

# STATE OF COLORADO

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### Voting Systems Trusted Build Procedures

The “witnessed compile in an audited compilation environment,” or Trusted Build, creates a chain of evidence from the technical data package and source code to the actual computer programs that are being evaluated for certification. This chain of evidence must be sufficient to provide assurance that:

- The system was built as described in the technical data package,
- The reviewed and approved source code was actually used in building the system, and
- No other elements, not included in the technical data package, were introduced in the system build.

The final product, the Trusted Build, provides an audited reference package, meeting legal rules of evidence in the form of a documented chain of custody, which may be used by technical reviewers at both the national and state level for certification. It also provides a benchmark for anyone who wants to determine with certainty whether the programs being run in an election jurisdiction are in fact a specific National Association of State Election Directors (NASSED) or Election Assistance Commission (EAC) certified version of the system. This answers the question, “How do you know?”

An ideal approach to creation of a Trusted Build is an isolated laboratory controlled installation in a computer or set of computers where the Voting Systems Testing Laboratory (VSTL – formerly, the Independent Testing Authority or ITA) has full administrative control and knowledge of any installed software. Such a setup will typically start with a baseline standard operating system, which has been configured according to the Technical Data Package (TDP). The test agent may also install verified copies of test tools needed to verify the operation and testing of the system. In this defined baseline environment, the system source software and support libraries under test, along with necessary third party programs and tools required and documented in the TDP, are installed in accordance with the directions in the TDP.

However, the controlled laboratory system may not be practical for some voting systems due to licensing requirements of the development environment packages used by the vendor or due to complexity of the installation. In these cases, the Trusted Build may need to be created in the vendor’s developmental environment. In this case, the VSTL personnel witnessing the build will need to be given physical access and information necessary to verify the location and file identities of all components of the build. They will also be required to ensure that other vendor personnel cannot and did not access or alter the files and components of the Trusted Build from the point the files are verified until the Trusted Build is created and downloaded to CDs. They may need to take additional steps to establish that the on-site witness build has equivalent independence and detail verification as the use of a controlled laboratory environment.

Although this document describes the producers of the deliverables as separate roles, it is acceptable for all four roles to be filled by one examiner in one engagement. In all cases, the examiner is an authorized staff member of the VSTL, not the vendor whose voting system is being tested. Each role has a start point, end point and deliverable that must be completed.

For either VSTL or vendor creation of the Trusted Build, the following deliverables must be created:

1. The reviewer of the TDP must extract or create a description of the compilation environment including the operating system, service packs, compilers, libraries, control scripts or files such as control parameter files and make files (especially those defining file and directory locations to be used in the build), and utilities that the system developer will use to build the system installation media. This description, deliverable number 1, will be delivered as part of the Trusted Build.
2. The reviewer of the source code will provide a copy of the reviewed code and a report. The report, deliverable number 2, will provide a clearly stated opinion that the code provided is (or is not) compliant with the standards. The report must include:
  - A description of the basis for the opinion;
  - A list of all anomalies found during the examination and how each anomaly was resolved.

The formal deliverable report shall be completed before the trusted build is released and included with the Trusted Build. However, the following stage may be started with an initial draft listing the source files and indicating any problems that may affect the Trusted Build.

3. The auditor of the compilation environment will examine said environment to determine if it complies with the description set forth in deliverable number 1. If differences are found, they will be discussed with the applicant for certification and described in a report back to the examiner who created deliverable number 1. The differences must be resolved by bringing the compilation environment into compliance with the technical data package or by amending the technical data package to reflect the change. In the latter case, the project manager for the VSTL work will have to decide if the change to the technical data package requires revisiting or recreating deliverable number 2.

When the compilation environment is found to be compliant with deliverable number 1 the auditor will create a report clearly stating the finding of compliance as deliverable number 3.

4. The auditor or VSTL witness of the compile shall perform or shall observe, in person, the developer's employees compiling the programs and assembling the contents and form of the installation media, using the source code from deliverable number 2, in the exact environment described in deliverable number 3. If the auditor and the witness are not the same person, they will be required to take additional steps to provide assurance and evidence that the compilation environment has not changed between the audit and the witness of the compile. The witness shall create a report, deliverable number 4, describing

the procedures used, observations, identification of the product of the compile, and system install build.

5. The VSTL project manager, or an appropriate delegate of the project manager, shall prepare a cover report which references the version and release of the system; describes, and is accompanied by two compact disks or sets of disks with the following content:
  - An installation disk, with all contents that will be delivered to a licensee or purchaser of the system. This disk will be used for functional testing of the system. If the system is certified, then all installation disks for the system distributed to purchasers or licensees of the system must be identical to this disk.
  - A technical data disk, containing all source code, and deliverables 1, 2, 3, and 4.
  - Optionally, the source code may be placed on a separate CD along with sufficient documentation to identify its contents.

All or any part of the Trusted Build disks may be encrypted. They should all be labeled as Proprietary Information and with identification of the vendor and release version based on the vendor's release instructions.

Approved by the Voting Systems Technical Committee February 2, 2006.

Approved by the NASED Executive Committee: 02/03/2006

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