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|  | Nuclear Engineering and Nonproliferation (NEN) Safeguards Science and Technology (NEN-1) |
| **Title:** | **Source Tracker Software Requirements Traceability Matrix** |
| Number: **NEN1-ST-RTM** | Revision: 3.0 | Page 1 of 18 |

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**History of Revisions**

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| **Revision Number** | **Approval Date** | **Change Description** |
| Revision 1.0 | 6/10/04 | Original Issue |
| Revision 1.0.1 | 11/30/04 | Revised to include original functionality of the ***Source Tracker*** software |
| Revision 1.0.2 | 12/20/04 | Comments from Matt Hykel, N1 Source Custodian |
| Revision 1.1 | 3/15/05 | Add requirements for NISC implementation of ST |
| Revision 1.11 | 4/12/05 | Deleted requirement Re-Create Declaration File – unused option |
| Revision 2.0 | 11/27/07 | Put into new template, made requirement wording more concise, added additional requirements |
| Revision 2.1 | 1/11/08 | Added SR 2.3, added SR 3.7, changed wording of SR 19.1, and changed wording of Section 3.7. |
| Revision 2.2 | 1/29/08 | Final – changed wording on SR 1, 15.4, & 18, added SR 1.6, and deleted SR 18.2, 18.3, and 25; document formatting; modified CAT IV definition and added DOE M 470.4-7; modified sections 2.2 & 2.4 |
| Revision 3.0 | 2/21/2016 | Major revision for new Source Tracker version |

**Source Tracker Requirements Traceability Matrix**

Refer to Section 2.3.2 of the *Source Tracker Software Project Plan*, NEN1-PLAN-ST-SPP, for information on how the requirements traceability matrix fits into the software development process. This list contains the mapping of requirements to design elements (which section in the design document) and then to which test cases test that requirement. Note: Test Cases are listed by a test number. The appropriate safety issue is listed for each requirement. If no issue is listed, then that requirement has no safety implications. Refer to the *Source Tracker Safety Software Plan*, NEN1-PLAN-ST-SSP, for information about dealing with safety issues.

| UniqueNumber | Requirement | Design Section | Test Case(s) |
| --- | --- | --- | --- |
| SR 1 Verify MAR and Physical Security, Fuel Rod and Criticality Limits | Before a transfer is made of a source from one location to another, a calculation must be performed to verify that the transfer will not cause the new location to exceed MAR (CAT 3), physical security, fuel rod or criticality limits, based on government regulation-defined limits found in DOE-STD-1027-92, LA-12981-MS, DOE M 470.4-6 [NEN1-ST-DAR], and facility specific criticality limits. | 4.1, 4.3, 4.4, 4.5, 4.13, 4.21 | 150-153,158-161,165-168,172-175,181 |
| SR 1.1 | A window must be displayed showing the MAR, physical security, fuel rod, and criticality values for the new location before the transfer and for the new location after the transfer.  | 4.1 | 150-153,158-161,165-168,172-175 |
| SR 1.2 | Sources within ANSI certified containers (exempt sources) must not contribute to MAR values. | 4.1 | 150 |
| SR 1.3 | If the transfer would cause the new location to exceed MAR, physical security, fuel rod, or criticality limits based on government regulation-defined limits found in DOE M 470.4-6., the transfer must not be allowed and a message must be displayed. | 4.1 | 150-153,158-161,165-168,172-175 |
| SR 1.4 | MAR physical security, fuel rod, and criticality limits must be verified every time a source is transferred to a different location, including when it is removed from its home repository, when it is returned to its home repository, or when it is re-assigned to a different location or a different owner, or is permanently transferred to another home repository. | 4.1 | 150-153,158-161,165-168,172-175,181 |
| SR 1.5 | Upon startup of the Source Tracker a program window must be displayed showing that the MAR, physical security, fuel rod, and criticality values are being calculated. | 4.1 | 1 |
| SR 2Transferring Accountable MASS or RSSDMS sources | A MASS source must be allowed to be transferred only to another approved MASS location. RSSDMS sources may be moved to any location. Note: the user should be provided with a list of buildings and rooms that the source can be transferred to (approved MASS locations) for MASS transactions. | 4.2, 4.3, 4.5, 4.13 | 9,14,22,38,42,79 |
| SR 2.1 | When a MASS or RSSDMS source is being transferred within the same MBA, the MASS Custodian must be sent an email message about this transfer. | 4.2 | 31,47 |
| SR 2.2 | When a MASS or RSSDMS source is being transferred to a different MBA, a MASS authorized user must also enter his/her Z number (in addition to the user entry of the source bar code and user Z number).  | 4.2 | 16,20,31 |
| SR 2.3 | When a MASS source is transferred to a different MASS location, a message must be displayed that the MASS system must also be updated and an email should be sent to the NMC’s. | 4.2 | 13,15,19,25,31,47 |
| SR 3Remove source from home repository | A capability must be provided for a user to remove a source from its home repository. | 4.3 | 8-24 |
| SR 3.1 | The user must enter the bar code of the source and his/her Z number and be an authorized user. | 4.3 | 8 |
| SR 3.2 | If the source is currently not located in its home repository, the user may still remove it but a warning message must be displayed instructing them to return it to the home repository when they have finished with it. | 4.3 | 188 |
| SR 3.3 | A display must be presented indicating the source description and the transfer details. | 4.3 | 10,18,43 |
| SR3.4 | The user must be given the opportunity to complete the transfer, cancel the transfer, or complete the transfer and continue with additional transfers. | 4.3 | 11,20 |
| SR 3.5 | If the transfer transaction completes successfully, the database must be updated with the new location and source owner. | 4.3 | 14,24 |
| SR 3.6 | If the user cancels the operation, no database update will be made. | 4.3 | 12,24,40 |
| SR3.7 | If a source has an expired leak test date, it must not be allowed to be removed from the repository unless it is within the configured grace period. Note: an error message should be displayed and an email message should be sent to the Custodian. | 4.3 | 36,37,47 |
| SR 4Return Source to Home Repository | A capability must be provided to return a source that has been removed from its home repository back to its home repository. | 4.4 | 25-35 |
| SR 4.1 | The user must enter the bar code of the source being returned using the barcode scanner. | 4.4 | 25 |
| SR 4.2 | It must be verified that the source is currently removed from its home repository. | 4.4 | 30 |
| SR 4.3 | A return must be performed at the home repository. | 4.4 | 27 |
| SR 4.5 | The database must update the source location to its home repository. | 4.4 | 26,27 |
| SR 5Re-Assign Source’s Current Location and/or Owner | A capability must be provided to any user to transfer a source from a location other than its home repository to another location that is also not its home repository. | 4.5 | 36-47 |
| SR 5.1 | The user that wants to be the new owner of the source must enter the bar code of the source, enter his/her Z number, and be an authorized user.  | 4.5 | 36,41 |
| SR 5.2 | The user must select the new location. | 4.5 | 43,46 |
| SR 5.3 | A display must be presented indicating the source description and the transfer details. | 4.5 | 43 |
| SR 5.4 | The user must be given the opportunity to complete the transfer, cancel the transfer, or complete the transfer and continue with additional transfers. | 4.5 | 39,44,46 |
| SR 5.5 | If the transfer transaction completes successfully, the database must be updated with the new location and new source owner. | 4.5 | 44 |
| SR 5.6 | If the user cancels the operation, no database update will be made. | 4.5 | 40 |
| SR 6Transaction Log | A log of transactions must be kept in the database. | 4.6 | 33,34,47 |
| SR 6.1 | Every source transaction in Source Tracker will be logged with a time/date, user, source information and transaction detail. | 4.6 | 33,34 |
| SR 6.2 | NMC’s may access a report of all transactions in a date range (start date/time, end date/time). This report may be emailed. | 4.6 | 34,35 |
| SR 7Browse Sources | A capability must be provided to display a list of all sources in the database. | 4.4, 4.7 | 48-64 |
| SR 7.1 | The user must enter his/her Z number and be an authorized user. | 4.7 | 48-50 |
| SR 7.2 | The information displayed for each source must include the bar code number, source ID, isotope type, activity level, current owner, location, and MASS value. | 4.7 | 50 |
| SR 7.3 | The user must be allowed to sort the displayed sources by bar code number, source ID, activity value, or MASS value. | 4.7 | 57,58 |
| SR 7.4 | The user must be allowed to select which sources are displayed based on search criteria. | 4.7 | 59,60 |
| SR 7.4.1 | The user must be allowed to display only sources of a specified source type or all possible source types. | 4.7 | 59,60 |
| SR 7.4.2 | The user must be allowed to display only sources containing a specified isotope or all possible isotopes. The user must be able to select any particular isotope found in the database. | 4.7 | 59,60 |
| SR 7.4.3 | The user must be allowed to display only sources currently located in specific locations or select all possible locations. The user must be able to select a particular room or building. | 4.7 | 59,60 |
| SR 7.4.4 | The user must be allowed to display only sources currently owned by a specific authorized user, all sources not currently owned (in a repository), all sources with an owner (not in a repository), or select all possible owners (in a repository or not). | 4.7 | 59,60 |
| SR 7.4.5 | The user must be allowed to display only MAR (non-exempt) sources or all sources (CAT 3 or not). The user must be able to select MAR sources by building. When the user selects to display only MAR sources, the information displayed for each source must also include the MAR contribution (fraction) of each isotope. | 4.7 | 59,60 |
| SR 7.5 | The user must be able to view additional details about a source. | 4.7 | 52,54-56 |
| SR 7.6 | The user must be able to view a picture of each source if one is available. | 4.7 | 52,54-56 |
| SR 7.7 | The user must be able to view a list of his/her sources that they currently have checked out. | 4.7 | 59,60 |
| SR 8Display Category 3 MAR Status for each of the Radiation Facilities | A capability must be provided to display Category 3 MAR status for each building. | 4.8 | 2,179,181 |
| SR 8.1 | The user must enter his/her Z number and be an authorized user. | 4.8 | 3,179,181 |
| SR 8.2 | The MAR levels for each building must be calculated and displayed as percentages of allowable limits. For each building, the checked-out RAD can totals, and the total of those values will be displayed. | 4.8 | 1-3,171,181 |
| SR 9Display Category IV Physical Security Status for each of the MBAs | A capability must be provided to display Category IV Physical Security status for each MBA. | 4.9 | 2,183 |
| SR 9.1 | The user must enter his/her Z number and be an authorized user. | 4.9 | 3,183 |
| SR 9.2 | The CAT IV attractiveness levels for each MBA must be calculated and displayed. For each MBA, the B, C, D, and E attractiveness totals for both Plutonium and Uranium must be displayed. | 4.9 | 165-168,183 |
| SR 10Display Criticality and Fuel Rod Count Status for Each of the Radiation Facilities | A capability must be provided to display criticality and fuel rod status for each building. | 4.10 | 2,180,182,184 |
| SR 10.1 | The user must enter his/her Z number using the barcode scanner and must be an authorized user. | 4.10 | 3,180,182 |
| SR 10.2 | The total grams of material contributing to the criticality limit for each building must be calculated and displayed along with the building’s criticality limit. For each building, the number of fuel rods currently at the building must also be displayed (if applicable) along with the limit for the number of fuel rods allowed at that building. | 4.10 | 2,3,180,182,184 |
| SR 11Sample Source Transaction |  | 4.11 |  |
| SR 11.1 | A capability must be added to perform a test source transaction to determine whether the transaction would exceed MAR, physical security, fuel rod or criticality limits. | 4.11 | 189 |
| SR 12Confirm inventory |  | 4.12 | 65-68 |
| SR 12.1 | The Custodian must enter his/her Z number and be an authorized Custodian. | 4.12 | 65 |
| SR 12.2 | The Custodian must select which sources to inventory. The Custodian must have the option to choose all sources, only checked-out sources, or only checked-in sources. The sources chosen must be displayed. Note: The information displayed for each source may include source bar code number, source ID, current owner, and current location. A quick way for the Custodian to browse sources without affecting the inventory process should be provided. | 4.12 | 65,73 |
| SR 12.3 | A running total must be displayed of sources that need to be confirmed, sources already confirmed, and sources that are unexpected (found at a location other than the current location in the database). | 4.12 | 65,77 |
| SR 12.4 | The Custodian must enter the bar code of the source being inventoried. The inventory date for that source must be updated in the database. | 4.12 | 65,74,76 |
| SR 12.5 | If the leak test for a source being inventoried has expired, a message must be displayed stating that, along with the last leak test date. | 4.12 | 70 |
| SR 12.6 | If the source is unexpected, a message must be displayed stating the expected location (the current location in the database). | 4.12 | 77,78 |
| SR 12.7 | If the Custodian quits confirming sources before the chosen sources are all confirmed, a message must be displayed warning the Custodian. | 4.12 | 67,68 |
| SR 12.8 | When the Custodian has finished inventorying sources, a summarized list of sources just confirmed must be sent to the Custodian in an email message. If a source is unexpected, it must be included in the summarized list. If the Custodian cancels the inventory process, the summarized list of sources must be displayed.  | 4.12 | 67-69 |
| SR 13Transfer a source permanently from one location to another | A capability must be provided to change the home repository of a source. | 4.13 | 79-86 |
| SR 13.1 | The Custodian must enter his/her Z number and be an authorized Custodian. | 4.13 | 79,83 |
| SR 13.2 | The Custodian must enter the bar code of the source to transfer. | 4.13 | 79,83 |
| SR 13.3 | The MAR and criticality limits for the destination location are checked to verify that no limits will be exceeded by the transfer. | 4.13 | 154,161 |
| SR 13.4 | The Custodian must select the new home repository location. The source must be allowed to be transferred only to locations approved for permanent storage of a radioactive sealed source. | 4.13 | 85 |
| SR 13.5 | A display must be presented indicating the source description and the transfer details. | 4.13 | 83 |
| SR 13.6 | The user must be given the opportunity to complete the transfer or cancel the transfer. | 4.13 | 81,84,85 |
| SR 13.7 | If the transfer transaction completes successfully, the database must be updated with the new location.  | 4.13 | 85 |
| SR 13.8 | If the user cancels the operation, no database update will be made.  | 4.13 | 81,84 |
| SR 13.9 | If the source being permanently transferred is a MASS source, a message must be displayed that the MASS system must also be updated. | 4.13 | 79,86 |
| SR 14Create a summary csv file of all sources | A capability must be provided to write summary information about all sources in the database into a text-format file. | 4.14 | 61 |
| SR 14.1 | The Custodian must enter his/her Z number and be an authorized Custodian. | 4.14 | 61 |
| SR 14.2 | The information for each source must include bar code number, source ID, isotope, initial activity date, initial mass value, initial activity, activity from mass, difference between initial and current activity (as a percentage), current activity, home repository (storage location), current location, current owner, last leak test (last swipe) (date and time), last inventory (date and time), and MAR contribution (as a percentage). | 4.14 | 61 |
| SR 14.3 | The text file must be emailed to the Custodian and a message must be displayed indicating that the file was sent to the Custodian. | 4.14 | 61,63 |
| SR 15Edit program parameters | A capability must be provided to edit program parameters. | 4.15 | 4,5,27,87,91 |
| SR 15.1 | The Custodian must enter his/her Z number and be an authorized Nuclear Material Custodian. | 4.15 | 27,87 |
| SR 15.2 | The Custodian must be allowed to set the current location of a client computer. Note: this parameter is needed so that any client computer can be set up at any defined home repository location. | 4.15 | 27 |
| SR 15.3 | The Custodian must be allowed to set leak test parameters, which specify intervals allowed between leak tests. The parameters include days permitted for unaccountable RSS sources, extra days permitted and days permitted for accountable MASS sources. Note: leak test requirements are specified in ISD 121-1.1. | 4.15 | 4,88 |
| SR 15.4 | The Custodian must be allowed to force the system to operate in test mode. Test mode allows operation of Source Tracker to an alternate database in order to test software components prior to release. | 4.15 | 5,91 |
| SR 15.5 | The Custodian must be allowed to set the main database connection string. | 4.15 | 89-91 |
| SR 16Record Leak Testing | A capability must be provided to record that a source was leak tested. | 4.16 | 92-103 |
| SR 16.1 | The Custodian must enter his/her Z number and be an authorized Custodian. | 4.16 | 93 |
| SR 16.2 | The Custodian must select which sources to leak test. The Custodian must have the option to choose all sources, only checked-out sources, or only checked-in sources. The sources chosen must be displayed. Notes: The information displayed for each source may include source bar code number, source ID, current owner, and current location, depending on whether it is currently checked out or not. A quick way for the Custodian to browse sources without affecting the leak test recording process should be provided. | 4.16 | 95 |
| SR 16.3 | A running total must be displayed of sources that need to be leak tested, sources already leak tested, and sources that are unexpected (found at a location other than the current location in the database). | 4.16 | 99,101 |
| SR 16.4 | The Custodian must enter the bar code of the source being updated. The leak test date for that source must be updated in the database.  | 4.16 | 36,47,70 |
| SR 16.5 | The Custodian must have the option to also confirm the inventory of a source when the leak testing is recorded. If the Custodian chooses to confirm the inventory at the same time, the inventory date for that source must be also be updated as leak testing is recorded. | 4.16 | 36,70 |
| SR 16.6 | If the source is found in an unexpected location, a message must be displayed stating the expected location (the current location logged in the database). | 4.16 | 102 |
| SR 16.7 | If the Custodian quits recording sources before the chosen sources are all recorded, a message must be displayed warning the Custodian. | 4.16 | 96 |
| SR 16.8 | When the Custodian has finished recording sources, a summarized list of sources just recorded must be sent to the Custodian in an email message. If a source is found in an unexpected location, it must be included in the summarized list. If there are any selected sources still needing leak testing, they must also be included in the summarized list. If the Custodian cancels the leak test recording process, the summarized list of sources must be displayed. Notes: The summary information is displayed upon cancellation because the email message may not be sent. The database is updated for all leak tested sources regardless of an email notification being sent or not. | 4.16 | 99,101 |
| SR 17Verify leak testing | Before a transfer is made of a source from one location to another, leak testing of that source must be checked to see if the leak testing is out of date or not. | 4.17, 4.12 | 36,47,70 |
| SR 17.1 | If leak testing is past due, there must be a message displayed indicating that the leak testing is out of date, but that it can be transferred anyway. | 4.17 | 36,47,70 |
| SR 18Automatic Database Backups | An automatic backup must be made of the central database every day. | 4.18 | 145-147 |
| SR 18.1 | The backup file names must include the date. Note: this is needed so that it is obvious when the backup was made. | 4.18 | 145-147 |
| SR 18.2 | If a system outage or error prevents a backup from being performed at its regularly scheduled interval, an email regarding backup failure should be mailed to the System Administrator. | 4.18 | 145-147 |
| SR 19Manually input MAR (CAT 3) contribution value for a source | A capability must be provided for the Custodian to manually enter a MAR (CAT 3) contribution override value used when verifying MAR limits. | 4.19 | 157 |
| SR 20Time-out timers | A time-out timer must be provided for each transaction such that if the user does not complete a transaction within a time limit, the transaction is cancelled and the screen returns to the main menu. | 4.20 | 51,138,139 |
| SR 21Add/Remove/Modify Source Information | A capability must be provided to add, delete, and edit source parameters. | 4.21 | 105-128,154,155,162,163,169-171,176-179 |
| SR 21.1 | The Custodian must enter his/her Z number using the barcode scanner and must be an authorized Nuclear Material Custodian. | 4.21 | 105,111,112,154,155,162,163,169-171,176-179 |
| SR 21.2 | The Custodian must be given the option to add, edit or delete a source. | 4.21 | 105-128,154,155,162,163,169-171,176-179 |
| SR 21.3 | The Custodian must enter the data using the touchscreen and barcode scanner. This includes bar code, source ID, isotope (must be able to have multiple isotopes), enrichment, activity (with units in a pull-down menu), mass (with units in a pull-down menu), RSSDMS number, MASS source, exempt source, dose rate, owner, description, U attractiveness level, Pu attractiveness level | 4.21 | 106-109,113-117 |
| SR 21.4 | The software shall allow photos of the source and certificates of repackaging to be entered into the database. When source information is displayed, the option to display these photos will be available. | 4.21 | 118-120 |
| SR 22Add//Modify User Information | A capability must be provided to add, or edit authorized users. | 4.22 | 129-136 |
| SR 22.1 | The Custodian must enter his/her Z number using the barcode scanner and must be an authorized Nuclear Material Custodian. | 4.22 | 129,132,133 |
| SR 22.2 | The Custodian must be given the option to add or edit a user record. | 4.22 | 129-136 |
| SR 22.3 | The Custodian must enter the data using the touchscreen and barcode scanner. This includes bar code, name, email, group and user roles. | 4.22 | 129-136 |
| SR 23Procedure in case of network outage |  | 4.23 | 190-194 |
| SR 23.1 | If the yellow network is down, the case must be handled when the central source database is not available. The Source Tracker software will disallow all source transactions during a network outage. Manual procedures may override source tracker control if outage is longer, see Custodian Manual. | 4.14, 4.23, 4.24 | 190-194 |
| SR 24Email notification requirements | The mail module of Source Tracker must send emails as required by the software. Reports, alerts and inventory information must be sent by the program. The program must allow custodians’ and system administrators’ email addresses to be accessed for the following alerts: | 4.24 | 31,47.61 |
| SR 24.1 | Notification for MASS transactions. | 4.24 | 31,47 |
| SR 24.2 | Notification if MAR > 80%. | 4.24 |  |
| SR 24.3 | Reports that are emailed shall be in comma separated variable format for easy import to Microsoft Excel. | 4.14 | 61 |
| SR 24.4 | When adding sources to the database, notifications and approvals shall go to all custodians other than the initiating custodian. | 4.21 | 111,112,125,126 |
| SR 24.5 | Alerts for unauthorized actions (e.g. unauthorized user tries to log in). | 4.24 | 48,64 |
| SR 24.6 | Scheduled check to verify that sources are placed in permanent storage locations at close of business. | 4.24 | 148,149  |
| SR 25System security requirements | The software system runs on the yellow network and all data stored in the databases are unclassified. Sources are held in rooms with restricted access, so physical security of the system is managed through user authorization to enter source locations. | 4.25 | 140-144 |
| SR 25.1 | Source Tracker runs on the yellow network and is also accessed by foreign nationals. In order to comply with cyber security requirements, users should not be allowed to access any computer operations except through the Source Tracker interface. | 4.25 | 140-144 |
| SR 25.2 | Custodians should be able to shut down the Source Tracker executable through the Custodian menu. | 4.25 | 7,143 |
| Backup and Recovery Requirements | Every six months, coinciding with required inventories, the most recent database backup will be stored in the source code repository. Also, for disaster recovery purposes, an official copy of everything needed to build a Source Tracker software system from scratch will be stored in the source code repository. | N/A | 195-202 |