Cyber Security Assessment Report

of

Application Name,

Department Name,

Govt. of AP

Dated

by

Andhra Pradesh Technology Services

3rd Floor, R&B Building, M.G. Road, Labbipet,

Vijayawada – 520 010. Andhra Pradesh

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1. Executive Summary

## Introduction

1. [One Liner about the Department]

Andhra Pradesh Technology Services (hereon referred as APTS) performed the Cyber Security Assessment of\_\_\_\_\_\_\_\_\_\_\_ Application for \_\_\_\_\_\_\_\_\_ Department to determine, if any weakness exist in the application.

## Engagement Specific Details

|  |  |  |
| --- | --- | --- |
| 1. **S. No.** | **Activity** | 1. **Date** |
| 1. 1. | 1. Start date of engagement | 1. DD/MM/YYYY |
| 1. 2. | 1. Submission date of initial report | 1. DD/MM/YYYY |
| 1. 3. | 1. Submission date of Final Confirmatory Review Report | 1. DD/MM/YYYY |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. **S. No** | **Area** | **Review Performed By** | **Application SPOC** | **Department Name** |
| 1. 1. | 1. Application Security Assessment | 1. Name, Name | 1. Name | 1. Department |
| 1. 2. | 1. Server Vulnerability Assessment | 1. Name, Name | 1. Name | 1. Department |

|  |  |  |  |
| --- | --- | --- | --- |
| 1. **S. No** | **Date** | **Version Number** | 1. **Remarks** |
| 1. 1. | 1. DD/MM/YYYY | 1. v1.0 | 1. Initial Review |
| 1. 2. | 1. DD/MM/YYYY | 1. v1.1 | 1. Confirmatory Security Review #1 |

## Scope Details

### Inclusion

1. **Web Application Security Assessment & Penetration Testing**

Application Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Application URL: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Environment: Production/UAT/SIT

Version Number [or] Latest Compilation Timestamp: \_\_\_\_\_\_\_\_

Type of Review: Blackbox / Greybox

Hash of Zipped Source Code (SHA512):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Server Vulnerability Assessment**

Type of Review: Blackbox / Greybox

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **IP Address** | **OEM** | **Version No.** | **Server Type** |
| 1. | 192.168.10.2 | RHEL | 7.4 | Web Server |
| 2. | NGINX | 1.12.2 |
| 3. | 192.168.11.2 | RHEL | 7.4 | App Server |
| 4. | GUNICORN | 19.6.0 |
| 5. | 192.168.12.2 | RHEL | 7.4 | DB Server |
| 6. | ORACLE | 12c |

### Exclusion

[If any]

1. Application Security Assessment
2. Server Vulnerability Assessment
3. Secure Code Review
4. Process Review
5. Secure Network Architecture Review

## Approach & Methodology

1. The web application security assessment was conducted in line with the leading security standards and guidelines for web application security such as OWASP.
2. The approach followed for the security assessment is detailed below:

### Information Gathering:

We conducted a walkthrough of the web application to assess the scope of the security assessment and obtain the following information to identify the potential attack vectors:

* 1. Functionalities available in the web application
  2. Entry points for the web application
  3. Web application is custom developed or off-the-shelf application
  4. Protocols used by the web application
  5. Back-end technology including web server, framework, and development language
  6. Conduct search engine discovery and reconnaissance
  7. Banner grabbing (finger printing) to identify the running version of web server / application server and framework
  8. Enumerate application on web server to identify other applications running on the server
  9. View source of the web application to review the comments and metadata
  10. Map functionalities and data flow to identify attack vectors

### Automated & Manual Scanning:

We performed an unauthenticated/ black-box automated & Manual scanning (without the knowledge of user credentials) of the web application URL using commercial and open source tools. The scanning was conducted to identify any known vulnerabilities in the subjected application.

### Analyse results and reporting:

We then analysed the results from manual inspection to identify the vulnerabilities applicable to the web application. The risk classification for each of these vulnerabilities was identified based on the likelihood of occurrence, impact, and level of access required to exploit these vulnerability as per the risk classification methodology detailed in 1.5 of the report.

1. An exception based detailed report is prepared with the following:
2. Description of the vulnerability
3. Risk Rating
4. Impact & Root Cause
5. Recommendation including reference links

## Risk Categorization

The risk ratings assigned to each finding in this report are based on 3 dimensions – Likelihood, Impact, and Level of access required. These are defined below.

|  |  |  |
| --- | --- | --- |
| **Likelihood** | High | Attacker can use existing tools to exploit the vulnerability by following prescriptive instructions and without knowledge of coding/platforms. Target can be exploited directly. Finding assists with exploitation of or is linked to other high or critical risk findings. |
| Medium | Attacker must have knowledge of coding/platforms and may require customisation of tools (e.g. batch scripts, shell scripts, Metasploit module customization) to exploit the vulnerability.  Exploitation of target may require setup of additional infrastructure or processes. |
| Low | High level of skill required to exploit. Attacker must develop their own tools or processes (e.g. custom written exploit code) to successfully exploit the vulnerability.  Publicly available exploits were not identified.  Exploitation of target requires setup of additional infrastructure or processes (e.g. Spear Phishing). |
| **Impact** | Severe | Vulnerability may lead to widespread administrator access to multiple materially sensitive systems (e.g. Enterprise Administrator), or access to the internal network from the Internet. |
| Major | Vulnerability may lead to immediate access to sensitive or materially sensitive data, or highly privileged access to critical business systems, or a severe and extended disruption to critical business systems or operations, with impact to many users or sites. |
| Moderate | Vulnerability may lead to access to sensitive data, or privileged access to critical business systems, or partial disruption to critical business systems or operations, with impact to some users or sites. |
| Minor | Vulnerability may lead to:  Access to non-sensitive data, or  Access to non-critical business systems, or  Disruption to non-critical business systems or operations, with limited impact to users/sites. |
| Insignificant | Information disclosure of non-sensitive enticement information (e.g. IP addresses, hostnames, system information) with no direct impact to availability. |
| **Level of access required** | Privileged | Privileged user (e.g. administrator). |
| Non-privileged | General user (e.g. domain user). |
| Internal Anonymous | Unauthenticated user with access to the internal network. |
| External Anonymous | Unauthenticated Internet user (includes web applications that allow self-registration). |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Consequence**  **Likelihood** | **Small** | **Moderate** | **Severe** | **Catastrophic** |
| **Low** | Info | Low | Medium | Medium |
| **Moderate** | Low | Medium | Medium | High |
| **High** | Low | Medium | High | High |
| **Very High** | Medium | High | High | High |

The final risk ratings are defined as follows:

|  |  |
| --- | --- |
| High | Urgent action should be taken to address findings. |
| Medium | Action should be taken to address findings in a timely manner.  Out of cycle change and compensating controls may be required. |
| Low | No immediate action required. Remediation items can be implemented during the next scheduled change window. |
| Information | No immediate risks to the environment were identified as part of the testing. Findings are informational only. |

Note: The above matrices are intended to be used as a guide only in determining the appropriate risk rating for a particular vulnerability. Other factors may need to be considered when weighing up the final risk rating, such as the number of servers/applications affected by the vulnerability, nature of system’s affected (e.g. Production, Development, and Test), and nature of data accessed or disclosed.

## Vulnerability Summary

Below is the summary of open vulnerabilities that still exist in the application.

|  |  |  |  |
| --- | --- | --- | --- |
| **Review Area** | **Initial Review** | | |
| **High** | **Medium** | **Low** |
| **Web Application Security Assessment** | 1 | 2 | 3 |
| **Server Vulnerability Assessment** | 4 | 5 | 6 |
| **Total** | **5** | **7** | **9** |
|  |  | **21** |

### Distribution of Observation

1. Detailed Observation

## Web Application Security Assessment & Penetration Testing

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

|  |  |  |
| --- | --- | --- |
| 1. **Vulnerability Name** |  | **Risk Rating**: [Risk Rating] |
| **Description** | [Description about the subjected Vulnerability] | |
| **Affected Path(s)** | URL1 – Parameter 1, URL2 – Parameter 1&2 | |
| **Impact** | [Potential Impact] | |
| **Evidence/Proof of Concept**  [Evidence & Screenshots] | | |
| **Recommendation** | [Recommendation steps & reference links] | |
| **Management Comments** |  | |

## Server Vulnerability Summary

| **S. No** | **Vulnerability Name** | **Risk Rating** | **Affected Devices** | **Description** | **Impact** | **Recommendation** | **Management Comments** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | [Vulnerability Name] | [High/Medium/  Low] | [IP Address Protocol : Port] | [Description] | [Impact] | [Recommendation] | [Management Comments] |

1. Appendix

## OWASP Checklist

The Application Security Assessment has been evaluated as per Open Web Application Security Project Testing guide v4.0 as follows:

| **Ref. No.** | **Category** | **Test Name** | **Safe?** | **Remarks** |
| --- | --- | --- | --- | --- |
| 1.1 | **Information Gathering** | | | |
| 1.1.1 | OTG-INFO-001 | Conduct Search Engine Discovery and Reconnaissance for Information Leakage | [Yes/No/ NA] | [Text] |
| 1.1.2 | OTG-INFO-002 | Fingerprint Web Server |  |  |
| 1.1.3 | OTG-INFO-003 | Review Webserver Metafiles for Information Leakage |  |  |
| 1.1.4 | OTG-INFO-004 | Enumerate Applications on Webserver |  |  |
| 1.1.5 | OTG-INFO-005 | Review Webpage Comments and Metadata for Information Leakage |  |  |
| 1.1.6 | OTG-INFO-006 | Identify application entry points |  |  |
| 1.1.7 | OTG-INFO-007 | Map execution paths through application |  |  |
| 1.1.8 | OTG-INFO-008 | Fingerprint Web Application Framework |  |  |
| 1.1.9 | OTG-INFO-009 | Fingerprint Web Application |  |  |
| 1.1.10 | OTG-INFO-010 | Map Application Architecture |  |  |
| 1.2 | **Configuration and Deploy Management Testing** | | | |
| 1.2.1 | OTG-CONFIG-001 | Test Network/Infrastructure Configuration |  |  |
| 1.2.2 | OTG-CONFIG-002 | Test Application Platform Configuration |  |  |
| 1.2.3 | OTG-CONFIG-003 | Test File Extensions Handling for Sensitive Information |  |  |
| 1.2.4 | OTG-CONFIG-004 | Backup and Unreferenced Files for Sensitive Information |  |  |
| 1.2.5 | OTG-CONFIG-005 | Enumerate Infrastructure and Application Admin Interfaces |  |  |
| 1.2.6 | OTG-CONFIG-006 | Test HTTP Methods |  |  |
| 1.2.7 | OTG-CONFIG-007 | Test HTTP Strict Transport Security |  |  |
| 1.2.8 | OTG-CONFIG-008 | Test RIA cross domain policy |  |  |
| 1.3 | **Identity Management Testing** | | | |
| 1.3.1 | OTG-IDENT-001 | Test Role Definitions |  |  |
| 1.3.2 | OTG-IDENT-002 | Test User Registration Process |  |  |
| 1.3.3 | OTG-IDENT-003 | Test Account Provisioning Process |  |  |
| 1.3.4 | OTG-IDENT-004 | Testing for Account Enumeration and Guessable User Account |  |  |
| 1.3.5 | OTG-IDENT-005 | Testing for Weak or unenforced username policy |  |  |
| 1.3.6 | OTG-IDENT-006 | Test Permissions of Guest/Training Accounts |  |  |
| 1.3.7 | OTG-IDENT-007 | Test Account Suspension/Resumption Process |  |  |
| 1.4 | **Authentication Testing** | | | |
| 1.4.1 | OTG-AUTHN-001 | Testing for Credentials Transported over an Encrypted Channel |  |  |
| 1.4.2 | OTG-AUTHN-002 | Testing for default credentials |  |  |
| 1.4.3 | OTG-AUTHN-003 | Testing for Weak lock out mechanism |  |  |
| 1.4.4 | OTG-AUTHN-004 | Testing for bypassing authentication schema |  |  |
| 1.4.5 | OTG-AUTHN-005 | Test remember password functionality |  |  |
| 1.4.6 | OTG-AUTHN-006 | Testing for Browser cache weakness |  |  |
| 1.4.7 | OTG-AUTHN-007 | Testing for Weak password policy |  |  |
| 1.4.8 | OTG-AUTHN-008 | Testing for Weak security question/answer |  |  |
| 1.4.9 | OTG-AUTHN-009 | Testing for weak password change or reset functionalities |  |  |
| 1.4.10 | OTG-AUTHN-010 | Testing for Weaker authentication in alternative channel |  |  |
| 1.5 | **Authorization Testing** | | | |
| 1.5.1 | OTG-AUTHZ-001 | Testing Directory traversal/file include |  |  |
| 1.5.2 | OTG-AUTHZ-002 | Testing for bypassing authorization schema |  |  |
| 1.5.3 | OTG-AUTHZ-003 | Testing for Privilege Escalation |  |  |
| 1.5.4 | OTG-AUTHZ-004 | Testing for Insecure Direct Object References |  |  |
| 1.6 | **Session Management Testing** | | | |
| 1.6.1 | OTG-SESS-001 | Testing for Bypassing Session Management Schema |  |  |
| 1.6.2 | OTG-SESS-002 | Testing for Cookies attributes |  |  |
| 1.6.3 | OTG-SESS-003 | Testing for Session Fixation |  |  |
| 1.6.4 | OTG-SESS-004 | Testing for Exposed Session Variables |  |  |
| 1.6.5 | OTG-SESS-005 | Testing for Cross Site Request Forgery |  |  |
| 1.6.6 | OTG-SESS-006 | Testing for logout functionality |  |  |
| 1.6.7 | OTG-SESS-007 | Test Session Timeout |  |  |
| 1.6.8 | OTG-SESS-008 | Testing for Session puzzling |  |  |
| 1.7 | **Data Validation Testing** | | | |
| 1.7.1 | OTG-INPVAL-001 | Testing for Reflected Cross Site Scripting |  |  |
| 1.7.2 | OTG-INPVAL-002 | Testing for Stored Cross Site Scripting |  |  |
| 1.7.3 | OTG-INPVAL-003 | Testing for HTTP Verb Tampering |  |  |
| 1.7.4 | OTG-INPVAL-004 | Testing for HTTP Parameter pollution |  |  |
| 1.7.5 | OTG-INPVAL-005 | Testing for SQL Injection |  |  |
| 1.7.5.1 |  | Oracle Testing |  |  |
| 1.7.5.2 |  | MySQL Testing |  |  |
| 1.7.5.3 |  | SQL Server Testing |  |  |
| 1.7.5.4 |  | Testing PostgreSQL |  |  |
| 1.7.5.5 |  | MS Access Testing |  |  |
| 1.7.5.6 |  | Testing for NoSQL injection |  |  |
| 1.7.6 | OTG-INPVAL-006 | Testing for LDAP Injection |  |  |
| 1.7.7 | OTG-INPVAL-007 | Testing for ORM Injection |  |  |
| 1.7.8 | OTG-INPVAL-008 | Testing for XML Injection |  |  |
| 1.7.9 | OTG-INPVAL-009 | Testing for SSI Injection |  |  |
| 1.7.10 | OTG-INPVAL-010 | Testing for XPath Injection |  |  |
| 1.7.11 | OTG-INPVAL-011 | IMAP/SMTP Injection |  |  |
| 1.7.12 | OTG-INPVAL-012 | Testing for Code Injection |  |  |
| 1.7.12.1 |  | Testing for Local File Inclusion |  |  |
| 1.7.12.2 |  | Testing for Remote File Inclusion |  |  |
| 1.7.13 | OTG-INPVAL-013 | Testing for Command Injection |  |  |
| 1.7.14 | OTG-INPVAL-014 | Testing for Buffer overflow |  |  |
| 1.7.14.1 |  | Testing for Heap overflow |  |  |
| 1.7.14.2 |  | Testing for Stack overflow |  |  |
| 1.7.14.3 |  | Testing for Format string |  |  |
| 1.7.15 | OTG-INPVAL-015 | Testing for incubated vulnerabilities |  |  |
| 1.7.16 | OTG-INPVAL-016 | Testing for HTTP Splitting/Smuggling |  |  |
| 1.8 | **Error Handling** | | | |
| 1.8.1 | OTG-ERR-001 | Analysis of Error Codes |  |  |
| 1.8.2 | OTG-ERR-002 | Analysis of Stack Traces |  |  |
| 1.9 | **Cryptography** | | | |
| 1.9.1 | OTG-CRYPST-001 | Testing for Weak SSL/TSL Ciphers, Insufficient Transport Layer Protection |  |  |
| 1.9.2 | OTG-CRYPST-002 | Testing for Padding Oracle |  |  |
| 1.9.3 | OTG-CRYPST-003 | Testing for Sensitive information sent via unencrypted channels |  |  |
| 1.1 | **Business Logic Testing** | | | |
| 1.10.1 | OTG-BUSLOGIC-001 | Test Business Logic Data Validation |  |  |
| 1.10.2 | OTG-BUSLOGIC-002 | Test Ability to Forge Requests |  |  |
| 1.10.3 | OTG-BUSLOGIC-003 | Test Integrity Checks |  |  |
| 1.10.4 | OTG-BUSLOGIC-004 | Test for Process Timing |  |  |
| 1.10.5 | OTG-BUSLOGIC-005 | Test Number of Times a Function Can be Used Limits |  |  |
| 1.10.6 | OTG-BUSLOGIC-006 | Testing for the Circumvention of Work Flows |  |  |
| 1.10.7 | OTG-BUSLOGIC-007 | Test Defenses Against Application Mis-use |  |  |
| 1.10.8 | OTG-BUSLOGIC-008 | Test Upload of Unexpected File Types |  |  |
| 1.10.9 | OTG-BUSLOGIC-009 | Test Upload of Malicious Files |  |  |
| 1.11 | **Client Side Testing** | | | |
| 1.11.1 | OTG-CLIENT-001 | Testing for DOM based Cross Site Scripting |  |  |
| 1.11.2 | OTG-CLIENT-002 | Testing for JavaScript Execution |  |  |
| 1.11.3 | OTG-CLIENT-003 | Testing for HTML Injection |  |  |
| 1.11.4 | OTG-CLIENT-004 | Testing for Client Side URL Redirect |  |  |
| 1.11.5 | OTG-CLIENT-005 | Testing for CSS Injection |  |  |
| 1.11.6 | OTG-CLIENT-006 | Testing for Client Side Resource Manipulation |  |  |
| 1.11.7 | OTG-CLIENT-007 | Test Cross Origin Resource Sharing |  |  |
| 1.11.8 | OTG-CLIENT-008 | Testing for Cross Site Flashing |  |  |
| 1.11.9 | OTG-CLIENT-009 | Testing for Clickjacking |  |  |
| 1.11.10 | OTG-CLIENT-010 | Testing WebSockets |  |  |
| 1.11.11 | OTG-CLIENT-011 | Test Web Messaging |  |  |
| 1.11.12 | OTG-CLIENT-012 | Test Local Storage |  |  |

## Network Reconnaissance

[Nmap Output]

## SSL Test

[SSL Test Output]

## Scanned Items

## Limitations

1. The report has been prepared based on the information given by dept\_name and is accordingly, given for the specific purpose of internal use by the dept\_name. Our conclusions are based on the completeness and accuracy of the stated facts and assumptions; which if not entirely complete or accurate, should be communicated to us immediately, as the inaccuracy or incompleteness could have a material impact on our conclusions.
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5. This report makes recommendations based on the initial information. However, corrective action must be taken by the respective owners by performing a root cause analysis for each of the observations highlighted as part of this report.