# National Information Assurance Partnership Common Criteria Evaluation and Validation Scheme



# **Validation Report**

### for the

# Seagate® BarraCuda<sup>™</sup> 515 SSD, Firmware Version ECPM13.1

**Report Number: CCEVS-VR-VID11322-2023** 

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## **Table of Contents**

1.	Executive Summary			
2.	Identification			
3.	Arch	itectural Information	4	
	3.1.	Evaluated Configuration	4	
	3.2.	Physical Boundary	4	
	3.3.	Required Non-TOE Hardware, Software, and Firmware	5	
4.	Secu	rity Policy	6	
	4.1.	Cryptographic Support	6	
	4.2.	User Data Protection	6	
	4.3.	Security Management	6	
	4.4.	Protection of the TSF	6	
5.	Assu	mptions and Clarification of Scope	7	
	5.1.	Assumptions	7	
	5.2.	Clarification of Scope	7	
6.	Docu	ımentation	8	
7.	IT Pı	oduct Testing	9	
	7.1.	Developer Testing.	9	
	7.2.	Evaluation Team Independent Testing	9	
	7.3.	Remote testing	9	
	7.4.	TOE Test Environment Configuration	9	
8.	Resu	lts of the Evaluation	11	
	8.1.	Evaluation of Security Target (ASE)	11	
	8.2.	Evaluation of Development Documentation (ADV)	11	
	8.3.	Evaluation of Guidance Documents (AGD)	11	
	8.4.	Evaluation of Life Cycle Support Activities (ALC)	12	
	8.5.	Evaluation of Test Documentation and the Test Activity (ATE)	12	
	8.6.	Vulnerability Assessment Activity (VAN)	12	
	8.7.	Summary of Evaluation Results	13	
9.	Valid	dator Comments	14	
10.	Anne	exes	15	
11.	Secu	rity Target	16	

# $Seagate \circledR \ BarraCuda ^{\texttt{TM}} 515 \ SSD, \ Firmware \ Version \ ECPM13.1 \\ Validation \ Report, \ Version \ 1.0$

12.	Glossary	17
13.	Acronym List	18
14.	Bibliography	19
	List of Tables	
Tab	ole 1: Evaluation Identifiers	
Tab	ole 2: Devices in the Testing Environment	9
	ble 3: Tools Used for Testing	

### 1. Executive Summary

This report documents the assessment of the National Information Assurance Partnership (NIAP) validation team of the evaluation of Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1 solution provided by DIGISTOR. It presents the evaluation results, their justifications, and the conformance results. This Validation Report (VR) is not an endorsement of the Target of Evaluation (TOE) by any agency of the U.S. government, and no warranty is either expressed or implied.

The evaluation was performed by the Lightship Security USA Common Criteria Laboratory (CCTL) in Baltimore, MD, United States of America, and was completed in March 2023. The information in this report is largely derived from the Evaluation Technical Report (ETR) and associated test reports, all written by Lightship Security (LS). The evaluation determined that the product is both Common Criteria Part 2 Extended and Part 3 Conformant and meets the assurance requirements of the collaborative Protection Profile for Full Drive Encryption - Encryption Engine Version 2.0 + Errata 20190201, February 1, 2019.

The TOE is the Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1. The TOE identified in this VR has been evaluated at a NIAP approved CCTL using the Common Methodology for IT Security Evaluation (Version 3.1, Rev 5) for conformance to the Common Criteria for IT Security Evaluation (Version 3.1, Rev 5). This VR applies only to the specific version of the TOE as evaluated. The evaluation has been conducted in accordance with the provisions of the NIAP Common Criteria Evaluation and Validation Scheme (CCEVS) and the conclusions of the testing laboratory in the ETR are consistent with the evidence provided.

The Validation team monitored the activities of the Evaluation team, provided guidance on technical issues and evaluation processes, and reviewed the individual work units and successive versions of the ETR. The Validation team found that the evaluation showed that the product satisfies all of the functional requirements and assurance requirements stated in the Security Target (ST). Therefore, the Validation team concludes that the testing laboratory's findings are accurate, the conclusions justified, and the conformance results are correct. The conclusions of the testing laboratory in the ETR are consistent with the evidence produced.

The technical information included in this report was obtained from the *Seagate*® *BarraCuda*<sup>TM</sup> *515 SSD*, *Firmware Version ECPM13.1 Security Target*, Version 1.1, March 2023, and analysis performed by the Validation Team.

### 2. Identification

The CCEVS is a joint National Security Agency (NSA) and National Institute of Standards and Technology (NIST) effort to establish commercial facilities to perform trusted product evaluations. Under this program, security evaluations are conducted by commercial testing laboratories called Common Criteria Testing Laboratories (CCTLs) using the Common Evaluation Methodology (CEM) in accordance with National Voluntary Laboratory Assessment Program (NVLAP) accreditation.

The NIAP Validation Body assigns Validators to monitor the CCTLs to ensure quality and consistency across evaluations. Developers of information technology products desiring a security evaluation contract with a CCTL and pay a fee for their product's evaluation. Upon successful completion of the evaluation, the product is added to NIAP's Validated Products List.

Table 1 provides information needed to completely identify the product, including:

- The TOE: the fully qualified identifier of the product as evaluated.
- The ST, describing the security features, claims, and assurances of the product.
- The conformance result of the evaluation.
- The Protection Profile (PP) to which the product is conformant.
- The organizations and individuals participating in the evaluation.

**Table 1: Evaluation Identifiers** 

Item	Identifier		
Evaluation Scheme	United States NIAP Common Criteria Evaluation and		
Evaluation Scheme	Validation Scheme		
TOE	Seagate® BarraCuda <sup>™</sup> 515 SSD, Firmware Version		
TOL	ECPM13.1		
	DIGISTOR		
Sponsor and Developer	1000 SE Tech Center Dr		
Sponsor and Developer	Suite 160		
	Vancouver, WA 98683		
	Lightship Security USA		
CCTL	3600 O'Donnell St., Suite 2		
	Baltimore, MD 21224		
CC Version	Common Criteria for Information Technology Security		
CC Version	Evaluation, Version 3.1, Revision 5, April 2017.		
	Common Methodology for Information Technology Security		
CEM	Evaluation: Evaluation Methodology, Version 3.1, Revision		
	5, April 2017.		
	collaborative Protection Profile for Full Drive Encryption -		
Protection Profile	Encryption Engine, Version 2.0 + Errata 20190201, February		
	1, 2019		
ST	Seagate® BarraCuda™ 515 SSD, Firmware Version		
51	ECPM13.1 Security Target, Version 1.1, March 2023		

Item	Identifier	
	Seagate® BarraCuda™ 515 SSD, Firmware Version	
Evaluation Technical Report	ECPM13.1 Evaluation Technical Report, Version 0.5,	
	March 2023	
Conformance Result	CC Part 2 extended, CC Part 3 conformant	
Evaluation Personnel	Lightship USA: Eric Isaac, Furukh Siddique, Kevin Steiner	
CCEVS Validators	Farid Ahmed, Jenn Dotson, Anne Gugel, Chris Thorpe,	
CCEVS Validators	Richard Toren	

### 3. Architectural Information

Note: The following architectural description is based on the description presented in the Security Target.

The Target of Evaluation (TOE) is a solid state self-encrypting drive that provides encryption and decryption of stored user data.

### 3.1. Evaluated Configuration

The TOE evaluated configuration includes the Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1, which consists of the following models and versions:

Module	Drive	Capacity	Controller	FW Version
	ZP256MC30012	256GB	- PS5012-E12	ECPM13.1
	ZP512MC30012	512GB		
	ZP1024MC30012	1024GB		
Seagate® BarraCuda™ 515	ZP2048MC30012	2048GB		
SSD, Firmware Version ECPM13.1	ZP256MC30022	256GB		
	ZP512MC30022	512GB		
	ZP1024MC30022	1024GB		
	ZP2048MC30022	2048GB		

#### 3.2. TOE Architecture

The TOE provides full drive encryption to protect data at rest on a lost or stolen device. The Encryption Engine (EE) ensures that the data is encrypted using FIPS-validated algorithms. It manages the encryption and decryption of the stored data, policy enforcement, and key management.

### 3.3. Physical Boundary

The physical boundary of the TOE encompasses the DIGISTOR Seagate® BarraCuda<sup>TM</sup> 515 SSD firmware running on the SEDs. The TOE hardware is delivered to customers via trusted courier with the firmware preinstalled.

The TOE models support either NVMe PCIe or SATA III interfaces. All TOE models incorporate an ARM Cortex-R5 processor (ARMv7-R microarchitecture).

### 3.4. Required Non-TOE Hardware, Software, and Firmware

The TOE operates with the following components in the environment:

- Authorization Acquisition. KLC CipherDrive v1.2.2 software installed on a 128 MB read-only Shadow MBR partition on the SED. This supplies the Border Encryption Value (BEV) for locking and unlocking the drives. The KLC software provides the GUI used for performing the security management functions described within this ST.
- Protected OS. The TOE supports protection of commonly used operating systems, such as Linux Operating Systems/Linux based Hypervisors and Windows Operating Systems.
- Computer Hardware. Intel based UEFI booted systems that supports Intel Secure Key Technology. CC Testing performed using CPUs:
  - o Intel Core i3-8100
  - o Intel Core i5-9600

### 4. Security Policy

This section summarizes the security functionality of the TOE:

### 4.1. Cryptographic Support

The TOE ensures key material used for storage encryption is properly generated and protected from disclosure. It also implements cryptographic key and key material destruction during transitioning to a Compliant power saving state, or when all keys and key material are no longer needed.

The TOE performs cryptographic operations as shown in relevant Cryptographic Algorithm Validation Program (CAVP) certificates.

#### 4.2. User Data Protection

The TOE enables encryption and decryption of user data on a SED to protect it from unauthorized disclosure.

#### 4.3. Security Management

The TOE enables management of its security functions, including:

- i) Changing and erasing the DEK
- ii) Updating the TOE firmware

#### 4.4. Protection of the TSF

The TOE ensures the authenticity and integrity of firmware updates through digital signatures using RSA 2048 with SHA-256. The TOE supports the D3 compliant power saving state dependent on the OS parameters or user-initiated request.

The TOE ensures its integrity and operation by performing self-tests.

### 5. Assumptions and Clarification of Scope

### 5.1. Assumptions

The Security Problem Definition, including the assumptions, can be found in the following document:

• collaborative Protection Profile for Full Drive Encryption - Encryption Engine, Version 2.0 + Errata 20190201, February 1, 2019

That information has not been reproduced here and CPP\_FDE\_EE\_V2.0E should be consulted if there is interest in that material.

### 5.2. Clarification of Scope

The scope of this evaluation was limited to the functionality and assurances covered in CPP\_FDE\_EE\_V2.0E as described for this TOE in the ST. Other functionality provided by the devices was not assessed as part of this evaluation. All other functionality needs to be assessed separately, and no further conclusions can be drawn about their effectiveness.

All evaluations (and all products) have limitations, as well as potential misconceptions that need clarification. This text covers some of the more important limitations and clarifications of this evaluation. Note that:

- As with any evaluation, this evaluation only shows that the evaluated configuration meets the security claims made in accordance with the assurance activities specified in the CPP\_FDE\_EE\_V2.0E and performed by the Evaluation team.
- This evaluation covers only the specific software version identified in this document, and not any earlier or later versions released or in process.
- Apart from the Admin Guide identified in Section 6, additional customer documentation for the specific models was not included in the scope of the evaluation and therefore should not be relied upon when configuring or operating the device as evaluated.
- This evaluation did not specifically search for, nor attempt to exploit, vulnerabilities that were not "obvious" or vulnerabilities to objectives not claimed in the ST. The CEM defines an "obvious" vulnerability as one that is easily exploited with a minimum of understanding of the TOE, technical sophistication, and resources.
- The functionality evaluated is scoped exclusively to the security functional requirements specified in the CPP\_FDE\_EE\_V2.0E and applicable Technical Decisions. Any additional security related functional capabilities of the TOE were not covered by this evaluation. In particular, functionality defined in Section 3.2 is not covered by this evaluation.

### 6. Documentation

The following guidance documents were available with the TOE for evaluation:

• Seagate® BarraCuda™ 515 SSD, Firmware Version ECPM13.1 Common Criteria Guide, Version 1.1, March 2023

This document is the only documentation that should be trusted to set-up, administer, or use the product in the evaluated configuration. Additional documentation was not included in the scope of the evaluation and should not be relied upon when configuring or operating the device as evaluated.

### 7. IT Product Testing

This section describes the testing efforts of the Evaluation team. It is derived from information contained in *Seagate® BarraCuda*<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1 FDE Encryption Engine Test Plan, which is not publicly available. The Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1 Assurance Activity Report, Version 0.5, March 2023 provides an overview of testing and the prescribed assurance activities.

#### 7.1. Developer Testing

No evidence of developer testing is required in the Assurance Activities for this product.

### 7.2. Evaluation Team Independent Testing

The Evaluation team conducted independent testing at Lightship Security USA lab in Baltimore, MD from August 8, 2022, until February 2, 2023. The Evaluation team configured the TOE according to vendor installation instructions and as identified in the Security Target.

The Evaluation team confirmed the technical accuracy of the setup and installation guide during installation of the TOE. The Evaluation team confirmed that the TOE version delivered for testing was identical to the version identified in the ST.

The Evaluation team used the Protection Profile test procedures as a basis for creating each of the independent tests as required by the Assurance Activities.

Each Assurance Activity was tested as required by the conformant Protection Profile and the evaluation team verified that each test passed.

#### 7.3. Remote testing

Remote testing was conducted at the Phison facility located in Jhunan, Miaoli, Taiwan. Phison representatives conducted the testing. The Evaluation team directed and observed remote testing for the ZP256MC30012 TOE model for the FCS\_CKM.1(c), FCS\_CKM.4(b) and FDP\_DSK\_EXT.1 test activities. This was performed over a recorded remote session and participation included the CCTL, NIAP and the Validation team on November 21, 2022. Prior approval was granted by NIAP. Prior to testing, the Evaluation team confirmed the TOE model was running the correct firmware and was physically and logically separated from other hardware in the test facility.

#### 7.4. TOE Test Environment Configuration

The TOE testing environment components are identified in the tables.

**Table 2: Devices in the Testing Environment** 

TOE model	Platform	Controller	Firmware	SFRs
ZP256MC30012	Windows 10 Pro, Intel i5-9600	PS5012-E12	ECPM13.1	FCS_VAL_EXT.1 FMT_SMF.1

TOE model	Platform	Controller	Firmware	SFRs
				FPT_TUD_EXT.1
ZP256MC30012	Ubuntu 20.04.2 LTS, Intel i3-8100	PS5012-E12	ECPM13.1	FCS_CKM.1(c) FCS_CKM.4(b) FDP_DSK_EXT.1

**Table 3: Tools Used for Testing** 

Tool name	Version	Description
KLC CipherDrive	v1.2.2	This tool provides GUI access to the TOE to be able to perform management functions
Phison Test utility for ECPM drives	1.10.01.01_FIPS_Digistor	This tool was used to test the deletion and generation of key as well as provide dumps of the entire drive to verify evidence
DLMC Tool for Trusted Update	ECPM13.1	This tool was used for updating the firmware on the TOE for trusted update tests.
HxD	2.5.0.0	This tool was used to verify binary file dumps with key contents

### 8. Results of the Evaluation

The results of the assurance requirements are generally described in this section and are presented in detail in the proprietary documents: the Detailed Test Report (DTR) and the Evaluation Technical Report (ETR). The reader of this document can assume that all activities and work units received a passing verdict.

A verdict for an assurance component is determined by the resulting verdicts assigned to the corresponding evaluator action elements. The evaluation was conducted based upon CC Version 3.1 Revision 5 and CEM Version 3.1 Revision 5. The evaluation determined the Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1 to be Part 2 extended, and to meet the SARs contained in the PP. Additionally, the evaluator performed the Assurance Activities specified in CPP\_FDE\_EE\_V2.0E.

### 8.1. Evaluation of Security Target (ASE)

The Evaluation team applied each ASE CEM work unit. The ST evaluation ensured the ST contains a description of the environment in terms of policies and assumptions, a statement of security requirements claimed to be met by the Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1 products that are consistent with the Common Criteria, and product security function descriptions that support the requirements.

The Validation team reviewed the work of the Evaluation team and found that sufficient evidence and justification was provided by the Evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the Evaluation team was justified.

#### 8.2. Evaluation of Development Documentation (ADV)

The Evaluation team applied each ADV CEM work unit. The Evaluation team assessed the design documentation and found it adequate to aid in understanding how the TSF provides the security functions. The design documentation consists of a functional specification contained in the ST and Guidance documents. Additionally, the evaluator performed the assurance activities specified in the CPP\_FDE\_EE\_V2.0E related to the examination of the information contained in the TOE Summary Specification (TSS).

The Validation reviewed the work of the Evaluation team and found that sufficient evidence and justification was provided by the Evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the Evaluation team was justified.

#### 8.3. Evaluation of Guidance Documents (AGD)

The Evaluation team applied each AGD CEM work unit. The Evaluation team ensured the adequacy of the user guidance in describing how to use the operational TOE. Additionally, the Evaluation team ensured the adequacy of the administrator guidance in describing how to securely administer the TOE. All of the guides were assessed during the design and testing phases of the evaluation to ensure they were complete.

The Validation team reviewed the work of the Evaluation team and found that sufficient evidence and justification was provided by the Evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the Evaluation team was justified.

#### 8.4. Evaluation of Life Cycle Support Activities (ALC)

The Evaluation team applied each ALC CEM work unit. The Evaluation team found that the TOE was appropriately labeled with a unique identifier consistent with the TOE identification in the evaluation evidence and that the TOE references used are consistent.

The Validation team reviewed the work of the Evaluation team and found that sufficient evidence and justification was provided by the Evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the Evaluation team was justified.

### 8.5. Evaluation of Test Documentation and the Test Activity (ATE)

The Evaluation team applied each ATE CEM work unit. The Evaluation team ran the set of tests specified by the assurance activities in the CPP\_FDE\_EE\_V2.0E and recorded the results in the DTR, summarized in the AAR.

The Validation team reviewed the work of the Evaluation team and found that sufficient evidence and justification was provided by the Evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the Evaluation team was justified.

#### 8.6. Vulnerability Assessment Activity (VAN)

The evaluation team applied each AVA CEM work unit. The vulnerability analysis is in the *Seagate® BarraCuda*<sup>TM</sup> *515 SSD*, *Firmware Version ECPM13.1 CPP\_FDE\_EE\_v2.0E Vulnerability Assessment*, Version 0.5, February 2023, report prepared by the Evaluation team. The vulnerability analysis includes a public search for vulnerabilities. The public search for vulnerabilities conducted on February 28, 2023, did not uncover any residual vulnerability.

The Evaluation team searched:

- NIST National Vulnerabilities Database (can be used to access CVE and US-CERT databases identified below): https://web.nvd.nist.gov/view/vuln/search
- Common Vulnerabilities and Exposures: https://cve.mitre.org/cve/search\_cve\_list.html
- US-CERT: http://www.kb.cert.org/vuls/html/search

The Evaluation team performed a search using the following keywords:

- Seagate BarraCuda 515 SSD
- Seagate
- Trusted Computing Group (TCG)

- PS5012-E12
- ECPM13.1
- ZP256MC30012
- ZP512MC30012
- ZP1024MC30012
- ZP2048MC30012
- ZP256MC30022
- ZP1024MC30022
- ZP2048MC30022
- Drive encryption
- Disk encryption
- Key destruction
- Key sanitization
- OPAL
- Self Encrypting Drive (SED)
- ARM Cortex-R5 processor
- ARMv7-R microarchitecture
- Phison TCG OPAL SSC SSD solutions

The Validation team reviewed the work of the Evaluation team and found that sufficient evidence and justification was provided by the Evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the Evaluation team was justified.

### 8.7. Summary of Evaluation Results

The Evaluation team's assessment of the evaluation evidence demonstrates that the claims in the ST are met. Additionally, the evaluation team's test activities also demonstrated the accuracy of the claims in the ST.

The Validation team's assessment of the evidence provided by the evaluation team is that it demonstrates that the Evaluation team followed the procedures defined in the CEM and performed the Assurance Activities in the CPP\_FDE\_EE\_V2.0E and correctly verified that the product meets the claims in the ST.

### 9. Validator Comments

The Validation team notes that the evaluated configuration is dependent upon the TOE being configured per the evaluated configuration instructions in the documentation referenced in Section 6 of this VR. Consumers are encouraged to download the configuration guide from the NIAP website to ensure the device is configured as evaluated. Any additional customer documentation provided with the product, or that is available online, was not included in the scope of the evaluation and should not be relied upon when configuring or operating the device as evaluated.

The functionality evaluated is scoped exclusively to the security functional requirements specified in the ST. Other functionality included in the product was not assessed as part of this evaluation. Other functionality provided by devices in the operational environment, needs to be assessed separately and no further conclusions can be drawn about their effectiveness. No versions of the TOE models or Firmware versions, either earlier or later, were evaluated.

# 10. Annexes

Not applicable.

# 11. Security Target

Seagate® BarraCuda<sup>TM</sup> 515 SSD, Firmware Version ECPM13.1 Security Target, Version 1.1, March 2023.

### 12. GLOSSARY

- Common Criteria Testing Laboratory (CCTL): An IT security evaluation facility
  accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and
  approved by the CCEVS Validation Body to conduct Common Criteria-based
  evaluations.
- **Conformance.** The ability to demonstrate in an unambiguous way that a given implementation is correct with respect to the formal model.
- Evaluation: The assessment of an IT product against the Common Criteria using the Common Criteria Evaluation Methodology to determine whether or not the claims made are justified; or the assessment of a protection profile against the Common Criteria using the Common Evaluation Methodology to determine if the Profile is complete, consistent, technically sound and hence suitable for use as a statement of requirements for one or more TOEs that may be evaluated.
- **Evaluation Evidence:** Any tangible resource (information) required from the sponsor or developer by the evaluator to perform one or more evaluation activities.
- **Feature.** Part of a product that is either included with the product or can be ordered separately.
- Target of Evaluation (TOE): A group of IT products configured as an IT system, or an IT product, and associated documentation that is the subject of a security evaluation under the CC.
- Threat: Means through which the ability or intent of a threat agent to adversely affect the primary functionality of the TOE, facility that contains the TOE, or malicious operation directed towards the TOE. A potential violation of security.
- Validation: The process carried out by the CCEVS Validation Body leading to the issue of a Common Criteria certificate.
- Validation Body: A governmental organization responsible for carrying out validation and for overseeing the day-to-day operation of the NIAP Common Criteria Evaluation and Validation Scheme.
- **Vulnerabilities:** A vulnerability is a hardware, firmware, or software flaw that leaves an Automated Information System (AIS) open for potential exploitation. A weakness in automated system security procedures, administrative controls, physical layout, internal controls, and so forth, which could be exploited by a threat to gain unauthorized access to information or disrupt critical processing.

# 13. Acronym List

CAVP	Cryptographic Algorithm Validation Program (CAVP)
CCEVS	Common Criteria Evaluation and Validation Scheme
CCIMB	Common Criteria Interpretations Management Board
CCTL	Common Criteria Testing Laboratories
CEM	Common Evaluation Methodology for IT Security Evaluation
LS	Lightship Security USA CCTL
ETR	Evaluation Technical Report
IT	Information Technology
NIAP	National Information Assurance Partnership
NIST	National Institute of Standards and Technology
NSA	National Security Agency
NVLAP	National Voluntary Laboratory Assessment Program
os	Operating System
OSP	Organizational Security Policies
PCL	Products Compliant List
ST	Security Target
TOE	Target of Evaluation
VR	Validation Report
V IX	Validation Report

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