of low E/C value.

Building personnel complained about unit heaters constantly being "water logged". In fact, the unit heater in the south end of the building is left draining continuously. Action is needed to remedy this problem caused by either low steam pressure or lack of condensate return pumping capacity.

Building 321 is also part of basewide EMCS ECIP to improve temperature control problems and implement nighttime and weekend setbacks.

WAREHOUSE - BUILDING 323

Construction - 8" cinder block on concrete slab, wood trusses covered with 1" sheathing and built-up roof. No insulation. Cinder block in poor condition.

Size - Single story, 90,000 ft^2

Windows - Non-operable, single-pane

Heating - Steam-fed unit heaters with individual thermostats controlling unit heater fans. This system tends to overheat since even when thermostat is satisfied, steam remains to be supplied to the heater coils. Boilers are located in Building 319 (See Building 319 write-up).

Cooling - None

Hot Water - 40 gallon, electric water heater in restrooms.

Other - Numerous drink machines, ice maker, food machines in break room

Discussion - Building 323 is a general warehouse used for storage. Office and breakrooms areas occupy approximately 28,000 ft^2 in the central portion of the building. The south end of the building is basically a receiving, sorting, storage and shipping operation. The north half is secured storage. Operation hours are 0730 - 1600 for approximately 20-40 people.

Recommendations - Building insulation was studied and rejected because of low E/C values ($\sim$ 10). Building 323 is part of a basewide Energy Monitoring and Control System (EMCS) ECIP project, recommended with an E/C of 33. This will provide improved building temperature control plus automatic nighttime and week-end set back by using motorized control valves and associated electronic controls.

The building roof is in poor repair. Facilities engineers have a project in the works for repairing it. Also most steam lines are in poor condition, leaks and lack insulation. This also causes overheating problems, particularly in the north end of the building where the main steam lines enter. Insulation of Building No. 323 will commence in spring of 1981 under existing binding contract.

SHED TYPE STOREHOUSE DEHUMIDIFIED & UNHEATED
BUILDINGS 339, 341, 342, 345 & 346

Construction - Walls are cinder block with no insulation or vapor barrier. The roof is comprised of wood rafters with a built-up roof.

Size - Building is single story with floor area of 90,000 square feet (500' x 180' x 21.7').

Windows and Doors - There are no windows. Buildings were constructed with twenty 12' x 12' doors and 4 personnel doors. The majority of the doors have been permanently sealed to prevent air infiltration.

Heating - Buildings are not heated except for the heat generated by the dehumidification process.

Cooling - The buildings are not cooled in any way.

Hot Water - The majority of warehouses were observed to have no hot water usage.

Dehumidifiers - Each building has six Model Y-100-20 or four Model W-120-27 dehumidifiers. Each dehumidifier has its own humidistat which is set to maintain a maximum of 50% relative humidity. There are two kinds of dehumidifiers in use.

Cargocaire
Model Y-100-20 Type I
21 lbs water per hour
19.1 kW

Cargocaire
Model W-120-27
24.8 lbs water per hour
23.8 kW

Occupancy Schedule - All warehouses are occupied Monday through Friday - from 0730 - 1600. Little or no personnel traffic occurs.

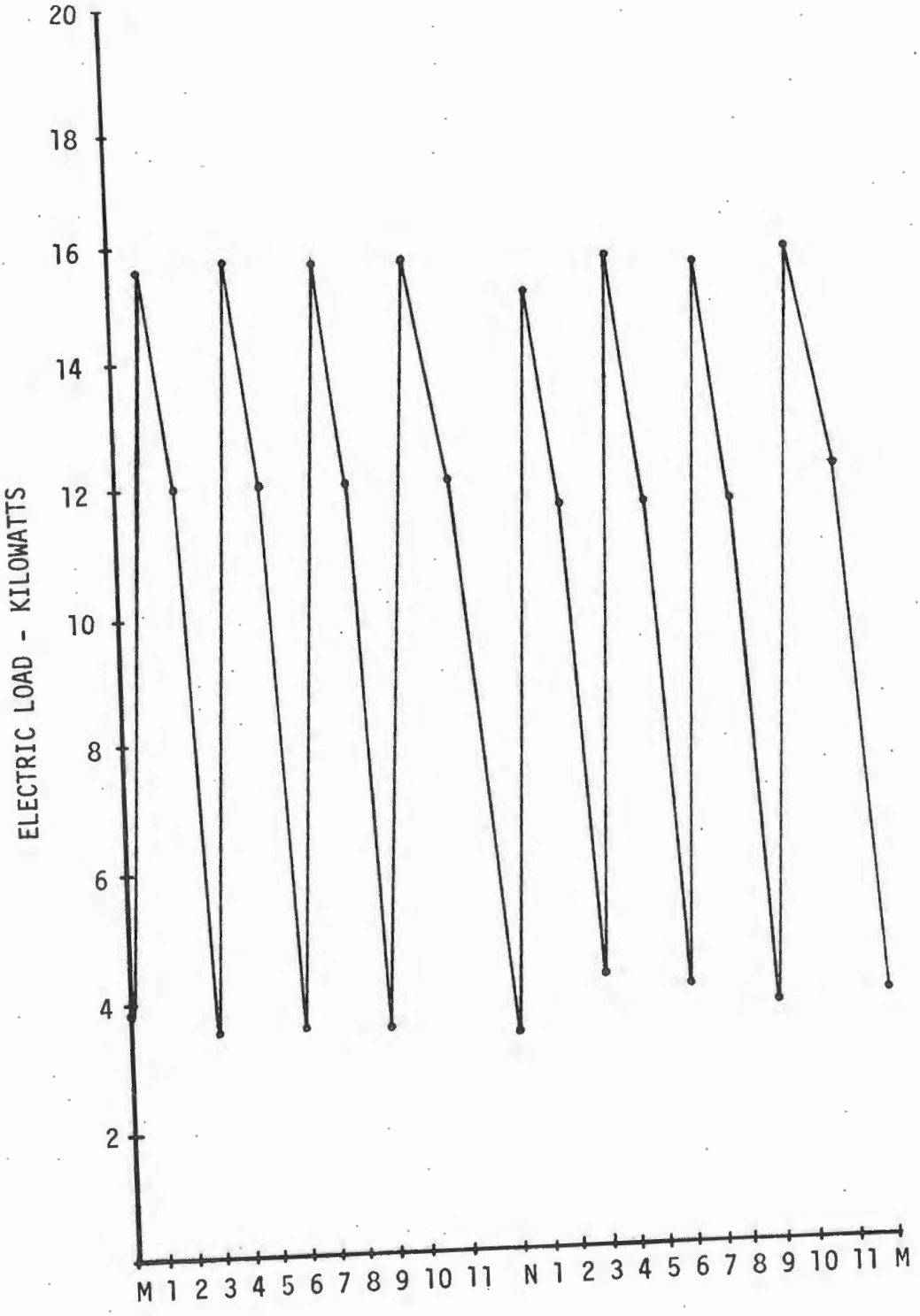
Discussion - These five warehouses are used primarily for the storage or assembly of machinery. To minimize inspection and preservation costs, a 50% relative humidity is maintained through the use of desiccant type dehumidifiers. These dehumidifiers use electric strip heaters to dry the desiccant beds after they become saturated.

The warehouses original construction and present condition allow considerable moisture infiltration to occur. This increases the load on the dehumidifiers and causes increased electrical consumption.

In addition to the above wall problems, numerous roof leaks exist which also increase the dehumidifier load. Structural timbers supporting the roofs have bowed and hence roof leaks have developed. These roof leaks permit water to wet the extremely porous cinder block walls. This deteriorates the walls which allows more moisture infiltration as well as directly contributing to the moisture load.

Recommendations - Install a vapor barrier to cover all wall surface areas except operating doors. The above requires that the roof and its structural supports be permanently repaired prior to the vapor barrier installation.

The above recommendation is based on an ECIP analysis which predicted an energy to cost (E/C) ratio of 37.7 MEGA Btu's per thousand dollars and a corresponding discounted benefits to cost (B/C) ratio of 2.8. This investment would be amortized in 7.8 years.



SENECA ARMY DEPOT
BLDG. 339, UNIT #4-DAILY
ELECTRIC LOAD PROFILES

FIGURE NO. 8

AIRFIELD OPERATIONS - BUILDING 2305

Construction - 12" concrete block - 1" x 3" wood bridging with 1" rigid insulation, 1" roof deck and built-up roof.

Size - Two story - 4,700 ft^2

Windows - Metal frame, single-pane

Heating - Perimeter baseboard radiation + unit heaters in open bay area

Boiler: Farrar Trefts
Order # BC1876
Boiler # 24914
2.08 x 10^6 Btu/hr
#2 Fuel Oil

Cooling - None

Hot Water - 52 Gallon electric water heater, 2,500 watt

Discussion - Building 2305 is the airfield operations building with the control center for all take-offs and landing at the air strip. Building is occupied by about 20 people from 0730-1600. However, is heated for 1-5 people 24/da for incoming and departing flights. Approximate annual fuel consumption 9.600 gals #2 fuel oil.

Recommendations - Facilities engineering has stated that they are currently involved in energy conservation studies in this building; therefore, no futher analysis is recommended.

AIRFIELD ADMINISTRATION - BUILDING S2306

Construction - Wood frame 2" x 4" studs covered with asphalt tiles in poor condition - Asphalt shingles on roof. Crawl space w/half basement.

Size - Two story - 10,000 ft^2 - also vacant control tower several stories high.

Windows - Wood panel double hung - single pane in poor condition.

Heating - Perimeter fin tube heating with one centrally-located thermostat.

Boiler: National U.S., Steel Boiler, Crane Co.
Mod. # A-4102
Serial # 139311
SBI Gross output 1800 MBH

Cooling - None

Hot Water - 52 Gallon electric water heater 9,000 watts

Discussion - Building S2306 is an administrative building at the airfield. The building is used 0730-1600.

Recommendations - Facilities engineering is currently working on several design modifications to S2306. Therefore, no further studies are recommended.

SEAD FAMILY HOUSING

Types 1, 2, 3

Construction - Wood frame with brick facing or 5/8" plywood. 3/12 slope with built-up roof. Slab-on-grade - Original insulation levels - 1" wall, 2" ceil, 1-1/2" slab perimeter. Project added 6" insulation in attic floor.

Size - Single story, single family, 1806 - 2134 ft^2

Windows - Aluminum, double hung with storm sash.

Heating - Forced air with distribution in floor slab - single thermostat.

Furnace: Lennox 84,000 Btu/hr
Mod. # OHP30-8
#2 Fuel Oil

Cooling - None

Hot Water - 52 Gallon, 2,500 watt water heater

Types 4, 5

Construction - Wood frame with 6" bevel siding or 5/8" plywood. Built-up roof. Slab-on grade. Original insulation levels: 2" ceiling, 1" walls, 1-1/2" slab perimeter. Project added 6" insulation in attic floor.

Size - Single story - duplex, 3200-3500 ft^2

Windows - Aluminum, double hung with storm sash.

Heating - Forced air with distribution in floor slab. Single thermostat.

Furnace: #0SR7D-1050
#2 Fuel Oil

Cooling - None

Hot Water - 40 gallon electric water heater.

Types 7, 8

Construction - Wood frame - with half wood sheathing and half brick facing. Roll asphalt roofing. Cathedral ceilings. Original insulation levels: 1" ceiling, 1" wall, 1" perimeter.

Size - Two story, townhouse, 5278 - 5918 ft^2 total 2 2-bedrooms @ 1020 ft^2 and 2 3-bedrooms @ 1133 ft^2.

Windows - Aluminum, double-hung with storm sash

Heating - Forced air with distribution in floor slab. Single thermostat.

Furnace: Dunham-Bush, Inc.
Mod. # OCFB10012BR
Serial # C16173602
100,000 Btu/hr bonnet cap
#2 Fuel Oil

Hot Water - 40 gallon, 4500 watt water heater

Discussion - There are nine different types of family housing at SEAD. They are classified by the numbers 1-8 and the name MCA. Listed below are the family housing units at SEAD by type:

Type	Bldg. #	# of Units	# of Similar Units	Annual Avg. fuel use (gal. #2)
1	204	1	10	900/unit
2	203,205,206,217	4		
3	202,207,214-216	5		
4	211,213,218,221,223	10	18	850/unit
5	210,212,219,222	8		
6	200,201	4	4	1060/unit
7	224-242	76	88	940/unit
8	243-245	12		
MCA	208,209	4	4	1440/unit
Total			124	117,020

Types 1, 2 and 3 are single family buildings of similar construction. Types 4 & 5 are single-story duplexs. Types 7 & 8 are two-story buildings with 4 families per building. Type 6 and the MCA buildings were not studied because they are unique and small in number.

All are occupied 24/da, 7 days/week.

Recommendations - Facilities Engineering has numerous projects planned for family housing. In addition, Facilities Engineering has investigated the feasibility of expanding central plant steam heating of family housing. Expanding steam distribution proved to be economically unviable. After discussions with Facilities Engineering, it was concluded that no further study of this area is necessary.

NORTH BASE AREA

(TROOP AREA)

SENECA ARMY DEPOT

HEADQUARTERS
BUILDING 701

Construction - Ten inch cavity walls; built-up roofing on 2" rigid insulation over concrete pan joist roof deck; first and second floors pan joist construction; pipe/crawl space approximately 2 feet deep.

Size - Two story, 170 feet x 42 feet with 14280 square feet floor area.

Windows - First floor steel security sash, second floor architectural projected steel sash; North and West windows equipped with storm windows; Areas as follows:

Second Floor -	East	- 99 square feet
	South	- 528 square feet
	West	- 114 square feet
	North	- 495 square feet
First Floor	East	- 45 square feet
	South	- 450 square feet
	West	- 90 square feet
	North	- 331 square feet

Heating - Served by steam from boiler plant 718; steam-to-hot water converter with condensate cooler serving perimeter fintube radiation system; heating hot water temperature reset by outside air temperature.

Cooling - Approximately 1400 square feet of the first floor (east end of building) is conditioned by central station horizontal air handling unit with direct expansion cooling coil, steam grid humidifier and steam reheat coil; cooling provided by 10 ton air cooled condensing unit mounted on grade; air handling unit equipped with mixing box and manual outside air damper.

Hot Water - Fifty gallon storage tank with steam heating bundle.

Occupancy - Administrative areas occupied 0800 to 1700 5 days per week; communications center and computer facility occupied continuously.

Discussion - Storm windows on north and west windows do not fit securely and are not effective in reducing infiltration. Entry vestibule interior set of doors observed propped open. Classroom lighting fixtures are in poor condition. Fenced security area around building lighted with 6 mercury vapor lights.

Recommendations - Mercury vapor security area lamps (6 each) should be changed to sodium vapor lamps. Crawl space vents should be closed during heating season with removeable plywood or sandwich panels.

BACHELOR OFFICERS QUARTERS
BUILDING 702

Construction - Steel reinforced concrete roof and floor with built-up roofing on 2½-inch rigid insulation on roof; concrete block walls with gypsum board finish on furring strips.

Size - Two story, 41 feet x 245 feet, including single story section 41 feet x 41 feet on south end; floor area 4045 square feet - first floor and 3,025 square feet - second floor.

Windows - Steel sash single pane architectural projected type with some units fitted with triple track aluminum storm windows; areas as follows:

East	-	2nd Floor 595 square feet
		1st Floor 595 square feet
West	-	2nd Floor 672 square feet
		1st Floor 651 square feet
South	-	1st Floor 42 square feet
North	-	2nd Floor 21 square feet
		1st Floor 77 square feet

Heating - Served by steam from boiler plant 718; steam-to-hot water converter, with condensate cooler, serving perimeter fin tube radiation system; heating hot water temperature reset by outside air temperature.

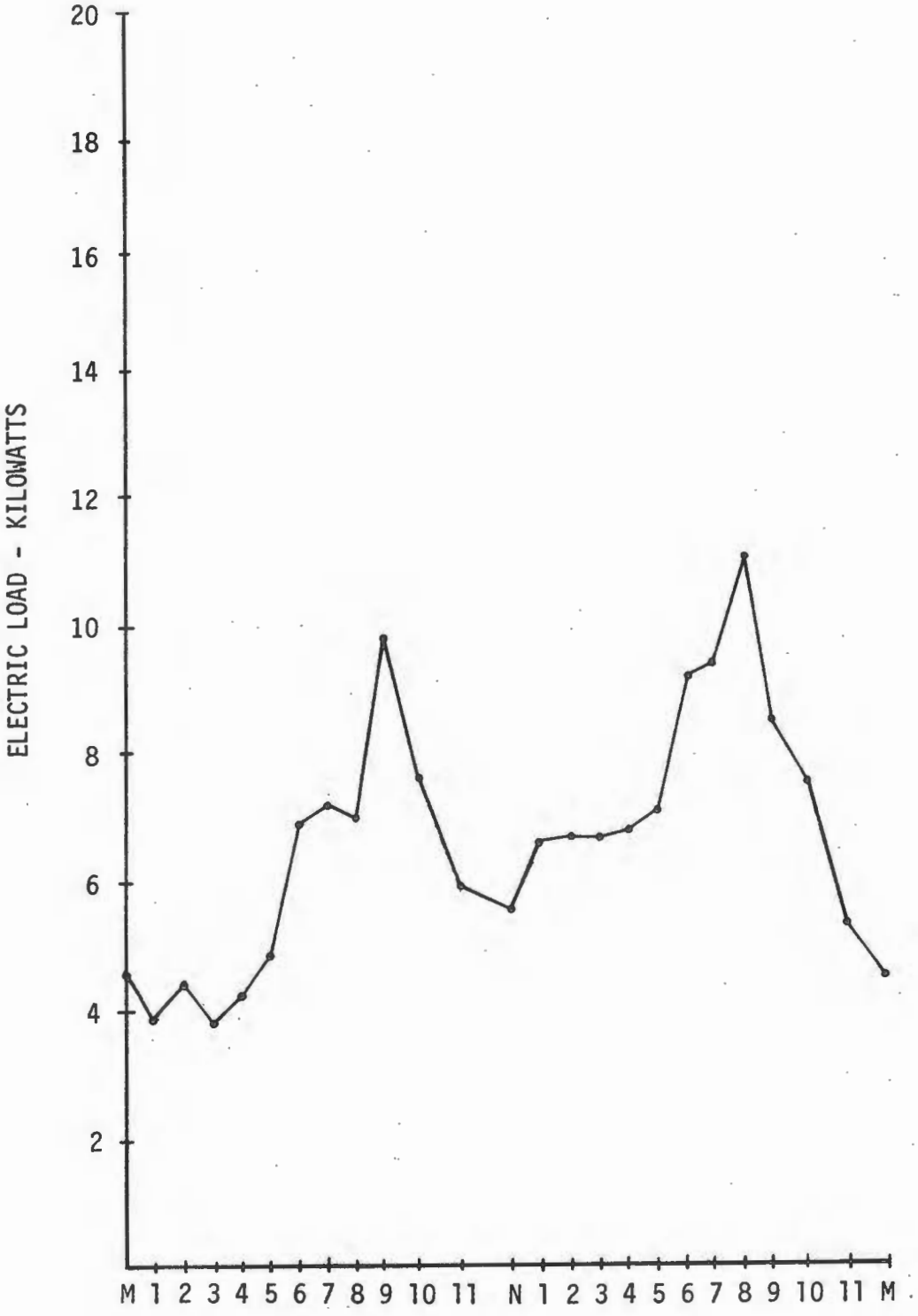
Hot Water - Horizontal 290 gallon storage tank with steam heating bundle; 150° Ft.

Occupancy - Living quarters on first and second floor subject to occupancy 24 hours per day; first floor lounge normally occupied only in evenings until about 2100.

Discussion - Drawings indicate storm windows were installed on the west side only in 1963. Many of the glass storm window panes are now missing or broken and the aluminum frames/tracks are not effectively sealed at the main window frame.

Building electrical system was metered with temporary meters. A daily electrical load profile was developed from the metering data and is presented as Figure No. 9.

Recommendations - Lighting levels in hallways should be reduced by delamping two out of every three fixtures. Crawl space cast iron vent grilles should be closed during heating season with removeable plywood or sandwich panels. Domestic hot water temperature should be reduced to 110^{o} F.



SENECA ARMY DEPOT
BLDG. 702-DAILY ELECTRIC
LOAD PROFILES

FIGURE NO. 9

BARRACKS
BUILDINGS 704 & 708

Construction - Concrete block walls; built-up roofing on rigid insulation over concrete pan joist roof deck; first and second floors concrete pan joist; first floor off grade with approximately 3 feet pipe space. Retrofit initiated to add exterior insulation to building walls, reduce window areas, and add storm windows.

Size - Three story rectangular configuration, 266 feet x 39 feet, with 31,120 square feet floor area.

Windows - Hinged projected type with steel frames and single glazing with retrofitted storm windows. Buildings are oriented with long dimension north-south, resulting in east and west glass exposure (approximately 3400 square feet each side).

Heating - Served by steam from boiler plant 718; steam-to-hot water converter serving baseboard radiation in occupied areas; heating hot water temperature is reset by outside air temperature; retrofit program has been initiated to add thermostat controlled valves on individual radiators.

Hot Water - Horizontal 845 gallon storage tank with steam heating bundle; $140^{o}F$.

Occupancy Schedule - First floor - 0730 to 1600; second and third floor - 1600 to 0730.

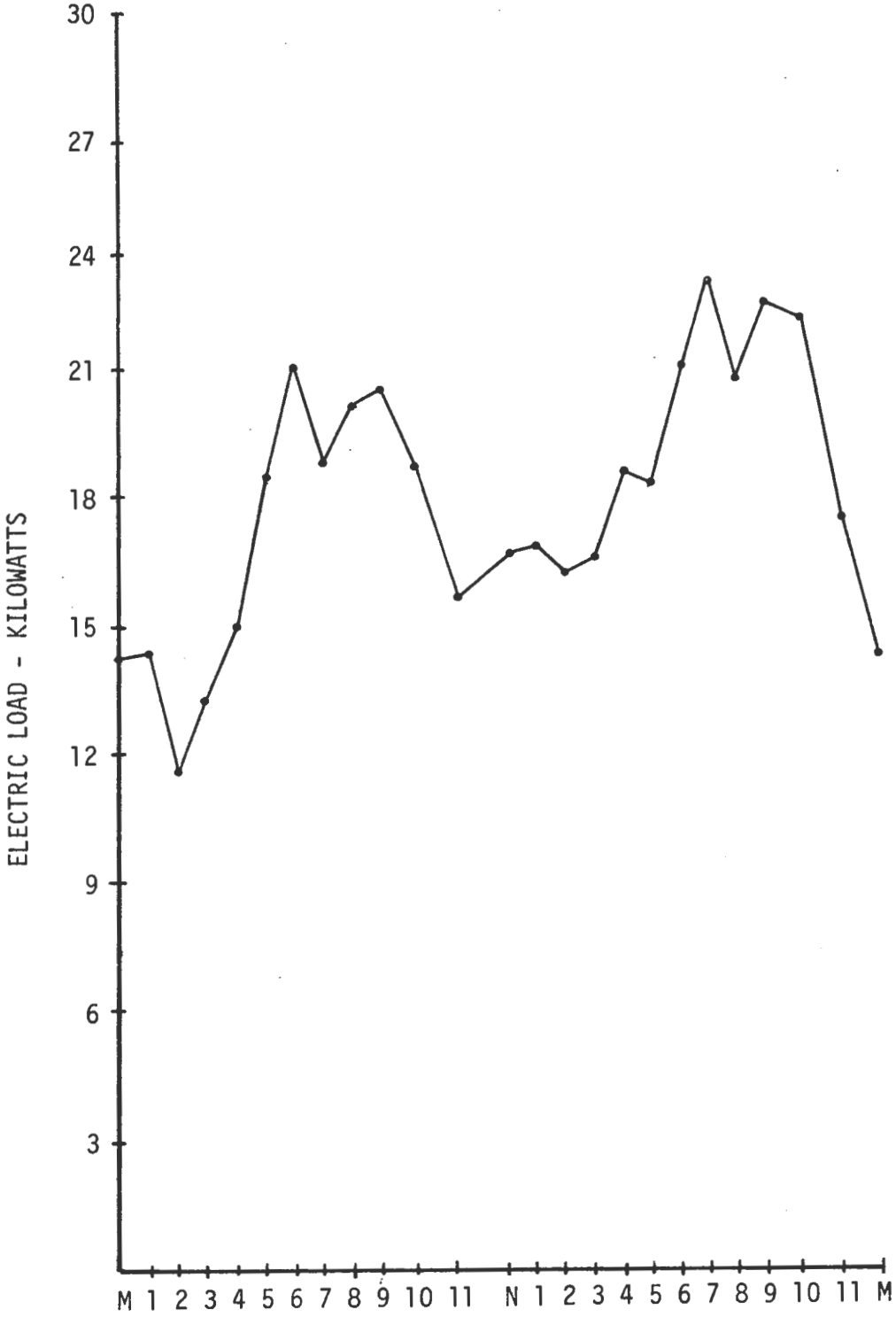
Discussion - Occupancy schedules indicate normal functional useage. All spaces within the building are subject to incidental occupancy 24 hours per day 7 days per week.

Heating hot water and domestic hot water piping insulation is in need of repair. Piping is currently insulated with asbestos insulation. Replacement of this hazardous material was being considered at the time the inspection was performed.

Space temperature control was observed to be unsatisfactory, with occupants in overheated rooms leaving windows open to maintain comfort conditions.

Building 704 electrical system was metered with temporary meters. A daily electric load profile was developed from the metering data and is presented in Figure No. 10.

Recommendations - Crawl space vents should be closed with removeable plywood or sandwich panels in heating season.



SENECA ARMY DEPOT
BLDG. 704-DAILY ELECTRIC
LOAD PROFILES

FIGURE NO. 10

RECREATION CENTER
BUILDING 705

Construction - Concrete block walls; irregular flat roof (four different levels) with built up roofing over rigid insulation on metal deck; rigid insulation with plaster finish has been installed on building exterior.

Size - Irregular shape (nominally 94 feet x 82 feet) with 6570 square feet floor area, single story.

Windows - mixed fixed glass and projection type, wood frames; North - 190 square feet; East - 150 sq.ft.; South - 305 sq.ft.; West - 246 sq.ft.

Heating - Served by steam from boiler plant 718; steam-to-hot water converter serving perimeter fintube radiation system; central air handling unit with duct mounted heating coil serving all spaces except game room.

Cooling - Free standing direct discharge 7½ ton split system air conditioner installed in game room; 20 ton direct expansion cooling coil installed on existing air handling unit for remainder of building; air cooled condensing units located at grade for both systems; outside air economizer system components installed; humidistat for dehumidification in library.

Hot Water - Horizontal 205 gallon storage tank with steam heating bundle.

Occupancy Schedule - Office area 0800 to 1700 weekdays; recreation hall 1600 to 2300 weekdays and Saturdays and 1130 to 2000 Sundays; Library 1300 to 2000 weekdays and Saturday and 1130 to 1930 Sundays.

Discussion - All spaces are conditioned on weekdays when offices are occupied but remainder of building is unoccupied. Library maximum desired humidity is 60%. The humidistat is located in the lounge, however, and all spaces except the game room are affected by humidity limits. Exterior building insulation shows signs of accelerated deterioration (cracking, peeling, and separation from concrete block walls). Excessive leakage in supply duct system was observed. Economizer control linkage has been disconnected.

Recommendations - Economizer dampers and control linkage should be repaired Control valve at duct mounted heating coil should be inspected to insure tight shutoff when controls are not calling for heat. Self contained packaged dehumidifier installed in the library would permit deactivation of the main unit humidity control. A simple arrangement of a motorized zone shutoff damper coordinated with a supply-to-return-air motorized bypass damper would permit isolation of the recreation room while still permitting conditioning of the remainder of the building. Windows in the library, game room and lounge should be equipped with storm windows. Plaster finish over exterior insulation should be repaired to prevent water saturation of insulation.

GENERAL AUDITORIUM
BUILDING 706

Construction - Off grade building, concrete pan joist floor, concrete block walls, longspan barjoist with steel roof decking, two-inch rigid insulation and built-up roofing.

Size - Single story, 84 feet x 38 feet, 17 feet floor to roof (3200 square feet).

Windows - Fixed glass with steel sash; areas as follows:

East - 21 square feet
South- 21 square feet
West - 14 square feet
North- 6 square feet

Heating - Horizontal draw thru air handling unit rated at 4000 cfm with return air/outside air mixing box and two steam heating coils in series. The lead steam coil utilizes steam supplied through a modulating valve in response to proportional signal from room thermostat in the auditorium; The second coil is a flash steam recovery device utilizing flash steam from the medium pressure condensate drains within the building. Design drawings indicate 50% outside air. Vestibules, toilets, projection room and storage space are heated with fintube radiators served from a steam-to-hot water converter with heating hot water reset by outside air temperature. Steam supplied from boiler plant 718.

Cooling - Auditorium is cooled by two separate air handling units controlled by wall mounted thermostats, one for each unit.

Hot Water - Electric hot water heater, 52 gallons.

Occupancy - Used three or four times per week during the day for meetings, lectures, etc., and three times per week in evenings for movies. Maximum seating capacity 200 people.

Discussion - Extremely low usage precludes justification for significant investment to save energy.

Recommendations - Turn off hot water heater. Insulate condensate receiver tank. Install dampers in outside air intakes to shut off outside air for precooling/preheating building.

CONSOLIDATED MESS/PX/BARBER SHOP
BUILDING 707

Construction - Off grade construction with concrete block walls, built up roofing on rigid insulation over flat concrete roof deck; no insulation in walls; suspended acoustical tile ceiling in all areas except kitchen, equipment room, PX storage area and plumbing area.

Size - Building approximately square, 136 feet on a side, with 18700 square feet of floor area.

Windows - Metal intermediate projected type, single pane, window areas as follows:

East	-	472 square feet	South	-	367 square feet
West	-	378 square feet	North	-	610 square feet

Heating - Served by steam from boiler plant 718; steam-to-hot water converter serving perimeter radiation system controlled by outside temperature reset controller but without controls to coordinate operation with airside equipment; air handling units (4 each) with steam heating coils (units designed to handle 100% outside air with no provisions for return air) controlled by room thermostats; air handling units coordinated with exhaust fans in spaces served.

Cooling - Air cooled direct expansion cooling units serve dining area and exchange; fan section free standing direct discharge type:

Dining area	-	20 ton Trane mod. BRCA-2008-0A
PX	-	20 ton Trane mod. RAVA-2003-MA
		15 ton Trane mod. RAS-153A
		7½ ton Trane mod. RAS-86C

Hot Water - Horizontal 750 gallon storage tank with steam heating bundle; 128°F.

Occupancy Schedule - Occupancy varies widely throughout building; portions of building occupied 7 days per week for food service; building unoccupied between 2200 and 0400.

Discussion - Numerous partition changes have been made in the building and temperature control zones are no longer optimized. Exhaust hoods in the kitchen area and over the serving line remove conditioned air from the building and appear to be operated for longer periods than required. Air balance between makeup units and exhaust systems is apparently not consistent, sometimes causing excess building pressurization and other times inducing significant infiltration. Entry vestibules were observed to be approximately $80^{o}F$ and the controls were set for maximum heating.

Recommendations - Optimized coordination of inter-related heating and cooling systems, and exhaust systems, should be incorporated in the EMCS software. Personnel should be encouraged to be more conscious of energy conservation opportunities afforded with lighting control. Heating hot water and domestic hot water piping insulation should be repaired where required. Crawl space vents should be closed with removeable plywood or sandwich panels in heating season.

ORDNANCE DISPOSAL
BUILDING 720

Construction - Slab-on- grade with concrete block walls; steel decking on longspan steel bar joists, 2" rigid insulation and built up roofing; steel reinforced concrete mezzanine floor.

Size - Single story with mezzanine area on west end of building; 104 feet x 41 feet; 4260 square feet first floor, 650 square feet mezzanine.

Windows - Architectural projected steel sash on east end; mixed double hung and steel casement type other areas; all windows single glass; areas as follows:

East - 100 square feet
South - 25 square feet
West - 38 square feet
North - 24 square feet

Doors - Vehicular roll up doors (12 feet x 12 feet) were installed on both east and west walls (five each side) but four doors on the west side have been permanently closed with a stud wall system and plywood sheathing.

Heating - Steam supplied from boiler plant 718. Horizontal ceiling hung air handling unit with outside air/return air/relief air dampers delivering air to high bay area at north end of building and to the lounge and office area of mezzanine. Unit has two heating coils; the leading coil utilizes steam supplied through a modulating control valve in response to proportional signal from return air thermostat; the second coil is a flash steam recovery device utilizing flash steam from the medium pressure condensate drains within the building. A second horizontal heating and ventilating unit supplies heated air to offices, toilet and kitchen below the mezzanine, with non-freeze steam heating coil.

Occupancy - Continuous occupancy in mezzanine area; normal working day occupancy other areas.

Discussion - Mezzanine area was not designed for continous occupancy and therefore, does not have adequate facilities or temperature control capabilities. Entire high bay area must be heated continuously.

Recommendations - Consideration should be made to relocate sleeping area to a barracks building to permit temperature setback and/or partial system shutdown. If this is not practicable, the mezzanine area could be isolated from the high bay area with new partitions and new heating system for that space. The return air duct system should be patched and repaired where it is presently open to the equipment room. Air leaks into the equipment room around doors and louvers should be stopped.

COMMISSARY WAREHOUSE
BUILDING 722

Construction - Slab-on-grade with concrete block walls; steel decking on longspan steel bar joists; 2" rigid insulation and built up roofing; 18.5 ft. floor to roof.

Size - Single story, 114 feet x 41 feet (4675 square feet).

Windows - Architectural projected steel sash, single pane glass.

Heating - Served with steam from boiler plant 718; steam unit heaters with fans controlled by room thermostats.

Occupancy - Open 0930 to 1700 Monday through Friday and 0930 to 1400 Saturday.

Discussion - Package liquour store at south end of building has suspended ceiling and panelled walls. Area cooled in summer with thru-the-wall air conditioner. Package store heating by ducted unit heater discharge to lowered ceiling, but unit heater inlet still open to rest of building.

Recommendations - Lower package store unit heaters below ceiling. Replace flourescent fixtures in warehouse area with sodium vapor lamps.

CLOTHING SALES/HOBBY SHOP
BUILDING 724

Construction - Concrete block walls (12"). Longspan steel barjoist roof framing supporting steel roof deck, 2" rigid insulation and built up roofing; slab-on-grade floor.

Size - Single story, 149 feet x 59.5 feet (8860 square feet) with 16 feet high walls.

Windows - Steel sash single pane intermediate projected type; areas as follows:

East	-	135 square feet
West	-	200 square feet
South	-	90 square feet
North	-	78 square feet

Doors - Vehicular roll up doors (12' x 8') are installed on both east and west sides of building (six each side). One vehicle door near the center of the front of the building has been closed with a stud wall system and plywood sheathing, with a single 3 foot mandoor installed.

Heating - Major part of south section of building served by 100% outside air heating and ventilating unit with non-freeze type steam heating coil with leaving air temperature controller. Two duct mounted steam heating coils are also included in the H&V system on branches to two rooms. These coils are controlled by room thermostats. Other rooms served by the H&V system have horizontal projection steam unit heaters, as do the remaining spaces except offices in the northeast corner. The offices are heated by steam fintube radiation. Multiple exhaust fans mounted on the roof provide building air balance in the areas served by the H&V unit.

Hot Water - A 30 gallon electric water heater with 1500 watt heating element is installed in the equipment room on the south end of the building.

Occupancy - Offices occupied 0730-1700; other areas irregular.

Discussion - Significant steam leak observed outside the building in buried piping. Uninsulated hot piping inside the building overheats spaces on the west side. Some unit heaters have been deactivated.

Recommendations - Repair steam leak and piping insulation. Turn off electric water heater (serves 2 lavatories only). Turn off H&V unit and exhaust fans when not required. Reduce outside air to minimum required.

NCO CLUB ANNEX - BUILDING 731

Construction - Original building is concrete block with 2" rigid insulation covered by wall board. Roof is built-up with 3" roof insulation plus suspended, insulating ceiling tile. Addition has wood frame wall with R-11 batt insulation. Ceiling/roof is wood frame with R-16 batt insulation covered with acoustical tile.

Size - Single story - 2,700 ft^2

Windows - Metal awning, single pane

Heating - Perimeter fin tube radiation with central located thermostat controlling motorized steam valves. Boiler located in Building 718.

Cooling -

Chiller: Milac 41 7.5 ton
12 kW heating (available for space heating)

Discussion - Building 731 is the Non-Commissioned Officer's Club Annex. It has a full kitchen with ovens, ranges, food warmers, freezer storage, etc. There is also a bar/lounge, recreation area with a small office for the manager. A new addition to the building is a dance floor. Operation hours are 0730 - 0100.

Recommendations - Building is well-insulated. Due to extended operation, this building is not included in basewide EMCS ECIP. Twelve kilowatt heating should be permanently disconnected.

NORTH BASE AREA

(Q AREA)

SENECA ARMY DEPOT

TECHNICAL OFFICE - BUILDING #802

Construction - A concrete block structure.

Size - A single story rectangular building with flat roof masonry 99 feet by 38 feet. Height is 12 feet above grade. Floor plan area is 3760 square feet. Wall area including windows and doors is approximately 3290 square feet.

Windows - As an inspection of this building was not permitted, no information is available concerning the condition of windows and doors.

Heating - No information.

Cooling - There is no air conditioning in this building.

Hot Water - No information.

Occupancy Schedule - No information

Discussion- Usage, hours of operation:
No information
Condition:
No information
Observations:
No inspection permitted

SHOP - DRAWING #803

Construction- A concrete block structure.

Size- A single story rectangular building with flat roof measuring 53 feet by 42 feet. Height is 11 feet above grade. Floor plan area is 2226 square feet. Wall area including windows and doors is approximately 2090 square feet.

Windows- As an inspection of this building was not permitted, no information is available concerning the condition of windows and doors.

Heating - No information

Cooling- There is no air conditioning in this building.

Hot Water - No information

Occupancy Schedule- No information

Discussion- Usage, hours of operation:
No information
Condition:
No information
Observations:
No inspection permitted.

SHOP - BUILDING #804

Construction - A concrete block structure.

Size- A single story rectangular building with vee roof measuring 37 feet by 33 feet. Height is 17 feet above grade. Floor plan area is 1221 square feet. Exposed wall area including doors is approximately 2380 square feet.

Windows- There are no windows in this building.

Heating- Heat for this building is provided by a 506,000 Btu per hour furnace using Number 2 fuel oil.

Cooling- The building is air conditioned, Heat rejection is through a water "cooling tower".

Hot Water - Domestic hot water was supplied from a 52 gallon electrical heated tank.

Other- As no inspection was permitted inside this building, no "other" loads suitable for energy monitoring and control were identified.

Occupancy Schedule- Unknown - but is assumed to be occupied during normal business hours.

Discussion- Usage, hours of operation:

The assumed occupancy schedule of this building makes it a suitable candidate for temperature setback.

Condition- As entrance into this building was not permitted, no discussion on its condition can be made.

Observations- The process function done in this building may limit the energy savings potential. This should be evaluated by cognizant engineers before specific projects are authorized.

BOILER PLANT - BUILDING #805

Construction- A concrete block structure.

Size - A single story rectangular building with flat roof measuring 27 feet by 13 feet. Height is 17 feet. Floor plan area is 351 square feet. Wall area including vents and doors is approximately 1360 square feet.

Windows - No windows in this building. There is one vent in rear. Double doors in front.

Heating- This building provides heat for Building No. 804, and is described thereunder. The 506,000 Btu per hour heater uses Number 2 fuel oil.

Cooling- This building contains the cooling equipment for Building No. 804, and is described thereunder.

Hot Water - This building contains the DWH equipment for Building No. 804 and is described thereunder.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Only occupied occasionally.

Discussion

Usage, hours of operation:

This building functions as an equipment room for Building 804 and is neither heated or cooled directly. A single EMCS terminal located in either Building 804 or 805 would serve both.

Conditions - The building was in servicable condition.

Observations - The unique item of equipment in this building is the water "cooling tower" for heat rejection from the air-conditioner serving Building 804. The only other buildings having cooling towers are 815 and 816.

TRAINING - BUILDING #806

Construction- A metal clad steel frame structure.

Size - A single story rectangular building with vee roof measuring 120 feet by 40 feet. Height is assumed to be 11 feet. Floor plan area is 4800 square feet. Wall area including windows and doors is approximately 3520 square feet.

Windows- The one window in the building has a piece of plastic installed on the inside. The doors and roll-up doors are extremely cold in the winter time. The metal seal at the bottom of the roll-up door is gone.

Heating- Heating unit is a Number 2 oil fired forced air furnace of 400,000 Btu per hour capacity.

Cooling- No air-conditioning in this building.

Hot Water- Domestic hot water is supplied from a 40 gallon electrically heated tank.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule- Normal business hours

Discussion

Usage, hours of operation

The occupancy of this building only during normal business hours makes it a suitable candidate for temperature setback via an EMCS.

Condition - The building was judged to be in suitable condition.

Recommendations - The high ceiling in this building makes it a good candidate for the installation of low speed, ceiling fans to circulate the warm air from the ceiling back down to the work area.

ASSEMBLY & C/O - BUILDING 807

Construction - Metal clad steel frame structure with insulation.

Size - A one story rectangular building with vee roof measuring 120 feet by 40 feet. Height is assumed to be 11 feet. Floor plan area is 4,800 square feet. Wall area including windows and doors is approximately 3,520 square feet.

Windows - This building is similar to Building 806.

Heating - Heating unit is a Number 2 oil fired forced air furnace of 400,000 Btu per hour capacity.

Cooling - No air conditioning in this building.

Hot Water - Based upon Building 806, this building contains a 40 gallon electric hot water heater.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Normal business hours

Discussion -

Usage, Hours of Operation
The occupancy of this building only during normal business hours makes it a suitable candidate for using our EMCS to perform temperature set back.

Condition -
The building was judged to be in suitable condition.

Observations -
This building was not inspected; however, it was said to be identical to Building 806.

INFLAM STORAGE - BUILDING 809

Construction - A concrete block structure

Size - A one story square building with flat roof measuring 13 feet by 13 feet. Height is 10 feet. Floor plan area is 169 square feet. Wall area including windows and doors is approximately 520 square feet.

Windows - The building contains three windows and one personnel door. Windows are 3'-5" by 4' high. Door is 3'-4" by 6'-10".

Heating - No information

Cooling - No information

Hot Water - No information

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - No information

Discussion -

Usage, Hours of Operation
The size and usage of the building as an inflammable storage area indicates the building is only occupied occasionally.

Condition - No information

Observations -
No on-site inspection was made of this building. Its occasional use and small size limit energy savings that would be achieved by conventional energy reductions procedures.

WAREHOUSE - BUILDING 810

Construction - A concrete block structure with metal deck roof.

Size - A single story rectangular building with flat roof measuring 230 feet by 100 feet. Height is estimated to be 11 feet. Floor plan area is 2300 square feet. Wall area including windows and doors is approximately 7260 square feet.

Windows - Only one window in this building and it is a single pane metal frame that is old, rusty and badly putted. The roll up doors are in good condition. They are well sealed and have no apparent leaks.

Heating - Unit heaters are suspended below the bar joists. Fuel is Number 2 oil. Heat output is 1.174 Million Btu per hour.

Cooling - An air conditioning is used to control humidity in one portion of the warehouse and to cool the ADP (Automatic Data Processing) facility housed in another section. The compressor requires 2.6 KW input and the cooling fan is 1/4 horsepower (0.3 kW).

Hot Water - Domestic hot water is supplied from a 40 gallon electrically heated tank.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - The building is occupied during normal business hours.

Discussion -

Usage, Hours of Operation

The occupancy schedule of this building makes it a suitable candidate for temperature set back. Care must be taken that temperature changes permitted in the warehouse portion do not result in temperature variations in the isolated ADP facility which exceed their specified range.

Condition -

This building was judged to be in serviceable condition.

Observations -

The ADP facility was housed in a 30 foot x 20 foot inter office. Conditions in this area were being maintained at 70 F and 50 percent relative humidity. This necessitates use of reheat under certain circumstances. Specific operating limits of the equipment should be checked and the control limits relaxed if possible.

Condition -

This building was judged to be in serviceable condition.

Observations -

The ADP facility was housed in a 30 foot x 20 foot inter office. Conditions in this area were being maintained at 70 F and 50 percent relative humidity. This necessitates use of reheat under certain circumstances. Specific operating limits of the equipment should be checked and the control limits relaxed if possible.

GUARD HOUSE - BUILDING 812

Construction - A concrete block structure.

Size - A two story (including basement) rectangular building with flat roof measuring 120 feet by 45 feet. Height, above grade, is 11 feet. Plan area of main floor is 5,400 square feet. Exposed wall area including windows and doors is approximately 3,630 square feet.

Windows - Thick "bullet proof" glass in fixed frames. "Gun port" openings in windows were without covers. Roll-up doors in garage area have new seals. Personnel doors are winterized.

Heating - Building is heated by a furnace using Number 2 oil. Furnace is a hydronic system capable of providing 668,000 Btu per hour.

Cooling - The building is air conditioned and includes an electronic air cleaner. The system cools and dehumidifies the basement as well as the main floor.

Hot Water - Domestic hot water is supplied from an 80 gallon electrical heated tank.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - This building is occupied 24 hours daily.

Discussion -

Usage, Hours of Operation

The continuous occupancy of this building makes it a poor candidate for temperature setback.

Condition -

The building was in good condition. At the time of inspection, several renovation projects were underway.

Observations -

Covers for the gun port openings in the glass windows would stop convective heat losses at a very small investment.

PAINT SHOP - BUILDING 813

Construction - A concrete block structure.

Size - A one story rectangular building with flat roof measuring 63 feet by 34 feet. Height is 18 feet. Floor plan area is 2,142 square feet. Wall area including windows and doors is approximately 3,690 square feet.

Windows - Windows have old metal frames without storm windows. Roll up door appears to need a bottom seal.

Heating - The building has two furnaces. One furnace provides 500,000 Btu per hour to the office area. The second furnace is much larger and supplies heat to the painting bay. The heat capacity of this second furnace could not be determined from the nameplate.

Cooling - There is no air conditioning in this building.

Hot Water - Domestic hot water is supplied from a 40 gallon electrically heat tank.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Normal business hours.

Discussion -

Usage, Hours of Operation -
The occupancy pattern of this building makes it a suitable candidate for connection to an EMCS system.

Condition -
The building was in serviceable condition. Winterization of windows and doors should be done as a regular maintenance item.

Observations -

Heat loss through paint chamber vents could be considerable. Consideration may be given to scheduling production so as to minimize forced venting during extremely cold days.

STOREROOM - BUILDING 814

Construction - Metal clad steel frame with insulation.

Size - A one story rectangular building with vee roof measuring 60 feet by 32 feet. Height is 14 feet. Floor plan area is 1,920 square feet. Wall area including windows and doors is approximately 2,580 square feet.

Windows - There are no windows in this building. Seals on the roll up door appears to be in satisfactory condition.

Heating - Heat for this building is supplied by a furnace. Fuel consumption is 1.85 gallons per hour of Number 2 fuel oil.

Cooling - No air conditioning in this building.

Hot Water - No information.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - No information

Discussion -

Usage, Hours of Operation
Use of this building as a store room indicates infrequent and irregular occupancy.

Condition -
The building was in satisfactory condition.

Observations -
Use and occupancy pattern for this building indicate that it would be a good candidate for temperature set back and control by an energy monitoring and control system.

Recommendations - The high ceiling in this building makes it a good candidate for the installation of low speed, ceiling fans to circulate the warm air from the ceiling back down to the work area.

ASSEMBLY - BUILDING 815

Construction - A concrete structure.

Size - A one story irregular shaped building with flat roof approximately 124 feet by 62 feet. Height is 15 feet. Floor plan area is 7,688 square feet. Wall area including windows and doors is approximately 7,020 square feet.

Windows - This building contains no windows. Doors are heavy construction and well sealed.

Heating - The building is heated by a forced air system using steam coils. Steam is supplied from the 1.76 MBtuH furnace in Building 816.

Cooling - 120 tons of air conditioning are used for dehumidification. During summer, approximately 2,000 gallons of fuel per month are used for reheat. Heat rejection is through cooling tower.

Hot Water - Domestic hot water is supplied for a 42 gallon electrically heated tank.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Assumed to be normal business hours.

Discussion -

Usage, Hours of Operation -
The assumed hours of occupancy make this a suitable candidate for connection to an EMCS system.

Condition -

Inspection was only permitted in the equipment room. This area was in satisfactory condition. There were great amounts of water on the equipment room floor coming from the dehumidification process.

Observations -

Dehumidification is thought to represent a major load in this building. If this moisture is coming through the walls from the surrounding earthen embankment, an improved vapor barrier should be considered. Since the construction costs for this modification combined with the Building No. 816 modification are considerably below minimum ECIP requirements, a detailed investigation was not undertaken. This project would be, however, a good candidate for an Increment G investigation.

ASSEMBLY - BUILDING 816

Construction - A concrete structure.

Size - A one story rectangular building with flat roof measuring 145 feet by 73 feet. Height is 15 feet. Floor plan area is 10,190 square feet. Wall area including windows and doors is approximately 6,540 square feet.

Windows - This building contains no windows. Doors are heavy construction and well sealed.

Heating - Heating is provided by a 1,764 million Btu per hour furnace.

Cooling - Air conditioning and dehumidification system consists of three 40 Hp compressors, two 3 Hp air handling units, and one 5 Hp air handling unit.

Hot Water - Domestic hot water is supplied from an electrically heated tank measuring 24 inches in diameter and 56 inches high.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Assumed to be normal business hours.

Discussion -

Usage, Hours of Operation -
The assumed hours of occupancy make this a suitable candidate for connection to an EMCS system.

Condition -
Inspection was only permitted in the equipment room. This area was in satisfactory condition.

Observations -

Dehumidification is thought to represent a major load in this building. If this moisture is coming through the walls from the surrounding earthen embankment, an improved vapor barrier should be considered. Since the construction cost for this combined with Building 815's modification is considerably below minimum ECIP requirements, a detailed investigation was not undertaken. This project would be, however a good candidate for an Increment G investigation.

PAINT SHOP - BUILDING 817

Construction - A concrete block structure.

Size - A one story "L" shaped building with flat roof measuring 35 feet by 31 feet. Height is 13 feet. Floor plan area is 940 square feet. Wall area including windows and doors is approximately 1,716 square feet.

Windows - There are no windows in this building. There is one personnel door and one roll up door to the paint spray room and a set of double personnel to the equipment room.

Heating - This building is served by two furnaces, both using Number 2 fuel oil. Normal heating needs one supplied by a small furnace providing 100,000 Btu per hour output. For times when the paint booth ventilation is on, a large furnace providing 1,000,000 Btu per hour output is utilized.

Cooling - No air conditioning in this building.

Hot Water - No information.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Assumed to be normal business hours.

Discussion -

Usage, Hours of Operation -
The assumed occupancy pattern of this building makes it a suitable candidate for connection to an EMCS system.

Condition -
No information.

Observations - An on-site inspection was not made of this building. Heat loss through the paint chamber vents could be considerable. Consideration should be given to scheduling production so as to minimize forced venting during extremely cold days.

ENVIRO TEST FACILITY - BUILDING 819

Construction - A concrete block structure.

Size - A one story irregular shaped building with flat roof measuring 100 feet by 90 feet at extremes. Height is 14 feet. Floor plan area is 5,620 square feet. Wall area including windows and doors is approximately 5,320 square feet.

Windows - There are no windows in this building. There are two roll up doors and three personnel doors.

Heating - The older section of the building has a central hot air system. In addition, there is a large unit heater in each of the two sections which provide additional heat. The diesel generator room has 2 unit heaters, on either side of the rooms.

Cooling - The central hot air systems provides air conditioning in the summer.

Hot Water - Domestic hot water is provided from an electrically heated 40 gallon tank.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - Assumed to be occupied only during normal business hours.

Discussion -

Usage, Hours of Operation -
If occupied only during normal business hours as assumed, this building is a suitable candidate for connection to an EMCS system.

Condition -
The building was in the process of being renovated but appeared to be in good structural slope.

Observations -
Proposed use of this building as an environmental test facility should make monitoring by the EMCS system even more desirable.

NOT UTILIZED - BUILDING 825

Construction - Metal clad steel frame structure.

Size - A single story rectangular building with vee roof measuring 100 feet by 40 feet. Height is 14 feet. Floor plan area is 4,000 square feet. Wall area including windows and doors is approximately 3,920 square feet.

Windows - There are no windows in this building. All the personnel doors fail to fit snuggly and have no weather stripping on threshold.

Heating - Building heat is maintained by a single hot air furnace controlled by a single thermostat on the wall. Furnace output is 95,000 Btu per hour.

Cooling - This building is not air conditioned.

Hot Water - No Information.

Other - No "other" loads suitable for energy monitoring and control were identified in this building.

Occupancy Schedule - This building was not occupied.

Discussion -

Usage, Hours of Operation -
This building is used as an occasioned truck storage facility. Occasional use of this building makes it a suitable candidate for connection to the EMCS system.

Condition -
This building was judged to be in servicable condition.

Observations -
During the inspection, the thermostat was set at 58 F. Temperature of the building was measured as 60 F. As the building was then not being used, its temperature could be reduced considerably more with no changes of internal freezing.

CENTRAL HEATING PLANTS

SENECA ARMY DEPOT

CENTRAL HEATING PLANT - BUILDING NO. 101

One relatively old steam boiler is installed. Boiler nameplate data is as follows:

Manufacturer: Burnham Pace King
Burner: Radiant Utilities Corp., Brooklyn, New York
265-375A 559-385A MP-1255
Fuel: No. 2 Oil

Steam piping insulation is one-half inch thick canvas jacketed. Duplex feedwater pumps are installed. The feedwater piping is uninuslated. A flue gas analysis was performed. The following results were obtained:

Stack Temperature:	450^{o} F
Room Temperature:	90^{o} F
CO_2 :	9.5%
Steam Pressure:	6 psig
Feedwater Temperature:	150^{o} F
Burner Efficiency:	82.6%

Recommendations - Insulate feedwater piping. Add an additional one-half inch insulation to the steam piping.

CENTRAL HEATING PLANT - BUILDING NO. 103

One low pressure steam boiler is installed in this building. Boiler nameplate data is as follows:

Manufacturer: Well-McLain
Model: 4-B-882
Capacity: 806 lb/hr
Oper. Pr.: 5 psig to 8 psig
Burner: Weil-McLain Model H C-34
Fuel: No. 2 oil, 7 to 10 gal/hr

Feedwater piping and some steam piping at the boiler outlet was uninsulated. A boiler outlet steam control valve was installed but was not wired for operation. A flue gas analysis was performed. The following results were obtained:

Stack Temperature:	675^{o} F
Room Temperature:	90^{o} F
CO_2 :	6.5%
Steam Pressure:	6 psig
Burner Efficiency:	68.5%

Recommendations - Repair insulation and controls.

CENTRAL HEATING PLANT - BUILDING NO. 116

One low pressure steam boiler is installed to supply heating steam to the clinic. Boiler nameplate data is as follows:

Manufacturer: H.B. Smith
Model: 2500A/2500L/250L
Capacity: Max 1258 lb/hr @ 15 psig
Burner: Carlin Oil Burner Model 500 CRD
Fuel: No. 2 Oil, 5 to 10 gal/hr

The boiler was recently installed, apparently as a replacement unit. The piping insulation and plant equipment were in good repair. A flue gas analysis was performed. The following results were obtained.

Stack Temperature:	670^{o} F
Room Temperature:	90^{o} F
CO_2 :	11.5%
Burner Efficiency:	78.6%

No recommendations are evident for this plant.

CENTRAL HEATING PLANT - BUILDING NO. 121

This boiler plant has three boilers installed. Boiler descriptions are as follows:

No. 1 - Kewanee Type "C" - Catalog No. 7L285K06
Main Burner - Kewanee Type KM
Model KM 5.0 1713 OH
Air Atomizing for No. 6 Fuel Oil; L.P. Gas Pilot
Nameplate Capacity - 6650 MBH (199 BHP)
Maximum Working Pressure - 15 psig

No. 2 - Identical to No. 1

No. 3 - Crane Co. (National) CW 7592-S 14570
Burner - Riley Stoker Co. X4434B
Underfeed Coal Type with Manual Inlet Vanes on Fan

Boiler No. 3 has been inoperative for an extended period of time and is isolated from the plant piping systems with all valves closed. The hydraulic drive unit and other components of the coal-feed stoker have been removed. The fireside of the boiler is continuously ventilated with air being drawn through the unit by stack effect at the boiler breeching. Interior firebox deterioration is severe and extensive repairs would be required to reactivate this boiler. The condition of the waterside components could not be evaluated but it is assumed extensive repair and replacement of tubes, piping, separators, controls and other components are necessary.

Coal bunkers and conveyor system are still in place.

Boilers No. 1 and No. 2 are operated on a manual lead/lag basis to maintain nearly equal time on each boiler. Operating pressure at time of inspection was approximately 9 psig.

All three boilers are connected to a common free standing masonry stack located on the north side of the plant. A single barometric damper is installed in the common breeching inside the building.

No. 6 fuel oil is provided to boilers No. 1 and No. 2 from a buried fuel oil tank which is heated by a closed loop water system with 15 KW, 240 V, 3-phase electric heater and centrifugal circulating pump. Observations of temperatures for both the tank heating water and fuel oil from the tank indicated that one or more thermometers were not registering properly. Duplex plant fuel oil basket strainers and fuel oil pumps are provided, with discharge from pumps connected to a single steam fuel oil heater. Condensate from the fuel oil heater is wasted to floor drains.

Each boiler is equipped with its own single basket strainer, fuel oil pump, electric final heater, and control valves. Burners are modulating type with mechanical linkage between fuel oil valve and fan inlet dampers.

Condensate from buildings served by the steam plant is returned to a vented package condensate receiver with duplex pumps. These pumps discharge into an elevated vented condensate storage tank. A level controller on the condensate storage tank controls cold water makeup to the system. Additionally, all plant steam header drip traps and unit heater traps discharge into the storage tank. Continuous flashing steam was observed venting from the storage tank.

Duplex boiler feed pumps take suction from the condensate storage tank. The boiler feed pumps operate intermittently in conjunction with automatic boiler feedwater valves, as dictated by operating water level controls on the boilers. Boiler No. 2 is equipped with an automatic low water feeder valve which will admit cold water to the boiler if normal low operating limits cannot be maintained.

The only metering in the plant is a totalizing meter on plant cold water makeup. Fuel consumption is monitored by daily readings of oil tank level.

Inspection Results

Burner efficiency tests were performed on boilers No. 1 and No. 2. Plant load during the testing period was very low, requiring only single boiler operation at minimum firing rate.

Results of testing are as follows:

	Boiler No. 1	Boiler No. 2
Load	Minimum	Minimum
Stack Outlet Temp.	385^{o}	$387^{o}/400^{o}$
Room Temperature	75^{o}	$70^{o}/68^{o}$
CO_2	12%	10%/11.5%
Calculated Efficiency	86.9%	84.9%/86.4%

Recommendations

Consideration should be given to installing flash steam recovery equipment. A flash tank on main fuel oil heater drains, with liquid discharge still directed to waste, would permit partial recovery of energy and reduce system makeup. Flash steam from the condensate storage tank and new flash tank could be utilized in the fuel oil tank closed loop heating system, with resultant reduction of electrical consumption at the existing heater.

This flash-steam-to-water heat exchanger could be installed high enough in the plant to permit gravity drainage back to the condensate pump/receiver.

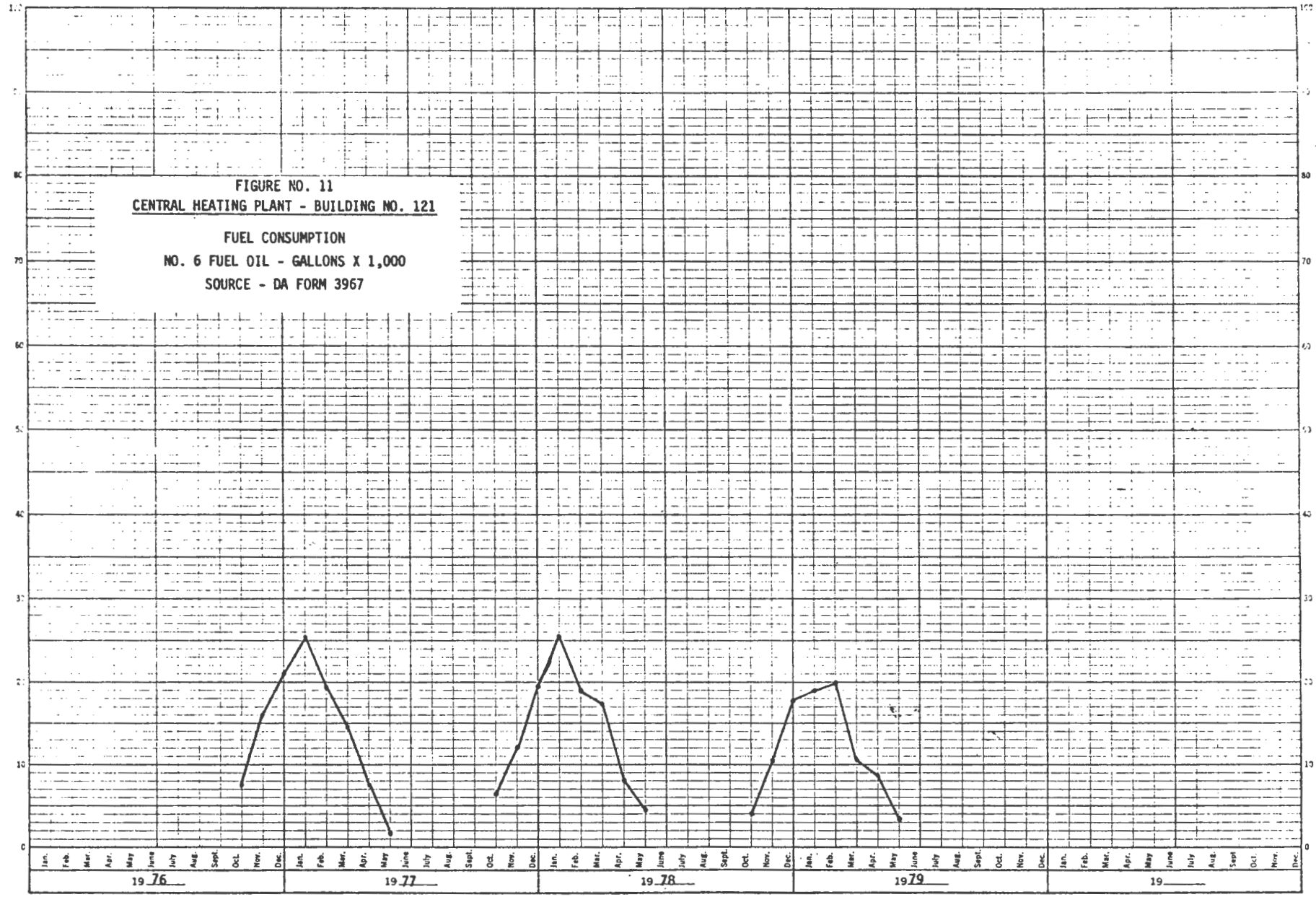
FIGURE NO. 11

CENTRAL HEATING PLANT - BUILDING NO. 121

FUEL CONSUMPTION

NO. 6 FUEL OIL - GALLONS X 1,000

SOURCE - DA FORM 3967



CENTRAL HEATING PLANT - BUILDING NO. 319

This boiler plant has two boilers installed. Boiler descriptions are as follows:

No. 1 - International Boiler Works Company
Type FDH 18-356
Heating Surface - 1,429 Square Feet
Design Pressure - 130 psig SWP
Steam Atomizing Burner - Todd Shipbuilding Co.
A018
120 GPH
No. 6 Fuel Oil
L.P. Gas Pilot

No. 2 - Keeler Company
Serial No. 16415, Built 1978
NB 5307 - 200 psig - No. 6 Fuel Oil
Heating Surface - 1,475 Square Feet
Nameplate Capacity - 15,000 pounds per hour
Todd Model D-15 Steam Atomizing Burner

Burner No. 1 was reported to be in need of general repairs. Steam separates are apparently not effective, and steam produced is extremely "wet." Boiler No. 2 is fired only a small percent of the time, since minimum load on the boiler exceeds instantaneous steam demand except for cold periods in the dead of winter. Consequently, operating time on Boiler No. 1 is disproportionately high, even though high maintenance and poor performance is common.

The two boilers are connected to a common plant steam header which is maintained at 100 psig nominal steam pressure. A steam flow orifice is installed in the header to measure steam flow to the two distribution branches and steam flow to the deaerator. Atomizing steam and steam to the fuel oil heaters is

taken off the header ahead of the orifice. Although the orifice is available, steam flow is not recorded.

Each distribution branch is equipped with a pressure reducing station to control distribution pressure at a nominal 50 psig. Steam used for fuel oil heating is further reduced in pressure at another pressure reducing station. Steam to the deaerator and to the burners is controlled by valves integrated into the controls for the respective devices.

New water softening equipment for system makeup, a new deaerator, and new boiler feed pumps were installed when Boiler No. 2 was installed. All condensate from the distribution branches is returned directly to the deaerator. Condensate from plant unit heaters, radiators and drip traps also is returned directly to the deaerator. A float operated, mechanical linkage, system makeup water control valve maintains deaerator storage tank level by introducing treated water from the fully automatic water softeners.

The duplex boiler feed pumps operate continuously. Water level in the boilers is controlled by feedwater valves at each boiler, and boiler feedwater is recirculated back to the deaerator continuously when the plant is operating at less than design capacity.

Two underground fuel oil storage tanks (20,000 gallons and 30,000 gallons) are utilized. The 20,000 gallon tank is heated by low pressure steam from the fuel oil heater PRV. The 30,000 gallon tank is heated by an electric heater in a closed loop water circulating system.

Fuel oil from the tanks is delivered to the building through duplex basket strainers and duplex fuel oil pumps. Pump discharge is directed through a plant fuel oil heater (steam heated) and ultimately to the burners (No. 2 boiler is equipped with an additional steam heater).

Condensate from the steam fuel oil heaters is discharged to grade outside the plant.

Burner efficiency tests were not performed since both boilers were off during the inspection.

No provision has been made for permanent combustion air intake to the plant. During winter operations when windows are closed, the large vehicle door on the west side of the plant is propped open with a brick.

Recommendations - A boiler feed "Jockey" pump should be installed in parallel with the two full size boiler feed pumps to eliminate excessive pumping energy expended for high recirculation rates during reduced plant loads. Automatic selection of pump operation could be indexed from plant steam flow as measured at the existing orifice in the main steam header. Since flow rates are so low, the use of steam driven feed water pumps was assumed to be a non-viable alternative.

Condensate from fuel oil heating system traps should be piped to a flash tank, where flash steam can be taken off and used in a heat exchanger ahead of the electric heater in the 20,000 gallon fuel oil tank closed water loop heating system. Condensate from this new heat exchanger could be returned to the deaerater by use of an Ogden Pump Trap or Johnson Liqui-Mover.

Combustion air intake louvers with back draft dampers should be installed.

To permit operation of Boiler No. 2 at realistic firing rates commensurate with current steam demand on this plant, modifications to the burner will be required. Optimized burner efficiency and significant elimination of on-off cycling of the burner at low plant steam demands can be accomplished. The only significant disadvantage of operating a large boiler at very low firing rates is the fact that radiation losses to the surroundings from the boiler wall surfaces will be much greater than for a properly sized boiler. A cursory analysis comparing the existing boiler to replacement boilers of nominally 10,000 pounds per hour and 7,500 pounds per hour design capacity indicates annual differential cost of existing boiler radiation losses are $950 when compared to the 10,000 pound per hour boiler and $1,170 when compared to the 7,500 pound per hour boiler. Neither value, when figured

in conjunction with an estimated salvage value of the existing boiler, would justify replacement. In addition, the small magnitude of the total radiation losses indicates that reducing steam supply pressure would not prove economical.

It is recommended, therefore, that burner redesign by the manufacturer (Todd Burner Division of Todd Shipyards - now doing business as CEA Combustion, Inc., Stanford, Conn.) should be initiated to permit continuous boiler operation at minimum load of 2,500 pounds per hour steam output, without burner cycling. The modifications should include FD fan replacement or shrouding, burner tip replacement, fuel oil valve replacement, burner throat diameter reduction, and feedwater valve replacement. Cost of these modifications should not exceed $10,000.

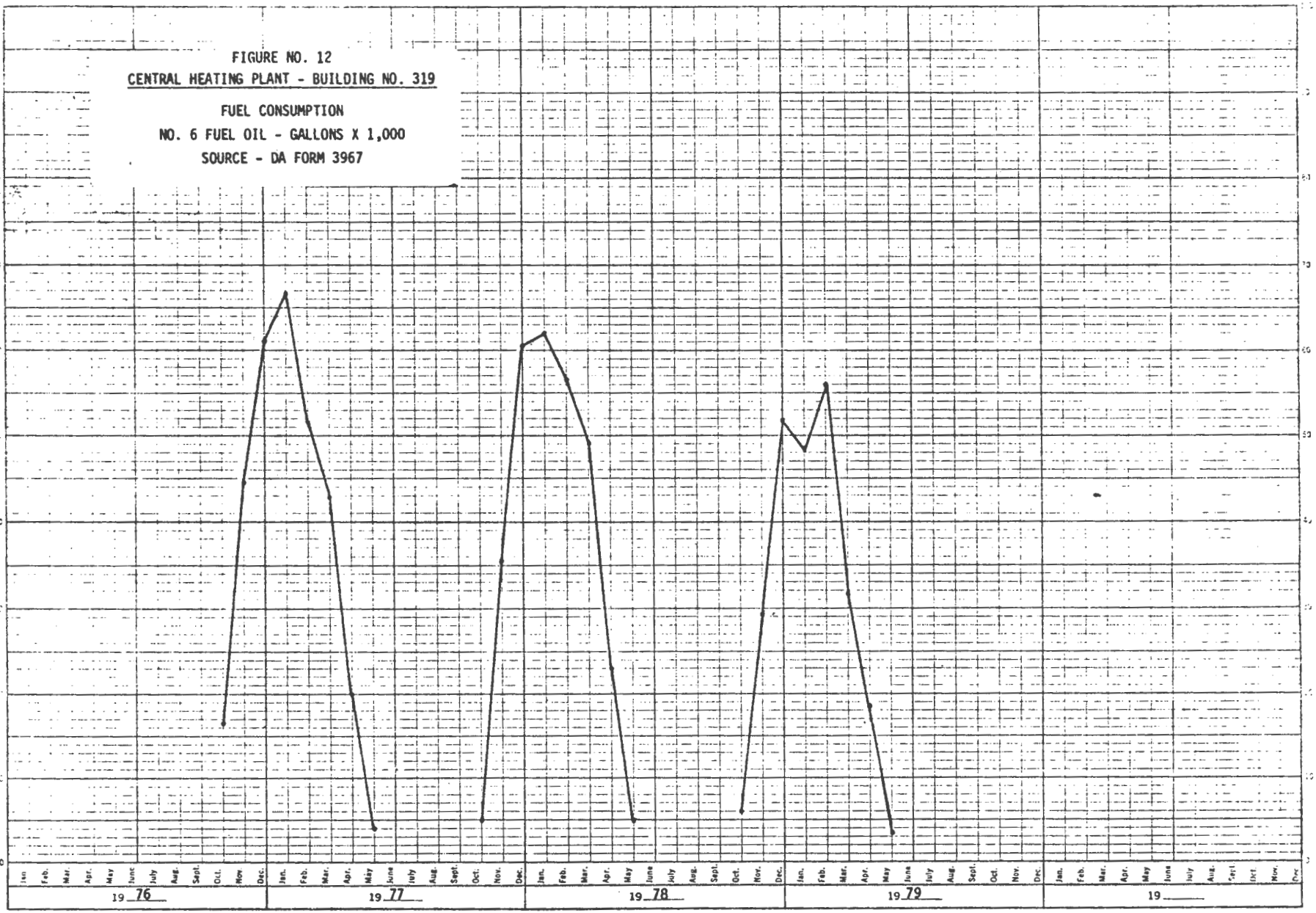
FIGURE NO. 12

CENTRAL HEATING PLANT - BUILDING NO. 319

FUEL CONSUMPTION

NO. 6 FUEL OIL - GALLONS X 1,000

SOURCE - DA FORM 3967



CENTRAL HEATING PLANT - BUILDING 718

This plant has three identical boilers installed. Boiler descriptions are as follows:

Manufacturer: Kewanee Ross, NB 18817, Series 3X
Type - Firebox, 2-Pass Firetube; Balanced Draft 2500
S.F. Heating Surface
Des. Press - 125 PSIG
Fuel - No. 6 Oil
Pilot - No. 2 Oil
Burner - Todd RAH Rotary Size D

Boiler No. 3 was the only boiler operating during inspection. Firebox refractory had recently been replaced and the boiler was found to be in very good condition. Burner efficency tests were performed with the following results:

Firing Rate - Minimum
Stack Temp - 370° F
Room Temp - 75° F
CO_2 - 10%/10.7%
Steam Press - 45 PSIG/47 PSIG
Brnr Eff. - 85.9%/86.5%

Boiler Nos. 1 & 2 refractory replacement was required, and it was noted that provisions had been made to accomplish this maintenance. All other boiler components were observed to be in good shape.

A project for replacement of burners on all three boilers has been initiated. This work (Seneca Army Depot Project No. 80-154) includes installation of new low pressure air atomizing multi-fuel burners, with minimum turndown ratio of 6 to 1, complete with accessories. The new burners will provide significant improvement in overall plant efficiency in that low load on-off firing periods will be greatly reduced.

No. 6 fuel oil for the boilers is stored in two underground storage tanks of 34,120 gallon and 20,000 gallon capacity, respectively. These tanks are equipped with spiral suction heaters, through which pressurized water from the boiler shell is circulated. Oil from the tanks is delivered to the burners through duplex basket strainers, duplex fuel oil pumps, and a steam heated fuel oil heater. Each new burner is equipped with final electric heaters and individual fuel oil pumps. Condensate from the main fuel oil heater is discharged to waste.

Steam output from each boiler is delivered to a common plant main steam header. East and west distribution branches are taken off the main steam header, and each branch is equipped with a metering orifice and steam flow recorder. The recorders are not used. Steam for plant unit heaters, fuel oil heaters, and the deaerator also comes from the main steam header but it is not metered. Fin tube heaters are installed in office areas and toilets, and steam used in these areas is included in metered steam to the east branch. Condensate from fin tube heaters and plant unit heaters is discharged to waste.

Condensate from the east branch is returned directly to an elevated 1,000 gallon surge tank located directly below the boiler plant roof. Condensate from the west branch is collected in a 250 gallon condensate receiver and then pumped to the surge tank. Duplex condensate pumps are installed at the 250 gallon receiver. Metered cold water makeup is introduced into the surge tank as dictated by a mechanical linkage float-cage/make-up-valve. Condensate from the surge tank flows by gravity through a float operated valve into the deaerator vent condenser and then into the heater section. Elevation head from the surge tank is not sufficient to overcome losses in the vent condenser and interconnecting piping. To maintain deaerator storage tank level, plant operators partially open a manual deaerator by-pass valve. The deaerator is a Graver Atmospheric Pressure unit. Steam inlet to the deaerator is modulated by a motorized valve which is controlled by an immersion thermostat in the deaerator heater section. It was noted that during the inspection, storage tank temperature was 185° F

and boiler feed pump discharge temperture was 128° F, indicating that most of the feedwater to the boilers was bypassing the deaerator.

Two boiler feed pumps are installed, and it was reported that a single pump will supply feedwater to all the boilers during peak plant demand. Pumps are driven by 15 HP electric motors.

Each boiler is equipped with its own feedwater valve and the pumps run continuously with high percentage of recirculation back to pump suction.

A skeleton EMCS system is located in the plant. The system is a Honeywell Delta 2000, with control and monitoring points as listed below:

Function	Bldg. 121 Point	Bldg. 2079 Point	Bldg. 319 Point
Start/Stop	Blr. #1	Blr. #1	Blr. #1
Start/Stop	Blr. #2	Blr. #2	Blr. #2
Alarm	Lo. Hdr. Pr.	Lo. Hdr. Pr.	Lo. Hdr. Pr.
Alarm	Blr. #1 Lo. Stm. Pr.	Blr. #1 Lo. Stm. Pr.	Blr. #1 Lo. Stm. Pr.
Alarm	Blr. #1 Hi. Stm. Pr.	Blr. #1 Hi. Stm. Pr.	Blr. #1 Hi. Stm. Pr.
Alarm	Blr. #1 Lo. Wtr.	Blr. #1 Lo. Wtr.	Blr. #1 Lo. Wtr.
Alarm	Blr. #1 Hi. Wtr.	Blr. #1 Hi. Wtr.	Blr. #1 Hi. Wtr.
Alarm	Blr. #1 Flame Fail	Blr. #1 Flame Fail	Blr. #1 Flame Fail
Alarm	Blr. #2 Lo. Stm. Pr.	Blr. #2 Lo. Stm. Pr.	Blr. #2 Lo. Stm. Pr.
Alarm	Blr. #2 Hi. Stm. Pr.	Blr. #2 Hi. Stm. Pr.	Blr. #2 Hi. Stm. Pr.
Alarm	Blr. #2 Lo. Wtr.	Blr. #2 Lo. Wtr.	Blr. #2 Lo. Wtr.
Alarm	Blr. #2 Hi. Wtr.	Blr. #2 Hi. Wtr.	Blr. #2 Hi. Wtr.
Alarm	Blr. #2 Flame Fail	Blr. #2 Flame Fail	Blr. #2 Flame Fail

A project for improvements to the west branch condensate return system, including piping insulation, has been funded and will be incorporated in the near future.

Recommendations -

Condensate from the plant unit heaters and fin tube heaters should be returned to the 250 gallon condensate receiver.

A flash tank should be installed on the fuel oil heater steam trap outlet, with flash steam piped to the deaerator heater section.

A boiler feed jockey pump should be installed for operation at reduced plant loads to permit shutdown of the main boiler feed pump and reduce pumping energy expended for high recirculation rates. Boiler feed pump recirculation piping should be rearranged to direct recirculation flow to the deaerator inlet. Additionally, a vent condenser by-pass arrangement, with oversized pipe, should be installed to permit all boiler feedwater to be deaerated. The deaerator should be operated at its design temperature of 212° F.

Repair steam flow meters and put recorders back in service.

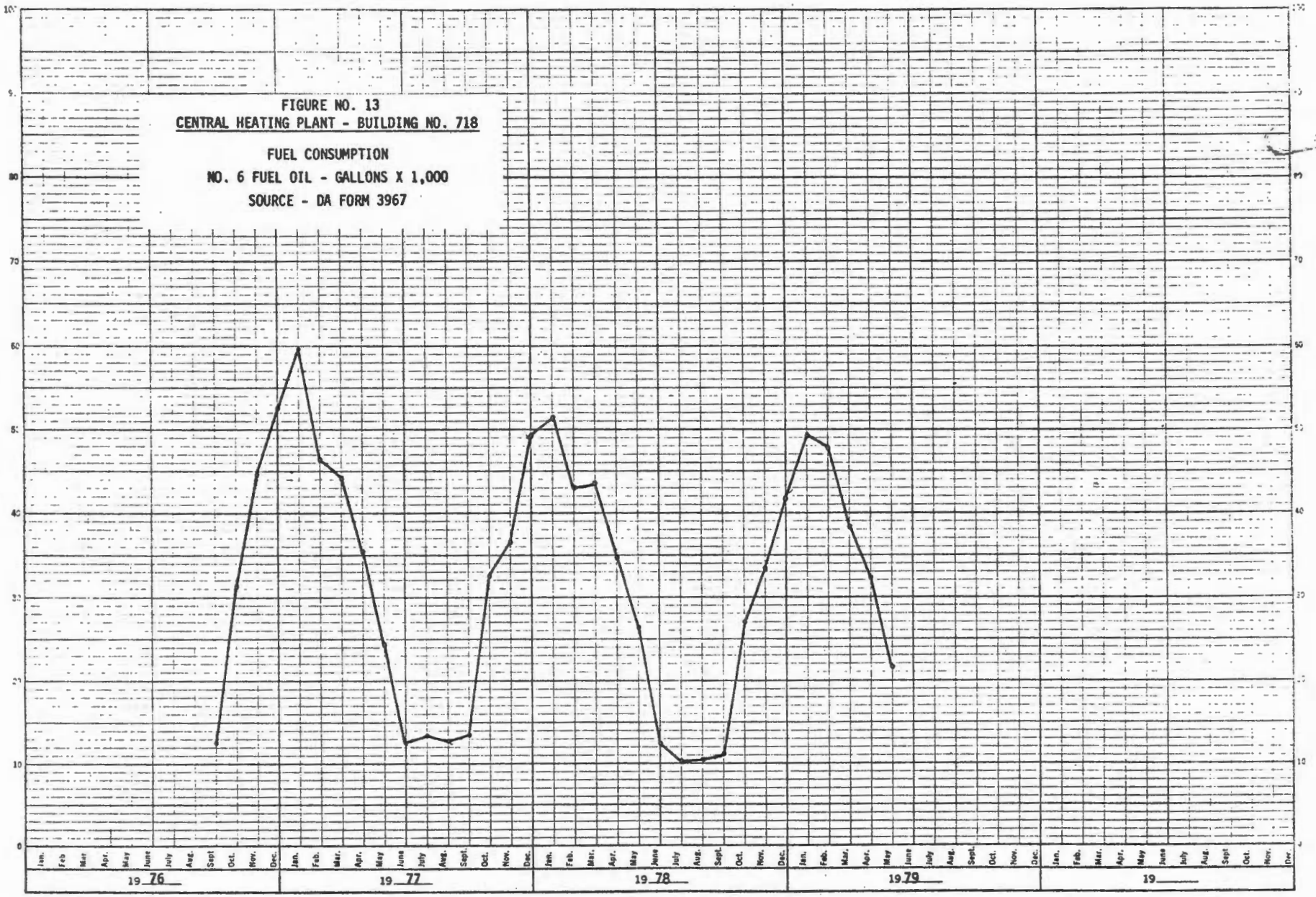


FIGURE NO. 13
CENTRAL HEATING PLANT - BUILDING NO. 718
FUEL CONSUMPTION
NO. 6 FUEL OIL - GALLONS X 1,000
SOURCE - DA FORM 3967
Jan. Feb Mar Apr. May June July Aug. Sept Oct. Nov. Dec.
19 76
19 77
19 78
19 79
19

ENERGY DISTRIBUTION SYSTEMS

SENECA ARMY DEPOT

ENERGY DISTRIBUTION SYSTEMS

There are only three energy distribution systems at SEAD. They are: an electrical supply system and two steam supply systems. No base-wide hot or chilled water distribution systems exist. Since SEAD is geographically two separate areas, the steam supply systems are not interconnected. The discussion of each area's steam system is treated separately. The electrical supply system, however, is from a single source and is discussed as a single system with three feeder circuits.

NORTH BASE STEAM SYSTEMS

The majority of the steam produced at the North Base is generated in the central heating plant - Building No. 718, which serves almost the entire North Base, excluding the Q Area. Buildings not supplied by the central heating plant are equipped with individual No. 2 fuel oil furnaces or boilers. See Figure No. 14 for details.

Building No. 718 is a central steam plant which houses most of the North Base steam production capability. The steam plant is equipped with three Kewanee Ross 310 HP packaged boilers, all in good condition. All of the units fire No. 6 fuel oil. Steam is generated nominally at 50 psig, saturated, and is distributed through underground and overhead lines to Building Nos. 701, 702, 704, 705, 706, 707, 708, 714, 718, 719, 720, 722, 723, 724, and 732. In addition, a new ammunition training facility presently under construction and a new barracks will be tied into the steam distribution system.

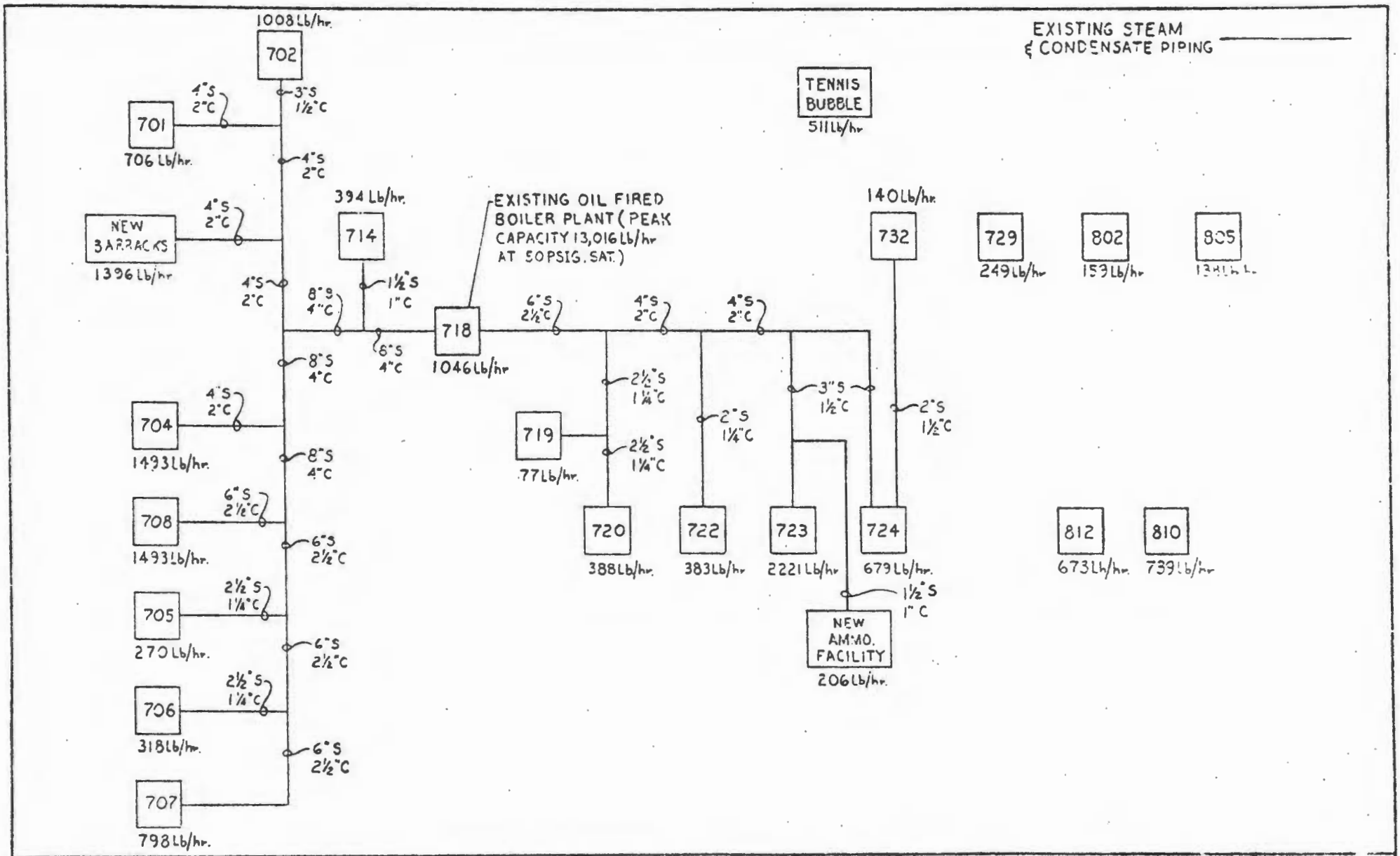
Building No. 729 is a fire station which houses a low pressure, low capacity Weil-McLain boiler and steam system. This boiler fires No. 2 fuel oil.

Building No. 802 is a technical office which houses a low pressure, low capacity boiler and steam system. This boiler fires No. 2 fuel oil.

Building No. 805 is a boiler plant which provides heat for Building No. 804. The low pressure, low capacity heater is fired on No. 2 fuel oil.

Building No. 810 is a warehouse which houses a low pressure, low capacity boiler fired on No. 2 fuel oil.

Building No. 812 is a guard house which houses a furnace fired on No. 2 fuel oil.



NO	DATE	REVISION	BY	APP	REFERENCE DRAWINGS
1					
2					
3					

REYNOLDS, SMITH AND HILLS
ARCHITECTS · ENGINEERS · PLANNERS
INCORPORATED
JACKSONVILLE, FLORIDA

DRAWN	CHECKED	DATE
F.C.M.		1/1/81

TITLE
SENECA ARMY DEPOT
NORTH BASE
FLOW DIAGRAM - STEAM & CONDENSATE SYSTEMS
BASE CASE

DRAWING NO
M-3

FILE NO
80122-000

A-106

The Tennis Bubble is an inflatable cover which houses two regulation size tennis courts. Heating is provided by an Applied Air System, Inc. heating coil/unit which is fired on No. 2 fuel oil.

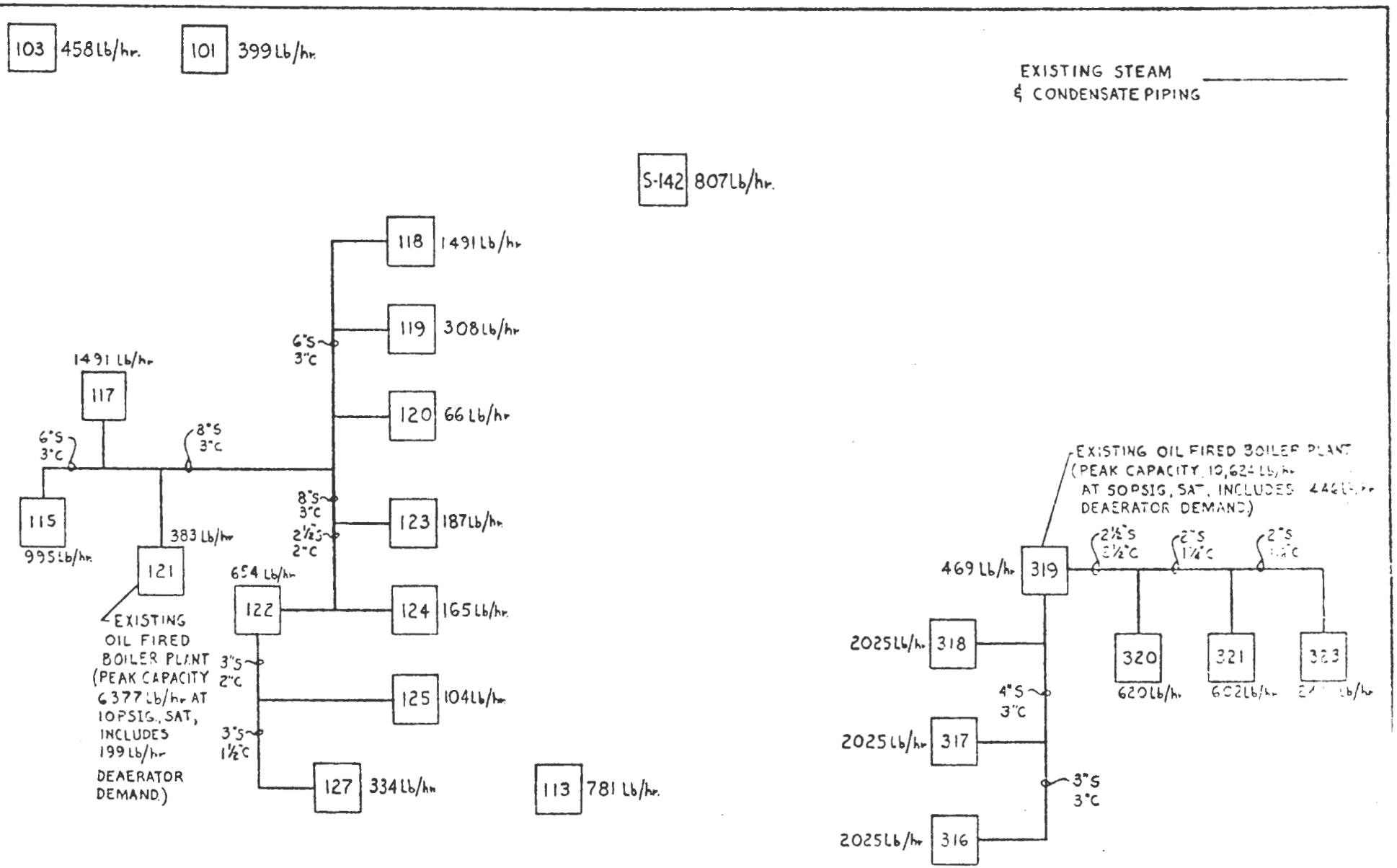
SOUTH BASE STEAM SYSTEMS

The majority of the steam produced at the South Base is generated at one of two central heating plants located in Building Nos. 121 and 319. The buildings not supplied by these central heating plants are equipped with individual No. 2 oil-fired furnaces or boilers. See Figure No. 15 for details.

Building No. 121 is a central steam plant which provides steam to most of the administrative area at the South Base. This steam plant is equipped with two Kewanee Type "C" package boilers, rated at 199 HP each and one Crane Company (National) coal-fired boiler rated at 12,600 pounds per hour. The Crane Company boiler has been unoperative for an extended period of time and is isolated from the plant. The Kewanee boilers are in good condition. Each of the two operating boilers are fired on No. 6 fuel oil, with steam generated at a nominal 15 psig, saturated. The steam is distributed to Building Nos. 115, 117, 119, 120, 122, 123, 124, 125 and 127 through underground and overhead lines.

Building No. 319 is a central steam plant which provides steam to various warehouses and maintenance shops at the South Base. This steam plant is equipped with one International Boiler Works package boiler, rated at 356 HP and one Keeler package boiler rated at 15,000 pound per hour.

The International boiler is in need of general repairs. The Keeler boiler was installed in 1978 and is in excellent condition. However, this boiler is considerably oversized for present and future anticipated loads and can only be operated during the coldest weather and then only at partial loads. Both of these boilers are fired on No. 6 fuel oil and generate steam at a nominal 100 psig, saturated. The steam is distributed to Building Nos. 316, 317, 318, 320, 321, and 323 through overhead lines at 50 psig, saturated.



NO	DATE	REVISION	BY	APP	REFERENCE DRAWINGS
1					
2					
3					

REYNOLDS, SMITH AND HILLS
ARCHITECTS · ENGINEERS · PLANNERS
INCORPORATED
JACKSONVILLE, FLORIDA

DRAWN	CHECKED	DATE
F.C.M.		2/1/81

TITLE
SENECA ARMY DEPOT
SOUTH BASE
FLOW DIAGRAM - STEAM & CONDENSATE SYSTEMS
BASE CASE

DRAWING NO
M-9

FILE NO
80122-000

FIGURE NO. 15

Building No. 101 is the SEAD Headquarters Building and houses a relatively old steam boiler and distribution system. The boiler is a No. 2 fuel oil-fired Burnham Pace King which produces steam at a nominal 6 psig, saturated.

Building No. 103 is the South Base fire station and houses an 800 pound per hour Weil-McLain steam boiler which generates steam at a nominal 8 psig, saturated, and is fired on No. 2 fuel oil.

Building No. 113 is the SEAD carpenter shop and houses a low pressure, low capacity Crane Company 80-Series steam boiler, which is fired on No. 2 fuel oil.

Building No. S-142 is the SEAD NCO Club and houses a hydronic heating system, including both wall units and space heaters suspended from the ceiling. Heat to the system is provided by a furnace which is fired on No. 2 fuel oil.

ELECTRICAL SYSTEM

A. Primay Source:

Electric power is supplied to Seneca Army Depot by New York State Electric and Gas Corporation at a single substation located near the Main Administration area. The utility source is a 34.5 kV line feeding the area from tne north depot area. A second 34.5 kV line from the south depot area provides a manually switched source for backup services.

B. Substation:

The depot has three 4,800 volt delta overhead distribution systems that supply various areas. The rating of the three utility-owned transformers is 1,667 kVA, one-phase, 34.5 kV primary to 4,800 volt secondary, for a total of 5,000 kVA available electrical power supply.

C. The On-Site Overhead Power Distribution System Consists of the Following:

1. Feeder A supplies portions of the Administration area and the Warehouse area.
2. Feeder B supplies the remainder of the Administration area and the Family Housing area.
3. Feeder C supplies the North Troop area, the Exclusion area, the Conventional Ammunition Storage area and the Lakeshore Housing area.

ELECTRICAL METERING PLAN

SENECA ARMY DEPOT

ELECTRICAL METERING PLAN

To effectively monitor and evaluate the electrical energy consumption at SEAD, the facility and its mission can be categorized into at least three areas of electrical usage as follows:

1. Administration and Warehouse Areas
2. Family Housing Area
3. North Troop Area

These areas of electrical energy usage closely correlate with the power distribution system feeders.

Since Feeder A serves the Administration and Warehouse areas, metering of this line would not particularly serve any useful input. Feeder B, which supplies the remainder of the Adminstration area and Family Housing area, can be effectively isolated into two of the electrical energy usage categories above since all of the family housing units on this feeder are effectively located along one portion of the line, with the exception of Building 101 - the Adminstration Building.

FAMILY HOUSING

Family Housing can be effectively monitored by the following procedure:

1. Install a high voltage metering unit on Feeder B ahead of any transformer serving family housing (i.e., east of the NCO club and west of First Avenue).

2. Open the airbreak switch located at the south-end of East Patrol Road and back feed on Feeder A any warehouses presently being supplied by Feeder B.

3. Install a low voltage meter unit at the service entrance of the Adminstration Building, Building 101, to deduct its energy usage from that of family housing.

All remaining loads on Feeder B between the high voltage metering unit and the open air break switch are relatively constant loads (i.e., street lighting and a sewage lift station serving family housing). See Figure No. 16 for details.

REYNOLDS, SMITH AND HILLS
ARCHITECTS • ENGINEERS • PLANNERS
INCORPORATED

SUBJECT
DESIGNER
CHECKER
AEP NO.
SHEET OF
DATE
DATE

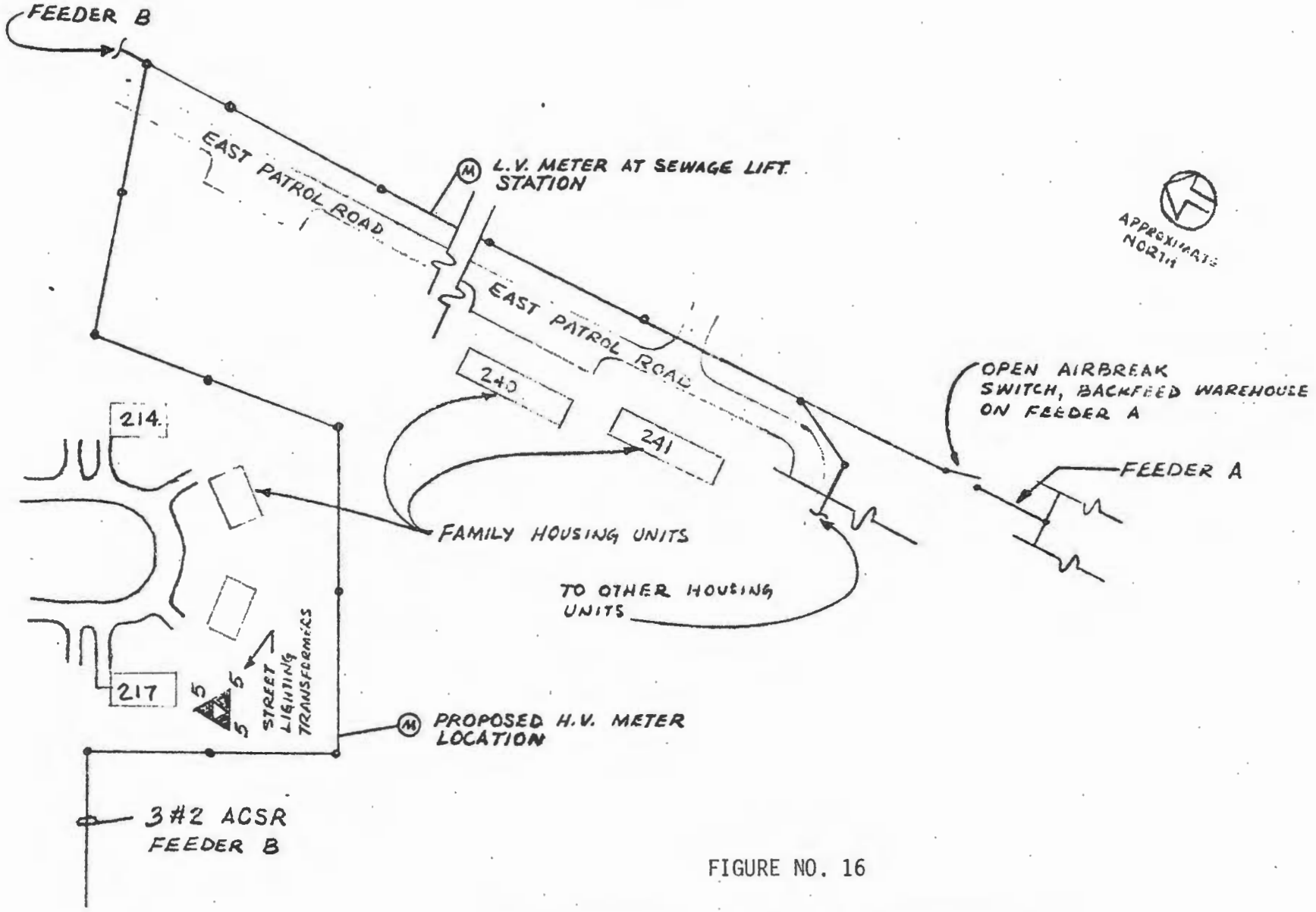


FIGURE NO. 16

METERING PLAN - FEEDER B

FAMILY HOUSING AREA

N.T.S.

Q AREA

To effectively monitor the North Troop area, an air break switch should be installed outside the Q Area on subfeeder line C-1 (see Barnard and Maybeck Study, Drawing No. SK71-03-00); and the N.O. air break switch between subfeeder lines C-1 and C-2 should be closed, thus only one feeder would supply power to buildings outside the Q Area.

Metering units should be located as follows (see Figure No. 17):

1. Install high voltage metering unit at east side of Q Area on feeder line C which supplies Electrical Substation No. 818. This would provide monitoring of the entire North Troop area.

2. Install high voltage metering unit on subfeeder line C-2, south of Building No. 706. This meter would monitor all buildings, barracks, administration areas, etc., outside the Q Area.

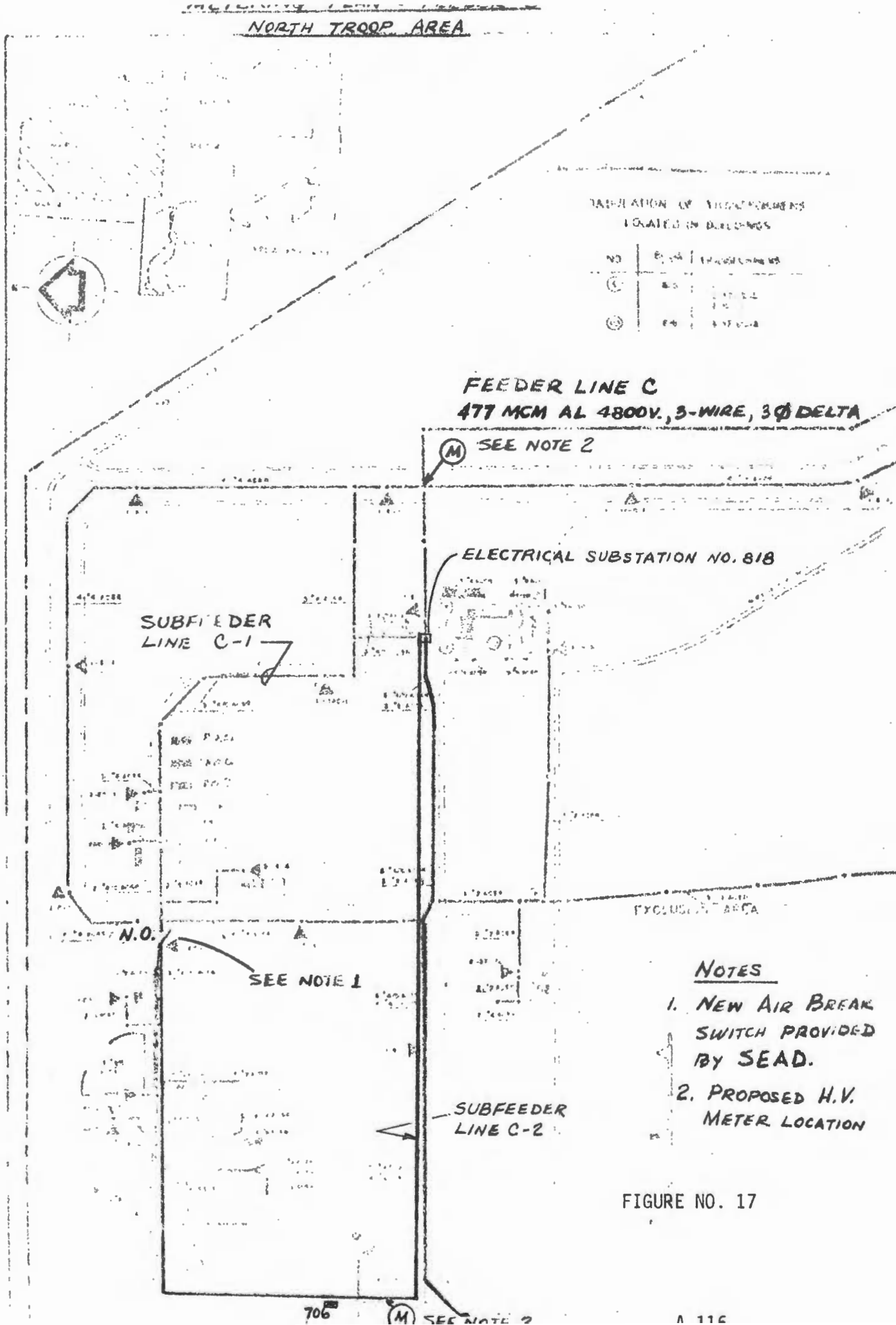

NORTH TROOP AREA
FEEDER LINE C
477 MCM AL 4800V., 3-WIRE, 3Ø DELTA
(M) SEE NOTE 2
ELECTRICAL SUBSTATION NO. 818
SUBFEEDER
LINE C-1
N.O.
SEE NOTE 1
SUBFEEDER
LINE C-2
706
(M) SEE NOTE 2
NOTES
1. NEW AIR BREAK SWITCH PROVIDED BY SEAD.
2. PROPOSED H.V. METER LOCATION

FIGURE NO. 17

FAMILY HOUSING - LAKESHORE AREA

To effectively monitor the Lakeshore area, metering units should be located as follows (see Figure No. 18):

1. Install a high voltage metering unit on subfeeder line C4-5. This would provide monitoring of the input power to the Lakeshore area.

2. Install a low voltage network meter, 277/480 volt, 3Ø, four-wire at the pump house, to deduct its energy usage from that of the housing units.

3. The recreation services facility and associated trailer should also be metered to monitor and deduct its energy usage from that of the Lakeshore Housing area. This metering unit can be purchased for an additional $180 above that cost indicated in the Cost Estimate Section.

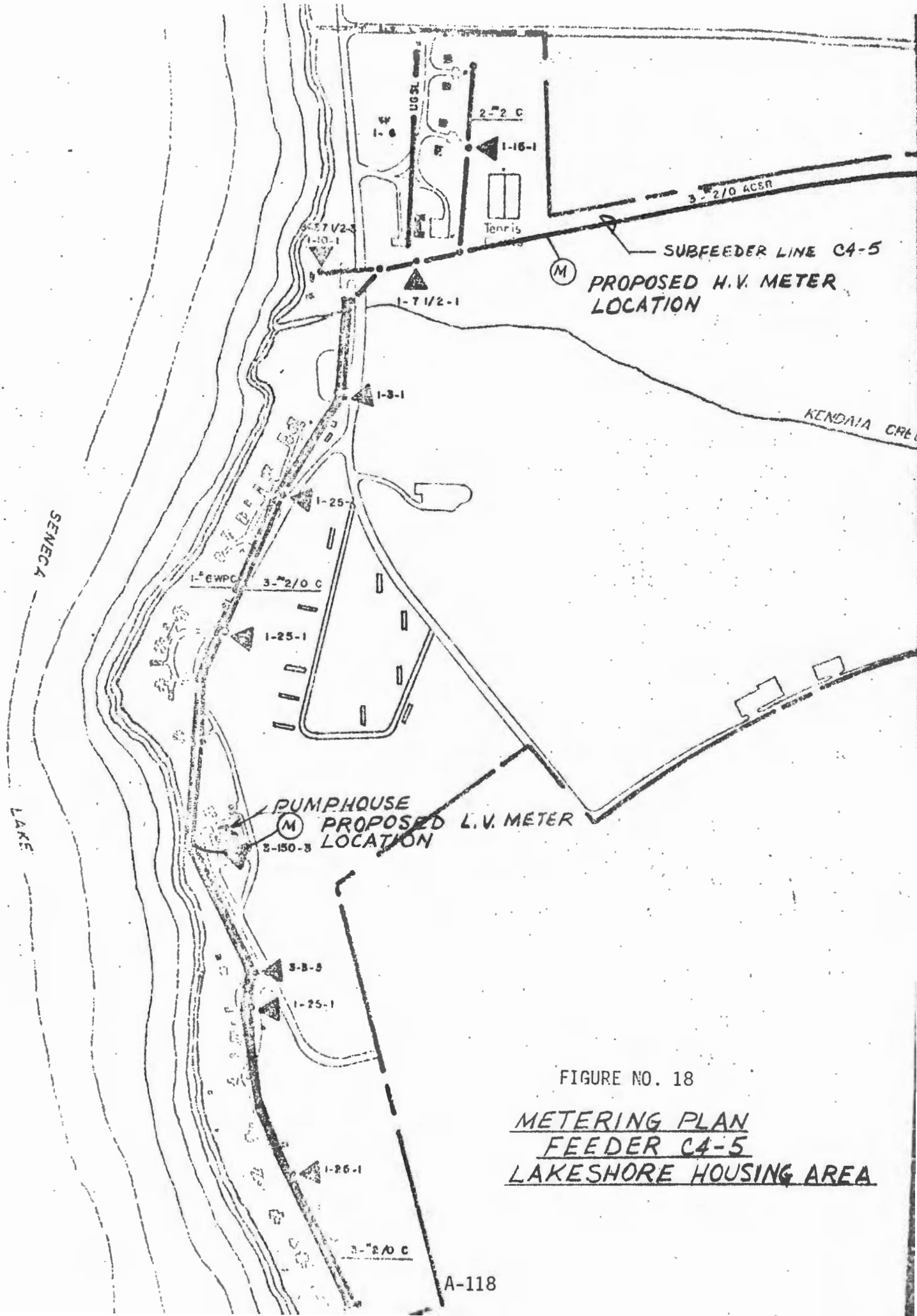


FIGURE NO. 18

METERING PLAN
FEEDER C4-5
LAKESHORE HOUSING AREA

COST ESTIMATE

Based on the above recommendations for primary and secondary metering, the estimated material cost of the metering units, excluding installation of current transformers, potential transformers, meter and socket installation, wiring, primary and secondary fusing, mounting hardware, cabinets and miscellaneous hardware, is as follows (See Section on Watthour Meter Cost Data, for unit prices):

4 - Three-Phase, 3-Wire H.V. Meters (Item A) @ $,1397	$5,588
1 - Low Voltage 120/208 Volt, 3Ø, Y Meter (Item D.2a)	180
1 - Low Voltage 277/480 Volt, 3Ø, Y Meter (Item E.2a)	180
Total Metering Material Cost:	$5,948

WATTHOUR METER COST DATA

A. Three-Phase, Three-Wire, High Voltage Circuits:

1. Watthour Meter with Demand Register, Type VM63S, 2-Stator, 3-Wire, 3-Phase, 30 Minute Interval Demand Meter, Class 20, Form 5S with M60 Register, GE Cat. No. 705X5G8.

Contractor Price:	$ 153.44

2. Meter Socket, 20 Amp, 8 Terminal with Automatic Circuit Closure, GE Cat. No. 741X18G138.

Contractor Price:	29.38

3. PT's (2/Meter), 4,800 V to 120 V or 40:1 Ratio, GE Cat. No. 764X30G13.

Contractor Price:	740.88

4. CT's (2/Meter), Type JKW3, Ratio up to 100:5, GE Cat. No. 693X79.

Contractor Price:	473.04
TOTAL HIGH VOLTAGE METER UNIT:	$ 1,396.74

B. Three-Phase, Four-Wire, 120/208 Volt Low Voltage Circuits, Load Currents Greater than 200 Amperes:

1. Watthour Meter with Demand Register, Type VM65S, 2-Stator, 4-Wire Y, 3-Phase, 30 Minute Interval Demand Register, Class 20, Form 6S with M60 Demand Register, GE Cat. No. 705X11G4.

Contractor Price: $ 169.68

2. Meter Socket, 20 Amps, 13 Terminal with Automatic Circuit Closure, GE Cat. No. 741X18G144.

Contractor Price: 52.51

3. CT's (3/Meter), Type JAK-0, 600 V, Class , Rated 400/5 (Good for 20 Amp through 1600 Amp), GE Cat. No. 750X33G313.

Contractor Price: 153.00

TOTAL LOW VOLTAGE METER UNIT: 375.19

C. Three-Phase, Four-Wire, 277/480 Volt, Low Voltage Circuits, Load Currents Greater than 200 Amperes:

1. Watthour Meter - Same as Item B.1 Above Except Rated 240 Volt. GE Cat. No. 705X11G6.

Contractor Price: $ 169.68

2. Meter Socket ECT's, Same as Above Item B.2 and Item B.3.

Contractor Price:	205.51
TOTAL LOW VOLTAGE METER UNIT:	$ 375.19

D. Low Voltage Circuits up to 200 Amp, 120/208 Volt Y:

1. With Demand Register --

a. Watthour Meter with Demand Register, 30 Minute Interval, Form 145, GE Cat. No. 700X24G166.

Contractor Price:	$ 187.08

b. Meter Socket, 300 Amp, Solid 7 Jaw 2" Hub, GE Cat. No. 741X30G1.

Contractor Price:	54.40
TOTAL LOW VOLTAGE METER UNIT:	$ 241.48

2. Without Demand Register --

a. Watthour Meter without Demand Register, GE Cat. No. 700X22G37.

Contractor Price:	$ 125.28

b. Meter Socket - Same as Item D.1.b.

Contractor Price:	54.40
TOTAL LOW VOLTAGE METER UNIT:	$ 179.68

E. Low Voltage Circuits, Up to 200 Amp, 277/480 Volt Y:

1. With Demand Register --

a. Watthour Meter with Demand Register, 30 Minute Interval, Form 145, Type VM65S, GE Cat. No. 700X24G222.

Contractor Price:	$ 187.08

b. Meter Socket, Same as D.1.b.

Contractor Price:	54.40
TOTAL LOW VOLTAGE METER UNIT:	$ 241.48

2. Without Demand Register --

a. Watthour Meter without Demand Register, GE Cat. No. 700X22G37.

Contractor Price:	$ 125.28

b. Meter Socket - Same as D.1.b.

Contractor Price:	54.40
TOTAL LOW VOLTAGE METER UNIT:	$ 179.68

F. Single Phase Watthour Meter Without Demand Register:

1. Residential Network Meter, Class 200, Form 125, Type V612S, 14, 120/208 V Y, 3-Wire, GE Cat. No. 700X92G22.

Contractor Price:	$	50.34

2. Meter Socket, 200 Amps, GE Cat. No. 743X1G103 and Fifth Terminal.

Contractor Price:		19.67
TOTAL LOW VOLTAGE METER UNIT:	$	70.01

BUILDING DESCRIPTION SUMMARY TABLES

SENECA ARMY DEPOT

TABLE NO. 1

BUILDING DESCRIPTION SUMMARY

ADMINISTRATION

BUILDING DESCRIPTION	BLDG NO	NO. OF FLOORS	Square Footage: ROOF	Square Footage: GROSS WALL AREA	WINDOW TYPE	Type of Constr.: WALLS	Type of Constr.: ROOF	U-Values: WALL	U-Values: ROOF	HVAC System: TYPE	HVAC System: CAP/ MAX HEAT LOSS	DHW Size/Energy	Heat Loss 10^6 Btu per Year	Energy Types	Occup. Hours	Utiliz.	Process Energy Systems
Headquarters	101	2	4,788	11,520	DP	8" B/ 4" BR	B Up	.24	.11	FHS	.700	50 gal/E	1,120	No. 2	0 to 24 7 to 16	CO OFF	N
Finance	115	1	13,579	10,821	SP w/SW	8" CB/ 4" BR	B Up	.24	.20	FTR DEX	~1.0 MBH 15 T	50 gal/E	2,715	SBS	0 to 24 7 to 16	DP OFF	N
Mil. House Office	116	1	12,000	10,620	SP	8" CB/ 4" BR	B Up	.24	.046	FAH	.5 MBH	50 gal/E	658	No. 2	7 to 16	OFF/ STO	N
Post Engineer	122	1	12,318	9,480	SP & DP	8" B/ 4" BR	B Up	.24	.10	SUH	~.75 MBH	40 gal/E	1,785	SBS	7 to 16	OFF/ STO	N
Facility Engineer	123	1	4,436	3,216	DP	8" CB/ 4" BR	B Up	.24	.05	FTR	~.225 MBH	50 gal/E	510	SBS	7 to 16	OFF	N
QA and Safety Office	125	1	6,517	7,200	DP	8" CB/ 4" BR	B Up	.24	.05	FTR	~.1	15 gal/E	285	SBS	7 to 16	OFF	N
Admin/ Ed. Crt.	701	1	7,140	8,160	SPW/SW*	12" BR	B Up	.33	.09	DEX FTR	~.75 MBH 10 T	50 gal/E	1,965	NBS	0 to 24 8 to 17	DP/CO OFF	N
BOQ/ Office	702	1	10,351	11,640	SPW/SW*	8" CB	B Up	.33	.09	FTR	~1.0 MBH	290 gal/S	2,805	NBS	0 to 24	LQ	N
Badging Building	710	1	2,490	2,486	---------- Not Studied, Too Small ----------												
Tech. Off. Building	802	1	3,760	3,290	---------- Not Studied, Inspection Prohibited ----------												
Guard House	812	1	5,400	3,630	SP	8" CB	B Up	.37	.11	DEX FHS	.668 MBH 15 T	80 gal/E	1,890	No. 2	0 to 24	OFF	N
Office/ Readiness Group	S2306	1	10,000	2,304	SP	4" WF	AS	.26	.14	FTH	1.8 MBH	52 gal/E	1,280	No. 2	7 to 16	OFF	N
Air Field Operation	2305	2	2,700	5,000	SP	12" CB	B Up	.30	.15	FAH FTR	2.08 MBH	52 gal/E	1,344	No. 2	0 to 24	OFF	N

*some

TABLE 2

BUILDING DESCRIPTION SUMMARY

SHOPS

BUILDING DESCRIPTION	BLDG NO.	NO. OF FLOORS	Square Footage: ROOF AREA	Square Footage: GROSS WALL AREA	WINDOW TYPE	Type of Constr: WALLS	Type of Constr: ROOF	U-Values: WALL	U-Values: ROOF	HVAC System: TYPE	HVAC System: CAP. OR MAX HEAT LOSS	DHW Size/Energy	FUEL CON. FOR HEATING 10^6Btu/Yr	ENERGY TYPES	OCCUP. HOURS	UTILIZ.	PROCESS ENERGY SYSTEMS
Carpentry	113	1	16,000	8,320	DP	8" CB	B Up	.37	.27	FAH	1.6	50 gal/E	2,394	No. 2	7 to 16	SH	N
Vehicle Maint.	117	1	19,261	13,960	DP	CB	B Up	.37	.10	FAH	1.4195	42 gal/E	4,440	SBS	7 to 16	SH	N
Vehicle Maint.	118	1	19,928	13,920	DP	CB	B Up	.37	.27	FAH	1.4195	42 gal/E	4,440	SBS	7 to 16	SH	N
Paint Shop	124	1	1,567	1,992	DP	CB	B Up	.37	.10	FAH	.170	40 gal/E	450	SBS	7 to 16	SH	N
Shop I	316	1	18,120	14,412	SP	SM	SM	.07	.09	FAH	1.9653	42 gal/E	5,635	SBS	7 to 16	SH	N
Shop II IPE	317	1	18,120	14,412	SP	SM	SM	.07	.09	FAH	1.9653	52 gal/E	5,635	SBS	7 to 16	SH	N
Process Shop	318	1	18,120	14,412	SP	SM	SM	.07	.09	FAH	1.9653	52 gal/E	5,635	SBS	7 to 16	SH	N
Ammo Shop	320	1	12,000	10,680	SP	8" CB	B Up	.39	.046	FAH FTR	.6016	None	2,070	SBS	7 to 16	SH	N
Bay Shop	803	1	2,226	2,090	----------	----------	----------	----------	----------	Not Studied, Inspection Prohibited	----------	----------	----------	----------	----------	----------	----------
Bay Shop	819	1	5,620	5,320	None	CB	B Up	.30	.15	DEX FAH	1.166 40 T	40 gal/E	900	No. 2	7 to 16	SH	N
Paint Shop	813	1	2,142	3,690	SP	CB	B Up	.30	.15	FAH	1.0+	40 gal/E	1,105	No. 2	7 to 16	SH	N
Paint Shop	817	1	940	1,716	None	12" CB	B Up	.30	.15	FAH	1.1	None	3,526	No. 2	7 to 16	SH	N
Shop Bldg	815	1	7,688	7,020	None	2' C w/dirt	2' C w/d	.17	.17	DEX FAH	.85 38 T	42 Gal/E	627	Steam Bdg 816	7 to 16	SH	N
Shop Bldg	816	1	10,190	6,540	None	2' C w/dirt	2' C w/d	.17	.17	DEX FAH	.85 81 T	100 Gal/E	627	No. 2	7 to 16	SH	N
Assembly & C/O	807	1	4,800	3,520	One	SM	SM	.07	.09	FAH	.400	40 gal/E	602	No. 2	7 to 16	SH	N
Shops	804 805	1	1,221	2,380	None	CB	B Up	.30	.15	DEX FAH	.1342 18 T	52 gal/E	517	No. 2	7 to 16	SH	Bldg Inspec. Not Permit.

TABLE NO. 3

BUILDING DESCRIPTION SUMMARY

WAREHOUSES

BUILDING DESCRIPTION	BLDG NO	NO. OF FLOORS	Square Footage: ROOF AREA	Square Footage: GROSS WALL AREA	WINDOW TYPE	Type of Constr.: WALL	Type of Constr.: ROOF	U-Values: WALL	U-Values: ROOF	HVAC System: TYPE	HVAC System: CAP	DHW Size/Energy	HEAT LOSS 10^6 Btu per Year	ENERGY TYPES	OCCUP. HOURS	UTILIZ.	PROCESS ENERGY SYSTEMS
Range & Rec Supply	114	1	12,000	10,680	None	8" CB	B Up	.37	.27	FAH	.550	None	980	No. 2	Varies	STO/OFF	-
Locomotive Storage	127	1	6,600	8,100	SP	8" CB 4" BR	B Up	.24	.20	FAH	.3178	None	1,215	SBS	Varies	STO	N
Warehouse	321	1	12,000	10,680	None	8" CB	B Up	.37	.27	DEX FAH	.5842 5 T	40 gal/E	2,010	SBS	7 to 16	SH	N
S/S Warehse/ IPE/Ammo	323	1	90,000	27,200	SP	8" CB	B Up	.39	.046	FAH	2.3412	40 gal/E	8,055	SBS	7 to 16	STO/OFF	N
Warehouse	339	1	90,000	29,500	None	12" CB	B Up	.28	.27	None	--	None	--	--	7 to 16	Dehum STO	110 KW Dehumid.
Warehouse	341	1															
Warehouse	342	1															
Warehouse	345	1															
Warehouse	346	1															
Warehouse	720	1	4,282	5,960	SP	CB	B Up	.30	.15	FAH	.3767	40 gal/E	1,440	NBS	0 to 24	LQ/SH	N
Warehouse	809	1	169	520	SP	Not Studied, Too Small											
Warehouse	810	1	2,300	7,260	SP	CB	B Up	.30	.12	DEX FAH	.7176 2 T	40 gal/E	2,492	No. 2	7 to 16	STO/DP	N
Storeroom	814	1	1,920	2,580	None	SM	SM	.07	.09	FAH	.259	None	490	No. 2	Varies	STO	N
Truck Storage	825	1	4,000	3,920	None	SM	SM	.07	.09	FAH	.095	None	252	No. 2	Varies	STO	N

TABLE NO. 4

BUILDING DESCRIPTION SUMMARY

RECREATION BUILDINGS/SERVICE BUILDINGS

BUILDING DESCRIPTION	BLDG NO	NO. OF FLOORS	Square Footage: ROOF AREA	Square Footage: GROSS WALL AREA	WINDOW TYPE	Type of Const.: WALL	Type of Const.: ROOF	U-Values: WALL	U-Values: ROOF	HVAC System: TYPE	HVAC System: CAP OR MAX HEAT LOSS MBtu/H	DHW Size/Energy	HEAT LOSS 10^6 Btu per Year	ENERGY TYPES	OCCUP. HOURS	UTILZ.	PROCESS ENERGY SYSTEMS
RECREATION BUILDINGS																	
NCO Club	S142	1	9,800	4,750	DP	WF	AS	.26	.14	FHS	.7837	90 gal/No2	2,268	No. 2	7 to 21	RES/REC	N
Library/ Rec Center	705	1	7,996	4,296	SP	CB	B Up	.09	.11	DEX FTR	.2616 27½ T	250 gal/S	750	NBS	16 to 23 8 to 17	REC OFF	N
Theater	706	1	3,705	3,288	SP	CB	B Up	.33	.11	FAH FTR	.3087	52 gal/E	885	NBS	Varies	REC	N
Craft Shop/ Clothing Sales	724	1	9,000	4,680	SP	12"CB	B Up	.30	.20	FAH FTR	.6592	30 gal/E	1,890	NBS	7 to 17	OFF/ REC	Shop Tools
NCO Club Annex	731	1	2,717	2,520	SP	CB	B Up	.07	.04	DEX FTR	.5755 7.5 T	52 gal/E	165	NBS	7 to 10	RES/ REC	N
Youth Activites	S220	2	3,600	5,580	SP	WF	AS	.26	.14	FHS	.700	30 gal/E	672	No. 2	16 to 23	REC	N
SERVICE BUILDINGS																	
Fire Station	103	2	2,618	8,792	DP	TB/ 4" BR	B Up	.24	.11	DEX FHS	.7009 4.2 T	50 gal/E	1,288	No. 2	0 to 24	LQ OFF	N
Dental/ Health Clinic	106	1	10,688	5,082	DP	CB/ 4" BR	B Up	.094	.046	DEX FAH FHS	.713 30 T	100 gal/No2	2,394	No. 2	7 to 16	MED	N
Cons. Mess/ PX/Barber	707	1	18,700	6,600	SP	CB	B Up	.29	.10	DEX FTR FAH	.7743 62½ T	750 gal/S	2,220	NBS	4 to 22	RES	N
Commissary/ Warehouse	722	1	4,700	3,672	SP	CB	B Up	.30	.15	FAH	.3715	52 gal/E	1,065	NBS	9 to 17	STO	N
Training Building	806	1	4,800	3,520	One	SM	SM	.07	.09	FAH	.400	40 gal/E	588	No. 2	7 to 16	OFF/SH	N

TABLE NO. 5
BUILDING DESCRIPTION SUMMARY

BARRACKS/FAMILY HOUSING

BUILDING DESCRIPTION	BLDG NO.	NO. OF FLOORS	Square Footage: ROOF AREA	Square Footage: GROSS WALL AREA	WINDOW TYPE	Type of Constr.: WALL	Type of Constr.: ROOF	U-Values: WALL	U-Values: ROOF	HVAC System: TYPE	HVAC System: CAP OR MAX HEAT LOSS	DHW Size/Energy	FUEL CONS FOR HEATING 10^6Btu/Yr	ENERGY TYPES	OCCUP. HOURS	UTILIZ.	PROCESS ENERGY SYSTEMS
BARRACKS																	
Barracks	704	3	10,374	18,300	SPW/SW	CB	B Up	.30	.15	FTR	1.4492	845 gal/S	4,155	NBS	0 to 24	LQ	N
Barracks	708	3	10,374	18,300	SPW/SW	CB	B Up	.30	.15	FTR	1.4492	845 gal/S	4,155	NBS	0 to 24	LQ	N
FAMILY HOUSING	BLDG TYPE	NO. OF UNITS	AREA/ UNIT								CAP/ UNIT		CONS/ UNIT				
Single Family:																	
204	1	1	1,806 to 2,134	Varies	SPW/SW	WF/ 4"BR	B Up	.26	.14	FAH	.084	52 gal/E	126	No. 2	0 to 24	LQ	N
203,205,206, 217	2	4				WF/ SD											
202,207,214, 215,216	3	5															
Duplex Units:																	
211,213,218, 221,223	4	10	3,200 to 3,500	Varies	SPW/SW	WF/SD	B Up	.26	.14	FAH	.100	40 gal/E	119	No. 2	0 to 24	LQ	N
210,212,219, 222	5	8															
200, 201	6	4	---------- Not Studied, Too Small in Number ----------										148	No. 2	0 to 24	LQ	N
Quadriplex Units:																	
224-242	7	76	5,278 to 5,918	Varies	SPW/SW	WF/ 4"BR	B Up	.26	.14	FAH	.100	40 gal/E	132	No. 2	0 to 24	LQ	N
243,244,245	8	12				WF/ SD											
208, 209	MCA	4	---------- Not Studied, Too Small in Number ----------										202	No. 2	0 to 24	LQ	N

CODES FOR BUILDING DESCRIPTION SUMMARY TABLES

WALL DESCRIPTIONS:

SP	-	Single Pane
DP	-	Double Pane
SW	-	Storm Window

ROOF DESCRIPTIONS:

C	-	Concrete
B	-	Block
BR	-	Brick
WF	-	Wood Frame
TB	-	Tile Block
SM	-	Sheet Metal
B Up	-	Built-Up
AS	-	Asphalt Shingles

HVAC SYSTEM TYPE:

FHS	-	Furnace Hydronic System
DEX	-	Direct Expansion
FTR	-	Fin Tube Rad.
FAH	-	Forced Air Heater
SUH	-	Steam Unit Heater

HVAC CAPACITY DESIGNATION:

T	-	Ton
MBH	-	10^6 Btu/Hr

HOT WATER ENERGY SOURCE:

E	-	Electric
S	-	Steam

ENERGY TYPES:

SBS	-	South Base Steam
NBS	-	North Base Steam
LS	-	Local Steam
No. 2	-	No. 2 Fuel Oil

BUILDING UTILIZATION:

MED	-	Medical
REC	-	Recreation
RES	-	Restaurant
CO	-	Communication
LQ	-	Living Quarters
OFF	-	Office
STO	-	Storage
DEHUM	-	Dehumidified
SH	-	Shop
DP	-	Data Processing

PROCESS ENERGY SYSTEM:

N	-	None

PAST ENERGY CONSERVATION
PROJECTS INITIATED
BY
SENECA ARMY DEPOT

TITLE	DESCRIPTION	STATUS
1. Update Air-Conditioning Systems Buildings 815 and 816	Eliminate boiler requirements for reheating by using compressor's rejected heat.	A
2. Energy Monitoring and Control System	Provide a facility-wide automated energy monitoring and control system (EMCS) utilizing the latest industry accepted equipment techniques	NA
3. Window Replacement Buildings 127, 702, 704, 706, 707, and 708	Remove all steel single-pane windows. Reduce wall area by filling with masonry. Install new aluminum double pane windows in smaller openings. Paint new interior finish. New brick exterior for Bldg. 127. New insulated plaster finish for Bldgs 704 & 708.	D
4. Seal Humidity Control Warehouses 339, 341, 342, 345, and 346	Provides for the sealing of humidity controlled warehouse to prevent moisture infiltration	NA

Note: Codes --
NA - Not Approved; D - Design Stage; A - Approved but not Complete;
C - Complete.

TITLE	DESCRIPTION	STATUS
5. Expand Steam Distribution to Family Housing	Eliminate need for individual boilers	NA
6. Air-Atomized Burners for Central Heating Plant 718	Replace mechanical atomized burners	C
7. Replace Condensate Return Piping/Insulation for Central Heating Plants 718 and 121	Eliminate condensate and heat losses	A
8. Flash Steam Recovery for Central Heating Plants 121, 319, and 718	Recover flash steam for use in heating No. 6 fuel oil	NA
9. Jockey Feed Pump for Central Heating Plants 319 and 718	Reduce electrical pumping costs	NA
10. Combustion Air Intake Louvers for Central Heating Plant 319	Reduce heat losses	NA
11. Downsize Burners for Central Heating Plant 319	Improve boiler efficiency	NA
12. Insulate Shops - Bldgs. 316, 317, and 318	Insulate walls and ceilings, seal windows and doors and repaint for better light utilization	A
13. Steam Line Insulation for Bldg. 323	Repair piping/insulation of main steam lines	A
14. Insulate roof - Bldg. 323 320, and 321	Reroof and add foil-backed insulation which will be held in place by chicken wire	A

TITLE	DESCRIPTION	STATUS
15. Insulate Roof - Bldgs 117, 118, 123	Add insulation in roof areas to limit heat losses	A
16. Storm Windows - Bldgs. 113 117, 118, 122, 123, 124, and 125	Install storm windows	C
17. Street Lighting	Replace existing lighting with sodium vapor lighting	NA
18. Humidity Control for Bldgs. 701, 705, 804, 805, 810, 812 and 819	Eliminate boiler requirements for reheating by using compressor's rejected heat	NA
19. Up Grade Family Housing	Install Vinyl siding and insulation; replace windows; replace doors; lower ceilings; and install insulation	NA
20. Up Grade Lake Area Housing	Install vinyl siding and insulation	C
21. Boiler Water Treatment Equipment	Add water softeners to chemical feed system (Bldgs 121 and 718)	NA
22. Convert Standard to Controlled Humidity Storage Buildings 340, 343, 347, 348, 349, and 350	This is not a conservation project but is presented here because it will affect base energy consumption	NA
23. Fuel Efficiency Tube Cleaners for Central Heating Plants 121, 319, 718		NA

TITLE	DESCRIPTION	STATUS
24. Boiler Combustion Controls for Central Heating Plants 121, 319, 718	Install CO_2 analyzers with feedback Controls which will trim boilers	NA
25. Insulate Bldgs 704, 708, 710	Add wall insulation	C
26. Add Vestibule - Bldgs S142 and 731	Construction of interior vestibule with a second set of doors	C

PROPOSED CHANGES IN BUILDING USAGE

(Construction and Demolition)

SENECA ARMY DEPOT

PROPOSED CHANGES IN BUILDING USAGE

DEMOLITION

Youth Activities (Building No. S-220)

NEW CONSTRUCTION

Barracks

Gym (Building No. 744)

Ammo Facility Training

Addition to Building No. 103

Vehicle Maintenance Shop

POPULATION STATISTICS

Military Personnel	524
Dependents	522
Civilian Employees	853