
Tracker for IBM i
Technical/Operations Guide



Dynamic Solutions
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Tracker for IBM I – User Guide

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Preface

IBM i customers using IBM's integrated backup and restore capabilities, either directly or thru vendor-provided software, generally are responsible for managing their critical backup data and media via manual methods or custom-built, manually-managed mechanisms.

Tracker was developed specifically for physical- or virtual-library usage for non-managed-media environments. It provides all of the basic media management capabilities required to manage recovery and/or archival data and media. Tracker does not replace your existing IBM i backup operations, but works along with IBM-based save processes to provide an effective, automated media management solution.

This solution includes media categorization, media expiration/retention and media movement capabilities as well as the optional ability to track/search media content and perform simple restorations of library, object, member, DLO and/or IFS data, right from the Tracker interface.

When combined with DSI's Conductor product and a DSI virtual library, the two applications can work together to completely automate all virtual media management requirements, including but not limited to:

- Media movement – move tapes to and from the vault automatically, securing live volumes away from the IBM host
- Automated Inventory management
 - Create new inventory automatically as needed, based on simple configurations.
 - Re-create tapes when found to have been deleted, expired and in the library location either by accident or policy;
 - Error correction – automatically corrects unreconciled changes between the library and the Tracker media manager.

Managing the preservation and security of retention media is a simple task using DSI's Tracker for IBM i.

Product Introduction

Tracker for IBM i provides comprehensive media management and optionally, data restoration capabilities for your existing physical library/media and/or your new virtual library and its virtual media. Where applicable and in conjunction with DSI's **Conductor for IBM I and an attached physical library device**, your exported physical media can be managed by Tracker as well.

Tracker provides the following capabilities using simple, rule-based configurations:

Media Usage/Expiration/Categorization Management: Based on customer-defined media categories and rules, save media will automatically be managed with respect to usage and retention. Upon tape expiration, the return of retained media to scratch media pools is automated, saving the operator the steps required to reclassify virtual media manually as it expires or to employ manual virtual media location management that may be required otherwise. Virtual media is automatically re-initialized, ensuring the virtual device is not wasting a byte of space on non-relevant data.

Virtual/Physical Media Movement: Where data security strategies involve moving virtual media in and out of the “virtual vault” or managing storage of physical media, Tracker is ready. Simple rule-based movement activities can be managed automatically by Tracker and are easily implemented by the Admin.

Media Content Management and Object Restoration Capabilities: Customers can choose to retain IBM SAV* command output information into the Tracker databases/files; using this data, Tracker provides both powerful media content search capabilities as well as restoration capabilities enabled within the application. Media containing libraries, objects, members (where applicable), DLO folders/documents and IFS directories/objects can all be located and restored quickly directly from the Tracker user interfaces.

Media Operations: Create, move and delete media on your VTL device directly from Tracker when matched with DSI’s **Conductor** software. Conductor can fully automate your media operations, from creating media on-demand as needed to moving virtual media to correcting human errors that might cause Tracker/Library synchronization issues – and possibly backup failures!

System Requirements

Hardware Requirements

- An IBM PowerX or other compatible server/partition running IBM i version V7R1M0 or higher.
- One or more IBM-compatible DSI Virtual Tape Library Devices (optional)
 - Build 9310 or higher
 - Virtual Libraries of type TS3500* emulation (L22, L32)
- A compatible physical media library (optional)
 - DSI’s **Conductor** product required for physical tape management.

Software Requirements

- VTL Tracker
- VTL Conductor (optional; enables automated virtual media creation/movement, policy-driven media duplication and host-enabled management of the virtual appliance)

Licensing Requirements

- Tracker is licensed according to the numbers of processors in use by partitions running the software.
- A valid license key is required; there is no initial grace period for this software. Evaluation keys can be requested and offer a 70-day “try it” period.
- Should an installed configuration exceed the number of processors for which the license is issued, a 70-day grace period to obtain an updated license reflecting the required number of processors is enabled.

1. IBM i5/os SAV* Command Integration Considerations

1.1 Planning for Tracker

IBM i5/os provides a tape categorization capability. IBM provides a variety of default tape categories (e.g. *NOSHARE, *SHARE400, *IPL, etc.) that can be used to create one or more pools of scratch media. User-defined categories can be created to categorize tapes that contain live data. Tape categorization prevents the media library from loading these tapes for output operations until they have been reclassified into a scratch category.

Using IBM's "SETTAPCGY" command, the IBM host can treat the virtual library as an "auto-loader" of sorts, loading volumes from the desired scratch category as the operating system commands request them and assigning user-defined categories to selected media. This command can be executed manually on-demand or can be configured to automatically assign daily usage categories based on simple calendar-type entries in the Tracker configuration.

Depending on the data security plan in place, an installation may require one or more user-defined categories to which media can be assigned upon usage. These user-defined categories allow Tracker to identify and apply varying retention/move requirements for various media usages and provide an important qualifier for **Conductor** automated policy definitions.

Assume "Mike's Pharmacy" runs the following backups with the indicated retention requirements:

<u>Backup Type</u>	<u>Retention</u>
SAVSYS (every time the system/config changes):	*PERM
Daily backups of *NONSYS, DLO, IFS:	65 days
Monthly backups of *NONSYS, DLO, IFS:	1 year

This simple plan would require the creation of three user-defined media categories ("retention categories"); one might select "SYSTEM", "DAILY" and "MONTHLY" as names for the new categories. If this virtual media are to be exported to physical tape via **Conductor** automation, an additional set of categories named "SYSTEMP", "DAILYP" and "MONTHLYP" might be created to discriminate between virtual and physical media usage/requirements.

Once defined, category rules can then be created in Tracker that identify how to manage newly-written media assigned into these categories.

Before beginning the software configuration process the retention media categories required to support the data security strategy should be considered and created. Categories can be reviewed and created using IBM commands or via the Tracker user interface.

1.2 Media Content Management Considerations

IBM SAV* commands provide the opportunity to export media save data to either streaming files (IFS/SAV command) or to database tables (all others). Tracker for IBM i takes advantage of this capability in order to allow for powerful media content search options as well as to provide internal restoration capabilities.

If having access to media content information and the ability to perform restorations directly from the Tracker interface offers value to the customer, it is recommended the SAV* commands in use be adapted as indicated below. An example save CL program is provided in the appendix.

SAV (Integrated File System saves): use the *OUTPUT parameter to specify the following file path to which to write media content data: `"/dsi/tracker/INF_IFS"`.

SAVDLO (Save Document Library Objects): Use the *OUTPUT parameter with the *OUTFILE option, specifying to *ADD data to table "`<your Tracker library>/QAOJSAVOD`". Typically, the software will install into a library called DSIMGR.

All other SAV* commands: Use the *OUTPUT option parameter with the *OUTFILE option, specifying to *ADD data to table "`<your Tracker library>/QASAVOBJD`". Where applicable, use the "type of output information" (INFTYPE parameter) to designate which level of save data is retained (*LIB, *OBJ, *MBR). Use of the *ERR option is not recommended.

1.3 Integrating IBM SAV* activities with Tracker

The following changes may be required for Tracker integration to your IBM SAV* activities:

SETTAPCGY usage: This command should be used to both identify the scratch pool from which to resource media and the target retention category to which the save media should be assigned. SAV* commands should then reference the keyword `"*MOUNTED"` on the volume parameter of the various save commands to automatically load volumes from the desired scratch category.

This command can be executed from the Tracker menu, the command line or may be embedded into your customer backup software code. See the "Commands" section for usage information.

Alternatively, Tracker provides a calendar-like ability to automate which categories are to be used on specific dates. For more information on the automated use of the SETTAPCGY command, see section **3.6 - Managing Media Category Rules**.

Be sure to use the *DEMOUNTED option of the SETTAPCGY command when your backups are complete or in-between saves to different volumes where the volumes have different retention requirements (when not using the SETCGYDSI command categorization automation).

An example of SETTAPCGY usage within a CL program is presented in the appendix; below please find an example of using the SETTAPCGY command as part of a manually-executed backup (e.g. before a “GO SAVE 2x”).

In the image presented below the host is being instructed to load media from the *NOSHARE category and re-assign the VRTRETAIN category to tapes as they’re selected; volumes will be selected according to the order in which they were added to the *NOSHARE category:

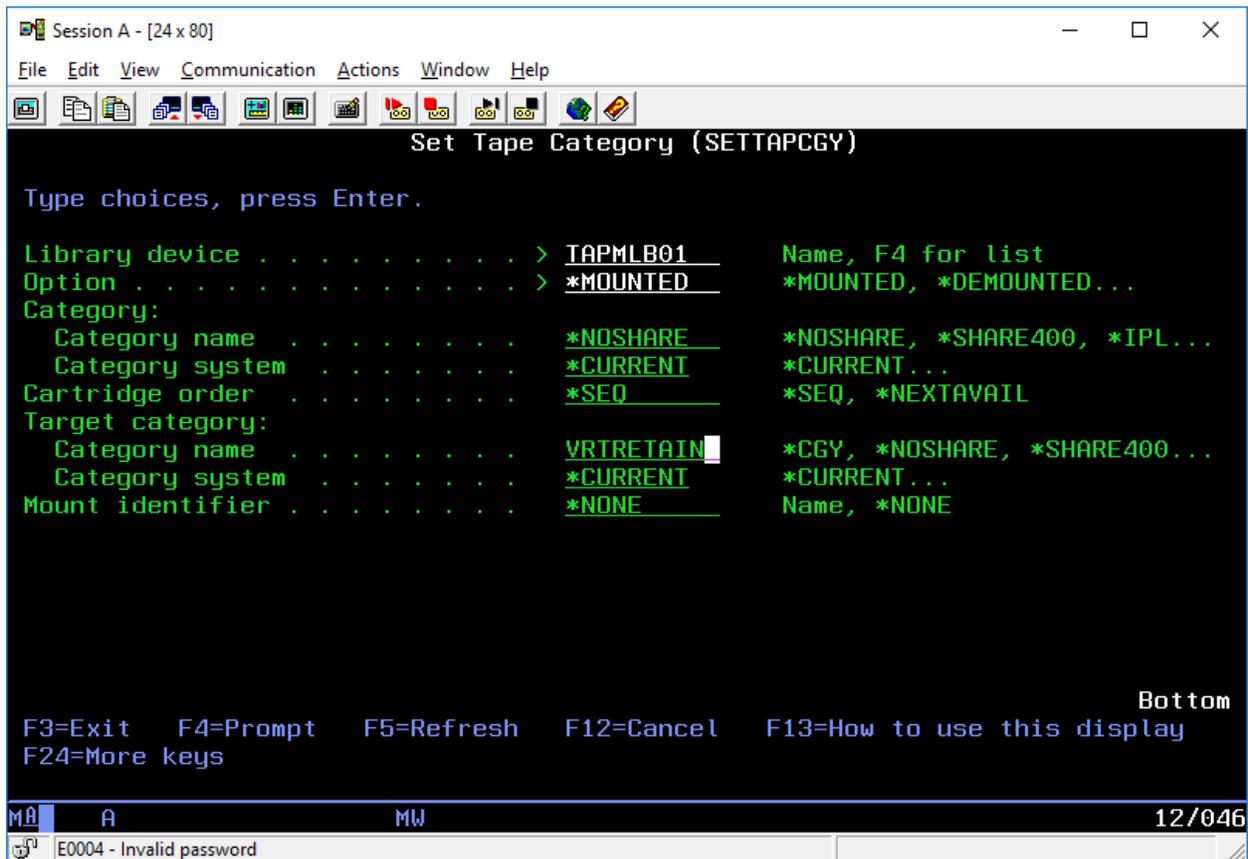


Figure 1: Example usage of the SETTAPCGY command

Once this command has been executed, backup activities can then be executed. Upon backup job completion, the same command is used in a different form to “dismount” the selected category from the library:

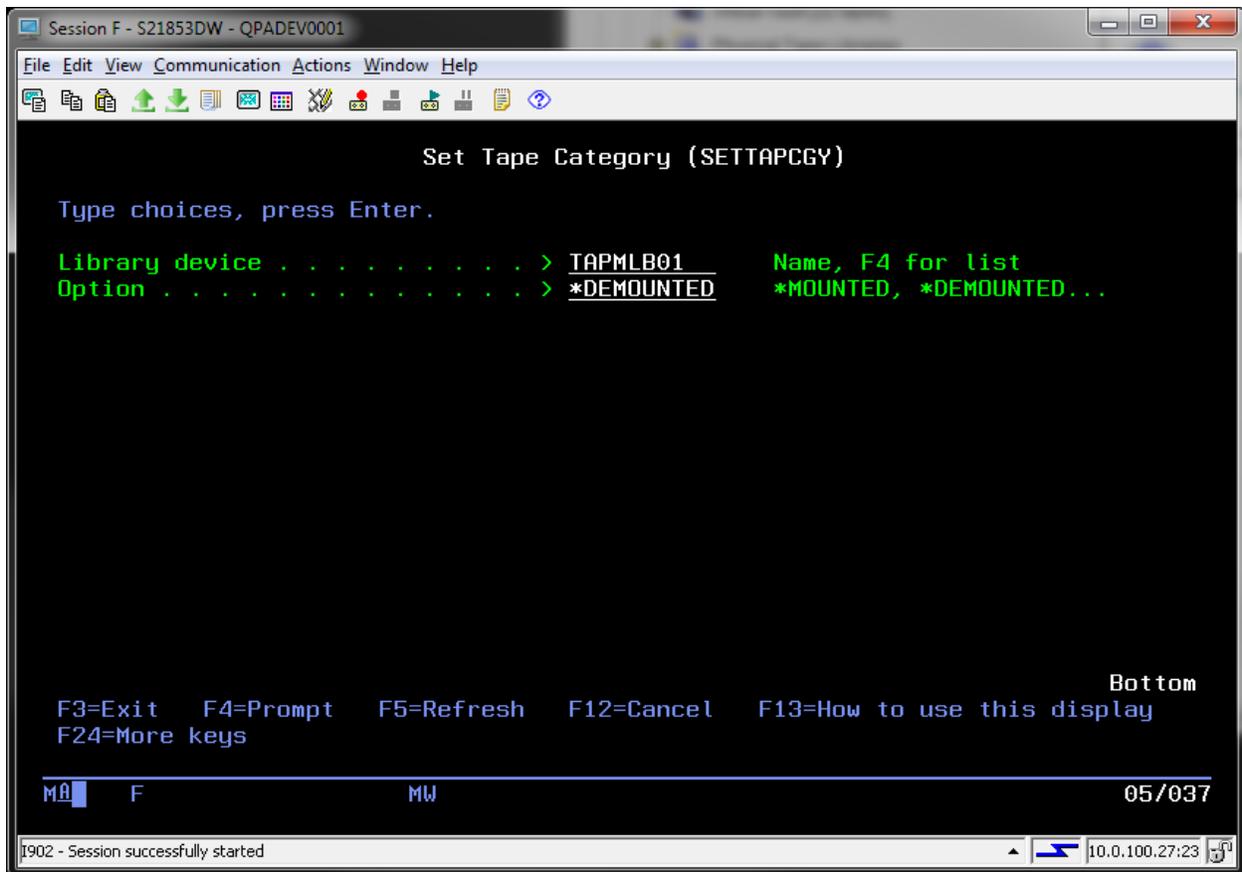


Figure 2: Dismounting a Media Category

Please see the IBM i5/os command reference for further information on SETTAPCGY usage.

2. Tracker Software Installation

2.1 Obtaining the Tracker for IBM i software

Tracker for IBM i is distributed on DVD media and can be downloaded from your DSI FTP site using your existing customer credentials.

The following products must be installed in order to use and license the Tracker software:

Product	Option	*SAVF (FTP download)
Conductor for IBM i V1R2M0	*BASE	DSISYS120B.SAVF
Tracker for IBM i V1R2M0	2	DSISYS1202.SAVF

Tracker requires appropriate licensing be acquired and installed. The license usage limit is based on the number of processors used across partitions. If you have not yet received your license information or license file(s) or would like to request an evaluation license (70 days), please contact DSI Support at 303-754-2000 or via the support portal at <http://dynamicsolutions.com/support>.

If Conductor is to be utilized alongside of Tracker, a Conductor license is also required. Please see the Conductor documentation for more information.

2.2 Installing Tracker

Tracker will be restored to a library named “DSISYS” by default. This library name may be changed if an unrelated library with that name already exists; otherwise, use the default. See the instructions below.

If you already have a lower release of the same version of Tracker installed, please save your current Tracker library before attempting the restoration of an upgrade release.

When installing Tracker software version, release or modification upgrades be sure to install the new product into the current software library for the version being upgraded.

Software installation must be performed using an ID that has *SECADM/*ALLOBJ rights.

2.2.1 Installing from DVD media

- Load the DVD media into your optical device.
- Issue the following commands:

-
- RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) OPTION(*BASE)
 - RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) OPTION(2)

 - To install Tracker into an alternate library:
 - RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) OPTION(*BASE) LIB(<your install library>)
 - RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) OPTION(2) LIB(<your install library>)

2.2.2 Installing from downloaded *SAVF media

- Upload the DSISYS120B.SAVF and DSISYS1202.SAVF files (downloaded from your DSI FTP site) into *SAVF objects on your IBM server.

- Once the *SAVFs exist on the host, issue the following commands (SAVF object names may require library qualification):
 - RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) OPTION(*BASE) SAVF(DSISYS120B)
 - RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) OPTION(2) SAVF(DSISYS1202)

- To install Tracker into an alternate library:
 - RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) OPTION(*BASE) SAVF(DSISYS120B) LIB(<your install library>)
 - RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) OPTION(2) SAVF(DSISYS1202) LIB(<your install library>)

3. Configuring the Tracker for IBM i Software

Once Tracker is installed/licensed and your required “retention categories” and characteristics have been identified for your virtual (and optionally, physical) media, Tracker is ready to be configured. Follow the steps in the order presented to initialize your environment. If Conductor has also been installed, complete the Tracker configuration before beginning the Conductor configuration.

3.1 The Tracker Main Menu

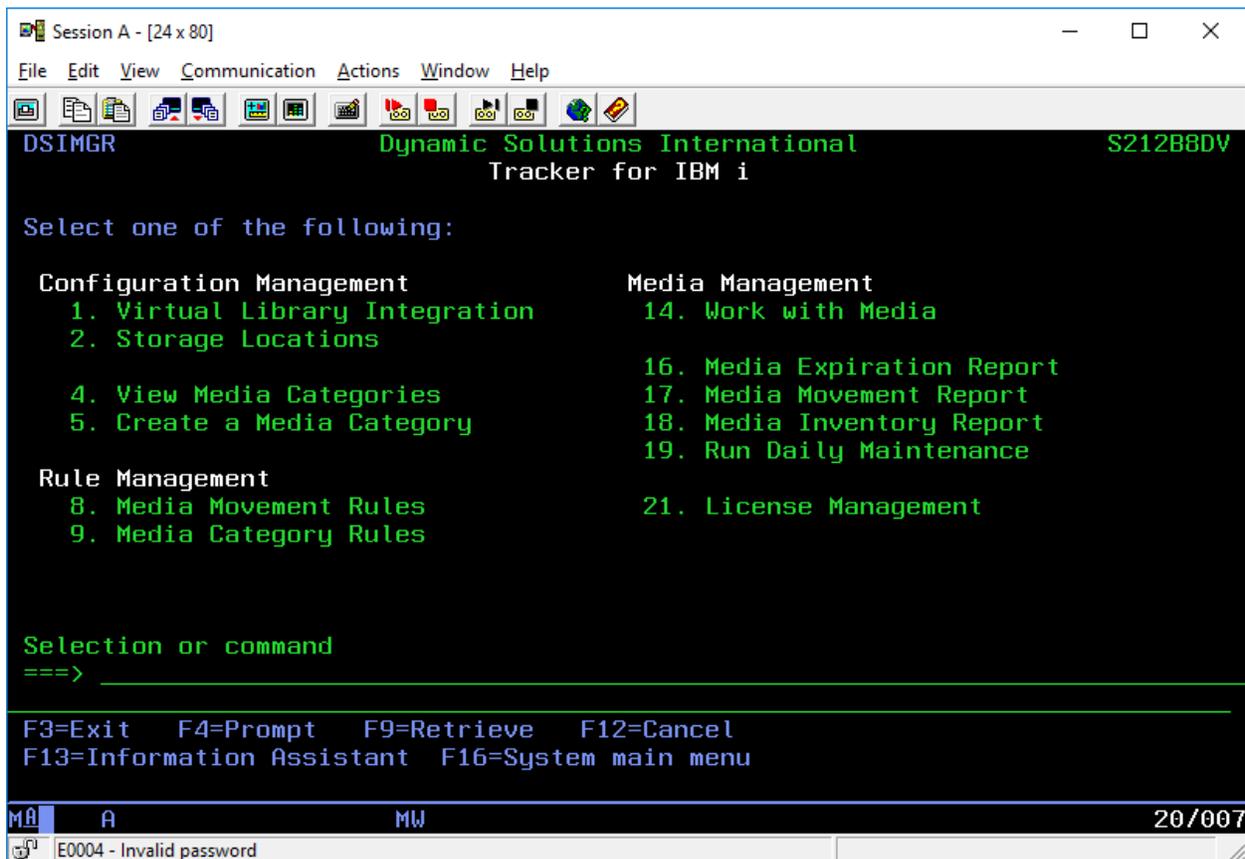


Figure 3: The Tracker Main Menu

The VTL Tracker System Management Menu consists of three application groups:

1. **Configuration Management:** Identify the virtual library or libraries to integrate; define media storage locations; view and add new media categories (“scratch” and/or “retention categories”).
2. **Rule Management:** Create/maintain media movement and category retention rules for defined “retention categories”.

-
3. **Media Management:** Provides access to virtual and physical media information and status, including media searches and restoration capabilities; on-demand media expiration, movement and inventory reporting; and on-demand daily media maintenance activities.

3.2 Integrating Virtual Libraries with Tracker

Tracker needs to know which libraries are to be managed. These can be virtual or physical libraries. Each library device known to the IBM host will be presented in the image shown below, presented upon selection the “Media Library Integration” option from the main menu. The user can choose to enable libraries as physical or virtual devices by using the appropriate option.

In the image shown below, library TAPMLB04 is to be enabled within Tracker as a virtual library:

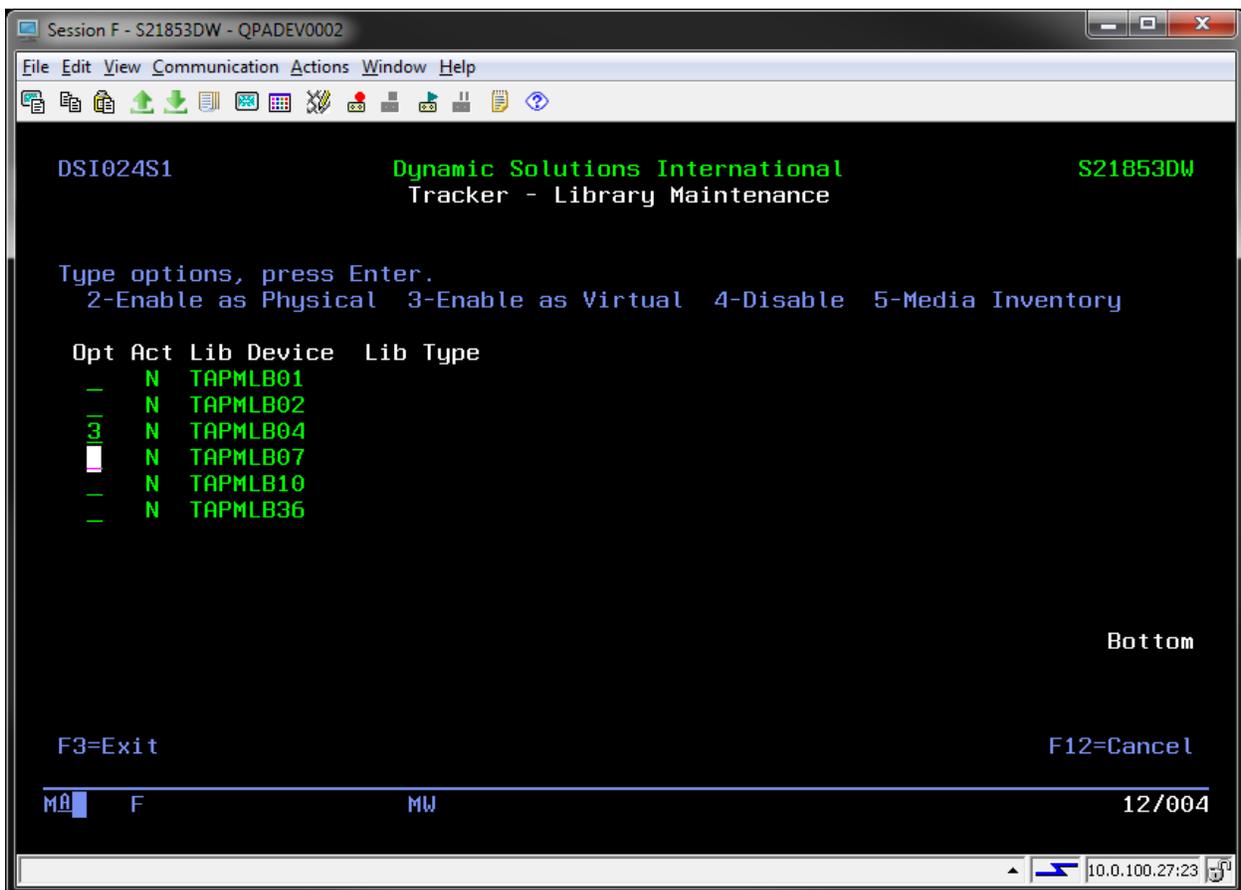


Figure 4: Integrating Library Devices

Once the Enter key has been pressed and the selection processed, the display will change to indicate that the library has been integrated as a virtual library, as shown in the following image:

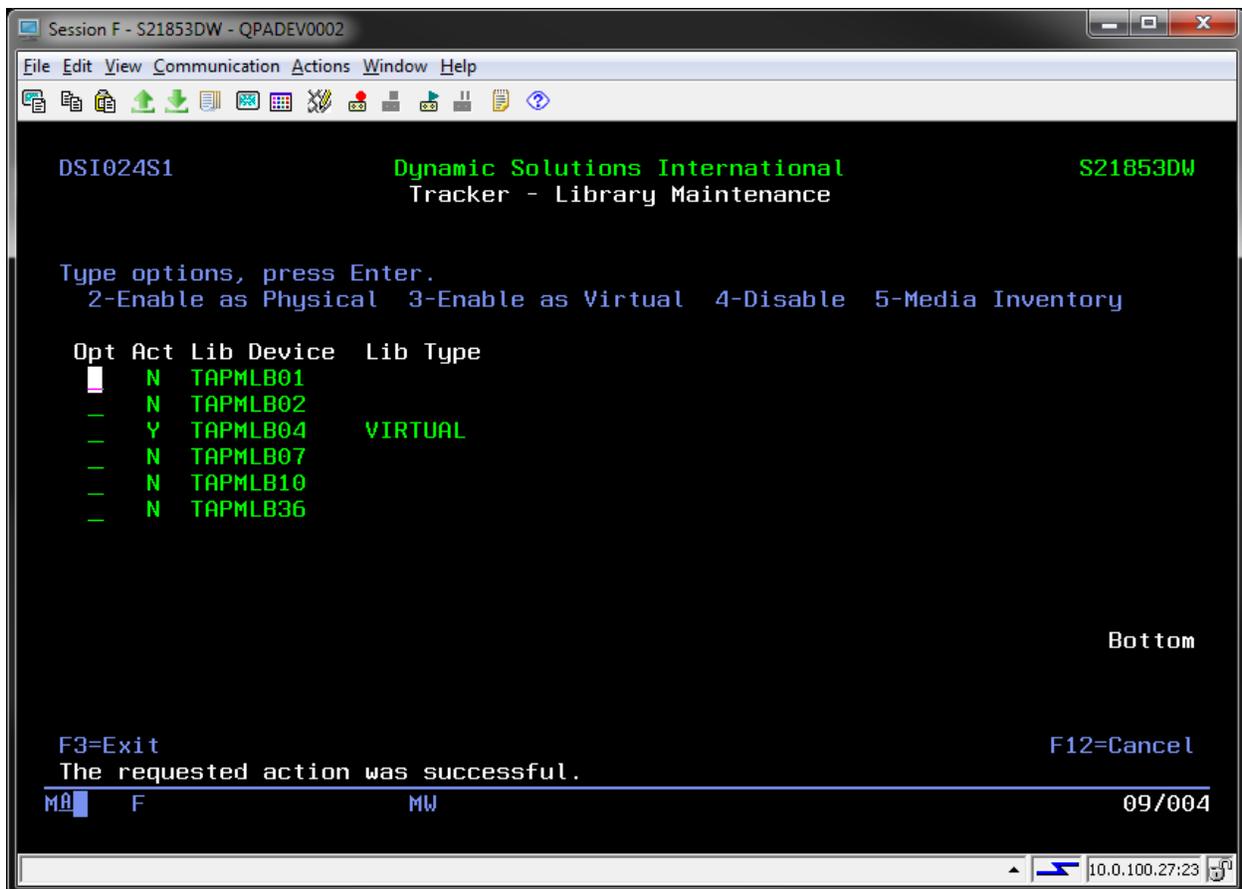


Figure 5: Enabling a Virtual Library

Once the library or libraries to be managed by Tracker have been integrated, automated activities for a library can be suspended/re-enabled by using the 2/3-Enable and 4-Disable options.

3.3 Defining Media Storage Locations

In the virtual world, the concept of the virtual vault exists to support both automated device capabilities as well as provide a secure location for live virtual media.

When taking advantage of the security of the virtual vault location or when supporting automated exports to physical tape via the VTL software, virtual tapes will need to be moved to the virtual vault.

Tracker comes with the “VAULT” location predefined, as shown below; this location can be used in movement rules (see the “Maintaining Media Movement Rules” section below) to alert the Admin when a tape should be moved into the vault and later, when that tape should return to the virtual library.

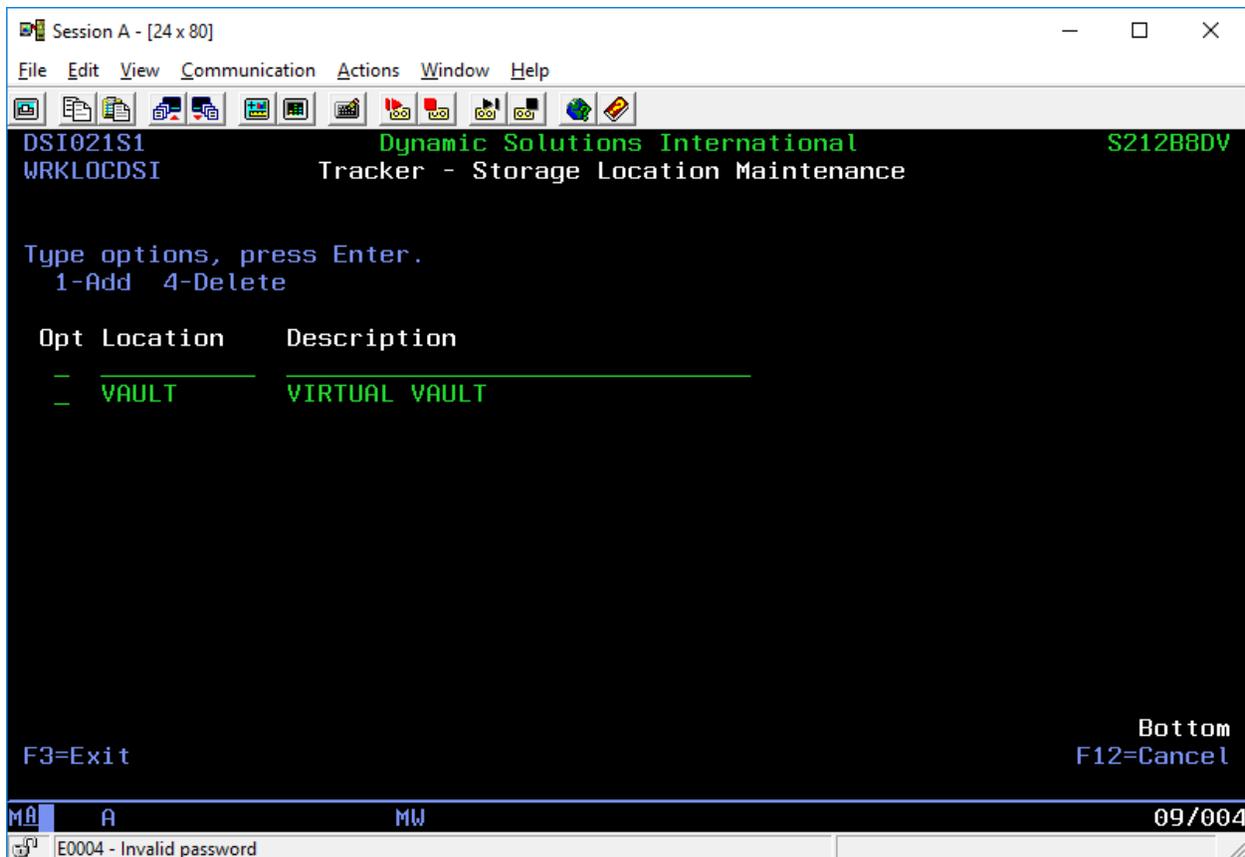


Figure 6: Storage Location Maintenance

The “VAULT” location is the only alternate location required for virtual media. When Tracker is combined with **Conductor** and where exporting virtual media to physical media, one or more physical media locations representing potential media storage locations should be created.

For example, an OFFSITE location might represent storage at an offsite facility; RACK1 may indicate a media storage rack with identifier “1”.

Create physical media locations as indicated in the image shown below, in which “OFFSITE” is being created:

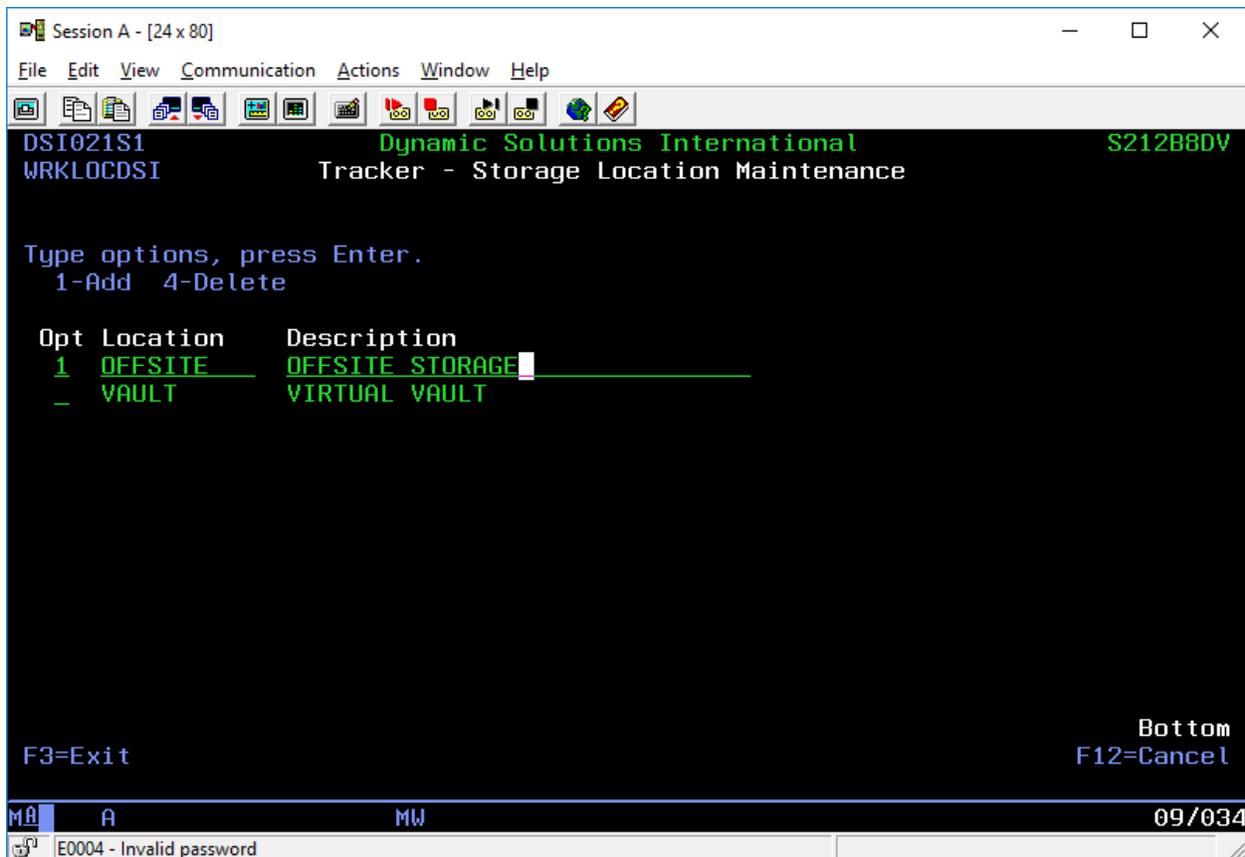


Figure 7: Creating a Storage Location

Upon pressing ENTER, the location will be added to the Tracker database.

Use option 4-Delete to delete a storage location. Locations cannot be deleted if media are currently assigned to the location and/or if the location is associated with a move rule.

Note: Device names will be considered locations by default for media belonging to those devices. They do not need to be added to the location database.

3.4 Viewing/Adding Media Categories

Viewing and adding Media Categories are IBM functions you can call directly from the command line (WRKTAPCGY/ADDTAPCGY) or that can be accessed from the Tracker main menu.

Using option **4-View Media Categories** presents the IBM command for the action. In the image below, the system-defined categories (*) and two user-defined “retain” categories (VRTRETAIN, PHYRETAIN) are available to be assigned to media:

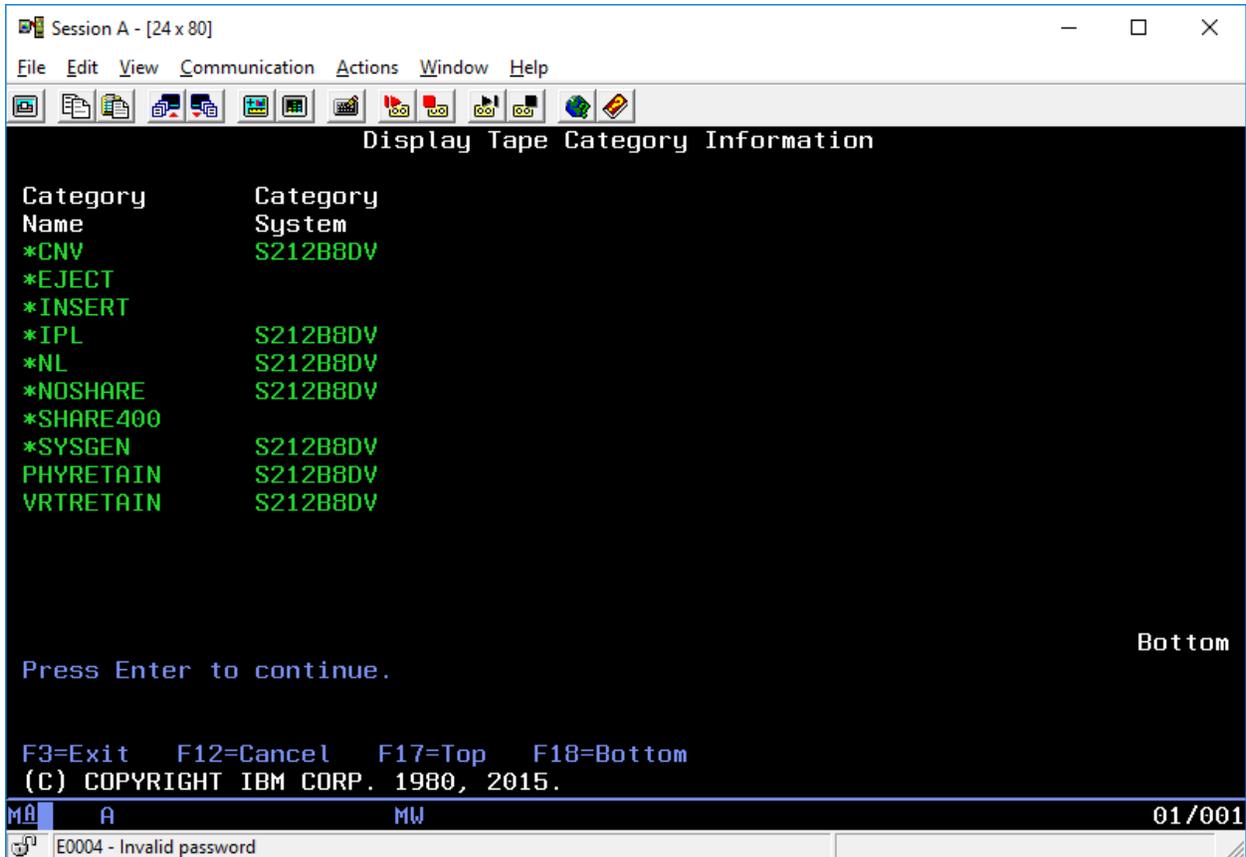


Figure 8: View Media Categories

To create a new “retention category” for use by Tracker, use option **5-Create a Media Category** to present the following panel. In this example a new category called “NEWCGY” is being created for the *CURRENT system (categories can only be created on the *CURRENT system):

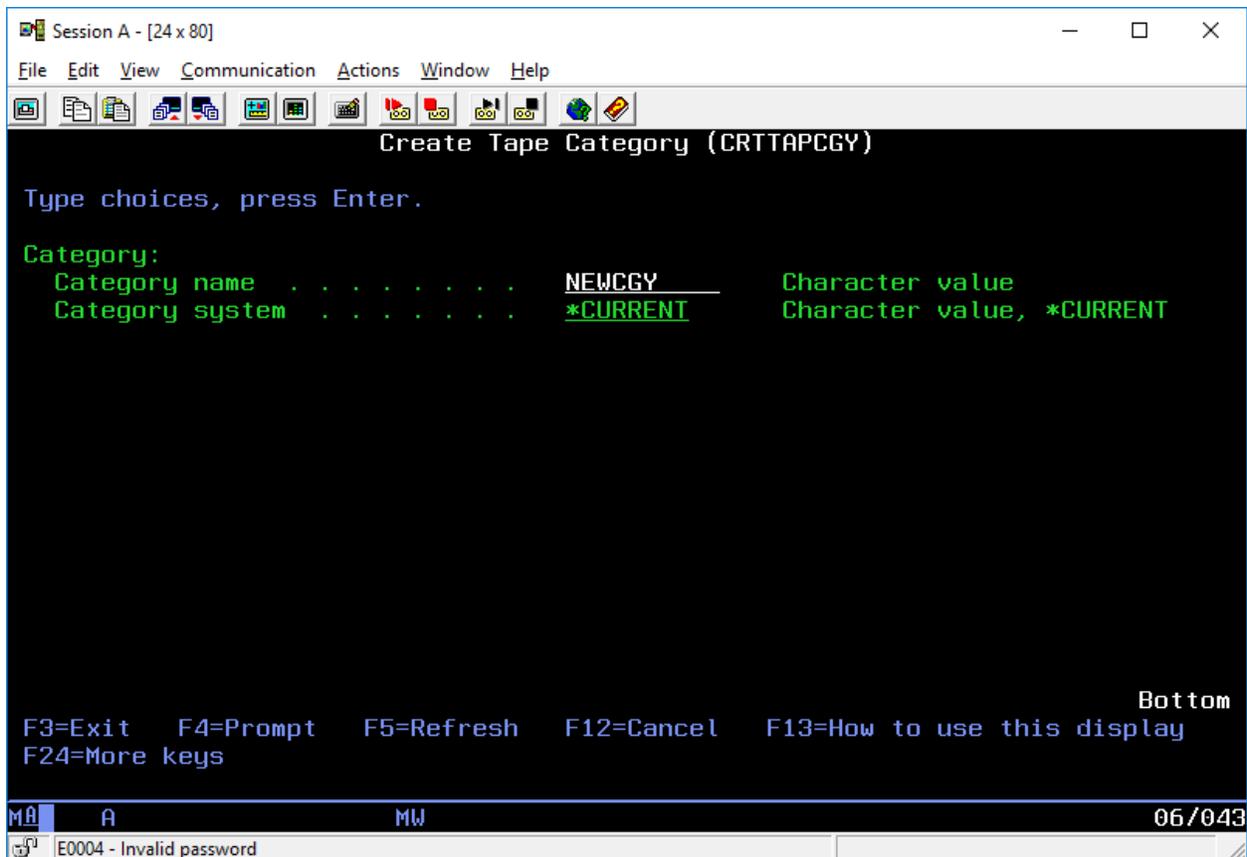


Figure 9: Creating a new Media Category

3.5 Managing Media Movement Rules

Media movement rules define the destination locations and durations for both virtual and physical media.

Virtual media movement generally consists of a move to the vault after a save activity has completed, with a return to the library location just before media expiration.

Physical media movement may model moves thru one or more storage locations, eventually back into the physical library.

To manage media movement rules, use option 8 from the main menu. The following panel appears, with values provided for a move rule named “VIRTUAL” to be created:

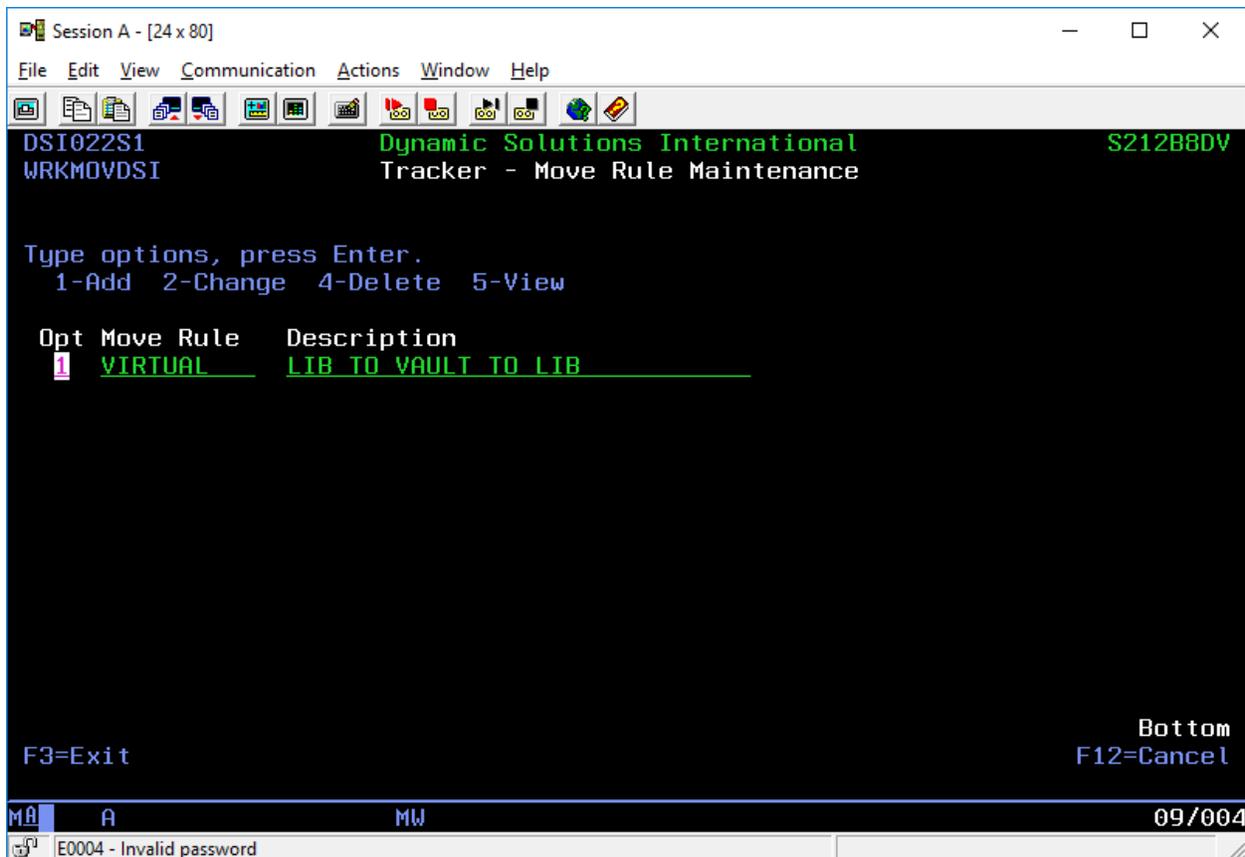


Figure 10: Creating a new Move Rule

Use Option 1 (as shown) to create a new move rule.

Use Option 2 to alter an existing move rule.

Use Option 4 to delete an existing move rule. Move rules must be removed from Category Rules before they can be deleted (see "Managing Category Rules" below).

Use Option 5 to review the selected move rule(s).

Upon pressing Enter on the above panel, the image below is presented (our first entry is keyed and ready for processing:

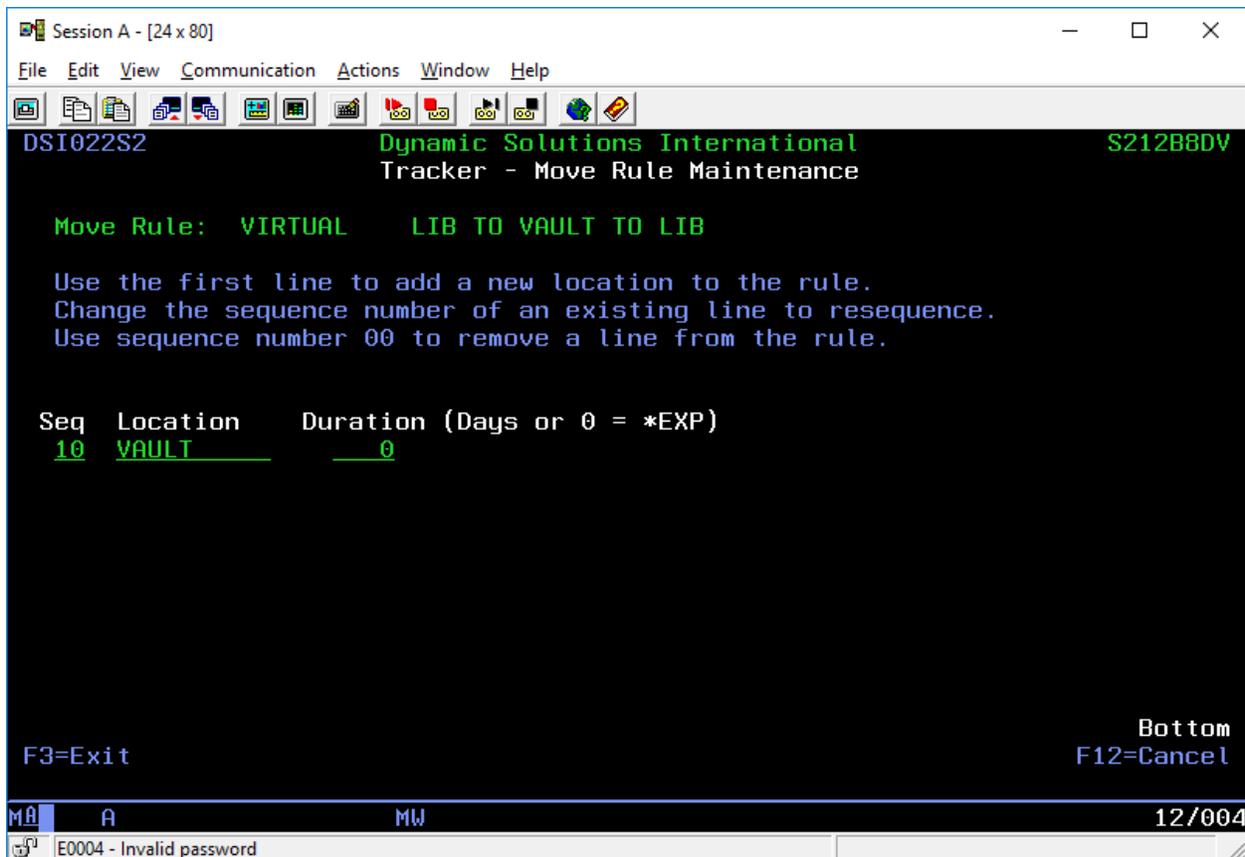


Figure 11: Defining Move Rules

In the image above, we're creating a move rule for virtual media indicating newly used media should move into the vault and remain there until the media expires. At expiration time, the daily maintenance job will produce a report of virtual and physical tapes that require movement (see the Appendix for report examples).

Note: When using the '0' option to indicate the tape should move at expiration time, the Tracker software will configure the move for the day prior to media expiration.

Upon pressing Enter, the panel changes as shown in the image below. If additional locations are required for the move plan, they can be added similarly.

Once locations are added to a rule, the following options can be applied:

- To re-sequence locations, change the sequence numbers as required.
- To delete a location from the plan, change the sequence number to 00.

Note: It is recommended the move rule for a category returns the media to its library location upon expiration to ensure scratch pools are adequately stocked.

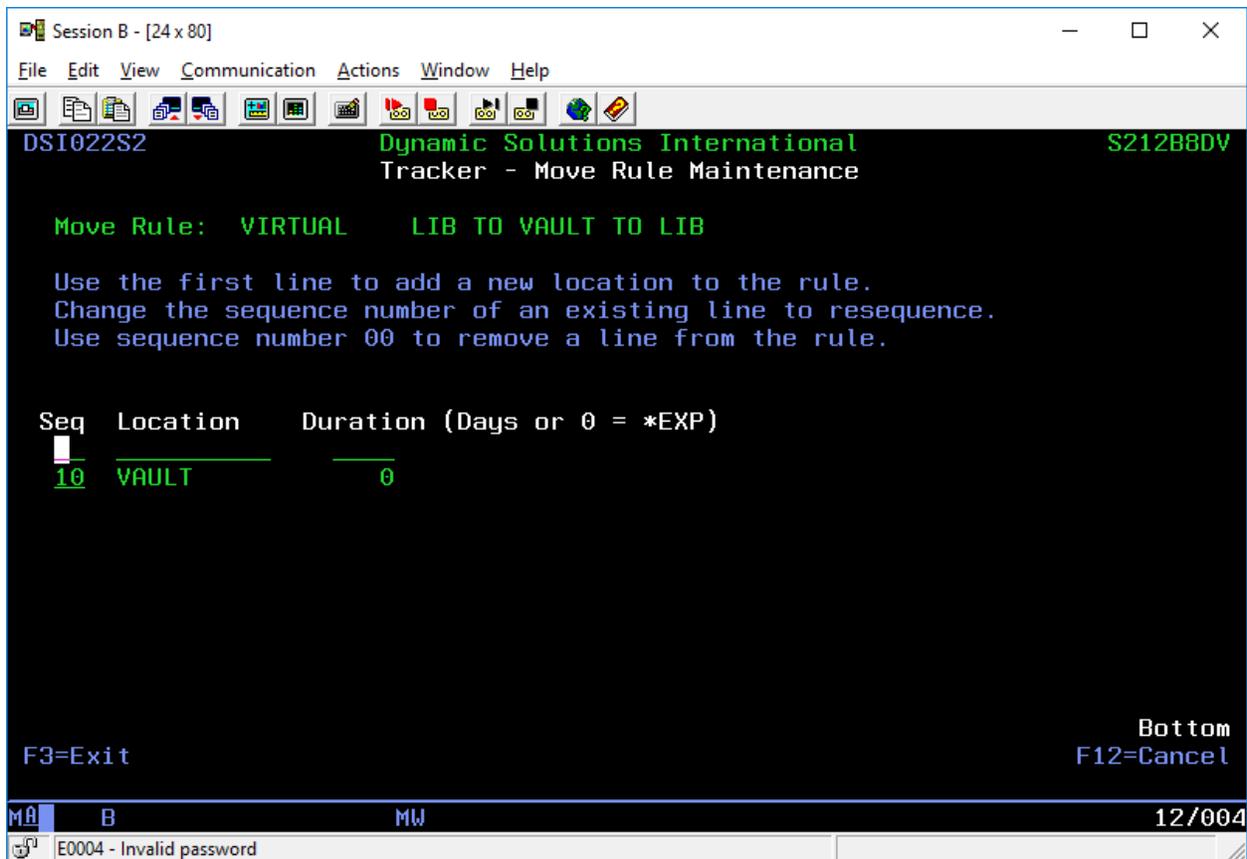


Figure 12: A single-location move rule

3.6 Managing Media Category Rules

Media category rules define how to retain media and apply optional media movement rules.

To manage media category rules, use option 9 from the main menu. The following panel appears, showing a variety of possible “retention categories” that have been defined:

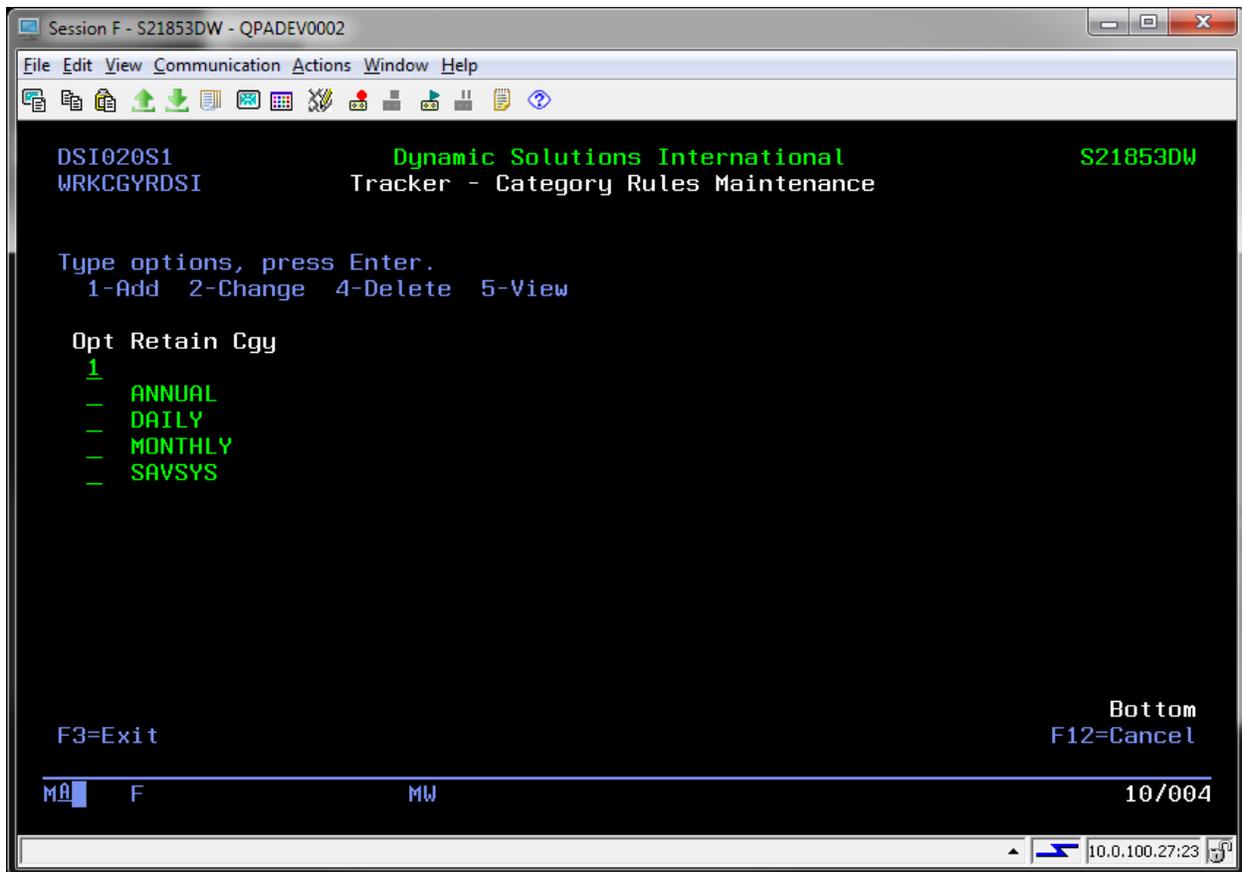


Figure 13: Category Rule Maintenance

Use option 1 to create a new Category Rule.

Use option 2 to modify the properties of an existing Category Rule.

Use option 4 to delete an existing Category Rule.

Use option 5 to View the properties of an existing Category Rule.

Upon pressing Enter with option 1 selected on the first line, the following panel appears (example values provided):

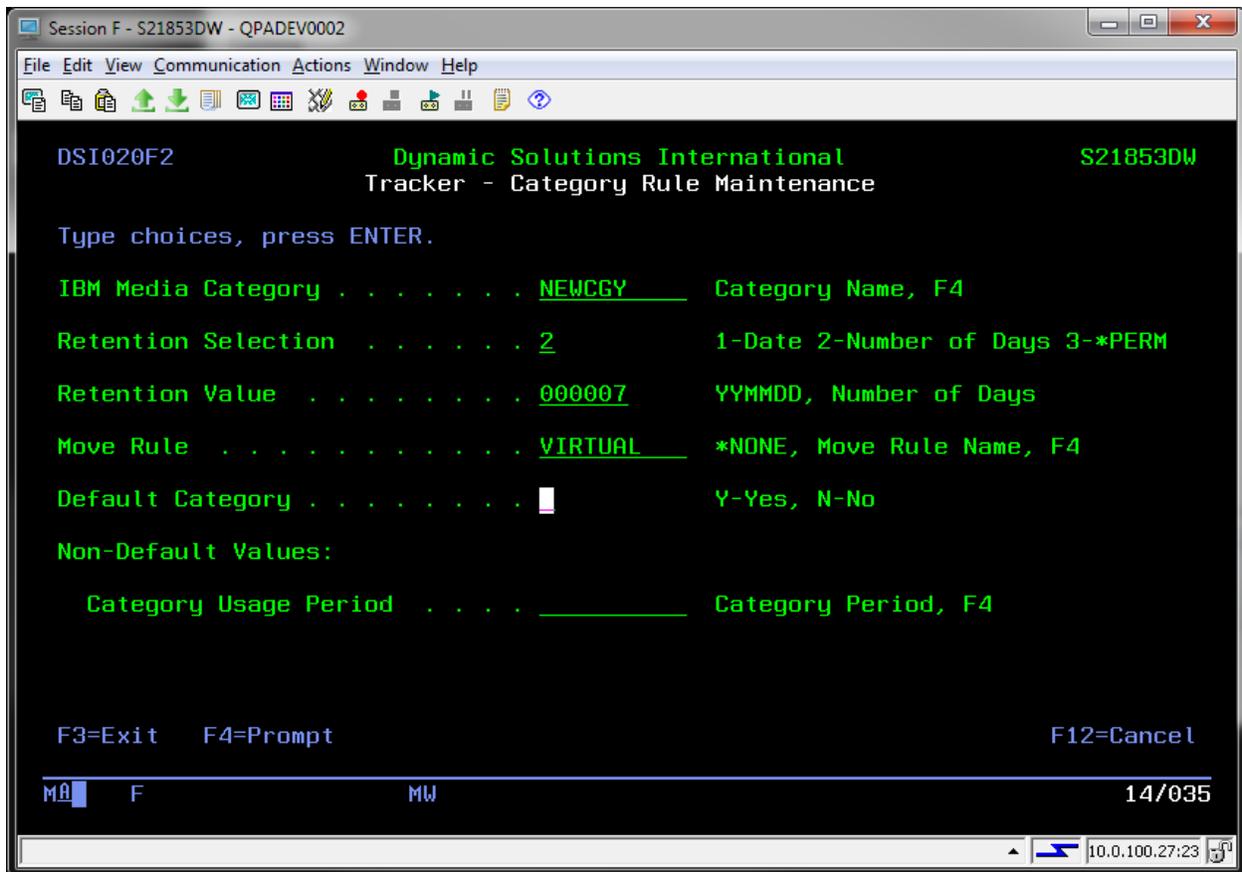


Figure 14: Category Rule Definition

Fields:

IBM Media Category: The “retention category” for which this category rule applies (“NEWCGY” is the name of a user-defined media category).

Retention Selection: 1 – Assigns a specific date
 2- Calculates expiration based on the number of days entered
 3- *PERM (manual expiration)

Retention Value: For selection 1, enter the desired date in YYMMDD format.
 For selection 2, enter the number of days to retain the media.
 For selection 3, this value is meaningless.

Move Rule (optional): The applicable move rule to apply to media of this category.

Default Category: If the use of the SETTAPCGY command is to be driven manually, embedded in custom-backup software or otherwise utilized outside of the Tracker software environment, leave this value blank.

If Tracker's "SETCGYDSI" command (see the commands section for usage instructions) is to be used to automatically determine, mount and dismount the daily retention category based on date entries, this value must be set to either "Y" or "N".

When using the SETTAPCGY command directly, the "Default Category" value should be left blank. Mixing types is not allowed; either all categories must be defined with blank default values (when using SETTAPCTY externally) or they must all be Y or N, with only one category serving as the default.

"Y" indicates that this category is the "default" category, and will be used when no overriding category information is found for the "current date".

"N" indicates that this category is not the default. Non-default categories require entry of the "Category Usage Period" (for V1R1, only *DATES is allowed) and subsequent entry of the dates for which the category is to be applied.

In the example below, the "NEWCGY" category, when applicable, will retain media for seven days, applies the VIRTUAL move rule, indicates the category is not the default-use category and thusly requires one or more date entries in order for the Tracker software to apply this "retention" category on those specific dates.

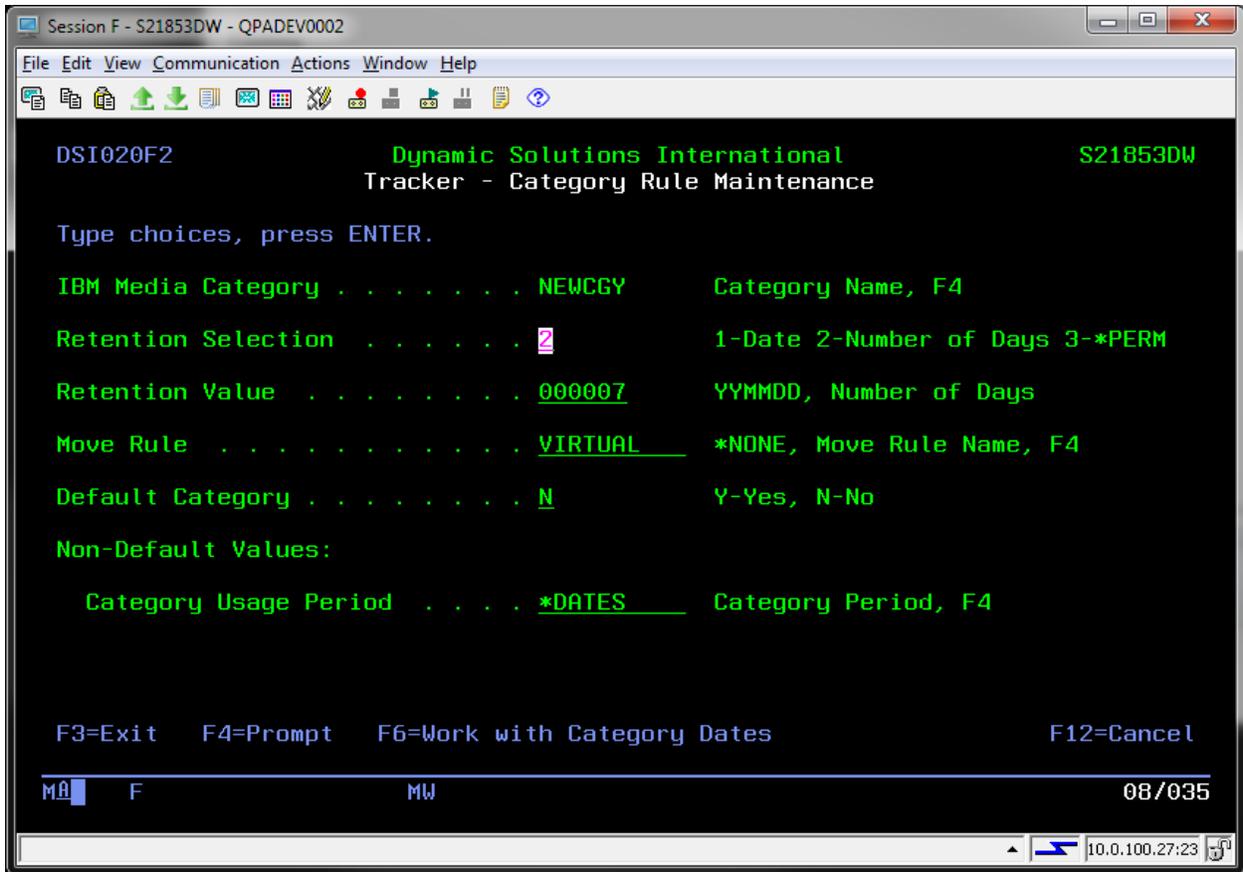


Figure 15: Configuring a Move Rule for date-specific usage

Upon pressing Enter and the entries provided have been validated and saved, the F6-Work with Category Dates command key is presented. Use this key to provide the applicable dates the non-default retention category is to be used. The next image indicates how to make individual date entries for a particular category (first sample entry shown):

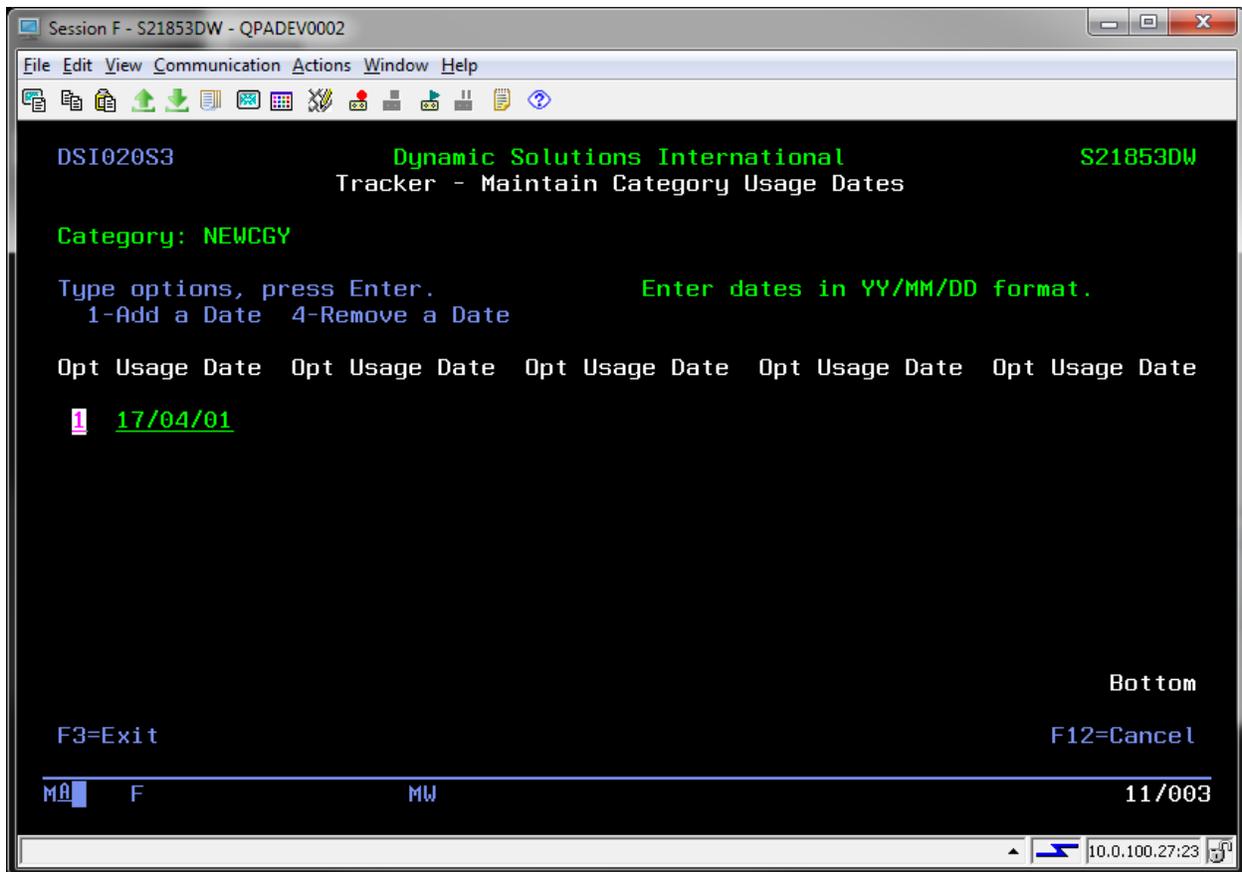


Figure 16: Adding a Usage Date to a Category Rule

Upon pressing enter, the date is validated; if the date is valid and not currently assigned to another category, the display will change to record the successful entry of the new date as shown below. Enter as many dates as necessary to support the category usage.

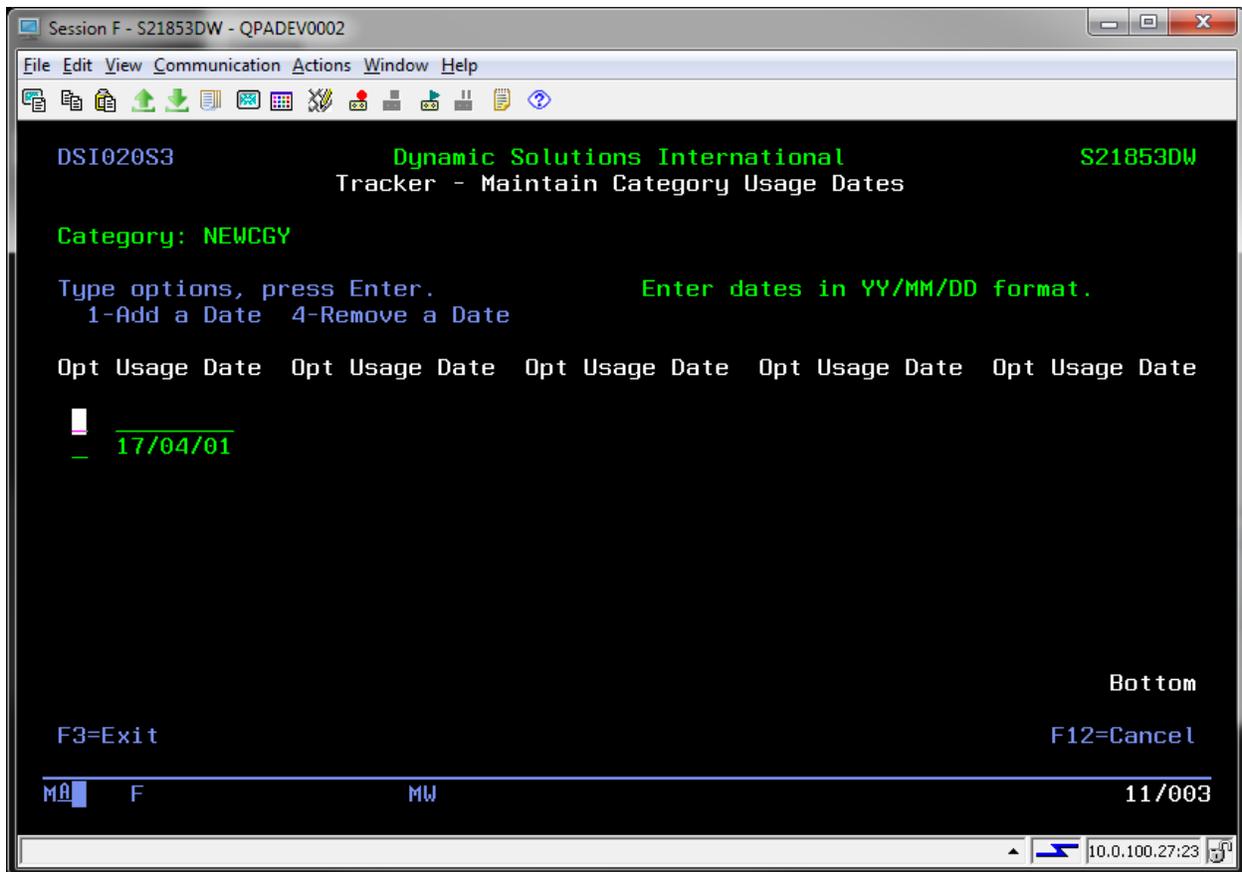


Figure 17: A successfully recorded usage date for category "NEWCGY".

4. Media Management

The Media Management section of the menu contains the applications discussed below.

4.1 Work with Media

The “Work with Media” application presents a list of all virtual and physical media known to Tracker. From this application, the current state of media can be reviewed; searches can be run across your virtual/physical media to help locate the tapes containing desired objects; media content can be reviewed tape-by-tape and a full set of object restoration capabilities are made available (optional, requires adjustments to the IBM SAV* commands as discussed earlier in this document).

Note: Search, inquiry and restoration capabilities require the modification of save commands as described in section 1.2 *Media Content Management Considerations*.

Use option 14-Work with Media from the main menu to access the media inventory, as shown below:

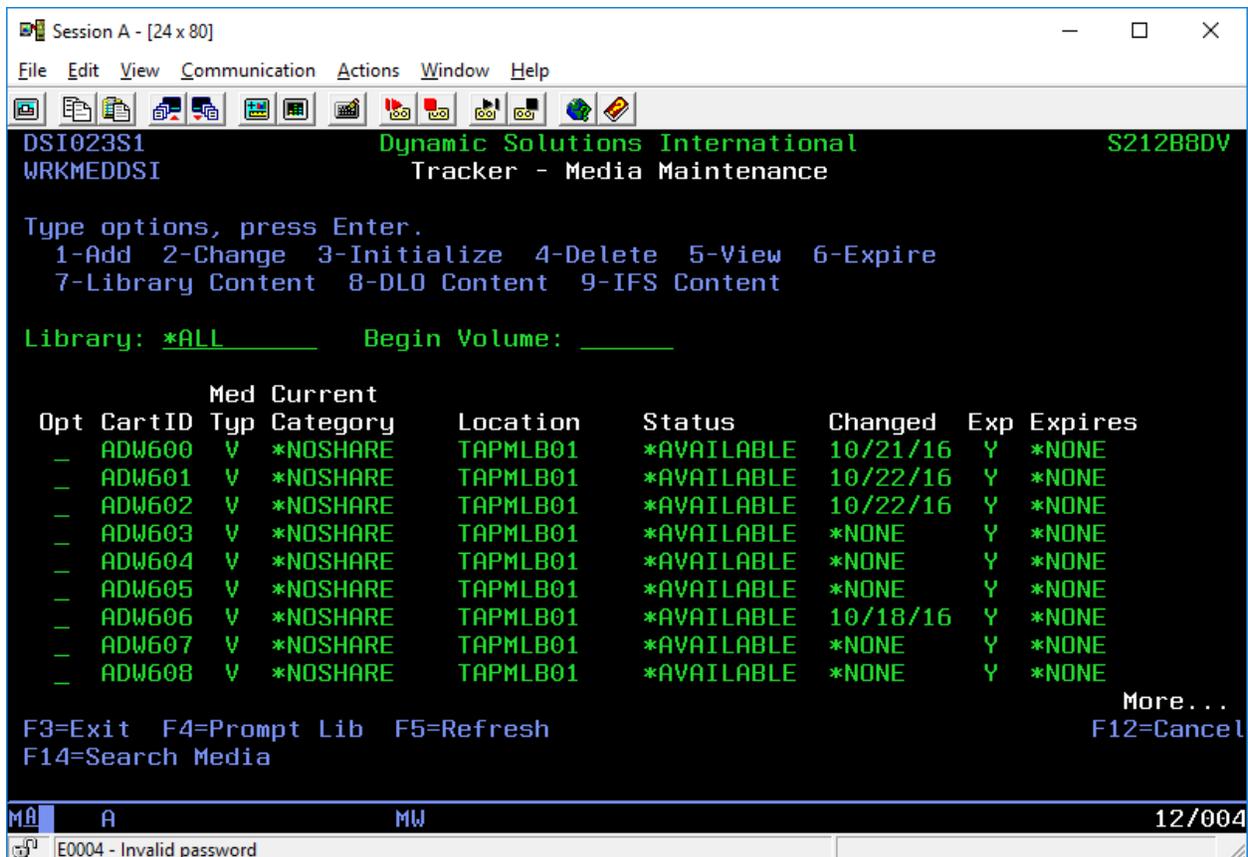


Figure 18: Media Inventory View

In the image above, a virtual-only environment is represented. If DSI's **Conductor** is installed and physical tape exports are managed via the DSI VTL and DSI's **Conductor** software this panel will display VTL-managed physical media as well.

Note: *Tracker offers the ability to discretely manage virtual and physical media sharing the same barcode.*

When multiple libraries are configured, this list can be filtered by using the "Library" field; in high-tape-volume installations, the "Begin Volume" can be used to start the list with a specific volume.

List options:

- 1- Add. This command allows a virtual tape in *INSERT status to be added to the media library. Tapes with a current category of *INSERT (new tapes) will be initialized.
- 2- Change. Change the Scratch Category, Current Category, Location and/or expiration status of a volume.
- 3- Initialize. Initialize an expired tape (the tape must have a library status of *AVAILABLE).
- 4- Delete. Removes media records, and may remove virtual media from a virtual library.
 - a. When Tracker is operating alongside of **Conductor**, deleting a virtual volume from this panel will remove the volume from the virtual library.
 - b. When Tracker is operating without **Conductor**, this option will remove the media records from the Tracker database. If the media remains in the virtual and/or physical libraries, those media records will be recreated.
- 5- View. View the current properties of the selected media.
- 6- Expire. Expires an active tape. Will automatically re-assign the tape's current category to its scratch category. The tape must be *AVAILABLE to the media library.
- 7- Library Content. Review library information saved on the media. Drill down into object and member level data. Perform restorations of libraries, objects and/or members (where applicable).
- 8- DLO Content. Review Document Library Object folders/documents. Restore folders/documents.
- 9- IFS Content. Search the IFS for directory paths; restore entire directories and/or objects within directories.

4.1.1 Creating Virtual Media

4.1.1.1 Creating media from the VTL Console – Conductor not installed

When Tracker is installed without DSI's **Conductor** software, media must first be created using the VTL Console software. Once created, Tracker is used to import/categorize/initialize media into the library. New media will default to the "*NOSHARE" category. DSI recommends a single scratch pool be used in

virtual environments. This is required when using automated category maintenance as described in the previous section.

When creating virtual media from the VTL Console software that comes with the VTL device, please follow the steps below.

- Create the required virtual media using the VTL console.
- Open the Tracker Media Management application (shown below).

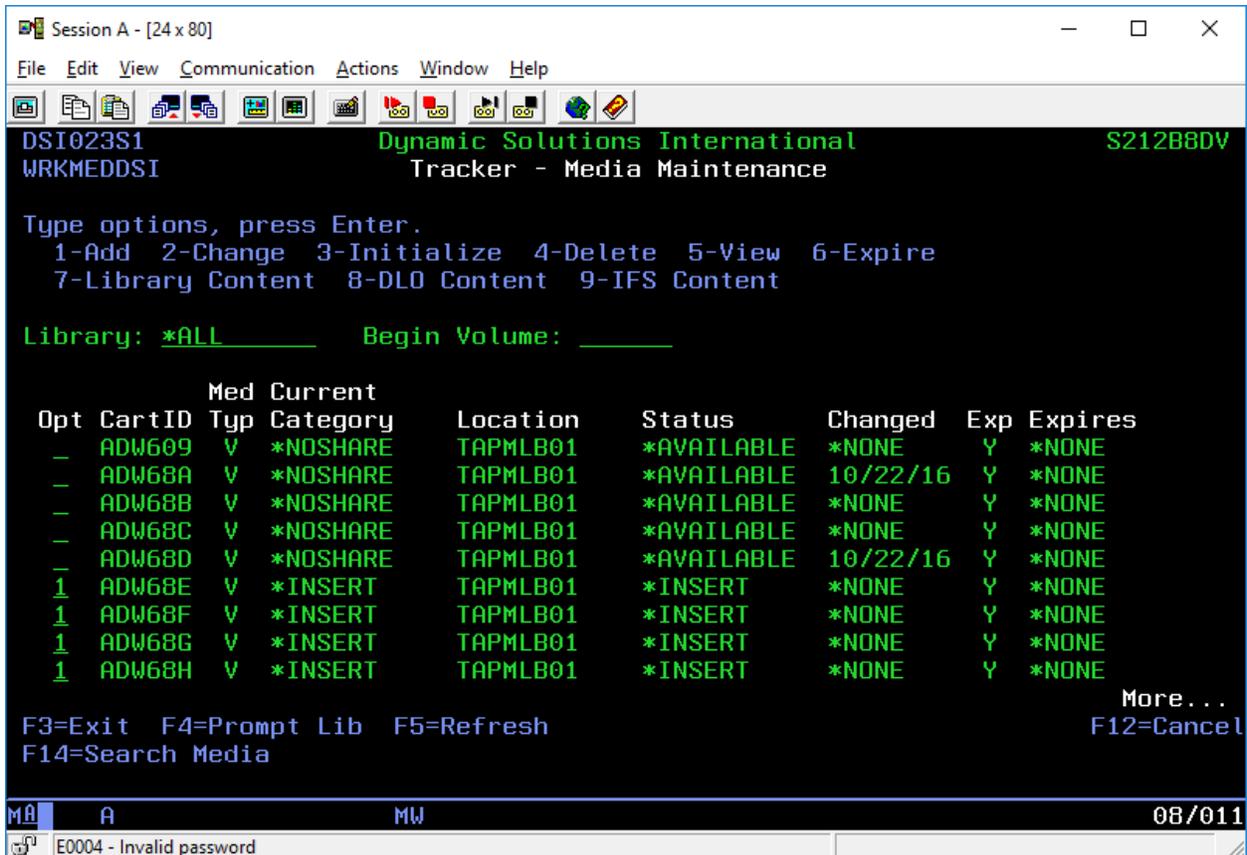


Figure 19: Adding Media created from the Console

Note: Tracker V1R1 does not yet allow for shared library usage; for this reason, *NOSHARE is the scratch category into which new tapes will be assigned by default.

- Locate the newly-created volumes (they will have a current category of *INSERT and a status of *INSERT).
- Use option 1 on each volume as shown above. Press Enter.
- Media will be added to the library, categorized and initialized.

If media is to be added into a category other than *NOSHARE (e.g. to add media to be used via a device outside of the Tracker environment), after adding the new media to the VTL via the console use the IBM WRKTAPCTG command to identify and categorize media to a category other than *NOSHARE. Then use

the instructions above to add the categorized media to the library. This will prevent Tracker from using physical media intended for direct device access outside of the Tracker environment when performing exports. Media can also be re-categorized using the 2-Change option from the panel in the image above.

4.1.1.2 Creating media from Tracker (when Conductor is installed)

When Tracker is installed with DSi's **Conductor** software, virtual media may be created and/or deleted from the Tracker Media Management application.

To create new media from the Tracker application, use the F6=Create New Virtual Media function key to display the "Create New Virtual Media" window:

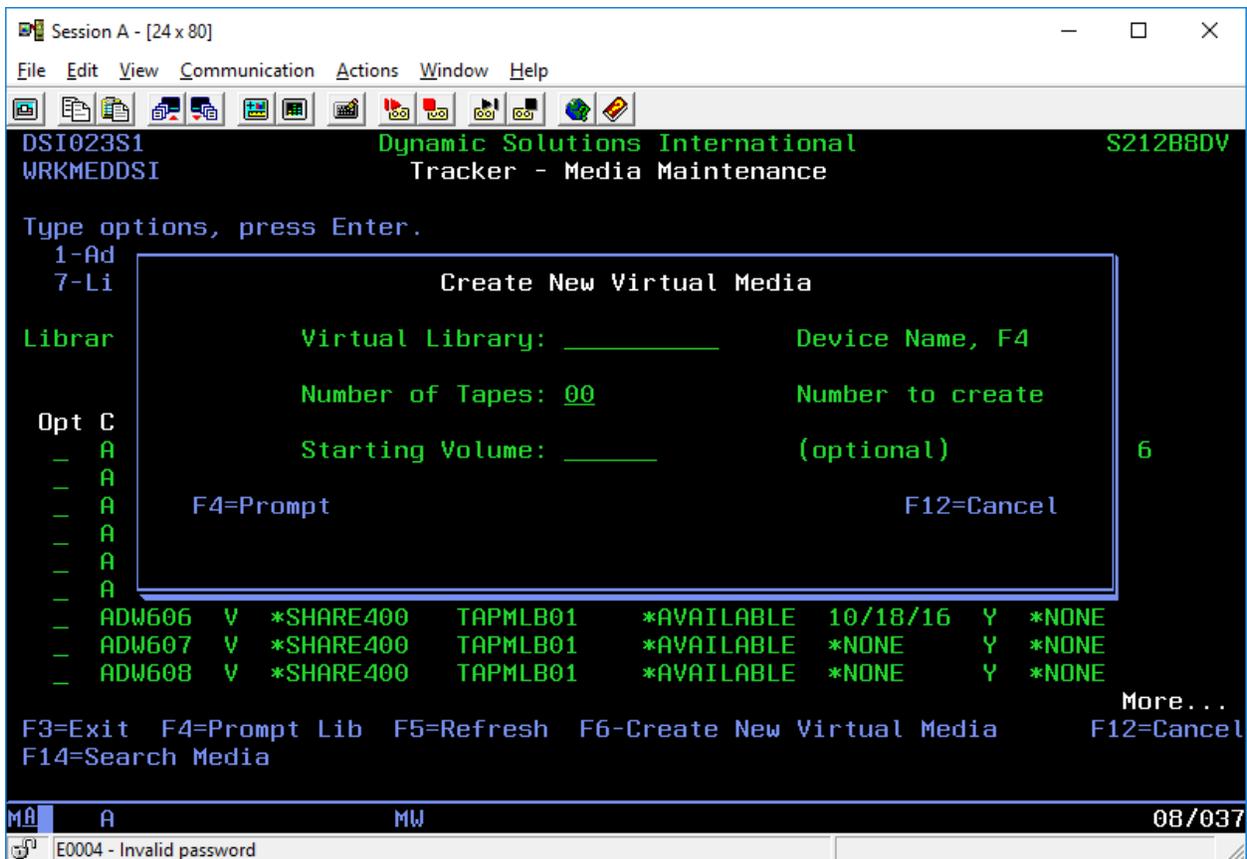


Figure 20: Creating New Virtual Media

Enter the target library device name, the number of volumes to create and optionally, the starting volume number. Upon pressing enter, messages will be sent to the VTL instructing the library to create the indicated tapes. Processing of these messages may take some number of seconds to complete. As the tapes are created, they'll automatically be added to the library, categorized and initialized.

If using a starting volume value the volume should have numeric values in the last two or three positions (e.g. "ABC001", not "ABCDEF"). The number of volumes requested will be created starting with the first available barcode \geq the starting value. If the number of volumes requested exceeds the number of volumes than can be created given the starting volume value, only the number of media than can be created will be created by Tracker.

For example, if you ask to create 20 volumes and your starting barcode is "ABC985", presumably 14 volumes will be created (ABC986 to ABC999), assuming no volumes already exist in the ABC986-ABC999 range.

When not entering a starting volume, the VTL device will determine the barcodes to add to the system. This is the preferred method for creating tapes via Conductor/Tracker.

4.1.1.2 Creating media from the VTL Console when Conductor is installed

When Tracker is installed with DSI's **Conductor** software, you can still add media to the system from the VTL console. In this scenario, as the **Conductor** software detects new media has been created, it will automatically categorize, insert and initialize the newly-detected media into the library.

4.2 Work with Media Attributes

Options 2 and 5 open the media properties window, shown in the following image:

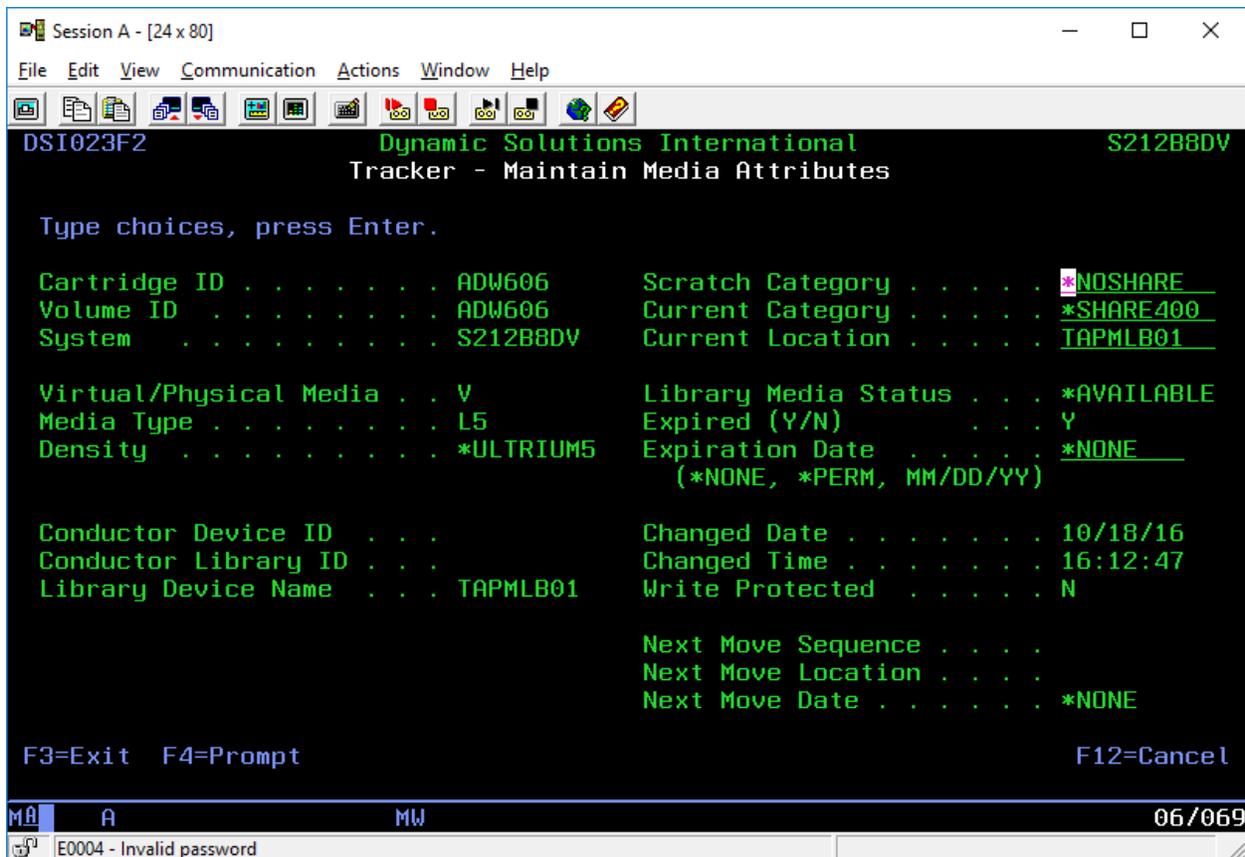


Figure 21: Media Properties

Various properties of the selected media are described below. Those fields that can be modified via the 2-Change option are displayed in **bold**:

- Cartridge ID: the barcode of the media being reviewed.
- Volume ID: the volume ID of the tape label, where applicable. For physical media containing copies of virtual media, this will be the virtual media barcode from which the data was copied.
- System: the system name to which the media belongs. For future use.
- Virtual/Physical Media: Indicator for the media type.
- Media type: the media type reported by the library.
- Density: the media density reported by the library.
- **Conductor** Device ID: the identification code for the indicated device from the **Conductor** system (if installed)
- **Conductor** Library ID: the virtual library identification code for the indicated device (if installed)
- Library Device Name: the device name for the library to which the media belongs.
- **Scratch Category**: the scratch pool into which expired media is delivered. This value may be modified.
- **Current Category**: the current category of the media. This value may be modified. If changed to the SCRATCH CATEGORY value, the media will be expired if necessary.

-
- **Current Location:** the current location of the media.
 - Library Media Status: the state of the library media.
 - Expired (Y/N): expiration indicator.
 - **Expiration Date:** *NONE (expired), *PERM (manual expiration) or the expiration date. This field can be changed to alter the expiration status and date.
 - Changed Date: the last reported write date.
 - Changed Time: the last reported write time.
 - Write protected: whether write protection is applicable to the volume
 - Next Move Sequence: the next move sequence for the volume (from Move Rules).
 - Next Move Location: the next location for the media.
 - Next Move Date: the date the next move will/should take place.

4.3 Work with Media Content

When the applicable IBM SAV* commands have been adjusted to write media information to the Tracker tables/files, Tracker provides two methods of interrogating media content and the ability to prepare and present restore commands to the user.

Note: *To ensure data is available at your desired level be sure to use the INFTYPE keyword that best meets your requirements when adapting your save commands ("OUTPUT (SAV) or *OUTFILE command properties).*

4.3.1 Searching Media Content

Using the F14 key on the media inventory list display (see figure 10) presents the media search window as displayed below.

Searching media requires the entry of the earliest save date for which media should be searched along with either the name of the save command to locate (SAVSYS, SAVCFG, etc.) or a library name optionally combined with an object and or an object/member name.

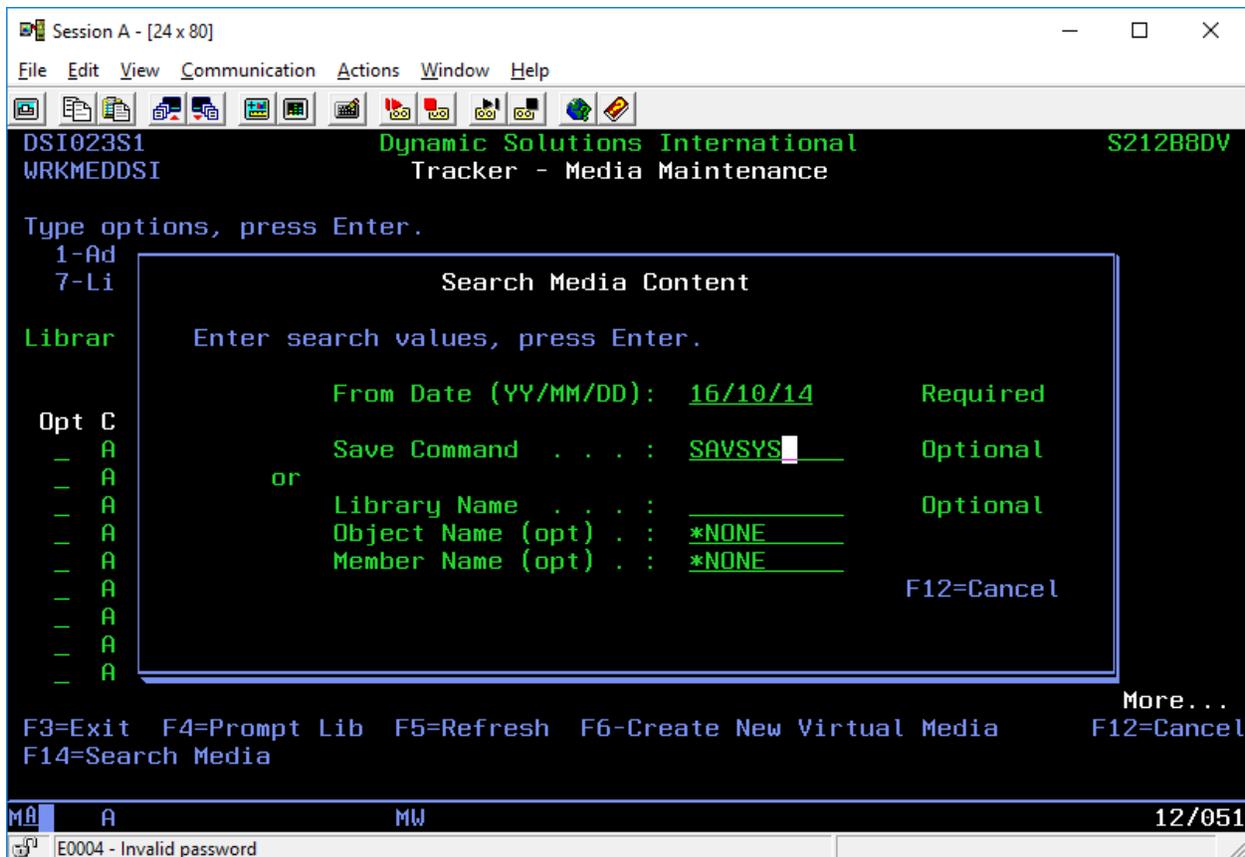


Figure 22: The Media Content Search Window

In the example above, a search is to be executed for tapes containing a SAVSYS label written on or after October 14, 2016.

Search results will be presented in a filtered view of the media inventory window. To return to the full media inventory view, use the F5=Refresh option.

4.3.2 Media Content Inquiries

Media content can be viewed directly by using one of the inquiry options: 7-Library Content; 8-DLO Content; and 9-IFS Content. Each allows for data restoration at the expected levels for each type.

Note: When using **Conductor** and managing physical media, restorations can be requested from physical volumes. This should only be attempted via a library device if the physical cartridge ID matches the magnetic volume ID.

In general, non-matched physical media should be imported back to the original virtual volume first and then restored from the virtual volume. In cases where this is impractical, vary off the library device, then

attempt then restore from a library drive device (or use another stand-alone device). If a virtual volume exists with the same cartridge ID as the physical magnetic volume ID, that virtual volume should be moved into the virtual vault before attempting the restore. Return the volume to the library after the restore has completed.

4.3.2.1 Library System Inquiries

Using option 7-Library Content on a media item presents the panel shown in the next image:

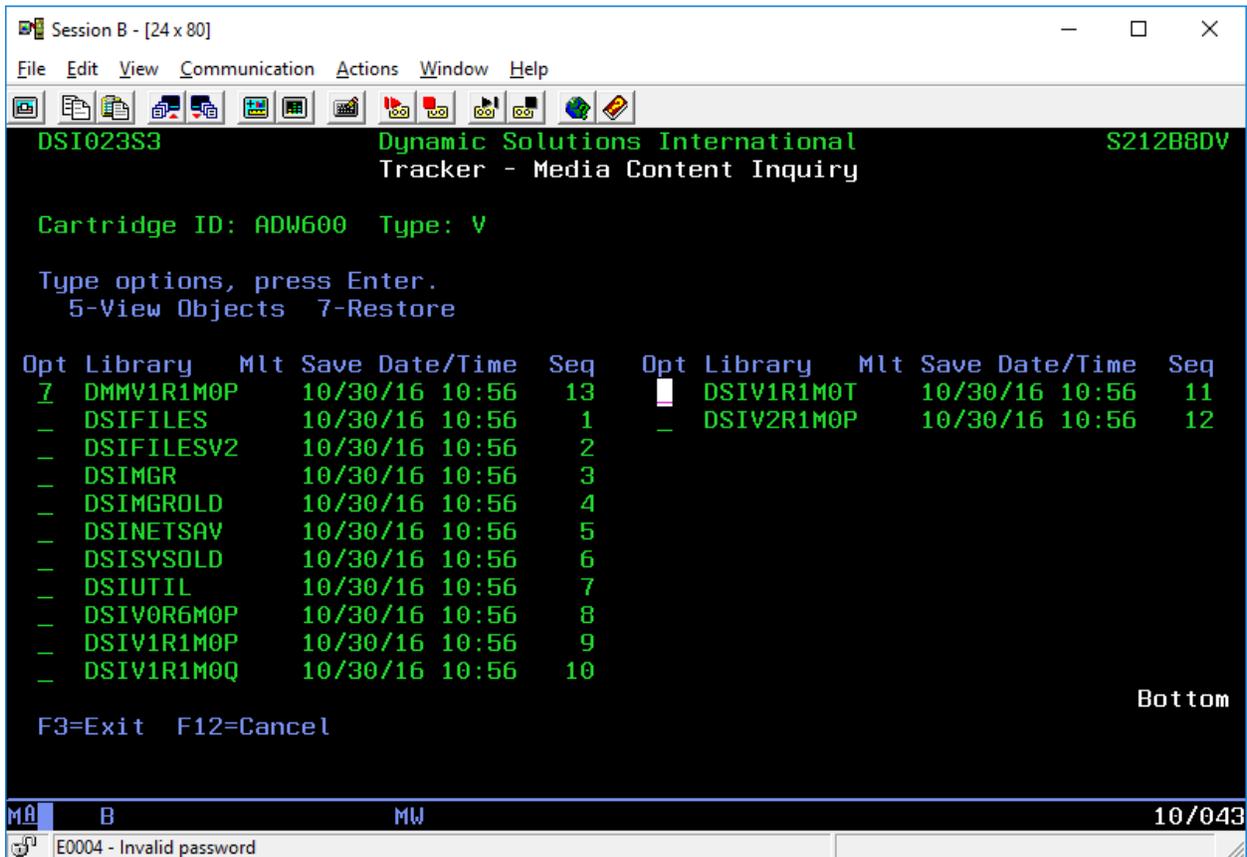


Figure 23: Viewing Media Library Content

Note: the “Mlt” column indicates an object spans across volumes with the add character (+’).

From this panel users may choose to drill into Library objects (next topic) or may request Tracker format and present a RSTLIB command for the selected library, as shown above for library “DSIV1R1M0P”. The RSTLIB command presented is shown in the image below.

Note: the RSTLIB command is presented with default values; user-entered modifications may be required to meet specific restoration needs (e.g. restoring to an alternate library).

Note: When selecting restoration options from physical media, Tracker will leave the device ID field of the applicable restoration command panel blank. It is up to the user to identify and enter the correct device. Stand-alone drives may require source tapes be loaded in advance of attempting the execution of the restoration.

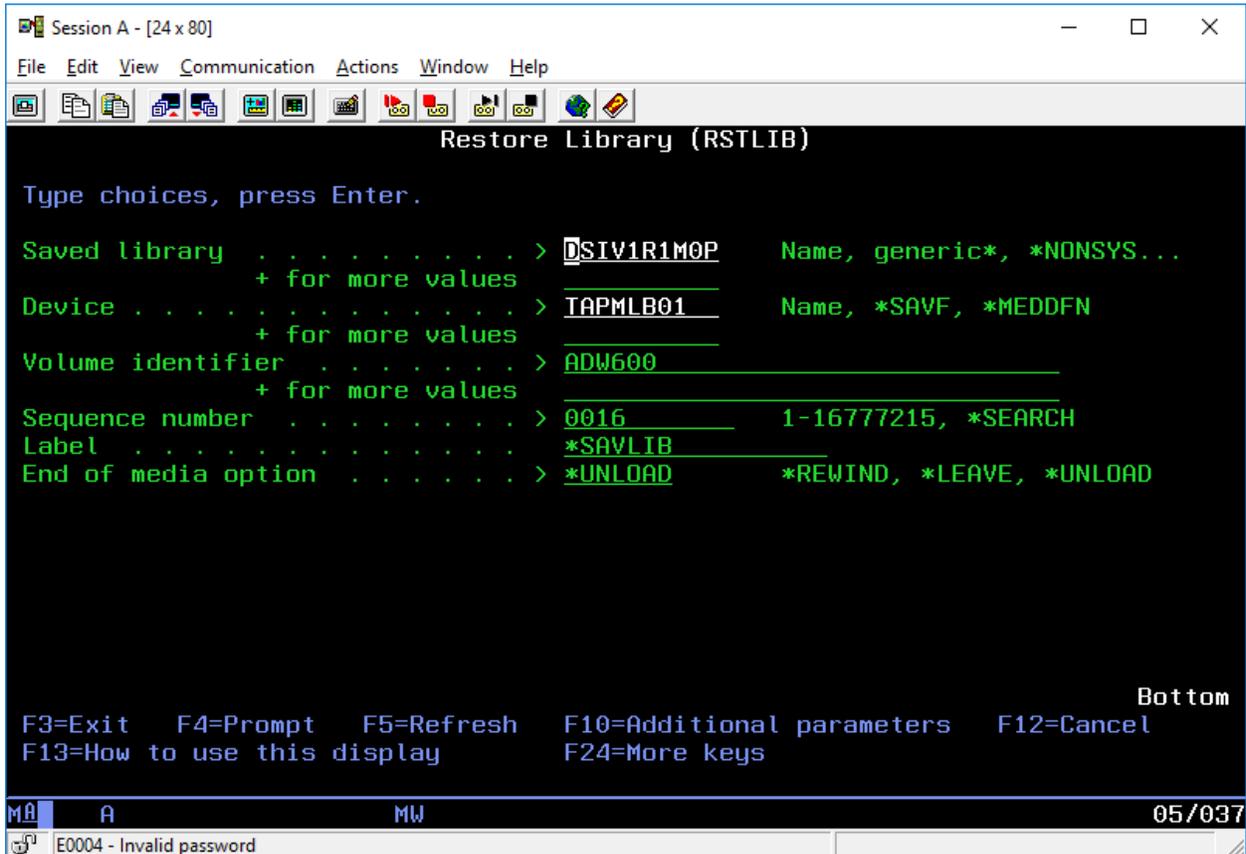


Figure 24: The formatted RSTLIB Command

After pressing Enter, the RSTLIB command is executed. Results will be presented when the command completes.

Using option 5-View Objects from the library view panel drills down into the library object list, where available:

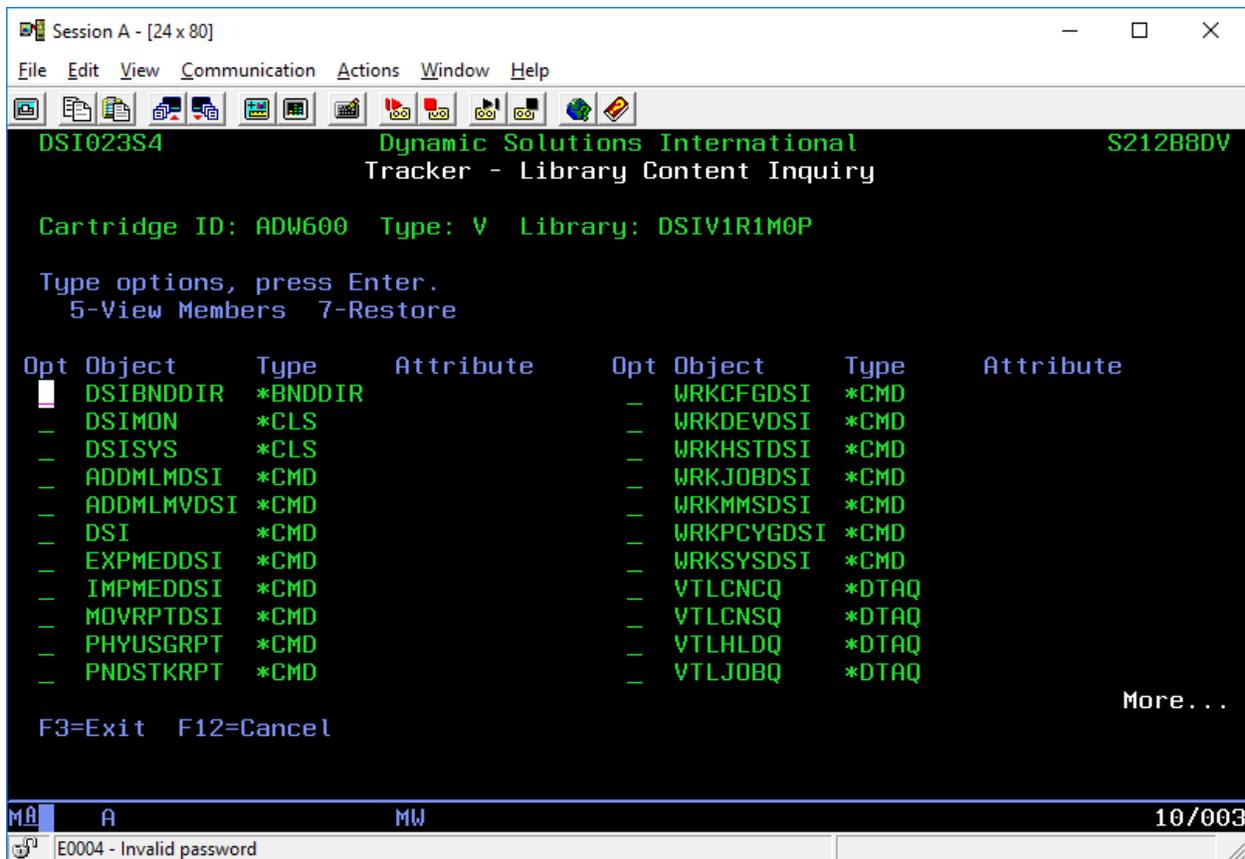


Figure 25: Library Object Inquiry

From this panel users may choose to drill into object members (where applicable, next topic) or may request Tracker format and present a RSTOBJ command for the selected object, as shown above for the *BNDDIR object “DSIBNDDIR”. The RSTOBJ command presented is shown in the image below.

Note: the RSTOBJ command is presented with default values; user-entered modifications may be required to complete the command entry.

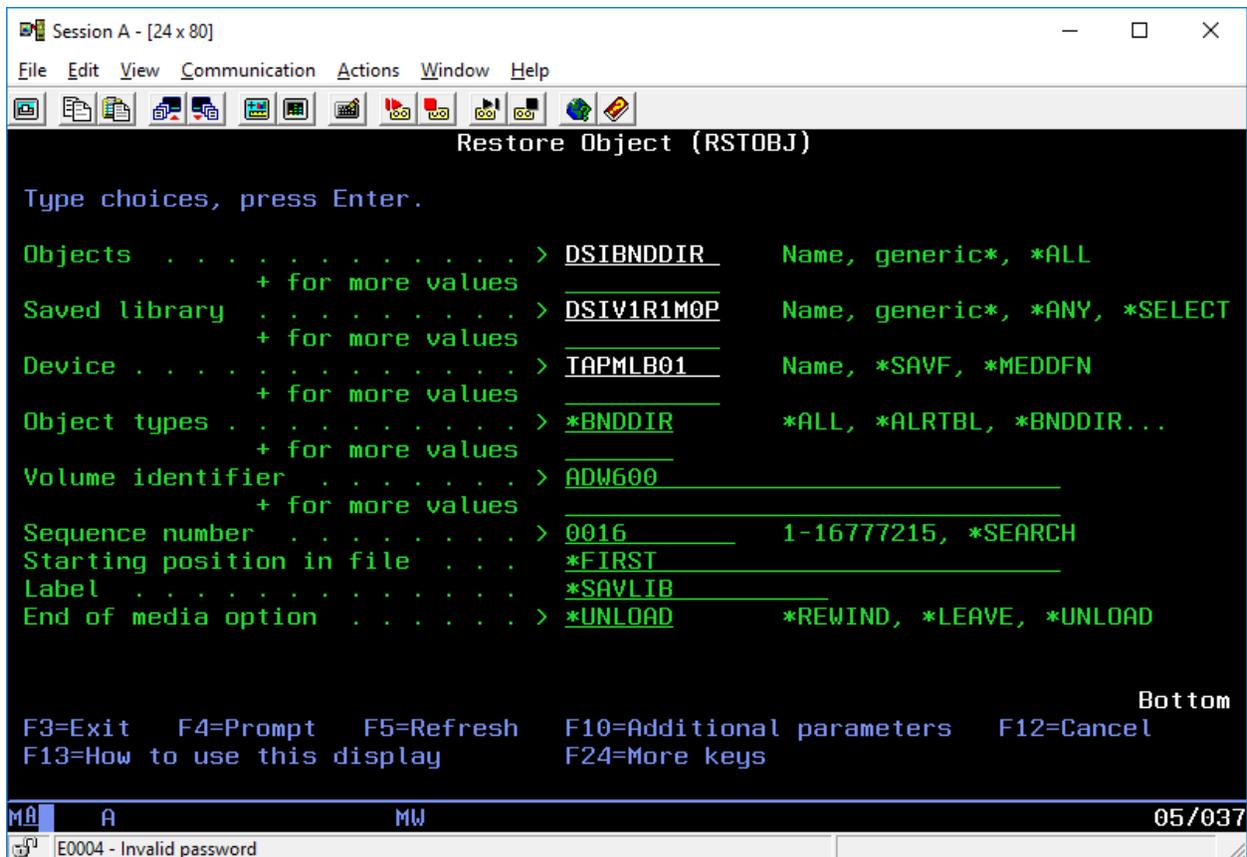


Figure 26: RSTOBJ command example

After pressing Enter, the RSTOBJ command is executed. Results will be presented when the command completes.

Using option 5-View Members from the library view panel drills down into the object member list, where available:

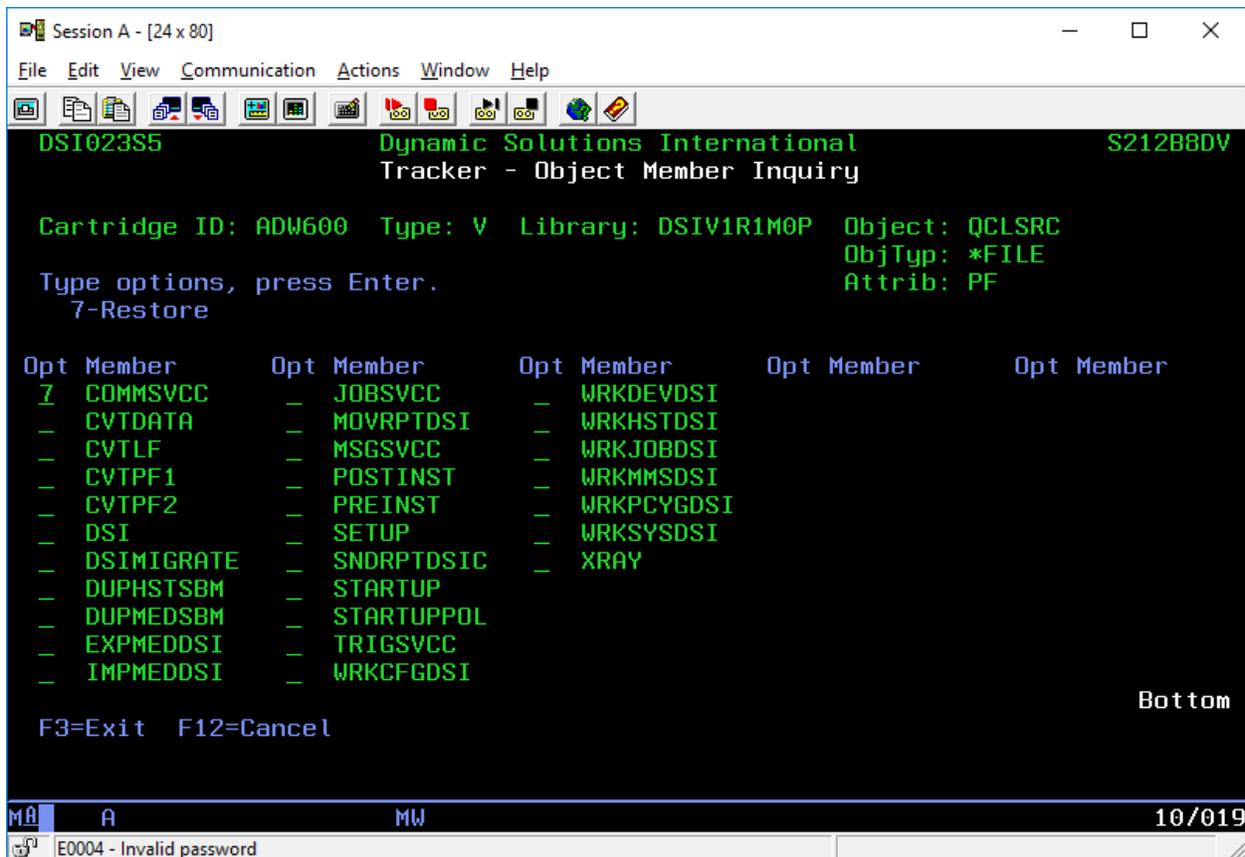


Figure 27: Object Member List

To restore a member from an object, use option 7 as shown above on member “COMMSVCC”. The RSTOBJ command is presented with values defaulted as shown on the following images:

Note: the “data base member option” of the RSTOBJ command will need to be modified to meet your specific need (e.g. replacing an existing member, restoring a missing member, etc.)

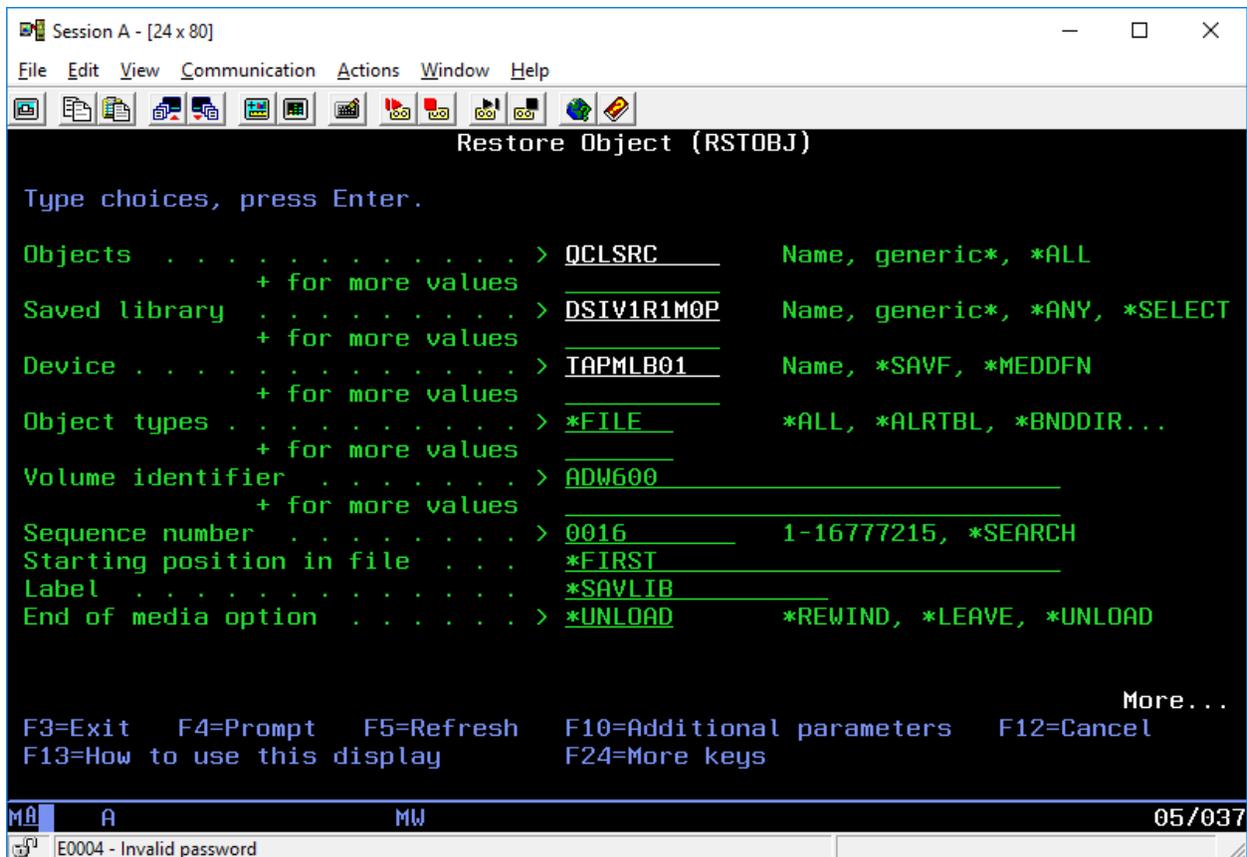


Figure 28: Member Restoration, panel 1

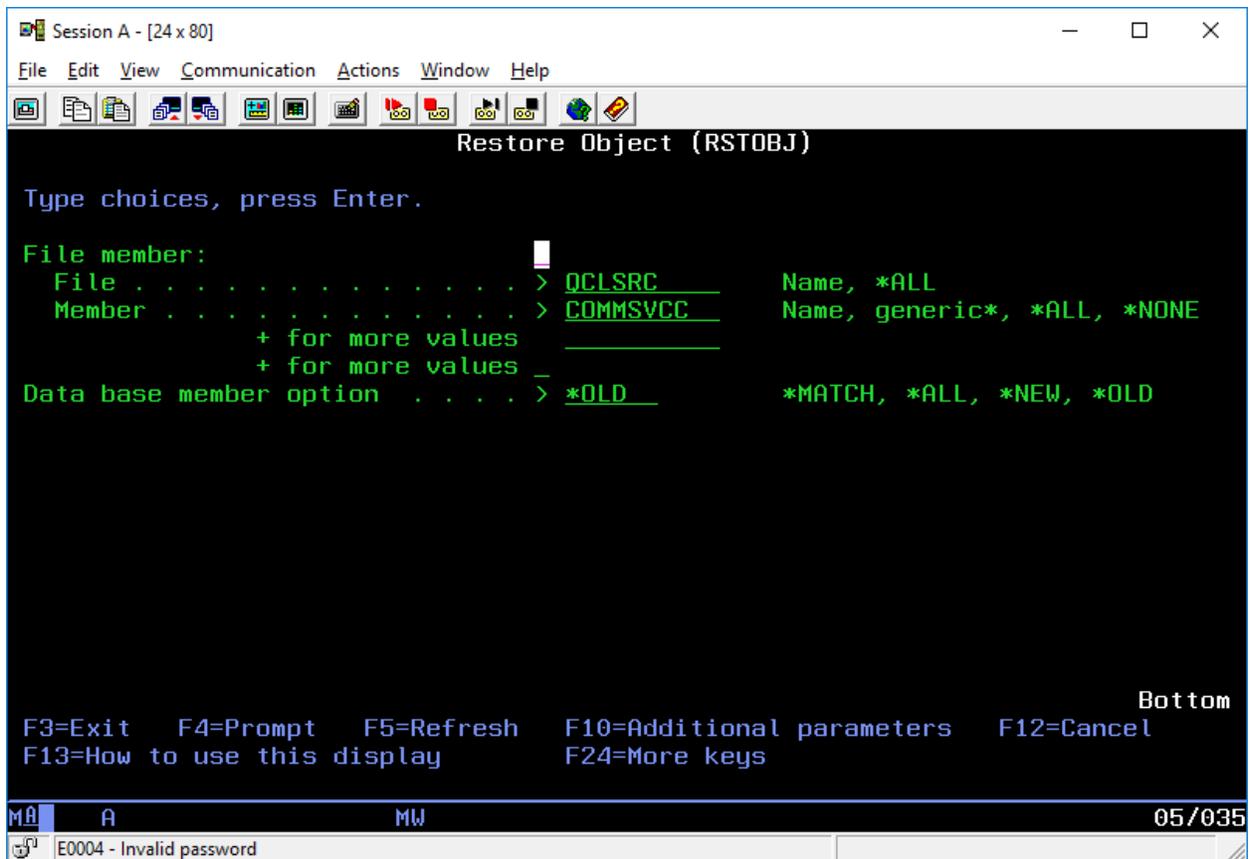


Figure 29: Member Restoration, panel 2

4.3.2.2 DLO System Inquiries

To review DLO folders and documents, use option 8-DLO Content on the desired volume. The DLO folder view appears:

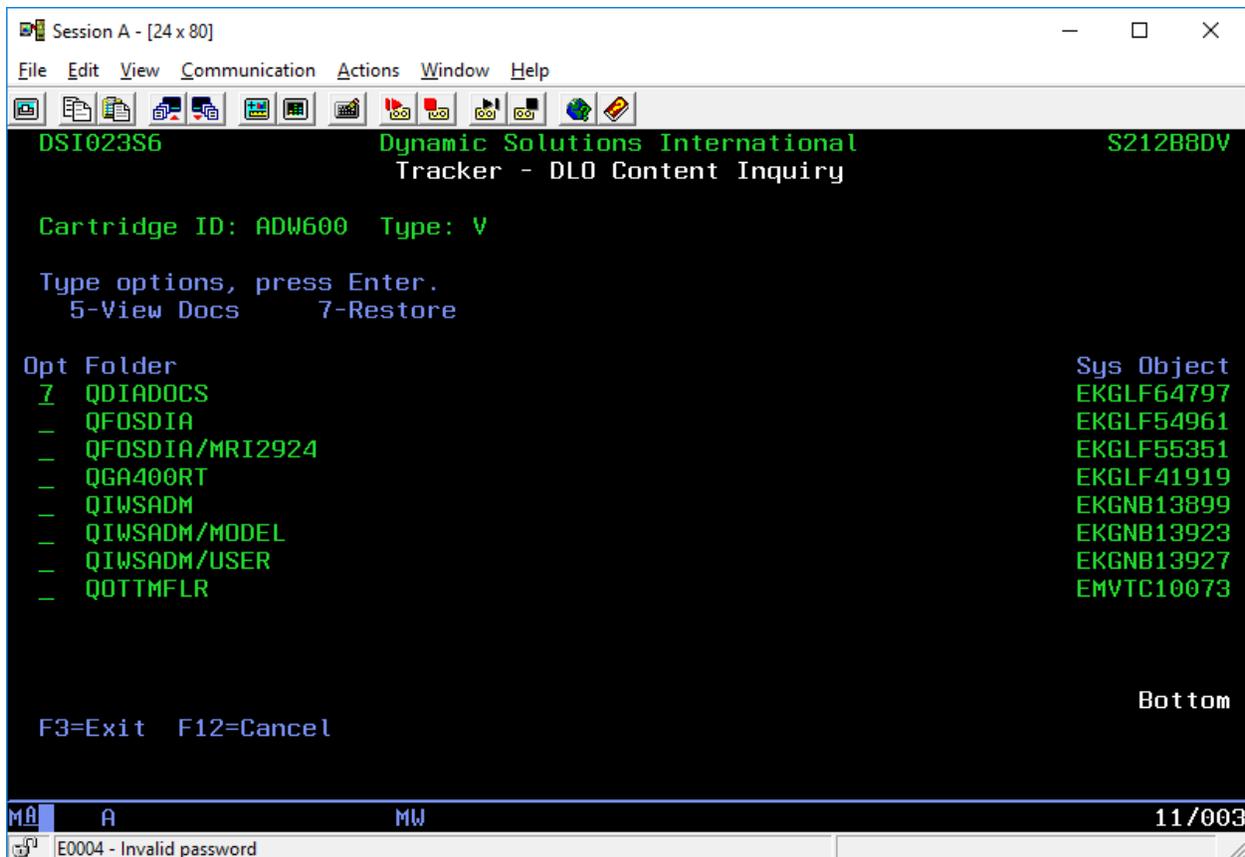


Figure 30: DLO Folder view

From this panel users may choose to drill into folder documents (where applicable, next topic) or may request Tracker format and present a RSTDLO command for the selected folder, as shown above for the “QDIADOCs” folder. The RSTDLO command presented is shown in the images below.

Note: the RSTDLO command is presented with default values; user-entered modifications may be required to complete the command entry for non-standard restorations.

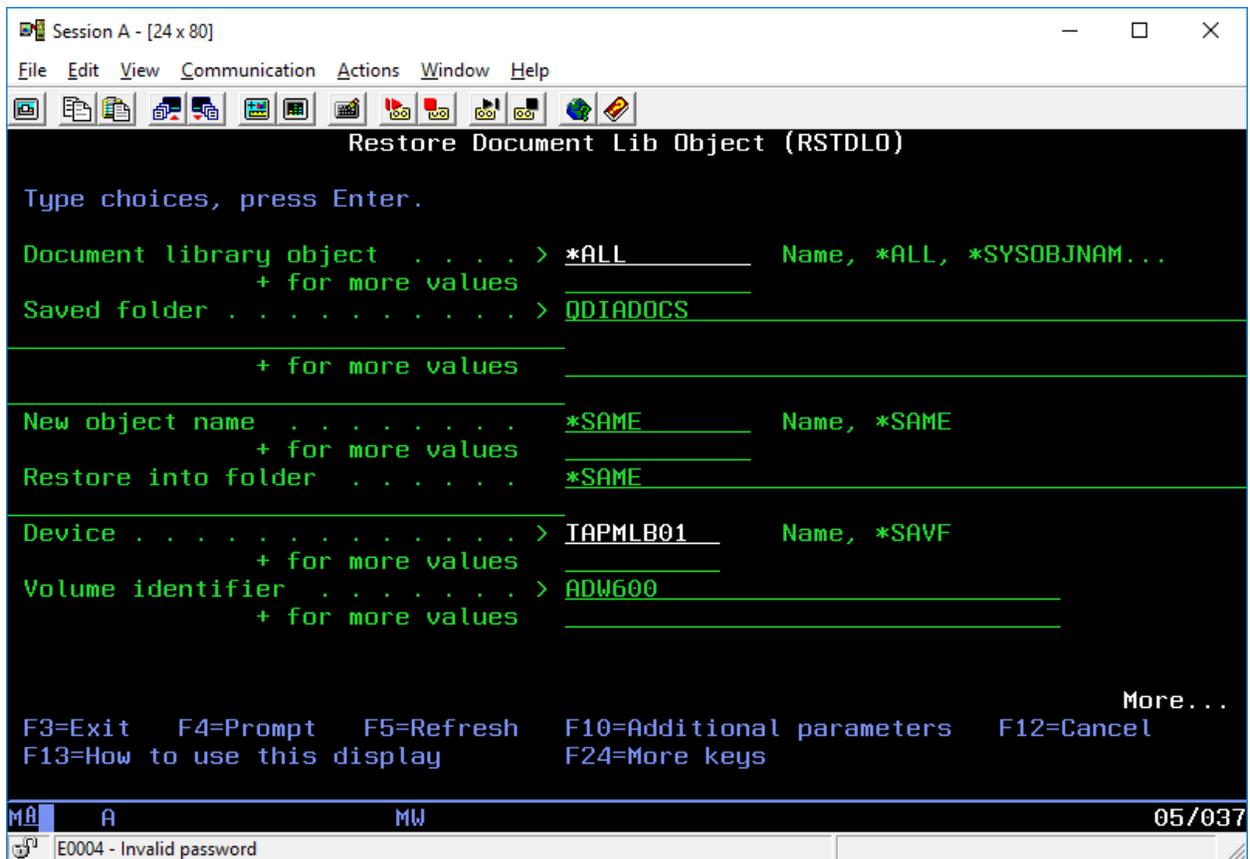


Figure 31: RSTDLO Command, panel 1

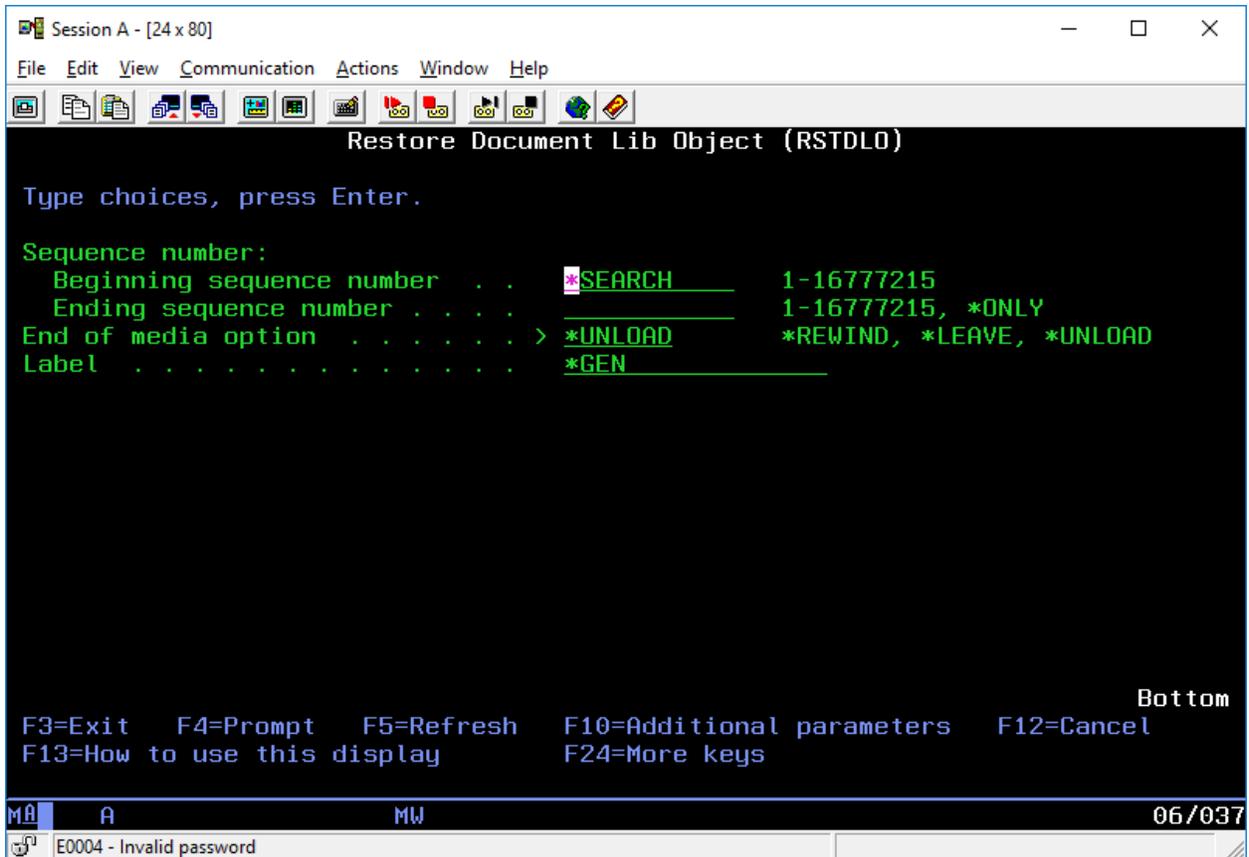


Figure 32: RSTDLO command, panel 2

Folder content can be viewed by using option 5 from the DLO inquiry panel. The next panel shows that panel for the same QIADOCs folder selected above:

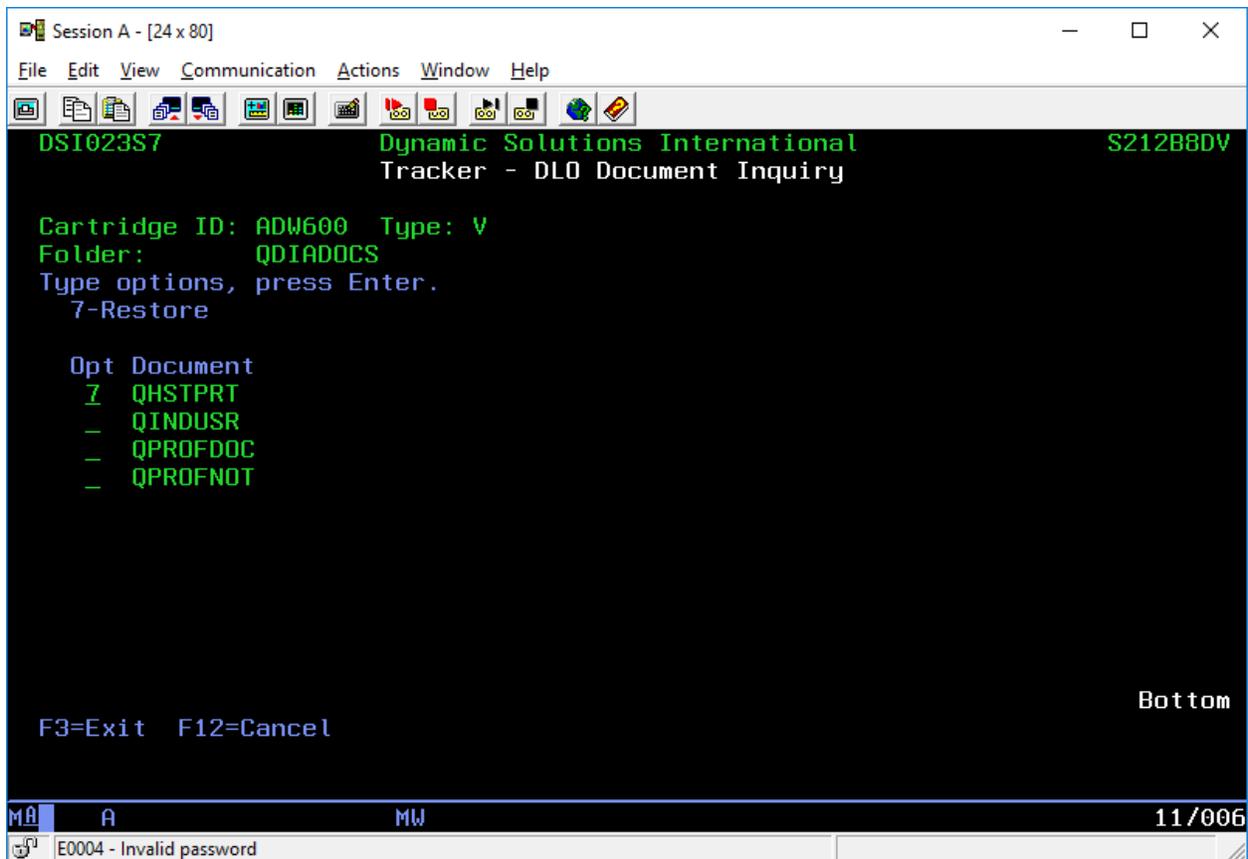


Figure 33: DLO Document View

Using option 7 from this panel prepares and displays a RSTDLO command for the selected document, as shown in the image below:

Note: As with the other pre-formatted restore commands, alterations to the provided parameters may be required to meet specific restoration requirements.

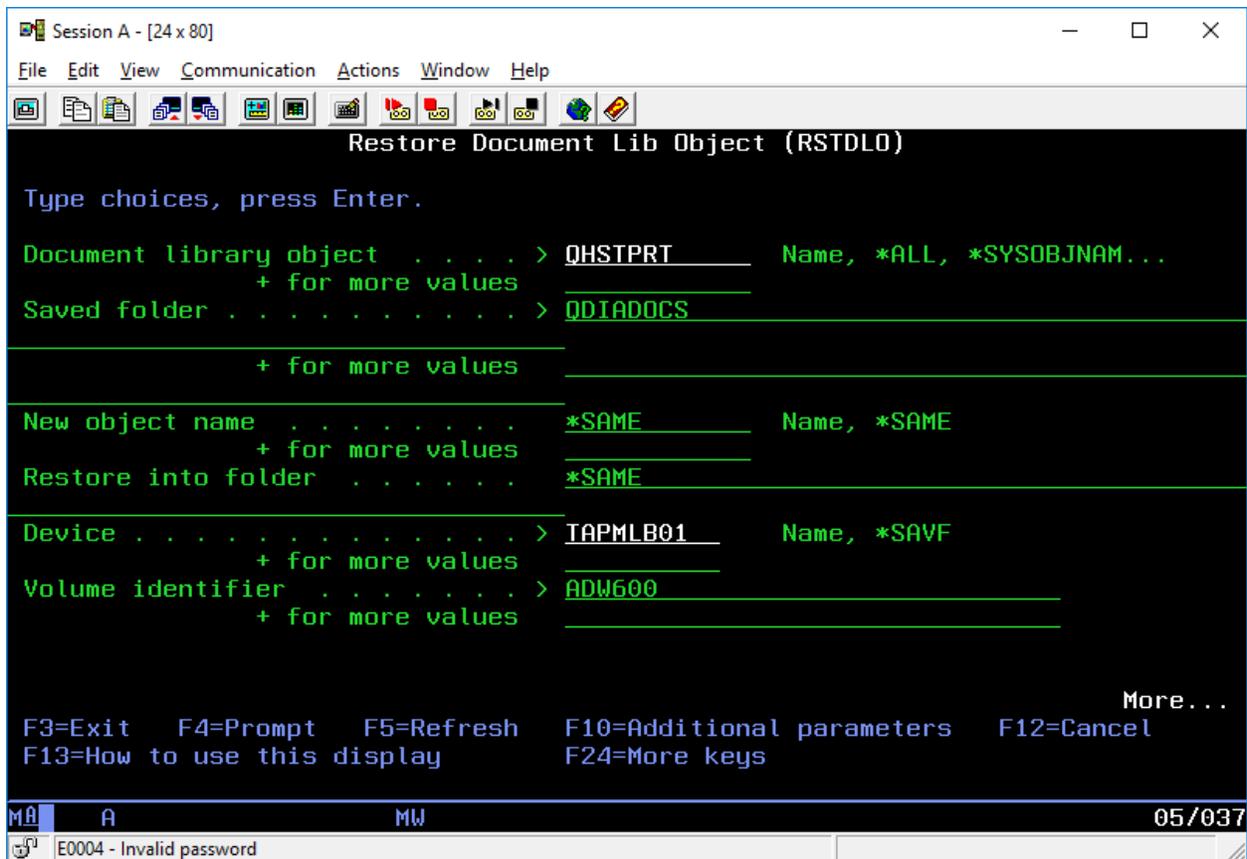


Figure 34: Restore a document

4.3.2.3 Integrated File System Inquiries

To review media IFS content, use option 9-IFS Content on the desired volume. The panel shown below is presented:

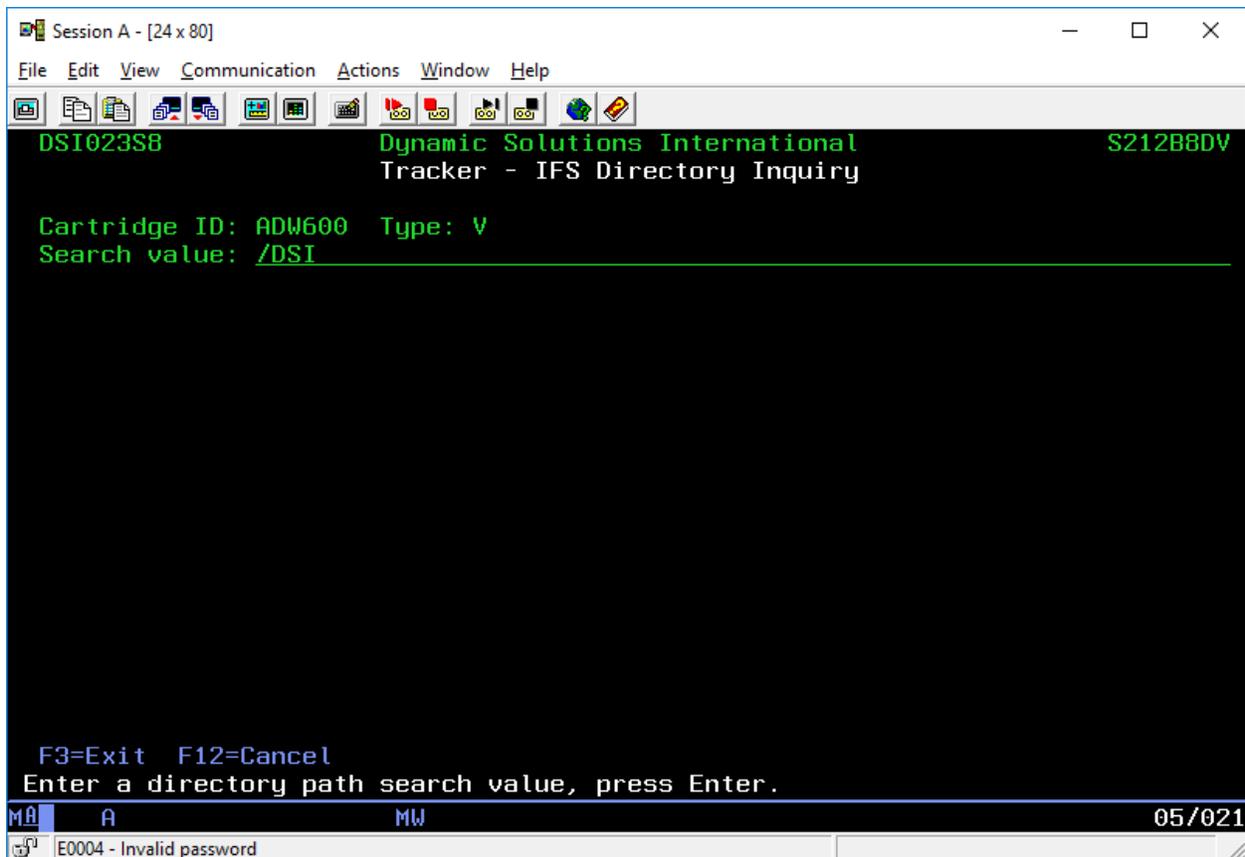


Figure 35: Searching IFS Content

To locate a specific directory enter a directory search string that uniquely identifies the path to be interrogated. In the above example, the /DSI path is our target. Upon pressing Enter, the results panel is presented, as shown below.

Note: *the search value is entered in CAPS; the search is not case-sensitive. Searching for /Java will return paths containing /JAVA, /Java, /java or any other combination of upper/lower case characters.*

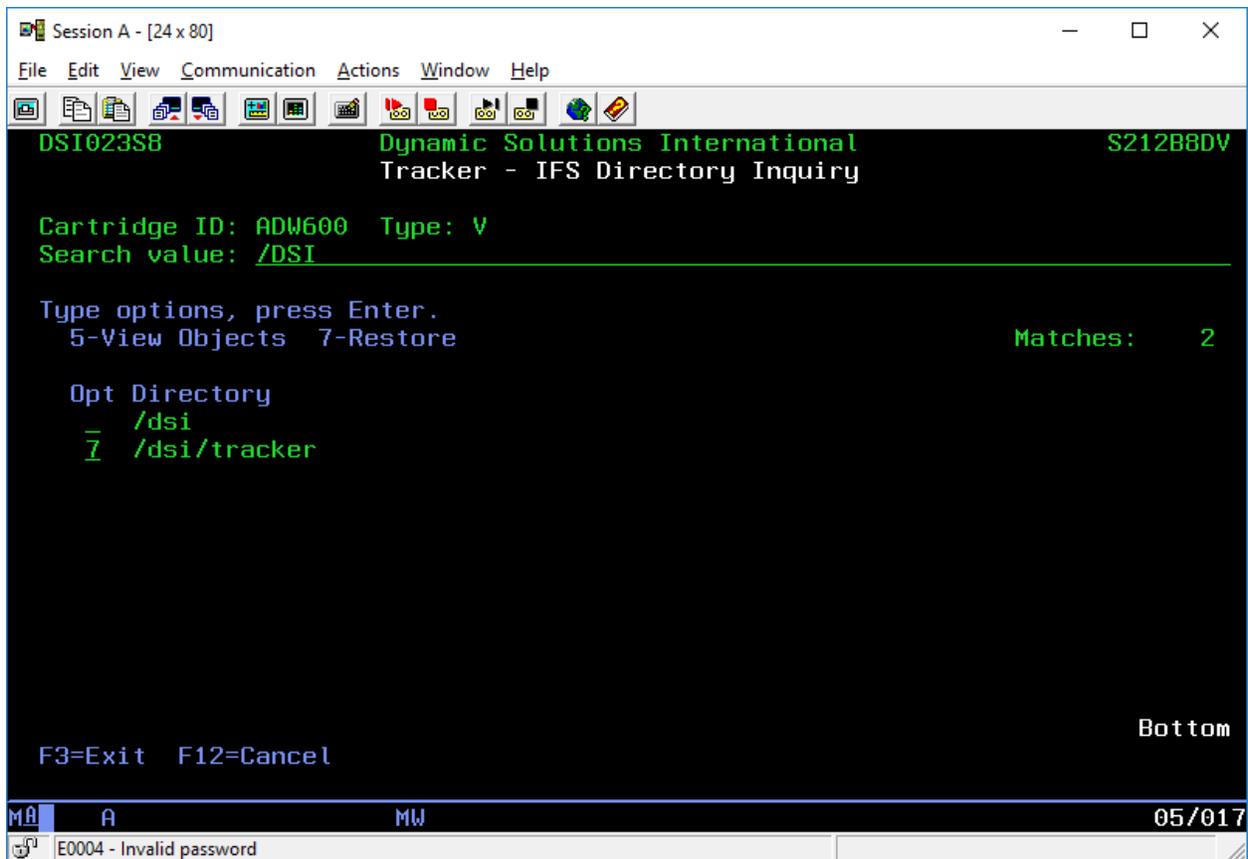


Figure 36: IFS directory search results

Each path that contains the search string will be displayed along with a count of matches. From this panel, users can either drill into directory files (discussed below) or select to restore the selected directory as shown in the image above for directory `/dsi/tracker`. The RST command for the selected path is displayed in the following image:

Note: *As with the other pre-formatted restore commands, alterations to the provided parameters may be required to meet specific restoration requirements.*

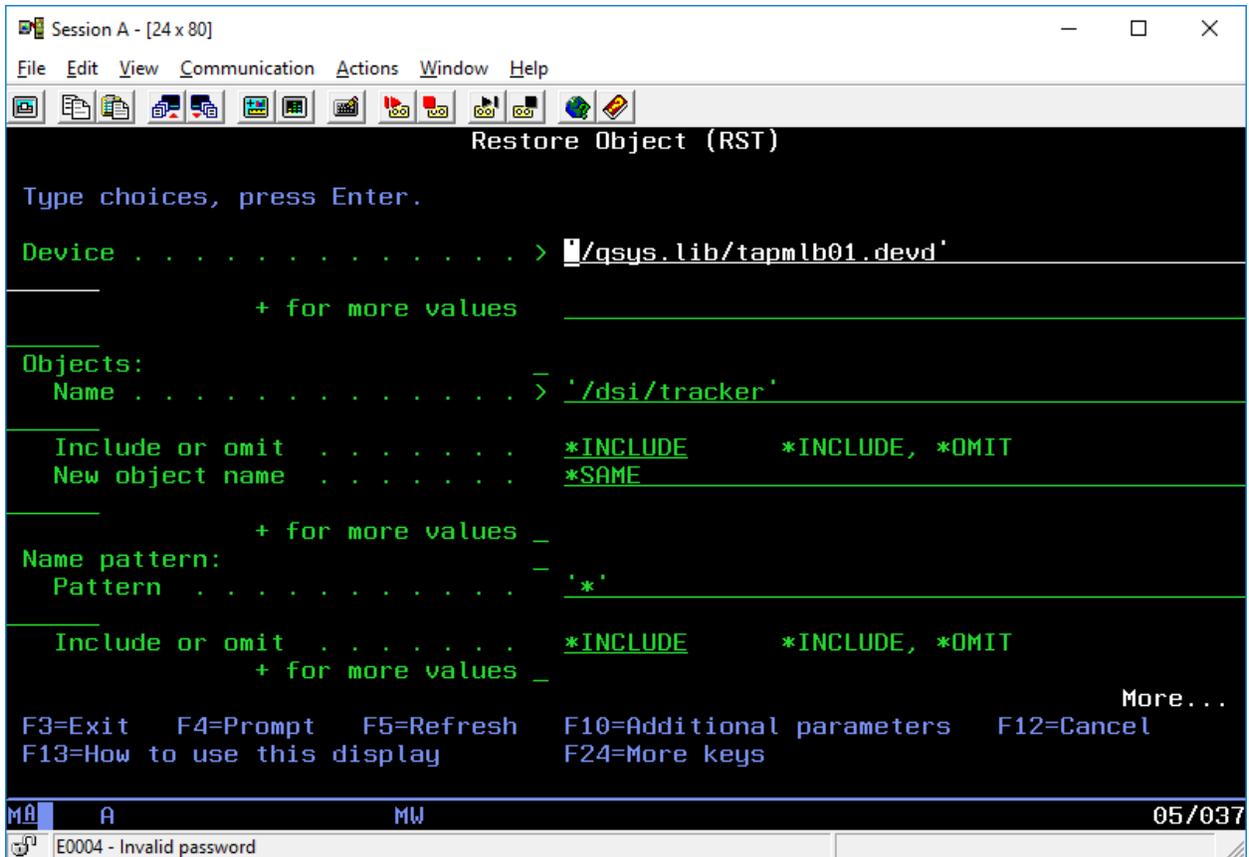


Figure 37: Restoring a Directory

To view the objects within a directory, use the 5-View option from the search results list. The following display appears:

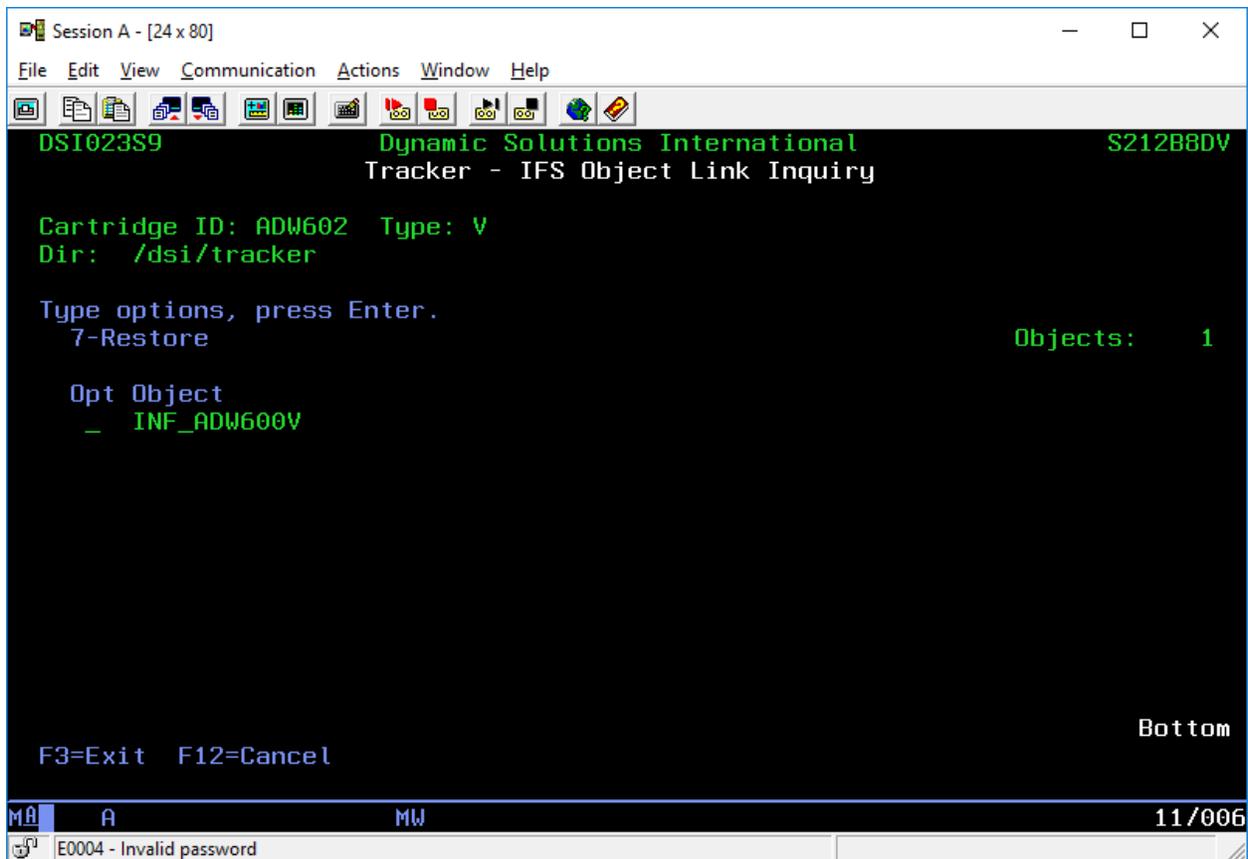


Figure 38: Directory Object View

Using option 7 from this panel produces a RST command for the specified object, as shown in the following images.

Note: As with the other pre-formatted restore commands, alterations to the provided parameters may be required to meet specific restoration requirements.

Note: Only directory objects that were successfully saved to the indicated volume will be presented. Objects that did not save are ignored.

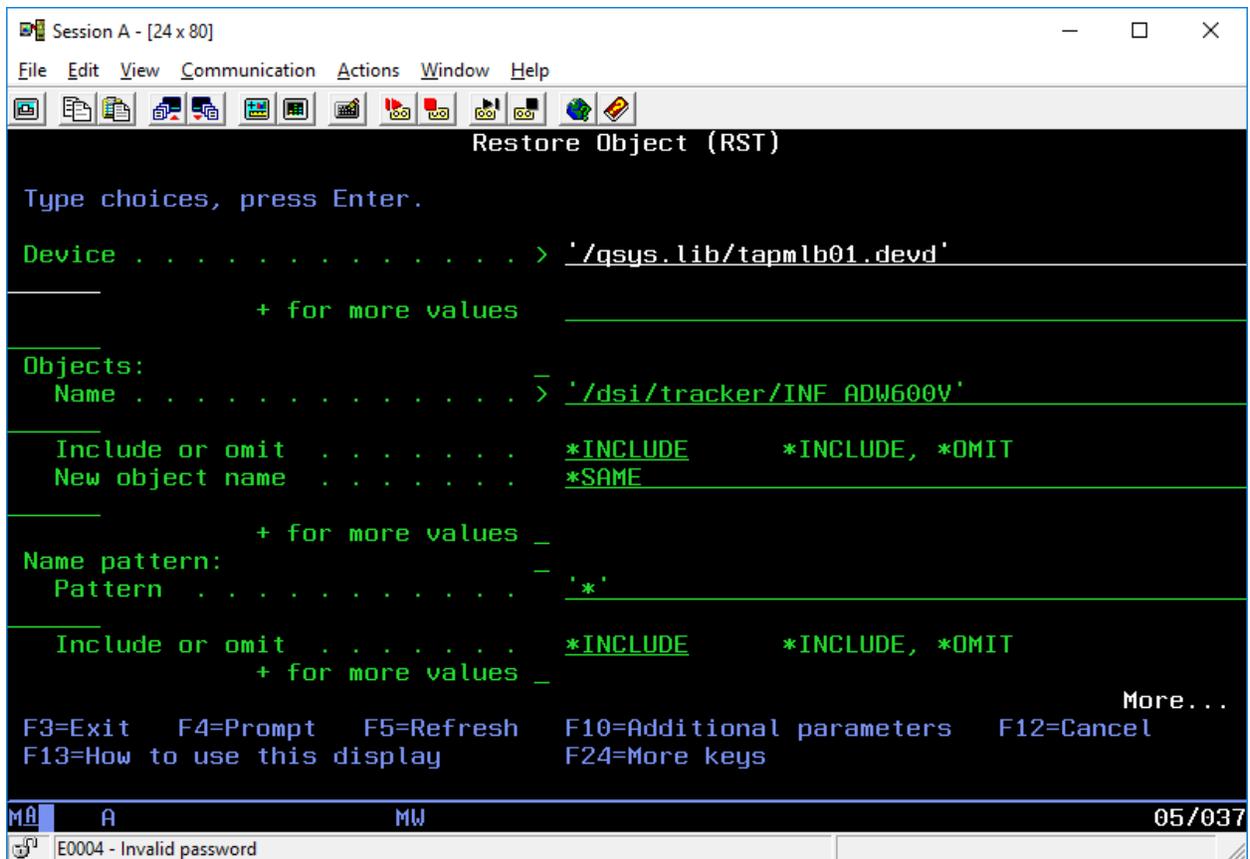


Figure 39: Directory Object Restoration, panel 1

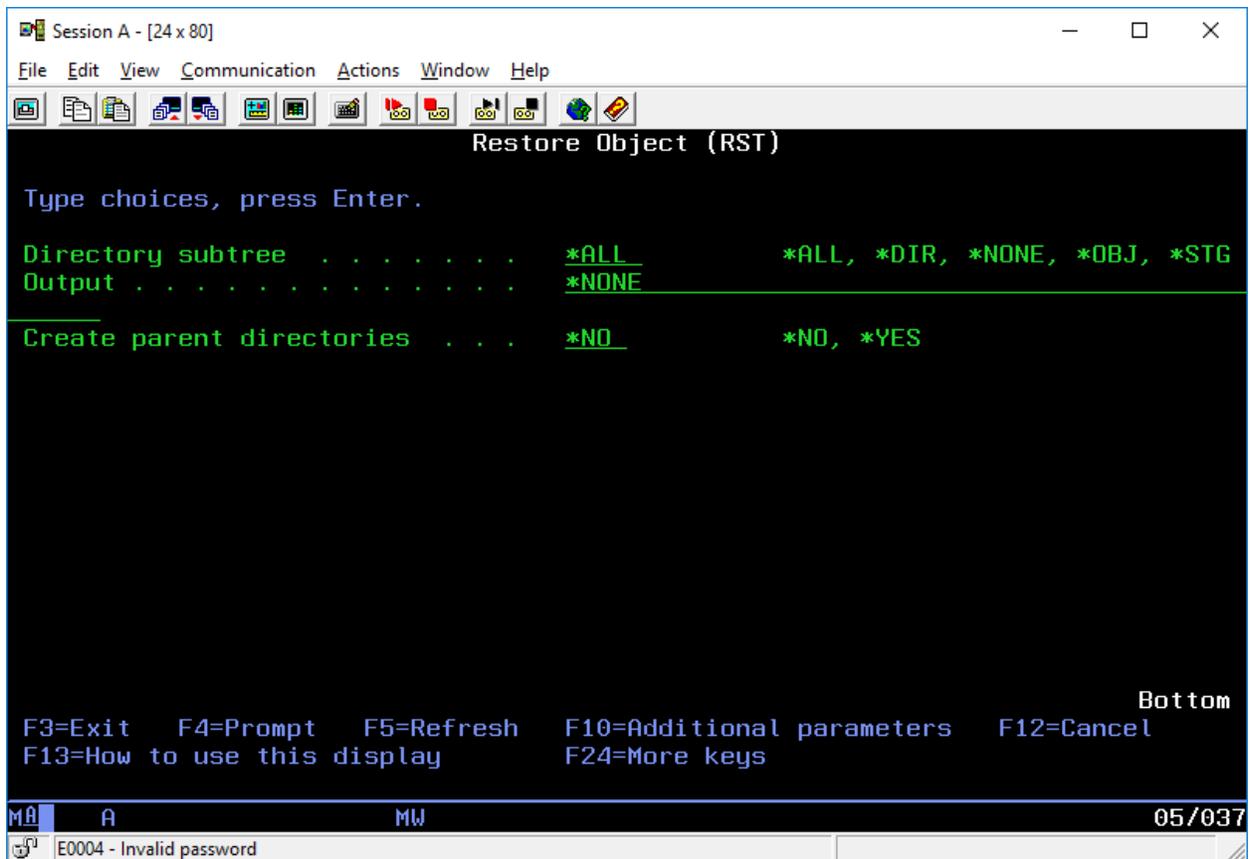


Figure 40: Directory Object Restoration, panel 2

5. Media Reports

Tracker provides three media report types that can be run on-demand from the Tracker menu:

1. Media Expiration Reports
2. Media Movement Reports
3. Active Media Inventory Reports

5.1 Media Expiration Reports

Selecting option 16-Media Expiration Report displays the following command panel:

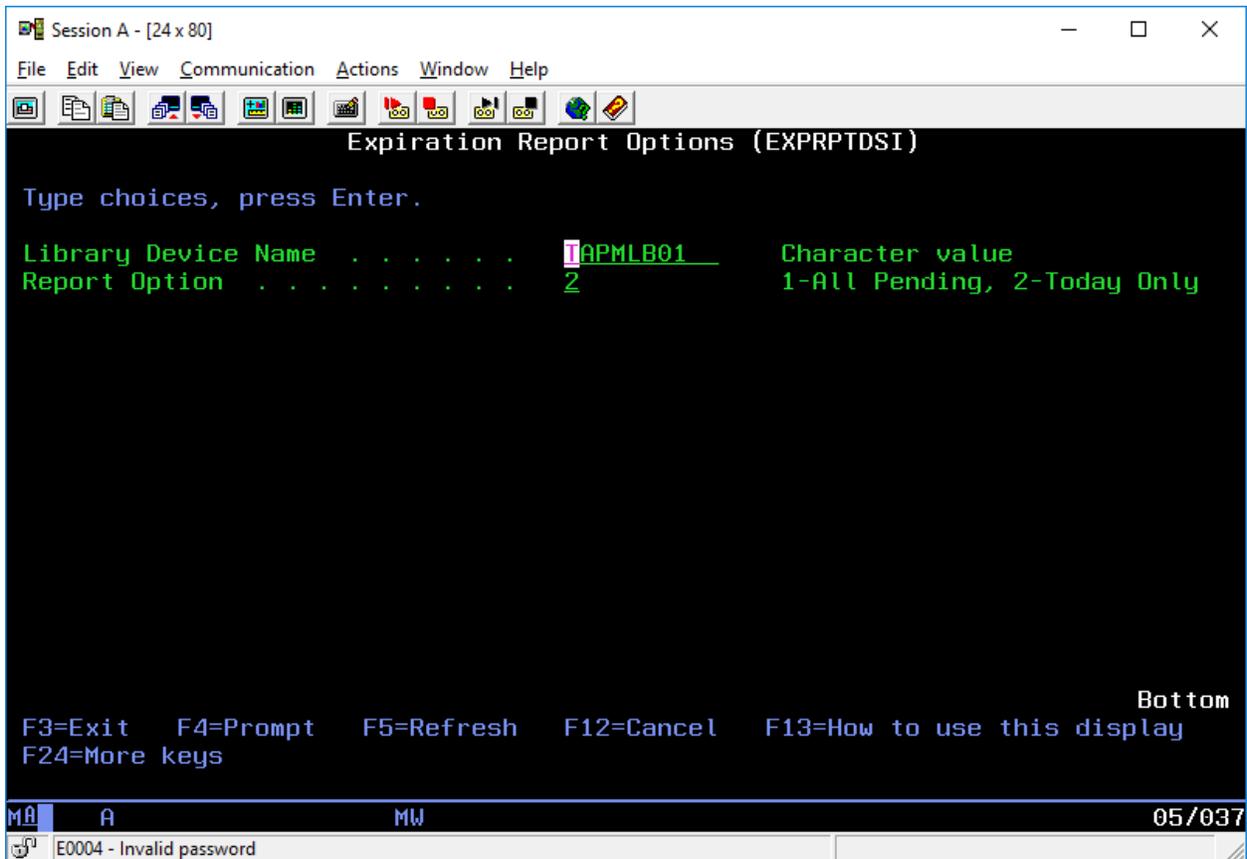


Figure 41: Expiration Report Options

Identify the library device for which the report is to be run and the content option. This report can be generated to produce a list of all media due to expire “today”, or the report can be requested to include all media with a pending expiration date.

This report can also be run on demand from the command line or embedded in software using the form

<your Tracker library >/EXPRPTDSI LIBRARY(TAPMLBxx) OPT(1 or 2)

See the “Report Samples” section for examples of the Expiration reports.

Note: *The daily version of this report is produced when the STRMNTDSI command is configured to run daily. See the “Commands” section for more information on the STRMNTDSI command.*

5.2 Media Movement Reports

Selecting option 17-Media Movement Report displays the following command panel:

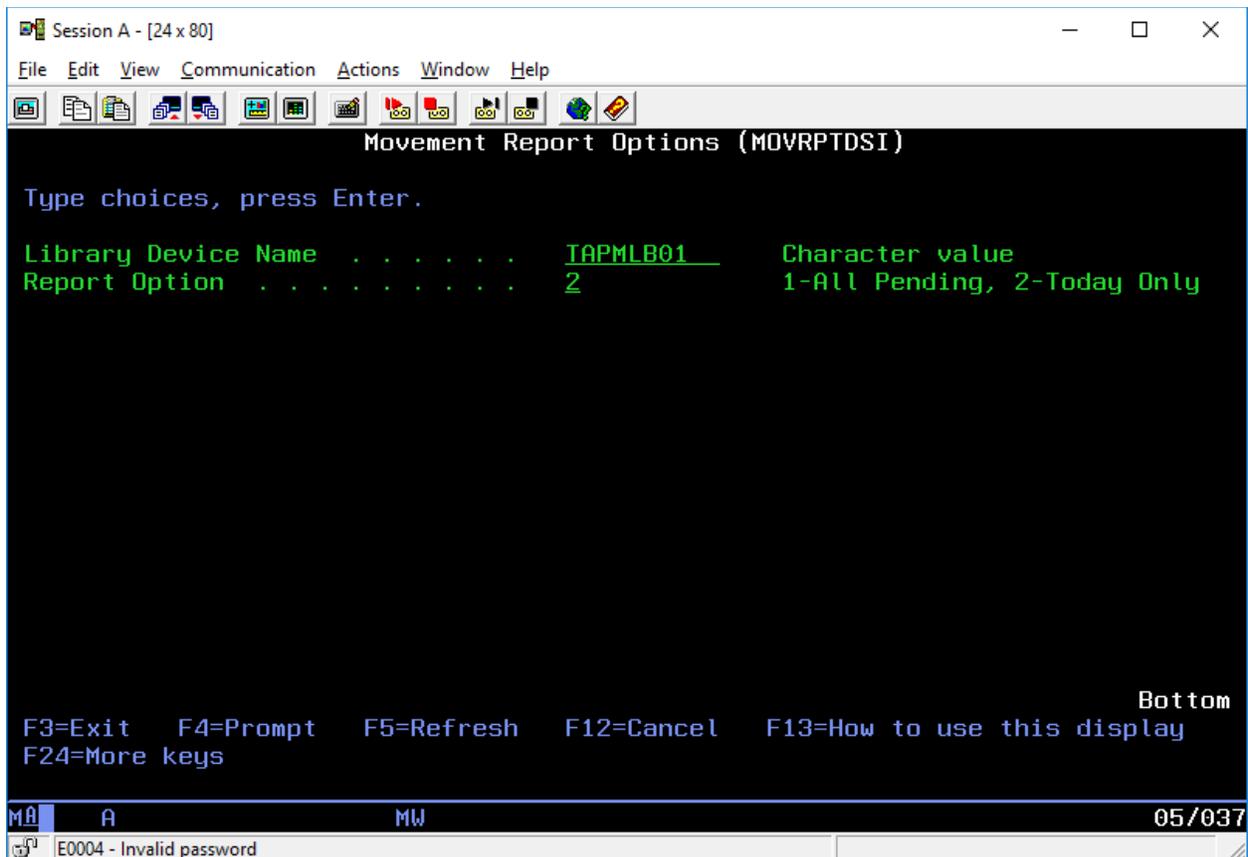


Figure 42: Movement Report Options

Identify the library device for which the report is to be run and the content option. This report can be generated to produce a list of all media due to move “today”, or the report can be requested to include all media with a pending movement date.

This report can also be run on demand from the command line or embedded in software using the form

<your Tracker library >/MOVRPTDSI LIBRARY(TAPMLBxx) OPT(1 or 2)

See the “Report Samples” section for examples of the Movement reports.

Note: *The daily version of this report is produced when the STRMNTDSI command is configured to run daily. See the “Commands” section for more information on the STRMNTDSI command.*

5.3 Active Media Inventory Report

Selecting option 18-Media Inventory Report displays the following command panel:

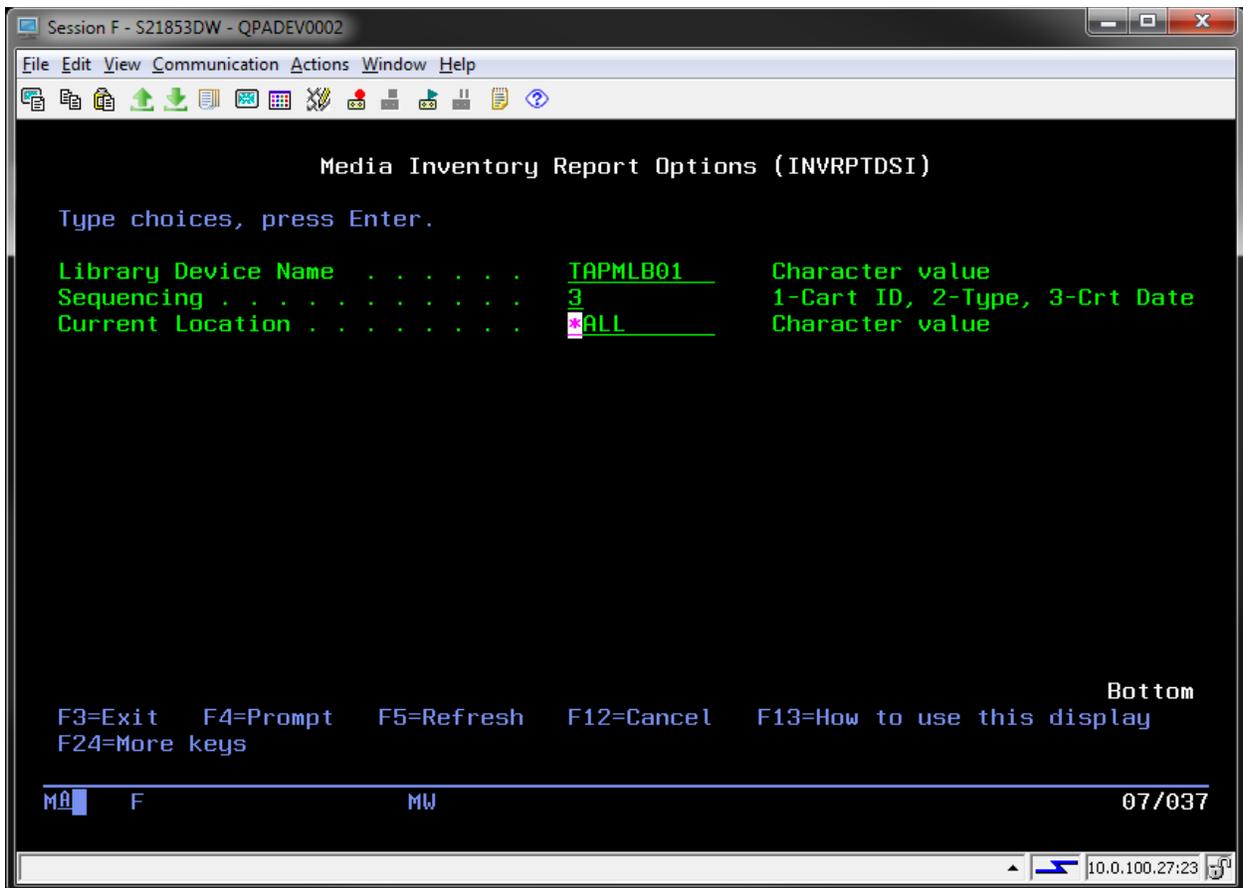


Figure 43: Movement Report Options

Identify the library device for which the report is to be run, the desired sequence (by Cartridge ID, Media Type/Cartridge ID or by created date) and qualify the location to report.

This report can be generated to produce a list of all library media or media in specific locations.

See the “Report Samples” section for examples of the Inventory reports.

6. Daily Maintenance

The following command should be executed after each backup job completes.

6.2 Daily Maintenance Command – STRMNTDSI

The command “<your Tracker library>/STRMNTDSI” must be executed or scheduled to run after the execution of daily backup job(s). It must be run once for each virtual library integrated with Tracker (usually this will be one library).

This command identifies any media pending expiration and/or movement, performs data maintenance related to those activities and produces daily Media Expiration and Media Movement reports for the specified library. It also identifies and processes information for newly-used media.

It is the responsibility of the user to ensure the moves indicated by the move reports occur. This is very important in ensuring scratch pools have enough expired media available to support the backup strategy.

Command line form: <your Tracker library>/STRMNTDSI LIBRARY(TAPMLBxx) EXP(*YES) MOV(*YES)

This command can be:

- added to your Job Scheduler to run at a time after the daily backup job(s) has run, or
- embedded into and executed after the end of save commands via custom backup software that may be in place.

The SETMEDDSI command prompt is shown below. It accepts the following parameters:

- Library Device Name: the name of the library containing media to process
- Run Daily Expiration: *YES or *NO
- Run Daily Movement: *YES or *NO

Note: *This command can be ‘split’ to run daily expiration and daily movement activities at different times, when applicable.*

Note: *When integrating Tracker with Conductor, and where Conductor is using automated policies to manage virtual media duplication/replication, this command should be run once post-backup without the expiration and movement options to allow tracker to determine media usage and apply category rules. At some point after the post-save duplication activities have occurred, the command should then be re-executed with the expiration and movement options to complete daily processing.*

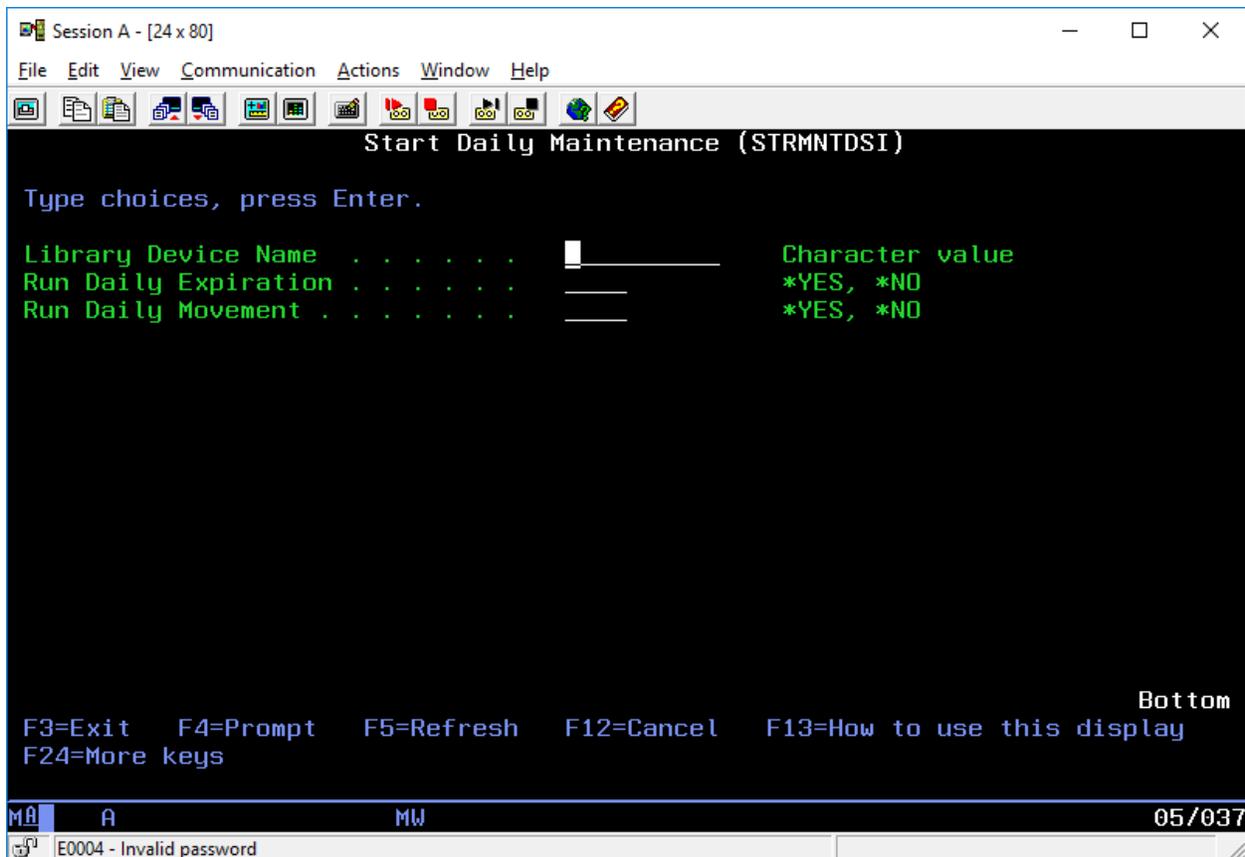


Figure 44: STRMNTDSI command prompt

7. Tracker Commands

Information about the commands described earlier in this document is presented here, including potential *ESCAPE messages that may be encountered, where applicable.

Command-produced reports will be delivered to the OUTQ defined for the job running the report.

EXPRPTDSI – Produce the daily or comprehensive media expiration report.

Form: <your Tracker library>/EXPRTPDSI LIBRARY(TAPMLBxx) OPT(x)

Where:

LIBRARY: your library device name.

OPT: 1 indicates all media pending expiration should be reported; 2 indicates only media expiring “today” are reported. If an invalid option is presented, the software will default to option 2.

*ESCAPE messages:

ERR1019: The library device specified does not exist or is not current active.

INVRPTDSI – Produce the Active Media Inventory Report.

Form: <your Tracker library>/ INVRPTDSI LIBRARY(TAPMLBxx) SEQUENCE(x) LOCATION(xxxxxxxxxx)

Where:

LIBRARY: your library device name.

SEQUENCE: 1 – Cart ID 2- Media Type, Cart ID 3-Create Date. If an invalid sequence code is presented, the software will default to sequence 2.

LOCATION: *ALL to indicate all media locations; use a specific location to filter the report.

*ESCAPE messages:

ERR1019: The library device specified does not exist or is not current active.

ERR1021: The location must be *ALL or a defined location.

MOVRPTDSI – Produce the Media Movement Report.

Form: <your Tracker library>/ EXPRTDPSI LIBRARY(TAPMLBxx) OPT(x)

Where:

LIBRARY: your library device name.

OPT: 1 indicates all media pending expiration should be reported; 2 indicates only media expiring “today” are reported. If an invalid option is presented, the software will default to option 2.

*ESCAPE messages:

ERR1019: The library device specified does not exist or is not current active.

SETCGYDSI – When using default/non-default settings in the Category Rules definition, the SETCGYDSI command should be executed once prior to the beginning of daily backup activities. It is critical this command be scheduled to run the same date as the subsequent backup job or activity is to occur. For example, if backups are scheduled to run exactly at 00:00 (Midnight), then the backups should be pushed back a minute or two and a new scheduled job to execute this command should be run on or just after midnight.

Form: <your Tracker library>/SETCTYDSI LIBRARY(TAPMLBxx) (use your device name for the library to be managed in the “library” prompt).

Note: *If manual use of the library with the categorization capability is desired while the SETCGYDSI is scheduled and active, use of the *DEMOUNTED and then *MOUNTED options of the IBM SETTAPCGY command should be executed manually before the indicated save activity occurs.*

Note: *If this command is executed without default/non-default categories having been configured, it will take no action and issue messages to the caller and to the *SYSOPR message queue indicating an invalid usage has been specified.*

*ESCAPE messages:

ERR1019: The library device specified does not exist or is not current active (in Tracker).

STRMNTDSI – This command executes daily maintenance activities related to media expiration and media movement.

When **Conductor** is installed, to ensure **Conductor**-produced physical media moves the day it is created, execute this command after **Conductor**'s post-processing has completed, where applicable. Tracker will not move media that has pending **Conductor** activity.

Note: *this command can be scheduled or executed to do expiration and movement processing at different times.*

Form: <your Tracker library>/ STRMNTDSI LIBRARY(TAPMLBxx) EXP(yyyy) MOV(yyyy)

Where:

LIBRARY: your library device name.

EXP: *YES – run media expiration processing/reports; *NO – do not run processing/reports.


```

MEIMOV RPT                               DSI MEDIA TRACKER                               Run Date: 10/28/16
DEVICE: TABMLB01                         DAILY MEDIA MOVEMENT REPORT                       Run Time: 10:59:49
                                                Page Nbr: 0001

```

Cartridge ID	Media Type	Current Category	Chg Date	Expired?	Exp Date	Curr Locn	Next Locn	Move Date	Locn End Date	Move Type
ADW606	V	VRTRETAIN	10/28/16	N	10/31/16	TABMLB01	VAULT	10/28/16	10/31/16	*MANUAL

*** End of Report ***

Figure 46: Movement Report Example

Media Inventory Report: This report lists the current state of all active media for a library, with the most recently used media shown at the top of the report.

```

MEDINVRPT                               DSI MEDIA TRACKER                               Run Date: 10/28/16
DEVICE: TABMLB01  SEQUENCE: Media Type  LOCATION: *ALL  LIBRARY MEDIA INVENTORY REPORT  Run Time: 11:10:04
                                                Page Nbr: 0001

```

Cart ID	Volume ID	Media Type	Home Category	Current Category	Chg Date	Expired?	Exp Date	Curr Locn	Media Status
ADW600	ADW600	V	*NOSHARE	*NOSHARE	10/27/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW601	ADW601	V	*NOSHARE	*NOSHARE	10/27/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW602	ADW602	V	*NOSHARE	*NOSHARE	10/27/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW603	ADW603	V	*NOSHARE	*NOSHARE	10/27/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW604	ADW604	V	*NOSHARE	*NOSHARE	10/28/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW605	ADW605	V	*NOSHARE	*NOSHARE	10/28/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW606	ADW606	V	*NOSHARE	VRTRETAIN	10/28/16	N	10/31/16	VAULT	*AVAILABLE
ADW607	ADW607	V	*NOSHARE	*NOSHARE	10/28/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW608	ADW608	V	*NOSHARE	*NOSHARE	10/28/16	Y	*NONE	TABMLB01	*AVAILABLE
ADW609	ADW609	V	*NOSHARE	*NOSHARE	10/28/16	Y	*NONE	TABMLB01	*AVAILABLE

*** End of Report ***

Figure 47: Inventory Report Example

8.2 Tracker Usage Example

The following source code represents a CLLE bound program that indicates how to:

1. Use the SETTAPCGY command to manage the virtual library and media
 - a. See the IBM i command reference for more information on use of the SETTAPCGY command.
2. Alter the various SAV* commands to write save information to the tracker database/IFS directory;
3. Execute the STRMNTDSI command.

```

/*****
/* Sample program source indicating how to adapt IBM SAV* commands  */
/* and integrate Tracker commands into save activities.             */
/*                                                                    */
/* SETMEDDSI/STRMNTDSI commands may also be scheduled or executed  */
/* on-demand via the command line                                   */
/*****

```

```

PGM                PARM(&LIBRARY)

DCL                VAR(&LIBRARY) TYPE(*CHAR) LEN(10)

```

```

/* SAVSYS: Load Media from the *IPL category */
/* Assign selected media to the IPLSAVE category */
/* Retrieve media in cart seq if possible */

SETTAPCGY DEV(&LIBRARY) OPTION(*MOUNTED) CGY(*IPL) +
          CTGORDER(*NEXTAVAIL) TGTCGY(IPLSAVE)

/* Sample SAVSYS media content output example */

SAVSYS    DEV(&LIBRARY) ENDOPT(*UNLOAD) +
          OUTPUT(*OUTFILE) +
          OUTFILE(DSIMGR/QASAVOBJD) OUTMBR(*FIRST +
          *ADD)

/* DE-MOUNT THE *IPL CATEGORY */

SETTAPCGY DEV(&LIBRARY) OPTION(*DEMOUNTED)

/* Mount the *NOSHARE category */
/* Assign selected media to the VRTRETAIN category */
/* Select media in the order it was added to the cgy */

SETTAPCGY DEV(&LIBRARY) OPTION(*MOUNTED) CGY(*NOSHARE) +
          CTGORDER(*SEQ) TGTCGY(VRTRETAIN)

/* SAVLIB media content output example */

SAVLIB    LIB(*NONSYS) DEV(&LIBRARY) +
          ENDOPT(*LEAVE) UPDHST(*YES) +
          OUTPUT(*OUTFILE) +
          OUTFILE(DSIMGR/QASAVOBJD) OUTMBR(*FIRST +
          *ADD) INFTYPE(*MBR)

/* Note all SAV* commands excepting the SAVDLO and SAV */
/* use the same target content table ( QASAVOBJD ) */

/* DLO media content output example */
/* NOTE DLO output to a different target file */

SAVDLO    DLO(*ALL) DEV(&LIBRARY) ENDOPT(*LEAVE) +
          OUTPUT(*OUTFILE) +
          OUTFILE(DSIMGR/QAOJSVOD) OUTMBR(*FIRST +
          *ADD)

/* IFS media content example */
/* output written to binary streamfile */
/* /dsi/tracker/INF_IFS */

SAV DEV('/qsys.lib/' *CAT &LIBRARY *TCAT '.devd') OBJ(('/' *') +
      ('/QDLS' *OMIT) ('/QSYS.LIB' *OMIT)) +
      OUTPUT('/dsi/tracker/INF_IFS') +
      ENDOPT(*UNLOAD)

/* De-mount the *NOSHARE Category */

```

```
SETTAPCGY  DEV(&LIBRARY)  OPTION(*DEMOUNTED)

/* Tracker Command Integration          */

/* Executes media expiration and movement */
/* Produces expiration and movement rpts */
/* Identifies/processes newly used media */

/* When CONDUCTOR is installed and is    */
/* managing the library the command will  */
/* automate virtual media movement, if    */
/* applicable.                            */

/* When CONDUCTOR is installed, is      */
/* managing the library and there are     */
/* automated duplication policies defined */
/* for applicable categories, movement    */
/* for media of those categories cannot   */
/* not be performed until Conductor has   */
/* completed post-processing activities.   */
/* The command should be re-executed for  */
/* movement after post-processing has     */
/* completed to ensure virtual and/or     */
/* physical media produced "today" move   */
/* "today".                               */

DSIMGR/STRMNTDSI LIBRARY(&LIBRARY) EXP(*YES) MOV(*YES)

END:      ENDPGM
```