
NAVAL FACILITIES ENGINEERING COMMAND
GUIDE PERFORMANCE WORK STATEMENT (GPWS)

FOR

OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

APRIL 1987

PREPARED BY:

SOUTHERN DIVISION, NAVAL FACILITIES ENGINEERING COMMAND

CHARLESTON, SC

NAVAL FACILITIES ENGINEERING COMMAND
GUIDE PERFORMANCE WORK STATEMENT FOR
OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

TABLE OF CONTENTS

USER'S GUIDE	UG-i
GUIDE PERFORMANCE WORK STATEMENT	
SECTION B SUPPLIES OR SERVICES AND PRICES/COSTS	B-1
SECTION C DESCRIPTION/SPECIFICATIONS/WORK STATEMENT	C-i
SECTION J LIST OF ATTACHMENTS	J-i
QUALITY ASSURANCE GUIDE	QA-i

USER'S GUIDE
GUIDE PERFORMANCE WORK STATEMENT FOR
OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

USER'S GUIDE
 GUIDE PERFORMANCE WORK STATEMENT FOR
 OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
 AND EMERGENCY GENERATION SYSTEMS

TABLE OF CONTENTS

		PAGE <u>NO.</u>
I.	INTRODUCTION.....	UG-1
	A. Purpose.....	UG-1
	B. Function Definition.....	UG-1
	C. Responsibilities.....	UG-2
II.	GPWS DEVELOPMENT AND USER CONSIDERATIONS.....	UG-3
	A. Development of the GPWS.....	UG-3
	B. GPWS User Considerations.....	UG-3
III.	TAILORING THE GPWS.....	UG-4
	A. Getting Started.....	UG-5
	B. Contract Line Item (Section B) Requirements.....	UG-5
	C. Schedule of Deductions.....	UG-8
	D. Davis-Bacon Considerations.....	UG-12
	E. Performance Requirements Summary.....	UG-13
IV.	COMMERCIAL ACTIVITIES (CA) PROGRAM CONSIDERATIONS.....	UG-15
	A. Scope of Work.....	UG-15
	B. Level of Effort (LOE).....	UG-15
	C. Pre-Priced Options to Extend.....	UG-15
	D. Continuity of Services.....	UG-16
	E. Multi-Function CA Contracts.....	UG-16
V.	PRE-AWARD CONSIDERATIONS.....	UG-16
	A. Quality Assurance Evaluator (QAE) Training.....	UG-16
	B. Site Visits.....	UG-16
	C. Government-Furnished Property.....	UG-17
	D. Building Monitors.....	UG-17
	E. Quality Assurance (QA) Plans.....	UG-17
	F. Other Considerations.....	UG-17

USER'S GUIDE
GUIDE PERFORMANCE WORK STATEMENT FOR
OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

I. INTRODUCTION

A. Purpose. This NAVFAC Guide Performance Work Statement (GPWS) has been written to provide assistance in preparing facilities support contracts to procure operation and maintenance of electrical distribution and emergency generation systems services. Contracts for such services may be a continuing contracting effort or conversion of services from in-house to contract performance under the Commercial Activities (CA) program. This NAVFAC GPWS may be used in either application. This GPWS Package consists of a User's Guide, guide contract sections B, C, and J in the Uniform Contract Format, and a Quality Assurance (QA) Guide.

1. The NAVFAC manual MO-327, *Service Contracts: Specifications and Surveillance*, provides extensive information on the preparation of NAVFAC facilities support contracts (FSCs), from guidance on making the initial decision to contract a given function through the entire PWS and surveillance program development process. This User's Guide is designed to supplement and to be used in conjunction with the MO-327 in developing a PWS for Operation and Maintenance of Electrical Distribution and Emergency Generation Systems services. It provides specific guidance on developing and tailoring the GPWS, special items which must be considered if the specification is being written in conjunction with a CA program study, and general guidance on required pre-award actions. Additional guidance on implementing CA program requirements can be found in the Supplement to OMB Circular A-76 and in OPNAVINST 4860.7B.

2. Sections B, C, and J provide suggested formats for displaying contract line (bid) items, technical specifications which the user may tailor to site specific needs, and attachments which provide supplemental information, historical data, etc.

3. The QA guide is designed to provide the framework for development of a comprehensive contract surveillance program. The user should modify and expand upon the sample QA plans provided as the GPWS is tailored.

B. Function Definition. For purposes of this GPWS, the Operation and Maintenance of Electrical Distribution and Emergency Generation Systems function is defined to include all labor, transportation, equipment, materials, supplies, management, coordination, and supervision required to perform operation and maintenance of electrical distribution and emergency systems services. Electrical functions under the CA functional code S725 are defined as operations and maintenance of electric plants and systems, which includes primary generating plants. Since most Naval Shore Activities purchase electric power from a commercial utility, they do not own primary generating plants, but do own emergency generating equipment to provide essential power during outages of the commercial power source. Electric functions and subfunctions in this GPWS are defined as operation and maintenance of electric distribution and emergency generating systems. A separate GPWS for the operation and maintenance of steam and primary electric power generation plants has been prepared for activities which own plants and need to contract for services to operate and maintain them. During the review process required by the CA program, it should be realized that where Government forces are presently performing the electric functions and

subfunctions defined above, some tasks are performed by personnel of the Utility Division while other tasks may be performed by Maintenance Division personnel. This situation should be considered when determining the total labor years of work which would be replaced by a proposed facilities support contract.

C. Responsibilities

1. Experience has shown that the best method of developing a facilities support contract specification is to involve a number of activity personnel, each having a portion of the knowledge and experience required to put the entire package together. A team of experienced activity personnel should be formed and a team leader appointed. At least one member of the team must be intimately familiar with each of the following areas:

- a. Must be familiar with and understand the applicable GPWS(s) and QA Guide(s).
- b. Must have working knowledge of basic contracting procedures.
- c. Must have first hand knowledge of the services, and/or equipment/system operations, repairs and maintenance to be provided by contract.
- d. Must be able to identify local needs/requirements that are different from the GPWS and apply specifically to the activity.

2. The following activity personnel are suggested as members of the specification development team.

a. Specification Writer. The Electrical Distribution Operations and Maintenance specification is most properly prepared by an engineer or engineering technician at the activity who has had some experience in writing facilities support contracts. The use of a planner and estimator (P&E) is also appropriate if one is experienced with writing contract specifications. The writer, regardless of who he/she is, should have attended the Civil Engineer Corps Officers School (CECOS) course on Facilities Support Contracts. Assistance and guidance may be requested from the geographical NAVFACENGCOM Engineering Field Division (EFD), Code 10.

b. Functional Manager/Customer. The functional manager is the technical representative of the team who is most familiar with the function to be contracted. Early in the tailoring process the Utilities Division Director or other functional expert must determine the total scope of the services required, and the specific needs of the activity which may differ from this GPWS.

c. Contract Specialist. The Contract Specialist provides overall contractual guidance in the preparation of the specification. This person will work with the writer in the preparation of sections B, C, and J, and will prepare the majority of the clauses in sections E, F, G, H, I, K, L, and M. Additionally, there are many pre-award and post-award contract actions to be initiated by the Contract Specialist.

d. CA Program Manager. If the specification is being prepared under the CA program, the CA Program Manager provides overall guidance on the CA program, and will ensure that the specification is developed in conjunction with required Most Efficient Organization and Management Studies.

3. The tailored specification should be reviewed by customer and functional manager representatives, the activity's Facilities Support Contract Manager (FSCM) and Quality Assurance Evaluators (QAEs), and the Engineering Division Director and Facilities Management Engineering Director. Consult appropriate EFD instructions to determine if EFD review/approval is required prior to solicitation.

II. GPWS DEVELOPMENT AND USER CONSIDERATIONS. This section of the User's Guide discusses certain assumptions which were made and special items that were considered during the development of the Operation and Maintenance of Electrical Distribution and Emergency Generation Systems GPWS, and provides general information and considerations that the user should be aware of during the tailoring process.

A. Development of the GPWS. In developing this GPWS, a functional analysis, as described in the NAVFAC MO-327, was used to identify each of the major subfunctions for electrical distribution and emergency generation systems operation and maintenance. These subfunctions were further subdivided to develop basic work requirements and attributes for each subfunction. Once all of the basic work requirements were identified for each subfunction, the requirements were put in narrative form and a Performance Requirements Summary Table was developed.

B. GPWS User Considerations. The clauses and provisions of this GPWS are arranged in the uniform contract format as required by the Federal Acquisition Regulations (FAR). The sections to which they are assigned shall not be changed.

1. This GPWS contains sections B, C and J only. These sections contain information and clauses peculiar to the technical services required, while Sections D, E, F, G, H, I, K, L and M contain contract clauses and provisions more closely related to administrative and contractual requirements. Since the latter group will generally be the same in the majority of NAVFAC contracts, their inclusion in each GPWS would be unnecessary duplication. Therefore, this group, to be referred to as the standard facilities support contract clauses, shall be packaged at each geographical EFD and contracting office, and made available to specification writers as required.

2. FAR clauses and provisions may be added or deleted as required by the FAR for specific functions, dollar limitations, bonding, small businesses, etc. They may not be altered unless specifically authorized by the FAR. The clauses in sections I and L, other than those requiring tailoring (e.g., blanks to be completed), may be included by reference. All other FAR clauses and provisions shall be included in full text. Procurement offices shall make available to bidders the full text of all clauses incorporated by reference upon request.

3. The "SCHEDULE OF DEDUCTIONS" and "CONSEQUENCES OF CONTRACTOR'S FAILURE TO PERFORM REQUIRED SERVICES" clauses are NAVFAC, not FAR clauses, and shall not be altered without NAVFAC approval. All other non-FAR clauses and provisions in the standard facilities support contract clauses should be used substantially as shown or deleted if not applicable to the solicitation. Extensive deliverable performance requirements should not be added to these clauses, but should be included in Section C.

4. Technical Specification

a. Section C, which describes the services to be provided, should be a performance specification. That is, over defining the Contractor's responsibilities in terms of methods or procedures should be avoided in writing the technical specifications since we hope to purchase not only the Contractor's labor, but also his/her expertise in the services to be provided and management of those services. A performance oriented specification should minimize the use of words describing "how to" and emphasize the performance standards to which the Contractor must operate and maintain the electrical distribution and emergency generation systems. Outputs must be described specifically and as explicitly as possible while leaving the Contractor latitude to manage his/her own work force and choose his/her own methods for accomplishing the work.

b. On the other hand, the specification must provide enough information to clearly and precisely define the magnitude (number of services we want to buy) and quality of each of the services to be provided, as well as the scope or limit of each. This is accomplished in the GPWS by specifying, in addition to the desired outputs, schedules of accomplishment and/or specific time limitations in which all services must be completed; listing mandatory operating procedures or steps that the Contractor must follow for some services; and providing historical data on the magnitude of services provided under previous contracts or by in-house forces. Such information will only slightly restrict the Contractor's latitude in managing his/her workforce, but will help ensure all bidders clearly visualize the magnitude of effort which will be required to provide the clearly defined scope of work. Typically this will result in more accurate/realistic Contractor bids, make payment deductions for unsatisfactorily performed or non-performed work easier to calculate, and reduce the number of contract administration problems.

5. As you use this GPWS, you will find that anytime a choice of options is available, there is a "NOTE TO THE SPECIFICATION WRITER". The note informs the user to select the appropriate clause, provide additional information, or delete the clause in its entirety. There are many areas in the GPWS where space has been left to fill in a blank; e.g., start times, dates, quantities, etc. All that is required is to complete the blanks and then delete the adjoining notes. If the final document is to be printed from the DISKETTE, it is not necessary to delete the notes as the equipment will print a justified copy without the notes.

6. Maximum Allowable Defect Rates (MADRs) (formerly Acceptable Quality Level (AQL)) provided in the Performance Requirements Summary Table are sample levels only. Refer to NAVFAC MO-327 and select levels that are appropriate to your activity.

III. TAILORING THE GPWS. NAVFAC GPWS for Operation and Maintenance of Electrical Distribution and Emergency Generation Systems services is not intended to fit the requirements of a specific activity, but rather, is to serve as a model to be tailored by activities in preparing their specific PWS. The first step in tailoring a GPWS to a specific case is for the user to become intimately familiar with the GPWS and its User's Guide. The user must know what is, and is not, included in the GPWS and what was intended before he/she can assess modifications required. The PWS is the instrument that lays out the functional and technical requirements and ultimately becomes part of a contract. The User's Guide provides the user with information concerning the GPWS and provides instructions on tailoring it to his/her use. Users should not assume

that the GPWS can be "plugged" into their application with little or no effort. A detailed analysis of the activity's requirements will be required.

A. Getting Started

1. The first step in tailoring this GPWS to a specific user activity must be to determine one of the following:

a. Requirements are currently contracted and this will be a continuation of the contracted services or the consolidation of several contracts. If this is the case, the GPWS may be tailored to accomplish any desired scope of work and level of performance.

b. Requirements to be included are subject to a CA cost comparison study under OMB Circular A-76. If this is the case, it is mandatory that the scope of work and level of performance specified be equivalent to the current in-house effort or to the level of effort that can be achieved by the Most Efficient Organization (MEO) if the function is retained in-house. Additional information on tailoring of the GPWS for a CA program study is included in paragraph IV of this User's Guide.

2. The next step should be a thorough review of Chapters 3 and 4 of NAVFAC MO-327. These two chapters outline in detail how to perform a functional analysis to determine just how the specification should be written and how Contractor performance is to be monitored. As the functional analysis is being performed, the user should compare his/her unique activity requirements with GPWS requirements to determine if any major changes are required, or if some of the questions being identified in the functional analysis have already been answered in the GPWS. If major changes are required, the user will need to re-write the affected GPWS section. A thorough functional analysis will make the actual tailoring of the GPWS and re-writing of paragraphs relatively easy since all required data will be readily available and the functions to be contracted will be well defined.

B. Contract Line Item (Section B) Requirements. A combination fixed-price and indefinite quantity contract is used in this GPWS. The contract line items shown in Section B are intended to encompass all of the services to be provided in the technical specifications. Of course they must be tailored to account for work items added or deleted during the functional analysis process and the projected start date of contract performance. The line items are made up of two types of work items: fixed-price items and fixed unit price (indefinite quantity) items. All new work items added by the user must fall into one of these two categories.

1. Fixed-Price Requirements. Fixed-price items are bid and payment is made for the total performance of a given work item over a given period of time (usually one month). These work items are either fixed in scope (time, location, frequency, quantity, etc. are known) or adequate historical data is available to make a biddable estimate. Because the scope of work is known, the Contractor agrees to perform a given function for a total price, and in essence there is one work order. The Contractor performs the work as scheduled and invoices are submitted for the services provided.

a. Examples of fixed-price items in this GPWS are service work, preventive maintenance inspections, and system operations. Some of these work items, such as service work, are limited in scope to specified labor and/or

dollar amounts. Work beyond these limits will either not be required by the contract, or will be included in the indefinite quantity portion of the contract. The higher the labor/dollar limits specified, the more historical data that must be provided.

b. Fixed-price work items added by the user must either have clearly defined scopes, or additional historical data will also have to be added to the PWS.

2. Indefinite Quantity Work Items. All items not included in the fixed-price portion are considered indefinite quantity work items. That is, the Contractor agrees to perform this work on an "as ordered" basis, and a fixed unit price to perform one occurrence or a given quantity of each type of work is bid. Payment for this type of work is based on the unit price bid per unit times the number of units performed. Because each Government order for indefinite quantity work is paid for separately, each and every work order must be inspected and accepted as being satisfactorily completed before payment may be made. Indefinite quantity work in this GPWS is divided into two separate categories, each with its own contract line item and set of subline items.

a. Unit Priced Tasks. Bid prices for unit priced tasks include all labor, materials, and equipment for performing a given quantity of work, such as replacement of a transformer of a specific size. The unit prices bid are multiplied by an estimated quantity of units to be ordered during the contract term, but only for purposes of bid evaluation, since work will only be paid for as ordered and completed.

b. Engineered Performance Standards (EPS) Hour Labor. This type of indefinite quantity work, which is also referred to as "level of effort work", should be used only in connection with maintenance, repairs, and alterations to facilities and/or equipment, and then only when such work cannot be identified in advance in sufficient detail to be included in the fixed-price or indefinite quantity - unit priced portions of the contract. The unit prices bid for labor include all costs to provide one EPS estimated hour of labor. The Contractor is reimbursed for the cost of materials (except for pre-expended bin materials) and equipment, as specified in the "ESTIMATES" paragraph of Section C. NOTE: Level of effort provisions used in a CA program PWS are considerably different than those in non CA studies. Refer to paragraph IV.B of this User's Guide for further guidance.

c. As many indefinite quantity work requirements as possible should be included as unit priced tasks vice as level of effort work since unit priced tasks are easier to understand, easier for Contractors to bid on, the work is easier to order and administer, and materials and equipment costs are included in the unit prices bid. Regardless of which of the two types of indefinite quantity work are used, the estimated quantities provided in the solicitation for bid for bid evaluation must be realistic estimates of the anticipated quantities to be ordered during the contract term.

3. Partial first year of performance

a. Because of funding restrictions, only four types of maintenance service contracts may be awarded for a 12-month period to begin at any time during the fiscal year. All other contracts, including those for Operation and Maintenance of Electrical Distribution and Emergency Generation Systems services must be funded using funds from the fiscal year in which the work will be

performed. This means that only contracts with terms beginning on 1 October may be awarded for a full 12-month period. Contract terms beginning on any other date must be awarded for something less than 12 months and must end on or before 30 September. Normally such contracts will not be awarded for less than three months. For example, a contract which begins on 1 April would have a six-month initial term, and then options to extend for up to 54 additional months. However, no single option period could be more than 12 months long, and the total term of contract could not exceed 60 months.

b. Section B of this GPWS assumes that the initial contract period will be less than 12 months. The user must also consider each of the following items in this situation.

(1) As illustrated in this GPWS, two sets of contract line items will be required in Section B. One set for the initial period for performance of work from the specified contract start date through 30 September. The other set will be for performance during the first 12-month option period, if the Government exercises its option to extend the contract. Additional pre-priced option periods may be added if desired, and are required if the specification is being written for a CA program study.

(2) Section C, the technical specifications, must clearly outline the scope of work for both the initial and first 12-month option periods since the work load can vary significantly from month to month. For example, the specification must state whether or not annual preventive maintenance inspections will be performed during the initial period.

(3) Two Schedules of Deductions, one for the initial period and one for the first option period, must be included. Of course the items of work and number of units in the Schedules of Deductions must agree with the fixed-price contract line items in Section B and the scopes of work defined in Section C. Paragraph III.C of this User's Guide provides more in depth information on the development of Schedules of Deductions.

(4) The "TERM OF THE CONTRACT" clause in Section F should read as follows:

"TERM OF THE CONTRACT. The initial contract term shall be for a !INSERT NUMBER!-month period commencing on !INSERT DATE! and ending on 30 September !INSERT YEAR!. The Government has the option to extend the term of the contract in accordance with the "OPTION TO EXTEND THE TERM OF THE CONTRACT-SERVICES" clause in Section I. In the option periods, the Government will adjust the prices, as required, based on new Department of Labor Wage Rate Determinations."

(5) The "BASIS FOR AWARD" clause should read as follows:

"BASIS FOR AWARD. The low bidder for purposes of award shall be the conforming, responsive, responsible bidder offering the lowest total price for Contract Line Item Numbers (CLINs) 0001, 0002, 0003, 0004, 0005, and 0006. However, the initial award will include only CLINs 0001, 0002 and 0003. Bids are solicited on an "all or none" basis and provision 52.214-10, "CONTRACT AWARD - SEALED BIDDING (APR 1985)" in Section L is hereby modified. FAILURE TO SUBMIT BIDS FOR ALL ITEMS AND QUANTITIES LISTED SHALL BE CAUSE FOR REJECTION OF THE BID."

c. If the initial contract term will be projected to begin on 1 October, make the following changes to the GPWS contract line items, Section B:

(1) The dates shown in CLINs 0001, 0002, and 0003 should read "(1 October !INSERT YEAR! through 30 September !INSERT YEAR!)".

(2) Delete CLINs 0004, 0005, and 0006 in their entirety, unless the PWS is being written under the CA program (see paragraph IV.C of this User's Guide).

C. Schedule of Deductions. The Schedule of Deductions is one of the most important items that the specification writer must consider in tailoring of this GPWS since it directly affects the degree of difficulty required to make payment deductions for unsatisfactory performance or non-performance of work. The schedule, which is used in conjunction with the "CONSEQUENCES OF CONTRACTOR'S FAILURE TO PERFORM" clause, Section E, requires the successful bidder to break the fixed-price portion of the bid down for each of the fixed-price work items in the PWS. The completed schedule must be provided by the Contractor within 15 days after award of the contract. The "SCHEDULE OF DEDUCTIONS" clause and suggested schedule format(s) for the base and first option periods follow.

"SCHEDULE OF DEDUCTIONS"

a. Within 15 days after contract award, the successful Contractor shall provide an acceptable Schedule of Deductions for the Base period of the contract. No work may commence until such Schedule of Deductions is approved by the ACO. The total of the Schedule of Deductions must equal the amount entered for CLIN 0001. Schedules of Deductions for the option years which include any labor adjustment granted shall be revised within 15 days of notice to extend the contract. If this contract is modified, the Contractor shall revise the Schedule of Deductions within 15 days of the agreement to modify the contract. Prices shown in the Schedule of Deductions will be utilized in conjunction with the "CONSEQUENCES OF THE CONTRACTOR'S FAILURE TO PERFORM REQUIRED SERVICES" clause, Section E, in making payment deductions for non-performance or unsatisfactory performance. Unbalancing in the Schedule of Deductions submitted shall be cause for withholding approval and requiring resubmittal of a balanced schedule, and may be grounds for TERMINATION FOR DEFAULT. The Government reserves the right to unilaterally establish a Schedule of Deductions in the event the successful Contractor presents a Schedule of Deductions which is unbalanced or materially deficient. The approved Schedule of Deductions shall be a part of the contract. DO NOT SUBMIT THE SCHEDULE OF DEDUCTIONS WITH BID.

b. The Government's estimate of the value of work will be based on the Schedule of Deductions for the fixed-price portion of the contract and the Schedule of Indefinite Quantity Work for the indefinite quantity portion of the contract in all instances except the following: for partially performed fixed-price work items, the Engineered Performance Standards (EPS) manuals (See Attachment J-E1) or, if not applicable, other estimating sources will be utilized to estimate the workhour value of the unperformed portion of the work. For deductions of partially performed work, the Government may estimate the Contractor's cost based on wage rates extracted from attached wage determination, locally determined rate for Contractor's overhead and profit, and employees fringe benefits times the estimated manhours, plus material costs if applicable."

**SCHEDULE OF DEDUCTIONS FOR THE BASE PERIOD
(DO NOT SUBMIT SCHEDULE OF DEDUCTIONS WITH BID)**

<u>ITEM OF WORK</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
1. Operation of emergency generation systems per paragraph C.7				
a. Unscheduled operation (during loss of normal power)	MONTH	! INSERT!	\$ _____	\$ _____
b. Scheduled operation	MONTH	! INSERT!	\$ _____	\$ _____
2. Perform preventive maintenance/ inspection on electrical distribution and emergency generation systems/components as specified in paragraph C.8				
a. Battery and charger				
1) 100 amp-hours and smaller	EACH	! INSERT!	\$ _____	\$ _____
2) Over 100 amp-hours	EACH	! INSERT!	\$ _____	\$ _____
b. Circuit breaker				
1) Low voltage, over 200 amps	EACH	! INSERT!	\$ _____	\$ _____
2) Medium voltage, over 200 amps	EACH	! INSERT!	\$ _____	\$ _____
c. Motor				
1) 5 hp and smaller	EACH	! INSERT!	\$ _____	\$ _____
2) Over 5 hp	EACH	! INSERT!	\$ _____	\$ _____
d. Motor Comptroller				
1) 5 hp and smaller	EACH	! INSERT!	\$ _____	\$ _____
2) Over 5 hp	EACH	! INSERT!	\$ _____	\$ _____
e. Disconnect Switch				
1) Medium voltage, 200 amps or less	EACH	! INSERT!	\$ _____	\$ _____
2) Medium voltage, over 200 amps	EACH	! INSERT!	\$ _____	\$ _____
f. Interrupter Switch				
1) Medium voltage, 200 amps and smaller	EACH	! INSERT!	\$ _____	\$ _____

<u>ITEM OF WORK</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
2) Medium voltage, over 200 amps	EACH	!INSERT!	\$_____	\$_____
g. Transformer				
1) 500 KVA and smaller	EACH	!INSERT!	\$_____	\$_____
2) Over 500 KVA	EACH	!INSERT!	\$_____	\$_____
h. Substation				
1) 500 KVA and smaller	EACH	!INSERT!	\$_____	\$_____
2) Over 500 KVA	EACH	!INSERT!	\$_____	\$_____
i. Overhead distribution lines				
1) Low voltage	LUMP SUM	N/A	N/A	\$_____
2) Medium voltage	LUMP SUM	N/A	N/A	\$_____
j. Underground distribution lines				
1) Low voltage	LUMP SUM	N/A	N/A	\$_____
2) Medium voltage	LUMP SUM	N/A	N/A	\$_____
k. Emergency generator set				
1) 100 KW and smaller	EACH	!INSERT!	\$_____	\$_____
2) Over 100 KW	EACH	!INSERT!	\$_____	\$_____
l. Exterior lights	EACH	!INSERT!	\$_____	\$_____
m. Electrical manholes and vaults	EACH	!INSERT!	\$_____	\$_____
3. Perform all service call repairs to electrical distribution and emergency generation systems as specified in paragraph C.9				
a. Emergency service calls	MONTH	!INSERT!	\$_____	\$_____
b. Routine service calls	MONTH	!INSERT!	\$_____	\$_____
TOTAL FIXED-PRICE (must equal amount bid for CLIN 0001)				\$_____

**SCHEDULE OF DEDUCTIONS FOR THE FIRST OPTION PERIOD
(DO NOT SUBMIT SCHEDULE OF DEDUCTIONS WITH BID)**

<u>ITEM OF WORK</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
1. Operation of emergency generation systems per paragraph C.7				
a. Unscheduled operation (during loss of normal power)	MONTH	12	\$ _____	\$ _____
b. Scheduled operation	MONTH	12	\$ _____	\$ _____
2. Perform preventive maintenance/ inspection on electrical distribution and emergency generation systems/components as specified in paragraph C.8				
a. Battery and charger				
1) 100 amp-hours and smaller	EACH	! INSERT!	\$ _____	\$ _____
2) Over 100 amp-hours	EACH	! INSERT!	\$ _____	\$ _____
b. Circuit breaker				
1) Low voltage, over 200 amps	EACH	! INSERT!	\$ _____	\$ _____
2) Medium voltage, over 200 amps	EACH	! INSERT!	\$ _____	\$ _____
c. Motor				
1) 5 hp and smaller	EACH	! INSERT!	\$ _____	\$ _____
2) Over 5 hp	EACH	! INSERT!	\$ _____	\$ _____
d. Motor Comptroller				
1) 5 hp and smaller	EACH	! INSERT!	\$ _____	\$ _____
2) Over 5 hp	EACH	! INSERT!	\$ _____	\$ _____
e. Disconnect Switch				
1) Medium voltage, 200 amps or less	EACH	! INSERT!	\$ _____	\$ _____
2) Medium voltage, over 200 amps	EACH	! INSERT!	\$ _____	\$ _____
f. Interrupter Switch				
1) Medium voltage, 200 amps and smaller	EACH	! INSERT!	\$ _____	\$ _____

<u>ITEM OF WORK</u>	<u>UNIT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
2) Medium voltage, over 200 amps	EACH	!INSERT!	\$_____	\$_____
g. Transformer				
1) 500 KVA and smaller	EACH	!INSERT!	\$_____	\$_____
2) Over 500 KVA	EACH	!INSERT!	\$_____	\$_____
h. Substation				
1) 500 KVA and smaller	EACH	!INSERT!	\$_____	\$_____
2) Over 500 KVA	EACH	!INSERT!	\$_____	\$_____
i. Overhead distribution lines				
1) Low voltage	LUMP SUM	N/A	N/A	\$_____
2) Medium voltage	LUMP SUM	N/A	N/A	\$_____
j. Underground distribution lines				
1) Low voltage	LUMP SUM	N/A	N/A	\$_____
2) Medium voltage	LUMP SUM	N/A	N/A	\$_____
k. Emergency generator set				
1) 100 KW and smaller	EACH	!INSERT!	\$_____	\$_____
2) Over 100 KW	EACH	!INSERT!	\$_____	\$_____
l. Exterior lights	EACH	!INSERT!	\$_____	\$_____
m. Electrical manholes and vaults	EACH	!INSERT!	\$_____	\$_____
3. Perform all service call repairs to electrical distribution and emergency generation systems as specified in paragraph C.9				
a. Emergency service calls	MONTH	12	\$_____	\$_____
b. Routine service calls	MONTH	12	\$_____	\$_____
TOTAL FIXED-PRICE (must equal amount bid for CLIN 0004)				\$_____

D. Davis-Bacon Considerations

1. A Contractor providing maintenance, repair and/or alteration services to Government facilities must pay his/her employees not less than the minimum wages and fringe benefits specified in the applicable Davis-Bacon wage

determination, if the total cost (labor and materials) of the one-time work effort exceeds \$2000. While any facilities support contract may contain Davis-Bacon wage provisions, only CA program contracts may contain options to extend the Davis-Bacon portion of the work. Therefore, Davis-Bacon wage provisions will not normally be included in non CA program contracts.

2. In the case of the GPWS for Operation and maintenance of Electrical Distribution and Emergency Generation Systems, the \$2000 Davis-Bacon limit applies to any individual order for maintenance or repair of electrical distribution and emergency generation systems. Because most non CA program contracts do not contain Davis-Bacon provisions, no single work order may exceed \$2000 in total cost. Work requirements greater than \$2000 would be considered out of the scope of a non CA contract and would have to be procured by a separate contract or performed by in-house forces.

E. Performance Requirements Summary. Once the GPWS has been tailored a Performance Requirements Summary Table (PRS) should be prepared. This table will be used primarily in the preparation of QA Plans (as discussed in the QA Guide to this GPWS), but it will also be of use to the ACO, FSCM, and customers to provide a convenient overview of services to be provided, standards of performance for those services, intended method of evaluation, and MADRs. A sample PRS Table, which reflects the work requirements of this GPWS, is provided below. The user should modify this table to reflect the tailored requirements of the PWS. NAVFAC MO-327 provides guidance on the development of PRS tables.

PERFORMANCE REQUIREMENTS SUMMARY TABLE

<u>WORK REQUIREMENT</u>	<u>PERFORMANCE INDICATOR/STANDARD</u>	<u>METHOD OF SURVEILLANCE</u>	<u>MADR</u>
1. CONTRACT REQUIREMENT: DEVELOP OPERATIONS PROGRAM			
Timeliness	Submitted within specified time	100% inspection	0%
Content	Watchstanding/corrective maintenance requirements and procedures comply with specification	100% inspection	0%
2. CONTRACT REQUIREMENT: DEVELOP PREVENTIVE MAINTENANCE PROGRAM			
Timeliness	Submitted within specified time	100% inspection	0%
Content	PM actions and frequencies comply with specification	100% inspection	0%
3. CONTRACT REQUIREMENT: WATCHSTANDING			
Power Stability	Voltage fluctuations do not vary more than plus or minus 5% of nominal for more than !INSERT! seconds	100% inspection	0%

<u>WORK REQUIREMENT</u>	<u>PERFORMANCE INDICATOR/STANDARD</u>	<u>METHOD OF SURVEILLANCE</u>	<u>MADR</u>
Manning	All shifts manned per approved plan	Planned sampling	Zero occurrences
Record Keeping	All readings and test results recorded at approved intervals	100% inspection	5%
Equipment Abnormalities	Detected promptly and corrective action initiated	Planned sampling	2 per month
4. CONTRACT REQUIREMENT: PREVENTIVE MAINTENANCE			
Timeliness	Performed per approved PM schedule	Planned sampling	5% of PM and tests performed late
Quality of PM	All specified work elements performed with minor deficiencies corrected and major deficiencies reported	Planned sampling	5% of required tests and inspections performed unsat (minor deficiencies not corrected, etc.)
Timely Submittals, Quality of PM Reports	Nature and urgency of deficiencies clearly stated, cost estimates included, results of tests clearly tabulated	Planned sampling	5% of reports reviewed don't include all required data
5. CONTRACT REQUIREMENT: CORRECTIVE MAINTENANCE			
Response/ Completion Time	Within specified time	100% inspection if less than 20 calls per week, planned sampling if 20 or more calls per week (always use 100% inspection for emergency calls)	10% of calls for 100% inspection, or 4 calls per week for planned sampling, not responded to within specified time
Quality of Repair	Equipment performance meets manufacturer's specifications	100% inspection if less than 20 calls per week, planned sampling if 20 or more calls per week (always use 100% inspection for emergency calls)	5% of calls for 100% inspection, or 2 calls per week for planned sampling, deficient

<u>WORK REQUIREMENT</u>	<u>PERFORMANCE INDICATOR/STANDARD</u>	<u>METHOD OF SURVEILLANCE</u>	<u>MADR</u>
Emergency Conditions Eliminated	Conditions posing hazard to persons or property eliminated	100% inspection if less than 20 calls per week, planned sampling if 20 or more calls per week (always use 100% inspection for emergency calls)	0% of emergency conditions not eliminated

6. CONTRACT REQUIREMENT: MINOR MAINTENANCE AND REPAIR

Timeliness	Completed within required time	100% inspection	10% exceed scheduled time by more than 10%
Quality of Repair	Repaired equipment meets specified performance criteria	100% inspection	5%
Estimates	Complete, neatly prepared, timely submission	100% inspection	10%

IV. COMMERCIAL ACTIVITIES (CA) PROGRAM CONSIDERATIONS. This section of the User's Guide discusses some of the special items which must be considered when using this GPWS to prepare a PWS as part of a CA program study.

A. Scope of Work. The user must remember that the scope of work and standards of performance specified in the PWS must be equivalent to the projected capabilities of the MEO. This GPWS has been written with a somewhat limited scope in that single instances of maintenance and repair are limited to a total cost to the Contractor of \$2000 or less. In CA program solicitations repairs costing more than \$2000 (Davis-Bacon type work) will normally be included, and will result in some modifications to the technical specifications.

B. Level of Effort (LOE). When LOE work is used in a CA program PWS, labor bids in Section B must be based on EPS craft hours vice full EPS hours. This results in additional changes being required to the "DEFINITIONS - TECHNICAL" and "ESTIMATES" paragraphs of Section C. Since it is important that the user fully understands the concept of craft hours, the geographical EFD should be contacted for guidance.

C. Pre-Priced Options to Extend. OMB Circular A-76 requires in-house and Contractor bids to be evaluated on at least a three year basis, unless contract funding limitations prevent the initial term from being a full 12 months in length. In this situation, pre-priced options must be included to cover at least two fiscal years after the initial term. This means that Section B must contain contract line items for the base period and at least two, one-year, pre-priced option periods. For example:

1. If the contract term is projected to begin on 1 October, Section B would include contract line items for the base year (12 months) of performance

(CLINs 0001, 0002, and 0003) and at least two, one-year, pre-priced option periods (CLINs 0004, 0005, and 0006; and 0007, 0008, and 0009).

2. If the contract term is projected to begin on 1 April, Section B would include contract line items for the initial six-month base period of performance through 30 September (CLINs 0001, 0002, and 0003) and two, one-year, pre-priced option periods (CLIN 0004, 0005, and 0006; and 0007, 0008, and 0009).

3. In no case may the total contract term exceed 60 months.

D. Continuity of Services. The PWS should address certain issues and requirements relative to the change-over from in-house to contracted performance of services. Therefore, the following "CONTINUITY OF SERVICES" paragraph should be added to Section C:

"CONTINUITY OF SERVICES. To insure continuity of essential services, the successful bidder shall be prepared to fully commence work on the start date of this contract. The phase-in of Contractor forces will occur in conjunction with a major reduction-in-force of in-house Government employees. The Contractor should not assume that Government employees will be available to guide, direct, or specifically orientate each Contractor employee."

E. Multi-Function CA Contracts. In many instances, CA program studies involve contracts containing more than one functional area or service. For example, the user may want to study Electrical Power Generation services in conjunction with Operation and Maintenance of Electrical Distribution and Emergency Generation Systems services, and issue a single solicitation. Since most NAVFAC GPWSs are written in the same format, the technical requirements of Sections C and J of this guide may be easily combined with other GPWSs to produce a tailored multi-function PWS.

V. PRE-AWARD CONSIDERATIONS. Prior to award it is essential that the activity consider the following aspects of the operation and administration of an Operation and Maintenance of Electrical Distribution and Emergency Generation Systems contract.

A. Quality Assurance Evaluator (QAE) Training. It is vitally important to have an adequate number of qualified QAEs on board prior to the contract start date. In fact NAVFAC EFD contract offices will not allow contracts to be advertised until the activity provides assurance that such resources will be provided. Ideally, QAE(s) should have attended the QAE training course provided by each of the EFDs. If this training has not been received, the activity should take steps to have the QAE(s) attend the next available course and in the meantime should develop a local training program. NAVFAC EFD Code 10s (Facilities Division) should be contacted for QAE training scheduling or assistance. The QAE should have a good working knowledge of maintenance and inspection procedures and requirements for electrical distribution and emergency generation systems. Prior to Bid Opening it is essential that the QAE become familiar with the Electrical Distribution and Emergency Generation Systems specification.

B. Site Visits. The QAE or other Government representative should be prepared to conduct site visits with potential bidders after inviting bids. The purpose of these visits is to familiarize the Contractor with the location of contract requirements, not to provide additional information which should have been included in the PWS. QAEs must be briefed by the ACO, the Contract

Specialist as to what can be said to potential bidders during site visits. Customers must be briefed by the ACO, or his/her representative, on precautions to be taken so as not to reveal sensitive information to potential bidders during these visits.

C. Government-Furnished Property. Is Government-furnished property, if any, ready for turnover?

D. Building Monitors. Are building monitors designated to act as focal points for customer complaints? If so have they been properly trained? Are they familiar with the specification? Has a method been developed for customers to submit complaints to the QAE, ACO or his/her representative?

E. Quality Assurance (QA) Plans. Are adequate QA Plans prepared and ready for use?

F. Other Conditions. Additionally, Chapter 7 of the NAVFAC MO-327 discusses a number of items which must be considered by the activity prior to the award of a contract, including a review of Contractor's submitted quality control and pre-award surveys of apparent, low, responsive, responsible bidder.

END OF USER'S GUIDE

GUIDE PERFORMANCE WORK STATEMENT
FOR
OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

PART I - THE SCHEDULE

SECTION B: SUPPLIES OR SERVICES AND PRICES/COSTS

!*****
 NOTE TO SPECIFICATION WRITER: Some NAVFAC Engineering Field Divisions (EFDs) require additional clauses to be added to Section B. The user must contact the appropriate geographical EFD to identify any additional clauses which may be required. The final contract line items shall be typed directly on Form SF-36. The example shown here includes column headings which are duplicated on the form. The numbering system for contract line items and subline items shall follow the method prescribed in Subpart 4.71 of the DOD FAR Supplement.
 *****!

SCHEDULE

<u>Item</u>	<u>Supplies/Services</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
0001	<u>FIRM FIXED-PRICE WORK:</u> Price for labor and material for the BASE PERIOD (!INSERT DATE! through 30 September !INSERT YEAR!) for all work specified in Section C except for work specifically identified as being included in the Indefinite Quantity portion of the contract.	!INSERT!	MONTH	\$_____	\$_____
	TOTAL PRICE FOR CLIN 0001				\$_____
0002	<u>INDEFINITE QUANTITY WORK - UNIT PRICED TASKS:</u> Price for labor and material in the BASE PERIOD (!INSERT DATE! through 30 September !INSERT YEAR!) to perform the Unit Priced Tasks listed in the Schedule of Indefinite Quantity Work below. The quantities listed are realistic estimates provided solely for the purpose of bid evaluation and for establishing penal sums of bonds (if required). The price for this bid item is the total of the subline items listed in the Schedule of Indefinite Quantity Work - Unit Priced Tasks.				

SCHEDULE

Item	Supplies/Services	Estimated Quantity	* Unit	Unit Price	Amount
------	-------------------	-----------------------	-----------	------------	--------

SCHEDULE OF INDEFINITE QUANTITY WORK - UNIT PRICED TASKS

0002AA	Replace transformer under 15 KVA per paragraph C.!	!INSERT!	EACH	\$_____	\$_____
0002AB	Replace lightning arresters per paragraph C.!	!INSERT!	EACH	\$_____	\$_____
TOTAL PRICE FOR CLIN 0002					\$_____

0003 INDEFINITE QUANTITY WORK - EPS HOUR LABOR: Price for labor in the BASE PERIOD (!INSERT DATE! through 30 September !INSERT YEAR!) to perform maintenance and repair work requirements that cannot be identified in sufficient detail to be included in CLINs 0001 and 0002. This work is described in paragraphs C.11 and C.12. The quantities listed below are realistic estimates provided solely for the purpose of bid evaluation and for establishing penal sums of bonds (if required). The price for this bid item is the total of the subline items listed in the Schedule of Indefinite Quantity Work - EPS Hour Labor.

SCHEDULE OF INDEFINITE QUANTITY WORK - EPS HOUR LABOR

0003AA	Electrical	!INSERT!	HR	\$_____	\$_____
0003AB	Sheet Metal	!INSERT!	HR	\$_____	\$_____
0003AC	Machinist	!INSERT!	HR	\$_____	\$_____
TOTAL PRICE FOR CLIN 0003					\$_____

SCHEDULE

<u>Item</u>	<u>Supplies/Services</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
0004	<p><u>FIRM FIXED-PRICE WORK:</u> Price for labor and material for the FIRST OPTION PERIOD (1 October !INSERT YEAR! through 30 September !INSERT YEAR!) for all work specified in Section C except for work specifically identified as being included in the Indefinite Quantity portion of the contract.</p>	12	MONTH	\$_____	\$_____
	<p>TOTAL PRICE FOR CLIN 0004</p>				\$_____
0005	<p><u>INDEFINITE QUANTITY WORK - UNIT PRICED TASKS:</u> Price for labor and material in the FIRST OPTION PERIOD (1 October !INSERT YEAR! through 30 September !INSERT YEAR!) to perform the Unit Priced Tasks listed in the Schedule of Indefinite Quantity Work below. The quantities listed are realistic estimates provided solely for the purpose of bid evaluation and for establishing penal sums of bonds (if required). The price for this bid item is the total of the subline items listed in the Schedule of Indefinite Quantity Work - Unit Priced Tasks.</p>				

SCHEDULE

Item	Supplies/Services	Estimated Quantity	* Unit	Unit Price	Amount
------	-------------------	-----------------------	-----------	------------	--------

SCHEDULE OF INDEFINITE QUANTITY WORK - UNIT PRICED TASKS

0005AA	Replace transformer under 15 KVA per paragraph C.!	!INSERT!	EACH	\$_____	\$_____
0005AB	Replace lightning arresters per paragraph C.!	!INSERT!	EACH	\$_____	\$_____
TOTAL PRICE FOR CLIN 0005					\$_____

0006 INDEFINITE QUANTITY WORK - EPS HOUR LABOR: Price for labor in the FIRST OPTION PERIOD (1 October !INSERT YEAR! through 30 September !INSERT YEAR!) to perform maintenance and repair work requirements that cannot be identified in sufficient detail to be included in CLINs 0004 and 0005. This work is described in paragraphs C.11 and C.12. The quantities listed below are realistic estimates provided solely for the purpose of bid evaluation and for establishing penal sums of bonds (if required). The price for this bid item is the total of the subline items listed in the Schedule of Indefinite Quantity Work - EPS Hour Labor.

SCHEDULE OF INDEFINITE QUANTITY WORK - EPS HOUR LABOR

0006AA	Electrical	!INSERT!	HR	\$_____	\$_____
0006AB	Sheet Metal	!INSERT!	HR	\$_____	\$_____
0006AC	Machinist	!INSERT!	HR	\$_____	\$_____
TOTAL PRICE FOR CLIN 0006					\$_____

* HR = EPS Estimated Labor Hour. See "DEFINITIONS - TECHNICAL" in Section C.

END OF SECTION B

PART I - THE SCHEDULE

SECTION C: DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

TABLE OF CONTENTS

<u>PARAGRAPH NUMBER</u>	<u>PARAGRAPH NAME</u>	<u>PAGE NUMBER</u>
C.1	General Intention	C-1
C.2	General Requirements	C-1
C.3	Definitions - Technical	C-1
C.4	Government-Furnished Property and Services	C-5
C.5	Contractor Furnished Items	C-8
C.6	Work Outside Regular Hours	C-8
C.7	Operations Program	C-8
C.8	Preventive Maintenance (PM) Program	C-8
C.9	Corrective Maintenance	C-9
C.10	Corrective Maintenance and Repair Limitation	C-12
C.11	Minor Maintenance and Repair	C-12
C.12	Estimates	C-13
C.13	Facility History Files	C-15

PART I - THE SCHEDULE

SECTION C: DESCRIPTION/SPECIFICATION/WORK STATEMENT

!*****
NOTE TO SPECIFICATION WRITER: A "WORK EXCLUDED" paragraph in Section C is optional but should be used with extreme care in order to avoid giving bidders the impression that if work is not specifically excluded it is automatically included. A "WORK EXCLUDED" paragraph may be useful to clarify the scope of work if some functions are already being performed by contract.
*****!

C.1 GENERAL INTENTION. It is the intention of this solicitation to obtain operation, maintenance, and repair services for Electrical Distribution and Emergency Generation Systems at !INSERT NAME OF ACTIVITY! by means of a combination fixed-price and indefinite quantity contract.

C.2 GENERAL REQUIREMENTS. The Contractor shall operate and maintain the Electrical Distribution and Emergency Generation Systems as described in Attachment J-C1. The work shall include, but is not limited to, the identification, planning, scheduling, status reporting, and analysis of electrical distribution and emergency generation systems operations, maintenance and repair. Electrical distribution includes all facility electrical distribution systems such as (1) overhead and underground transmission and distribution lines from delivery points to all main service entrance switches in buildings, including substations and accessories; (2) exterior lighting systems, including airfield, street, flood, perimeter and security lighting; (3) secondary drops to the building weatherhead or first connection to the building system; and (4) all components of ship-to-shore power systems, including portable power cables and connectors, receptacles, controls, and enclosures.

!*****
NOTE TO SPECIFICATION WRITER: Unique functional terms should be added to the following list of definitions. Definitions not required should be deleted.
*****!

C.3 DEFINITIONS - TECHNICAL As used throughout this contract, the following terms shall have the meaning set forth below. Additional definitions are in the "DEFINITIONS" clause in Section I.

a. Where "as shown", "as indicated", "as detailed" or words of similar import are used, it shall be understood that reference is made to this specification and the drawings accompanying this specification unless stated otherwise.

b. Where "as directed", "as required", "as permitted", "approval", "acceptance" or words of similar import are used, it shall be understood that direction, requirement, permission, approval, or acceptance of the ACO is intended unless stated otherwise.

c. Additional Material Handling. Time expended for loading materials from storage to truck; unloading materials to work area; moving materials to work area, moving materials from storage to job site; removing debris; and handling of materials during the job that is not included in the craft time standard. The above definition is a summary of the definition of "Additional Material Handling" as used in development of Engineered Performance Standards.

d. Administrative Contracting Officer (ACO). The individual designated by the Contracting Officer to administer the contract. Throughout this contract, the term ACO will be used to refer to the individual designated to administer the contract or his/her designated representative. See the "DEFINITIONS" Clause, Section I.

e. Contractor. The term Contractor as used herein refers to both the prime Contractor and any subcontractors. The Contractor shall be responsible for insuring that his/her subcontractors comply with the provisions of this contract.

f. Contractor Representative. A foreman or superintendent assigned in accordance with the "CONTRACTOR EMPLOYEES" clause, Section H.

g. Corrective Maintenance. Corrective maintenance is maintenance and repair work that is required to return a system or component to proper operating condition. Corrective maintenance shall be required on a routine basis (operator maintenance), as a result of preventive maintenance inspections, or as a result of service calls. Corrective maintenance is limited in total cost to the Contractor, as specified in the "CORRECTIVE MAINTENANCE REPAIR LIMITATION" paragraph, Section C.

h. Craft Phase. The numbered chronological sequence in which a specific craft performs a job phase. For example:

<u>JOB PHASE</u>	<u>CRAFT PHASE</u>	<u>CRAFT</u>	<u>DESCRIPTION</u>
1	1	Carpenter	Fabricate and install frame for new wall
2	1	Electrician	Rough in electrical
3	2	Carpenter	Install sheet rock
4	2	Electrician	Trim out electrical
5	1	Painter	Paint new wall

i. Delay Allowances. Time expended for planning the work in the shop and at the job site; personal needs; balancing delays/waiting for other craftsmen; unavoidable delays; partial day influence; waiting for tools or material that should have been at the job site. The above definition is a summary of the definition of "Delay Allowances" as used in development of Engineered Performance Standards.

j. Direct Material Costs. The actual vendor invoice charges for materials used for performance of work under this contract. Direct material costs shall include transportation charges when such charges are included on the invoice by the vendor, as well as any discounts allowed for prompt payment.

k. Engineered Performance Standards (EPS). A job estimating system developed for the Department of Defense. EPS is the average time necessary for a qualified craftsman working at a normal pace, following acceptable trade methods, receiving capable supervision, and experiencing normal delays to

perform defined amounts of work of a specified quality. EPS manuals are published under the following numbers by each military branch:

Navy: NAVFAC P 700 Series
Army: TB 420 Series
Air Force: AFM 85 series

l. Facility. An establishment, structure, or assembly of units of equipment designated for a specific function.

m. Frequency of Service

(1) Annual (A). Services performed once during each 12 month period of the contract.

(2) Semiannual (L). Services performed twice during each 12 month period of the contract at intervals of 160 to 200 days.

(3) Quarterly (Q). Services performed 4 times during each 12 month period of the contract at intervals of 80 to 100 days.

(4) Monthly (M). Services performed 12 times during each 12 month period of the contract at intervals of 28 to 31 days.

(5) Bi-Weekly (G). Services performed 26 times during each 12 month period of the contract at intervals of 11 to 14 days.

(6) Weekly (W). Services performed 52 times during each 12 month period of the contract at intervals of 6 to 8 days.

(7) Twice Weekly (F). Services performed twice each week at intervals of 3 to 4 days.

(8) Daily (D). Services performed once each day, seven days per week, including weekends and holidays.

n. Government Representative. The person(s) whom the ACO shall designate by name and/or position title to conduct liaison between the Contractor and the ACO on matters pertinent to this contract and be his/her authorized representative.

o. Job Phase. The numbered chronological sequence in which work is accomplished regardless of the craft(s) involved (see Craft Phase above).

p. Job Preparation. All work and costs associated with receiving and considering a job assignment and instructions; planning equipment and material requirements; obtaining proper tools; laying out tools, material, and equipment; setting up ready to begin work; cleaning and storing tools and equipment; and cleanup of job site.

q. Labor Hour Unit Price. A labor hour unit price is the unit price bid by the Contractor to provide one EPS hour of work-in-place. The unit price bid includes all direct and indirect costs associated with performing an EPS hour of work. The unit price would typically include the Contractor's hourly craft wage, adjusted to allow for the bidder's workforce productivity (i.e. the Contractor's estimate of how its workforce will perform in relation to

Engineered Performance Standards); and all costs for travel, pre-expended bin materials and supplies, ordering and stockpiling job material, profit, tools, equipment, field and home office overhead, clerical support, supervision, inspection, fees, taxes, licenses, permits, insurance, etc. In short, all costs associated with providing a specific EPS hour of effort.

r. Pre-expended bin materials and supplies. The minor materials and supplies, including those that are incidental to the job, for which the total adjusted cost of any one material line item shown on the material estimate is \$10 or less. Examples of pre-expended bin materials and supplies include, but are not limited to, solder, lead, flux, electrical connectors, electrical tape, fuses, nails, screws, bolts, nuts, washers, spacers, masking tape, sand paper, solvent, cleaners, lubricants, grease, oil, rags, mops, glue, epoxy, spackling compound, joint tape, gases, refrigerants, refrigeration fittings, plumbers tape and compound, clips, welding rods, heat sinks, electrical outlet, switches, cover plates, plumbing fixtures and fittings, touch up paint, and any other item for which the total line item adjusted cost is \$10 or less.

s. Quality Assurance (QA). A method used by the Government, to provide some measure of control over the quality of purchased goods and services received.

t. Quality Assurance Evaluator (QAE). The Government employee responsible for the daily monitoring of Contractor performance.

u. Quality Control (QC). A method used by the Contractor, to control the quality of goods and services produced.

v. Regular Working Hours. The Government's regular working hours are from !INSERT STARTING HOUR! to !INSERT ENDING HOUR!, Mondays through Fridays except (a) Federal Holidays and (b) other days specifically designated by the ACO.

w. Repair. Repair is the restoration of a piece of equipment, a system, or a facility to such condition that it may be effectively utilized for its designated purposes. Repair may be overhaul, reprocessing, or replacement of constituent parts or materials that have deteriorated by action of the elements or usage and have not been corrected through maintenance.

x. Response Time. Response time is defined as the time allowed the Contractor after initial notification of a work requirement to be physically on the premises at the work site, ready with appropriate tools, equipment, and materials, ready to perform the work required. Response times are designated in the appropriate technical paragraphs in Section C.

y. Task Time Standards. The number of craft work hours required by all of the workers of a single craft to accomplish a specific task. Task time standards may be combined to estimate complicated jobs involving various tasks and many crafts. Task time standards are composed of many operations to complete a specific task.

z. Travel Time. Time expended between shop and the job site; waiting for vehicle; getting in and out of vehicle; loading and carrying a tool box; vehicle travel; unloading, walking from vehicle to job site; opening and closing door; walking up and down stairs; using elevators; and access to secure or controlled areas.

aa. Work Content Comparison. Work content comparison is a method of comparing a task that is not specifically defined in EPS Task Time Standards to a very similar task that is defined in the EPS Task Time Standards. This definition is a summary of a more detailed definition which appears on page 37 of EPS Planner and Estimator in Workbook # NAVFAC P-700.2.

C.4 GOVERNMENT-FURNISHED PROPERTY AND SERVICES

!*****
NOTE TO SPECIFICATION WRITER: Government-furnished property may include real property or personal property. The specification writer must clearly identify Government-Furnished Facilities, Government-Furnished Equipment (GFE), and Government-Furnished Material (GFM). The following paragraphs should be modified as needed to fit the activity's specific situation and needs. If no facilities will be provided, paragraph (2) should be used. Remember that if a CA program study is being conducted, decisions on whether or not to provide Government-furnished facilities and equipment must be based on an economic analysis. Refer to OPNAVINST 4860.7B.
*****!

a. Government-Furnished Facilities

!SELECT EITHER (1) OR (2)!

(1) The Government shall furnish or make available to the Contractor the facilities described in Attachment J-C2. The Contractor shall assume responsibility and accountability of such facilities provided for his/her use and shall take adequate precautions to prevent fire hazards, odors and vermin. Janitorial services for Government-furnished facilities shall be the responsibility of the Contractor. The Contractor shall obtain written approval from the ACO prior to making any modifications or alterations to the facilities. Any such modifications or alterations approved by the Government will be made at the expense of the Contractor. At the completion of the contract, all facilities shall be returned to the Government in the same condition as received, except for reasonable wear and tear. The Contractor shall be held responsible for the cost of any repairs caused by negligence or abuse on his/her part, or on the part of his/her employees.

(2) The Government will not provide office space and operational facilities to the Contractor. The Contractor is responsible, at his/her expense, to secure and maintain the necessary office space and other facilities required for the performance of this contract.

!*****
NOTE TO SPECIFICATION WRITER: The specification writer must determine what equipment and material will be provided to the Contractor and select from the following paragraphs as appropriate. Extensive equipment listings should be placed in Attachment J-C3, including identification number, age, location, size or capacity, etc. Specific maintenance requirements beyond the general requirements of this paragraph should also be detailed in this Attachment. If equipment is located at other than the job site or Government-furnished facilities, specify location and responsibility for transportation. If no equipment or material will be provided to the Contractor, paragraph (2) should be used.
*****!

b. Government-Furnished Equipment

!SELECT EITHER (1) OR (2)!

(1) The Government will provide the Contractor the use of existing and available Government owned tools and equipment in the performance of the contract.

(a) Such Government-furnished tools and equipment are listed in Attachment J-C3. The Contractor shall be responsible for the periodic servicing, maintenance and repair of the equipment listed at no cost to the Government, and the total or partial breakdown or failure of the Government-furnished equipment shall not relieve the Contractor of the requirement to fully perform the work of the contract. Upon completion or termination of the contract, all Government owned equipment shall be returned to the Government in the same condition as received, except for normal wear and tear. Equipment which becomes worn out due to normal wear and tear shall be returned to the Government and its replacement shall be the responsibility of the Contractor at no cost to the Government. Equipment so acquired shall remain the property of the Contractor. The Contractor shall be responsible for the cost of any repairs or replacement caused by negligence or abuse by the Contractor or his/her employees.

(b) The Contractor and the ACO shall conduct a joint inventory before commencing work under this contract to determine the exact number and serviceability of Government-furnished equipment. The Contractor shall then certify the findings of this inventory, assume accounting responsibility, and subsequently report inventory discrepancies to the Government Representative. Government-furnished equipment shall not be removed from the military base unless approved by the ACO in writing.

(2) The Contractor shall furnish all tools and equipment to required for the performance of this contract. The Government will not provide tools or equipment to the Contractor.

c. Government-Furnished Material

!SELECT EITHER (1), (2), OR (3)!

(1) The Government shall furnish the material described in Attachment J-C3 to the Contractor on a one time basis for use only in connection with this contract. The use of Government-furnished material for any other purpose is prohibited. The Contractor and the Government Representative shall conduct a joint inventory before commencing work under this contract to determine the exact number and serviceability of Government-furnished materials. The Contractor shall then certify the findings of this inventory, assume accounting responsibility for all materials supplied, and shall provide documentation supporting issue/use of such material. Upon depletion of material provided to the Contractor by the Government, the Contractor shall furnish all material to perform the work of the contract, except as otherwise specified herein. Upon completion or termination of this contract a second joint inventory shall be conducted, if necessary, of all unused Government-furnished materials. The Contractor shall be held liable for all materials which cannot be accounted for by issue/use documentation.

(2) The Government will not provide any materials to the Contractor.

(3) The Government shall furnish the material described in Attachment J-C3 to the Contractor on a one time basis for use only in connection with this contract. The use of Government-furnished material for any other purpose is prohibited. The Contractor and the ACO shall conduct a joint inventory before commencing work under this contract to determine the exact number and serviceability of Government-furnished materials. The Contractor shall then certify the findings of this inventory, assume accounting responsibility for all materials supplied, and shall provide documentation supporting issue/use of such material.

(a) Upon depletion of material provided to the Contractor by the Government, as listed in Part A of Attachment J-C3, the Contractor shall furnish all material to perform the work of the contract, except as otherwise specified herein. Upon completion or termination of this contract a second joint inventory shall be conducted, if necessary, of all unused Government-furnished materials, as listed in Part A of Attachment J-C3. The Contractor shall be held liable for all materials missing which cannot be accounted for by issue/use documentation.

(b) Experience has shown that selected items of long lead time parts and materials must be stocked to insure repair of critical equipment in the event of failure. A list of these insurance items and minimum stocking levels are contained in Part B of Attachment J-C3. The Government shall provide the Contractor all items in at least the minimum quantities listed in Part B of Attachment J-C3. The Contractor shall maintain at least the minimum quantity of all the items specified. These items will be used by the Contractor in the maintenance and repair of the facilities/systems only as follows:

1. insurance items shall be used on the systems, facilities, or GFE with which they are associated.

2. A replacement insurance item shall be ordered within 3 working days after the use of any insurance item which causes the total quantity on hand to fall below the minimum specified level. The Contractor shall bear the cost of replacement of all insurance items.

3. Upon completion or termination of the contract, all insurance items shall be returned to the Government in the minimum specified quantities.

d. Availability of Utilities. The Government will furnish the following utility services at existing outlets, for use in those facilities provided by the Government and as may be required for the work to be performed under the contract: electricity, steam, natural gas, fresh water, sewage service, and refuse collection. Information concerning the location of existing outlets may be obtained from the ACO. The Contractor shall provide and maintain, at his/her expense, the necessary service lines from existing Government outlets to the site of work.

!SELECT EITHER (1) OR (2)!

(1) Utilities specified above will be furnished at no cost to the Contractor.

(2) The Contractor shall be required to pay for utilities consumed and shall, at his/her expense, install meters as required by the ACO to measure consumption of utilities provided by the Government. Rates for reimbursement to the Government of metered utilities will be: !LIST THE RATES OF REIMBURSEMENT PER TYPE OF SERVICE PROVIDED!

A restricted telephone line (USOC Class RS4) for on base calls will be provided by the Government at no cost to the Contractor. The Contractor shall install commercial telephone service, and all service and toll charges shall be paid for by the Contractor.

C.5 CONTRACTOR FURNISHED ITEMS. Except for items listed in paragraph C.4 the Contractor shall provide all equipment, materials, and services to perform the requirements of this contract. The Contractor shall provide new or factory reconditioned parts and components when providing maintenance and repair services as described herein. All replacement units, parts, components and materials to be used in the maintenance, repair, and alteration of facilities and equipment shall be compatible with that existing equipment on which it is to be used; shall be of equal or better quality as original equipment specifications; shall conform to the applicable specifications listed in Attachment J-C4 and the technical specifications, Section C; and used in accordance with original design and manufacturer intent. Items not listed in Attachment J-C4 or technical specifications shall be of acceptable industrial grade and quality. If the original manufacturer has updated the quality of parts for current production, parts supplied under this contract shall equal or exceed the updated quality. The Contractor shall retain the parts replaced for at least 10 days after completion of the job and make these parts readily available for inspection by the ACO upon request. When disputes arise concerning material, equipment, and components selected for work items already accomplished, the Contractor shall, at no cost to the Government, remove, replace, and/or rework material, equipment, and components so that compliance with the Government's requirements are satisfied. The resolution of formal disputes is addressed in the "DISPUTES" clause, Section I.

C.6 WORK OUTSIDE REGULAR HOURS. Except as may otherwise be specified, all work shall be performed during regular hours. If the Contractor desires to carry on work on Saturday, Sunday, holidays, or outside regular business hours, he/she may submit application to the ACO for approval.

C.7 OPERATIONS PROGRAM. The Contractor shall develop and implement an Operations (OPS) program which shall identify all requirements for safe, efficient operation of the electrical distribution system and emergency generation system within their rated capacities to continuously deliver stable electric power to all connected loads. The OPS program shall include, but is not limited to watchstanding schedules and duties; keeping equipment operating logs; operational testing; and measuring, recording, and reporting of operating data (voltage, current, power demand, kilowatt hours, fuel consumption, etc.). Within !INSERT! days after contract award, the Contractor shall submit a proposed OPS program to the ACO for approval.

C.8 PREVENTIVE MAINTENANCE (PM) PROGRAM. The Contractor shall develop and implement a preventive maintenance (PM) program for the electrical distribution and emergency generation systems. The PM program shall include, but shall not be limited to, periodic inspection, testing, cleaning, lubrication, and adjustment; insulating oil filtering, treatment and replacement; lubricating oil replacement; filter cleaning and replacement; and minor parts replacement and

minor repairs as required to keep systems and equipment in optimum operating condition. Except as otherwise specified, the minimum scope and frequency of preventive maintenance shall be in accordance with the requirements specified in Attachment J-C5. Within !INSERT! days after contract award date, the Contractor shall submit to the ACO for approval a detailed PM program schedule. The schedule shall indicate, for each item of equipment or system listed in Attachment J-C1, the day of the week in which weekly or more frequent inspections shall be performed, and the week and month(s) that all other inspections shall be performed for the entire contract period. Once approved by the ACO, this schedule shall be closely adhered to by the Contractor in order to facilitate the Government's inspection of the work. Any proposed changes to the submitted schedule must be submitted to the ACO for approval not later than Wednesday of the week prior to scheduled work accomplishment.

a. Preventive Maintenance Work. The Contractor shall be responsible for performing all PM work specified in Attachment J-C5 on the dates shown in the approved PM schedule. The Contractor shall correct all equipment deficiencies identified during PM inspections subject to the limits specified in the "CORRECTIVE MAINTENANCE REPAIR LIMITATION" paragraph, Section C. When possible, equipment deficiencies detected during PM inspections shall be corrected prior to departing the job site. All deficiencies, if within the scope of corrective maintenance, must be corrected within the time frames for an emergency or routine service call, as appropriate. If the Contractor believes the cost of such repairs is beyond the scope of corrective maintenance, the procedures in paragraph C.9.c(5) shall apply.

b. Preventive Maintenance Reports. Not later than 12:00 noon of each week during the term of the contract, the Contractor shall submit to the ACO a summary of the PM inspections completed during the previous week, a list of those scheduled inspections which were not accomplished, and a description of any corrective maintenance performed or in need of being performed.

c. Preventive Maintenance Records. The Contractor shall be responsible for maintaining PM records for each piece of equipment or system. These records shall reflect periodic maintenance performed, and the scheduled and completion dates. The Contractor shall update the PM records on a monthly basis within ten (10) days after the last day of the month. These records shall be made available to the ACO upon request. All PM records shall be turned over to the ACO within 15 days of contract termination.

!*****
NOTE TO SPECIFICATION WRITER: The intent of the following paragraph is to set the maximum limit for corrective maintenance under the fixed-price portion of the contract. As it is impossible to predict the frequency and nature of major repairs that may be required during the contract period, it is unreasonable to place complete financial responsibility and risk on the Contractor. Additionally, individual repairs in excess of \$2000 require the Contractor to pay Davis-Bacon wage rates, which are normally not included in non-CA program maintenance service contract.
*****!

C.9 CORRECTIVE MAINTENANCE. Corrective maintenance is maintenance and repair work that is required to return a system or component to proper operating condition. Corrective maintenance shall be required on a routine basis (operator maintenance), as a result of preventive maintenance inspections, or as a result of service calls. All corrective maintenance work is included in the

fixed-price portion of the contract, and is limited in total cost to the Contractor, as specified in the "CORRECTIVE MAINTENANCE REPAIR LIMITATION" paragraph, Section C.

a. Corrective maintenance shall be performed as required during the course of routine operations, in accordance with the Contractor's approved OPS program.

b. Equipment deficiencies detected during PM inspections shall be corrected as specified in paragraph C.8.

c. Service Calls. Service calls are defined as maintenance and repair requirements which are called into the Government operated work reception center or generated by authorized Government Representatives.

(1) Service Call Reception

(a) Normal Working Hours. The Government's work reception center will receive service call requests during normal working hours and classify each call in accordance with the definitions provided below. A description of the problem or requested work, date and time received, location, and other appropriate information will be placed on an Emergency/Service Work Authorization form and two copies made available for pickup by the Contractor at the Government's work reception center. If the call is classified as emergency the Government's work receptionist will notify the Contractor by phone that a call has been received and that a work authorization form is available for pickup. Emergency calls shall be considered as received by the Contractor at the time and date that this telephone call is made.

(b) After Normal Working Hours. The Contractor shall receive and respond to emergency service call requests directly from authorized Government Representatives after normal working hours, on weekends, and holidays.

(2) Service Call Classification

!*****
NOTE TO SPECIFICATION WRITER: This paragraph must be carefully tailored to fit the activity's needs. For example, an air station would need to address failures affecting runway lighting. Add or delete as required.
*****!

(a) Emergency calls. Service calls will be classified as an emergency call when the work consists of correcting failures which constitute an immediate danger to personnel or threaten to damage property, such as voltage fluctuations of greater than + 5% or a loss of power. The Contractor shall respond immediately and must be on the job site and working within 30 minutes after receipt of an emergency service call. The Contractor shall work continuously without interruption and shall arrest the emergency condition before departing the job site. If further labor and material is required to complete the repair the work shall be completed within the time requirements of a routine service call. No more than !INSERT PERCENTAGE! of the service calls issued to the Contractor will be classified as emergency.

1. Service calls to repair disabled emergency generation systems will normally be classified as an emergency call. The Contractor shall work continuously until the disabled unit/system is repaired. Daily reports shall be provided to the ACO until all required repairs and tests are completed.

When required by the ACO, the Contractor shall prepare contingency plans for and make cross-connections to available operative emergency generator units to support priority user requirements in the event that emergency power is required while the disabled unit/system is being repaired.

2. Service calls to connect or disconnect ship-to-shore power shall be handled as either routine or emergency, as determined by the ACO or the appropriate Government Representative.

(b) Routine Calls. Service calls will be classified as routine when the work does not qualify as an emergency. Routine calls shall be considered as received by the Contractor at the time and date the work reception center makes the work authorization form available for pickup. All routine calls must be completed within !INSERT! working days after receipt, and once begun, the work shall be prosecuted to completion. Routine calls shall normally be accomplished during normal work hours, Monday through Friday.

(3) The Contractor shall have adequate procedures for picking up service call work authorizations from the Government's work reception center during normal working hours, and for receiving and responding to emergency service calls 24 hours per day, including weekends and during holidays. A single local telephone number shall be provided by the Contractor for receiving emergency calls.

(4) Within one working day after completion of each service call the Contractor shall add the following information to the work authorization form and return one copy to the work reception center:

(a) Description of work actually completed (if different from original work description).

(b) Brief description of material and parts used, including quantities.

(c) Date and time work began.

(d) Date and time work was completed.

(e) Signature or initials of the Contractor's craftsman performing the work (or supervisor), indicating that the work has been completed.

(5) If the Contractor responds to a routine service call and believes that the work required is beyond the scope of corrective maintenance, as defined above in paragraph C.9, he/she shall return the work authorization form to the work control center not later than !INSERT TIME! the following workday. The Contractor shall attach a summary of the work needed and a detailed EPS estimate showing labor hour and material requirements. The ACO may waive the requirement to submit estimates in cases where the scope of work is clearly beyond that of a service call.

(a) If the ACO agrees that the work required is beyond the scope of a service call, the scope of the work will be reduced and a new service call work authorization issued by the Government, or the original work authorization will be canceled. If the original work authorization is cancelled, a minor job order will be issued to the Contractor, or the work will be accomplished by means other than this contract.

(b) If the ACO determines that the work falls within the scope of a service call, the original work authorization will be returned to the Contractor and the work shall be completed. Work on such calls must still be completed within !INSERT! working days from the original receipt date/time, plus the amount of time the work authorization was held by the ACO for determination.

(6) Data on the numbers and types of service calls of each classification that have historically been performed are included in Attachment J-C6.

d. The Contractor shall maintain sufficient off-the-shelf materials and equipment on hand to support corrective maintenance requirements. Lack of availability of materials or equipment will not relieve the Contractor from the requirement to complete corrective maintenance within the time limits specified. Records shall be maintained by the Contractor on the status of all corrective maintenance and such status shall be provided upon request from authorized Government representatives within !INSERT NUMBER! hours during normal working hours and within !INSERT NUMBER! hours after normal working hours.

C.10 CORRECTIVE MAINTENANCE REPAIR LIMITATION. The Contractor's liability under the fixed-price portion of the contract for corrective maintenance and repair shall be limited to not more than !INSERT! estimated total labor hours for accomplishment and not more than \$!INSERT! in total direct material costs, to include parts or entire unit replacement. When questions arise concerning the labor hours required for a particular job, labor hour requirements will be based on EPS Manuals (NAVFAC P-700 Series) or, if not applicable, other estimating sources. When questions arise concerning the cost of materials, material costs will be based on the lowest of quotes provided by the Contractor from at least two different commercial vendors for the actual direct cost of the material. The Government retains the right to obtain additional quotes in questionable situations. The lowest price will be used. For maintenance and repair requirements above the limits specified above, see the "MINOR MAINTENANCE AND REPAIR" and "ESTIMATES" paragraphs, Section C.

C.11 MINOR MAINTENANCE AND REPAIR. Minor work is defined as maintenance and repair work requirements which are beyond the scope of corrective maintenance and repair work (as defined in paragraphs C.9 and C.10). The cost of any single instance of minor maintenance or repair is limited to a total cost of \$2000. All minor work is included in the indefinite quantity portion of the contract. The Contractor will be paid a negotiated fixed-price for each delivery order for minor work as specified in the following procedures. Labor, material, and equipment required for the unit priced tasks listed in the Schedule of Indefinite Quantity Work-Unit Priced Tasks is included in the bid prices. Material and equipment required for work based on the Schedule of Indefinite Quantity Work-EPS Hour Labor, will be reimbursed in accordance with the "ESTIMATES" paragraph below.

a. Urgent Minor Work. The Government will classify up to !INSERT!% of the delivery orders for minor work as urgent. The Contractor shall complete all urgent minor delivery orders within !INSERT! calendar days of receipt. Urgent work shall normally be performed only during normal working hours, except that after hours and/or weekend work may be authorized by the ACO if required to complete work within the time requirement specified above.

b. Routine Minor Work. All non urgent minor work will be classified as routine minor work. Routine minor work will be further classified by the Government as one of two different "Types". Delivery orders for Type I routine minor work shall be completed within !INSERT! calendar days of receipt and Type II delivery orders within !INSERT! calendar days of receipt. No more than !INSERT!% of the delivery orders for routine minor work will be classified as Type I.

c. Establishing Final Cost for Minor Maintenance and Repair Work. On receipt of a proposed delivery order from the ACO, the Contractor shall prepare an estimate following the procedures outlined in the "ESTIMATES" paragraph of this Section. The Contractor's estimate will be evaluated to determine if: (1) the scope has been clearly and accurately identified, (2) the EPS standards (including work content comparison) have been accurately applied, (3) work which is not covered by EPS has been properly estimated with supporting data presented, (4) equipment and material estimates are reasonable and properly documented, and (5) unit price work has been estimated using the unit prices that were bid. After the estimate has been reviewed and there are no mathematical, typographical, scope or estimating errors, the ACO will approve the estimate. The approved estimate then shall be a fixed-price for the work described in the delivery order.

d. Ordering Minor Maintenance and Repair Work. The ACO will order minor maintenance and repair work by issuing to the Contractor a copy of the approved estimate and a delivery order for the work covered by the approved estimate in accordance with the "ORDERING OF WORK" clause in Section G.

e. Changes to Scope of Work in Delivery Orders. If during the course of work the Contractor encounters unforeseen conditions which impact the work and which could not be evaluated during the initial estimating procedures, the Contractor shall not proceed without ACO authorization. The ACO will direct the Contractor to (1) estimate the change of scope for the unforeseen condition only, or (2) prepare a new estimate for the total job as revised. The ACO will, after review and approval of the estimate, (1) issue a delivery order for the change of scope only, or (2) cancel the original delivery order and issue a new deliver order for the total job as revised.

C.12 ESTIMATES. Detailed estimates for proposed minor work orders shall be prepared when requested in writing by the ACO. Completed detailed estimates must be provided to the Government's work control center within !INSERT! calendar days after receipt of the proposed work order for urgent minor work, and within !INSERT! calendar days after receipt for routine minor work. After approval by the ACO, the detailed estimate will form the basis of payment for the work. The cost of preparation of estimates is included in the fixed-price portion of the contract.

a. EPS Manuals. EPS manuals will be made available for examination at !INSERT LOCATION AT THE ACTIVITY WHERE THE WORK WILL BE PERFORMED AND THE CONTRACTS OFFICE AT WHICH THE BIDS WILL BE RECEIVED! and at Naval Facilities Engineering Command Engineering Field Divisions during the bidding period of this contract. !INSERT! copies of the EPS manuals will be provided to the successful bidder upon award.

b. Travel Zone Maps. The Travel Zone map for !INSERT ACTIVITY! is provided as Attachment J-C7 and is to be used in conjunction with historical data to evaluate travel time impact.

c. Preparation of Estimates. The Government will provide the Contractor a detailed scope of work for which the Contractor shall prepare an independent estimate of the labor, equipment, and material required to complete the work ordered under the "MINOR MAINTENANCE AND REPAIR" paragraph. The detailed scope of work will be provided by the Government on the DD Form 2167, Job Phase Calculation Sheet, and will identify the overall work scope for each craft phase and the specific task descriptions. The Contractor shall complete the total estimate by entering the EPS craft time for each task description and applying the EPS nomograph to arrive at the total EPS time for each job phase. If required, the Contractor shall identify on the DD Form 2167 additional task descriptions that are necessary to satisfactorily accomplish the overall work scope for the particular craft phases and provide appropriate EPS task references and estimated EPS hours. Any portions of delivery orders that have been bid as unit priced tasks shall be priced using the unit prices bid instead of EPS. EPS does not cover every task that might be accomplished by specific crafts. For tasks not exactly identified in EPS manuals, work content comparison shall be performed prior to a determination that EPS does not apply to a job. Estimates and all supporting information, documentation, and calculations shall be submitted to the ACO.

(1) Labor Estimates. Labor estimates shall be expressed in EPS hours. Craft time shall be taken from the EPS task time standards or the craft spread sheets either directly or by work content comparison, applicable additional task times (additional material handling, additional travel, and additional preparation) shall be added, and total craft time applied to the EPS nomograph to add standard allowances for job preparation, craft delays, and partial day influence. The standard allowance for travel time will not be added, and travel zone 0 (shop) will be used when applying total craft time to the EPS nomograph. No other allowances, mark-ups, or add-ons for work time associated with union agreements, overhead, profit, material markups, supervision, or clerical support shall be added to the labor hour estimate. The estimate shall include job phasing and craft phasing, and the task time standard(s) or spread sheet used in the estimate shall be identified. For multiple craft jobs, a phasing summary sheet shall be prepared. DD Form 2167 (1 Nov 78) shall be completed as required.

(a) Estimating Work Not Covered by EPS. The Contractor shall clearly identify work that cannot be estimated either directly from EPS or using EPS work content comparison procedures. Such conventional labor hour estimates shall be based on the total labor hours required for the specific task(s). The Contractor shall submit all back up sheets with the estimate including a listing of all operations and supporting data for all estimates based on historical information. Estimates will be for labor hours only and shall not include any mark-ups, allowances, or add-ons for work time associated with union agreements, overhead, profit, material markups, supervision, or clerical support.

(b) Total Labor Cost Estimates. The total labor cost estimate will be determined by totaling the number of EPS estimated labor hours for each craft (trade) and then multiplying by the appropriate hourly unit price from the Schedule of Indefinite Quantity - EPS Hour Labor. This procedure shall be followed for each craft required to perform the job. The total for all crafts is the total labor cost estimate.

(2) Material Estimates. Material estimates shall include a detailed bill of materials establishing the size, quality, number of units, and unit

prices. Material prices shall be the lowest price available considering the availability of materials and the time constraints of the job. The direct material price shall be reduced by all discounts and rebates for core value or salvage value that accrue to the Contractor. Pre-expended bin supplies and materials shall not be included in the material estimate unless the total cost of the pre-expended bin items exceeds \$!INSERT! per delivery order. Contractor administrative and handling costs for acquiring material, and any Contractor material markups should be included in the prices bid for an EPS estimated labor hour.

(3) Construction and Weight Handling Equipment Estimates. Estimates for construction and weight handling equipment may be added for an individual job if not included in other portions of the contract or not provided by the Government. Estimates shall include a detailed price list stating size, capacities, quality, number of units, and unit prices.

(a) Rental equipment shall be based on the lowest price available considering the availability and time constraints of the job.

(b) When the equipment to be used is owned by the Contractor, the cost shall be based on the U.S. Army Corps of Engineers Construction Equipment Ownership and Operating Expense Schedule EP 1110-1-8.

(c) Cost for equipment operators, when separate operators are required, shall be estimated on a EPS unit hour basis, unless operator cost is included in equipment rental price or operator has been provided by the Government. Any overhead expense associated with equipment usage shall be included in the Contractor's bid for the applicable EPS labor hour unit price.

C.13 FACILITY HISTORY FILES. A facility history file for each piece of equipment identified by record number card shall be maintained by the Contractor. Each file shall contain a copy of all work performed by the Contractor on that equipment and copies of all preventive maintenance inspection reports. A copy of all work authorizations completed by the Contractor and/or submitted by the Government shall be included in the file along with a list of Government-owned equipment. The Contractor shall maintain all warranty information and inventories complete with their serial numbers in this file. The Government shall require access to these files and they shall be available for periodic review by the Government. All documents shall be filed within 10 days of the completed transaction. These files shall become property of the Government at the termination of this contract.

END OF SECTION C

PART III - LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHEMENTS

SECTION J: LIST OF ATTACHMENTS

!*****

NOTE TO SPECIFICATION WRITER: The numbering system used below is designed so that the number of the attachment refers back to the Section that it supports. Attachment J-C1 supports Section C and is the first attachment referenced in that Section.

*****!

TABLE OF CONTENTS

<u>ATTACHMENT</u> <u>NUMBER</u>	<u>TITLE</u>
J-1	Department of Labor Wage Determination !INSERT NUMBER!
J-C1	Electrical Distribution and Emergency Generation Systems/Equipment
J-C2	Facilities Provided for Contractor's Use
J-C3	Equipment and Materials Provided for Contractor's Use
J-C4	Material Provided by Contractor
J-C5	Preventive Maintenance Requirements
J-C6	Historical Data
J-C7	Activity Travel Zone Map
J-E1	List of Engineered Standards Manuals
J-G1	Work Order Forms
J-G2	Invoicing Instructions
J-H1	Directives/Reference Manuals
J-H2	Safety Requirements and Reports
!INSERT THE FOLLOWING, IF REQUIRED!	
J-H3	Station Regulations
J-H4	Energy Conservation
J-H5	Fire Protection
J-H6	Environmental Protection

ATTACHMENT J-1

DEPARTMENT OF LABOR WAGE DETERMINATION !INSERT NUMBER!

Attached is Wage Determination !INSERT NUMBER!. This determination specifies the minimum wages and fringe benefits to be paid under this contract.

ELECTRICAL DISTRIBUTION AND EMERGENCY GENERATION SYSTEMS/EQUIPMENT

!*****
NOTE TO SPECIFICATION WRITER: Identify and describe by rating, capacity, type, size, etc., all systems and equipment to be operated and maintained by the Contractor. Locations of equipment should also be given. When not prohibited by security requirements, maps showing overhead and underground distribution lines, substations, manholes and vaults should be included. The following list is a sample.
*****!

The Contractor shall operate and maintain the systems and equipment listed below:

1. Overhead Distribution Lines

a. 11500 volt, 3 phase, 3 wire, delta connected, resistance grounded, approximate length 4.7 miles (see map)

b. 4160 volt, 3 phase, 4 wire, wye connected, solidly grounded, approximate length 6.9 miles (see map)

2. Underground Distribution Lines

a. 11500 volt, 3 phase, 3 wire, delta connected, resistance grounded, 3 single conductor cables in duct, approximate length 2.6 miles (see map)

b. 4160 volt, 3 phase, 4 wire, wye connected, solidly grounded, 4 single conductor cables in duct, approximate length 3.4 miles (see map)

c. 2400 volt, 1 phase, 2 wire, solidly grounded, 1 cable with concentric neutral, directly buried, approximate length 2.5 miles

d. 480 volt, 3 phase, ungrounded, one 3 conductor cable in duct (under or in piers), approximate length 6000 feet (see map)

3. Outdoor Substations

a. "North Sub", 69000 volts - 11500 volts, 2500 KVA, 3 secondary feeders

b. "Center Sub", 11500 volts - 4160 volts, 1000 KVA, 5 secondary feeders

4. Indoor Substations

a. "Pier 6 Sub", 11500 volts - 480 volts, 750 KVA, 6 secondary circuits

b. "Admin Sub", 4160 volts - 208/120 volts, 500 KVA, 3 secondary circuits

5. Emergency Generation System

a. Diesel engine emergency generator set, 450 KW, Caterpillar Model X-XXX, located in Building N-600

b. Automatic transfer switch, 600 volt, 800 amps, 3 pole, ASCO Model X-XXX, located in Building N-600

6. Exterior Lighting System

a. Fifty street lights on steel poles with transformers in base, 400 watt, mercury vapor type with integral photo cell control in each

b. Ten security lights, 1000 watt, incandescent type mounted on Building A-50 with single time clock control

ATTACHMENT J-C2

FACILITIES PROVIDED FOR CONTRACTOR'S USE

The following facilities are provided for the Contractor's use during the term of the contract, as specified in paragraph C.4, Section C.

<u>BUILDING NUMBER</u>	<u>STORAGE SPACES</u>		<u>OFFICE SPACES</u>	
	<u>NUMBER SPACES</u>	<u>SQUARE FEET</u>	<u>NUMBER SPACES</u>	<u>SQUARE FEET</u>
5234	4	100	1	25
5347	6	400	1	100
5245	1	28	0	0

ATTACHMENT J-C3

EQUIPMENT AND MATERIAL PROVIDED FOR CONTRACTOR'S USE

!*****
NOTE TO SPECIFICATION WRITER: List all equipment and materials that are to be provided to the Contractor. Provide descriptive characteristics including generic name, federal specifications or commercial specifications, and quantities of issue. Indicate how it is to be provided to the Contractor, does Contractor pick it up (where and when) or will the Government deliver it?
*****!

Add the following where indicated.

EQUIPMENT

<u>ITEM</u>	<u>MANUFACTURER</u>	<u>MODEL NO.</u>	<u>APPROXIMATE AGE IN YEARS</u>	<u>LOCATION</u>
10-inch Grinder	Schaver	011702	15	5347

!ETC.!

MATERIAL

PART A - ONE TIME ISSUE

<u>DESCRIPTION</u>	<u>APPROXIMATE QUANTITY</u>
--------------------	-----------------------------

PART B - INSURANCE ITEMS

<u>DESCRIPTION</u>	<u>APPROXIMATE QUANTITY</u>
--------------------	-----------------------------

ATTACHMENT J-C4

MATERIAL PROVIDED BY THE CONTRACTOR

!*****
NOTICE TO SPECIFICATION WRITER: All materials/supplies for which the Government specifies quality standards should be listed here with the respective standards. All standards specified must be reviewed by the writer. The following partial list is a sample of the type of information that should be displayed here.
*****!

All materials and parts provided by the Contractor, shall be the same type as originally installed and shall meet all requirements of the applicable specifications and standards listed.

1. The materials listed below shall meet all requirements of REA Bulletin 43-5.

Air break switches	Insulators
Anchors	Lag screws
Anchor rods	Meter sockets
Arresters, lightning	Meters, Watthour
Bolts	Poles
Braces, crossarm	Reclosers, circuit
Brackets	Regulators, voltage
Capacitors, shunt	Splices
Clamps	Structure assy. H-frame
Conductors	Structure assy. steel pole
Connectors	Switches, oil
Crossarms	Switches, pole top air break
Crossarm assemblies	Switches, recloser by-pass
Cutouts	Switches, regulator by-pass
Clevises	Transformers, pole and power
Disconnect switches, hook operated	Transformers, current
Fuses	Transformers, voltage
Ground rods	Underground cable
Ground wire	Cable route marker
Grounding conductor, substation	Cable supports
Guy attachments	Cable riser shield
Guy hooks	Terminations

2. The materials listed below shall meet all requirements of the standards and specifications indicated:

- a. Generators and Prime Mover: NEMA-MG1
- b. Wire and Cable: A-A-59544, J-C-145, MIL-C-915, NEMA-WC3, NEMA-WC5, NEMA-WC7, NEMA-WC8, and QQ-W-343
- c. Conduit: ANSI-C80.1, NEMA-TC8, NEMA-RN1, and UL1
- d. Insulating Materials: ASTM-D709, ASTM-D5948, HH-P-46, HH-I-15126, and SS-C-160
- e. Manholes and Grating: A-A-60005 and ASTM-C32
- f. Lighting: UL67, UL844, UL924, and UL935

- g. Fuses, Circuit Breakers and Controls: ANSI-C37.17, IEEE-C37.20, IEEE-C37.90, NEMA-FU1, NEMA-SG2, NEMA-SG3, NEMA-ICS1; UL1008, and W-C-375
- h. Instruments: ANSI C39.2
- i. Paints and Preservation Materials: A-A-3067, MIL-C-18480, MIL-DTL-24441, SS-S-210, and TT-P-645
- j. Plugs, Connectors and Receptacles for Shore-to-Ship Power: MIL-C-24368
- k. Pumps: A-A-50561
- l. Piping: ASTM-A53, ASTM-A181, and WW-T-799
- m. Fencing: RR-F-191
- n. Insulating Oil: ASTM-D3487
- o. Filters and Strainers: F-F-351, MIL-F-20627, and WW-S-2739
- p. Batteries: A-A-55439 and W-B-137
- q. Power Panels and Switchboards: NEMA PB.2 and W-P-115
- r. Lubricating Oils and Grease: MIL-L-15719
- s. Diesel Fuel: A-A-52557
- t. Liquid Level Gages: A-A-50568
- u. Pressure Gages: ANSI-B40.1
- v. Terminations: IEEE48
- w. Snap Switches: UL20
- x. Aboveground Fuel Tanks: UL142

ATTACHMENT J-C5

ELECTRICAL DISTRIBUTION AND EMERGENCY GENERATION SYSTEM
PREVENTIVE MAINTENANCE REQUIREMENTS

!*****
NOTE TO SPECIFICATION WRITER: PM requirements must be developed and listed here. It is suggested that MO-322 and NFPA 70B be used as guides if a formal written PM program is not already being used by the activity. The attached is a sample of PM requirements excerpts from MO-322 and NFPA 70B. Tailor to fit user requirements.
*****!

The Contractor's Preventive Maintenance (PM) Program shall comply with the minimum requirements listed below. Frequencies of PM actions shall be as indicated by the frequency code shown, and as defined in paragraph C.3.

Frequency Code

- D = Daily
- F = Twice Weekly
- W = Weekly
- G = Biweekly
- M = Monthly
- Q = Quarterly
- L = Semiannually
- A = Annually

MAINTENANCE INSPECTION/SERVICE CHECKLIST

AREA LIGHTING

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	LIGHTING FIXTURES								
1	Check lighting fixtures for proper support.								X
2	Check for cracked or broken luminaries and fixtures, missing pull cords and parts, and evidence of overheating or damage. Replace or repair as required.								X
3	Inspect wiring and electrical controls/switches for loose connections; charred or broken insulation; evidence of short circuiting and other deficiencies. Tighten or replace as required.								X
4	Check for inoperative fixtures. Repair or replace as required. Clean reflector and refractor in accordance with manufacturer's instructions when lamp is replaced.					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

BATTERIES

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions.								
	PLANT BATTERY								
1	Check battery for loose connections, corroded or dirty terminals. Clean and tighten connections as required.				X				
2	Check battery for proper water level and add distilled water as required.				X				
3	Check battery chargers and controls for proper operation.				X				
4	Inspect wiring and electrical controls for loose connections; charred, broken or wet insulation; evidence of short circuiting and other deficiencies. Tighten, repair, or replace as required.				X				
5	Check accuracy of instruments.				X				
6	Inspect battery room or enclosure for cleanliness, adequacy of ventilation; condition of floor; lighting and power fixtures to minimize fire hazard.				X				
7	Check charge of lead-acid type with hydrometer; check charge of other types in accordance with manufacturer's instructions. Determine reason for low charge and correct as required.				X				

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISCONNECTING SWITCHES

Sheet 1 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Do not operate until tests show circuit is dead and grounding harnesses have been attached. Do not operate without prior clearance from operating forces. Inspection of pole-mounted switches requires an assistant to operate the switch from the ground.								
	OPERATING GEAR								
1	Group-Operated Switches: rust, corrosion, loose brackets and holding bolts, nonrigid bearings and supports.					X			
2	Grounding Cables, Clamps, and Straps: weak supports, broken or frayed portions of conductors, loose connections.					X			
3	Insulating Section of Operating Rod: indications of cracks or signs of flashovers.					X			
4	Movable Connections: inadequate lubrication, rust, corrosion, other conditions resulting in malfunctioning.					X			
5	Switch: gears stiff or adjustment needed. (Operate switch several times to determine. Do not operate without prior clearance.)					X			
6	Locking and Interlocking Devices and Mechanisms: functional inadequacy to prevent unauthorized operation.					X			
	MOUNTING AND BASES								
7	Rust, corrosion; twisted, bent, or warped; loose or missing ground wire.					X			
	INSULATORS								
8	Cracks, Breaks, Chips, or Checking of Porcelain Glaze: more than thin or transparent film of dirt, dust, grease, or other deposits on porcelain.					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISCONNECTING SWITCHES (CONTINUED)

Sheet 2 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
9	Damage indicated by streaks of carbon deposits from flashovers.					X			
10	Loose, broken, or deteriorated cement holding insulator to other parts. (Arrange for insulator cleaning during this inspection since it is performed only when line is deenergized.)					X			
	BLADES AND CONTACTS								
11	Excessive discoloration from overheating; roughness and pitting from arcing.					X			
12	Misalignment of blades with contacts.					X			
13	Arcing Horn Contacts: burns, pits, failure to contact each other throughout their length when switch is opened and closed.					X			
14	Inadequate tension of bolts and springs.					X			
15	Inadequate blade stop.					X			
16	Lack of hinge lubrication; insufficient nonoxide grease for blades and contacts.					X			
	CONNECTIONS								
17	Cable or Other Electrical Connections: loose belts, discolorations indicating excessive heating at connection points.					X			
18	Corrosion, particularly that resulting from atmospheric conditions.					X			
19	Electrical Clearance of Cable or Other Conductor: inadequate to other phases or to ground for applicable circuit voltage. (Switch both open and closed.)					X			
20	Flexible Connections: frayed, broken, or brittle. (Excessive discoloration indicates overheating.)					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISCONNECTING SWITCHES (CONTINUED)

Sheet 3 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
21	<p>Cable from Grounding Switch to Grounding System: frayed, broken strands, loose connections.</p> <p>Scope - Manually hook-stick- and group-operated disconnecting switches used on transmission lines and distribution systems, including grounding switches.</p>					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISTRIBUTION TRANSFORMERS, DEENERGIZED

Sheet 1 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Transformer must be deenergized and circuit switches locked out. Use grounding harnesses on input terminals.								
	BUSHINGS AND INSULATORS								
1	Remove all grease, dirt, and other foreign materials by washing and then drying.						X		
2	Insulators and Porcelain Parts: inspect for indications of cracks, checks, chips, breaks; where flashover streaks are visible, reexamine for injury to glaze or for presence of cracks.						X		
3	Chipped glaze exceeding 1/2 inch in depth, or an area exceeding one square inch on any insulator or insulator unit, report for investigation by a qualified electrical engineer.						X		
4	Inspect for severe cracks, chipped cement, or indications of leakage around bases of joints of metal to porcelain parts at terminal and transformer ends.						X		
5	Terminal Ends: inspect for mechanical deficiencies, looseness, corrosion, damage to cable clamps.						X		
6	Check for oil in oil-filled bushings. Fill bushing if oil is below proper level.						X		
7	Inspect for heating evidenced by discolorations, and corrosion indicated by blue, green, white, or brown corrosion products on metallic portions of all main and ground terminals, including terminal board and grounding connections inside transformer case. Clean metal work, disconnecting if required, and cover with thin coating of nonoxide grease; if connections are disassembled, rough spots on contact surfaces should be filed smooth, and all projections removed; see that all bolted and crimped connections are tight by setting up nuts or recrimping when						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISTRIBUTION TRANSFORMERS, DEENERGIZED (CONTINUED)

Sheet 2 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	looseness is evident or suspected; clean and tighten all corroded or loose connections; repair or replace cables with frayed and broken strands; repair frayed or broken cable insulation.								
	ENCLOSURES AND CASES								
8	If case is opened for any reason, examine immediately for signs of moisture inside cover, and where present for plugged breathers, inactive desiccant, enclosure leakage, etc.; correct as necessary to make weathertight. (Protect transformer liquid from dust, dirt, and windblown debris by covering open tank with temporary cover made of wood, Kraft paper, plastic sheeting, or other suitable dust-tight material; clear plugged openings; if desiccant is inactive, replace with fresh material or reactivate for proper functioning; if rust or corrosion is evident on inside cover, clean and paint with preservative.)						X		
	COILS AND CORES								
9	When cover is open, examine interior for dirt, deficiencies, and sludge. If feasible, probe down sides with glass rod, and if dirt and sludge exceed approximately 1/2 inch, arrange to change or filter insulating oil, and have coils and cores cleaned. (Use low-pressure air to blow out dust from air-cooled transformers, or pull out dust with vacuum equipment.)						X		
	GAGES AND ALARMS								
10	Liquid Level Gage and Alarm System: inspect for cleanliness, readability and frequency of calibration.						X		
11	Test grounding system.						X		
12	Measure load current with recording meter over period of time when load is likely to be at its						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISTRIBUTION TRANSFORMERS, DEENERGIZED (CONTINUED)

Sheet 3 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	peak; measure peak-load voltage; make regulation tests and tests of operating temperature during peak-load-current tests; test and calibrate thermometers or other temperature alarm systems. For procedure on next two items, see NAVFAC MO-200.								
13	Test dielectric strength of insulating liquid.						X		
14	Test insulation resistance.						X		
	ADDITIONAL INPSECTIONS								
15	Inspections described in the Inspection Guide, Distribution Transformers, Energized, are to be performed as part of this inspection.						X		
	Scope - Deenergized electric distribution transformers used for voltage reduction. Before inspection, make arrangements to have electricians and other required labor available.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISTRIBUTION TRANSFORMERS, ENERGIZED

Sheet 1 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Do not contact any part of the transformer or associated equipment.								
	CONCRETE FOUNDATIONS AND SUPPORTING PADS								
1	Settling and movement, surface cracks exceeding 1/16 inch in width, breaking or crumbling within two inches of anchor bolts.						X		
2	Anchor Bolts: loose or missing parts, corrosion, particularly at points closest to metal base plates and concrete foundations resulting from moisture or foreign matter, and exceeding 1/8 inch in depth.						X		
	MOUNTING PLATFORMS, WOODEN								
3	Cracks; breaks, signs of weakening around supporting members; rot, particularly at bolts and other fastening, holes through which bolts pass, wood contacting metal.						X		
4	Burning and charring at contact points, indicating grounding deficiency.						X		
5	Inadequate wood preservation treatment.						X		
	MOUNTING PLATFORMS, METALLIC								
6	Deep pits from rust, corrosion, other signs of deterioration likely to weaken structure.						X		
	HANGERS, BRACKETS, BRACES AND CONNECTIONS								
7	Rust, corrosion, bent, distorted, loose, missing, broken, split, other damage; burning or charring at wood contact points resulting from grounding deficiency.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISTRIBUTION TRANSFORMERS, ENERGIZED (CONTINUED)

Sheet 2 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	ENCLOSURES, CASES AND ATTACHED APPURTENANCES								
8	Collections of dirt and other debris close to enclosure that may interfere with radiation of heat from transformer or flashover.						X		
9	Dirt, particularly around insulators, bushings, or cable entrance boxes.						X		
10	Leaks of liquid-filled transformers.						X		
11	Deteriorated paint, scaling, rust; corrosion, particularly at all attached appurtenances, such as lifting lugs, bracket connections, and metallic parts in contact with each other.						X		
	NAMEPLATES AND WARNING SIGNS								
12	Dirty, chipped, worn, corroded, illegible, improperly placed.						X		
	GROUNDING								
13	Visual Connections: loose, missing, broken connections; signs of burning or overheating, corrosion, rust, frayed cable strands, more than one strand broken in 7-strand cable, more than three strands broken in 19-strand cable.						X		
	BUSHINGS AND INSULATORS								
14	Cracked, chipped, or broken porcelain, indication of carbon deposits, streaks from flashovers, dirt, dust, grease, soot, or other foreign material on porcelain parts, signs of oil or moisture at point of insulator entrance.						X		
	GROUNDING AND PHASE TERMINALS								
15	Overheating evidenced by excessive discoloration of copper, loose connection bolts, defective cable insulation, no mechanical tension during temperature						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

DISTRIBUTION TRANSFORMERS, ENERGIZED (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	changes, leads appear improperly trained and create danger of flashovers from unsafe phase-to phase or phase-to-phase ground clearances caused by deterioration of leads or expansions during temperature changes.								
	LIGHTNING ARRESTERS								
16	Where attached to or mounted on, refer to Inspection Guide on Lightning Arresters.						X		
	BREATHERS								
17	Holes plugged with debris, desiccant-type breathers need servicing or replacement.						X		
	GRILLS AND LOUVERS FOR VENTILATION OF AIR-COOLED TRANSFORMERS								
18	Plugged with debris or foreign matter, interfering with free passage of air. (Openings located near floor or ground line can be inspected with small nonmetallic framed mirror having long insulated handle, used in conjunction with light from hand flash lamp having insulated casing. Throw light beam onto mirror and reflect upward into openings.)						X		
	Scope - Energized electric distribution transformers used for voltage reduction.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRIC MOTORS AND GENERATORS

Sheet 1 of 5

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions.								
	GENERAL								
1	When practical, start, run, and cycle motor and generator equipment through load range. Take care in starting motors and generators. On standby or infrequently operated equipment, check rotor freedom and lubrication. At humid locations, check records for evidence of regular exercise; if not found, arrange for drying out windings; megger windings before starting motor.				X				
	GENERAL INSPECTION (WHILE EQUIPMENT OPERATES)								
2	Log or Operator Records: evidence of motor or generator overload, induction motor underload, low power factor of load, excessive variations in bearing temperature, operating difficulties.				X				
3	Exposure: unsafe accessibility for maintenance of instrumentation; exposed to physical or other damage from normal plant functions, processes, traffic, and radiant heat; inadequate personnel guards, fences; insufficient, missing, or illegible signs, identification, or operating instructions.				X				
4	Housekeeping: dust, dirt, airborne grit, sand; dripping oil, water, other fluids, vapors; rust, corrosion; peeling, scratches, abrasions or other damage to painted surfaces. Remove oil and solvent cans, oil or solvent soaked rags and waste, other combustibles, particularly those near commutating machinery; remove obstructions that may interfere with rotation or ventilation.				X				
5	Machine Operation: noisy, unbalanced, rubbing, excessive vibration, rattling parts.				X				
6	Structural Supports: inadequate, cracks, settlement; defective or inadequate vibration pads, shockmounts, dampers; loose, dirty, corroded bolts and fittings.				X				

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRIC MOTORS AND GENERATORS (CONTINUED)

Sheet 2 of 5

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
7	Ventilation: dirty, inadequate amount of air passing through machine; dirty clogged, stator-iron air slots causing excessive temperature. (Too hot to touch. Measured temperature should not exceed 80°C for open frames, or 90°C for enclosed frames. Compare with manufacturer's data.)				X				
8	Motor and Generator Leads: exposed bare conductors; frayed, cracked, peeled insulation; poor taping; moisture, paint, oil, grease; vibration, abrasions, breaks in insulation at entrance to conduit or machines; arcs, burns, overheated, inadequate terminal connections; lack of resiliency, lack of life, dried-out insulation; exposure to physical damage, traffic, water, heat for semipermanent, temporary, or emergency connections.				X				
9	Bearings: improper lubrication (check lubrication schedules for lubricant used and frequency), improper oil level in oil gages, incorrectly reading gages, noisy bearing, overheated bearing caps or housing. (If bearing are too hot to touch, determine causes. A slow but continuous rise in bearing temperature after greasing indicates possible overlubrication or underlubrication, improper lubricant, or deteriorated bearing. Under normal conditions, the temperature of ball or roller bearings will vary from 10°F to 60°F above the ambient temperature.)				X				
10	Collector Rings, Commutators, Brushes: excessive sparking, surface dirt, grease (check cleanliness with clean canvas paddle); sparking or excessive brush movement caused by eccentricity, sprung shaft, worn bearings, high bars or mica, surface scratches, roughness, end-play resulting from magnetic-center hunting of rotor; inadequate brush freedom; nonuniform brush wear; poor commutation, improper brushes, incorrect brush pressure. Adjust brush spring pressure to between 1-3/4 to 2-1/2 psi of brush-commutator contact area for light metallized carbon or graphite brushes; for pressure for other				X				

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRIC MOTORS AND GENERATORS (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	type brushes, check manufacturer's data. (Measure with spring scale.)								
11	Starter, Motor Controllers, Rheostats, Associated Switches: damaged or defective insulation, loose laminations, defective heater or resistance elements, worn contacts, shorts between contacts, arcing, grounds, loose connections, burned or corroded contacts. Replace worn contacts and defective heater or resistance elements.				X				
12	Protective Equipment: dirty, signs of arcing, symptoms of faulty operation, improper condition of contacts, burner-out pilot lamps, burned-out fuses.							X	
	SHUTDOWN INSPECTION (WHILE EQUIPMENT IS NOT IN OPERATION AND IS ELECTRICALLY DISCONNECTED. A SHUTDOWN INSPECTION INCLUDES A RUNNING INSPECTION.)								
13	Stators: dirt, debris, grease; coils not firmly set in slots; burns, tears, aging, embrittlement, moisture in insulation; clogged air slots; rubbing, corrosion, loose laminations of stator-iron; charred or broken slot wedges; abrasion of insulation or chafing in slots; signs of arcing or grounds.				X				
14	Rotors: difficult turning, rubbing, excessive bearing friction, end play, overheating, looseness of windings, charred wedges, broken, cracked loosely welded or soldered rotor bars or joints; cracked end rings in squirrel cage motors; loose filed spools and deteriorated leads and connections in synchronous motors; deteriorated insulation in wound rotors.				X				
15	Mechanical Parts: corrosion, improper lubrication, misalignment, end play, interference, inadequate chain or belt tension.				X				
16*	Insulation Resistance: test insulation resistance of motor and generator windings. Compare results with table below. Insulation resistance values are							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRIC MOTORS AND GENERATORS (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>arbitrary and should be correlated with operating conditions, exposure to moisture, metallic dust, age, length of time in service, severity of service, and maintenance level. Permanent records should be kept of measured insulation values on all integral hp motors. To ascertain trends, graphs showing the long-time relationship of insulation resistance to time should be prepared on all large or critical equipment.</p> <p>* Integral horse power equipment only.</p>								
	Insulation-Resistance Values								
	Machine Rate (Volts)	Insulation Resistance Minimum (Megohms)	Insulation Resistance Preferred (Megohms)						
	110	0.11	0.20						
	220	0.22	0.50						
	440	0.42	0.75						

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRIC MOTORS AND GENERATORS (CONTINUED)

Sheet 5 of 5

Evidence/Probable Cause	DC Motors		DC Generators	AC Motors			AC Synchronous Generators
	Shunt	Series		Squirrel Cage	Slip Ring	Synchronous	
NOISY BEARINGS (popping or churning)							
Overlubrication	X	X	X	X	X	X	X
Excessive moisture in lubricant	X	X	X	X	X	X	X
EXCESSIVE ARCING AT BRUSHES							
Incorrect brush position	X	X	X		X	X	X
Improper type, size, span of brushes	X	X	X		X	X	X
Incorrect brush pressure or contact	X	X	X		X	X	X
Loose brush rigging	X	X	X		X	X	X
Dirty or rough commutator or slip ring	X	X	X		X	X	X
High or low commutator bars	X	X	X		X	X	X
Short-circuited commutator bars	X	X	X				
Overload or excessive vibration	X	X	X		X		
NOISY BRUSHES (singing)							
Excessive brush pressure	X	X	X		X	X	X
Brushes too hard	X	X	X		X	X	X
Holders improperly adjusted	X	X	X		X	X	X
High or low commutator bars	X	X	X				
Loose commutator bars	X	X	X				
High mica between commutator bars	X	X	X				
Brushes set at improper angle	X	X	X		X	X	X
RING FIRE AND FLASHING ON COMMUTATOR							
Short or open circuit in armature coil	X	X	X				
OVERHEATING							
Overload	X	X	X	X	X	X	X
Poor ventilation	X	X	X	X	X	X	X
Field or armature short circuit	X	X	X	X	X	X	X
Rotor off center	X	X	X	X	X	X	X
Unbalanced phase currents						X	X
Excessive field current						X	X
Line voltage too low	X	X	X	X	X	X	X
Bearing friction	X	X	X	X	X	X	X
SPEED TOO HIGH							
Weak field current	X	X					
Prime mover speed too high			X				X
SPEED TOO LOW							
Overload	X	X		X	X		
Low line voltage	X	X		X	X		
Bearing friction	X	X		X	X		
Dragging rotor	X	X		X	X		
Prime mover speed too low			X				X
HUNTING ACTION							
Load variation	X	X					
Variation in voltage frequency (unstable speed of prime mover)				X	X	X	
Scope - AC and DC electric motors, generators, exciters, M-G sets, synchronous converters and condensers, other electrical rotating equipment.							

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL GROUNDS AND GROUNDING SYSTEMS

Sheet 1 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>Safety - Comply with all current safety precautions. The condition of the grounding system is important both for proper operation of the distribution system to (a) obtain indications of improper or unsafe conditions affecting operation of the system, and (b) to protect personnel from electric shock that might result in injury or death. Grounds and grounding systems require maintenance at much higher levels of perfection than most other facilities, to assure the required degree of safety to personnel. Because a current as low as 5 milliamperes is considered dangerously high, and a current as low as 10 milliamperes may be fatal, extreme care must be exercised in inspecting and testing ground and grounding systems to minimize danger of electric shock and possible resulting injury or death. In general, never open a grounding circuit connection when the equipment it is intended to protect is energized. This applies equally to grounds on structural or supporting members, to grounds on equipment enclosures, and to grounds on either primary or secondary system neutrals. The life and safety of everyone approaching, or coming in contact with, electrical facilities depends on how carefully and completely inspection of grounds and grounding systems is performed. When equipment is energized, do not make inspections at bases of electrical equipment, regardless of circuit voltage.</p>								
1	<p>Visual Connections: loose, missing, broken connections; signs of burning or overheating, corrosion, rust, frayed cable strands, more than one strand broken in 7-strand cable, more than three strands broken in 19-strand cable.</p>						X		
2	<p>Underground Connections: unsatisfactory condition or defects uncovered when four or five connections are exposed to view by digging.</p>						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL GROUNDS AND GROUNDING SYSTEMS (CONTINUED)

Sheet 2 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION			FREQUENCY									
				D	F	W	G	M	Q	L	A		
	TEST MEASUREMENTS TO BE MADE												
	From	To	Allowable Resistance										
3	Point of connection on structure, equipment enclosure, or neutral conductor	Top of ground rod	See Table							X			
4	Ground rod, mat, or network	Ground (earth)	See Table							X			
5	Gates	Gateposts	1/2 ohm							X			
6	Operating rods and handles of group-operated switches	Supporting structure	1/2 ohm							X			
7	Metallic-cable sheathing	Ground rod, cable, or metal structure	1/2 ohm							X			
8	Equipment served by rigid conduit	Nearest grounding cable attachment on conduit runs of less than 25 feet	10 ohms							X			
	TABLE												
	Maximum permissive resistance for grounds and grounding systems between equipment or structure being grounded and solid ground (earth).												
	Grounding System		Maximum Permissive Resistance (ohms)										
	a. For generating stations		1										
	b. For main substations, distribution substations, and switching stations on primary distribution systems		3										

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL GROUNDS AND GROUNDING SYSTEMS (CONTINUED)

Sheet 3 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION		FREQUENCY						
			D	F	W	G	M	Q	L
TABLE (Continued)									
	Grounding System	Maximum Permissive Resistance (ohms)							
	c. For secondary distribution system (neutral) grounding, noncurrent-carrying parts of the distribution system itself, and enclosures of electrical equipment not normally within reach of other than authorized and qualified electrical operating and maintenance personnel	10							
	d. For individual transformer and lightning-arrester grounds on distribution system	10							
9	When total resistance in check point 4 or 5 exceeds allowable, measure resistances of individual portions of the circuits to determine the points of excessive resistance and report.							X	
10	Substandard resistance values resulting from poor contact between metallic portion of grounding system and earth.							X	
11	Structural steel, piping, or conduit run exceeding 25 feet used as a current-carrying part of grounding circuit for protection of equipment.							X	
12	Absence of ground-cable connections.							X	
	Scope - Electrical grounds and grounding systems for all electrical equipment, apparatus, machinery, metallic conduit, and all accessories that are a part of the outdoor electrical power distribution system. It also includes grounds of structural supports, frames, towers, safety fencing, hardware,								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL GROUNDS AND GROUNDING SYSTEMS (CONTINUED)

Sheet 4 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>equipment enclosures, system neutrals, and buried ground cable networks and counterpoises used in substation and similar areas. In such places, good engineering practice, Bureau specifications, and other controlling rules and regulations such as National Electric Code, National Electrical Safety Code, and United States Navy Safety Precautions for Shore Activities, NAVSO P-2455, require grounding for operational and personnel safety.</p>								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL INSTRUMENTS

Sheet 1 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions								
	GENERAL								
1	Improper shielding, mounting, or enclosures when located near strong magnetic fields, subject to vibrations, extremes in temperature, moisture, metallic and other dust, and acid or corrosive vapors.					X			
2	Inadequately, improperly, not neatly stored in cases or cabinets that are free from dust, corrosive fumes, excessive heat, moisture, vibration, strong magnetic fields.					X			
3	Not clean, improperly marked and identified, incorrect type and range for application, no manufacturer's instructions for servicing.					X			
4	Poor physical condition of instrument cases, portable cases, handles, nameplate, leads, calibrated leads, shunts, multipliers.					X			
5	Loose electrical connections; dirty or corroded contact surfaces; inadequate, poorly arranged, improperly insulated wire, cable, and leads.					X			
6	Broken glass, pointer friction, warped or dirty scale, bent pointers, and missing parts.					X			
7	Moving elements not locked when instruments provided with locking devices are not in use.					X			
8	Inkwell not clean and dry when portable type recording instruments are in storage.					X			
	CALIBRATION								
9	Not services, calibrated, or tested at appropriate intervals to accepted standard of accuracy for particular instrument; records of tests not available.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL INSTRUMENTS (CONTINUED)

Sheet 2 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	WATT-HOUR METERS								
10	Nonoperative voltage (power-on) indicating lamps.						X		
11	Outdoor Service Meters: poor physical condition, loose weather seals, moisture or dirt in enclosure, corrosion, loose connections, missing parts.						X		
	DC AMMETERS								
12	Improperly connected in grounded leg of grounded DC circuits.						X		
	INSTRUMENT TRANSFORMERS								
13	Poor physical condition, dirty, inadequate connections, visual evidence of overloading or overheating.						X		
	Scope - Electrical AC and DC indicating, recording, and portable instruments and associated equipment used for measurement of electrical power quantities.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL POTHEADS

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Do not touch when energized.								
	PORCELAIN								
1	Cracks, breaks, chips, checking of porcelain glaze.						X		
2	Streaks of carbon deposits indicating flashovers and possible damage.						X		
3	Dirt, dust, grease, other deposits.						X		
4	Cracks, breaks, or deterioration of cement sealing compound, and leakage or signs of moisture.						X		
	CABLE CLAMPS								
5	Corrosion, loose bolts, solder, ground connection, poor mechanical connections. (Corrosion of lead cables and connections at potheads indicated by presence of a white, brownish, or reddish product.)						X		
	TERMINAL STUDS AND BOLTING PADS								
6	Corrosion, loose connections, and poor contacts evidenced by discolorations from heating.						X		
	MOUNTINGS								
7	Corrosion and other weakness.						X		
	Scope - Electrical potheads used in power distribution systems, including potheads used as terminals of underground cables as well as those incorporated as terminals of equipment and a part thereof.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL RELAYS

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>Safety - Comply with all current safety precautions.</p> <p>(Control Inspector Only - Is DEIS adequate?)</p> <p>GENERAL</p>								
1	Dirty, evidence of moisture, high temperature, and other adverse conditions.						X		
2	Visible corrosion, deterioration, or pitting of contacts, pivots, and coils.						X		
3	Broken or loose parts and connections.						X		
	TEMPERATURE AND PRESSURE RELAYS								
4	Settings at improper temperature and pressure limits.						X		
5	Evidence of damaging temperature or pressure conditions.						X		
	<p>Scope - Protective relays located in electrical power circuits only. It does not include relays used to protect or control utilization equipment. Relay adjustments, settings, and electrical tests are not covered by this Inspection Guide. Inspection is limited to those aspects that relate to care rather than to the operating characteristics of relays.</p>								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

FUSES AND SMALL CIRCUIT BREAKERS
(600 VOLTS AND BELOW, 100 AMPERES AND BELOW)

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Do not contact fuses. Do not remove covers. Do not deenergize.								
1	By-passing: report apparent by-passing of fuses or circuit breakers for further investigation.								X
2	Housekeeping: dust, dirt, oil, grease, corrosion, foreign matter within enclosure; inadequate identification of circuits.								X
3	Enclosures: deterioration of enclosures or connecting conduit or cable due to rust or corrosion; loose, corroded, or missing covers.								X
4	Connections (if visible without removing covers): loose, corroded, inadequate; deteriorated insulation.								X
5	Capacity: check size of existing fuses or circuit breakers against system engineering drawings. Report oversized fuses and circuit breakers.								X
6	Fuses: overheating, indicated by discoloration of brass or copper at contact points; distortion, charring, deterioration of fiber cases of cartridge type cases.								X
7	Circuit Breakers: distortion, charring, deterioration of molded portions of case.								X
8	Grounding: loose corroded connections; deteriorated or abraded insulation; frayed or broken cables.								X
	Scope - Visual inspection only of fuses and small circuit breakers and their enclosures in electrical circuits operating at 600 volts or below, and rated at 100 amperes and below.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

LIGHTNING ARRESTERS

Sheet 1 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Never allow any part of the body to contact any part of an energized lightning arrester or the ground cable connected to it. Some items require an outage and deenergization of the arrester.								
	FOUNDATIONS AND SUPPORT								
1	Signs of weakness, cracked or broken concrete, burns, loose hold-down bolts, rust, corrosion, mechanical damage.						X		
	GROUNDING CABLES FOR POLE-MOUNTED LIGHTNING ARRESTERS (WHERE ACCESSIBLE TO PUBLIC)								
2	Cracks, breakage, splintering, defective paint, evidence of tampering, other weakness in protective moldings.						X		
	TREATED CERAMIC-GAP TYPE (SUCH AS THYRITE AND AUTOVALVE)								
3	Porcelain Insulators: signs of flashovers and serious flashover marks; scarring, chipping or cracking of porcelain; dirt, grease, or other film on porcelain.						X		
4	Metal Bases, Caps, and Intermediate Section Couplings: indications of loose bolts, rust, corrosion, or loose cement.						X		
5	Connections to Line, Equipment, or Ground Lead: looseness, corrosion, breakage, or misalignment that may put undue mechanical strain on porcelain.						X		
6	Ground Cable Connection to Ground Mat: loose or corroded connectors where visible.						X		
	OXIDE-FILM TYPE (OBSOLETE, NOT ACCEPTABLE FOR REPLACEMENT)								
7	Accumulation of dirt, particularly on edge of cells, deterioration of paint, rust, corrosion.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

LIGHTNING ARRESTERS (CONTINUED)

Sheet 2 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
8	Loose connections and mounting bolts, badly corroded connection posts. Tighten all loose bolts; remove cable connection, clean post, and reconnect cable; inspect internal parts, and clean if accumulation of dirt is noticeable. PALLET-TYPE (OBSOLETE, NOT ACCEPTABLE FOR REPLACEMENT)						X		
9	Indications of burns and scars on porcelain bodies from flashovers, cracked or broken bodies and caps.						X		
10	Mounting Clamps: rust, corrosion, loose bolts at arrester and supporting point of bracket.						X		
11	Poor physical condition of ground cable from arrester to point of connection to ground rod or grounding system, where visible; loose or corroded connectors.						X		
12	Signs of flashover on porcelain insulators and metal enclosures resulting in cracking, breaking or burning.						X		
13	Connection Points: looseness, corrosion, frayed ground cables, evidence of mechanical strain.						X		
14	Enclosures: excessive rust and corrosion.						X		
15	Porcelain: dirt accumulations in appreciable amounts.						X		
16	Tighten all loose connection and mounting bolts; clean dirt from insulator and enclosure. EXPULSION-GAP TYPE						X		
17	Looseness of mounting, flashovers, damage to tubing, corrosion, loose ground connections, signs of burning and apparent damage from visual check of gap opening between arcing horn and line being protected.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

LIGHTNING ARRESTERS (CONTINUED)

Sheet 3 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY																									
		D	F	W	G	M	Q	L	A																		
18	Poor physical condition of ground cable from arrester to point of connection to ground rod or grounding system; loose or corroded connectors.						X																				
19	Signs of burning on external air gaps.						X																				
20	Check opening of air gap; examine tube carefully for damage from flashovers and burnouts; corrosion of metal mounting parts.						X																				
21	Adjust air gap, where deficient, to conform to following gap distances, in accordance with voltage of line being protected. Interpolate to obtain proper air gaps for voltages not listed.						X																				
	<table border="1"> <thead> <tr> <th>Volts</th> <th>Minimum External Gap in Inches (Up to 3300 feet altitude*)</th> </tr> </thead> <tbody> <tr> <td>13800</td> <td>3/4</td> </tr> <tr> <td>23000</td> <td>1-1/2</td> </tr> <tr> <td>34500</td> <td>2</td> </tr> <tr> <td>46000</td> <td>3-1/4</td> </tr> <tr> <td>69000</td> <td>5-1/2</td> </tr> <tr> <td>92000</td> <td>8-1/2</td> </tr> <tr> <td>115000</td> <td>11</td> </tr> <tr> <td>138000</td> <td>14</td> </tr> </tbody> </table>	Volts	Minimum External Gap in Inches (Up to 3300 feet altitude*)	13800	3/4	23000	1-1/2	34500	2	46000	3-1/4	69000	5-1/2	92000	8-1/2	115000	11	138000	14								
Volts	Minimum External Gap in Inches (Up to 3300 feet altitude*)																										
13800	3/4																										
23000	1-1/2																										
34500	2																										
46000	3-1/4																										
69000	5-1/2																										
92000	8-1/2																										
115000	11																										
138000	14																										
	<p>* Above 3300 feet, spacing should be increased. Obtain engineering data from EFD for exact setting required for high-altitude lines having this type of arrester.</p> <p>Scope - All types of lightning for protection of electric power distribution lines and equipment. The types include the oxide-film type, the treated-ceramic-gap type such as Thyrite or Autovalve, the obsolete pellet type used for distribution system and lower voltage transformer protection (up to 34.5 KV), the capacitor type used mostly for protection of rotating equipment, and the expulsion-gap type used to reduce outages from flashovers caused by lightning.</p>																										

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, DEENERGIZED

Sheet 1 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Transformer must be deenergized and circuit switches lock out. Use grounding harnesses on input terminals.								
	BUSHINGS AND INSULATORS								
1	Remove all grease, dirt, and other foreign materials by washing and then drying.						X		
2	Insulators and Porcelain Parts: inspect for indications of cracks, checks, chips, breaks; where flashover streaks are visible, reexamine for injury to glaze or for presence of cracks.						X		
3	Chipped glaze exceeding 1/2 inch in depth or an area exceeding one square inch on any insulator or insulator unit, report for investigation by a qualified electrical engineer.						X		
4	Severe cracks, chipped cement, or indication of leakage around bases of joints of metal to porcelain parts at terminal and transformer ends.						X		
5	Terminal Ends: mechanical deficiencies, looseness, corrosion, damage to cable clamps.						X		
6	Check oil level in oil-filled bushings. (Fill bushing if oil is below proper level.)						X		
7	Inspect for heating evidenced by discolorations, and corrosion indicated by blue, green, white, or brown corrosion products on metallic portions of all main and ground terminals, including terminal board and grounding connections inside transformer case.						X		
8	Pipe, Bar Copper, and Connections: inspect for indications of overheating or flashover fusing.						X		
9	Cable Connections: inspect for broken, burned, corroded, missing strands. (Fused portions of connectors, cables, pipe, or bus copper should						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, DEENERGIZED (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>be filed smooth and all projections removed; clean metalwork, disconnecting if required and cover with thin coating of nonoxide grease; if connections are disassembled, rough spots on contact surfaces should be filed smooth, and all projections removed; see that all bolted and crimped connections are tight by setting up nuts or recrimping when looseness is evident or suspected; clean and tighten all corroded or loose connections; repair or replace cables with frayed and broken strands; repair frayed or broken cable insulation.)</p> <p>ENCLOSURES AND CASES</p>								
10	<p>If case is opened for any reason, examine immediately for signs of moisture inside cover, and where present, for plugged breathers, inactive desiccant, enclosure leakage. (Protect transformer liquid from dust, dirt, and windblown debris by covering open tank with temporary cover made of wood, Kraft paper, plastic sheeting, or other suitable dust tight material; clear plugged openings; if desiccant is inactive, replace with fresh material or reactivate for proper functioning; if rust or corrosion is evident on inside cover, clean an paint with preservative.)</p>						X		
	<p>COILS AND CORES</p>								
11	<p>When cover is open, examine interior for sludge, deficiencies, and dirt. If feasible, probe down sides with glass rod, and if dirt and sludge exceeds approximately 1/2 inch, arrange to change or filter insulating oil, and have coil and cores cleaned.</p>						X		
	<p>BUSHING-TYPE INSTRUMENT TRANSFORMERS</p>								
12	<p>Indications of Deteriorated Insulation: overheating evidenced by excessive discoloration of terminals and other visible copper; physical strains indicated by bent or distorted members.</p>						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, DEENERGIZED (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
13	Terminals, Including Secondaries: corrosion, loose connections.						X		
14	Secondary Leads: visible broken, cracked, or frayed insulation.						X		
15	Conduit and Associated Fittings Carrying Secondary Leads: rust, corrosion, other deterioration, loose joints in conduit fittings and around terminal boxes. (Clean, tighten, or repair terminals; tighten all loose components of conduits and accessories; tighten/replace loose or defective conduit-supporting clamps; clean and paint conduit and associated fitting areas showing rust and corrosion; if fuse box for bushing-type potential transformers is installed, check fuses for proper size, as specified by manufacturer or station engineers; assure that fuses have not been shorted out or bridged; replace blown or improperly sized fuses.) AUTOMATIC TAP-CHANGERS (LOAD RATIO CONTROL APPARATUS)						X		
16	Make inspection in accordance with manufacturer's instructions. (Clean and lubricate all moving parts and contacts in accordance with manufacturer's recommendations.) FORCED-AIR FANS AND FAN CONTROLS						X		
17	Fans and Motors: defective bearings, inadequate lubrication, presence of dirt, bent or broken fan blades and guards, lack of rigidity of mountings, indications of corrosion or rust. (Make minor repairs as necessary to assure dependable and continuous service until next inspection.)						X		
18	Starting and Stopping Devices: improper functioning as determined from operating once or twice.						X		
19	Fan Speed: not in accordance with nameplate requirements.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, DEENERGIZED (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	WATER COOLING SYSTEMS								
20	Water not being delivered in required quantity.						X		
	GAGES AND ALARMS								
21	Liquid Level Gage and Alarm System: inspect for cleanliness, readability, frequency of calibration.						X		
22	Pressure Gages and Valves on Inert Gas Systems: inspect for frequency of gage calibration; leaks in piping both before opening and after closing tanks; apply soap bubble test to all joints and connections when pressure is unsteady.						X		
23	Test grounding system.						X		
24	Measure load current with recording meter over period of time when load is likely to be at its peak; measure peak-load voltage; make regulation tests and tests of operating temperature during peak-load-current tests; test and calibrate thermometers or other temperature alarm systems.						X		
25	Test dielectric strength of insulating liquid. Test insulation resistance.						X		
	ADDITIONAL INSPECTIONS								
26	Inspection described in Inspection Guide on Power Transformers Energized, are to be performed as part of this inspection.						X		
	Scope - Deenergized electric power transformers used for voltage transformation on transmission lines and high voltage distribution systems. Before inspections, make arrangements to have electricians and other required labor available.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, ENERGIZED

Sheet 1 of 5

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Do not contact any part of the transformer or associated equipment.								
	CONCRETE FOUNDATIONS AND SUPPORTING PADS								
1	Settling and movement, surface cracks exceeding 1/16 inch in width, breaking or crumbling within two inches of anchor bolts.						X		
2	Anchor Bolts: loose or missing parts, corrosion, particularly at points closest to metal base plates and concrete foundations resulting from moisture or foreign matter, and exceeding 1/8 inch in depth.						X		
	MOUNTING PLATFORMS, WOODEN								
3	Cracks, breaks, signs of weakening around supporting members; rot, particularly at bolts and other fastenings, holes through which bolts pass, wood contacting metal.						X		
4	Burning and charring at contact points, indicating grounding deficiency.						X		
5	Inadequate wood preservation treatment.						X		
	MOUNTING PLATFORMS, METALLIC								
6	Deep pits from rust, corrosion, other signs of deterioration likely to weaken structure.						X		
	HANGERS, BRACKETS, BRACES, AND CONNECTIONS								
7	Rust, corrosion, bent, distorted, loose, missing, broken, split, other damage; burning or charring at wood contact points caused by grounding deficiency.						X		
	ENCLOSURES, CASES, AND ATTACHED APPURTANCES								
8	Collections of dirt or other debris close to enclosure that may interfere with radiation of heat from transformer or flashover.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, ENERGIZED (CONTINUED)

Sheet 2 of 5

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
9	Dirt, particularly around insulators, bushings, or cable entrance boxes.						X		
10	Leaks of liquid-filled transformers.						X		
11	Deteriorated paint, scaling, rust; corrosion, particularly at all attached appurtenances, such as lifting lugs, bracket connections, and metallic parts in contact with each other.						X		
	NAMEPLATES AND WARNING SIGNS								
12	Dirty, chipped, worn, corroded, illegible, improperly placed.						X		
	GASKETS								
13	Leakage, cracks, breaks, brittleness.						X		
	INERT GAS SYSTEMS								
14	Incorrect pressure in system. (Maximum - three to five pounds; minimum - 1/4 to one pound.)						X		
15	Pipe and Valve Connections: leaking gas (indicated by liquid oozing out of joints or by soapsuds test).						X		
16	Loose gas tank fastenings, loose valves.						X		
17	If previous arrangements were made with operating forces, bleed a little gas from system and watch gage to assure that fresh gas is let into system by means of pressure-regulating device; note evidence of leaks.						X		
	BUSHINGS AND INSULATORS								
18	Cracked, chipped, or broken porcelain, indication of carbon deposits, streaks from flashovers, dirt, dust, grease, soot, or other foreign material on porcelain parts, signs of oil or moisture at point of insulator entrance.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, ENERGIZED (CONTINUED)

Sheet 3 of 5

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	GROUNDING AND PHASE TERMINALS								
19	Overheating evidence by excessive discolorations of copper, loose connection bolts, defective cable insulation, no mechanical tension during temperature changes, leads appear improperly trained, and create danger of flashovers from unsafe phase-to-phase or phase-to-ground clearances caused by deterioration of leads or expansions during temperature changes.						X		
	INSTRUMENT TRANSFORMER JUNCTION BOXES AND CONDUITS								
20	Loose or severely corroded components, including secondary lead connections.						X		
	BREATHERS								
21	Holes plugged with debris; desiccant-type breathers need servicing or replacement.						X		
	TEMPERATURE-INDICATING AND ALARM SYSTEMS, INCLUDING CONDUIT AND FITTING								
22	Loose fastenings, rust, severe corrosion, deteriorated paint, other mechanical defects, loose electrical connections.						X		
	MANUAL AND AUTOMATIC TAP CHANGERS								
23	Loose connections, rust, severe corrosion, other mechanical defects, lack of lubrication, signs of burning around conducting and nonconducting parts of terminal boards.						X		
	LIQUID LEVEL INDICATORS								
24	Rust, corrosion, lack of protective paint, cracked or dirty gage glasses so that liquid level not discernible, plugged gage-glass piping, liquid level below permissible level indicated by mark for gaging, signs of leakage around piping, gage cocks, gage glasses, or other indicating devices.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, ENERGIZED (CONTINUED)

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	FANS AND FAN CONTROLS FOR AIR-COOLED TRANSFORMERS								
25	Lack of rigidity in mounting fastenings.						X		
26	Motors (External): dirty, moisture, grease, oil, overheating, detrimental ambient conditions.						X		
27	Apparent deterioration of open wiring and conduit that may cause malfunctioning of either fans or controls.						X		
28	Improper functioning when manual (not automatic) fan controls operated.						X		
	WATER COOLING SYSTEMS								
29	Leaks in piping, fittings, or valve; visible drainage system plugged; open ditches for drainage water fouled with vegetation.						X		
30	Bearings: evidence of wear, indications of corrosion, external deterioration, leaks.						X		
31	Incipient deterioration, corrosion, rust, loose fastenings, other mechanical deficiencies, loose electrical connections for all components of alarm system.						X		
32	Temperature Devices: signs of deterioration that might cause malfunction or difficulty in taking readings.						X		
33	When pressure gage readings on each side of strainer varies more than a pound or two, look fo cause, such as plugged strainer.						X		
	GROUNDING								
34	Visual Connections: loose, missing, broken connections; signs of burning or overheating, corrosion, rust, frayed cable strands, more than one strand broken in a 7-strand cable, more than three strands broken in a 19-strand cable.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

POWER TRANSFORMERS, ENERGIZED (CONTINUED)

Sheet 5 of 5

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	LIGHTNING ARRESTERS								
35	Where attached to or mounted on, refer to Inspection Guide on Lightning Arresters.						X		
	PROTECTIVE RELAYS								
36	Where attached to or mounted on, refer to another Inspection Guide.						X		
	Scope - Energized electric power transformers used for voltage transformation on transmission lines and high voltage distribution systems.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

RECTIFIERS

Sheet 1 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>Safety - Comply with all current safety precautions. Rectifier cabinets and enclosures contain energized electrical equipment. Do not tighten wires, make adjustments, or disturb any valve, control, or other adjustable device.</p> <p>ENCLOSURES</p>								
1	Housekeeping: dust, dirt, trash, debris in general area.						X		
2	Exterior: mechanical damage, excessive corrosion (more than two rust spots 1/2 inch diameter); corroded, binding, unlubricated hinges and latches.						X		
3	Interior: rust, corrosion, moisture condensation, indications of excessive heating.						X		
4	Wiring: Broken, damaged, deteriorated, missing insulation or clamps; corroded or mechanically damaged conduit; cracked or broken sleeves on floor or wall bushings.						X		
	METALLIC RECTIFIERS								
5	Electric Meters: record reading from all AC and DCC ammeters and voltmeters. Report if supply voltage is more than 5% below or above nameplate rating. Report defective meters.						X		
6	Temperature: record readings of water temperature indicators, if provided. On indoor installations, record ambient temperature at apparent hottest point five feet from units. Report if temperature of cooling water is more than 10% above that recommended by manufacturer.						X		
7	Fan: dirt, excessive vibration, loose hold-down bolts, loose or worn bearings, inadequate or improper lubrication.						X		

MAINTENANCE INSPECTION/SERVICE CHECKLIST

RECTIFIERS (CONTINUED)

Sheet 2 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	MERCURY-ARC RECTIFIERS								
8	Meters and Gages: illegible, inadequate lighting; cracked, broken, dirty, badly stained viewpoint glasses.						X		
9	Water Cooling Systems: leaks, rust, corrosion, mechanical damage, excessive vibration.						X		
10	Pumps, Fans, and Motors: leaks, excessive vibration, loose or missing hold-down bolts, deteriorated mounting pads or shock pads, inadequate or improper lubrication.						X		
	Scope - Visual inspection only of metallic and mercury-arc rectifiers. Rectifiers used in cathodic protection systems are covered in another Inspection Guide.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

SAFETY FENCES

Sheet 1 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Safety fences can be hot.								
	POST FOUNDATIONS AND EMBEDDED PIPE SLEEVES								
1	Cracked, broken, settling, movement, water ponding at base; severe corrosion or need of recaulking of pipe sleeves.							X	
	METALLIC FENCE POSTS, GATE POSES, HINGES, FASTENINGS, RAILS, BRACINGS, AND OTHER COMPONENT PARTS								
2	Rust, corrosion, bent, loose, missing, inadequate, deteriorated paint. Tighten loose bolts.							X	
	GUARD WIRES AND GUARD WIRE BRACKETS.								
3	Rust, corrosion, bent, broken, loose, missing, sagging, failure to provide three guard wires where accessible to public (regardless of location), deteriorated paint. Tighten loose tiewires, clamps, and guard wires.							X	
	WIRE FABRIC								
4	Rust, corrosion, mechanical damage, holes six inches or more in diameter.							X	
	HOLDING WIRES, CLAMPS, AND OTHER FASTENINGS								
5	Rust, corrosion, loose, missing, broken, other damage. Tighten loose fastenings.							X	
	GATES								
6	Rust, corrosion, bent, difficult operation, sagging, inadequate clearances, other damage; loose, missing, or other damage to stops, catches, checks, latches, locks, and other appurtenances. Tighten loose fastenings and appurtenances; make minor adjustments; lubricate moving parts.							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

SAFETY FENCES (CONTINUED)

Sheet 2 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
7	Supplemental Guard Wires: rust, corrosion, sagging, missing parts, broken, inadequate for safety of the public and prevention of entry of unauthorized persons. Tighten loose connections. ADEQUACY OF SECURITY THROUGHOUT ENTIRE PERIMETER							X	
8	Construction of excavations, washouts, unauthorized changes in ground surface grade both inside and outside fence line; openings, particularly along bottom edge, large enough to permit entry of small children.							X	
9	Effective height decreased by changes in ground grade on either or both sides of fence.							X	
10	Lumber, boxes, piles of dirt or other materials within three feet of fence line on either side.							X	
11	Possible installation of new equipment within three feet of fence line that will interfere with safety, maintenance and inspection. ADEQUACY FOR PREVENTION OF DAMAGE TO FENCE OR SAFETY OF PERSONNEL							X	
12	Woods, trash, or other debris along fence line.							X	
13	Damage to galvanizing or protective coatings from burning operations along fence line.							X	
14	Exposed live electrical parts less than eight feet from inside of fence or barrier. WARNING SIGNS							X	
15	Not installed at all gates and other locations on fence, not in sight from each normal approach path, insecurely fastened, illegible.							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

SAFETY FENCES (CONTINUED)

Sheet 3 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	ELECTRICAL GROUNDING								
16	Cables not attached to posts and fabric of fence; missing flexible connection at all gates.							X	
17	Rust, corrosion, frayed or broken, missing connectors, broken strands. Tighten loose clamps.							X	
18	Loose, missing, or other damage to visible connections at top of ground rods. Tighten loose connections. (Do not disconnect ground connections or open any connections between ground cables and ground rods.)							X	
19	Failure to connect or provide, or damage to ground wires attached to supplementary guard wires on wooden structures.							X	
	Scope - Metallic and wooden fences and other permanent barriers surrounding electric power equipment centers and preventing unauthorized personnel from accidentally contacting such equipment.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

STEEL POWER POLES AND STRUCTURES

Sheet 1 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>Safety - Comply with all current safety precautions Remember these structures are part of an electrical system and may be conducting current. Avoid contact with line poles and structures until they have been grounded and/or deenergized. At least two men shall be assigned to these inspections.</p> <p>GROUND AREA</p>								
1	<p>Trash, debris, and weeds or brush one foot in height within three feet of pole or structure.</p>							X	
	<p>CONCRETE BASES, PADS, AND ANCHOR BOLTS</p>								
2	<p>Cracks, including surface cracks wider than 1/16 inch, breaks, chipped areas deeper than 1/2 inch, settlement, movement, water ponding at base.</p>							X	
3	<p>Defective paint/galvanizing, visible rust or corrosion to depths exceeding 1/16 inch, loose or missing nuts/bolts, where visible, inspect all metal where it enters concrete.</p>							X	
	<p>STREET LIGHT STANDARD HANDHOLES AND BELL INTERIORS (VISUAL INSPECTION ONLY, IF ENERGIZED)</p>								
4	<p>Rust, corrosion, or drops of moisture, indicating poor ventilation.</p>							X	
5	<p>Installed Transformers: loose wires, excessive discolorations from heating and sparking, signs of insulation compound or other leakage, charred, burned or missing insulation.</p>							X	
	<p>POLES, STRUCTURES, CROSSARMS, AND BEAMS (INSPECTION FROM GROUND, USE FIELD GLASSES)</p>								
6	<p>Defective paint/galvanizing, visible rust or corrosion, especially pitting where visible, inspect all metal in contact with, or entering concrete.</p>							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

STEEL POWER POLES AND STRUCTURES (CONTINUED)

Sheet 2 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
7	Loose bolts and pins; excessive rust and corrosion between pole and/or structure and braces, equipment supports, insulator pins, guy fastenings, and similar locations.							X	
8	Checking, chipping, flaking, or scaling of paint on pole and attachments.							X	
9	Broken or bent structural or accessory members, especially near bolts.							X	
10	Misalignment. (Top of unguyed pole is out of line more than one foot in any direction.)							X	
	GUYS AND ANCHORS								
11	Corroded, cracked or worn hardware at guy takeoffs, anchors and insulators; cracked, broken, or dirty insulators; missing insulators.							X	
12	Defective galvanizing, corrosion, broken strands, battered or corroded guy shields, excessive sag or tautness.							X	
13	Guy anchor movement.							X	
	GROUND WIRE (VISUAL INSPECTION ONLY)								
14	Failure to install at least one wire at every steel pole or structural support, including each steel column in substation or switching station.							X	
15	Connections: rust, corrosion, looseness, discolorations from overheating, substandard conditions.							X	
	Scope - Steel power poles and towers, metallic street lighting standards, A-frames, and all other steel structures use to support electric power lines or equipment, including those used for transmission lines, distribution systems, substations, and switching stations.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

VAULTS AND MANHOLES - ELECTRICAL

Sheet 1 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>Safety - Comply with all current safety precautions. An assistant should always be available to render assistance or first aid. Underground vaults and manholes should be entered only after allowing sufficient time for natural ventilation. An approved tube-type power blower should be used for ventilating such areas when the presence of dangerous, noxious, or flammable gases is detected or suspected. Sources of such gases or highly explosive mixtures should be reported for immediate correction, particularly when the cable is heavily loaded, when the source is near electric welding work, or when other possible sources of ignition are present. Before entering vaults or manholes, observe the following precautions. Do not carry lighted tobacco, open flames, or extension lamps near, or into, vaults and manholes. Do not lower electric fans for the purpose of ventilation. Do not wear hobnailed shoes. Request that a test be made with approved United States Bureau of Mines gas-detecting equipment for the type and concentration of gases.</p> <p>GENERAL</p>								
1	<p>Dangerous, noxious, or flammable gases detected or suspected.</p> <p>MANHOLE COVERS AND GRATINGS</p>								X
2	<p>Plugged vents, defective gaskets, cracks, rust, corrosion, particularly on underside, poor fit, structural inadequacy. Clean vents; clean and paint rusted areas; replace deteriorated gaskets.</p> <p>LADDERS AND STEPS</p>								X
3	<p>Rust, corrosion, loose anchorage, other defects. Clean and paint rusted areas.</p>								X

MAINTENANCE INSPECTION/SERVICE CHECKLIST

VAULTS AND MANHOLES - ELECTRICAL (CONTINUED)

Sheet 2 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	ROOFS, WALLS, AND FLOORS								
4	Dirty, evidence of burning, cracks, leakage, flooding, structural inadequacy, other defects. Clean out sediment, mud, and trash; remove all stored materials and equipment.								X
	VAULT DOORS								
5	Unlocked, binding, difficult operation, does not swing clear and free; defective hinges, latches, locks, and other similar devices; rust, corrosion, abrasions, or other defects. Lightly lubricate and wipe hinges clean; clean rust and abraded spots and spot paint.								X
	VENTILATION SYSTEMS, DUCTS, BLOWERS, AND AUTOMATIC CONTROLS								
6	Dirty, rust, corrosion, excessive noise and vibration, dirty air filters, defective operation. Replace filters.					X			
	LIGHTS AND SWITCHES								
7	Broken or missing globes and protectors; types not in accordance with safety regulations, if required; defective operation; rust and corrosion from excessive moisture.					X			
	FIREFIGHTING EQUIPMENT								
8	Inadequate and apparent unsatisfactory operating condition. (Determine from fire inspector's tags.)					X			
	SIGNS, INSTRUCTIONS, AND IDENTIFICATION TAGS								
9	Dirty, illegible, and improperly located.					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

VAULTS AND MANHOLES - ELECTRICAL (CONTINUED)

Sheet 3 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	SEWER AND SUMP								
10	Trash, other obstructions, clogged drains causing ponding or flooding, faulty operation of pump. Remove obstructions or open clogged drains.					X			
	GROUNDING WIRE OR CABLE, AND GROUND RODS WHERE VISIBLE								
11	Lack of continuity, loose connections, signs of corrosion.					X			
12	Measure ground-resistance values; report those in excess of three ohms.					X			
	BONDING SHEATHS								
13	Bonding wire or cable touching cable sheath at other than point of connection.					X			
14	Lack of continuity; corrosion, loose connections.					X			
	CABLES								
15	Excessive strain on sheath, poor arrangement, crowding, splices for overheating, leaks, bulges.					X			
16	Cracks, punctures, deep scratches in cable sheath.					X			
17	Tighten loose anchor bolts; replace missing cable racks, cable supports, broken or missing rack insulators, and defective or missing cable saddles.					X			
	DUCTS								
18	Cable damage from abrasion, cable not free to expand and contract, inadequate cable training, defective or rusted cable shields.					X			
	FIREPROOFING CABLE (2200 VOLTS OR MORE) (VISUAL INSPECTION)								
19	Wrapping not in place, loose, insecure.					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

VAULTS AND MANHOLES - ELECTRICAL (CONTINUED)

Sheet 4 of 4

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	POTHEADS								
20	Rust, corrosion, cracked or broken porcelain, leakage of joint compound. Clean porcelain; stop leaks and replace compound, leaving no voids.					X			
	SUBWAY JUNCTION BOXES								
21	Rust, corrosion, loose, missing or defective cover bolts. Clean and paint rusted and corroded areas; tighten bolts and replace those missing or defective.					X			
22	Breaks, aging, or leading gaskets, particularly in pressurized boxes. Where leakage is suspected, remove cover, clean, and install new gasket. If box is opened, check physical condition of sectionalizing fuses and copper links.					x			
	Scope - Vaults and manhole used in electrical power distribution systems. Vaults include any space or structure used to house electrical distribution equipment. Manholes include in-ground structures used to provide junctions for cable runs, for pulling cable, to allow space for expansion and contraction of cable, to provide ventilation, to drain underground conduit runs, or to house electrical equipment. Transformers and switchgear are covered by other Inspection Guides.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

WOOD POLES AND ACCESSORIES

Sheet 1 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	<p>Safety - Comply with all current safety precautions. Because overhead electric distribution systems are energized almost continuously, inspection of such items as poles, hardware, and associated accessories should be made from the ground except during those periods when planned outages of the various systems will permit a climbing inspection. Ordinarily, such climbing inspections will occur very infrequently and should be performed only when it is certain that all linewires attached to the pole are deenergized and provided with safety grounding. Poles supporting only telephone open wires or telephone aerial cables should not be climbed unless an obvious defect indicates the necessity of climbing to permit a close inspection. Before climbing any pole, it is essential that questionable poles be tested and supported before the pole is subjected to the unbalanced load caused by climbing. Particular attention shall be given to weather conditions, power hazards, traffic warning procedures, and tree and brush cuttings.</p> <p>GROUND AREA</p> <p>1 Water ponding at base, and debris, trash, or weeds within three feet in any direction.</p> <p>POLES (VISUAL INSPECTION, EXCEPT AS INDICATED)</p> <p>2 Sound-test with unpointed hammer for hollowness or decay from ground line to the highest point reached from standing position; hollow sections or decay pockets at knotholes or woodpecker holes.</p> <p>3 Splits; lightning, bird, insect, vehicle, or other damage.</p> <p>4 Make shallow excavation around pole and take increment boring if a faulty condition below ground is suspected. (Upon completion of boring, treat hole with wood preservative, drive treated plug into hole, sterilize soil, backfill, and tamp excavation.)</p>								
								X	
									X
									X
									X

MAINTENANCE INSPECTION/SERVICE CHECKLIST

WOOD POLES AND ACCESSORIES (CONTINUED)

Sheet 2 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
5	Ground-line treatment of untreated poles required; failure of originally installed protective treatment of pole.							X	
6	Posts should not lean except for special reasons. When lean is more than one foot at top, pole should be straightened, and if necessary, guyed. (To determine whether top of pole is out of alignment, sight the pole from those adjacent to it.)							X	
7	Structural inadequacy or other deficiencies requiring stub reinforcement or complete replacement. CROSSARMS AND BUCKARMS (USE FIELD GLASSES)							X	
8	Splits, burns, decay, twists, weathering damage, other defects. INSULATORS AND PINS (USE FIELD GLASSES)							X	
9	Cracks, breaks, chips, dirty or missing insulators; cracked broken, missing pins.							X	
10	Rust, corrosion, or looseness of insulator bolted connections and fastenings to crossarms resulting in strains on linewires or movement of wires on insulators. TIEWIRES AND LINEWIRES (USE FIELD GLASSES)							X	
11	Looseness, chafing, slippage, or other damage within a foot or two of insulators and corrosion at points where linewires and tie wires come together near insulators. HARDWARE, POLE STEPS, CROSSARM BRACES, GROUNDING BONDS, BRACKETS, THROUGH BOLTS, OR OTHER (USE FIELD GLASSES)							X	
12	Signs of fire damage and rot or insect damage around all hardware in contact with pole or crossarms; rust, corrosion, and looseness of all parts.							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

WOOD POLES AND ACCESSORIES (CONTINUED)

Sheet 3 of 3

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	GROUND WIRES (USE FILED GLASSES)								
13	Rust, corrosion, frayed or broken strands, discoloration that may indicate overheating, or complete failure of connections, including connection to ground rod at base of pole. (Do not disconnect or allow contact with body if overhead lines are energized.)							X	
14	Protective Moldings: looseness, missing, broken, cracks, decay.							X	
	GUYWIRES								
15	Loose, missing, or corroded clamps, wires or holding bolts, and brackets.							X	
16	Broken or cracked insulators and complete absence of insulator on circuits over 300 volts.							X	
17	Excessive tautness or looseness and failure of guys and guy anchors; vehicle damage; inadequacy and nonvisibility of shield or protectors; corrosion, fraying, or broken strands.							X	
	CLEARANCES AND TREE LIMBS (USE FIELD GLASSES)								
18	Inadequate separation from limbs, branches, and foliage; dead trees or limbs that may fall on line.							X	
19	Brush and tree prunings have not been removed.							X	
20	Inadequacy and poor condition of tree guards and attachments on insulated wire.							X	
	Scope - Wood poles supporting overhead electric distribution systems and/or telephone open wire or aerial cable systems, including crossarms, insulators, pins, tiewires, hardware, linewires near pole, guywires, and grounding wires. Inspection of equipment such as transformers, cutouts, lightning arresters, or terminal boxes that are mounted on wood poles is covered in other Inspection Guides.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

OIL CIRCUIT BREAKERS

Sheet 1 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Ensure equipment and control circuits are deenergized and stored energy mechanisms are discharged.								
1	Bushings: inspect for damage and surface contaminations. Clean or replace as required.							X	
2	Oil: perform dielectric breakdown, visual, and color-indicator titration tests in accordance with ASTM standards D877, D1524, and D1534 respectively. Check for proper level and evidence of leaks. Top off or replace with new or reconditioned oil as required.							X	
3	Contacts: measure resistance with ohmmeter. Measure contact engagement by measuring travel of lift rod from start of contact opening to point of separation as indicated by ohmmeter. Adjust as required.							X	
4*	When tank is drained and lowered, the following should be performed:								
4a	Inspect contacts for erosion, pitting, proper pressure and alignment. Clean, dress or replace as required.								
4b	Inspect bolted connections and contact springs for looseness. Tighten or renew as required.								
4c	Inspect arc-quenching assemblies for carbon deposits.								
	* Frequency will be determined by severity of breaker duty (number of operations and operating current levels.) Any time the breaker has interrupted a fault current at or near its maximum interrupting rating, this maintenance should be performed.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

OIL CIRCUIT BREAKERS (CONTINUED)

Sheet 2 of 2

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
5	Operating Mechanism: inspect for loose, broken or missing parts, binding or excessive wear. Adjust, repair or replace as required.							X	
6	Auxiliary Devices: inspect closing motor or solenoid, trip devices, auxiliary switches and bell alarm switch for proper operation, insulation condition, and loose connections. Check on-off indicators, spring charge indicators, electrical and mechanical interlocks, key interlocks, and padlock fixtures for proper operation. Correct deficiencies as required.							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

VACUUM AIR CIRCUIT BREAKERS

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Ensure equipment and all control circuits are deenergized, and all stored energy closing mechanisms are discharged.								
1	Insulation: inspect for cleanliness, moisture, and signs of corona, tracking or thermal damage. Clean, dry or replace as required.								X
2*	Contacts: inspect for burrs, pitting and evidence of overheating. Manually close breaker to check for proper wipe, pressure alignment, and to ensure that all contacts make at the same time. Inspect drawout contacts for overheating, proper alignment and weak or broken springs. Clean, lubricate and replace as required.								X
3*	Arc Interrupters: blow out with dry compressed air. Remove residue, dirt, or arc products with a cloth or light sanding. Check for broken, eroded or cracked ceramic parts and replace as required. Check air puffer devices for proper operation.								X
4	Operating Mechanism: inspect for loose, broken or missing parts, binding, or excessive wear. Adjust or replace as required.								X
5	Auxiliary Devices: inspect closing motor or solenoid, shunt trip, undervoltage or overvoltage trip, auxiliary switches and bell alarm switch for proper operation, insulation condition and loose connections. Tighten, repair, or replace as required. Check on-off indicators, spring charge indicators, mechanical and electrical interlocks, key interlocks, and padlocking fixtures for proper operation, and lubricate as required.								X
6	Protective Relays: check for proper operation. Clean, adjust, repair or replace as required.								X
	* Not applicable for vacuum breakers.								

MAINTENANCE INSPECTION/SERVICE CHECKLIST

CAPACITORS

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions. Discharge with grounding devices and insulated short circuit jumper.								
1	Inspect case for leaks, bulges, or discoloration. Replace any liquid filled capacitors found to be bulged or leaking.							X	
2	Inspect case, bushings and connections for dirt and corrosion. Clean as required. Clean and paint corroded cases and mounting.							X	
3	Check fuses. Replace as required.							X	
4	Insure adequate ventilation is provided and maintained.							X	

MAINTENANCE INSPECTION/SERVICE CHECKLIST

ELECTRICAL SYSTEMS (WATERFRONT)

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions.								
1	Check conductor enclosures and supports for corrosion, damage, missing or loose covers and fittings, proper drainage, dirt, debris, and missing fasteners.					X			
2	Check conductors for orderly arrangement, adequate support, proper sag, and adequate insulation.					X			
3	Check insulation for damage, signs of arcing and hot spots.					X			
4	Check outlets for condition, signs of arcing, loose or missing fittings and covers, and corrosion.					X			
5	Check circuit breakers for condition as described in PM requirements for circuit breakers.					X			
6	Check interlock switches to ensure that outlets are deenergized when cable connectors are unplugged.					X			
7	Inspect wiring and electrical controls for loose connections; charred, broken, or wet insulation; evidence of arcing, overheating and other deficiencies. Tighten, repair or replace as required.					X			
8	Inspect portable power cables for damaged insulation and connectors, arcing, and evidence of overheating.					X			

MAINTENANCE INSPECTION/SERVICE CHECKLIST

EMERGENCY GENERATOR SET (DIESEL OR GASOLINE)

Sheet 1 of 1

C P H O E I C N K T	CHECKPOINT DESCRIPTION	FREQUENCY							
		D	F	W	G	M	Q	L	A
	Safety - Comply with all current safety precautions.								
1	Check engine for oil, fuel, radiator water, and battery water. Add or change as necessary.				X				
2	Clean or replace filters and strainers as required.				X				
3	Inspect electrical wiring, connections, switches, brushes, contacts, etc. Repair, replace, tighten, clean, or adjust as required.				X				
4	Lubricate as required.				X				
5	Start unit and run for 30 minutes; test generator under load (use load bank if necessary). Observe mechanical and electrical operation and make adjustments as required. Allow unit to cool down under no load conditions before securing.				X				

ATTACHMENT J-C6

HISTORICAL DATA

The data in this attachment is taken from the activity's records and is provided to indicate the types and an approximate order of magnitude of the work to be accomplished under the contract. It is not, however, by itself, considered sufficiently accurate for bidding purposes.

NUMBER OF SERVICE CALLS 1986

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

!INSERT APPROPRIATE NUMBER OF CALLS FOR EACH MONTH!

% of calls received after normal working hours = !INSERT!%

The Government used the various trades listed below in performing the service calls shown in the charge above. The percentage of the total number of service calls shown in which each trade was involved are also shown below. For example, electricians were involved in approximately !INSERT!% of the calls shown above. Some calls involved more than one trade.

<u>TRADE/CRAFT</u>	<u>PERCENT (%) TRADE INVOLVEMENT</u>
Electrical	!INSERT!
Plumbing/Pipefitting	!INSERT!
Moving/Rigging	!INSERT!
Sheet Metal	!INSERT!
Machinist	!INSERT!
Labor	!INSERT!

MINOR MAINTENANCE AND REPAIR

<u>CRAFT</u>	<u>NUMBER OF JOBS *</u>
Electrical	!INSERT!
Sheet Metal	!INSERT!
Machinist	!INSERT!

* Craft involvement only. Not total jobs.

<u>TRAVEL ZONE</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>TOTAL</u>
No. of jobs performed								
Total EPS hr/zone								
<u>JOB SIZE (EPS HOURS)</u>	<u>(0-16)</u>	<u>(17-40)</u>	<u>(41-80)</u>	<u>(81-120)</u>	<u>(121-160)</u>			<u>TOTAL</u>

FY-85 (Number of Jobs)

FY-86 (Number of Jobs)

ATTACHMENT J-C7

ACTIVITY TRAVEL ZONE MAP

!*****
NOTE TO SPECIFICATION WRITER: Attach a legible copy of the activity's EPS
travel zone map.
*****!

ATTACHMENT J-E1

LIST OF ENGINEERED PERFORMANCE STANDARDS MANUALS

<u>PUBLICATION</u> <u>NUMBER</u>	<u>NAME</u>
P-700.0	EPS-Engineers Manual
P-701.0	EPS-General Handbook
P-702.0	EPS-Carpentry Handbook
P-703.0	EPS-Electrical Electronic Handbook
P-704.0	EPS-Heating, Cooling & Ventilation Handbook
P-705.0	EPS-Emergency/Service Handbook
P-706.0	Janitorial and Custodial Services Handbook
P-707.0	EPS-Machine Shop Machine Repairs Handbook
P-708.0	EPS-Masonry Handbook
P-709.0	Moving, Rigging Handbook
P-710.0	EPS-Paint Handbook
P-711.0	EPS-Pipefitting Plumbing Handbook
P-712.0	Roads, Grounds, Pest Control and Refuse Collection Handbook
P-713.0	EPS-Sheetmetal Structural Iron/Welding Handbook
P-714.0	Trackage Handbook
P-715.0	Wharfbuilding Handbook
P-716.0	Unit Price Standards (UPS) Handbook
P-717.0	Preventive/Recurring Maintenance Handbook

ATTACHMENT J-G1

WORK ORDER FORMS

1. Attached is a sample copy of the delivery order form, DD 1155, which will be used to order all indefinite quantity work.

!*****
NOTE TO SPECIFICATION WRITER: Identify specific forms that will be used to order work and provide a sample of each.
*****!

2. The following documents will be used to order work under the fixed-price portion of the contract.

- a. Emergency/Service Work Authorization Form

!ETC.!

ATTACHMENT J-G2

INVOICING INSTRUCTIONS

!*****

NOTE TO SPECIFICATION: This attachment should include the following information:

1. Name and address of person who is to receive the monthly invoice.
2. Date invoice should be submitted.
3. Number of copies required.
4. Back-up form showing work that is:
 - a. performed on a regular basis and is to be paid 1/12 per month, and
 - b. performed on an indefinite frequency basis and must be accompanied by work orders in accordance with the "ORDERING OF WORK" clause, Section G.
5. Contractor monthly submittal requirements, if any.
 - a. work schedules
 - b. !ETC.!

*****!

ATTACHMENT J-H1

DIRECTIVES/REFERENCES

!*****
NOTE TO SPECIFICATION WRITER: List all directives, specifications, standards, manuals, and instructions referred in this specification. Indicate those that are advisory and those that are mandatory. The following list is a sample and must be tailored to fit the user's needs.
*****!

1. Directives/references listed here are classified as either advisory or mandatory. Those directives/references classified as advisory are identified to the Contractor to provide guidance as to the standards of performance that the Government will use in evaluating the Contractor's overall work performance. Those directives/references classified as mandatory must be complied with by the Contractor in the performance of this contract.

2. Single copies of detail specifications and federal specifications required by activities outside the federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Office in Atlanta, GA; Auburn, WA; Boston, MA; Chicago, IL; Denver, CO; Fort Worth, TX; Kansas City, MO; New York, NY; Philadelphia, PA; San Francisco, CA; Washington, DC.

3. The following directives, publications, specifications, and standards are mandatory:

a. American Concrete Institute:

ACI318 Building Code Requirements for Reinforced Concrete

b. American National Standards Institute

ANSI-A14.3 Ladders - Fixed-Safety Requirements for

ANSI-B40.1 Gauges - Pressure, Indicating Dial Type - Elastic Element

ANSI-C2 National Electrical Safety Code

ANSI-C37.17 Trip Device, for AC and General Purpose DC Low Voltage Power Circuit Breaker, Standard for

ANSI-C80.1 Conduit, Rigid Steel, Zinc-Coated, Standard for

ANSI-Z49.1 Welding and Cutting, Safety in

ANSI-Z89.1 Headwear, Protective, for Industrial Workers - Requirements

c. American Society of Testing and Materials

ASTMA-A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM-B187	Copper Bar, Bus Bar, Rod and Shapes
ASTM-C32	Brick, Sewer and Manhole (Made from Clay or Shale)
ASTM-D709	Materials, Laminate, Thermosetting
ASTM-D877	Liquids, Insulating, Using Disk Electrodes, Dielectric Breakdown Voltage of
ASTM-D923	Liquids, Sampling Electric Insulating
ASTM-D1524	Visual Examination of Used Electrical Insulating Oils of Petroleum Origin in the Field, Method for
ASTM-D1534	Approximate Acidity in Electrical Insulating Liquids by Color-Indicator Titration, Test Method for
ASTM-D3487	Mineral Insulating Oil Used in Electrical Apparatus
ASTM-D5948	Compounds, Molding, Thermosetting

d. Commercial Item Descriptions

A-A-3067	Paint, Alkyd, Exterior, Low VOC
A-A-50568	Gages, Liquid Level Measuring, Tank
A-A-52557	Fuel Oil, Diesel; for Posts, Camps and Stations
A-A-55439	Battery, Storage, Vehicular Ignition, Lighting, and Starting
A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-60005	Frames, Covers, Gratings, Steps, Sumps and Catch Basin, Manhole

e. Detail Specifications

DOD-P-15328	Primer (Wash), Pretreatment (Formula No. 117 for Metals)
MIL-C-915	Cable and Cord, Electrical, for Shipboard Use, General Specification for
MIL-C-18480	Coating Compound, Bituminous, Solvent, coal-Tar Base
MIL-C-24368	Connector Assemblies; Plugs and Receptacles, Electric, Power Transfer, Shore to Ship and Ship to Ship, General Specification for
MIL-F-20627	Filter Assembly and Filter Elements, Fluid Pressure (for Engines with Liquid Fuel Injection Systems)
MIL-I-15126	Insulation Tape, Electrical, Pressure Sensitive Adhesive and Pressure Sensitive Thermosetting Adhesive

f. Environmental Protection Agency Rules

40 CFR Part 761 Polychlorinated Biphenyls (PCBs) Manufacturing,
Processing Distribution in Commerce, and Use
Prohibitions

f. Federal Specifications

F-F-351 Filters and Filter Elements, Fluid, Pressure:
Lubricating Oil, Bypass and Full Flow

HH-P-46 Packing; Asbestos, Sheet, Compressed

J-C-145 Cable, Power, Electrical and Wire, Electrical
(Weather-Resistant)

QQ-W-343 Wire, Electrical, Copper (Uninsulated)

RR-F-191 Fencing, Wire and Post Metal (and Gates, Chain-Link
Fence Fabric, and Accessories)

SS-S-210 Sealing Compound, Preformed Plastic, for Expansion
Joints & Pipe Joints

TT-P-28 Paint, Aluminum, Heat Resisting (1200°F)

TT-P-645 Primer, Paint, Zinc-Molybdate, Alkyd Type

WW-B-137 Battery, Storage (Nickel-Alkaline, Industrial, Floating
Service)

W-C-596 Connector, Electrical, Power, General Specification for

W-P-115 Panel, Power Distribution

WW-S-2739 Strainers, Sediment: Pipeline, Water, Air, Gas, Oil, or
Steam

WW-T-799 Tube, Copper, Seamless, Water (for Use with Solder-,
Flared-, or Compression-Type Fittings)

h. Institute of Electrical and Electronic Engineers

IEEE48 Termination, Cable, Current, Test Procedures and
Requirements for High-Voltage Alternating

IEEE-C37.20 Switchgear, Assemblies, Including Metal Enclosed Bus,
Standard for

IEEE-C37.90 Relays and Relay Systems Associated with Electric Power
Apparatus

i. National Electrical Manufacturer's Association

NEMA-FU1 Fuses, Low Voltage, Cartridge

- | | |
|------------|---|
| NEMA-ICS1 | Industrial Control and Systems, General Standards for |
| NEMA-PB2 | Switchboard, Deadfront Distribution |
| NEMA-PB2.1 | Switchboards Rated 600 Volts or Less, Deadfront Distribution, Proper Handling, Installation, Operation and Maintenance of |
| NEMA-RN1 | Steel Conduit and Intermediate Metal Conduit Galvanized Rigid Polyvinyl-Chloride (PVC) Externally Coated |
| NEMA-SG2 | Fuses, High Voltage, Standard for |
| NEMA-SG3 | Circuit Breaker, Low Voltage Power |
| NEMA-WC3 | Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy |
| NEMA-WC5 | Wire and Cable for Thermoplastic-Insulated Wire for the Transmission and Distribution of Electrical Energy |
| NEMA-WC7 | Wires and Cables, Cross linked-Thermosetting Polyethylene Insulated Wire and Cable |
| NEMA-WC8 | Wire and Cable, for Transmission and Distribution of Electrical Energy, Ethylene-Propylene-Rubber Insulated, Standard for |
- j. National Fire Protection Association
- | | |
|---------|--|
| NFPA30 | Flammable and Combustible Liquids Code |
| NFPA37 | Stationary Combustion Engines and Gas Turbines |
| NFPA70 | National Electrical Code |
| NFPA101 | Life Safety Code |
- k. Rural Electrification Administration (REA)
- | | |
|---------------|--|
| Bulletin 43-5 | List of Materials Acceptable for Use on Systems of REA Electrification Borrowers |
|---------------|--|
- l. Society of Automotive Engineers
- | | |
|-------------|---|
| SAE-AMS2518 | Thread Compound Anti-Seize, Graphite-Petrolatum |
|-------------|---|
- m. Underwriter's Laboratories, Inc.
- | | |
|-------|--|
| UL1 | Flexible Metal Conduit |
| UL20 | Switches, Snap, General Use |
| UL142 | Tanks, Steel Aboveground for Flammable and Combustible Liquids |

UL467	Grounding and Bonding Equipment
UL844	Lighting Fixtures, Electrical, for Use in Hazardous (Classified) Locations
UL924	Emergency Lighting and Power Equipment
UL935	Ballasts, Fluorescent-Lamp, Standard for
UL1008	Switches, Safety Automatic Transfer, Standard for

4. The following publications are advisory:

a. American National Standards Institute, Inc.

ANSI-C12 Electricity Metering, Code for

b. National Fire Protection Association

NFPA70B Equipment, Electrical, Maintenance

c. Navy

NAVFAC MO-200 Facilities Engineering, Electrical Exterior Facilities

NAVFAC MO-201 Electrical Power Distribution Systems Operation

NAVFAC MO-322 Inspection of Shore Facilities, Volume II

ATTACHMENT J-H2

SAFETY REQUIREMENTS

1. Two-Man Rule. Contractor personnel working on energized circuits shall be required to work, at minimum, in two-man teams, with one worker positioned to deenergize the involved circuit at the first sign of trouble. All circuits deenergized for maintenance purposes shall have safety switches, circuit breakers, or fuse-box handles wired in the open position to prevent accidental energizing during maintenance procedures. Circuits wired in the open position shall be posted with information as to date and time disabled, and the Contractor point of contact.

2. Health Hazards. Contractor personnel shall become familiar with the precautions to be observed when working with or near asbestos and components containing the toxic substance PCB.

!*****
NOTE TO SPECIFICATION WRITER: All pertinent safety directives and standards should be listed, including local station and activity directives, OSHA rules, etc. The following list is a sample list and should be tailored to fit the user's requirements. Standards and directives listed here should also be listed in Attachment J-H1.
*****!

3. Safety Standards and Directives. All Contractor personnel shall comply with the safety/health requirements of the standards and directives listed below:

- a. ANSI Standards A10.4, A10.5, A10.14, A14.3, C2, Z35.1, Z49.1 and Z89.1
- b. NFPA Standards 70 and 101
- c. NEMA Standard PB2.1
- d. 40 CFR Part 761
- e. OSHA Regulations !INSERT APPLICABLE OSHA REGULATIONS!
- f. Navy Directives !INSERT APPLICABLE NAVY DIRECTIVES/INSTRUCTIONS!

END OF SECTION J

QUALITY ASSURANCE GUIDE

FOR

OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION

AND EMERGENCY GENERATION SYSTEMS

QUALITY ASSURANCE GUIDE
OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

TABLE OF CONTENTS

	PAGE NO.
I. INTRODUCTION.....	QA-1
A. Overview.....	QA-1
B. Qualifications.....	QA-1
II. QUALITY ASSURANCE PLAN DEVELOPMENT.....	QA-1
A. Functional Considerations.....	QA-1
B. QAE Staffing.....	QA-2
C. Performance Requirements.....	QA-2
III. QUALITY ASSURANCE PLANS.....	QA-2
QA Plan #1 Watchstanding.....	QA-4
QA Plan #2 Preventive Maintenance.....	QA-8
QA Plan #3 Corrective Maintenance.....	QA-11
QA Plan #4 Minor Maintenance and Repair.....	QA-16
IV. CONTRACTOR'S OVERALL PERFORMANCE EVALUATION.....	QA-18
A. Summary Report.....	QA-18
B. Recommended Payment Deductions.....	QA-18
V. CONTRACTOR SUBMISSIONS.....	QA-18

QUALITY ASSURANCE GUIDE
OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
AND EMERGENCY GENERATION SYSTEMS

I. INTRODUCTION

A. Overview. The Electrical Distribution and Emergency Generation Quality Assurance (QA) Guide is designed to assist the Quality Assurance Evaluator (QAE), under the direction of the Facilities Support Contract Manager (FSCM) in setting up the activity's QA Program. The user is advised to refer to NAVFAC MO-327, *Facility Support Contract Quality Management Manual* for more detailed information on the development and implementation of a QA Program. This Guide suggests specific methods for monitoring services and provides sample QA Plans. These sample plans must be tailored concurrently with the tailoring of this GPWS to develop a unique QA Program that fits the needs of the activity. This QA Guide is divided into four parts.

1. The *INTRODUCTION* presents an overview and provides information on QAE qualifications/training.

2. *QUALITY ASSURANCE PLAN DEVELOPMENT* provides the user with special considerations that affect the way in which operation and maintenance of electrical distribution and emergency generation systems services may be monitored.

3. Sample *QUALITY ASSURANCE PLANS* are provided with numerical examples, and must be modified by the user to conform with the tailored PWS.

4. *CONTRACTOR'S OVERALL PERFORMANCE EVALUATION* provides a sample monthly summary report to be used by the QAE to report the Contractor's performance to the FSCM.

5. *CONTRACTOR SUBMISSIONS* discusses development of a list of Contractor submissions, when they are due, and to whom they should be routed. These submissions should be separated into before award and after award submissions.

B. Qualifications. QAEs should be qualified journeymen electricians with experience on medium and high voltage equipment, and should be trained and fully conversant with the specification. It is recommended inspectors attend the QAE Training Course provided by each of the NAVFAC Engineering Field Divisions.

II. QUALITY ASSURANCE PLAN DEVELOPMENT

A. Functional Considerations. The following considerations in preparing QA Plans for surveillance of electrical distribution and emergency generation systems services are offered for user information.

1. Magnitude of Work. In preparing the QA Plans, it was assumed the magnitude or number of individual service calls for equipment repair would be a manageable number, and would therefore allow for 100% inspection. However, preventive maintenance (PM) work normally involve many pieces of equipment and could result in a large population. For this reason, planned sampling was chosen as the method of surveillance. The user should consider any unique requirements, and alter the plans as necessary for manageable evaluation of work.

2. Work Requirements. Each plan lists a number of performance indicators which comprise the major work item. Certain items were chosen as more critical than others in deciding on an overall evaluation. As an example, in watchstanding, the manning level is considered critical and regardless of the other work items, a grade of unsatisfactory (UNSAT) is given if the manning level is not at the required number. The PM work item is more flexible and allows for some error due to the large number of expected PMs.

3. Grading. There is a unique difference in the grading procedure for watchstanding and PMs as opposed to maintenance and repairs. In the former, a monthly summary can be made of all unsatisfactory grades and an observed defect rate (ODR) can be calculated for each performance indicator (manning, record keeping, etc.) because there will have been a large enough number of observations to make an ODR meaningful. For maintenance and repairs however, it is unlikely a large number (over 50) will have been issued unless the base is quite large. For this reason, each service call is individually graded satisfactory (SAT) or unsatisfactory (UNSAT), and at the end of the month, the QAE can report on the percentage of service calls found unsatisfactory. This percentage should not be used as an ODR% because there will probably be too few observations for it to be valid.

4. Rework. Rework is mandatory for PM work and corrective maintenance. A failure to properly man the watchstanding function should result in a payment deduction based on the "CONSEQUENCES OF CONTRACTOR'S FAILURE TO PERFORM REQUIRED SERVICES" clause, Section E. Response times allowed to perform rework are also specified in this clause.

B. QAE Staffing. QAE staffing should be based on surveillance requirements rather than determining surveillance requirements based on the availability of QAEs. QAE schedules are the documents used to establish staffing requirements. These schedules, based on specific QA plans and other known duties, are prepared by the QAE and approved by the FSCM. Once schedules and QA Plans are prepared, QAE staffing requirements are determined. If QAEs are not made available to perform identified surveillance requirements, surveillance requirements are systematically reduced to the level of QAE availability. In this situation, the activity is at least in a position of knowing exactly what surveillance is not being accomplished.

C. Performance Requirements

1. Maximum Allowable Defect Rates (MADRs), formerly Acceptable Quality Levels (AQLs), set the point at which performance becomes unsatisfactory to the customer, and stronger action on the part of the FSCM/ACO is required. Deductions are always required when an instance of noncompliance is observed and documented. The MADR reflects that point where overall service becomes unsatisfactory. MADRs are used solely as a tool to administer the contract and should not be made known to the Contractor.

2. A Performance Requirements Summary Table (PRS) is prepared by the specification writer as the GPWS is tailored (see the User's Guide for a sample). This table will be used by the QAE to determine the types of QA Plans required for contract surveillance. The tailored PWS will be the basis for individual plans.

III. QUALITY ASSURANCE PLANS

A. The following plans are suggested to the activity for use in monitoring the operation and maintenance of electrical distribution and emergency generation systems function:

QA Plan #1 - Watchstanding

QA Plan #2 - Preventive Maintenance

QA Plan #3 - Corrective Maintenance

QA Plan #4 - Minor Maintenance and Repair

B. Specification requirements for the Contractor to submit schedules of work, PM schedules, etc., do not require a separate QA plan. Either the PM Plan is submitted by the required date or it is not. If submitted, it must conform to the requirements stipulated in the contract.

QUALITY ASSURANCE PLAN #1
WATCHSTANDING

1. Contract Requirement. This QA Plan provides for the surveillance of watchstanding personnel operating and maintaining emergency generating equipment.

2. Performance Indicators - Standards of Performance

<u>Type of Service</u>	<u>Paragraph</u>
a. Manning	C.7
b. Voltage fluctuations	C.7
c. Record keeping	C.7
d. Equipment abnormalities	C.7

3. Primary Method of Surveillance

- a. Voltage fluctuations and record keeping - 100% inspection
- b. Manning and equipment abnormalities - Planned Sampling

4. Maximum Allowable Defect Rate (MADR)

- a. Manning 0%
- b. Voltage fluctuations 0% of observations outside range
- c. Record keeping 5%
- d. Equipment abnormalities 2 per month

5. Quantity of Work

a. 100% Inspection. The quantity of work is the total number of 24-hour voltage record charts, and all required log entries the Contractor is required to make during the evaluation period.

b. Planned Inspection. The quantity of work is the number of emergency generating equipment locations times the number of operating shifts and the number of operating days in the evaluation period.

6. Level of Surveillance

- a. 100% Inspection. N/A
- b. Planned Sampling

(1) Normal Surveillance (Level II). The normal level of surveillance will be used at the beginning of the contract, and will continue to be used until such time as the ODR indicates a different level is necessary.

(2) Reduced Surveillance (Level I). Reduced surveillance will be used when the ODR has been observed to be less than 1/2 the MADR for two consecutive months under normal surveillance (Level II). The sample sizes will remain at this level as long as the ODR is less than the MADR.

(3) Increased Surveillance (Level III). If at normal surveillance the ODR is greater than or equal to the MADR, then change the level of surveillance to increased (Level III). If at Level III the ODR is less than the MADR, return to Level II surveillance.

7. Sample Size

a. 100% Inspection. N/A

b. Planned Sampling

<u>Level of Surveillance</u>	<u>Number per Month</u>
Normal (Level II)	20% of locations
Reduced (Level I)	10% of locations
Increased (Level III)	40% of locations

8. Sampling Procedure. Each week, the QAE will choose the appropriate number of samples for the given level of surveillance. The samples should be chosen on a rotating basis so each location will be inspected at least once during a three-month period. The QAE will record the chosen sample locations on a monthly schedule sheet and update this schedule as necessary.

9. Evaluation Procedure. A recommended evaluation work sheet for watchstanding is attached. A daily inspection of the Generating Station is recommended at which time the QAE can perform inspection of all four work items.

a. All records are to be reviewed for proper recording of data.

b. Voltage charts are to be reviewed to identify any variations beyond the acceptable range.

c. A physical count of shift personnel is made to verify compliance with the specification.

d. A physical check of equipment is made to ensure normal operating characteristics are met.

10. Analysis of Results. At the end of the month, the QAE is to count the number of unsatisfactory grades for each work item. One unsatisfactory grade exceeding the allowed limit in manning or voltage fluctuation is justification for an overall unsatisfactory grade. For the other two items, an ODR is calculated by dividing the number of unsatisfactory grades by the total observations made. If the ODR exceeds the MADR, the task is considered unsatisfactory. Conclusions that can be drawn based on the ODR are:

a. If the ODR is less than the MADR, the evaluation indicates the performance indicator is satisfactory.

b. When the ODR exceeds the MADR, the evaluation indicates the performance indicator is unsatisfactory. If this occurs, the QAE should recommend a Contract Discrepancy Report (CDR) be issued to the Contractor.

c. For all observed defects, the QAE will calculate the appropriate deductions, and at the end of the invoice period, provide the FSCM with a report which itemizes the amounts by which the Contractor's invoice should be reduced.

EVALUATION WORK SHEET FOR WATCHSTANDING
QA PLAN #1

REQUIREMENTS	WORK ITEMS			
	MANNING	EQUIPMENT ABNORMALITIES	RECORD KEEPING	VOLTAGE FLUCTUATIONS
	3	None	All Entries	None
Monday	2 UNSATs	SAT	SAT	SAT
Tuesday	3 UNSATs	SAT	SAT	1 UNSAT
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

QUALITY ASSURANCE PLAN #2
PREVENTIVE MAINTENANCE

1. Contract Requirement. This QA Plan provides for the surveillance of the Contractor's PM Program.

2. Performance Indicators - Standards of Performance

<u>Type of Service</u>	<u>Paragraph</u>
a. Timeliness of test and PM	C.8.a
b. Quality of PM and test	C.8.a
c. Quality of test and deficiency reports	C.8.b, C.8.c

3. Primary Method of Surveillance. Planned Sampling

4. Maximum Allowable Defect Rate (MADR). A MADR of 5% is recommended.

5. Quantity of Work. Based on both specified requirements as well as the Contractor's PM schedule, the QAE should know what pieces of equipment are to receive preventive maintenance during each week of any given month. The number of pieces of equipment PM'd during any given month, times the frequency of PM for each, represents the total population size to be sampled.

6. Level of Surveillance

a. Normal Surveillance (Level II). The normal level of surveillance will be used at the beginning of the contract, and will continue to be used until such time as the ODR indicates a different level is necessary.

b. Reduced Surveillance (Level I). Reduced surveillance will be used when the ODR has been observed to be less than 1/2 the MADR for two months under normal surveillance (Level II). The sample sizes will remain at this level as long as the ODR is less than the MADR.

c. Increased Surveillance (Level III). If at normal surveillance the ODR is greater than or equal to the MADR, then change the level of surveillance to increased (Level III). If at Level III the ODR is less than the MADR, return to Level II surveillance.

7. Sample Size

<u>Level of Surveillance</u>	<u>Number per Month</u>
Normal (Level II)	20% of scheduled services
Reduced (Level I)	10% of scheduled services
Increased (Level III)	40% of scheduled services

8. Sampling Procedure. Each week, the QAE will choose the appropriate number of samples for the given level of surveillance. The samples should be chosen on a rotating basis so each location will be inspected at least once during a three-month period. The QAE will record the chosen sample locations on a weekly schedule sheet and update this schedule as necessary.

9. Evaluation Procedures. Some time during the week, the QAE will visit each of the chosen locations. These visits can be conducted on any day of the week, and should be coordinated with other inspections which occur in the general area. Consideration must be given to timing of the inspections so they occur soon after the scheduled service. Care must be given to avoid setting up a pattern of inspections which would allow the Contractor to predict the location or time of any inspection. Evaluation work sheets, such as that attached to this plan, are prepared by the QAE for each day evaluations are scheduled for the coming month. On the day work is to be evaluated, the QAE will visit the work site and evaluate performance of each work item listed. Work items performed satisfactorily will have a "SAT" recorded; those that are unsatisfactory or nonperformed will have an "UNSAT" entered. At the end of the day, the QAE will determine the total amount of work unsatisfactory or nonperformed. At the end of the month, this information will be the basis for calculating overall performance and any payment deductions made.

10. Analysis of Results. At the end of the month, the QAE will count the number of checkpoints classified as unsatisfactory, and compute an ODR for each performance indicator. The ODR is the number of unsatisfactory checkpoints divided by the total number of checkpoints.

$$\text{ODR} = \frac{\text{Total Unsatisfactory Checkpoints}}{\text{Total Number of Checkpoints}} \times 100$$

Conclusions that can be drawn based on the ODR are:

a. If the ODR is less than the MADR for a given performance indicator, the evaluation indicates performance has been satisfactory.

b. When the ODR exceeds the MADR for the given performance indicator, the performance is unsatisfactory. If this occurs, the QAE should recommend a Contract Discrepancy Report (CDR) be issued to the Contractor.

c. For all observed defects, the QAE will calculate the appropriate deductions, and at the end of the invoice period, provide the FSCM with a report which itemizes the amounts by which the Contractor's invoice should be reduced.

QUALITY ASSURANCE PLAN #3
CORRECTIVE MAINTENANCE

1. Contract Requirement. This QA Plan provides for surveillance of the Contractor's performance of corrective maintenance, including correction of deficiencies detected by the Contractor during routine operations, PM inspections, and the performance of service calls.

2. Performance Indicators - Standards of Performance

<u>Type of Service</u>	<u>Paragraph</u>
a. Response/completion time	C.9.d
b. Quality of repair (correction of malfunction)	C.9
c. Elimination of emergency condition	C.9.c(2)

3. Primary Method of Surveillance. One hundred percent inspection if the number of work orders per week is less than 20; otherwise use planned sampling. Always use 100% inspection for emergency service calls.

4. Maximum Allowable Defect Rate (MADR)

a. Response/completion time	10% or 4/week
b. Quality of repair (correction of malfunction)	5% or 2/week
c. Elimination of emergency condition	0%

5. Quantity of Work. The quantity of work will vary each month, and will be determined by the number of corrective maintenance work orders received and completed.

6. Level of Surveillance

- a. 100% Inspection. N/A
- b. Planned Sampling

(1) Normal Surveillance (Level II). The normal level of surveillance will be used at the beginning of the contract, and will continue to be used until such time as the ODR indicates a different level is necessary.

(2) Reduced Surveillance (Level I). The reduced surveillance will be used when the ODR has been observed to be less than 1/2 the MADR for two consecutive months under normal surveillance (Level II). The sample sizes will remain at this level as long as the ODR is less than the MADR.

(3) Increased Surveillance (Level III). If at normal surveillance the ODR is greater than or equal to the MADR, then change the level of surveillance to increased (Level III). If at Level III the ODR is less than the MADR, return to Level II surveillance.

7. Sample Size

a. 100% Inspection. N/A

b. Planned Sampling. The quantity of work for the month is determined from the number of work orders issued.

<u>Level of Surveillance</u>	<u>Number per Month</u>
Normal (Level II)	20% of work orders
Reduced (Level I)	10% of work orders
Increased (Level III)	40% of work orders

8. Sampling Procedure. Each month, the QAE will choose the appropriate number of samples based on the level of surveillance being used. Any work order may be chosen, but consideration will be given to areas with command interest or where unsatisfactory performance has been observed during the previous evaluation period.

9. Evaluation Procedure. Corrective maintenance actions will either be generated by the Contractor or issued by a Government representative. Each action inspected will be graded on the following standards, if applicable. The QAE should prepare an individual work sheet similar to that attached.

	<u>STANDARD</u>	<u>MADR</u>
Response/completion time	Within !INSERT! days for routine calls and !INSERT! hours for emergency calls	10% of work reviewed is responded to or completed beyond the standard time
Quality of repair	Equipment functions as intended	5% of work reviewed shows a deficiency in repair quality
Elimination of emergency condition	Eliminate all conditions posing a hazard to persons or property	0%

The QAE will use a standard inspection report which lists the type of inspection, location, date, and each checkpoint to be evaluated. This report will be completed on-site and signed by the QAE. Any noted defects will be explained, and if rework is ordered, the action taken by the Contractor will be noted.

10. Analysis of Results. At the end of the month, the QAE will count the number of checkpoints classified as unsatisfactory, and compute an ODR for the month. The ODR is the number of unsatisfactory checkpoints divided by the total number of checkpoints.

$$\text{ODR} = \frac{\text{Total Unsatisfactory Checkpoints}}{\text{Total Number of Checkpoints}} \times 100$$

Conclusions that can be drawn based on the ODR are:

a. If the ODR is less than the MADR for a given performance indicator, the evaluation indicates performance has been satisfactory.

b. When the ODR exceeds the MADR for the given performance indicator, performance is unsatisfactory. If this occurs, the QAE should recommend a Contract Discrepancy Report (CDR) be issued to the Contractor.

c. For all observed defects, the QAE will calculate the appropriate deductions, and at the end of the invoice period, provide the FSCM with a report which itemizes the amounts by which the Contractor's invoice should be reduced.

QUALITY ASSURANCE PLAN #4
MINOR MAINTENANCE AND REPAIR

1. Contract Requirement. This QA Plan provides for the surveillance of the Contractor's performance of delivery orders for minor maintenance and repair.

2. Performance Indicators - Standards of Performance

<u>Type of Service</u>	<u>Paragraph</u>
a. Timeliness of repair	C.11.a, C.11.b
b. Quality of repair	C.11
c. Complete/timely estimates	C.12.c

3. Primary Method of Surveillance. One hundred percent inspection.

4. Maximum Allowable Defect Rate (MADR)

a. Timeliness of repair	10%
b. Quality of repair	5%
c. Complete/timely estimates	10%

5. Quantity of Work. The quantity of work will be all minor maintenance and repair completed during the month.

6. Level of Surveillance. N/A

7. Sample Size. N/A

8. Sampling Procedure. N/A

9. Evaluation Procedure. Each delivery order is individually inspected, and if necessary, reinspected until accepted as satisfactorily completed. The QAE will use an individual inspection report for each delivery order, which lists the type of inspection, location, date, and each checkpoint to be evaluated. This report will be completed on-site and signed by the QAE. Any noted defects will be explained, and if rework is ordered, the action taken by the Contractor will be noted.

10. Analysis of Results. An unsatisfactory grade in the area of quality is unacceptable and cause for nonpayment until corrected by the Contractor. If the completion time is unsatisfactory but the quality is satisfactory, the service may be graded satisfactory; however, at the end of the month, the number of unsatisfactory grades for timeliness is added, and an ODR is calculated and compared to the MADR. If the ODR exceeds the MADR in either timeliness or quality, the service performance is unsatisfactory for the month and should be included in the CDR.

MINOR MAINTENANCE AND REPAIR WORK SHEET
QA PLAN #4

Delivery Order _____

Date issued _____

Required Completion Date _____

Actual Completion Date _____

Timeliness: SAT UNSAT

	<u>Required Operating Characteristics</u>	<u>Actual Performance</u>	<u>SAT/UNSAT</u>
1.			
2.			
3.			
4.			
5.			
6.			

Total UNSAT Grades _____

Quality Grade (SAT/UNSAT) _____

Remarks:

QAE Signature/Date _____

IV. CONTRACTOR'S OVERALL PERFORMANCE EVALUATION. The end result of a QA Program is the overall evaluation of the Contractor's performance for each service monitored. It is important to establish an overall monthly performance to determine whether to increase, decrease, or maintain the same level of surveillance. If the overall performance has been unsatisfactory, a CDR is needed (see NAVFAC MO-327). Each and every contract discrepancy observed and documented should result in a deduction from the Contractor's monthly invoice. At the end of each month, the QAE will complete the monthly evaluation report and submit it to the FSCM. This report is based on:

QA Plan #1 - Watchstanding

QA Plan #2 - Preventive Maintenance

QA Plan #3 - Corrective Maintenance

QA Plan #4 - Minor Maintenance and Repair

A. Summary Report. The monthly summary report on the following page is suggested for activity use. An overall grade for each performance indicator is assigned based on the results of the months inspections.

B. Recommended Payment Deductions

1. Deductions will only be based on observed defects. When there is an established price for a work item in the Schedule of Deductions, as is the case for preventive maintenance work items, that price times the number of observed defects will be the basis for deductions. When there is no established price for a work item, as is the case for service calls, Engineered Performance Standards (EPS) and the wage determination attached to the contract will be used to determine the amount to deduct from the Contractor's invoice, as specified in the "SCHEDULE OF DEDUCTIONS" clause.

2. All work not in compliance with the contract is subject to deductions plus a 10% or 20% charge for liquidated damages (see "CONSEQUENCES OF CONTRACTOR'S FAILURE TO PERFORM REQUIRED SERVICES" clause, Section E).

V. CONTRACTOR SUBMISSIONS. Develop list of all Contractor submissions, when they are due, and to whom they should be routed. These submissions should be separated into before award and after award submissions.

MONTHLY SUMMARY REPORT
 OPERATION AND MAINTENANCE OF ELECTRICAL DISTRIBUTION
 AND EMERGENCY GENERATION SYSTEMS
 For the month of April

Date Submitted 10 May 1987

Submitted by Tom Brady

SERVICE	MADR	ODR	CDR REQUIRED	DEDUCTIONS*
QA PLAN #1 - WATCHSTANDING				
Manning	0%	0.0%	No	\$ 0
Voltage fluctuations	0%	0.0%	No	\$ 0
Record keeping	5%	1.6%	No	\$ 56
Equipment abnormalities	2/month	1	No	\$ 0
QA PLAN #2 - PREVENTIVE MAINTENANCE				
Timeliness of test and PM	5%	2.0%	No	\$ 36
Quality of PM and test	5%	1.8%	No	\$ 34
Quality of reports	5%	7.5%	Yes	\$ 78
QA PLAN #3 - CORRECTIVE MAINTENANCE				
Response/completion time	10%	6.7%	No	\$ 102
Quality of repair	5%	4.9%	No	\$ 310
Elimination of emergency condition	0%	0.0%	Yes	\$ 0
QA PLAN #4 - MINOR MAINTENANCE AND REPAIR				
Timeliness of repair	10%	6.7%	No	\$ 0
Quality of repair	5%	4.9%	No	\$ 31
Complete/timely estimates	10%	0.0%	No	\$ 0

* See attached sheets for calculation of payment deductions.

END OF QA GUIDE