Westinghouse

Westinghouse Non-Proprietary Class 3

Advanced Logic System

Advanced Logic System (ALS) II Project Management Plan

6003-00000-NP,
Rev. 1

Nuclear Safety Related

July 2014

APPROVALS

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a,c,e

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ACRONYMS AND TRADEMARKS

Acronyms used in the document are defined in 6002-00040, "ALS Terms and Abbreviations" (Reference 1), or included below to ensure unambiguous understanding of their use within this document.

Acronym	Definition
AFS	Automation and Field Services
ALS ATR	ALS Approved Topical Report
CAPAL	Corrrective Action, Prevention, and Learning
DRAI	Design Review Action Item
GICP	Global Instrumentation and Control Production
IPL	Integrated Process Lead
IV&V	Independent Verification & Validation
PCSA	Platform Configuration Status Accounting
PMP	Project Management Plan
RA	Resource Allocation
RAW	Risk Assessment Worksheet
SER	Safety Evaluation Report
TAB	Test ALS Bus
VV	Verification and Validation
xxx	The notation "xxx" is used to denote that a document exists for each of the boards in the platform and xxx will be substituted by the 3-digit identifier for the document associated with a given board.

GLOSSARY OF TERMS

Standard terms used in the document are defined in 6002-00040 (Reference 1) or included below to ensure unambiguous understanding of their use within this document.

Term	Definition

None.

REFERENCES

Following is a list of references used throughout this document. Revision levels are "latest" unless otherwise specified.

Note:

> The notation "xxx" is used to denote that a document exists for each of the boards in the platform and xxx will be substituted by the 3-digit identifier for the document associated with a given board.

1. 6002-00040, "ALS Terms and Abbreviations," Westinghouse Electric Company LLC.

2. 6002-00301-P-A, Rev. 4, "Advanced Logic System Topical Report," Westinghouse Electric Company LLC.

3. Westinghouse Electric Company Automation and Field Services Level 3 Procedure NA 3.18, "FPGA-based Project Planning and Execution."

4. Westinghouse Electric Company Automation and Field Services Level 3 Procedure NA 4.48, "Component/Sub-assembly Hardware Design Process."

5. Westinghouse Electric Company Level 2 Procedure WEC 3.3.1, "Design Reviews."

6. Westinghouse Electric Company Automation and Field Services Level 3 Procedure NA 4.51, "Field Programmable Gate Array (FPGA) Development Process."

7. WNA-IG-00097-GEN, "Standard and Project Documentation Creation Guidelines," Westinghouse Electric Company LLC.

8. Westinghouse Electric Company Automation and Field Services Level 3 Procedure NA 4.37, "Configuration Management."

9. 6003-00001, "ALS II Quality Assurance Plan," Westinghouse Electric Company LLC.

10. 6002-00002, "ALS Configuration Management Plan," Westinghouse Electric Company LLC.

11. 6003-00003, "ALS VV Plan," Westinghouse Electric Company LLC.

12. 6003-00005, "ALS Test Plan," Westinghouse Electric Company LLC.

13. 6002-00006, "ALS Security Plan, Westinghouse Electric Company LLC.

14. 6003-00007, "ALS Platform Configuration Status Accounting," Westinghouse Electric Company LLC.

REFERENCES (cont.)

15. 6002-00008, "ALS Application Guidance," Westinghouse Electric Company LLC.

16. 6003-00010, "ALS Platform Requirements Specification," Westinghouse Electric Company LLC.

17. 6003-00011, "ALS Platform Specification," Westinghouse Electric Company LLC.

18. 6003-xxx12, "ALS-xxx FPA FMEA and Reliability Analysis," Westinghouse Electric Company LLC.

19. 6002-00018, "ALS Platform FPGA VV Test Plan," Westinghouse Electric Company LLC.

20. 6002-00030, "ALS Design Tools," Westinghouse Electric Company LLC.

21. 6002-00031, "ALS Diversity Analysis," Westinghouse Electric Company LLC.

22. NUREG-CR-6101, "Software Reliability and Safety in Nuclear Reactor Protection Systems," U.S. Nuclear Regulatory Commission, June 1993.

23. IEEE Std. 1074-1995, "IEEE Standard for Developing Life Cycle Processes," Institute of Electrical and Electronics Engineers, 1995.

24. IEEE Std. 1058-1998, "IEEE Standard for Software Project Management Plans," Institute of Electrical and Electronics Engineers, 1998.

25. Regulatory Guide 1.173, "Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants," U.S. Nuclear Regulatory Commission, September 1997.

26. Westinghouse Electric Company Quality Management System, Westinghouse Electric Company LLC.

27. Westinghouse Level 2 Procedure WEC 16.2, Rev. 7, "Westinghouse Corrective Action Program."

28. Westinghouse Level 2 Procedure WEC 21.0, Rev. 0, "Identification and Reporting of Conditions Adverse to Safety."

29. 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks, U.S. Nuclear Regulatory Commission."

30. Regulatory Guide 5.71, Rev. 3, "Cyber Security Programs for Nuclear Facilities," U.S. Nuclear Regulatory Commission, January 2010.

31. 10CFR Part 21, "Reporting of Defects and Noncompliance," U.S. Nuclear Regulatory Commission.

REFERENCES (cont.)

32. 6002-00255, "Advanced Logic System (ALS) Production Test Plan, Westinghouse Electric Company LLC."

33. Westinghouse Level 2 Procedure WEC 6.1, "Document Control."

34. 6003-xxx01, "ALS-xxx Requirements Specification," Westinghouse Electric Company LLC.

35. 6003-00004, "ALS II Equipment Qualification Plan," Westinghouse Electric Company LLC.

36. Westinghouse Level 2 Procedure WEC 7.5, "Control of Purchased Items and Services."

37. Westinghouse AFS Level 3 Procedure NA 9.1, "Manufacturing/Assembly Process"

38. 9006-01501, "Defect Management Work Instruction," Westinghouse Electric Company LLC.

39. Westinghouse Level 2 Procedure WEC 7.8, "Dedication of Commercial Grade Items"

40. 6002-00052, "ALS Production Programming & Configuration Procedure," Westinghouse Electric Company LLC

41. Westinghouse AFS Level 3 Procedure NA 2.8, "Training Oversight"

42. Westinghouse AFS Level 3 Procedure NA 7.4, "Preparation of Commercial Dedication Instructions (CDIs)"

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SECTION 1
PREFACE

The Advanced Logic System® (ALS®) II Project Management Plan (ALS II PMP) defines the process and development life-cycle used to manage the development of the ALS II Platform. The approved ALS Topical Report, 6002-00301-P-A (Reference 2) (ALS ATR) describes how this plan complies with the Institute of Electrical and Electronics Engineers (IEEE) Std. 1074-1995, "IEEE Standard for Developing Life Cycle Processes" (Reference 23), which is endorsed by Regulatory Guide 1.173, "Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants" (Reference 25).

Internal to Westinghouse, the project is named ALS II, Phase 1. The scope of the ALS II PMP aligns with the scope of the ALS II, Phase 1 project. The intended audience of the management plan is the project's leadership team and key stakeholders.

Per Section 3.10.2.3 of the Safety Evaluation Report included in the approved ALS ATR it was noted "During the ALS platform development, CSI began transitioning its quality assurance program to comport with the "Westinghouse Quality Management System." Although the transition to the "Westinghouse Quality Management System" completed after the majority of the ALS platform development had finished, 10 CFR Part 50, Appendix B, does not prohibit changes to quality assurance programs that continue to fulfill the regulatory requirements, and holds licensees responsible for vendor quality. Licensees typically use audits, which are distinct from U.S. Nuclear Regulatory Commission (NRC) staff regulatory audits, to fulfill this responsibility." Since the submittal of the ALS Platform documentation by Scottsdale Operations (formerly CS Innovations [CSI]) to the NRC for review in February 2013, the Scottsdale Operations facility has been closed and ALS Platform development, maintenance and project specific application activities are now executed by Westinghouse Automation in Warrendale, Pennsylvania. Per this transition to Westinghouse Automation, this ALS II PMP and associated ALS platform development activities have fully adopted the policies and procedures defined by the Westinghouse Quality Management System (QMS) (Reference 26). As a result, some of the governing policies and procedures that were referenced in the ALS ATR have either been revised or replaced. A summary of this transition of policies and procedures is included in Appendix A.

(Last Page of Section 1)

SECTION 2
OVERVIEW

2.1 PROJECT SUMMARY

2.1.1 Purpose, Scope and Objectives

The purpose of this project is to enhance the ALS platform as defined in the ALS ATR to better serve the safety system upgrade market for operating plants. The ALS II, Phase 1 project described by this ALS II PMP is [ ]^{a,c,e}. No changes will be made to the fundamental architecture that provides the safety function described in the ALS ATR.

Given the similarity between ALS II and ALS, the two platforms will share "6002-xxxxx" documents where appropriate. The 6002-xxxxx based documents will be updated as necessary to reflect inclusion of both platforms. There are cases where the differences between ALS and ALS II drive the need to distinguish between the platforms for a given set of documentation. In those cases, the ALS II version of the intended document will be designated as a "6003-xxxxx."

The ALS enhancements that will be implemented as part of the internal Westinghouse program, ALS II Phase 1, and fall into 3 categories described below.

2.1.1.1 Category 1 Enhancements

Category 1 enhancements are related to [

]^{a,c,e} This change in [ ]^{a,c,e} is what establishes the key differentiator between ALS II and ALS. This change only affects the [ ]^{a,c,e} of ALS. The new ALS II cards will use the same corresponding [ ]^{a,c,e} in the ALS SER. The ALS board numbers will change to designate the difference between ALS and ALS II cards. See Table 2.1-1.

Table 2.1-1. Correlation of ALS to ALS II Board Numbering

ALS	ALS II
ALS-102	ALS-152
ALS-302	ALS-352
ALS-311	ALS-361

Table 2.1-1. Correlation of ALS to ALS II Board Numbering (cont.)

ALS	ALS II
ALS-321	ALS-371
ALS-402	ALS-452
ALS-421	ALS-471
ALS-601	ALS-651

Due to its limited scope, these Category 1 enhancements are being developed per [

]a,c,e

2.1.1.2 Category 2 Enhancements

Category 2 enhancements relate to providing [ ]a,c,e of the ALS Platform.

The ALS II Phase 1 program also includes [ ]a,c,e.
Like the Category 1 enhancements described above, Category 2 enhancements [

]a,c,e. Category 2 enhancements that are being implemented into ALS II are as follows:
[

]a,c,e

[
]a,c,e

The table below summarizes the ALS II [ ]a,c,e

Table 2.1-2. [ ]a,c,e

a,c,e

- Category 2 enhancements also address certain [

]a,c,e.

These Category 2 enhancements are being developed per [

]a,c,e

2.1.1.3 Category 3 Enhancements

Category 3 enhancements related to [ ]a,c,e are discussed below.

[

]a,c,e

[

]a,c,e

2.1.2 Assumptions and Constraints

- The Westinghouse internal project number for ALS II is: D003
- While the ALS II PMP has references to specific QA procedures, the overall applicability to the Westinghouse QMS is defined in 6003-00001, "ALS II Quality Assurance Plan" (Reference 9).
- [

]a,c,e

- Like ALS, the ALS II Platform is based on a [

]a,c,e

[

]a,c,e

2.1.3 Project Deliverables

The key ALS II Phase 1 project deliverables are listed below.
[

]a,c,e

Per the ALS CM Plan (Reference 10), all configuration items that define the ALS II platform will be captured and maintained in the ALS II Configuration Status Accounting document, 6003-00007 (Reference 14).

2.1.3.1 Test Deliverables

ALS II Test deliverables are documented in 6003-00005, “ALS II Test Plan” (Reference 12).

2.1.3.2 NRC Docketed Document Deliverable Assessment

Appendix B illustrates the relationship of ALS II platform documentation with respect to ALS platform documentation that was docketed as part of the ALS SER.

2.1.4 Document References

[

]a,c,e

2.1.5 Requirements and Design Specification Documents

Figure 2.1-1 shows the technical document flow of the ALS II boards and its similarity to the ALS technical document flow described in the ALS SER.

[

]a,c,e

[

]a,c,e

Note that some document names listed in Figure 2.1-1 have been modified from the official titles to improve readability of the figure, and that the structure in the figure is for illustration only and does not define the tracing structure of the requirements traceability matrices (RTMs).

a,c,e

Figure 2.1-1 ALS & ALS II Document Diagram Comparison

2.1.6 Schedule and Budget Summary

The supplier and customer for the generic ALS II Phase 1 Platform [

]a,c,e The high-level milestones are captured in the resource and task loaded [

]a,c,e

The high-level milestones are also reported as part of the regular management reviews and as part of the monthly major project reviews.

Future application-specific projects shall create a management plan that includes a schedule based on customer requirements.

2.2 EVOLUTION OF THE PLAN

The ALS Management Plan is expected to be updated, if needed, after each life-cycle stage of this project. Changes are managed using the process defined in 6002-00002, "ALS Configuration Management Plan". The configuration management of these documents follows the process defined in the 6002-00002, "ALS Configuration Management Plan" (Reference 10) [

]^{a,c,e}

As stated above, Section 6.2 of this document provides clarification of how 6002-00002 is applied to the ALS II Platform project. It is important to understand early in this document how key concepts identified in 6002-00002 are applied to the ALS II Platform project. Two specific concepts include [

]^{a,c,e}.

2.2.1 Project Control Points & ALS II Platform CM Release Letters

2.2.1.1 Project Control Points

[

]^{a,c,e}

2.2.1.2 ALS II Platform CM Release Letters

[

]^{a,c,e}

[

]a,c,e

As needed, [ ]a,c,e can be created and released as determined by the Project Manager in collaboration with the CCB.

Additional information on the ALS II Platform configuration management activities are provided in Section 6.2 of this document.

(Last Page of Section 2)

SECTION 3
PROJECT ORGANIZATION

3.1 EXTERNAL INTERFACES

Figure 3.1-1 illustrates the overall project organization structure. The external project organization is highlighted by solid line boxes and the internal project organization consists of those boxes enclosed by the dashed line. Future application-specific project management plans may include additional entities. The primary project external interfaces are the following:

[

]a,c,e

a,c,e

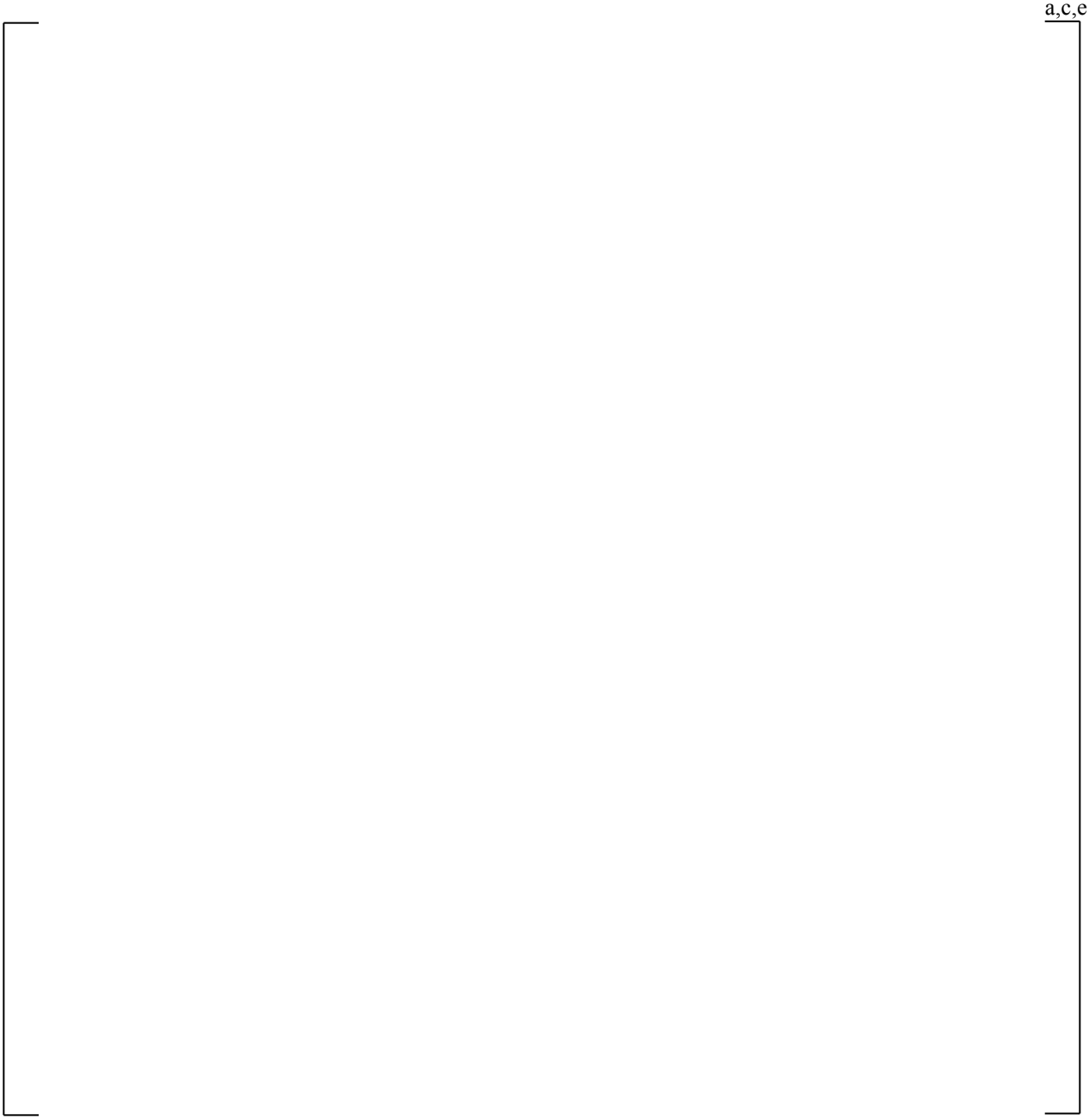

Figure 3.1-1. Project Organization Structure

3.2 INTERNAL INTERFACES

The internal project organization consists of the ALS Project Management Team and the ALS Project Team shown in Figure 3.1-1.

The ALS Project Team consists of the Project Leadership Team along with individual contributors assigned to the project. [

]^{a,c,e}

The structure listed in Table 3.2-1 may be used for future application-specific projects. These future projects may include additional leadership team members. The decision to add additional leadership team members shall be made during the planning stage and documented in the application-specific management plan.

Table 3.2-1. Project Leadership Team

a,c,e

Table 3.2-1. Project Leadership Team (cont.)

a,c,e

3.3 ROLES & RESPONSIBILITIES

A matrix of the project's major work activities and responsible entities is presented in Table 3.3-1. The matrix covers the development activities for the generic ALS II Platform. Future application-specific projects may expand the matrix. The decision to add additional activities shall be made during the planning stage and documented in the application-specific management plan.

Table 3.3-1. Roles & Responsibilities

a,c,e

Table 3.3-1. Roles & Responsibilities (cont.)

a,c,e

Table 3.3-1. Roles & Responsibilities (cont.)

a,c,e

(Last Page of Section 3)

SECTION 4
MANAGERIAL PROCESS PLANS

4.1 PROJECT START-UP PLAN

4.1.1 Estimation Plan

Subsection 2.1.6 specifies the project's budget and scheduling. [

]a,c,e

4.1.2 Staffing Plan

[

]a,c,e

4.1.3 Resource Acquisition Plan

[

]a,c,e

4.1.4 Project Staff Training Plan Review

[

]a,c,e

4.2 WORK PLAN

4.2.1 Work Activities

The top-level work activities for the generic ALS II Phase 1 Platform project are detailed in the project schedule (refer to subsection 2.1.5). Future application-specific projects will typically use a similar approach.

4.2.2 Schedule Allocation

The project schedule illustrates the scheduling relationships among work activities. The milestones listed provide points where progress and quality can be objectively measured to determine progress to plan. Refer to subsection 2.1.5.

4.2.3 Resource Allocation

[

]a,c,e

4.2.4 Budget Allocation

[

]a,c,e

4.3 CONTROL PLAN

4.3.1 Requirements Control Plan

The change control mechanisms for the project are defined in Reference 11 [
]^{a,c,e} in Section 6.2 of this plan. .

4.3.2 Schedule Control Plan

Project milestones provide points where progress and quality can be objectively measured to determine progress being made towards the plan. A detailed project schedule, which includes key project milestones, is maintained by the Project Manager. Periodic project team meetings are held to assess the status of activities down to the work task level against the project schedule. Implementation of actions is the responsibility of the Project Leadership Team. Actions are assigned by the Project Manager to the appropriate, individual project team member. The project team member is responsible to act upon, and satisfactorily complete, his/her assigned action(s). Open actions are reviewed by the Project Leadership Team in the periodic team meetings. A link to the project schedule is provided in subsection 2.1.5.

4.3.3 Budget Control Plan

[ ]^{a,c,e}
See subsection 2.1.6.

4.3.4 Quality Control Plan

The project follows the plan described in 6003-00001, “ALS II Quality Assurance Plan.”

4.3.5 Reporting and Communication Plan

Project status reports are distributed periodically. Typically the status reports are distributed, via email, to the project team and stakeholders. These reports include progress-to-plan, key issues and risks, help needed and action items assignment, as applicable. The project team responsibilities and assignments are communicated via the project team meetings. [

]^{a,c,e}

4.3.6 Metrics Collection Plan

The project maintains the following metrics:
[

]^{a,c,e}

4.4 RISK MANAGEMENT PLAN

Throughout the project lifecycle, the project is analyzed by the project team and the appropriate subject-matter experts to identify risk and issues. The project team analyzes each risk when identified to determine the appropriate risk mitigation plan based on the probability and impact of the risk. The list of risks are consolidated by the Project Manager and recorded in the Risk Assessment Worksheet (RAW). The [

]a,c,e

4.5 PROJECT CLOSEOUT PLAN

Upon satisfying the project objectives, the Project Manager:
[

]a,c,e

(Last Page of Section 4)

SECTION 5
TECHNICAL PROCESS PLANS

5.1 LIFE-CYCLE PROCESS MODEL

[

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Table 5.1-1. ALS II Applicable Life-Cycle Stages

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a,c,e

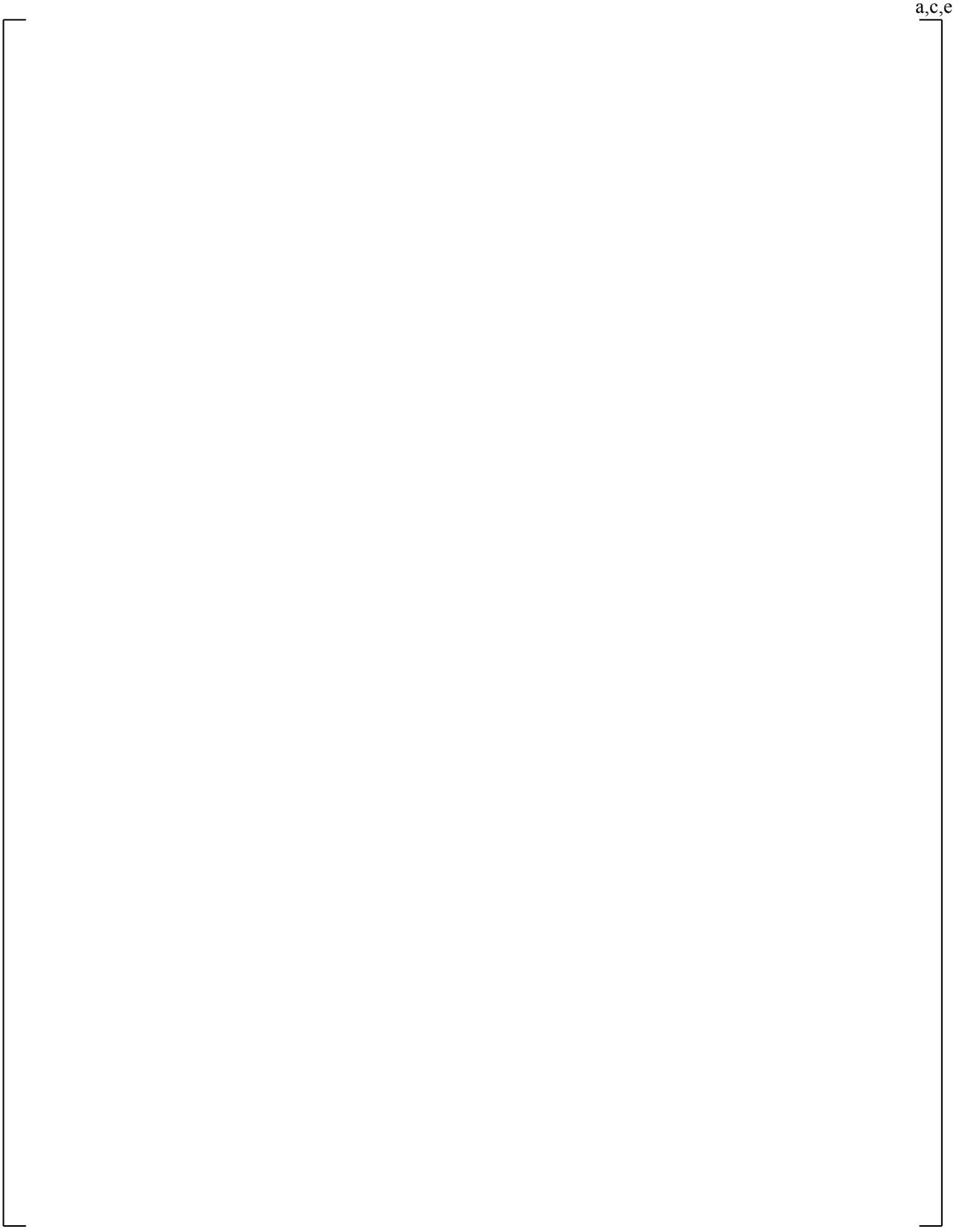

Figure 5.1-1. ALS Platform Project Life-Cycle Process Model

[

]a,c,e

5.1.1 Opportunity Stage

The Opportunity Stage as defined in Reference 3 [
]a,c,e

5.1.2 Planning Stage

The Planning Stage is the initial stage of the project life-cycle defined by Reference 3. The key elements in this stage establish the overall project strategy, such as:
[

]a,c,e

5.1.2.1 Concept Phase

The key element of the Concept Phase is the [

]a,c,e

[

]a,c,e

Table 5.1-2. Concept Phase Exit Criteria

a,c,e

[

]

5.1.2.2 Planning Phase

In the Planning Phase, [

]a,c,e

Table 5.1-3. Planning Phase Exit Criteria

a,c,e

Table 5.1-3. Planning Phase Exit Criteria (cont.)

a,c,e

5.1.2.3 Requirement Phase

The Requirements Phase shall [

]a,c,e

Table 5.1-4. Requirements Phase Exit Criteria

a,c,e

Table 5.1-4. Requirements Phase Exit Criteria (cont.)

a,c,e

The Requirements Phase is the final phase [

]a,c,e

5.1.3 Development Stage

[

]a,c,e

[

]a,c,e

5.1.3.1 Design Phase

[

]a,c,e

Table 5.1-5. Design Phase Exit Criteria

a,c,e

Table 5.1-5. Design Phase Exit Criteria (cont.)

a,c,e

At the conclusion of the Design Phase, the project shall [

]a,c,e

5.1.3.2 Implementation Phase

Following the completion of the Design Phase, the [

]a,c,e

Table 5.1-6. Implementation Phase Exit Criteria

a,c,e

At the conclusion of the Implementation Phase, [

]a,c,e

5.1.3.3 Test Phase

The Test Phase [

]a,c,e

Table 5.1-7. Test Phase Exit Criteria

a,c,e

At the conclusion of the Test Phase, [

]a,c,e

5.1.4 Manufacturing Stage

In the manufacturing stage, [

]a,c,e

5.1.5 System Test Stage

[

]a,c,e

[

]a,c,e

5.1.6 Installation Stage

[

]a,c,e

5.1.7 Maintenance

[

]a,c,e

5.1.8 Retirement

[ ]a,c,e

5.2 METHODS, TOOLS, AND TECHNIQUES

[

]a,c,e

[

]a,c,e

5.3 INFRASTRUCTURE PLAN

[

]a,c,e

5.4 PRODUCT ACCEPTANCE PLAN

[

]a,c,e

(Last Page of Section 5)

SECTION 6
SUPPORTING PROCESS PLANS

The purpose of this section is to identify ALS II Phase 1 applicable process plans and to clarify and identify any exceptions needed in this project management plan.

6.1 SOFTWARE (FPGA) DEVELOPMENT PLAN

The ALS II Phase 1 Category 1 and 2 scope of work related to the ALS-152, 352, 361, 371, 452, 461, and 651, utilizes [ ]^{a,c,e} ALS FPGA logic [ ]^{a,c,}.

[

]^{a,c,e}

6.2 CONFIGURATION MANAGEMENT PLAN

The Project's configuration management plan is specified in 6002-00002 (Reference 10).

[

]^{a,c,e}

Table 6.2-1. ALS II Phase 1 CM Activities

a,c,e

[

]a,c,e

6.3 VERIFICATION AND VALIDATION PLAN

The Project's verification and validation plan is specified in 6003-00003 (Reference 11). As shown in Figure 3.1-1, [ ]a,c,e

6.4 TEST PLAN

Testing of the ALS II Phase 1 configuration items shall be done in accordance with 6003-00005, ALS II Test Plan (Reference 12). As shown in Figure 3.1-1, [
]a,c,e

6.5 QUALITY ASSURANCE PLAN

The Project's quality assurance activities follow the Westinghouse QMS (Reference 26). The project's quality assurance plan is specified in 6003-00001 (Reference 9). As shown in Figure 3.1-1, [
]a,c,e

6.6 REVIEWS AND AUDITS PLAN

[

]a,c,e

6.7 PROBLEM RESOLUTION PLAN

[

]a,c,e

[

]a,c,e

6.8 SUBCONTRACTOR MANAGEMENT PLANS

[

]a,c,e

6.9 PROCESS IMPROVEMENT PLAN

[

]a,c,e

6.10 SOFTWARE SAFETY PLAN

[

]a,c,e

6.10.1 Review of Planning Documents

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]a,c,e

6.10.2 Software Safety Plan Review

[

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[

]a,c,e

(Last Page of Section 6)

Appendix A

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]a,c,e

Table A-1. [ ]a,c,e

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(Last Page of Appendix A)

Appendix B

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[

]a,c,e

Table B-1. [ ]a,c,e

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Table B-1. [ ][a,c,e]

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Table B-1. [ ][a,c,e]

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