(13)

NHB 5320.2

OFFICE OF MANNED SPACE FLIGHT

APOLLO PROGRAM

OCTOBER 1965

CONTRACTOR RELIABILITY PLANS AND PERFORMANCE EVALUATION MANUAL

SURVEY OF

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

PREFACE

This document is an official release of the Apollo Program Office and its use shall be implemented by all cognizant elements of the Apollo Program in their performance of surveys.

One of the most essential items in any management function is feedback. This is especially true in a program the magnitude of the Apollo Program. This Manual for Evaluating Apollo Contractor Reliability Plans and Performance is a working manual providing this feedback and serves as a method to survey and evaluate the effectiveness of procedures, designs, development and production in industry and their impact on reliability. The survey format is intended to be a constructive aid to NASA management and contractors in assisting them in their program management responsibilities.

Some of the areas the survey is concerned with are:

(a) Reliability performance assurance in design;

(b) Reliability performance assurance in testing;

(c) Reliability analysis of equipment non-performance;

(d) Reliability considerations on the Apollo program administration;

(e) Reliability growth in industry and in the program.

The Apollo Program must assure the highest reliability program for success. This Manual for Evaluating Apollo Contractor Reliability Plans and Performance was accomplished in collaboration with the three field Centers under the auspices of NASA Headquarters, Washington, D.C.

Samuel C. Phillips
Major General, USAF
Director, Apollo Program

DISTRIBUTION:
SPECIAL

INDEX FINDER

MANUAL FOR EVALUATING CONTRACTOR RELIABILITY PLANS AND PERFORMANCE

ABSTRACT

This manual has been prepared for use in reviewing and evaluating a contractor' s Reliability Program Plan and its implementation.

It is based on and is consistent with NASA Reliability Publication NPC 250-1 and embodies Reliability Program Evaluation Procedures NASA SP-6002.

TABLE OF CONTENTS

WORK ELEMENTS

TABLE OF CONTENTS (CONT.)

PRIME CONTRACTOR _____

SURVEY NUMBER 1 DATE _____

TEAM CHAIRMAN _____

TEAM MEMBERS _____

SURVEY NUMBER 2 DATE _____

TEAM CHAIRMAN _____

TEAM MEMBERS _____

SURVEY NUMBER 3 DATE _____

TEAM CHAIRMAN _____

TEAM MEMBERS _____

SURVEY NUMBER 4 DATE _____

TEAM CHAIRMAN _____

TEAM MEMBERS _____

1

INTRODUCTION

INTRODUCTION

This manual is a standard for use as:

1. A checklist for reviewing a contractor's Reliability Program Plan(s).
2. A guide to assist NASA surveyors in preparing for, conducting, evaluating, and reporting appraisals of a contractor's effectiveness in implementing his specific Reliability Program Plan.

It is designed to be used for checking all contracts which invoke NASA Reliability Publication NPC 250-1 for compliance to the Reliability Program Plan, and performance of a contractor in implementing the plan. When portions of NPC 250-1 or other reliability specifications are invoked, the work elements in this manual may be selectively applied to survey compliance of performance.

The broad overall objectives for the manual are threefold:

1. To establish uniform methods for evaluating the degree and effectiveness of reliability practices and controls.
2. To provide a tool for identifying reliability type problems for evaluation and timely corrections.
3. To aid in recognition of improved methods being used to control specific program areas so that these methods can be applied beneficially to all space programs.

Comments and questions concerning the requirements set forth in this publication should be referred to Apollo Program Office Headquarters (Code MAR), Washington 25, D.C. Questions concerning the application of this manual to specific contracts should be referred to the cognizant NASA installation.

ARRANGEMENT OF MANUAL

Numbering System

The manual includes five (5) major sections corresponding to the five sections in NPC 250-1. These are:

Section 1 - Introduction
Section 2 - Program Management
Section 3 - Reliability Engineering
Section 4 - Testing and Reliability Evaluation
Section 5 - Documentation of Reliability Program

Each section is divided into major groups significantly numbered and identified as "Activity Area." The activity area may be either an entire section or a significant part of the section. These are:

Activity Area 2.0 - Program Management
Activity Area 3.2 - Design Specifications
Activity Area 3.3 - Reliability Prediction and Estimation
Activity Area 3.4 - Failure Mode, Effect, and Criticality Analysis
Activity Area 3.5 - Maintainability and Elimination of Human Induced Failure
Activity Area 3.6 - Design Review Program
Activity Area 3.7 - Failure Reporting and Correction
Activity Area 3.8 - Standardization of Design Practices
Activity Area 3.9 - Parts and Materials Program
Activity Area 3.10 - Equipment Logs
Activity Area 4.0 - Testing and Reliability Evaluation
Activity Area 5.0 - Documentation of Reliability Program

Each activity area includes a series of major paragraphs significantly numbered and consistent with the major paragraphs in NPC 250-1. In turn, each paragraph is subdivided into individual basic work elements. Work elements are identified with the major paragraph in which they appear. The last digit arbitrarily identifies the work element sequence. For example:

"SECTION 3: RELIABILITY ENGINEERING"
"ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM"
"3.6.1 DESIGN REVIEWS BY THE CONTRACTOR"
"3.6.1.1 The contractor establishes ----------major component level."
(This is the first work element in paragraph 3.6.1)

RESPONSIBILITIES AND AUTHORITY

APOLLO PROGRAM OFFICE HEADQUARTERS

a. Be the central receiving headquarters for all survey reports.

b. Prepare and issue consolidated reports.

c. Cooperate with centers in recommending survey schedules and scope of survey for contractors.

d. Establish, unify, and monitor evaluation procedures and techniques.

COGNIZANT NASA INSTALLATIONS

a. Schedule contractor surveys in collaboration with contractor.

b. Formally notify the contractor and all other appropriate activities of date, purpose, and scope of survey.

c. Request contractor to conduct an introductory meeting to acquaint survey team members with his organization, practices, and procedures.

d. Advise the contractor, formally, of the results and conclusions of the survey, and suggested action to improve or correct activities deemed inadequate.

e. Follow-up survey results to determine compliance of contractor toward correcting deficiencies, if any.

f. Prepare and maintain survey reports and related documentation.

g. Transmit survey reports and related documentation to Apollo Program Office Headquarters and other designated activities.

CHAIRMAN OF SURVEY TEAM

Note

> Before leaving the NASA installation for a contractor survey, ascertain that the status of every applicable work element of the contractor's appropriate reliability program plan is clearly indicated in the "CONTRACTOR RELIABILITY PROGRAM PLAN" block in all surveyor's manuals.

If this status is lacking, the survey team chairman should initiate action to obtain this data.

a. Plan and organize the survey so that time at the contractor's plant will be minimized.

b. Check in with the NASA Resident Inspector or the Government Inspection Agency representative at contractor's plant and review survey plans.

c. Review the purpose, technique, and schedule of the survey at the introductory meeting with contractor's personnel.

d. Coordinate the survey and appraisal of the contractor's compliance to applicable reliability activities.

e. Indoctrinate lesser experienced team members in developing guidelines for evaluating work elements.

f. Conduct a post survey critique with contractor personnel and informally discuss the results of the survey. Allow the contractor to explain any unusual or discrepant information obtained.

g. Prepare a final report of the results of the survey for the cognizant NASA installation. Copies of this report to be sent to personnel and activities as designated.

SUGGESTIONS FOR SCHEDULING AND CONDUCTING THE SURVEY

a. Establish a realistic schedule of daily activities for the survey team during the survey. Review surveyors progress daily and adjust techniques and/or assignments as necessary to maintain established schedules.

b. Establish a realistic duration for the survey commensurate with the magnitude of the contractor's activities and objectives to be achieved. The survey should be accomplished in the shortest possible time. (Extended surveys are not only costly to both NASA and the contractor, but they could have a detrimental effect on the contractor's delivery schedules.) The surveyor should also be particularly careful not to unnecessarily interfere with or impede the contractor's operations.

c. After the introductory meeting with the contractor's personnel, each survey team member should review his assigned activity area(s) with the responsible contractor's representative.

d. For each activity area, request the contractor's representative to thoroughly describe its organization, function, operating procedures, practices, and relationship to other functional units. (Allow contractor representative to make entire presentation without interruption.)

e. Survey team members should take adequate notes to stimulate subsequent informative discussions during detailed review and appraisal of individual work elements.

f. Detailed review of work elements should take place, preferably, in the immediate vicinity of the activity being reviewed. This will permit closer personal observation of the activity leading to a more thorough exploration of data and information the surveyor needs to make a realistic and fair appraisal of the contractor's performance.

USE OF MANUAL

GENERAL

This manual is designed to be used as a working document prior to and during the survey of a space system contractor for the measurement of his compliance to reliability program provisions of NPC 250-1 for the duration of the contract.

It is used in the review of the contractor's Reliability Program Plan(s). It is used in the evaluation of the contractor's performance in the implementation of his specific Reliability Program Plan(s).

RELIABILITY PROGRAM PLAN REVIEW

The work elements in the manual detail all of the requirements of NPC 250-1. Since most of these are covered in an effective Reliability Program Plan, this manual serves as an excellent checklist for the evaluation of any pertinent contractor-submitted plan.

To properly evaluate a given plan, the reviewing personnel at the cognizant NASA installation must have available all contractual documents, statements of work, and all other agreements invoked on the contractor.

The reviewing personnel must check all contractual requirements, and indicate plan designation by Paragraph Numbers 2.2.2, 2.2.3, or 2.2.4 referring to the Preliminary, Intermediate, or Formal Plans, respectively. In addition, the reviewers will review the contractor's Reliability Program Plan content against each work element applicable to the plan as indicated by the statement below the "CONTRACTOR RELIABILITY PROGRAM PLAN" block.

The reviewers will indicate degree of adequacy and quality of contractor's program plan by their entries in the compliance block for each applicable work element.

"NA," to designate "Not Applicable," will be entered in the appropriate block spaces for those elements not indicated as applicable to a given plan.

All matters requiring discussion and/or corrective action should be entered under "NARRATIVE COMMENTS AND CORRECTIVE ACTION" for each applicable element.

EVALUATING IMPLEMENTATION OF THE CONTRACTOR'S RELIABILITY PROGRAM PLAN

The assessment of a contractor's reliability performance through an in-plant survey is a challenging and responsible assignment. In addition to providing a measure of performance,

the assignment provides an opportunity to recommend specific action to make future performance more effective. Feedback from surveyors should be used to develop better and stronger reliability programs.

It is desirable that the key surveyors on the team be well qualified. Suggested basic requirements for a surveyor include the following:

a. Be familiar with contract reliability requirements and the contractor's organization and program plans.
b. Be knowledgeable of the assigned activity area.
c. Be able to converse effectively with contractor personnel and thereby obtain objective evidence concerning the degree of contractor compliance to the reliability requirements.

The success of the survey and the impressions left with the contractor will be influenced greatly by the preparation and planning which should take place at the NASA Center before going into the contractor's plant.

Usually, information at the Center will provide excellent background material. This information is available in documents and publications such as:

a. The contract.
b. Statements of work supplementing the contract.
c. The Reliability Program Plan(s).
d. This manual with its developed checklist of applicable work elements.
e. Supplementary pertinent documents and reports.
f. Records of previous surveys in addition to this manual.

The work elements in this manual describe reliability procedures, controls, and documentation necessary to assure maximum results in each activity area. The number of elements for each activity varies with the complexity of the activity, and all elements within the activity are not necessarily of equal importance. It is the surveyor's responsibility to evaluate the contractor's performance for each applicable work element with ultimate importance factors to be determined by the survey team.

It is important that records of previous summaries of the same contractor be carefully reviewed prior to the contemplated survey to establish those activity areas and work elements which had previously required improvement. Deficiencies noted in previous surveys can be carefully scrutinized during this survey.

However, the emphasis on the review of previously deficient work elements should not detract from or prevent a complete re-evaulation of those elements which were previously fully conforming. An objective evaluation should be made of all work elements during each survey.

HOW TO FILL IN THE WORK ELEMENT PAGES

1. It is recommended that certain portions of the work element pages be filled in at the cognizant NASA installation. This may be done by personnel who are responsible for reviewing the contractor's Reliability Program Plan(s) and pertinent supporting documentation such as various reports, lists, and other informative documents. These personnel will be referred to as "Plan Reviewer" throughout this instruction.

   Personnel performing the actual survey at the contractor's facilities will be referred to as "Surveyors."

   In the following instructions, suggestions will be made for specific personnel to perform certain functions where it appears most convenient for them to do so.

2. It is recommended that the "Plan Reviewers" accumulate and categorize all of a contractor's documentation. This documentation should be reviewed completely at the installation, and all applicable work elements be evaluated before the survey team enters the contractor's plant for their survey. At the same time, the Plan Reviewers can indicate in the manual which work elements could not be completely evaluated at the installation, and that further review is necessary at the contractor's plant.

3. For the assistance of the Plan Reviewers and the Surveyors, the following are included:
   a. Pages XVI and XVII include a brief basic description of the work element page.
   b. Pages XVIII and XIX are suggested instructions to the Plan Reviewer.
   c. Pages XX and XXI are suggested instructions to the Surveyor.
   d. Pages XXII and XXIII are typical filled-in work element pages as a result of action by the Plan Reviewers and the Surveyors after several reviews and surveys.

DESCRIPTION OF THE WORK ELEMENT PAGE

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM

3.6.1 Design Reviews by the Contractor

These headings identify the activity area and a major effort of an activity area.

SURVEYOR _____

_____

_____

_____

These spaces are provided for the names of the Surveyors appraising the subject work element. Each line can accommodate two names, thus allowing for four surveys.

3.6.1.1 The contractor establishes and conducts a formal program of planned, scheduled, and documented design reviews at the system, subsystem, and major component level.

This is the actual work element that will be appraised and evaluated.

Doc. No. _____ Title _____ Date _____

These headings within the work element area indicate that the contractor is expected to have documentation verifying his compliance to this requirement of NPC 250–1.

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

This space is provided for the name of the contractor's functional unit responsible for implementing the subject work element.

250–1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN			
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE

This block is designed to identify and to represent the status of the contractor's Reliability Program Plan(s) contents pertinent to the subject work element.

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This statement is included as a guide suggesting the Reliability Program Plan(s) to which the subject work element may apply.

(Fill in During Survey) IMPLEMENTATION		
ADEQUATE	INADEQUATE	DATE

The status of implementation of this work element is to be indicated in this block as a result of the survey.

This work element overlaps NPC 200–2, paragraph 4.2. Verify that the contractor is complying with this requirement without duplication of effort.

Certain work elements of NPC 250–1 are duplicates of some work elements of NPC 200–2. This statement, when it appears, alerts the surveyor to ascertain that the requirement is being performed under the Reliability Program or the Quality Program, but not by both programs.

At each milestone formal design reviews have been held for each subsystem and major component defined to date culminating in a formal review of the system and its objectives.

The meetings are conducted and follow a predetermined agenda prepared for each specific meeting to insure complete review coverage. The formal review covers the whole design effort to date, including previous formal and informal design reviews.

These are amplifying statements generally included for most work elements. Some elements appear to have no need for additional information.

a. Is there a documented design review procedure?
b. Is the formal design review program documented?
c. Were all major components identified to date reviewed?
d. Were all subsystems identified to date reviewed?
e. Were these reviews conducted with the emphasis on overall system objectives?
f. Was each subsystem reviewed from the viewpoint of system reliability requirements?

Most work element pages include a varying number of typical questions that the Plan Reviewer or Surveyor may wish to apply during the review as an element. The questions are designed with the intent of stimulating informative discussions with the contractor's personnel and are capable of being verified by the contractor's documentation.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

All the space below this heading is allotted for remarks, comments, and directions by all personnel associated with or participating in the review of a contractor's Reliability Program Plan(s), his documentation, and in recording the results of a plant survey. The page following the work element page is used to continue this information.

SUGGESTED INSTRUCTIONS TO PLAN REVIEWER

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM **SURVEYOR** _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.1 The contractor establishes and conducts a formal program of planned, scheduled, and documented design reviews at the system, subsystem, and major component level.

No action is required for the above headings as they define the activity area and spell out the work element. Leave Surveyor spaces blank.

Doc. No. _____ Title _____ Date _____

a. *Enter the identification, title, and latest revision designation for those documents pertinent to the subject work element. If the above space is inadequate to include all documents, enter a notation in the space above to the effect that a summary of documents and their evaluation may be found under "NARRATIVE COMMENTS AND CORRECTIVE ACTION." (Lack of readily identifiable documents may indicate non-compliance to NPC 250-1. A notation should be entered under "NARRATIVE COMMENTS" recommending further investigation.)*

b. *Review and evaluate the contractor's documentation as follows:*

1. *If the documentation is the Reliability Program Plan or any portion thereof, record its identification and date in the spaces above and proceed to "CONTRACTOR ORGANIZATION RESPONSIBILITY." (Omit steps 2 and 3.)*
2. *If the documentation consists of reports, lists, and informative supporting documents, enter data in spaces above.*
3. *Review and evaluate their contents for compliance to the subject work element. Express in appropriate terminology their degree of compliance under "NARRATIVE COMMENTS AND CORRECTIVE ACTION." Enter any other necessary instructions or comments.*

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

a. *From the review of a contractor's documentation, ascertain and enter which of the contractor's functional units or groups is most likely to be responsible for the implementation of the subject work element. (Having this knowledge beforehand will enable the survey team to plan their survey activities more realistically, to reduce time spent at the contractor's plant, and to create a better atmosphere by inconveniencing the contractor as little as possible.)*

b. *If it is not readily ascertainable which group is most likely to be responsible, leave this line blank.*

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN			
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. *Under "PLAN," enter "2.2.2," "2.2.3," or "2.2.4" as applicable to the work element of the reliability plan being surveyed. The statement below this block may be used as a guide to select the plan to which the work element applies. Enter "NA" (not applicable) under "PLAN" and under "PAGE/PAR. NO." when the element is not a part of the program plan, but consists of supporting documentation.*

b. *Under "PAGE/PAR. NO.," enter page number and paragraph designation of the contractor's reliability plan in which subject work element is covered.*

c. *Enter status of program plan coverage as follows:*

   1. *If the contractor has satisfactorily or adequately covered the work element in his Reliability Program Plan, the Plan Reviewer will enter his name or initials under heading "ADEQUATE" and the date of the review under "DATE."*

   2. *If the contractor's coverage is not satisfactory, the Plan Reviewer will enter his identity under heading "INADEQUATE" and the date of the review under "DATE." He will also enter appropriate comments to explain why coverage is considered inadequate under "NARRATIVE COMMENTS AND CORRECTIVE ACTION."*

This work element overlaps NPC 200-2, paragraph 4.2. Verify that the contractor is complying with this requirement without duplication of effort.

In conjunction with his review, research, and evaluation, it may be convenient for the Plan Reviewer to ascertain that the contractor is or is not duplicating effort in complying with the work element requirement. When the Plan Reviewer does make this determination, he should so indicate under "NARRATIVE COMMENTS". This will serve to alert the Surveyor not to duplicate this effort of review at the contractor's facility.

a. Is there a documented design review procedure?
b. Is the formal design review program documented?
c. Were all major components identified to date reviewed?
d. Were all subsystems identified to date reviewed?
e. Were these reviews conducted with the emphasis on overall system objectives?
f. Was each subsystem reviewed from the viewpoint of system reliability requirements?

The Plan Reviewer may wish to utilize or supplement the suggested tickler questions generally included for each work element. He may wish to devise his own questions and pattern of investigation to arrive at a fair appraisal and evaluation of the contractor's documentation requirements.

(Fill in During Survey) **IMPLEMENTATION**		
ADEQUATE	INADEQUATE	DATE

When the contractor's implementation consists of reports, procedures, and other informative documents requiring submission to the cognizant NASA installation, enter "NA" under "INADEQUATE" and the date of entry under "DATE" in the above block. (This will alert the Surveyor at the plant, normally, to ignore the implementation of work elements so designated.) However, the Plan Reviewer may find it advisable to include instructions to the Surveyor under "NARRATIVE COMMENTS."

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Use the space under this heading for any and all remarks, comments, instructions, and directions that will provide a detailed running account of the complete history of each applicable work element resulting in a comprehensive input to the evaluation of a contractor's overall performance in his implementation of the invoked Reliability Program Plan(s).

It is suggested that the Plan Reviewer initial and date his narration, and draw a line at the end of the narration.

SUGGESTED INSTRUCTIONS TO SURVEYOR

SURVEYOR _____

_____

_____

_____

These spaces are provided for the names of the Surveyors appraising the subject work element. Each line can accommodate two names, thus allowing for four surveys.

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.1 The contractor establishes and conducts a formal program of planned, scheduled, and documented design reviews at the system, subsystem, and major component level.

No surveyor action is required for the above headings as they define the activity area and spell out the work element.

Doc. No. _____ Title _____ Date _____

a. *If the above headings are blank it is an indication that the required documents were not available at the cognizant NASA installation. Submission of required documentation may have been an oversight by the contractor, it may have been delayed, or it may not require contractor submission. It may be available for review at the contractor's facilities.*

b. *Check for comments and/or suggested action by the Plan Reviewer under "NARRATIVE COMMENTS AND CORRECTIVE ACTION." (The appraisal of the work element which requires documentation cannot be considered complete until the appropriate documentation is available and has been reviewed. This must be done by either the Plan Reviewer or by the Surveyor, or through their combined efforts.)*

c. *Enter the identification, title, and latest revision designation in the above spaces for those documents previously unavailable at the NASA installation.*

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

a. *Check to see that the contractor's responsible functional group is indicated.*

b. *If this line is blank, determine who is responsible while at the contractor's plant and enter this information for use in this and subsequent surveys.*

c. *Verify that the functional group, as previously determined by the Plan Reviewer, is correct.*

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN			
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE

a. *The above block is normally filled in by the Plan Reviewer at the installation and action is generally not required by the Surveyor. Check to see that the block has been filled in at the installation.*

b. Verify, where convenient, that the information in the Program Plan Block is the latest available.

c. As a final check, review the "NARRATIVE COMMENTS AND CORRECTIVE ACTION" notations for any instruction that the Plan Reviewer may have included for the Surveyor to check into while at the contractor's facility.

This work element overlaps NPC 200-2, paragraph 4.2. Verify that the contractor is complying with this requirement without duplication of effort.

a. Check "NARRATIVE COMMENTS" for any notations that the Plan Reviewer may have entered.

b. If there are no notations, it is up to the Surveyor to ascertain that the contractor is or is not duplicating effort in complying with the work element requirement. Enter all appropriate comments under "NARRATIVE COMMENTS."

At each milestone formal design reviews have been held for each subsystem and major component defined to date culminating in a formal review of the system and its objectives.

The meetings are conducted and follow a predetermined agenda prepared for each specific meeting to insure complete review coverage. The formal review covers the whole design effort to date, including previous formal and informal design reviews.

The Surveyor may wish to orient himself with the amplifying information generally following the "PROGRAM PLAN" and "IMPLEMENTATION" blocks. Except for this orientation, Surveyor action is not required.

a. Is there a documented design review procedure?
b. Is the formal design review program documented?
c. Were all major components identified to date reviewed?
d. Were all subsystems identified to date reviewed?
e. Were these reviews conducted with the emphasis on overall system objectives?
f. Was each subsystem reviewed from the viewpoint of system reliability requirements?

The Surveyor may wish to utilize or supplement the suggested tickler questions generally included for each work element. He may wish to devise his own questions and pattern of investigation to arrive at a fair appraisal and evaluation of the contractor's implementation of the applicable work elements. These questions are designed to provide a starting point for the review of each element.

(Fill in During Survey) **IMPLEMENTATION**		
ADEQUATE	INADEQUATE	DATE

After reviewing and evaluating the contractor's implementation of each applicable work element, and after factoring in the results of the installation's directions, enter the survey team chairman's initials under "ADEQUATE" or "INADEQUATE" and the date the survey was conducted. His initials indicate that he is in agreement with the results reported by the Surveyors. The Surveyor(s) must supplement their appraisal of inadequate with the explanation for this appraisal under "NARRATIVE COMMENTS."

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Use the space under this heading for any and all remarks, comments, instructions, and directions that will provide a detailed running account of the complete history of each applicable work element resulting in a comprehensive input to the evaluation of a contractor's overall performance in his implementation of the invoked Reliability Program Plan(s).

It is suggested that the Surveyor initial and date his narration, and draw a line at the end of the narration.

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM

SURVEYOR J. C. Daykes, E. A. Smith, R. M. Brown

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.1 The contractor establishes and conducts a formal program of planned, scheduled, and documented design reviews at the system, subsystem, and major component level.

Doc. No. 765.2.477 Title Design Review Procedure Date 10/22/63

CONTRACTOR ORGANIZATION RESPONSIBILITY Engineering/Management

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE
2.2.2	110/18.3.4		Don Gray	2/26/64		J.C.D.	3/1/65
2.2.2	110/18.3.4	Don Gray		3/5/64		E.A.S.	8/30/65
2.2.3	93/10.1	L. White		6/1/64	R.M.B		6/10/66
2.2.4	93/10.1	L. White		10/30/64			

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 4.2. Verify that the contractor is complying with this requirement without duplication of effort.

At each milestone formal design reviews have been held for each subsystem and major component defined to date culminating in a formal review of the system and its objectives.

The meetings are conducted and follow a predetermined agenda prepared for each specific meeting, to insure complete review coverage. The formal review covers the whole design effort to date, including previous formal and informal design reviews.

a. Is there a documented design review procedure?
b. Is the formal design review program documented?
c. Were all major components identified to date reviewed?
d. Were all subsystems identified to date reviewed?
e. Were these reviews conducted with the emphasis on overall system objectives?
f. Was each subsystem reviewed from the viewpoint of system reliability requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

First submission of 2.2.2 is inadequate because the equipment covered was only to the subsystem level. Don Gray 2/26/64

In plant survey revealed poor representation and lack of documentation at design review meetings. J.C. Daykes 3/1/65

Design review meetings not scheduled — E.A. Smith 8/30/65

Implementation overlaps Q.C.

Continued on next page

3.6.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Overlapping area with Q.C. eliminated.
Design reviews scheduled, published, and distributed. L. D. Brown 6/10/66

POST SURVEY CRITIQUE AND FINAL REPORT

A critique with the contractor and the preparation of a final report for the cognizant NASA center are important responsibilities of the survey team chairman.

The purpose of the critique is to be sure that the contractor's management personnel are fully cognizant of the strengths and possible discrepancies in the implementation of his reliability program.

Presentation

The survey team chairman should determine specific objectives which he hopes to achieve during the critique. The objectives should include:

1. A focus of attention to the main points of significance which developed during the survey.
2. The provision of an opportunity for the contractor's personnel to explain unusual or discrepant information.
3. A constructive discussion of the preliminary results of the evaluation; their importance and course of action to be taken to meet reliability program requirements.

The critique should be well planned, brief as possible, and held immediately after the survey. As the survey progresses, it is desirable that the survey team chairman be simultaneously organizing his presentation. As a courtesy, the survey team chairman should favorable commend outstanding phases of the contractor's reliability program. He should reiterate that the surveying team is there to give help, when needed, and to better understand the contractor's entire operation so that, if problems arise, all concerned can cooperate in resolving them.

A preliminary list of discrepancies may be unofficially left with the contractor, but with the clear understanding that official communications will be routed through the contracting officer of the cognizant NASA Procurement Agency, and that the preliminary list is subject to change due to subsequent objective evaluation.

This list should be as complete as possible so that the official transmittal to the contractor management personnel will not need to include additional areas.

Final Report

Before the survey team disbands, the team chairman should obtain from each member a summary of their significant findings. These summaries will aid him in preparing the final

report and will help assure that the right degree of emphasis is used for reporting discrepancies.

It may be well to consider two reports. One should be written so that the cognizant NASA installation, with a minimum amount of editing, can forward it to the contractor. The other may include information which might not be appropriate to transmit to the contractor, and could include recommendations for general improvements in NASA's overall reliability programs.

SECTION I

INTRODUCTION

1.0 INTRODUCTION

SURVEYOR _____

1.1 SCOPE

1.1.1 The contractor is encouraged to propose any additional program elements which will increase the effectiveness and efficiency of the program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

This should encourage a discussion of the contractor's reliability philosophy. The answers to the questions below require some judgment and should be weighed lightly. However, if the contractor can show documentary evidence of additional program elements, the answers become valuable. Include document identification.

a. Is there any evidence of additional program elements?
b. What documents cover these additional program elements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

1.2 APPLICABILITY

1.2.1 The provisions set forth in NPC 250-1 are generally applicable to all NASA space systems.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

The NPC 250-1 provisions are applicable to all NASA contractors, but to varying degrees. The degree of applicability is spelled out in the contract and, in more detail, in the Statement of Work. The approved Reliability Program Plan should reflect the extent of applicability.

a. Do the contract and the Statement of Work define the applicability of NPC 250-1? List the limitations and exceptions.
b. Does the approved Reliability Program Plan conform to the contractual applicability of NPC 250-1?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

1.2 APPLICABILITY

1.2.2 The contractor includes in his Requests for Proposals to potential subcontractors the provisions set forth in NPC 250-1 as reliability program guidelines.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

The provisions of NPC 250-1 apply also to the subcontractors of the contractor being surveyed. The surveyor should check the Requests for Proposals sent out by the contractor.

a. Does the contractor provide reliability program guidelines as set forth in NPC 250-1 in his Requests for Proposals?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

1.2 APPLICABILITY

1.2.3 The contractor invokes the provisions of NPC 250-1 as reliability program requirements when negotiating subcontracts with his subcontractors.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

See paragraph 2.6.2.1.

a. Is there any evidence that the contractor invoked NPC 250-1 during subcontract negotiations?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

1.3 RELATIONSHIP TO OTHER CONTRACT REQUIREMENTS

SURVEYOR _____

Sub-paragraph 1.3.1

1.3.1.1 Organizational responsibility for overlapping functions shall be clearly delineated in the Reliability Program Plan and cross-referenced in other pertinent technical program documents.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

A check of all applicable program documents should reveal the contractor's divisions of responsibilities. None of the provisions in NPC 250-1 shall be construed as a requirement for duplication of effort. However, it should be determined if the provisions of NPC 250-1 are being met.

a. Is there evidence of duplication of effort between the various contractor's organizations?
b. Has the organizational responsibility for overlapping functions been cross-referenced in other pertinent documents? List these documents.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.3.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

Sub-paragraph 1.3.2

1.3.2.1 The contractor's reliability program requirements are consistent with the requirements of NPC 200-2 and NPC 200-3.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2) only.

a. Is the above statement true?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.3.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

Sub-paragraph 1.3.3

1.3.3.1 The provisions of the contractor's reliability program as stated in NPC 250-1 should not be interpreted to preclude compliance with the requirements of NPC 200-2 or NPC 200-3 which are invoked in the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

The reliability program and the quality program should be well integrated in overlapping areas to avoid functional conflicts within the contractor's organization.

a. Does the reliability program preclude compliance with the requirements of NPC 200-2 or NPC 200-3 which are invoked in the contract?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.3.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

Sub-paragraph 1.3.4

1.3.4.1 If conflict exists between the provisions of NPC 250-1 and those of the Work Statement of the contract, the latter shall have precedence.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

All exceptions to NPC 250-1 taken by the contractor should be authorized in the contract.

a. Have exceptions to NPC 250-1 been taken? List exceptions.
b. Were the exceptions taken authorized by the contract?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.3.4.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

1.4 ACTIONS AND PREROGATIVES OF THE GOVERNMENT

SURVEYOR _____

1.4.1 GENERAL

1.4.1.1 All data and documentation generated for the contract effort by the contractor are subject to continuous examination by the cognizant NASA installation or its designated representative.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NASA reserves the right to monitor the contractor's progress through a NASA representative or through an outside organization retained for this purpose. These questions should be answered after the survey.

a. Did the contractor have all requested data and documentation pertaining to the contract effort available for examination?
b. Did the contractor and his subcontractors cooperate fully with these prerogatives?
c. Was a request for data and documentation made to the contractor by either NASA or its representative?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.4.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

1.5 APPROACH

1.5.1 The contractor's reliability program follows the provisions of NPC 250-1.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

The contractor's program, in actual operation, should be scrutinized for indications that the intent of the program provisions are met. This paragraph summarizes the intent of NPC 250-1 and should be used for information only.

a. Does the contractor have a thoroughly planned program?
b. Is the management of the reliability effort effective?
c. Are the major reliability tasks defined as an integral part of the design and development process?
d. Is the reliability assurance effective through a program of prediction, test, and evaluation?
e. Is the continuous status indication and control on the effectiveness of the reliability program adequate?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.5.1 Cont' d. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SURVEYOR _____

1.6 APPROVAL AND REVIEW BY NASA

1.6.1 Certain documentation for submittal by the contractor shall be submitted (or be available for submission) for either NASA "approval" or NASA "review."

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

See Appendix "F," the contract, and the work statement. Also see paragraph 5.3.1 of this manual.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

1.6.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

3

SECTION 2

ACTIVITY AREA 2.0

PROGRAM MANAGEMENT

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.1 ORGANIZATION

2.1.1 The contractor has a clearly identified group within his organization which is responsible for management of the reliability program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The reliability program management group, as identified in the Reliability Program Plan, and approved by the cognizant NASA installation, should exist in actual fact and function as described in the plan.

a. Does the reliability group have full responsibility for the management of the reliability program?
b. Is the reliability group identified in the organizational charts of the contractor?
c. Is the reliability group adequately staffed to effectively administer the reliability program?
d. Are position guides available for each position in the reliability group?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.1.2 The reliability group is responsible for monitoring the contractor's reliability tasks and assuring that all are carried out effectively.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN (s).

In a successful operation reliability tasks must be performed by reliability engineers and all elements of the contractor's organization involved in the project. The reliability management group has the responsibility and must have the authority to monitor these tasks and insure that all tasks are accomplished effectively. To achieve effective reliability performance throughout the contractor's organization, the reliability management group should provide guidance in reliability problems to other groups.

a. Does the reliability group monitor all reliability tasks throughout the contractor's organization?
b. Does the reliability group discharge its responsibility for assuring that all reliability tasks are accomplished effectively?
c. Does the reliability group have the confidence of other groups in the contractor's organization?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.1.3 The head of the reliability group:
1. Has the necessary authority to discharge his responsibilities.
2. Has direct, unimpeded access to top management.
3. Devotes full time to the reliability effort.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the company organization chart indicate undivided responsibility for administering the reliability program?
b. Does top management appear to be behind the reliability effort?
c. Is the manager of the reliability group at the same reporting level as managers of other functions, such as engineering, manufacturing, marketing, etc.?
d. Are there indications that the Manager of Reliability may be deeply involved in other functions?
e. Does the Manager of Reliability have an adequate organization with qualified managers so that he can direct his attention to the overall reliability program?
f. What do personnel in other functions think of the reliability effort? Is it administered aggressively?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.1.3 (Cont'd). - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2 RELIABILITY PROGRAM PLAN

2.2.1 GENERAL

2.2.1.1 The contractor prepares a Reliability Program Plan to serve as the master planning and control document for the reliability program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.1.2 The Reliability Program Plan details the approach and step-by-step procedure by which the contractor intends to insure compliance with all provisions of NPC 250-1 in general and also the specific requirements of the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.1.3 The Reliability Program Plan includes reliability program coverage of both the prime contract and all portions of the system under subcontract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.1.4 The Reliability Program Plan is prepared in close collaboration with the cognizant NASA installation (except for the preliminary program plan).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s).

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.1.5 The Reliability Program Plan is submitted to NASA in accordance with the requirements of the Request for Proposal and as prescribed in subparagraphs 2.2.2, 2.2.3, and 2.2.4.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1 Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.1.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT **SURVEYOR** _____

2.2.2 PRELIMINARY PLAN (PROPOSAL)

2.2.2.1 The contractor submits a preliminary plan of the proposed reliability effort covering the elements on "GENERAL" (paragraph 2.2.1) in the degree of detail prescribed in the Request for Proposal.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.2.2 The preliminary program plan includes the item and areas to be covered in Appendix B of NPC 250-1.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT **SURVEYOR** _____

2.2.3 INTERMEDIATE PLAN (NEGOTIATION)

2.2.3.1 The contractor(s) selected by NASA for contract negotiation submits to the cognizant NASA installation, 30 days prior to initial contract negotiation, an intermediate Reliability Program Plan as prescribed on the Request for Proposal.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.3.2 The intermediate plan covers, as a minimum, all major elements (with costs) of the elements listed under "GENERAL" (paragraph 2.2.1), in sufficient detail to serve as an adequate basis for negotiation of reliability program specifics into the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION 1

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.3.3 The intermediate Reliability Program Plan includes the items and areas of coverage listed in Appendix C of NPC 250-1.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.3.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.2.4 FORMAL PLAN FOR APPROVAL

Sub-paragraph 2.2.4.1

2.2.4.1.1 Within 60 days subsequent to the date of the initial contractual document, the contractor submits for the approval of the cognizant NASA installation, a revised Reliability Program Plan reflecting changes in earlier proposed programs negotiated into the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.4.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

Sub-paragraph 2.2.4.1

2.2.4.1.2 The formal Reliability Program Plan is specific and in complete response (considering status of design and subcontracting) to the requirements stated on 2.2.1. (NPC 250-1)

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.4.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

Sub-paragraph 2.2.4.1

2.2.4.1.3 All of the elements listed in Appendix D of NPC 250-1 were factored into the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.4.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

Sub-paragraph 2.2.4.2

2.2.4.2.1 Notwithstanding the 60 day allowance to prepare the formal Reliability Program Plan, all reliability program actions, agreed to during contract negotiations which require initiation at the conceptual design stage for full effectiveness, are initiated without delay by the contractor.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.4.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

Sub-paragraph 2.2.4.3

2.2.4.3.1 The Reliability Program Plan is reviewed periodically and revised as prescribed in paragraph 2.3 of NPC 250-1.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

2.2 Reliability Program Plan overlaps NPC 200-2, paragraph 3.1. Verify that the contractor is complying with this requirement without duplication of effort.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.2.4.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.3 RELIABILITY PROGRAM REVIEWS

2.3.1 The contractor and the cognizant NASA installation jointly conduct formal reviews of the reliability program to assess its progress and effectiveness and to determine the need for adjustments or changes.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) only.

a. Are formal program reviews held?
b. Has the cognizant NASA installation participated in all reviews?
c. Have the reviews been thorough and conducted so as to get a realistic measure of progress and effectiveness of the reliability program?
d. Have adjustments and changes been found necessary and were they made in a timely manner?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.3.2 The reliability program reviews are scheduled at major milestones in the program and also periodically as prescribed by the cognizant NASA installation or requested by by contractor.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), and INTERMEDIATE (2.2.3) PLAN(s) only.

a. Are program reviews conducted at major milestones as called for in the reliability program plan?
b. Is there evidence that additional reviews would make the reliability effort more effective?
c. If the answer to (b) is affirmative, has the contractor requested such reviews?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.3.3 The schedule of program reviews is given in the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The schedule of reviews included in the Formal Reliability Program Plan should have been updated as the program progressed and changes were made to the original scheduel.

a. Were program reviews added or deleted?
b. If the answer to (a) is affirmative, were these changes reported to the cognizant NASA installation and documented in the Plan?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.3.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.3.4 The Reliability Program Reviews are documented by the contractor.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN (s) only.

a. Have all reviews been documented?
b. Is the documentation adequate to give a complete and clear description of the important phases of the program?
c. Have potential problem areas been highlighted so that corrective action is assured?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.3.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.3.5 Revisions to the Reliability Program Plan are submitted to the cognizant NASA installation for approval within 30 days following the review at which the need to revise was established.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Are proposed revisions to the Reliability Program Plan submitted to the cognizant NASA installation within 30 days following the determination of a need to change?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.3.5 Cont'd. -NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.3.6 Reliability program changes within the scope of the work contract are implemented within the time periods agreed upon at the review meeting.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

Reliability Program changes should be reviewed prior to going to the contractor's plant and notes should be made so that the surveyor can ask objective questions of the contractor personnel during the survey. Such a procedure should help disclose delinquent action which might reduce the effectiveness of the reliability program.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.3.6 Cont'd. -NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.4 RELIABILITY PROGRAM CONTROL

2.4.1 The contractor has in operation a system for close management control and audit of the reliability program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Specific questions to help evaluate the contractor's system and facilities for management control and audit of the reliability plan, are presented with work elements 2.4.2 through 2.4.6. Therefore this work element is introductory in nature and it would be appropriate to score this work element after reviewing the other 5 elements in subsection 2.4.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.4.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.4.2 The management control and audit system utilizes, insofar as practical, the NASA reporting system prescribed for the overall contract effort, with supplemental provisions as agreed on with the cognizant NASA installation.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Does the contractor utilize the NASA reporting system?
b. Are supplemental provisions agreed upon and if so, were they implemented?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.4.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.4.3 The control and audit system identifies each reliability task with the organizational element responsible for its execution, detailed time-phasing data, and complete reliability milestone identification.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the breakdown into reliability tasks include each of the elements set forth in Appendix C?
b. Is the organizational element responsible for each reliability task identified?
c. Has detailed time-phasing data been established for each reliability task and is the current status of each task on schedule?
d. Is each reliability task properly related to milestone identification points for the overall reliability program?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.4.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.4.4 The control and audit system provides for each reliability task, a detailed listing of man-hours, materials, facilities, services, and support with associated costs by time-phase.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

This type of detailed information should be available in the form of charts with columns available for updating as the job progresses and revisions become necessary.

a. Is this information in a form which can be easily evaluated and updated as necessary?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.4.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.4.5 The Reliability Program Plan includes a detailed overall plan for management control and scheduling of the reliability effort.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. What controls and check points have been established for monitoring and measuring results of the reliability effort?
b. Do these controls appear to be adequate to keep the program on schedule and effective?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.4.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.4.6 Progress in implementation of the reliability-control system is reported periodically as prescribed in subsection 5.2.3 on Reliability Program Control Reports.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Is reporting timely?
b. Do the reports stress the key areas and cover all the information needed to alert NASA to potential problems?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.4.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT **SURVEYOR** _____

2.5 RELIABILITY INDOCTRINATION AND TRAINING

2.5.1 An effective training program has been developed and implemented to educate the appropriate personnel in potential reliability problem areas peculiar to the system(s) or subsystem(s) under contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Have the potential reliability problem areas of the system(s) or subsystem(s) been established?
b. Is the training program implemented in a timely fashion?
c. Is the responsibility delegated and a system in operation to update the training program as changes occur?
d. Does the program include training of new or transferred employees and retraining when the program is changed?
e. Does the training program cover all applicable divisions of the contractor's organization and not limited to the reliability personnel?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.5.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.5.2 The contractor has submitted a detailed outline of his proposed reliability training program as a part of the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Is the outline oriented toward the problem areas?
b. Has the outline been updated as the program progresses?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.5.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT **SURVEYOR** _____

2.6 SUBCONTRACTOR AND SUPPLIER CONTROL

2.6.1 GENERAL

2.6.1.1 It is the responsibility of the system contractor to insure that all tiers of subcontracted system elements will meet the overall system reliability requirements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, Section 5. Verify that the contractor is complying with this requirement without duplication of effort.

The contractor is responsible for the reliability and quality levels on subcontracted material which will not conflict with the reliability requirements of the total system.

a. What disciplines of each system element, as related to the overall system have been established?
b. Do the subcontracts include the reliability requirements for each element?
c. Is there evidence that the reliability requirements are reviewed and revised as necessary?
d. Is there evidence that the contractor has worked closely with subcontractors to maintain the high levels of reliability required?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.1.2 All subcontracts include provisions for review and evaluation of the subcontractor's reliability effort by NASA or its representatives.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Do the contractor's purchase orders for all subcontracted material clearly cover the requirements for continuous examination of data, documentation, and reliability effectiveness by NASA?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.2 RELIABILITY PROGRAM REQUIREMENTS FOR MAJOR SUBCONTRACTORS

2.6.2.1 Appropriate provisions of NPC 250-1 are invoked by the major contractor on all major subcontracts, on suppliers of all major subcontracts, and on suppliers of all major components used in the system.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Is the procurement function advised of the reliability requirements of the prime contract by a written procedure.
b. Is the responsibility for assuring that the purchasing organization is made aware of contract reliability requirements defined?
c. Do the purchase orders for subcontracted components embody all of the applicable contract reliability requirements?
d. Are there written procedures and responsibility assigned to notify subcontractors of changes in the reliability requirements as they occur?
e. Is there evidence of the operation of these procedures?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.2.2 The subcontracts covered by NPC 250-1 and the extent of application of provisions of this specification are described, insofar as possible, in the initial submission of the initial submission of the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

NPC 250-1 or any applicable provisions thereof is specified in any order for major components of the system.

a. Is there a procedure and an indication of its implementation?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.2.3 As subcontractors and suppliers of additional components were selected subsequent to the original submission of the program plan, the contractor included their names, system components to be provided, and provisions for reliability control in the periodic reports for NASA review.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Do the periodic Progress Reports cover this information in a timely manner?
b. Do the reports give complete information and cover provisions for reliability control as well as description of the system components and subcontractor's name and address?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.3 RESIDENT REPRESENTATIVES

2.6.3.1 The contractor has placed technical representatives in the facilities of major subcontractors supplying critical systems or subsystems. These representatives monitor and assist in the direction of the subcontractor's reliability program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor places technical representatives in the facilities of certain subcontractors. Having representatives at a supplier's facility can be an effective form of assistance and control.

a. Do the technical representatives have well defined responsibilities and authority?
b. Are these agreed upon in the definitized subcontract?
c. Are the intercommunications between the prime contractor and his technical representatives written and filed?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.3.2 The contractor's representatives at subcontractors' facilities have the competence to judge and, where reliability is considered to be jeopardized, the authority to disapprove the subcontractors' design, specifications and procedures

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Do the definitized subcontracts include a statement as to the authority delegated to the prime contractor's technical representatives?
b. Does this authority include the power to disapprove design, specifications and procedures?
c. What minimum qualifications has the contractor used to establish competence?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.3.3 The contractor's representatives at subcontractors' facilities have the authority to reject hardware considered to be below prescribed quality standards. The subcontractors which are controlled by having resident representatives at the subcontractor's facilities are identified in the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Is this authority clearly defined in the subcontract?
b. Are all of the subcontracts on which this means of control is envoked identified in the Reliability Program Plan?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.3.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT **SURVEYOR** _____

2.6.4 MINIMUM RELIABILITY CONTROLS FOR COMPONENTS NOT CLASSIFIED AS MAJOR

2.6.4.1 The reliability of all components obtained from suppliers who are not required to maintain a formal reliability program is controlled by specifications similar to those prescribed under "Parts and Materials Specifications" in Section 3.9.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates the element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor and the cognizant NASA installation will determine jointly if adequate specifications exist for all parts and materials of the system. The contractor should generate specifications, as indicated in the above work statement, if they are found to be missing or inadequate.

a. Does a checklist exist for assuring there is a specification for all parts and materials of the system?
b. Is there evidence of reliability control by the use of these specifications?
c. Does the contractor's reliability personnel review and approve these specifications?
d. Is there a written procedure that includes:
   1. An automatic distribution of parts and materials specifications?
   2. A means to control the timeliness of reviews and approvals?
   3. A checklist to assure the inclusion of the contract reliability requirements in all specifications?
   4. Responsibility to update specifications as changes occur in the reliability requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.4.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.6.4.2 A listing of the components not classified as major, and the control provisions are included in the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Does the Reliability Program Plan include a list of components requiring control specifications?
b. Are the controls compatible with the system devised for subsection 2.4 of this manual?
c. Is there a checklist of components not classified as major?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.4.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT **SURVEYOR** _____

2.6.4.3 Pertinent qualification and test and inspection requirements are prescribed for the components not classified as major in the Quality Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

This work element overlaps NPC 200-2, paragraphs 4.3, 5.5, and 5.6. Verify that the contractor is complying with this requirement without duplication of effort.

a. Does the Quality Program contain the requirements for qualification, test, and inspection?
b. Is it evident that the reliability personnel has reviewed these statements in the Quality Program Plan and concur that they satisfy good reliability demands?
c. Was there a report or other documentation issued confirming these reviews?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.6.4.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT

SURVEYOR _____

2.7 CONTROL OF GOVERNMENT-FURNISHED PROPERTY (GFP)

2.7.1 The contractor uses the best obtainable reliability data in his reliability apportionments and predictions for components or subsystems furnished by NASA.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

This work element overlaps NPC 200-2, Section 6. Verify that the contractor is complying with this requirement without duplication of effort.

a. Is there evidence of coordination with NASA for the acquisition of all the Reliability data for the component or subsystem furnished?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.7.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 2.0 PROGRAM MANAGEMENT SURVEYOR _____

2.7.2 Where system testing or evaluation of data received for Government-Furnished Property indicated that the GFP equipment was incompatible with the reliability requirements of the overall system, the contractor formally notified the cognizant NASA installation and obtained appropriate action.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Was reliability of GFP inadequate for the required application?
b. If answer to (a) is yes, was NASA formally notified and was the matter expedited until satisfactory action was obtained?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.7.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

2.7.3 The Reliability Program Plan includes a detailed statement of the contractor's approach to early Reliability evaluation of GFP and specific reliability problems associated with it.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Have there been problems with the reliability of GFP?
b. If the answer to (a) is affirmative, have these problems been resolved in accordance with the approach outlined in the Reliability Program Plan?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

2.7.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SECTION 3

RELIABILITY ENGINEERING

ACTIVITY AREA: 3.0 RELIABILITY ENGINEERING SURVEYOR _____

1

3.1 GENERAL

This section encompasses nine key activity areas that will have a very important affect on the effectiveness of the overall Reliability Program. Each subsection is covered as a separate activity with individual work elements to guide the surveyor. The questions listed below are intended to help establish the purpose and importance of the section.

a. Design Specifications: Does the contractor describe the plan which assures design specification review by the Reliability organization?
b. Reliability Prediction and Estimation: Does the contractor describe in detail the approach and methods to be utilized in preparing reliability prediction models?
c. Failure Mode, Effect and Criticality Analyses: Does this section of the plan define in detail the manner in which the contractor intends to accomplish failure mode effect and criticality analyses at the system, subsystem, and component levels?
d. Maintainability and Elimination of Human Induced Failure: Does the contractor define the approach, methods, and controls to be implemented in order to minimize potential sources of human induced failure?
e. Design Review Program: Does the program plan outline in detail the approach, methods, and plans the contractor will implement to establish a comprehensive formal design review program?
   1. Is the contractor conducting design reviews as called for in the program plan?
   2. Does this program include provision for design reviews as major program milestones with participation of designated responsible representative from within the company and NASA as required?
   3. Does the plan provide for adequate reports including corrective action responsibility and subsequent results?
   4. Does the plan include provisions for review of design change subsequent to final design review?
   5. Does the plan include provisions for design review by subcontractors?
f. Failure Reporting and Correction: Do the contractor and subcontractor employ a strictly controlled system for the reporting analysis, correction, and data feedback of all failures and malfunctions that occur throughout the fabrication, handling, test, checkout, and operation of the space system?
g. Standardization of Design Procedures: Does the contractor explain the approach and methods he has taken to implement a standards program?
   1. Has the contractor developed a flow chart which depicts the relationship of the reliability review and responsibility for assuring the adequacy of standards to reliability requirements?
   2. Does the contractor scrutinize deviations from standard?
h. Parts and Materials Program: Has the contractor implemented a Parts and Materials Program to review all items in the system and assure that selection of parts and materials is in accordance with NPC 250-1, Section 3.9?
i. Equipment Logs: Is the contractor submitting Equipment Logs for approval by the cognizant NASA installation?
   1. Has the contractor maintained a log for each major equipment and identified the log with the particular equipment to which it applies?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

2

ACTIVITY AREA 3.2

DESIGN SPECIFICATIONS

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.1 The contractor's reliability organization reviews and concurs in all contractor generated design specifications.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Enumerating just a few minimum typical requirements for this phase of the program, the reliability organization must be the recipient of all contractor generated new and revised design specifications and design specification data on a systematic and expedited basis. It must be the recipient of all customer generated reliability assurance requirements, documents and Work Statements, also on an expedited basis. It must have its own handbook of philosophy, organization, function, operating procedures and relationship with other functional units.

a. Does the reliability group automatically receive all design specifications and changes for all hardware items of the contractor's responsibility?
b. Between the time of sign-off by the engineering groups, and the receipt of design specifications by the reliability group, is the established and followed procedure adequate for minimum time lag?
c. Does a review of design specifications from the reliability group's files indicate that design specifications are consistently being reviewed by reliability personnel as a matter of mandatory procedure?
d. Do all selected design specifications and revisions conspicuously indicate date of review, reviewer and status of specification?
e. Where the reliability organization does not concur with the design specification or revision as issued, and transmits their comments to originating unit, do the reliability files include all subsequent communications and feedback in, preferably, chronological order?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.2 The reliability organization ascertains that design specifications cover all items of hardware at systems, subsystems and component level.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

It is mandatory that the reliability organization be the automatic and prompt recipient of all indexes, drawings, specifications and parts lists issued by the contractor's and subcontractor's engineering and drafting personnel. Included in the indexes, there should be a top-down breakdown listing of all hardware items at system, subsystem and component level with applicable design specifications.

a. Is there such an up-to-the minute listing or equal in the reliability organization's files?
b. Have the reliability group prepared their own working copy of a hardware items list including applicable design specifications?
c. Has the reliability group prepared a status of each specification for instantaneous review of complete program status, and to pinpoint gaps, or specifications in process?
d. Does it appear that the reliability organization is at all times in complete communication with the Engineering and Drafting groups?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.3 The reliability organization ascertains that design specifications adequately and validly state mission performance requirements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

Before being able to evaluate the contractor's design specifications for inclusion of mission profile performance requirements, it will be necessary for the surveyor to make sure he has the latest copy of all contractual documentation and agreements issued by the cognizant NASA installation.

a. As a check for effective and prompt communication; does the reliability organization have identical documentation as released by the cognizant NASA installation?
b. Does it appear that the contractor has successfully interpreted and included NASA's current mission profile performance requirements into his own design specifications?
c. Do the design specifications include a dated and initialed notation or remarks that each specification has been reviewed by the reliability organization for compliance particularly for mission profile performance?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.4 The reliability organization ascertains that the contractor's design specifications state environmental profile requirements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This work element is a continuation of 3.2.1.3.

a. Are the randomly selected contractor's design specifications in apparent agreement with latest NASA contractual documentation regarding environmental profile requirements?
b. Do the specifications carry a dated notation that they have been reviewed by reliability for environmental requirements?
c. Do any of the specifications indicate that the reliability organization discovered errors or omissions in a particular specification and corrective action taken in a prompt manner?
d. Do any of the reviewed specifications include errors, omissions or misinterpretations, even after release by engineering and concurrence by reliability?
e. In general, is there any indication that the contractor is taking any shortcuts which might jeopardize any portion of the reliability program?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS **SURVEYOR** _____

Sub-paragraph 3.2.1

3.2.1.5 The reliability organization ascertains that design specifications state pertinent test criteria (including overstress).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

Again, this is a check on completeness or inclusion, and not one of accuracy.
Note, this is for test criteria and not for test specifications.

a. Review with the contractor the methods used to determine completeness of test criteria.
b. Is it documented?
c. Does the contractor define the test criteria in orderly form?
d. Does the test criteria cover both operation factors (input and output limits), and environment factors and their interrelation?
e. What is the overstress criteria?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.6 The reliability organization ascertains that the contractor's design specifications state safety margins.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This is a continuation of work element 3.2.1.4.

a. Do NASA contractual documents clearly state safety margin requirements?
b. Has the contractor successfully incorporated these requirements into his design specifications?
c. Is the safety factor data incorporated in the design specifications?
d. Is it positively certain that the reliability group has reviewed, concurred, and contributed to the safety aspect of all design specifications?
e. Can the reliability group produce back-up data or other substantiating evidence that they have analyzed the safety margin requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.7 The reliability organization ascertains that design specifications adequately and validly state derating factors.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This is a continuation of work element 3.2.1.4.

Because of the vital importance of component and "black box" derating, it is recommended that more than the usual amount of the contractor's design specifications be reviewed for clear cut inclusion of derating requirements and derating factors.

a. Are the contractor's concept and philosophy of derating in agreement with that of NASA, as exemplified by his design specifications?
b. Are the specifications specific and inclusive in the presentation of derating factors and requirements?
c. Is the reliability organization devoting a substantial amount of their time, toward the advancement of derating?
d. Do all reviewed specifications show evidence of the reliability group's participation and concurrence on a conginual basis?
e. Does the contractor's reliability organization apply the principles of derating philosophy by the following:
   1. library of available vendor data?
   2. field report data?
   3. contractor test and qualification data?
   4. independent testing laboratory reports?
   5. military and commercial handbooks?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.7 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.1

3.2.1.8 The reliability organization ascertains that the contractors design specifications adequately and validly state apportioned reliability goal (including definition of satisfactory performance) for each system element.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This is a continuation of work element 3.2.1.4.

a. Are reliability goals clearly delineated in contractual documentation?
b. Has the contractor successfully interpreted and incorporated these goals into his own design specifications?
c. Are these goals compatible with the overall system goals?
d. Does each design specification include a definition of satisfactory performance reflecting contractual requirements?
e. Is it evident that all reviewed design specifications have been, and are being subject to continuous observation by the reliability organization on a systematic documented basis?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.1.8 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.2

3.2.2.1 Specifications are updated as necessary.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

As the surveying personnel may have inferred from previous work elements on "Design Specifications", these specifications are vitally important, since they practically guide the contractor's efforts. Among their many other uses, they are also subject to NASA review at all times as a barometer of the contractor's and subcontractors' capabilities and required performance. They are referenced as functional block diagrams on a scheduled basis and are the subject of design reviews. Therefore, it is mandatory that all design specifications continuously reflect the latest actions of contractual changes, NASA reviews, reliability organizations requirements and design reviews.

a. Are design specifications promptly updated, as substantiated by the history of requests for updating?
b. If it is a contractual requirement, are the updated specifications automatically transmitted to NASA for review on a systematic and timely basis?
c. After the expiration of the two week period without notification of disapproval from NASA, is it evident that the contractor then implements these documents as substantiated by internal instructions bearing effectivity dates?
d. Does it appear that the contractor is performing satisfactorily in making sure his design specifications are maintained current with all approved change request inputs?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.2

3.2.2.2 The reliability organization requires revision of specifications when considered necessary.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The surveying personnel will find, at times; there is considerable discussion between the reliability organization and the contractor's other functional units before revision to design specifications are finalized. Changes to design specifications will be, in general, a co-operative effort with the reliability playing a major part in final concurrence.

a. Is there a procedures manual completely describing the function and operation of the reliability organization?
b. Does this manual indicate that the reliability group has the authority to request revisions to be made to design specifications?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS **SURVEYOR** _____

Sub-paragraph 3.2.2

3.2.2.3 The contractor references design specifications on functional block diagrams for the overall system and showing apportioned reliability goals for each of the system elements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Are the functional block diagrams listed on the system index?
b. Do the diagrams show the status of all design specifications included?
c. Is the current apportioned reliability goal indicated in the immediate vicinity of the design specification to which it applies?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.2

3.2.2.4 The functional block diagrams are updated as scheduled in the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

Updating will consist of activities such as indicating current revision of each specification; latest apportioned reliability goal, and inclusion or deletion of specifications reflecting current system element status.

a. Does the contractor's Reliability Program Plan include a specific requirement and a realistic schedule for updating the functional block diagrams?
b. Is the contractor following his own established schedule with reasonable promptness?
c. Is it possible to determine the status of the functional block diagrams and their contents from marked-up working documents between formal scheduled revisions?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.2.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.2

3.2.2.5 The functional block diagrams are submitted to NASA for information.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Are the diagrams being submitted to NASA as scheduled in the Reliability Program Plan?
b. Does the contractor have any NASA feedback from previous submissions?
c. Does the contractor briefly advise NASA of the nature of revisions since the last submission?
d. Does the contractor have a history of missing or delinquent submissions?
e. Is it apparent, to the surveying personnel, that the contractor is performing satisfactorily and in a timely manner in this requirement?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.2.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.2 DESIGN SPECIFICATIONS SURVEYOR _____

Sub-paragraph 3.2.2

3.2.2.6 The initial overall system functional block diagrams were submitted at the time of the submittal of the first formal Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

As a refresher, NPC 250-1, paragraph 2.2.4.1 states that the contractor shall submit for the approval of the cognizant NASA installation a revised (formal) Reliability Program Plan. He shall do this within 60 days subsequent to the date of the execution of the initial contractual document.

a. Is it evident that the contractor's first formal submission of the Reliability Program Plan included the overall system functional block diagrams?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.2.2.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

3

ACTIVITY AREA 3.3

RELIABILITY PREDICTION AND ESTIMATION

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION

SURVEYOR _____

3.3.1 Reliability prediction models were started early in the conceptual stage of the system design.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) PLAN only.

"Prediction" and "assessment" are stages of the reliability model evolution not overlapping tasks.

The milestone or time at which the initial prediction is required and the succeeding major or intermediate milestones at which predictions are required are specified in the contract.

a. Are the apportioned reliability goals for all of the system elements included in the system models?
b. Is there a system checklist or a method to assure that all elements are included?
c. Does each system element specification contain an apportioned reliability goal for that element?
d. Is there evidence that the reliability prediction models were initiated at the beginning of the design concept?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION

SURVEYOR _____

3.3.2 A system and method is developed to revise and maintain models as required by:

1. Evaluation of the system design
2. Design changes
3. Data resulting from reliability engineering analyses
4. Data from test results

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Is there a procedure for updating models as required by 1, 2, 3, and 4 above and is it effective?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION SURVEYOR _____

3.3.3 Models are being used to emphasize potential reliability problem areas.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Is this task demonstrated?
b. Have methodologies and analytical procedures been developed to use prediction models to help solve reliability problems?
c. Is there any documentary evidence of reliability problems being solved by the use of models?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION SURVEYOR _____

3.3.4 Models are being used to guide design trade-offs.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Do the documented design reviews indicate activity in this area?
b. Is there a direct line of communication between the reliability group and the design engineering group so trade-off information is timely?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION

SURVEYOR _____

3.3.5 The test program planning is based on the reliability prediction models and updated as the reliability assessment models are issued.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Is evidence available to substantiate this use of reliability models?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION

SURVEYOR _____

3.3.6 Reliability prediction models together with empirical test data are used to formulate reliability assessment models used in the reliability evaluation program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

Reference - See definition of "Reliability Assessment" in Glossary of Terms NPC 250-1.

a. Can it be shown that the reliability models are updated at each milestone in the Reliability Evaluation Plan?
b. Are there procedures established to incorporate newly available test results, design changes, and refinements into the models?
c. Are these procedures effective?
d. Are these procedures written?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION

SURVEYOR _____

3.3.7 Models are being used for additional failure mode, effect, and criticality analyses.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Are analysts assigned for these tasks?
b. Is there a check system to assure that the latest model is being used?
c. Are the outputs of the analysts timely?
d. Does the contractor have a method to assure the outputs are timely?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.7 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.3 RELIABILITY PREDICTION AND ESTIMATION SURVEYOR _____

3.3.8 Models are being used as a basis for redundancy studies.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Is there an established documented procedure to accomplish redundancy requirement studies using the models as a basis?
b. Is this information fed back to design or systems engineering in a timely manner?
c. Is there a method in use to assure the models being used for this effort are up to date?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.8 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

4

ACTIVITY AREA 3.4

FAILURE MODE,

EFFECT AND CRITICALITY ANALYSIS

ACTIVITY AREA: 3.4 FAILURE MODE, EFFECT, AND CRITICALITY ANALYSES

SURVEYOR _____

Sub-paragraph 3.4.1

3.4.1.1 As part of the early design process, the contractor develops projected analyses of the system to determine possible modes of failure and their effects on mission success.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Ideally, the projection of failure modes, effects and criticality analyses and its documentation should be a separate function of the reliability engineering organization. Personnel associated with this activity should have ready access to the following:

1. Design specifications and data.
2. Drawings.
3. Qualification test data.
4. Vendor and supplier test data.
5. Previous history and information for similar systems, subsystems, and components.
6. Reliability data and test results from organizations specializing in the independent investigation of component reliability.

All input documentation should be directed to this activity on an automatic revision and subscription basis.

a. Does the contractor have a reasonably staffed group of competent personnel engaged in the continuous study of failure modes and their effects on mission success?
b. Does it appear that the failure mode activity has been underway since early design stages?
c. Are the files of input documentation accessible, comprehensive, systematically organized, maintained?
d. Are the activities and results of this projection documented and distributed to the contractor's activities and applicable subcontractors and suppliers affected by the results?
e. Does the group actively participate in the contractor's and subcontractor's design reviews?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.4.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.4 FAILURE MODE, EFFECT, AND CRITICALITY ANALYSES

SURVEYOR _____

Sub-paragraph 3.4.1

3.4.1.2 The projected failure modes and effects analyses are used to discover critical failure areas and remove susceptibility to such failures from the system.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. As possible critical failure areas are discovered, does the reliability organization take steps to finalize disposition of questionable components, applications or interactions? Is additional testing or a design change requested?
b. As definite failure modes are discovered, does the reliability organization immediately notify all appropriate departments of the contractor's organization of their findings and recommended disposition?
c. From a review of the contractor's methods, facilities, organization and subsequent documentation, does it appear that these failure analyses and resultant actions are thorough, effective, and inspire confidence in the contractor's ability and performance?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.4.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.4 FAILURE MODE, EFFECT, AND CRITICALITY ANALYSES

SURVEYOR _____

Sub-paragraph 3.4.1

3.4.1.3 Projected failure mode and effects analyses are made starting at the top system level and expanding down to the components level.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Is there a comprehensive index of system, subsystem and component breakdown?
b. Do the parts lists on each unit indicate that the parts lists, or that the components on the parts lists have been reviewed for failure mode analysis?
c. Is it possible to ascertain where changes to parts lists and design changes have been made at the instigation of the reliability organization in conducting failure mode analyses?
d. From parts lists and other related documentation, is it possible to gauge the effectiveness of the reliability organization's efforts in discovering failure areas and subsequent action taken?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.4.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.4 FAILURE MODE, EFFECT, AND CRITICALITY ANALYSES

SURVEYOR _____

Sub-paragraph 3.4.1

3.4.1.4 Each potential failure is considered as to probability of happening and categorized for probable affect on mission success of the space system as an aid in proportioning effort for corrective design action and reliability control.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The analyses shall be made starting at the system level and expanding downward to the components level. In the analyses, the requirements of each level shall be defined in terms of output requirements from the next lower level. When the analysis has reached the component level the effect of failure of any element at that level is defined for the other elements at that level and for the outputs of the level. The effect upon the input to the next level shall be evaluated. Thus, the effect of a failure at any level is traced upward to an effect upon mission success.

a. Does the contractor's plan give evidence of potential failure analyses?
b. Does the contractor's plan use the categorized potential failure analysis in his proportioning effort?
c. Has corrective design action been taken when the analyses have indicated a need for this?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.4.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.4 FAILURE MODE, EFFECT, AND CRITICALITY ANALYSES

SURVEYOR _____

Sub-paragraph 3.4.1

3.4.1.5 The projected analyses are a major consideration in design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

All available data from failure analyses, reliability design analyses, design analyses, and test reports on similar items should be factored into design reviews for consideration as applicable to the performance, environment, and mission requirements.

a. Does the contractor's design review plan give evidence of review of the projected analyses?
b. Are the reviews documented?
c. Are the projected analyses made and reviewed at the system, subsystem, and component levels?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.4.1.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.4 FAILURE MODE, EFFECT, AND CRITICALITY ANALYSES

SURVEYOR _____

Sub-paragraph 3.4.1

3.4.1.6 The projected system analyses provide criteria for:

1. Test planning.
2. Establishing checkout procedures.
3. Establishing use time or cycles.
4. Establishing logging requirements.
5. Establishing the required frequency of monitoring during checkout.
6. Establishing the required frequency of monitoring throughout the launch operation sequence.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

As a result of projected system analyses, inspection and test procedures and checkout procedures can be tentatively established and documented outlining the tests to be performed, the test equipment to be used, and the test parameters with acceptability specifications to be checked. The projected system analyses also helps to establish the "use or time cycles" which is the availability of the system (operating reliability plus standby reliability). The contractor is also in a position to set up a separate log for each major component, subsystem, and system in documenting the continuous history of the item. Lastly, based upon the probability of the items as projected by failure mode, effect and criticality analyses the contractor establishes the required frequency of monitoring during checkout and launch.

a. Is there an inspection and test plan established?
b. Is there a checkout procedure established?
c. Has the contractor established the availability of the system as predicted by the analysis?
d. Has the contractor established a format of the log?
e. Has the contractor established the frequency of monitoring of the system during checkout and launch?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.4.1.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA 3.5

MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

5

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.1 The contractor gives careful consideration to the maintainability of the system throughout the entire contractual effort, i.e. from basic design through operational use.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN (s).

At the beginning of a program, a maintainability document should be prepared by the contractor. The document covers the contractor's maintainability objectives starting with equipment design, maintenance techniques, and support requirements. The contractor should also establish a procedure for controlling timely actions for monitoring and directing the implementation of maintainability objectives and features.

a. Does the document describe the equipment as to purpose, type and use?
b. Does the document describe the operating environment as to installation, physical environment, availability, reliability, and mean-time to repair?
c. Does the document describe the maintenance environment as to personnel, support equipment, maintenance organization and policies?
d. Does the document consider specific design considerations? (E.g. weight and size limitations).
e. Does the document describe control and evaluation requirements?
   1. Control - (How the implementation of maintainability objectives will be monitored).
   2. Evaluation - (How the maintainability factors are to be evaluated or measured).
   3. Conformance - (What, how, when, where, and who will demonstrate conformity to the maintainability objectives and specifications).
f. Is there a procedure for implementing the contractor's maintainability objectives?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.2 The contractor gives careful consideration to the elimination of potential sources of human induced failures throughout the entire contractual effort, i.e., from basic design through operation use.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

In the process of failure diagnosis, the effect of human error is one of the parameters of concern. Each failure should be screened to ascertain the influence of the human in the loop. In each case, human performance should be weighed against standards of human performance to ascertain whether human capability, training, or motivation has been exceeded.

a. Does the contractor have a plan establishing standards of human performance?
b. Does this plan give specialized attention to operator capability to perform within limits of expected shock, noise, vibration, temperature, illumination, and radiation environments?
c. Does the contractor's plan give specialized attention to operator capability to perform for planned time period without excessive fatigue?
d. Does the contractor's plan give specialized attention to operator capability to perform within psychological and physiological stress conditions?
e. Has the internal effect of the human on manufacturing techniques and procedures been studied in order to reduce any degradation to the design during manufacturing? Such as:
   1. Evaluation of worker qualifications and selection?
   2. Training programs?
   3. Employee morale and motivation?
   4. Supervision?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.3 Considerations of maintainability include a study of requirements for test, checkout, inspection, parts or component replacement, disassembly, and self monitoring.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Equipment should be designed and built so that it can be maintained easily if and when malfunction occurs. Maintainability will constitute the quality of item design and installation which facilitates the accomplishment of inspection, test, servicing, and repair with minimum time in the planned environment.

a. Has the contractor determined and identified the maintenance functions during the initial stages of design and engineering?
b. Has the contractor made maximum use of standard parts, modules, components, circuits, and accessories to achieve a high degree of interchangeability?
c. Has the contractor planned for rapid and adequate replacement of malfunctioning units in equipment?
d. Has the contractor designed to require a minimum number and type of space, parts and assemblies?
e. Has the contractor planned that maximum use is made of readout and built in test equipment?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.4 Considerations of maintainability include determination of the need for provision of access and other design features to facilitate performance of all checkout, repair, and maintenance tasks.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Maintainability can only be achieved by including good maintainability characteristics in the engineering design and development, and the checking and evaluating of maintainability characteristics during manufacturing procedures. If during fabrication, a maintainability evaluation shows that it takes as much time (or more) to install or service an article or subassembly than is allowed for downtime under actual use, then it is evident that the maintainability index is unsatisfactory.

a. Has the contractor designed for optimum accessibility in all systems, equipments, and components requiring maintenance, inspection, removal or replacement?
b. Has the contractor considered minimum numbers and types of tools and test equipment (special and standard) needed to perform maintenance?
c. Has the contractor's design requirements shown minimum maintenance and training needed to develop adequate maintenance proficiency?
d. Does the contractor's design show evidence of enhancing and facilitating organizational and field level maintenance action?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.5 The contractor makes an intensive design effort toward making proper and safe use of equipment convenient, and toward making improper or unsafe use inconvenient and extremely difficult.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Making the equipment convenient for safe use and difficult for improper or unsafe use enhances the system's capability to be fabricated, handled, maintained and operated with maximum facility and with minimum hazard to human life and equipment.

a. Does the contractor have a staff known as Human Engineering, or Human Factors Engineering or equivalent?
b. If not, does he utilize the services of a convenient independent organization experienced in or specializing in human engineering design?
c. In addition, does the contractor have adequate copies of military and NASA specifications dealing with Human Engineering design, commercially available reference books, and other guidelines for convenient use by designers and engineers?
d. Depending on the status of the contract, does it appear evident from examination of drawings, models, prototypes or actual equipment (whatever is available) that contractor is diligently applying safe use principles in the design, fabrication, maintenance and operation of his equipment?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.6 Human induced failure considerations enter into the design of the equipment and all instructional material and training associated with its handling, storage, transportation, checkout, and use.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

All of the contractor's support groups shall be made aware and educated to the importance of maintainability, and how it augments the equipments reliability to perform its mission. Engineering design, manufacturing and training groups should review possibilities of human induced failures, analyze them, and make recommendations compatible with other considerations as they affect handling, storage, transportation, checkout and use.

a. Are there written procedures?
b. Do they consider raw and in-process material as well as the finished product?
c. Are there provisions for review of these procedures by the contractor's maintainability group prior to implementation of these procedures established?
d. Is responsibility for development, maintenance, and implementation of these procedures established?
e. Is there evidence of an intelligent, documented, and scheduled human training program oriented toward each program phase?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.7 Features to eliminate potential human induced failures are given careful consideration in all design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The contractor studies the human element with the following goals in mind:

(1) Proper and safe use of equipment must be convenient. All human operations required for successful mission accomplishment, including maintenance operations are simple, and foolproof.

(2) Improper and unsafe use of the equipment must be as inconvenient as possible. Any human operation which may introduce erroneous data into the system or prove damaging to the equipment has been eliminated or made extremely inconvenient.

a. Has the contractor provided his designers with a checklist for calling attention to potential human induced failures in the design?

b. Is there evidence that the designers use this checklist?

c. Does the contractor have a human factors engineer attend the design reviews? Does he attend a majority of design review meetings?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.7 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.5 MAINTAINABILITY AND ELIMINATION OF HUMAN INDUCED FAILURE

SURVEYOR _____

3.5.8 Features to enhance maintainability are given careful consideration in all design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

At formal reviews, pertinent documentation, drawings, reports, test data, etc. are reviewed and a decision is made relative to the capacity of the design to meet its requirements in the maintainability area. Some of the features that have been considered in design to enhance maintainability are:

1. Accessibility.
2. Adjustment, alignment and calibration.
3. Circuitry.
4. Diagrams.
5. Displays, controls and indicators.
6. Ease of replacement.
7. Environment.
8. Handling.
9. Identification.
10. Interchangeability.
11. Lubrication.
12. Maintenance procedures.
13. Manuals.
14. Mounting.
15. Part selection.
16. Safety.
17. Test equipment.
18. Test points.
19. Tools.

a. Is there evidence, from the design reviews, that a checklist has been established to guide the designer from a maintainability standpoint?
b. Do the design reviews show these maintainability guidelines have been followed and that responsibility has been assigned for corrective action to be taken?
c. Do the design reviews aid in rapid and efficient redesign as areas of unsatisfactory maintainability are revealed?
d. Does each designer and maintainability engineer strive to develop additional maintainability guidelines for their particular applications?
e. Have these guidelines (d) been documented?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.5.8 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA 3.6

DESIGN REVIEW PROGRAM

6

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.1 The contractor establishes and conducts a formal program of planned, scheduled and documented design reviews at the system, subsystem, and major component level.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 4.2. Verify that the contractor is complying with this requirement without duplication of effort.

At each milestone formal design reviews have been held for each subsystem and major component defined to date culminating in a formal review of the system and its objectives.

The meetings are conducted and follow a predetermined agenda prepared for each specific meeting, to insure complete review coverage. The formal review covers the whole design effort to date including previous formal and informal design reviews.

a. Is there a documented design review procedure?
b. Is the formal design review documented?
c. Were all major components identified to date reviewed?
d. Were all subsystems identified to date reviewed?
e. Were these reviews conducted with the emphasis on overall system objectives?
f. Was each subsystem reviewed from the viewpoint of system reliability requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.2 The formal design reviews have been comprehensive critical audits of all pertinent aspects of the design, particularly its reliability.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The design reviews have covered all the system aspects pertinent at a particular milestone. As a minimum requirement the items of the following list have been critically audited from the point of view of the system objectives, particularly the system reliability.

a. Specifications.
b. Drawings.
c. Test data.
d. Test procedures.
e. Engineering instructions.
f. Engineering change orders.
g. Human factors.
h. Test equipment.
i. Parts application.
j. Design practices and procedures.
k. Safety margins.
l. Derating.
m. Maintainability.
n. Repairability.
o. Producibility.
p. Reliability apportionment.
q. Environmental factors.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.3 Design reviews are scheduled at major milestones in the program beginning in the feasibility stage and additionally at various stages in the evolution of each design as prescribed in the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

Formal design reviews are scheduled by functional requirements rather than by calendar dates.

Appropriate subdivisions for segregation of formal reviews are as follows:

Design Review I
This review is conducted during the conceptual or preliminary design stage before any large commitments of engineering time or material have been made.

Design Review II
The review is conducted at the breadboard stage of development, that is, when a breadboard or equivalent assembly has been constructed and operated.

Design Review III
This review is conducted either prior to manufacture of the first engineering prototype, or prior to final release of engineering drawings to manufacture.

a. Are formal design reviews scheduled on the project program charts? (PERT Charts?)
b. Are these reviews scheduled at each major milestone?
c. Were formal design reviews held at past major milestones as indicated in the Reliability Program Plan?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.4 Participation in design reviews includes personnel from design, fabrication, reliability, quality, parts application and other areas of the contractor's organization as well as NASA representatives (at the discretion of the cognizant NASA installation).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Does the chairman give sufficient notice to all group representatives involved of forthcoming design reviews?
b. Did representatives of all responsible groups in the contractor's organization participate? Is there a listing showing the groups represented?
c. Was the reliability group sufficiently represented?
d. Is there evidence that NASA representatives have participated?
e. Is there an agenda of the review meeting given to NASA in a timely manner?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.5 Participants in design reviews sign the reports to indicate concurrence with completeness of the review and the actions to be taken.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

All participants in the review have signed the design review reports to indicate concurrence with the completeness of the review and actions to be taken. Participants include the contractor's reliability group, as well as other participating elements of the contractor's organization.

a. Were the design review reports signed and accepted by the reliability group?
b. Were the design review reports signed by all other participating groups?
c. How promptly have the reviews been signed as indicated by the date next to a signature?
d. Are there provisions for feedback in case a participant does not concur?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.6 The reliability group performs follow-up on action items to insure that cognizant groups have completed these actions satisfactorily.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

An action item status form containing the action item identification, corrective action taken or to be taken, and scheduled/actual completion date of the action has been maintained and made available on a continuing basis to all Design Review participants. The reliability group has followed up on all action items to assure that cognizant groups have completed these actions satisfactorily.

a. Is there evidence that the reliability group has followed up on the corrective actions?
b. Was the reliability group's follow-up successful in the past?
c. How did the reliability group monitor the follow-up on action items?
d. Did the reliability group keep the cognizant NASA installation informed of the corrective actions initiated?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1 DESIGN REVIEWS BY THE CONTRACTOR

3.6.1.7 The contractor submits a detailed description of the design review program. This description includes practices and procedures employed, a checklist of design aspects to be covered, and a schedule of individual reviews. The description is included or referenced in the Reliability Program Plan and is updated as necessary.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

A formal design review program exists and is documented. It lists who, what, when, where and how. It should include up to date versions of stated reliability requirements, reliability specifications, failure rate versus stress information on parts, reliability block diagrams, reliability allocations, components and parts failure rate predictions, parts lists and specific environmental stress limits for parts and components.

a. Does a formal design review program exist which includes practices and procedures employed?
b. Does a checklist exist of design aspects to be covered?
c. Was an agenda prepared prior to each design reviewed?
d. Is the detailed description of the design review program referenced in the Reliability Program?
e. Is the design review kept up to date?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.3.1.7 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1.8 Fifteen days in advance of each design review, the contractor notifies the cognizant NASA installation or its designated representative as to the system element to be reviewed, firm date, time, location, and descriptive information on the review in question.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

A (15) day advance notice to NASA or its designated representative of each pending design review is to emphasize adequate time allowance for NASA in preparation for the meeting.

a. Is the cognizant NASA installation or its designated representative notified at least 15 days in advance of each review?
b. Did notification to NASA include:
   1. The system element to be reviewed?
   2. The firm review date?
   3. The meeting time?
   4. The meeting location?
   5. Descriptive information on the review in question?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.8 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1.9 Design review reports include a listing of representation at the review, a statement of actions to be taken, and responsibility therefor.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

Design review minutes are recorded during the review meeting. These minutes are available to all participants and they form the basis for the design review reports.

a. Were minutes recorded during the design review meetings?
b. Was a design review report issued for each formal review?
c. Do the reports include listings of representation at the reviews?
d. Do the reports include statements of action to be taken and the responsibility therefor?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.9 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1.10 Design review reports are provided to, or made available for review by, the cognizant NASA installation within 21 days after the review meeting.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

A comprehensive design review report submitted to NASA within the allotted time can prove very helpful to the contractor. NASA's approval or disapproval of design review results and resultant action items can be redirected and give the contractor the assurance and backing that he is proceeding in the right direction.

a. Were the reports available for NASA review within 21 days after the review meeting?
b. Does the contractor document his reports to NASA?
c. Can the contractor submit proof that NASA has received the reports?
d. Has NASA made comments about reports submitted?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.10 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.1.11 Necessary corrective action resulting from design reviews is initiated and reported informally to the cognizant NASA installation within time periods agreed upon at the review meeting.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

Corrective action on the part of the contractor should proceed immediately. The corrective action taken can be explained to NASA informally within the time agreed upon at the meeting, or by verbal explanation during subsequent visits of NASA.

a. Was corrective action resulting from the reviews reported informally to the cognizant NASA installation?
b. Was corrective action started immediately?
c. Were there time periods agreed upon at the review meeting?
d. Did the contractor meet these time periods?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.1.11 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.2 DESIGN REVIEW BY SUBCONTRACTORS

3.6.2.1 All the conditions set forth under "Design Reviews by the Contractors" are invoked by the prime contractor on all his major subcontractors working on the contract effort.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

For the provisions of this section, a major subcontractor is one who is required to submit a formal Reliability Program Plan. The contractor in this section is the prime contractor or a subcontractor in a tier higher than his own. The following questions should be answered from the contractor's point of view.

a. Were contractor representatives present at major subcontractors' design review meetings?
b. Which groups of the contractor's organization were represented?
c. List the subcontractors where representatives were represented?
d. Did the subcontractors give timely notification for the formal review meetings?
e. Were these notifications passed on to the cognizant NASA installation at least 15 days in advance of the review meetings?
f. Were the subcontractors' design review reports passed on to the cognizant NASA installation?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.2.2 Provisions are made for participation of appropriate contractor representatives (design, reliability, quality, etc.) in subcontractor formal design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The design review program for major subcontractors should include the same requirements as those for a contractor with the additional provision that contractor representatives should be invited to attend. The following questions should be answered from the subcontractors' point of view.

a. Did the contractor send representatives to the formal design review meetings?
b. Which technical areas did these representatives cover?
c. Was the contractor, and through him the cognizant NASA installation, notified with sufficient time of the formal review meetings?
d. Were the design review reports submitted to the contractor?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.2.3 Provisions are made for attendance by NASA personnel as observers at all subcontractor formal design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

NASA or their designated representatives would want to avail themselves of the opportunity to "sit in" on a subcontractor's review. The contractor should make this possible by timely notification to NASA, who would only be interested as an observer, since the prime contractor is responsible for the reliability effort of his subcontractors.

a. Is there evidence that the contractor gives notice to NASA of all subcontractor's design reviews?
b. Is there evidence that NASA or its representative has attended a subcontractor's design review?
c. Were any comments or suggestions made, on the part of NASA, at a subcontractor's review?
d. Has the subcontractor followed through on NASA's comments?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.2.4 The notification and reporting requirements stated for contractor design reviews are implemented by the contractor with respect to his subcontractors.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This requirement deals with notification by a subcontractor to his prime contractor (not to the cognizant NASA installation) of 15 days notice in advance of each design review as to the system element to be reviewed, date, time, location and descriptive information on the review in question.

The design review reporting portion of the above work element is related to 3.6.1.c. (NPC 250-1) which the subcontractor has followed in listing the organizational representation at the review, a statement of the actions taken, the responsibility for these actions and providing to or making available for review by the cognizant prime contractor within 21 days after the review meeting.

a. Is there evidence that the cognizant prime contractor was notified at least 15 days in advance of each review?
b. Did notification to the prime contractor include:
   1. The system element to be reviewed?
   2. The firm review date?
   3. The meeting time?
   4. The meeting location?
   5. Descriptive information on the review in question?
c. Were the reports available for prime contractor reviews within (21) days after the review meeting?
d. Does the subcontractor document his reports to the prime contractor?
e. Has the prime contractor made comments about documents submitted?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.2.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.3 ENGINEERING DESIGN CHANGES

3.6.3.1 Each engineering design change made for any reason after the final review of the element in question is submitted for review, analysis, and concurrence of the design review group (or Change Control Board, if applicable).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This work element overlaps NPC 200-2, paragraphs 2.3 and 5.3.1.k. Verify that the contractor is complying with this requirement without duplication of effort.

a. Are the reasons for changes made clear in the engineering design change documents?
b. Is the affected element identified and described in clear language?
c. Is the expected affect of the change on other parts of the equipment described?
d. Did all cognizant groups, especially reliability, sign the change document?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.6 DESIGN REVIEW PROGRAM SURVEYOR _____

3.6.3.2 At the request of any member of the group performing design change reviews, a new design review is conducted before the change is released.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

Each member of the design review group (or Change Control Board) should analyze the proposed change from the point of view of his responsibility, i.e. the reliability representative should investigate the affect of the change on the reliability of the equipment. If any member of the group considers it necessary, a new formal design review should be conducted before the release of the change.

a. Is there a procedure for all members of design group to receive change documents?
b. Is it evident that procedure is being followed?
c. Is there evidence that change documents receive prompt attention?
d. Is there evidence that the cognizant groups, reliability in particular, contribute constructive critique?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.6.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA 3.7

FAILURE REPORTING AND CORRECTION

7

ACTIVITY AREA: 3.7 FAILURE REPORTING AND CORRECTION

SURVEYOR _____

3.7.1 The contractor and his subcontractors employ a strickly controlled system for the reporting, analysis, correction, and data feedback of all failures and malfunctions occurring during performance of contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, Section 14 and paragraph 5.8. Verify that the contractor is complying with this requirement without duplication of effort.

A controlled system of Failure Reporting and Correction provides timely status information on the failure history of equipment components and provides a yardstick for measuring and recording the progress being made in correcting failure causes. It is a necessary tool to assure the proper feedback of deficiency and malfunction information and the initiation and follow-through of effective corrective action techniques.

a. Is there a written procedure?
b. Does the procedure provide for:
   1. Provisions for comprehensive and timely failure reporting?
   2. Screening and classification of failure reports for formal analysis action?
   3. Conducting analyses and provide for closed-loop follow-up of recommended corrective action?
   4. Initiating corrective action and verifying its implementation?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.7.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.7 FAILURE REPORTING AND CORRECTION

SURVEYOR _____

3.7.2 The failure and malfunction control system emphasizes timely reporting and analysis of all failure and malfunctions, regardless of their apparent magnitude. This will allow timely and appropriate evaluation, corrective and preventative action and follow-through can be accomplished by cognizant design, fabrication, quality and/or field personnel.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

A positive documented procedure is established and is followed in reporting and analyzing all failures and malfunctions.

a. Is there a written procedure?
b. Does the procedure provide for:
   (1) Report of all failures?
   (2) Identification of failures with regard to parts and drawing number?
   (3) Immediate notification to the applicable contractor's functions that corrective and preventative action is required?
   (4) Immediate notification to the appropriate NASA office of critical failures or malfunctions (those affecting safety, mission, delivery schedule, or early effectivity)?
   (5) Abstract of failure analysis?
      (a) Failure mode?
      (b) Frequency?
      (c) Criticality (effect) ?
   (6) Analysis by responsible functions of malfunctions, troubles, and failure traceable to operator error, design, purchasing, fabrication, inspection, or test?
   (7) Prompt corrective and preventative action and documentation of the action?
   (8) Rework of all affected articles, in the plant, at test sites, and at operating sites?
   (9) Review to determine the adequacy of the corrective and preventative actions?
   (10) Notation of each deficiency in reports prepared by the contractor until adequate action has been taken?
c. Is there evidence that this procedure is being followed?
d. Is there a Failure Analysis Lab report procedure?

Continued on next page

3.7.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTIONS -

ACTIVITY AREA: 3.7 FAILURE REPORTING AND CORRECTION

SURVEYOR _____

3.7.3 The contractor submits a detailed description of his own and his subcontractor's failure reporting and corrective system including procedures, organizational responsibilities, and formats and numbering of reports for NASA approval as a part of the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The contractor collects and analyzes all trouble, failure, and reliability data resulting from testing, inspection, and usage of the articles procured or produced. The development of a standard format would enable the data to be mechanically handled for analysis of failure data, operating time to failure, mode of failure, etc. If the NASA installation has requested a standard format for submission of operating data, the contractor should follow this established format.

a. Is there a written procedure?
b. Does the procedure specify the responsibility for this collection and analysis? What function or functions?
c. Is there evidence that data has been collected and analyzed?
d. Do procedures specify the types of data to be collected and analyzed?
e. Is there evidence that the customer has requested a particular format?
f. Is the format being used for operational data approved by the customer?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.7.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.7 FAILURE REPORTING AND CORRECTION

SURVEYOR _____

3.7.4 The contractor submits, for his own and his subcontractor's operations, periodic listings for each reporting period of failure reports, failure analysis reports, and corrective action reports becoming available during that period as a part of the periodic reliability progress reports. The individual reports are referenced by number but are not submitted unless specifically requested by the cognizant NASA installation.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

Failure analysis actions are summarized and corrective action status reviewed periodically to management with special notation of all overdue actions.

a. Is there a written collection, summarization, and analysis system?
b. Are reports published regularly?
c. Do the reports adequately depict the analysis work performed?
d. Is there a distribution list for these documents?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.7.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA 3.8

STANDARDIZATION OF DESIGN PRACTICES

8

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.1 The contractor maintains a continuous standardization effort in the areas of design practices and processing procedures.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

NASA Circular 293 indicates that the Statement of Work for NPC 250-1 paragraph 3.8 should point out that the standards effort will be limited to that required to modify existing contractor standards to meet system requirements, and that it is not necessarily intended to have the contractor set up a complete new standards system at NASA expense.

Proper standardization is most important, and must, as its final objective, be applied in accordance with customer satisfaction. Related subcontract work must be properly integrated with the contractor's existing standards.

a. Does the contractor have a coordinating group of personnel who maintain liaison with the other functional units that generate process specifications, manufacturing instructions, drafting practices, etc.?
b. Is it evident that the contractor had a standardization effort commensurate with his needs prior to award of subject contract?
c. Are the members of this group formally assigned specific areas to participate in, so that each member can be considered an authority in his assigned endeavors?
d. Are these people basically devoting full time to standardization activities on documented results?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.2 The contractor formalizes the results of the standardization efforts in manuals for use of his design, drafting, fabrication, processing and inspection personnel.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the contractor have a series of readily-identifiable standards, procedures, processing, etc., manuals for the use of his appropriate personnel?
b. Is the publication, revision and distribution of these manuals integrated through a central office or activity?
c. If not, is it fairly simple to locate the printers and distributors of other functional group's publications?
d. Is it reasonably apparent that the majority of bookholders are maintaining and using them, as evidenced by signs of wear of the manuals' contents, and by a lack of back-log of unfiled revisions?
e. Does it appear that the contents of these manuals are basically up-to-date as evidenced by the frequent issuance of new material, and by the revision of previously published material?
f. Is it substantiated that his subcontractors are also receiving necessary sets of the contractor's standardization manuals to assure uniformity and to maximize compatibility of equipment being supplied?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.3 The contractor uses his existing standards and specifications insofar, as practicable, with modifications as necessary to meet contractual quality and reliability requirements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Have the contractor's designated personnel made a review of contractual quality and reliability requirements, and have incorporated these requirements into existing standards?
b. Where existing standards were not adequate or compatible, has the contractor issued and implemented entirely new specifications consistent with contractual requirements?
c. Does the contractor or any subcontractor show a history of requesting an above-average number of waivers in lieu of modifying his specifications, even though contractual requirements seemingly impose no significant hardship on the contractor or subcontractor?
d. Does the contractor have so-called project data books or similar publications to formalize and summarize technical and design requirements for specific jobs?
e. Are these project books maintained current during the life of the contract?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.4 Available NASA Design Criteria are incorporated in the contractor's and subcontractors' design standards systems to the extent prescribed in the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Do the contractor's design standards include NASA design criteria?
b. Has the contractor imposed NASA's design criteria on his subcontractors?
c. Since the contractor should have copies of his subcontractors' design standards, do they include NASA's Design Criteria?
d. Has the contractor or any subcontractors requested an unusual amount of waivers taking exception to NASA's design criteria requirements?
e. Are the waivers documented as to acceptance or rejection; and final action taken by contractor and his subcontractors?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES SURVEYOR _____

3.8.5 The contractor's reliability organization reviews the design and processing standards for adequacy in meeting reliability requirements of the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the contractor's reliability organization have a composite index of the contractor's and his subcontractor's current design and processing standards?
b. Does the reliability organization have a library or files of all standards listed on the index, assuming the index to be up-to-date and inclusive?
c. Does the reliability group have the latest copy of all contractual requirements?
d. Can it be confirmed by documentation that the reliability group has reviewed, and will continue to review the contractor's and subcontractors' design and processing standards for compliance of requirements and intent of the contract?
e. Where the reliability group may have found non-compliance of contractor's or subcontractors' standards with contractual requirements, did the personnel in the group advise the responsible personnel of their findings and recommendations; and then expedite investigation and resolution for corrective action?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.6 The contractor's reliability organization is responsible for monitoring and insuring that the design and process standards are being followed.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The surveying team reviews briefly the extent of reliability's efforts and procedure in monitoring and assuring that design and process standards are being followed. The original contractor presentation should have included an ample description of how monitoring is being accomplished.

a. Does the reliability group have a formal and competent operating and procedures manual?
b. Does the manual appear to be comprehensive for the essential tasks to be performed?
c. Does the manual appear to be well maintained as evidenced by the inclusion of new material, and revision of previously published material?
d. Does the manual permit and require the reliability group to self-monitor itself, and to self-monitor its procedures, methods and controls?
e. Does the contractor have an adequate and competent staff of reliability indoctrinated personnel whose primary duty and responsibility is physical monitoring of fabrication, processes and processing, testing and inspection functions of the contractor and his subcontractors?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.7 The contractor's quality organization reviews the design and processing standards for adequacy in meeting quality requirements of the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the contractor's quality organization have a composite index of the contractor's and his subcontractors' current design and processing standards?
b. Does the quality organization have a library or files of all standards listed on the index, assuming the index to be up-to-date and inclusive?
c. Does the quality group have the latest copy of all contractual requirements?
d. Can it be confirmed by documentation that the quality group has reviewed, and will continue to review the contractor's and subcontractor's design and processing standards for compliance of requirements and intent of the contract?
e. Where the quality group may have found non-compliance of contractor's or subcontractors' standards with contractual requirements, did the personnel in the group advise the responsible personnel of their findings and recommendations; and then expedite investigation and resolution for corrective action?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.7 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES SURVEYOR _____

3.8.8 The contractor's quality organization is responsible for monitoring and insuring that the design and process standards are being followed.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The surveying team reviews briefly the extent of quality efforts and procedure in monitoring and assuring that design and process standards are being followed. The original contractor presentation should have included an ample description of how monitoring is being accomplished.

a. Does the quality group have a formal and competent operating and procedure manual?
b. Does the manual appear to be comprehensive for the essential task to be performed?
c. Does the manual appear to be well maintained as evidenced by the inclusion of new material, and revision of published material?
d. Does the quality manual include the following typical procedures:
   1. Incoming inspection and test of purchased items.
   2. Inspection of manufactured parts.
   3. In-process inspection of assemblies.
   4. Final testing.
   5. Purchase order procedures.
   6. Tools, gages and fixtures.
   7. Test equipment.
   8. Processes.
   9. Material review procedure.
   10. Bailed equipment.
   11. Government furnished property.
   12. Preservation, packaging, packing, documentation, shipping and inspection.
   13. Scrap control.
   14. Storage of supplies.
   15. Quality control records.
   16. Control of Non-conforming material.
e. Does the contractor have an adequate and competent staff of quality indoctrinated personnel whose primary duty and responsibility is the physical monitoring of fabrication; process and processing, testing and inspection functions of the contractor and his subcontractors?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.8 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.9 The contractor reviews the standards of his subcontractors for compatibility.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the contractor have a ready-reference index of what his subcontractors are supplying, applicable design specifications, and standards to be used?
b. Has the contractor's personnel reviewed the subcontractor's standards in the early design stage, and are currently reviewing additions and revisions during the life of the contract?
c. Is the contractor invoking and integrating his standard practices and procedures on the subcontractors?
d. Where the contractor points out discrepancies or potential noncompatibility situations, is he receiving satisfactory cooperation and mutually acceptable resolution?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.9 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES SURVEYOR _____

3.8.10 Standards are subject to inspection by NASA.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Has NASA exercised its prerogative to inspect the contractor's and subcontractors' standards, processes and procedures?
b. If so, does the contractor have a record of the documents that NASA inspected, and their comments for those documents inspected?
c. Where NASA did make suggestions, did the contractor and subcontractors take timely action by revising the existing standard, by implementing a different preferred standard, or by requesting and receiving a waiver for the use of the originally specified standard?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.10 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.11 Deviations from standard practices are the subject of particular scrutiny in design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. As deviations of standards, processes and procedures are discovered, and are of such significance as to warrant being scrutinized, are these deviations formally entered on the agenda for a forthcoming design review?
b. From a review of consecutive design review reports, is it possible to trace the history of the deviation from start to final disposition, even though it required the concurrence of several people and perhaps more than one discussion?
c. Does it appear that the design review meetings resolve these deviations in a prompt manner?
d. When the resolution of deviations requires a revision to standards, processes or procedures, are the applicable documents revised in a timely manner? Are the revised documents promptly implemented as agreed upon at the design review meetings?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

3.8.11 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.12 Typical areas covered in the standardization system include process specifications.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 7.5.4. Verify that the contractor is complying with this requirement without duplication of effort.

Process specifications that may be encountered by the surveying personnel are plating, finishing, surface preparing and painting, bonding, soldering, brazing, welding, molding, encapsulating and heat treating etc.

a. Since process specifications are intended for general use, has the contractor prepared an index or similar guide of process specifications that are contractually permitted or required to be used on a particular system, subsystem, or component?
b. Does the index or guide show the inclusion of NASA approved, recommended, or required process specifications?
c. Is the index or guide widely distributed and actively maintained for the use of applicable groups to minimize individual research, to assure uniformity of processes for given applications, and to save time?
d. Do the process specifications appear to be formal, permanent, well prepared and well maintained documents in the contractor's system, rather than hastily contrived pieces of paper just to satisfy the immediate requirements?
e. Does the contractor have a competent facility for the investigation and testing of processes and process materials; for preparation, maintenance and dissemination of process specifications; specialized process facilities; and for vendor and supplier certification? (This may be his own materials and processes laboratory, or it may be an independent laboratory whose services are readily available to the contractor.)

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.12 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES SURVEYOR _____

3.8.13 Typical areas covered in the standardization system include fabrication, assembly and machining standards.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Fabrication, assembly and machining standards will include typical subjects such as classes of fits, knurling, counterboring, countersinking, tapping of holes, standard hole sizes, bend radii, swagging, riveting, staking, tightening torques for hardware, use of inserts and incremental spacing.

a. Does the contractor have and maintain formal publications including a substantial number of appropriate fabrication practices, assembly methods and machining standards for the use of not only his own functional units, but also for his subcontractors use during the contract?
b. Do the contents of these publications show considerable effort of research, preparation and maintenance reflecting the latest facilities, processes and techniques acquired by or developed by the contractor and by outside sources?
c. Does the distribution of those publications appear to be well organized and systematic; so that additions and revisions promptly reach the manual holders?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.13 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.14 Typical areas covered in the standardization system include drafting practice and drawing specifications.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 2.3.1. Verify that the contractor is complying with this requirement without duplication of effort.

a. Does the contractor have a readily identified publication known as a Drafting Practice or Drafting Manual?
b. Does the publication appear to be a well organized, well maintained, and comprehensive medium of contractor drafting procedures and know-how?
c. Does it include interpretations and reprints of customer-imposed requirements and standards?
d. Does the drafting practices manual include evidence that it may have been the subject of considerable review by reliability or by the design review group?
e. Is it evident that his subcontractors are also following the procedures and practices of the contractor's drafting manual for planned compatibility of drawing format?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.14 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.15 Typical areas covered in the standardization system include general design specifications for electronic assemblies.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Depending on the contractor's activities, specifications in this category may include typical procedures and design data for dip soldering of component boards, printed circuits, interface connections on printed wiring boards, encapsulation, micro-electronics, modules, standard circuits, standard functional assemblies, etc.

a. Are these general design specifications cataloged and included in a formally issued and maintained contractor's manual?
b. Is it apparent that the subcontractors are also using and abiding by this publication?
c. From what is already known and has been observed, does it appear that the contractor's activities are adequately covered in this manual?
d. Do the manuals include preferably, copies of general specifications issued, endorsed or invoked by the cognizant NASA installation as contractual requirements?
e. Is it evident that the various write-ups have been the subject of design reviews, and reviews by reliability personnel?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.15 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.16 Typical areas covered in the standardization system include general design specifications for mechanical, hydraulic, and pneumatic assemblies.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Areas covered in this category may include typical subjects such as gear design, gear assembly, gear and gear component selection; gear tolerances and calculations, mechanical drives, frame construction, enclosure design, pipe and hose standards, properties, pipe threads, heat transfer, pressure and stress calculations, rate of flow, pipe and fitting resistance, etc.

a. Does the contractor have a cataloged manual of these and similar types of specifications and design data?
b. Does it include a representative cross-section of data and specifications covering the contractor's predominate activities?
c. In addition to contractor-prepared design data, does the manual also include reprints and appropriate extracts of commercially available data?
d. Do the various specifications show evidence of reliability review and concurrence, and results of design and other reviews?
e. Is there a continuing effort on the contractor's part to upgrade existing data and specifications, and also to develop and acquire data for new activities as warranted by the needs and magnitude of the activity?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.16 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.17 Typical areas covered in the standardization system include general guides for design simplification.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Design simplification-guides may encompass typical areas such as mathematical tables, conversion charts, properties and characteristics tables, nomographs; precalculated design data, equivalents, design factors, equations; design considerations, selection charts, etc.

a. Does the contractor have a formal, cataloged manual of such material?
b. Does this manual include some of his own generated data, as well as a significant amount of commercially prepared data?
c. Is it fairly simple to locate needed data and to readily ascertain that desired data is not a part of the manual?
d. Do the contractor-originated guides and design data show evidence of having been reviewed by reliability and by design reviews?
e. It is evident that reliability has concurred with commercial data?
f. If the cognizant NASA installations have such design data, is it included or referenced in the contractor's manual?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.17 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES

SURVEYOR _____

3.8.18 Typical areas covered in the standardization system include procedures for insuring formalization in drawings and specifications of "quick fixes" made to correct failures in test.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 2.3. Verify that the contractor is complying with this requirement without duplication of effort.

a. Does the contractor have a formal documented procedure for the handling and processing of changes necessitated by failures in test?
b. Does the procedure completely delineate the action require to:
   1. Correct engineering drawings.
   2. Correct parts lists.
   3. Correct end-item specifications.
   4. Update spare parts and documentation.
   5. Update handbooks.
   6. Establish effectivity point.
   7. Establish disposition of affected material.
c. Is it evident that the reliability group is automatically advised of all changes, reviews all "fixes", and concurs with the actions taken?
d. Do "fixes" of significant magnitude reach design review meetings?
e. Can the contractor substantiate that failures in test are corrected promptly and that all other affected documentation and procedures are made to agree in a timely manner with the equipment configuration as a result of changes?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.18 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.8 STANDARDIZATION OF DESIGN PRACTICES SURVEYOR _____

3.8.19 Typical areas covered in the standardization system include procedures for insuring formalization in drawings and specifications of "quick fixes" made to correct failures in field use.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the contractor have a documented procedure for the handling and processing of changes necessitated by failures in field use?
b. Does this procedure completely delineate the action required to:
   1. Correct engineering drawings.
   2. Correct parts lists.
   3. Correct end item specifications.
   4. Update spare parts and documentation.
   5. Update handbooks.
   6. Establish effectivity point.
   7. Prepare field change kits and documentation.
   8. Establish requirement of installation tools.
   9. Instigate contractual coverage.
   10. Establish disposition of affected material.
c. Is it evident that the reliability group is automatically advised of all changes, reviews all "fixes" and concurs with the actions taken?
d. Do "fixes" of significant magnitude reach design review meetings?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.8.19 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA 3.9

PARTS AND MATERIALS PROGRAM

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.0.1 The contractor implements a program covering selection, reduction in number of types, specification, qualification and application review of parts and materials for all items to be used in the system.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor should have, in operation, a documented method for the control of his standardization efforts to control the selection, qualification and application of the various parts and materials. This method should be consistent with the program outlined in the Reliability Program Plan.

a. Does the contractor have an identifiable, formally organized and competently managed group of qualified personnel with accompanying facilities to select, specify, qualify, test and apply parts and materials?
b. Does this group document, publish, maintain and disseminate the results of these activities?
c. Does the organizational chart indicate a reasonable distribution of engineers with supporting technical and clerical personnel assigned to perform these activities?
d. Is there an adequate number of key personnel with well defined and specific responsibilities in these activities commensurate with the magnitude of the task?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.0.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.0.2 A description of the parts and materials program is submitted as a part of the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2) and INTERMEDIATE (2.2.3) PLAN(s) only.

a. Does the Reliability Program Plan include a description of the parts and materials program?
b. As a minimum, does this description include items such as:
   1. Description and amount of manpower anticipated for assignment to parts and materials program.
   2. Documentation output of program.
   3. Implementation of documentation.
   4. Relationship with the reliability group.
   5. Relationship with the contractor's other functional units.
   6. Basic operating procedures.
   7. Facilities established for qualification testing.
c. Is it apparent that the contractor's reliability organization concurred with the parts and materials program as presented in the Reliability Program Plan?
d. Has NASA reviewed and approved the parts and materials program as presented in the Reliability Program Plan?
e. Has the contractor had the opportunity to incorporate NASA's comments and suggestions on this program into his own operating procedures, and has he done so?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.0.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.0.3 Progress of the parts and materials effort with problem areas encountered is reported in the periodic reliability progress reports.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Is it evident that the contractor is regularly and promptly reporting his parts and materials effort status in the periodic reliability progress reports as a readily identifiable section of the report?
b. Does the contractor discuss problem areas in sufficient depth outlining the problem, its causes and effects, method of ultimate resolution, and efforts of other participating groups such as reliability, for example?
c. Does it appear that the overall reporting of the parts and materials program status is well organized and well presented, and is indicative of the contractor's desire to perform adequately for the job requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.0.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.1 PARTS AND MATERIALS GROUP

3.9.1.1 The contractor establishes a group of qualified specialists to act as advisors to the design groups on the application and selection of parts and materials and to conduct the parts program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Is it apparent that the contractor's other functional groups respect the judgement of and solicit the advice and recommendations of the parts and materials specialists?
b. Can the contractor produce or point out typical documentation that demonstrates the effectiveness of his specialists in their relationship with other functional units?
c. Can he point out typical normal outputs of his advisors for the use and benefit of his other functional units?
d. Does the reliability group have the responsibility and opportunity to collaborate and concur with the parts and materials specialists where reliability may be affected?
e. Is the reliability group automatically advised of all outputs of the specialists, either before formal dissemination of documentation for reliability's concurrence, or after dissemination for reliability's information?
f. Is there a close-coupled relationship between the parts and materials specialists and the reliability personnel?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.1.2 A description of the organization and procedures pertinent to the parts and materials group is included in the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2) and INTERMEDIATE (2.2.3) PLAN(s) only.

a. Does the issue if effect of the Reliability Program Plan include a description of the parts and materials organization?
b. As a minimum, does this description include items such as:
   1. Organizational chart of key personnel.
   2. Description of the organization.
   3. Procedure in selecting qualified and other approved parts and materials for the system.
   4. Procedure for preparation of parts and materials specifications.
   5. Procedure in conducting qualification and requalification testing of parts and materials.
   6. Procedure for preparing lists of approved parts and materials.
   7. Procedure in the conduct of application reviews.
c. Do the various procedures delineate the degree of formal collaboration and ultimate concurrence with the reliability group?
d. Has there been feedback from NASA expressing concurrence with the parts and materials organization and charter, its operating procedures, and its relationship with the reliability group and other functional units?
e. If any of NASA's suggestions required the contractor to strengthen his procedures, for example, has he done so in a timely manner?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

3.9.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2 PARTS SELECTION

3.9.2.1 The contractor selects parts for the system on the basis of proven qualification of each part and material for its application(s).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The surveyor should ascertain:

(1) Whether NASA provided, to the contractor, data on parts already proven for other systems to limit the scope of his part selection effort, and (2) that the contract specifies an order of precedence for the selection of parts and materials.

a. Is it evident that the contractor has utilized NASA data in his part selection?
b. Can the contractor show, by documented procedures, that the order of precedence (when specified) is well known to his personnel who select and review parts and materials?
c. Is it evident that parts having a history of high reliability, and parts recognized and identified as standard high reliability parts receive top attention by contractor's personnel are referenced on parts lists?
d. Do the parts lists necessarily show some parts specified by Industry Standard designations which are readily justifiable by the contractor?
e. Does material call-out also reflect NASA's recommendations and requirements; MIL, JAN, FED or other government agency designation; Industry Standard designation; and contractor's own designation in order of precedence where NASA may have elected to specify this stipulation?
f. Is the reliability group monitoring and advising the part and material selection activity to make sure that their records contain no information adversely affecting part selection and part call-out?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2.2 The contractor selects parts from sources employing effective reliability and quality programs in their manufacture.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Since he is building equipment for a customer who must have utmost reliability, a resourceful contractor will take advantage of services offered. One of these services is the availability of Qualified Products Lists (QPL's) for a great number of parts and materials covered by military specifications. The "QPL" denotes vendors capable of and who have manufactured parts to specification.

Another scheme a resourceful contractor will do is create and maintain a complete history of parts and materials received, inspected and tested from all vendors and suppliers for an extended period of time. The contractor may also create and maintain a complete history of all parts tested, qualified and rejected as a result of his regular and qualification testing. Results of integrated field report data, failure reports and line test data will all serve to influence part sources.

Generally, part manufacturers employing the more effective reliability and quality programs will be substantiated by parts having the best part history.

a. Is the contractor subscribing to and utilizing Qualified Products Lists as a contributing basis of determining and confirming part sources?
b. Are receiving, inspection and incoming test data results automatically forwarded to the parts and materials group, to the reliability group and to other applicable units?
c. Are field reports, failure reports, and line test data also sent to these and other applicable units?
d. Does the parts and materials group have and systematically maintain drawings, parts specifications, vendor data and other available historical data for each part used by the contractor?
e. Does the part and materials group have the delegated responsibility for determining and recommending preferred sources of parts?
f. Does the parts and materials group maintain a morgue of unreliable, failed, and otherwise unacceptable parts?
g. Does the contractor make it a point to personally survey significant parts manufacturer's reliability and quality programs in operation at their facilities?
h. Does the contractor assist and make his resources available to his subcontractors to expedite and integrate their part and material procurement from approved sources?

Continued on next page

3.9.2.2 Cont'd. -NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2.3 Items already qualified to pertinent specifications are chosen when possible.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor should have a book, list, card file, or manual of parts that are already qualified to pertinent specifications for the design engineer's ready reference. This standard manual will reduce the duplication of effort when an already existing part will accomplish a task.

a. Is the contractor, particularly the parts and materials group, continually publicizing and emphasizing the use of parts already qualified?
b. Does he make it easy for the development and design personnel to acquire high reliability, standard and preferred parts for "bread-boarding", so that ultimately these parts will be called for on the final parts lists?
c. Does he make it extremely difficult for a designer to obtain part references that have a poor or questionable history or record?
d. When the parts and materials group discovers a "bad" part called out, and if they are unsuccessful in convincing the designer to change to a preferred part, do they formally call upon the reliability group for assistance?
e. Does it appear that the parts and materials group is dynamic and progressive toward increasing the variety and scope of available qualified parts through efforts such as searching for additional approved sources for parts and materials, by investigating and testing new parts and materials, and by conducting tests to help vendors in meeting qualification requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2.4 The minimum practicable number of styles of each generic type is used.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Ideally, the contractor should continually screen the parts and materials used in his organization, and should select and advocate the use of preferred styles, configurations, and values of each general type. Where equipment performance is not jeopardized through the use of a minimum practicable number of styles and values, both NASA and the contractor will gain the following:

1. Improved production control.
2. Economy of larger quantity procurement.
3. Improved reliability part history.
4. Reduction in possibility of introducing inferior parts into equipment.
5. Reduction in variety and number of spare parts and associated documentation.

a. Is it evident that the contractor is emphasizing the use of selected preferred values, tolerances, ratings, etc. within a given style or part?
b. Is he promoting the use of preferred sizes, styles, materials, finishes, lengths, configurations, shapes, thicknesses, etc. in the area of raw materials, fastening devices and assembly hardware?
c. Is he extending his selection efforts into the field of wiring and cabling through listings of preferred wire, wire sizes, insulating materials and terminations?
d. Are there contractor prepared, maintained and distributed formal lists and charts widely promoting the use of standard, selected and preferred parts and materials in his system?
e. For convenience, are these lists and charts a part of the contractor's formal operating and design manuals?
f. From the surveyor's general knowledge of the great scope, variety and number of parts available for use, does it appear that the contractor's parts and materials group is conscientiously striving to provide an optimum number and materials to meet job requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.2.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2.5 When selecting items previously qualified, the contractor devotes particular attention to currentness of data, applicability of bases of qualification, and adequacy of specifications.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the parts and materials group have a standard mandatory procedure whereby the personnel in the group thoroughly and promptly review and update parts drawings and subsequent lists, manuals and indexes against recently revised specifications, new vendor data and test results?
b. Particularly in the case of part drawings based on Military Specifications, do the contractor's parts drawings have a provision and a sign-off stating that the drawing agrees with its pertinent specification and the revision identification of the latest amendment, supplement or revision?
c. Is it apparent that the contractor's parts drawings are in general agreement with its pertinent specification and latest revision?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.2.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2.6 The results of the parts selection effort determine requirements for additional qualification testing.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

It is highly improbable that the contractor is able to generate a complete selection of fully qualified parts to meet all contractual requirements. There may be instances where parts qualified in the past to then existing requirements, will not meet present requirements. It is the contractor's responsibility to determine which available parts, with or without previous qualification history, stand the best chance of meeting new qualification requirements. The contractor devises new additional requalification testing requirements, or locates and tests state-of-the-art parts, or develops new sources potentially capable of producing parts for the more stringent requirements, or combinations thereof.

a. Does the contractor have a continuous indication of his qualified parts status (per component) indicating:
   1. Parts fully qualified.
   2. Parts previously qualified undergoing further testing.
   3. Parts having test data reviewed by cognizant NASA installation for qualification.
   4. Parts in qualification test.
   5. Parts to be received from vendors for test showing anticipated receipt and start-of-test dates.
b. Does this indicating list spotlight those parts which could jeopardize equipment performance or delay delivery, thus alerting the contractor to consider alternate possibilities of resolution long before a situation becomes catastrophic?
c. Does this list or other evidence indicate where the contractor may have requested waivers to contractual requirements where the requirements appeared unrealistic; or where parts to meet contractual requirements were unavailable within the time limits imposed?
d. Is it evident that the reliability group is automatically informed of qualification testing status and that their personnel participates in the resolution of problems that could hamper the overall program?
e. Is it evident that potential part problems are brought to the attention of design reviews and parts application reviews, and they were the subject of discussion with suggested alternatives of approach for resolution?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.2.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.2.7 The results of the parts selection effort are an important input to the approved parts list for the system.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

To maximize uniformity of design and to avoid repetitious research, the contractor generally creates and maintains a complete parts and materials handbook issued specifically for a given equipment or system. This working document is established to indicate the majority of standard preferred parts and materials, and includes a listing of qualified parts that must be used to satisfy contractual requirements.

a. Does the contractor have a readily identified parts and materials handbook sometimes referred to as a project data book or equivalent?
b. Is there a documented procedure for the parts and materials group to formally participate, as advisors, in preparing and monitoring this handbook?
c. Is there a documented procedure for the reliability group to continually monitor the contents of this handbook, and to recommend changes when deemed necessary?
d. In the project data book activity, is it apparent that the liaison, cooperation and results between design engineering, reliability and parts and materials personnel is effective and efficient?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.2.7 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.3 PARTS AND MATERIALS SPECIFICATIONS

3.9.3.1 When the contractor and the cognizant NASA installation determine that adequate specifications do not exist for certain parts and materials to be used in the system, the contractor prepares specifications for such parts and materials.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Does the contractor have an index or summary indicating that adequate specifications do or do not exist for parts and materials used on a system?
b. Does the parts and materials group operate to a documented procedure or check list to assure uniformity and completeness in the preparation of specifications for parts and materials?
c. Does it appear that the contractor takes the initiative in establishing whether available specifications are adequate to fulfill requirements and takes necessary action, rather than wait for the cognizant NASA installation's recommendations?
d. Do the reliability personnel have the functional opportunity to review, endorse or suggest improvements to all procurement specifications before release into the contractor's production system?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.3.2 Parts and materials specifications are responsive to the applicable reliability and other mission criteria.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Is the parts and materials group on automatic distribution for all design specifications used for a system?
b. Before design specification revisions and additions are filed, is there a formal procedure for each pertinent part and materials group personnel to review them for effect on purchase part specifications, test program and qualification status?
c. Is it evident that each revision and addition is being reviewed for its effect on purchase part specifications, and that the required action is either schedules, in process or complete?
d. In general, do the purchase part specifications and/or drawings include at least, the following basic information and data:
   1. Outline and dimensions.
   2. Ratings and tolerances.
   3. Vendors identification.
   4. Application and derating data.
   5. Circuit diagrams.
   6. Overstress requirements.
   7. Marking of parts.
   8. Special handling and warning notes.
   9. Specifications and standards to be met.
   10. Testing requirements to assure reliability and other mission criteria.

e. Can the contractor demonstrate that random selected part specifications reflect and meet applicable design specification requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.3.3 Specifications are expressed in terms of conformance to readily measurable criteria.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

It is practically impossible for a surveyor to critically analyze a contractor's specifications for exact compliance to readily measurable criteria because of the ever increasing state-of-the-art advancements in this type of program.

a. Does it appear that the reviewed specifications are clear and concise in their requirements?
b. Does it appear that the requirements are stipulated as state-of-the-art standards?
c. Does conversation with the contractor's test personnel indicate that requirements are readily measurable with available test equipment, or with his own specialized test set-up?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.3.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.3.4 Specifications include protective packaging requirements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

Occasionally, a parts or materials supplier will not be completely aware of damage that may occur during transit, normal handling and storage. For his own protection, the system contractor may want to guide the supplier in specifying packaging, packing and shipping instructions.

a. Do specifications for critical parts include special handling and shipping instructions?
b. Do the usual parts and materials specifications call out NASA, government, or industry recognized packaging and packing specifications?
c. Does the contractor's packaging and packing group review specifications for critical parts to assure adequate packaging and packing materials and procedures?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.3.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.3.5 Parts and materials specifications are available to the cognizant NASA installation for review.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Has this requirement been incorporated in the contractor's operating procedures?
b. Does the parts and materials group have a listing of those specifications sent to NASA for review?
c. Does the listing indicate those disapproved by NASA, and the contractor's final corrective action?
d. Does it appear that there may be an unusually high number of disapprovals in relationship to the number submitted?
e. Is it evident that the contractor is complying with this requirement?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.3.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.4 PARTS AND MATERIALS QUALIFICATION TESTS

3.9.4.1 In the absence of adequate qualification data, the contractor designs and conducts qualification tests on parts and materials to determine their adequacy in meeting specification requirements and for development of criteria to be used in acceptance testing.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 4.3.1. Verify that the contractor is complying with this requirement without duplication of effort.

NPC 200-2 states "Qualification tests are performed to demonstrate that the design is inherently capable of meeting established requirements. The contractor designs qualification tests to:
1. Locate significant failure modes.
2. Determine the effects of varied stress levels.
3. Determine the effects of combinations of tolerances and drift of design parameters.
4. Determine the effects of combinations and sequences of environments and of stress levels.

Destructive tests and an inspection of disassembled articles shall be included as appropriate. Qualification tests shall be appropriate for the system performance, environments and associated time requirements."

a. Does the contractor have a readily available log of qualification test status including, as a minimum:
   1. Identification of part.
   2. Test objective.
   3. Test scheduled.
   4. Criteria for passing or failing the test.
   5. Criteria for determining conformance or rejection of part.
   6. Final disposition.
b. Is it apparent by a review of typical qualification test specifications that tests are incorporated to bring out data and information with respect to Items 1, 2, 3, and 4 above?
c. Is consideration given to marginal testing for critical items?
d. Are applicable environmental and load conditions verified by the test program?
e. Does the reliability group collaborate with the parts and materials group on a formal basis designing qualification tests and evaluating results?
f. Does the reliability group physically monitor qualification testing in progress?

Continued on next page

3.9.4.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.4.2 The contractor reports qualification status for parts in the overall Qualification Status List (NPC 200-2, Paragraph 4.3.5).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

This work element overlaps NPC 200-2, paragraph 4.3.5. Verify that the contractor is complying with this requirement without duplication of effort.

NPC 200-2 states, "The contractor shall prepare and maintain a qualification status list showing the planned and completed qualification status of each part. The basis for any omission of qualification tests shall be shown. Where qualification is based on tests conducted under the applicable contract, reference shall be made to the pertinent test reports or data. The qualification status list and changes thereto shall be submitted for approval in a manner and at intervals mutually agreed upon with the NASA installation."

a. Does the contractor systematically maintain a qualification status list?
b. Does it include information such as:
   1. Planned and completed qualification of each part.
   2. Basis for omission of qualification tests.
   3. Pertinent test reports or data.
c. Is it readily confirmed that Qualification Status Lists are being submitted to NASA for approval per stipulation?
d. Does the contractor's working status list indicate:
   1. Items having NASA approval.
   2. Items awaiting NASA disposition.
   3. Items rejected by NASA.
   4. Contractor's date of implementation of approved items and items waived.
e. Is there any evidence indicating that the contractor may have implemented parts into his system <u>before</u> approval was received from NASA <u>within</u> the time specified in the contract, or by mutual agreement?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.4.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.4.3 The contractor submits for NASA review test specifications for parts proposed for qualification testing.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

This work element overlaps NPC 200-2, paragraphs 7.3.1 and 7.3.2. Verify that the contractor is complying with this requirement without duplication of effort.

NPC 200-2 states (in essence) that specific written test procedures shall be prepared and submitted for each test operation to be performed by the contractor or his subcontractors. These procedures shall include at least the following:

1. Identification of the article to be tested.
2. Test objectives.
3. Measuring and test equipment to be used, specify range, accuracy and type. Specify the particular scale, dial or device to be observed. If recording type, indicate details of tape, film, sensitized paper or punchcards involved.
4. Detailed operations to be performed by the test operator including operational checks or preliminary calibration of test setup.
5. Exact method of measuring, including necessary manipulation of controls on the article involved, and on the measuring and test equipment.
6. Conditions that must be maintained during test, including ambient or environmental conditions and precautions to be observed to prevent damage to the articles or instruments involved.
7. Criteria for passing or failing the test, or for determining conformance or rejection of the article.

Each characteristic to be observed shall be defined in terms of:

1. The condition which should exist at each examination point.
2. The tolerance conditions under which the characteristic being examined may be considered acceptable.
3. The levels of limits of inputs or stresses.

a. Does the contractor have a status list of test specifications being submitted to NASA for review?
b. Is this list comprehensive to the point where the contractor's current status of the testing program is self-evident?
c. Do typical test specifications closely conform to the requirements listed above?
d. Is it evident that the date of submission of test specifications to NASA for review precedes the contractor's start of test by at least two weeks for those items in question?

Continued on next page

3.9.4.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.4.4 Requalification of parts and materials is conducted to insure control over changes in items after initial qualification.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 4.3.4. Verify that the contractor is complying with this requirement without duplication of effort.

Requalification may be required when inspection, tests, or operational data indicates the inadequacy of a previously qualified article, or when the design has been changed. A basic intent of requalification is to detect and prevent the degradation of reliability of parts previously found to be satisfactory. Requalification shall be accomplished only after necessary corrective action has been implemented.

a. Does the contractor have a readily available log of those items undergoing requalification testing?
b. Does the log spotlight the reason or reasons for requalification testing?
c. Does this log or other pertinent document indicate status of:
   1. Generation or revision, and submission of requalification testing specifications to NASA for review.
   2. Status of parts undergoing requalification testing on overall Qualification Status List.
d. Is it evident that the reliability group participates just as actively with the parts and materials group in this area as they do in qualification testing?
e. Does it appear that the contractor is faced with an average number of items requiring requalification commensurate with the size and complexity of the equipment?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.4.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.5 APPROVED PARTS AND MATERIALS LISTS

3.9.5.1 The contractor prepares lists of approved parts and materials for use by his design engineers based on parts and materials selection studies and qualification tests.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4), PLAN(s).

This work element overlaps NPC 200-2, paragraph 4.2.2. Verify that the contractor is complying with this requirement without duplication of effort.

The approved parts and materials list is another control technique intended to minimize the indiscriminate use of parts and materials other than those approved and sanctioned by NASA and the contractor. A well-monitored and well-maintained list such as this will help to increase reliability throughout the system.

a. Does the contractor have a readily identified document or handbook that includes a comprehensive and carefully selected listing of the majority of approved parts and materials for use on the system under contract?
b. Does the contractor employ vigilance to detect that a non-approved part is called for where an approved part should have been used?
c. Does the contractor have a documented procedure whereby the offensive part is referred to the attention of the group originally specifying it, so that it can be corrected?
d. Does it appear that the function, use, format, maintenance and distribution of this handbook is so well organized and publicized that there is little excuse for parts other than those approved being called for in the system's parts lists?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.5.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.5.2 The approved parts and materials lists are submitted to the cognizant NASA installation for review.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

a. Is it evident that these lists, additions,and revisions are being submitted, in a timely manner, to NASA for review?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.5.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.6 PARTS AND MATERIALS APPLICATION REVIEW

3.9.6.1 Prior to finalization of the design of each component ("black box") the contractor or sub-contractor conducts a thorough applications review to determine the applicability of each part, material (or design feature) in that design to mission profile requirements (including environment).

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The normal design cycle should involve several check points that permit specialized personnel to contribute their information regarding the application of each part, material, or design feature. This "application review" should be conducted prior to release of the drawings for fabrication.

a. Does the contractor have an "application review" prior to drawing release?
b. What is the functional relationship of the specialists to the design personnel? (i.e. Does the specialist have the prerogative to require a design change if material is incorrectly applied?)
c. Has the contractor conducted such "application reviews" on the current contract?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.6.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.6.2 The parts and materials application reviews are thoroughly documented.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor should maintain adequate records which will provide information on the application reviews. Such information can prove exceedingly valuable if a part or material proves unreliable when subjected to the actual environment.

a. Has the contractor maintained an accurate documentation of the parts and materials application review?
b. Do these records demonstrate the many changes and improvements resulting from the review?
c. Does the actual equipment reflect any of these changes? Is an example available?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.6.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION-

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.6.3 The application reviews are a "checklist" item for formal design reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

* See paragraph 3.6.1.a for reference.

a. Have the application review reports been included as a "checklist" item for the formal design review?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.6.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.6.4 Within 30 days of completion of each applications review, documentation is available for review by the cognizant NASA installation.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The data resulting from the applications review can be used as an excellent measure of the effectiveness of the review. This data should be complete and concise and reflect the fact that problems were located and solutions proposed. A check of later documentation should show that the proposed solution was accepted or rejected.

a. Has the subject documentation been made available to cognizant NASA installation within time period specified?
b. Does this documentation define a problem area and propose any solution?
c. Has the proposed solution been applied to practice?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.6.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.9 PARTS AND MATERIALS PROGRAM

SURVEYOR _____

3.9.6.5 The contractor takes immediate action to correct any deficiencies uncovered during parts and materials application reviews.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the contractor take immediate action to correct any deficiencies uncovered during reviews?
b. How is this demonstrated or proven?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.9.6.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA 3.10

EQUIPMENT LOGS

ACTIVITY AREA: 3.10 EQUIPMENT LOGS SURVEYOR _____

3.10.1 The contractor maintains a separate log for each major component, subsystem, and system throughout the development, inspection, and test phases and the operation phase prior to launch.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

Trouble, failure, and performance data on every part, component, subsystem, and system should be completely and accurately collected, processed, analyzed and disseminated in a minimum of time to all pertinent areas within the contractor's organizations to the suppliers concerned, and be available to the cognizant NASA installation or its designated representative.

a. Is the accumulated data properly recorded on a preplanned form to insure the required results are adequately documented?
b. Is the generated data accumulated in a centrally controlled area, for proper screening, processing, and retention?
c. Is there evidence that a separate log is maintained for each major component, subsystem, and system?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.10.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.10 EQUIPMENT LOGS SURVEYOR _____

3.10.2 The equipment log is identified to the equipment to which it pertains.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the equipment log include a complete description of the item?
b. Does the log identify the item correctly and show the proper serial number?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.10.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.10 EQUIPMENT LOGS SURVEYOR _____

3.10.3 The equipment log is maintained in chronological order and accounts for all periods of time, including idle periods, and any movements of the item.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The equipment log must give a history of the item in a complete and clear fashion. It must account for idle periods and movements of the item in a manner which gives a complete picture of the item in a chronological way.

a. Is there evidence that contractor is maintaining records of inspections and tests performed throughout the entire development, fabrication, and assembly processes?
b. Does the contractor account for idle periods of time?
c. Does the contractor account for movements of the item?
d. Has a check been made for unaccounted periods of time?
e. Does the log show all discrepancies and corrections made?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.10.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.10 EQUIPMENT LOGS SURVEYOR _____

3.10.4 Equipment log entries shall include at least the following:

1. Date and time of entry.
2. Identity of test or inspection.
3. Environmental conditions.
4. Characteristics being investigated.
5. Parameter measurements.
6. Complete identification of instrumentation used, including serial numbers and calibration date.
7. Failure observations and failure report reference.
8. Accumulated operating time.
9. Cumulative number of duty cycles to date.
10. Discrepancies between the item tested and pertinent specifications or drawings.
11. Repair and maintenance record.
12. Record of pertinent, unusual, or questionable occurrences involving the equipment.
13. Action taken to have "quick fixes" in test formalized as design changes and drawing changes.
14. Identity of individual making entry.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraph 14.2.3, 14.2.4, and Section 9. Verify that the contractor is complying with this requirement without duplication of effort.

a. Do the equipment logs include the above items?
b. Are the entries complete and self-explanatory?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.10.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.10 EQUIPMENT LOGS SURVEYOR _____

3.10.5 The contractor submits a proposed format for equipment logs for approval by the cognizant NASA installation as part of the Reliability Program Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) PLAN only.

If the NASA installation has requested a standard format for submission and follow-up data, the contractor should follow this established format.

a. Is there evidence that the NASA installation has requested a particular format?
b. Is the format being used, approved by the customer?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.10.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 3.10 EQUIPMENT LOGS SURVEYOR _____

3.10.6 Equipment logs are available for inspection with the equipment whether at the contractor's facilities or another location.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

This statement is interpreted to include both operating time during manufacture and field use. The equipment log should be attached or packaged with the item at all times. Equipment logs need not necessarily be submitted to NASA, but shall be available.

a. Are equipment logs maintained and available?
b. Does the contractor perform inspections periodically to insure availability of logs?
c. Are the equipment logs suitably protected against damage, soil, etc.?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

3.10.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SECTION 4

ACTIVITY AREA 4.0

TESTING AND RELIABILITY EVALUATION

5

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.1 GENERAL

4.1.1 The contractor has established a program to evaluate system reliability throughout the design and development process.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraphs 4.3, 7.3, 7.4, 5.6, and 5.3.1.g. Verify that the contractor is complying with this requirement without duplication of effort.

The contractor describes the detailed approach and procedures to implement a complete reliability evaluation program. In general, the program will include the parallel efforts of an integrated test program and reliability assessment. The reliability evaluation program is maintained current.

a. Has a program to evaluate system reliability been established?
b. Is there evidence that this program evaluates reliability throughout the design and development process?
c. Does the reliability evaluation program include subcontractor's plans?
d. Does the reliability evaluation program include testing schedules, assessment schedules, and facility requirements?
e. Does the reliability evaluation plan specify procedures to assure that replacement parts possess as high an inherent reliability as the original parts?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.1.2 The contractor has established an integrated system test program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor has established in detail an integrated test program relationship to the reliability assessment. The applicability of each test to the overall program is defined, including the requirements for the test, the degree of testing, and planned use of test data. Detailed cost, time phasing, and schedule information is provided for each test to be performed. Flow diagrams may be utilized to clearly show detailed information.

a. Has an integrated test program been established?
b. Can it be shown that the reliability prediction/assessment models were used as a basis in the development of the test program planning?
c. Does the integrated test program cover testing of systems, subsystems, and components?
d. Does the integrated test program list test equipment and facilities to be used?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.1.3 The contractor has established and conducts a Reliability Assessment Program using the results of the test program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The contractor makes an analytical determination of numerical reliability of a system or portion thereof without actual demonstration testing. Such assessments usually employ mathematical modeling, use of directly applicable results of tests on system hardware, and some use of estimated reliability figures.

a. Has a program of Reliability Assessment been established?
b. Is the assessment program based upon the results of the test program?
c. Is there a medium of proof that the empirical data is being used to update the reliability prediction models into reliability assessment models?
d. Is there documentation indicating that the reliability assessment program is being conducted in parallel with the integrated test programs?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.1.4 The Reliability Evaluation Program is designed to produce the data necessary for determination of the degree of system conformance to contractual reliability requirements.

Doc. No. _____ Title _____ Date ____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAP. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The contractor has complied the empirical test data and a summary of test results for determining the degree of system conformance to contractual reliability requirements.

a. Has a program been developed to determine whether the system conforms to the reliability requirements?
b. Does this system meet the reliability requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.1.5 The contractor's reliability organization is responsible for the overall reliability evaluation program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor's reliability organization has as a primary objective the attainment of reliability requirements and goals of the program. The reliability organization must be assured that all parts of the program are directed toward this end.

a. Is the contractor's reliability organization responsible for the evaluation program?
b. How is this control maintained?
c. Does the contractor's reliability group check the integrated test program? Is there documentary proof?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.1.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.1.6 The contractor's reliability organization is responsible for insuring that the integrated test program adequately contributes to reliability evaluation at the system, subsystem, and component levels.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor's reliability organization does not normally have the primary responsibility for testing, but must assure themselves that the integrated test program contributes to reliability evaluation at the various levels.

a. Is there evidence that the contractor's reliability organization insures that the integrated test program contributes to reliability evaluation?
b. How is the responsibility and control delegated from the manager of reliability?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.1.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.2 RELIABILITY EVALUATION PLAN

4.2.1 As a separate section of the Reliability Program Plan, the contractor submits a comprehensive plan of the reliability evaluation program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) PLAN only.

This has been submitted initially as part of NPC 250-1, paragraph 2.2, Reliability Program Plan, and as part of the plan must be submitted to the NASA installation for approval.

a. Has the reliability evaluation plan been approved by cognizant NASA installation?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.2.2 The reliability evaluation plan includes:

1. A detailed outline and schedule of the integrated testing program in relation to reliability assessment (analytical) models and assessment schedule.
2. Testing costs.
3. All tests, except minor component level design feasibility or experimental analysis tests and parts qualification tests. (Quality tests are covered elsewhere.)
4. A description of the role of tests in evaluation, and an outline of alternative actions as may be determinable to be taken as a result of each test.
5. The requirement for types and degrees of testing based on the models.
6. A description of the planned use of test data in confirming or adjusting the assessment models and in the determination of quantitative system reliability.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The requirement is formulated in such a manner that the reliability evaluation plan will be complete and contain the proper data. The checklist below will serve to validate the content of the plan.

a. Outline and schedule relative to analytical models.
b. Testing costs.
c. All tests except qualification tests (listed).
d. Test description and alternative.
e. Types and degrees of testing based on models.
f. Planned use of data to adjust models.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3 TESTING

4.3.1 SCOPE

4.3.1.1 The integrated test program is designed to evaluate all aspects of the performance capability of the system and its elements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The system test programs have been designed to be conducted in three functional divisions or categories.

Category I - consists of development testing and evaluation of the individual components, subsystems, and, in certain cases, the complete system.

Category II - consists of development testing and evaluation, and covers the integration of subsystems into a complete system in as near an operational configuration as is practicable.

Category III - consists of testing and evaluating operational systems. These tests include all components, support items, personnel skills, technical data and procedures and are performed under as near operational conditions as practicable.

a. Does the test program satisfactorily measure the performance capability of the system?
b. Has the test program been documented?
c. Does the integrated test program define methods and procedures for prevention of contamination during test? Such as clean room facilities?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.1.1 Cont'd - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.1.2 The test program includes evaluation of reliability at system and lower levels. Included here are environmental, prototype thermal model, qualification, and proof tests.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The surveyor should check to see that the test program contains at least the items listed below:

a. Environmental.
b. Prototype.
c. Thermal model.
d. Qualification tests.
e. Proof tests.

a. Has the contractor's program complied with all of the requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.1.3 Non-flight hardware environmental tests include overstress, test-to-failure, and life testing.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

Non-flight hardware, by definition, is that equipment which is not directly involved in the actual flight, such as off-the-line ground support equipment.

This classification of equipment can be tested to overstress, tested to failure, etc.

a. Does the environmental test program include overstress, test to failure, and life testing?
b. Does this plan specifically define the length of time for test to failure?
c. Does the environmental test specify the conditions that must be maintained during testing such as ambient or other environmental conditions?
d. Does the environmental test specify precautions to be observed to prevent damage to articles or instruments involved?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.1.4 Overstress, test-to-failure, and life environmental tests are avoided in the testing of flight hardware except as prescribed in the flight assurance test specifications.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The contractor's flight assurance test specification delineates overstress, test-to-failure, and life environmental tests which are avoided in the testing of flight hardware.

a. Are the severe and damaging environmental tests avoided, except when required in the flight assurance tests?
b. Does the environmental test plan specifically state that parts or components are to be marked for "non-flight usage" if they have been overstressed?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.1.5 The contractor conducts specified flight assurance tests on all flight hardware.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The contractor conducts a test or series of tests to ascertain that an item of flight hardware meets specified environmental and performance criteria established to confirm that the specimen in question is flight-worthy. The flight assurance tests are conducted at the component, subsystem, or system level on specimens of hardware which have not been previously subjected to severe test or handling treatments, but which are identical to the qualification test specimens in all physical respects and in the methods and controls used in their fabrication.

a. Does the test plan include all aspects of the flight assurance tests?
b. Has all flight hardware been subjected to these tests?
c. Is there evidence that the results of the flight assurance tests have been documented?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.1.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.2 CONCEPT OF TESTING

4.3.2.1 Testing is directed toward assessing the hardware performance capability, identification of potential failures which are not revealed in design reviews and reliability analysis, obtaining failure rates and other numerical reliability data.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Does the testing adequately prove the system performance capability?
b. Does the testing lead to the identification of areas of potential failures?
c. Does the testing yield data on failure rates and other reliability data?
d. Have the test results been documented in an easily interpretable manner?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.2.2 Tests are planned using statistical design of experiment techniques insofar as practicable.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3) and FORMAL (2.2.4) PLAN(s) only.

The contractor's reliability program has incorporated utilization of statistical planning and analysis. He has included the method of statistical design of experiment techniques which is particularly suited to the design and development phases.

a. Are the tests based upon experimental techniques which have a basis in statistical design?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.2.3 Tests are conducted under levels of environmental stress and for periods of time appropriate to the purpose of the tests.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Have the tests been conducted at the stress levels for the time periods appropriate for the purpose?
b. How is this data documented?
c. Has the contractor submitted separate test specifications for each qualification test (containing overstress requirements) to NASA for review prior to use?
d. Has the contractor submitted separate test specifications for each flight assurance test to NASA for review prior to use?
e. Has the contractor submitted required levels of stress to be employed and configuration control requirements for each flight assurance test to NASA for review prior to use?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.2.4 Tests are based on a concept of a potential failure pattern.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor is aware of the potential failure pattern that will exist within his system, and therefore designs the tests to expose the test articles to these conditions.

a. Are the tests based upon a potential failure pattern?
b. Does the test subject the equipment to the maximum stress for a sufficient time period?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.2.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.2.5 Tests are designed to:

1. Verify design performance, including reliability and life expectancy.
2. Identify unexpected interactions among components.
3. Identify failure modes, reflecting design weaknesses and defects in materials, workmanship, and quality control.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

a. Is there evidence that the contractor's test plan is designed to verify design performance, including reliability and life expectancy?
b. Does the contractor's test plan have provisions for identification of unexpected interactions among components?
c. Does the contractor's test plan cover identification of modes of failure?
d. Does the contractor's test provide for reflecting design weaknesses?
e. Does the contractor's test plan provide for detecting material defects?
f. Does the contractor's test plan provide for detecting faulty workmanship?
g. Does the contractor's test plan identify quality control requirements?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.2.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.3 TEST SPECIFICATIONS, PROCEDURES, AND REPORTS

4.3.3.1 The contractor prepares a separate test specification, test procedure, and test report for each test in his testing program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The test specification should stress the following:
1. Part, component, or system identification.
2. Purpose of test and type of test.
3. Complete description of all failures or unsatisfactory conditions.
4. Actual numerical test results.
5. Photographs, oscillograms, graphs.
6. Duration of operating or test time.
7. Recommendations.

a. Has the contractor prepared test specifications, test procedures, and test reports for each test?
b. Are these tests properly documented?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.3.2 The contractor reviews and approves the specifications generated as a part of the test programs of his subcontractors and suppliers.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

The contractor should maintain control over the test programs which are proposed and conducted by the subcontractors and suppliers. The best method of initiating and maintaining this control, is to retain "Review and Approval" option on test programs.

a. Does the contractor have review and approval authority on the subcontractors and suppliers?
b. If not, explain how control is maintained.

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.3.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.3.3 All test specification shall be subject to NASA review. Test specifications include, as a minimum:

1. Test objectives.
2. Test item identification.
3. Number of specimens to be tested.
4. Environmental and performance conditions.
5. Testing time or cycles.
6. Allowable maintenance.
7. Logging requirements.
8. Manner of analysis and use of test results.
9. Disposition of test specimens.
10. Retest requirements.
11. Reliability goal.
12. Allowable failures per test.
13. Definition of failure.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This work element overlaps NPC 200-2, paragraph 7.3.2. *Verify that the contractor is complying with this requirement without duplication of effort.*

a. Each test specification should include as a minimum the items listed above. This should be checked by the surveyor.
b. Is there evidence that the test specifications have been reviewed and approved by NASA?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.3.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.3.4 All test procedures shall be subject to NASA review. Test procedures include, as a minimum:

1. The steps to be accomplished, in detail and sequence.
2. The test equipment to be used and calibration requirements.
3. Layout and interconnection of equipment.
4. Safety factors, for equipment and personnel, to be observed.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

This work element overlaps NPC 200-2, paragraph 7.3.1 and Section 9. Verify that the contractor is complying with this requirement without duplication of effort.

Test procedures should be sufficiently descriptive to define the parameters in detail. The analysis of these procedures, for adequacy, should be in question form resulting in yes or no answers.

a. Are the test steps clear and detailed?
b. Has the test equipment and its calibration been well defined?
c. Has the physical location and method of connection of the equipment been specified?
d. Are all safety factors clearly noted?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.3.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.3.5 All test reports shall be subject to NASA review. Test reports include, as a minimum:

1. Reference test procedure used.
2. Include the pertinent test specification as an appendix.
3. Satisfy other criteria on format and content as may be prescribed by NASA.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

This work element overlaps NPC 200-2, paragraphs 14.1 and 14.2. Verify that the contractor is complying with this requirement without duplication of effort.

The test reports are the communication link between contractor and the cognizant NASA installation, therefore, the reports should be clear, concise, and factual. The analysis of the test reports should be conducted with questions that yield a positive or negative answer.

a. Does the test report reference the test procedure used?
b. Does the test report include the pertinent test data?
c. Does the test report agree with the format and content as prescribed by the cognizant NASA installation?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.3.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.3.6 Formal test reports are issued as early as practicable, but preliminary reports of tests are provided the cognizant NASA installation or its designated representative or both, as applicable, within 10 days of completion of the test.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Have the preliminary reports been provided to the cognizant NASA representative within ten days of completion of test?
b. Have these results been documented in the final reporting form?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.3.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.4 RELIABILITY DEMONSTRATION TESTS

4.3.4.1 Formal reliability demonstration tests are included in the Reliability Evaluation Plan to the extent required in the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The contractor has used statistically designed testing, with specified confidence level, to demonstrate that an item meets the established reliability requirements.

a. Is formal reliability demonstration a contractual requirement?
b. Has this demonstration testing been completed to the extent required by the contract?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.4.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.3.4.2 Reliability demonstration tests are conducted at the highest practicable level of assembly.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The contractor conducts reliability tests at the system, and major subsystem or component levels separately and in combination, as applicable.

a. Does the contractor's integrated test program specify the level of assembly at which reliability demonstration tests are conducted?
b. Have these been conducted at that level?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.3.4.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.4 RELIABILITY ASSESSMENT

4.4.1 At milestones specified in the Reliability Evaluation Plan, the contractor assesses the system reliability for:

1. Revising failure mode and criticality analysis.
2. Updating the reliability models as necessary to incorporate newly available test results and design changes and refinements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The contractor analyzes his failure modes and effects for assessing system reliability. This analysis provides updating information concerning weakness in the equipment which may be eliminated in subsequent designs.

a. Has the Reliability Evaluation Plan been revised to reflect failure mode and criticality analysis?
b. Has the Plan included updating reliability models to incorporate new data?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.4.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.5 RELIABILITY EVALUATION PROGRAM REVIEWS

4.5.1 The contractor and NASA jointly conduct formal, documented reviews of the Reliability Evaluation Program at appropriate major milestones scheduled in the Reliability Evaluation Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This section should specify, as agreed jointly with the cognizant representatives, the appropriate program milestones for program reviews. A general content of the proposed review should be presented and a flow diagram included to present the contractor's procedure for assigning responsibilities resulting from the reviews.

a. Has the formal Reliability Evaluation Program review been held?
b. Are the documented reports available for review?
c. Have the Reliability Evaluation Program reviews been approved by NASA?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.5.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.5.2 During the reviews of the Reliability Evaluation Program, all pertinent test results are examined to determine the need for revisions to the Reliability Evaluation Program, and/or confirm that the portions of the program under review have adequately evaluated conformance to apportioned goals.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Have the results of the reviews shown a need for revision of the Reliability Evaluation Program?
b. Has the portion of the program under review adequately evaluated conformance to the goals?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.5.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 4.0 TESTING AND RELIABILITY EVALUATION

SURVEYOR _____

4.5.3 The contractor furnishes NASA, within 30 days, a formal report of the review, including actions to be taken, responsibility for taking action, and any revisions to the Reliability Evaluation Plan.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Has the contractor furnished for formal report of review?
b. Does it include documentation of (a) the actions to be taken (b) the personnel or function that has the responsibility for taking corrective action (c) any revisions that may be required to correct information included in the Reliability Evaluation Plan?
c. Is this data complete?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

4.5.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

SECTION 5

ACTIVITY AREA 5.0

DOCUMENTATION OF RELIABILITY PROGRAM

6

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.1 GENERAL

5.1.1 The contractor's reliability effort is documented in detail throughout.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This work element overlaps NPC 200-2, paragraphs 2.2 and 4.1. Verify that the contractor is complying with this requirement without duplication of effort.

This statement is a directive to be followed by the contractor and his subcontractors. It not only emphasizes the importance of the contractor's effort in documentation, but also alerts the surveyor that the evaluation and assessment of the contractor's performance is not to be minimized.

To set the stage for the mood of the evaluation, it may be in order at this time to repeat an earlier statement in NPC 250-1, paragraph 1.4.1. It states, "All data and documentation generated for the contract effort by the contractor and his subcontractor, including all design and test data and all quality program documentation, are subject to continuous examination, evaluation and inspection by the cognizant NASA installation or its designated representative."

Before proceeding with the formal portion of the evaluation, the surveyor may already have had ample opportunity to observe the sincerity of the contractors documentation effort as based on the initial presentation, and on performance of previous work statements.

Specific questions in this activity are covered in the following work elements. Evaluation of the contractor's efforts must be based on NPC 250-1, on contractual requirements, and effectiveness of implementation

a. Does the quality and quantity of data supporting the reliability efforts compare favorably with the quality and quantity of data available for other phases of the contract effort?
b. Does the contractor have and maintain a family tree type of Document Index listing the identity of all documentation requirements per Appendix F in NPC 250-1.
c. Have documents requiring submittal and approval been submitted in a timely manner?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.1.2 The contractor maintains a data center or unified file of all reliability documentation at a central location within his facilities. This is, preferably, a combined reliability-quality file.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to PRELIMINARY (2.2.2), INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s).

This requirement will normally be further implemented contractually. NASA circular 293 specifically states that procurement requests and work statements will provide guidance on documentation requirements.

The surveyor should review the contract and work statements to determine the full extent of documentation requirements.

a. Is there a central file?
b. How nearly does this data center approach the concept of a combined reliability-quality file?
c. Are the files systematic and orderly?
d. Is retrieval of documentation simple and expeditious?
e. Is the magnitude of the data center compatible with the job requirements?
f. Does the general structure and operation of the data center inspire confidence in the contractor's ability and interest in this phase of the reliability effort?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.1.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.1.3 Certain portions of the reliability data generated under the contract may be required to be submitted to NASA for inputs to various data exchange programs.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This requirement as imposed will be called out in the contract or Work Statements and these should be reviewed to see to what extent, if any, inputs to or for Data Exchange Programs are required.

The types of data most frequently used for data exchange programs are usually limited to parts and include failure rates, life expectancy, failure modes, and test results.

a. What is the contractor's attitude to this requirement?
b. Is data submitted in a form acceptable to the agency receiving it?
c. Does the contractor understand that participation in data exchange programs will help establish a pool of reliability information which will benefit himself as well as the overall space effort?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.1.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.1.4 Reporting is in accordance with the contract. Where certain elements of the documentation are required by both reliability and other areas, e.g. quality, such reports are composed only once, and copies are submitted to satisfy the reliability documentation requirements.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This requirement refers to expeditious and simultaneous transmission of appropriate documentation to personnel and locations having need for this information.

a. Are there formal mailing lists or indexes for each category of documentation so that mailings of documents, additions and revisions are made systematically and on a timely basis?
b. Do the available mailing lists and indexes agree with specified requirements as reasonable evidence that contractor is earnestly complying with work statement requirements?
c. Are there specific competent personnel assigned to correlate documentation requirements on a timely basis?
d. Are documents generated in one area automatically distributed to other interested areas?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.1.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2 RELIABILITY PROGRESS REPORTS

5.2.1 WEEKLY SUMMARIES

5.2.1.1 The contractor submits a one or two page weekly summary by letter or teletype as prescribed by the cognizant NASA installation. This summary is in the nature of a bulletin and contains the following information as it significantly affects the reliability program:

1. Schedules of forthcoming meetings and events (testing, program item completions, etc.).
2. Brief summaries of meetings, program events and recent decisions affecting reliability.
3. Information of problem areas and any anticipated Reliability Program Slippages.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

This bulletin can be of real value as a secondary source of information for meeting dates and an up-to-date reference for schedules of other events.

a. Is the contractor submitting a weekly bulletin on a regular schedule?
b. Are the contents of these bulletins concise, specific and informative?
c. Are problem areas readily detectable?
d. Is the contractor openly frank about discussing problem areas and revealing anticipated program slippages?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.1.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.2.1 The contractor reports on the progress of the reliability program and each task therein (including all subcontracted tasks) on the same schedule as required by the contract for reporting of overall technical progress.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

a. Is the contractor submitting reliability progress reports as scheduled in the contract? (This report may be included with the overall technical progress report).
b. Are the reports dates?
c. Are subcontracted tasks fully covered and is information supplied for each of the following five work elements? (5.2.2.2 through 5.2.2.6).

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.2.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.2.2 The periodic progress reports include information on reliability programs in sufficient detail to show significant accomplishments and milestones reached.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Are significant accomplishments and milestones reasonably prominent to highlight these major elements?
b. Is the format and arrangement of the reports systematic and well planned?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.2.2 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.2.3 The periodic progress reports cover all reliability problem areas, and indicate anticipated reliability program slippages with the effects on the overall program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Do problem areas appear to be adequately covered in the reports?
b. Are anticipated program slippages reported and does the amount of slippage seem to be in line with the magnitude of the problem?
c. Have the effects of slippages on the project been defined and do they seem realistic?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.2.3 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.2.4 The periodic progress reports include revisions of schedules for work and significant program events which will change prior to the next report period.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

a. Reported program slippages may require schedule revisions. Have schedule changes been reported to cover the program slippages indicated because of unusual problems encountered?
b. Are schedule revisions realistic and in relation to the magnitude of the problems?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.2.4 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.2.5 The periodic progress reports include information on significant decisions and actions which have impact on the reliability effort and their effects on the program.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

The surveyor is likely to have difficulty auditing this requirement.

a. Do this and other surveyors' notes indicate significant decisions and actions which have not been reported?
b. Do the reports reviewed contain information on significant decisions and actions?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.2.5 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.2.6 The periodic progress reports include pertinent technical data, reports, and summaries.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

These reports should be comprehensive and as the program progresses they should, as a minimum, cover all items listed in Appendix F.

a. Do the reports appear to be comprehensive?
b. Do spot checks show that pertinent information in the contractor's data center has been used in the periodic progress reports?
c. Have important reports and summaries uncovered during the survey been included in a timely manner in the periodic progress reports?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.2.6 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.2.3 RELIABILITY PROGRAM CONTROL REPORTS

5.2.3.1 The contractor submits reliability program control data as a separate section of the periodic financial and management report required by the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	(Fill in During Evaluation of Program Plans) CONTRACTOR RELIABILITY PROGRAM PLAN				(Fill in During Survey) IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE.	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to FORMAL (2.2.4) PLAN only.

Since the format and contents of Program Control Reports is a subject for comprehensive analysis earlier in this manual (paragraph 2.4, NPC 250-1), this work element should evaluate the contractor's compliance in submitting this information in a timely manner.

a. Are the reports complete?
b. Do the reports reflect the current status of the program?
c. Do the reports include estimates of costs and expenditures for the succeeding reporting period?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.2.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.3 SUMMARY OF TECHNICAL DOCUMENTATION

5.3.1 Required technical documentation as set forth in Appendix F is submitted in the manner prescribed in the contract.

Doc. No. _____ Title _____ Date _____

CONTRACTOR ORGANIZATION RESPONSIBILITY _____

250-1 Para. No.	*(Fill in During Evaluation of Program Plans)* CONTRACTOR RELIABILITY PROGRAM PLAN				*(Fill in During Survey)* IMPLEMENTATION		
PLAN	PAGE/PAR. NO.	ADEQUATE	INADEQUATE	DATE	ADEQUATE	INADEQUATE	DATE

NPC 250-1 indicates this element is applicable to INTERMEDIATE (2.2.3), and FORMAL (2.2.4) PLAN(s) only.

The surveyor should determine from the contract the manner prescribed for submitting technical documentation (i.e. separate submittal as generated, submittal as part of a periodic report or in some other specified manner).

Following the questions is a list of documents, reproduced from NPC 250-1, Appendix F, which should be submitted or be available for either Approval, Review or Information (enter applicable word and date). In the "Action taken by NASA" column, enter "Approved" or "Disapproved" and the date. If no action was taken by NASA (or a higher tier contractor), enter NO ACTION and date of survey. This paragraph should be used as a document summary, filled in by the surveyor after the survey, but while still at the contractor's facility.

a. Are items requiring NASA approval submitted as specified?
b. Is the NASA approval in writing received in the specified time?
c. Are items requiring NASA review submitted to the cognizant NASA installation at least two weeks prior to intended use by the contractor?

- NARRATIVE COMMENTS AND CORRECTIVE ACTION -

Continued on next page

5.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

ACTIVITY AREA: 5.0 DOCUMENTATION OF RELIABILITY PROGRAM

SURVEYOR _____

5.3.1 Cont'd.

Item	Paragraph Reference	Submitted or Available for (Approval, Review or Information)	Action Taken By NASA
Reliability Program Plan (and revisions)	2.2.4 2.3		
Reliability Evaluation Plan	4.2		
Reliability Evaluation Program Review Reports	4.5		
Parts and Materials Qualification Status Lists	3.9.4		
Design Review Reports (Contractor)	3.6.1		
Design Review Report (subcontractors)	3.6.2		
Parts and Materials Application Reviews	3.9.6		
Design Specifications	3.2		
Parts and Materials Specifications	3.9.3		
Parts and Materials Qualification Test Specifications	3.9.4		
Test Specifications and Procedures	4.3.3		
List of suppliers and subcontractors selected after approval of Reliability Program Plan (with reliability control provisions)	2.6.2		
Reliability Block Diagrams (as updated)	3.2		
Reliability Prediction Models (as updated)	3.3		
Failure Mode, Effect, and Criticality Analyses	3.4		
Maintainability and Elimination of Human Error Reports	3.5		
Failure and Corrective Action Summaries	3.7.b		
Parts and Materials Program Progress Reports	3.9		
Approved Parts and Materials Lists	3.9.5		
Reliability Assessment Models	4.4		
Test Reports	4.3.3.c		

Continued on next page

5.3.1 Cont'd. - NARRATIVE COMMENTS AND CORRECTIVE ACTION -

☆ U.S. GOVERNMENT PRINTING OFFICE : 1965 O—788-046