Conductor for IBM i
User Guide

Conductor for IBM i – User Guide

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Table of Contents

Table of Figures

Preface

Modern virtual tape technology provides new capabilities for securing and managing critical enterprise data. Using Conductor software can augment these new capabilities with industry-unique data, media and virtual device management opportunities.

This document describes how to leverage your virtual tape library or libraries, Conductor software and your media management software (IBM's **BRMS** or DSI's **Tracker**) to create improved DR and/or data security strategies enabled by the DSI virtual tape device and Conductor. And do a lot more, too.

Conductor helps the Virtual Tape Library customers achieve their modern goals simply, reliably and automatically, right from the IBM i host.

Product Introduction

The DSI VTL and Conductor offer a variety of new opportunities to the IBM i Administrator:

- to completely automate virtual media management/movement;

- to ensure expired virtual media is always available to the media manager, providing a safety net for backup systems;

- to create automated, schedulable, policy-driven actions to manage virtual media duplication, consolidation and/or archival activities;

- to more efficiently manage retained backup data/media;

- to help ensure the most efficient use of VTL storage;

- to assist in managing the virtual device from the IBM i interface.

Conductor can be installed in two configurations:

- as a stand-alone product responsible for managing activities for its host and the host's virtual library or libraries (single-instance mode for BRMS/Tracker), or

- when combined with the Enterprise option, in BRMS networks Conductor can manage media requirements and duplication activities for all partitions/virtual libraries in the network from a single IBM i host.

Conductor adds value to your hardware investment in each of the following areas:

Dynamic Virtual Media Management (DVMM): Conductor offers an understanding of your media management system that no other vendor can match. When integrated with IBM's **BRMS** or DSI's **Tracker** all media management functions can be fully automated and driven from the integrated media manager, as it should be. There is no need for the Administrator to be concerned with virtual media configurations, maintenance or movement.

Conductor's **DVMM**, when activated, enables a Conductor service that synchronizes the virtual media environment to match the media manager's media database, ensuring the two always are in harmony.

DVMM can automatically create new media inventories using the BRMS/Tracker/Conductor configuration as a guide, adding volumes as needed until equilibrium is reached. DVMM can also perform rolling migrations of existing media environments into DSI virtual media automatically, while preserving media information for legacy media until expiration allowing for a variety of data recovery options for legacy media data. Conductor with DVMM can even do both at the same time, where necessary.

Once media equilibrium is reached, Conductor and DVMM can step in when necessary to ensure a nominal number of expired media always exist for managed classes or categories, ensuring backups succeed no matter the state of the media manager or the media inventory.

Conductor and DVMM can move your media between the secure virtual vault and home libraries; DVMM can even move media between compatible managed libraries on the same device. All activities are driven by the automated movement instructions of the integrated media manager or by manual location changes via the media manager.

DVMM corrects all inventory inconsistencies automatically, ensuring unreconciled tape changes made in the GUI software or as a result of improper moves are corrected automatically, always returning the library to the last valid media manager state.

DVMM will even create removed or otherwise missing virtual tapes when the media manager inventories indicate expired media for which there are no related virtual media. This enables **DSM** (Dynamic Storage Management), a tool which allows the Administrator to use Conductor's duplication policies to manage local and remote virtual media inventories; remote copies of backup media can be automatically removed from remote devices upon expiration, and where applicable local media can be removed in advance of expiration.

From small stand-alone environments thru large BRMS networks, Conductor makes managing media simpler and more reliable than it has ever been.   See section **3.5 Defining Virtual Library Relationships** for more information.

Media Duplication/Consolidation: Conductor works alongside IBM's **BRMS** and DSI's *Tracker* to simplify and automate virtual media duplication/consolidation/archival requirements. Conductor can be configured to automatically and reliably execute a wide-ranging variety of these activities – on your schedule.

Conductor offers full duplication job management, inquiry and notification capabilities including a 2-key failed job recovery process.

See section **4 Automated Media Duplication Management** for more information.

Virtual Device Monitoring: Conductor can simplify your daily operations and monitoring activities by bringing all of your VTLs' key operating information directly into the IBM environment.   Most of the information about device information, job activity/results and event log messaging can be monitored directly on the IBM host right from the same QSYSOPR queue used by Admins and via DSI-specific message queues and applications within the Conductor software environment.

Backup Data/Physical Media Consolidation: For customers with significant physical retention requirements Conductor can help cut the costs of offsite storage media and the storage of that media by utilizing automated policies – sometimes working together - to consolidate long-retained backup data onto as few media as possible or to more efficiently organize related archival data before it is sent offsite.

Automated Physical Media Management: When using VTL-attached physical libraries/media, Conductor can automatically add new media to the BRMS inventory as it identifies and uses new media. This allows BRMS to manage and move physical volumes that it never sees. When integrated with Tracker, physical media is managed as soon as it has been added to the library.   In either case, all the Administrator need do is label and load physical tapes. Conductor does the rest.

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
  - Build 9310 or higher
  - Agent version 2.0.27 or higher
  - Virtual Libraries of type TS3500* emulation (L22, L32)
- A compatible physical media library or libraries (optional)
  - Libraries may be VTL-attached, host-attached, or both

Software Requirements

- Conductor software
- Media Management Software (optional)
  - IBM BRMS (Backup, Recovery and Media Services)
    - BRMS Networking Supported via Conductor's Enterprise option (BRMS Advanced Features required for Conductor Enterprise integration)
    - Conductor Enterprise Option (optional)
  - DSI Tracker

Licensing Requirements

- Both Conductor and the Conductor Enterprise option are licensed according to the numbers of processors in use by partitions running the software.

- Valid license keys are required for each product to be utilized; there is no initial grace 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. BRMS Integration Considerations

1.1 Planning for Conductor

Before installation and configuration of the Conductor software, DSI recommends that existing backup/recovery and media management strategies be reevaluated in the virtual library/Conductor context. Those new to VTL usage may find that the new capabilities offered via the DSI VTL and Conductor may offer opportunities to improve upon their current strategies.

It is recommended a thorough review of this manual be undertaken in order to understand the new capabilities offered by the DSI VTL and Conductor software and evaluate them in the local context to determine which of these capabilities can be leveraged to improve DR and data archival plans.

The first consideration is whether or not to use DVMM's ability to manage media inventories.

In short, Conductor and DLMM can automatically correct discrepancies between the virtual library and the media manager database (in the favor of the database) and can ensure that even with enduring media maintenance failures, planning shortcomings and/or changes to the environment that scratch virtual media is always available for backup activities, given VTL space and open library slots.

More information on DLMM is available in **sections 3.5 – Defining Virtual Library Relationships** thru **3.6 – Configuring Managed Classes and Nominal Requirements for DLMM.**

Having considered DVMM, the next step is to understand post-save media duplication and management requirements, where applicable.

- Are all of the backup media going to be treated identically with respect to post-save activities or are there different actions required for different types of save activities (or for different host servers/partitions in BRMS networks)?

- Will backup data/media consolidation opportunities be leveraged?

- If a BRMS network is involved, will server-specific, enterprise or both types of processing models and automation policies be considered?

Conductor uses BRMS media classes and Tracker media categories to associate specific action policies to volumes. This implies that additional BRMS media policies and classes or Tracker media categories may be required to achieve discrete objectives.

For example, you may have different duplication/archival requirements for the following save types:

- *SAVSYS;
- Daily full or cumulative *NONSYS backups;
- Monthly backups
- Other backups

If each of the virtual media written by your backup activities are to be treated identically for duplication and/or archival purposes then no additional action is required to prepare virtual media for post-processing. Conductor policies can be configured to qualify tapes of any class found in the logical library's home location (BRMS) or a single category (Tracker).

When post-save-processing requirements vary for discrete media types/usage, a specific media class or category should be created or identified for that type/usage. For example, if you only wish to archive *SAVSYS backups to physical tape but your strategy indicates that all of the other saves/media are to be both written to physical media and also be "remote copied" to a DR site VTL, you would create two media classes or categories: One for the *SAVSYS usage and one for all other usage. These classes/categories will require corresponding media policies (BRMS) or category rules (Tracker) which describes their retention, movement, etc.

The media class or category associated with the *SAVSYS operation would then be associated with a single Conductor archival policy item (export to tape); the media class or category used by the rest of the strategy would then be associated to both an archival and a remote copy policy item. In BRMS environments an alternative would be to configure *ARCHIVE policies to process all media classes and then have a *REMCOPY policy to manage the non-*SAVSYS class.

Once you've reviewed the new capabilities offered by VTL and Conductor usage, identified your new post-processing requirements and finalized your new VTL DR and/or backup/recovery strategies, you're ready to configure BRMS and install and configure your Conductor software.

1.2 i5/BRMS Considerations

Confirm each of the following IBM/BRMS configuration requirements.

1.2.1 Managed Partition Host Names

The system names used by BRMS networking must be resolvable via Conductor. If necessary, use the "ADDTCPHTE" command to add each BRMS system name entry to the Conductor partition's host name entry table. For example, to add a system with an IP address of 192.168.10.1, use the following command (where SXXXYYYY is your BRMS system name):

ADDTCPHTE INTNETADR('192.168.10.1') HOSTNAME((SXXXYYYY))

1.2.2 Use of *APPEND in Save Activities

In the virtual world, usage of the *APPEND option should be carefully considered when performing remote replication without deduplication and/or utilizing export policies:

- When performing replications from/to a non-deduplicated appliance, when using the *APPEND option on save media you are in effect moving the existing data on the tape every time you add data to a tape.

- If you are using matched-volume *ARCHIVE physical exports to back up virtual volumes, the archival actions will be re-writing the same data already on the physical media, plus new data.

- In non-matched periodic *ARCHIVAL situations this places the same data on multiple tapes.

The APPEND option can be used on device-attached *DUPLICATE policies to stack virtual media content. If this option is used, the source virtual tapes should not be written with the *APPEND option to prevent redundant data storage.

Using *ALL server relationships with the *STACK policy group type allows you to consolidate virtual media written from one or more servers using a shared library onto common physical media. This is most effective when the bulk of virtual media uses half or less of the virtual tape capacity. For this reason, you should not "pre-stack" virtual media intended for physical *STACK situations.

1.2.3 Conductor Duplication Automation Qualification Requirements

1.2.3.1 Media Policies

Conductor automated duplication processing requires that Media Policies for applicable backup activities have the "Mark Volume for Duplication" value set to *YES.

Conductor's BRMS automation qualifies *ACTIVE, "Marked for Duplication" volumes in the home location of the device(s) being monitored to identify when to process virtual tape duplication/archival activities.   Conductor will release the "Mark Volume for Duplication" setting on virtual media as it completes post-processing.

Any existing software that may be processing media based on the "Mark Volumes for Duplication" setting should be disabled to avoid conflicts with Conductor automation.

1.2.3.2 Move Policies

When using the duplication capabilities of Conductor, move policies for virtual media must be set to "Move marked for duplication" = *NO.   This prevents BRMS from moving a virtual volume that is either currently being processed by or has had an export job scheduled by Conductor. Conductor will release the duplication mark once it completes the last duplication job for the volume, enabling BRMS to move the volume at that time.

Ensure move policies are referenced specifically in media policies or in backup commands when using DVMM to create and manage media. One thing Conductor can't do is predict the media policy that will access new virtual media; DVMM-created media will have a default *NONE value for the move policy.

1.2.3.3 Home Locations

In multiple library scenarios BRMS requires discreet library home location names.   Conductor requires these names match the name of the device to which they relate.   This allows Conductor to manage devices not available to the Conductor host.

1.2.3.4 Media Classes

BRMS' media class configuration includes a property to allow automatic initialization upon expiration. DSI recommends strongly this value be set to '*YES'.   This ensures the most efficient use of the VTL's storage by releasing space for expired volumes and can serve as a backup initialization capability should Conductor create a tape but be unable to initialize it (for example, when a remote server is not available). While QSYSOPR messages and optional emails are sent in these cases, it is recommended this setting be utilized as a backup.

1.2.4 BRMS Move Management/Media Maintenance Considerations

The DSI virtual tape library contains an internal virtual location called the "virtual vault". Using move management functions on virtual volumes to move media into the vault, while not necessary, can be advantageous for a variety of reasons.

Virtual tapes in the vault are analogous to physical tapes ejected from a physical library. It makes them invisible to the library's host(s). Moving virtual tapes into the vault while those volumes are active provides an additional layer of security for your local virtual backup data.

In addition, where DSI's "auto-export" capabilities are enabled on the VTL device for the library or the media, moving tapes into the vault is required to initiate the export.

BRMS can move the tape to the vault for you, but it can't move it back. That requires Conductor and DVMM.

Conductor requires a special BRMS location named "VAULT" in order to manage media movement and synchronization activities for virtual media. Create this location with the "Allow volumes to expire" value set to "*NO" and the *ORIGIN return location. Use the VAULT location in move policies and manual move requests from BRMS when moving tapes to the virtual vault. The *NO setting for expiration is required to ensure BRMS expires and initializes media while it is in the library.

1.2.4.1 Using DVMM to Automate Virtual Media Movement

Conductor and DVMM manage your virtual media movement for you according to movement activities undertaken by the media management system or by manual changes to the media information location.

When BRMS move policies or manual location changes indicate a currently-vaulted tape is to be returned to its library, DVMM moves the volume to the library automatically.

When BRMS move policies or manual location changes indicate the media is to move into another compatible library, DVMM does the move for you. There is no need for the Administrator to go anywhere near the VTL GUI.

DVMM will even auto-correct movement errors; for example, a move of a virtual tape to a non-compatible virtual library, to a non-managed virtual library or to a non-virtual library location.   In each case, BRMS is left out of sync, indicating a BRMS location while the tape is in the vault. DVMM will ensure the tape is returned to its last valid state/location and that BRMS is updated.

1.2.4.2 BRMS Moves of VTL-Managed Physical Media

A media and move policy for physical tapes must be created for each logical library that will "own" physical media if movement via BRMS for non-matched exports is desired.

In the example below, physical media is written to VTL-attached library media supporting virtual libraries TAPMLB01 and TAPMLB02.   For BRMS media information purposes, VTL-attached media is domiciled in the home location of the virtual library that has been written from.

The image below shows a sample media policy for physical tapes assigned to virtual library TAPMLB01. The virtual library home location has been assigned to the storage (home) location value for the virtual library (TAPMLB01) and the media policy references a move policy called OFFSITE01 (for offsite moves for TAPMLB01-exported media).   The OFFSITE01 move policy is presented in the subsequent image.
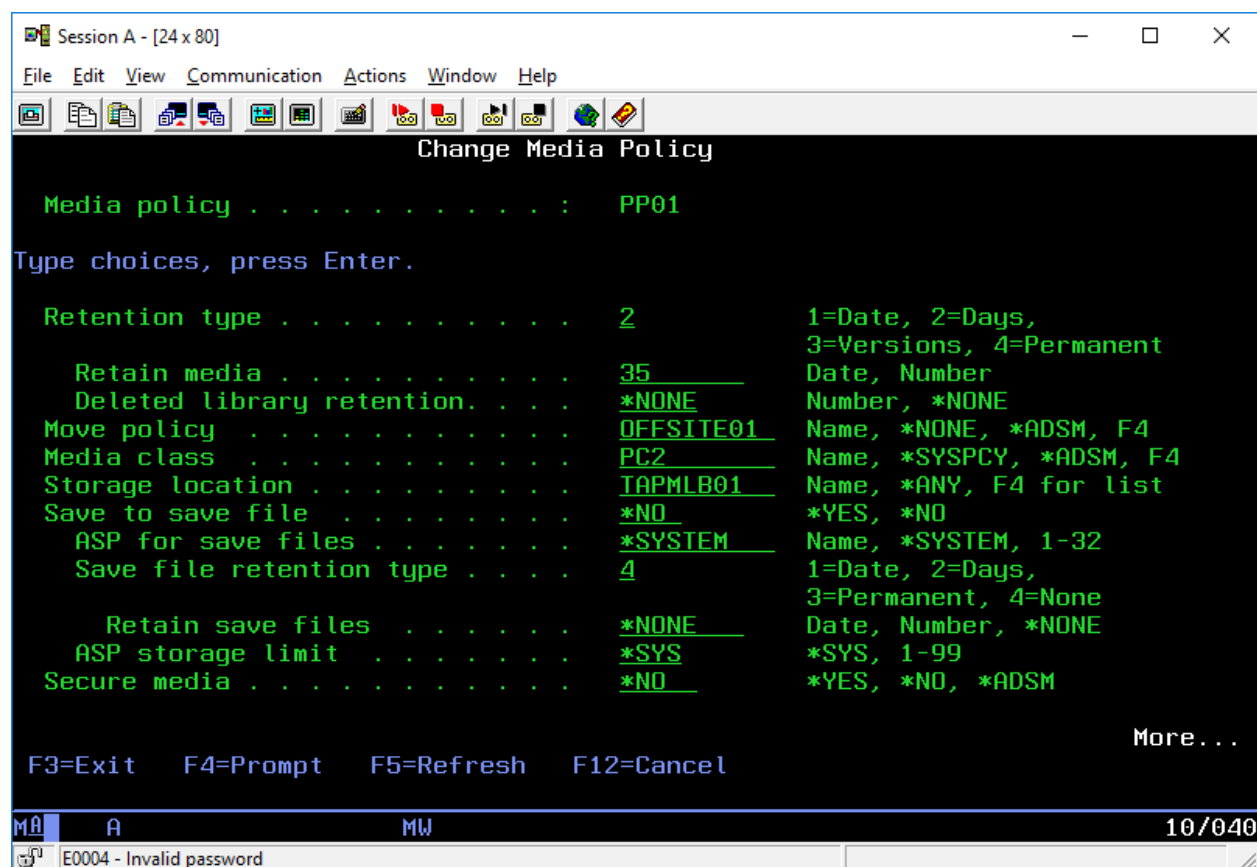
Figure 1: VTL-Attached Physical Media Policy (BRMS)

The move policy referenced in the above media policy is presented in the next image. It identifies the home location for this physical media as the home location for the virtual library having written the media, as per Conductor requirements for VTL-managed physical media.

```
Session A - [24 x 80]                                                    —    □    ×
File  Edit  View  Communication  Actions  Window  Help
                          Change Move Policy                      S212B8DV

Move policy  . . . . . . . . . :  OFFSITE01
Home location  . . . . . . . . .  TAPMLB01    Name, *SYSPCY, *ORIGIN, F4 list
Use container  . . . . . . . . .  *NO         *YES, *NO
Verify moves . . . . . . . . . .  *NO         *YES, *NO
Calendar for working days  . . .  *ALLDAYS    Name, *ALLDAYS, F4 for list
Calendar for move days . . . . .  *ALLDAYS    Name, *ALLDAYS, F4 for list
Move marked for duplication . .   *NO         *NO, *YES
Text . . . . . . . . . . . . . .  Move policy for TAPMLB01 VTL physical media


Type choices, press Enter.

  Seq    Location     Duration   Container Action

   10    OFFSITE      *EXP




                                                                    Bottom
F3=Exit    F4=Prompt     F5=Refresh     F12=Cancel

MA    A                 MW                                        15/003
     E0004 - Invalid password
```

Figure 2: VTL-Attached Physical Media Move Policy (BRMS

If more than one virtual library will be writing to VTL-attached physical media, create a media and move policy as indicated above for each virtual library. In this example, media policy PP02 and move policy OFFSITE02 would be created indicating TAPMLB02 as indicated above in the TAPMLB01 examples.

Other move configurations may result in BRMS moving physical media into the location indicated by the system policy, which may result in media inaccessibility.

Note: *When MOVMEDBRM moves a VTL-managed volume out of its home location, BRMS may issue an error message to QSYSOPR indicating a failure of the system to actually eject the tape. These messages can be ignored.*

1.2.4.3 STRMNTBRM w/ or MOVMEDBRM

When Conductor's automated media duplication is enabled, BRMS' media movement activities may require rescheduling to a time later than the expected completion time of post-save export activities to ensure all daily movement of media is executed in a timely way.

Note: *Media automation is not instantaneous; at a 15-second service interval, DVMM will run about once every four minutes. Moves from library to library require actions from media services for each library; depending on service timing and direction, this can take anywhere from seconds to 8 minutes to achieve at the recommended service interval.*

Note: *One partition, preferably the Conductor host, should use the *Audit system media" option using the *NETGRP value when executing STRMNTBRM.*

1.2.4.4 Manual To-VAULT Moves in BRMS Networks with DVMM

When moving tapes into the VAULT location manually from BRMS, best results are realized when the manual location change is initiated from the Conductor host. If the manual move is performed from a remote node, should DVMM synchronization occur prior to BRMS synchronization DVMM will return the volume to the previous location and update BRMS with that previous location. When the location is changed from the host, BRMS synchronization works in the other direction, ensuring the tape remains in the VAULT location.

1.3 BRMS Networking Considerations

In networked environments, ensure the following steps are completed on each server/partition for which Conductor will be managing/processing virtual tapes.

1.3.1 BRMS Synchronization Interval

Conductor works best when BRMS is set to synchronize changes at the minimal interval of 30 seconds. DSI recommends the BRMS system policies on each BRMS partition be set to a "Shared inventory delay" of 30 seconds. Ensure each network partition utilizes the same interval.

1.3.2 Set Network Receives to *LIB

Ensure each BRMS instance is set as indicted:

> WRKPCYBRM TYPE(*SYS)

> Press the Enter key. Then, select Option 4.

> F11 and change "Local Receives" to *LIB

1.3.3 Create the DSIUSER ID

When Conductor is installed with the Enterprise option, the DSIUSER user Id must be created on each partition for which Conductor will be managing and/or duplicating virtual media. Use the following command on each applicable remote server/partition:

CRTUSRPRF USRPRF(DSIUSER) STATUS(*ENABLED) INLMNU(*SIGNOFF) TEXT(' DSI User ID')

1.4 BRMS Network Virtual Library Configurations

DSI virtual libraries can model three basic configurations.   Each is discussed below.

A single shared library can be used across the enterprise, using shared, non-shared or a mixture of both media types.

Multiple shared libraries can also be used, where individual partitions share one of multiple libraries, again with shared or non-shared use of media.

Discreet virtual libraries can be created and assigned to specific IBM i partitions across the network.

Hybrid environments may be configured for a mixture of shared and discreet libraries.

When using shared libraries, Conductor requires each partition sharing a library use a consistent device name and home location across the network.

DSI recommends that all virtual libraries to be managed by Conductor be device-configured (shared) to the Conductor host. When Conductor does not have access to a device description for a virtual library, the following limitations apply:

- *IMPORT and *UNSTACK jobs cannot auto-duplicate live target virtual media before import, requiring manual duplication be performed from the target volume's host partition when the data on the target volume is to be retained.

- *DUPLICATE and *CONSOL policy types require device descriptions to perform BRMS-style duplications and thusly will not be made available.

- Attempts to initialize new media for remote systems may fail if the remote system is not available. For this reason DSI recommends that virtual media classes be set to initialize tapes upon expiration. Should BRMS encounter a non-initialized tape, it will place it in *INZ status and the next execution of STRMNTBRM will initialize all *INZ volumes belonging to the host. Conductor does its best to ensure remote systems are available before attempting to process remote media via remote devices.

1.5 Physical Media Export Options

Conductor can be used with physical libraries in three different configurations:

1. where libraries are device-configured to the host server/partition;
2. where libraries are attached directly to the VTL device;
3. where libraries are attached to both hosts simultaneously.

Note: *When creating Media Policies for Conductor-managed physical media, be sure to not use the "Versions" expiration option. Conductor requires one of the date-based methods (or *PERM).*

1.5.1 Device-Configured Target Media Libraries

In cases where the target media library or libraries are attached to the IBM host, Conductor can use BRMS duplication commands to achieve media duplication, media stacking and/or media consolidation activities. These activities can be directed to any compatible media library/device defined to the host system.

The IBM host carries the load of duplication jobs when executing BRMS-managed policies.

Each virtual library in the network (where applicable) requires a device description on the IBM server hosting the Conductor software in order to utilize device-configured policy groups on media from those libraries.

1.5.2 VTL-Attached Target Media Libraries

In cases where the target media library or libraries are attached to the VTL appliance, Conductor takes advantage of the VTL's ability to copy and/or stack tapes onto physical media.

There are some distinct advantages to using the VTL-attached physical library policies over the device-attached policies:

- The IBM host is not involved in these jobs/activities, saving the IBM host from the duplication job load;

- Media duplication activities can take place during IBM host downtime, which is not possible in the device-attached model;

- The ability to consolidate virtual volumes written to shared virtual libraries from different IBM servers/partitions allows for very efficient utilization of physical media.

1.4.3 Configuring BRMS Physical Media Locations for Conductor

BRMS media home locations for physical media must be managed according to physical library configuration and the intended use of the media. Follow the guidelines below. More information on the *ARCHIVE, *STACK, *DUPLICATE and *CONSOL policy types can be found in section **4.1.1 – Policy Group Types**.

1. When the library is device-attached to the IBM host, media to be used by the host should use the physical library home location.

   a. Direct save/restore/duplicate/read from the IBM host
   b. Conductor's *DUPLICATE or *CONSOL policy target media

2. When the library is VTL-attached, media to be managed by VTL export processes should use the virtual library home location. VTL-managed physical media appears to "belong" to the virtual library that the physical media is servicing.

   a. *ARCHIVE media (matched or non-matched)
   b. *STACK media

3. When physical libraries are shared to both the IBM and VTL hosts, a mixture of media locations can be used following the rules above.

Zoning physical libraries to both hosts allows the BRMS ADDMLMBRM command to load media from IE to library slots.   If a VTL-attached physical library is not zoned to the IBM host, use the ADDMLMDSI command to automatically load physical media from IE slots. See the Commands section for more information.

2. Conductor Software Installation

In addition to the software library and its contents, Conductor will create three user-related objects on the host server(s):

User ID:	DSIUSER (*JOBCTL special authority, no *SIGNON ability)
Message Queue:	QUSRSYS/DSIUSER
Directory Entry:	A basic directory entry is created to enable SMTP functions, where applicable.

If the "DSIUSER" ID or the QUSRSYS/DSIUSER message queue already exist for another purpose, their properties will be adjusted to meet the DSI Conductor requirements.   This may negatively affect other systems/processes; in this case DSI recommends the existing User ID/Message Queue/Directory Entries be changed to another ID prior to the Conductor software installation.

The DSIUSER ID will be granted *CHANGE access to the QUSRBRM/QA1AMM *file object. Two types of changes are made to BRMS media records that do not use BRMS' public interfaces:

1. When Conductor has completed post-save processing activities for a virtual volume, it will release the duplication flag in the volume's BRMS media record.

2. When writing non-matched physical media from VTL-attached policies, Conductor will assign creation dates, expiration dates, next move dates, next move locations and expiration status values in the applicable BRMS media record(s) as per the applicable BRMS media/move policies.

2.1 Obtaining the Conductor software

Conductor is distributed on DVD media and can be downloaded from your DSI FTP site using your existing customer credentials.

Product	Option	*SAVF (FTP download)
DSI Conductor V1R2M0	*BASE	DSISYS120B.SAVF
DSI Conductor Enterprise	1	DSISYS1201.SAVF

The DSI Conductor Enterprise option is required if a single Conductor instance will be managing virtual libraries hosted by multiple network servers/partitions (enterprise mode).

Both products require 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, please contact DSI Support at 303-754-2000.

2.2 Installing Conductor

Conductor 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. See the instructions below.

If you already have a version of Conductor installed, please shut down your DSISYS and DSIMON subsystems and save your current software library before attempting the restore of an upgrade release.

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

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 command:

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

- To install Conductor into an alternate library (only if you already have a DSISYS library that is not related to your DSI VTL):

    - RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) LIB(<your install library>)

2.2.2 Installing from downloaded *SAVF media

- Upload the VTLCV1R1M0.SAVF file (downloaded from your DSI FTP site) into an empty *SAVF object on your IBM server.   Ideally, use the DSIV1R1M0 name for your *SAVF (you can select another name if desired).

    - use CRTSAVF (<your *SAVF library>/<your *SAVF name>) to create the target *SAVF into which to upload the downloaded software.

- Once the *SAVF exists on the host, issue the following command:

- o RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) SAVF(<your *SAVF library>/<your *SAVF name>)

- To install Conductor into an alternate library (only if you already have a DSISYS library that is not related to your DSI VTL):

  - o RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) SAVF(<your *SAVF library>/ <your *SAVF name>) LIB(<your install library>)

After the product has been restored, the DSI Conductor software library (**DSISYS** or the customer-selected library name) should be either:

1. Added to the host server's system library list, or
2. Included in the library list for the job description(s) for any user/application that wishes to utilize Conductor software or commands.

2.3 Installing the Conductor Enterprise option

If you expect to manage multiple servers on a BRMS network from a single host partition, the Conductor Enterprise option will need to be licensed and installed after the Conductor installation is completed.

2.3.1 Installing from DVD media

- Load the DVD media for the Conductor Enterprise option into your optical device.

- Issue the following command:

  - o RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) OPTION(1)

- To install the Conductor Enterprise option into an alternate library (only if you already have a DSISYS library that is not related to your DSI VTL):

  - o RSTLICPGM LICPGM(2CB8D11) DEV(<your optical device>) LIB(<your install library>) OPTION(1)

2.3.2 Installing from downloaded *SAVF media

- Restore the VTLCENT.SAVF file (downloaded from your DSI FTP site) into an empty *SAVF object on your IBM server.   Ideally, use the DSIBRMS name for your *SAVF (you can select another name if desired).

    - use CRTSAVF (<your *SAVF library>/<your *SAVF name>) to create the target *SAVF into which to upload the downloaded software.

- Issue the following command to install into the default location:

    - RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) OPTION(1) SAVF(<your *SAVF library>/<your *SAVF name>)

- To install Conductor into an alternate library:

    - RSTLICPGM LICPGM(2CB8D11) DEV(*SAVF) OPTION(1) SAVF(<your *SAVF library>/<your *SAVF name>) LIB(<your install library>)

Upon the initial successful restoration of the licensed software, please take an immediate backup of your newly-restored software library.

Use the IBM WRKLICINF CL command, GO LICPGM or option 22 from the Conductor main menu (go DSIMAIN) to apply the applicable software licenses to your installed products.

2.4 Managing Conductor Subsystems

Two subsystems support Conductor activities: **DSISYS** and **DSIMON**. Do not start these subsystems until the VTL software configuration steps described in sections 3.2 thru 3.5 below have been completed.

2.4.1 Subsystem DSISYS

DSISYS jobs manage communications between the IBM server and VTL devices/logical libraries, job queueing and scheduling functions for Conductor and process messages received from VTL devices. In addition, system cleanup and reorganization procedures run at the start of this subsystem.

A variety of job types will execute from the DSISYS subsystem:

- COMMSVC jobs manage communications between the IBM host and each configured, active virtual library. One COMMSVC job will be submitted for each active virtual library.

- JOBSVC jobs manage job scheduling and job queueing activities for virtual libraries. One JOBSVC job will be submitted for each active virtual library.
- One MEDSVC job manages synchronization between BRMS/Tracker and *PRIMARY virtual libraries.
- One MSGSVC job will execute in order to process messages returned from the virtual libraries.
- Conductor-created *DUPLICATE and *CONSOL jobs will run in this subsystem.
- Reporting jobs run in this subsystem.
- Conductor file purge and reorganization processes run in this subsystem.

2.4.1.1 Managing the DSISYS Subsystem

Start the DSISYS subsystem using the following command. Be sure to complete the configuration steps in sections 3.1 thru 3.5 before starting the subsystem the first time.

    QSYS/STRSBS < your Conductor library >/DSISYS

The DSISYS subsystem should be started at IPL (after TCP/IP is started to avoid communications error messages). It should be running at all times that the host is not in a restricted state.   If you do not regularly IPL your host, the DSISYS subsystem should be ended and restarted according to the shorter of your selected system log or job log purge retention criteria (see section **3.2 initializing the Conductor software**).   Conductor does its housekeeping at DSISYS startup.

The DSISYS subsystem should always be terminated using the *CNTRLD option.

To terminate the DSISYS subsystem, schedule a job or jobs as appropriate to terminate in a controlled manner before a scheduled IPL implementing an *IMMED termination; end the subsystems *CNTRLD in advance of any Ad-Hoc IPL or prior to a restricted-state request where "ENDSBS SBS(*ALL)" is using the *IMMED option.

Use the following command adjusting the delay time as per the applicable service delay interval (see section 3.3.4 Configure Monitoring). In the command below, the default 15-second interval is assumed; a 60-second maximum delay should offer plenty of time for the DSISYS subsystem to shut down normally.

    QSYS/ENDSBS SBS(DSISYS) OPTION(*CNTRLD) DELAY(60) ENDSBSOPT(*NOJOBLOG)

2.4.2 Subsystem DSIMON

The DSIMON subsystem houses the triggering service that identifies virtual volumes to process via media duplication automation.   This subsystem need be started only when utilizing the automated duplication capabilities of Conductor.

2.4.2.1 Managing the DSIMON Subsystem

Typically, the DSIMON subsystem should be running any time Conductor duplication policies are active and the IBM host is not in a restricted state. If **Save While Active** backups are in use, please be aware of the following exception. Note the following can be ignored if media is always *UNLOADed after use.

If not using Conductor to perform automated media duplications, this subsystem does not need to be started/ended.

Qualifying Mounted Virtual Volumes:

Conductor automation policy definitions include a property that determines whether Conductor should ignore virtual volumes that are mounted when the volumes are qualified (see section **4.1 Automated Duplication Policies** for more information). Generally, DSI recommends that this property be set to 'Y' ("Yes"), indicating that qualified volumes be ignored until they are unmounted.   When Conductor policies are configured in this manner, BRMS control groups or IBM SAV* commands should be configured to *UNLOAD media upon completion of backup activities.

When assigning the "Ignore Mounted Volumes" property of any policy item definition to a value of "N" ("No") to indicate that mounted volumes may be processed by Conductor policies, the DSIMON subsystem will need to be brought down while the control groups or backups for managed libraries are running. This applies to any BRMS control group or external duplication execution across a network where the target virtual library and the media are managed by a Conductor enterprise instance.

If this is not done, Conductor may qualify and attempt to process virtual volume(s) while BRMS is actively writing backup data.

Different subsystem termination requirements may apply depending on the specific environment:

- Where Conductor is installed on a single partition or where control groups are executed on the Conductor host server/partition in an enterprise configuration, the ending and restarting of the DSIMON subsystem can be managed via local BRMS control group configuration. See the BRMS documentation for more information on ending and restarting subsystems from control groups.

- When Conductor is operating in enterprise mode, a job or jobs should be scheduled to terminate the DSIMON subsystem before node server/partition backup window(s) start and to restart the subsystem a short time after the node backup activities are expected to end.

- If node server backup executions are staggered, this may require that multiple DSIMON subsystem terminations/restarts be scheduled on the Conductor host when prompt post-processing is required for each node server/partition.

The processing interval for the TRIGSVC job that runs in this subsystem is set to one minute. To terminate the DSIMON subsystem, use the following command and allow up to two minutes for the subsystem to self-terminate:

    QSYS/ENDSBS SBS(DSIMON) OPTION(*CNTRLD) DELAY(120) ENDSBSOPT(*NOJOBLOG)

To restart the subsystem, use the following command:

    QSYS/STRSBS SBS(<your Conductor library>/DSIMON)

If necessary, the DSIMON subsystem can be safely taken down *IMMED if the TRIGSVC job within is in a *SIGW status.

3. Configuring the Conductor Software

Once your Conductor software has been restored to your system, licenses have been applied and any media management system adjustments required to support your new data security strategy have been made, you're ready to begin configuring your Conductor software.

To access the Conductor Software menu enter the command CONDUCTOR from the command line.   The CONDUCTOR command is added to your QGPL library when the product is installed.

3.1 The Conductor Main Menu
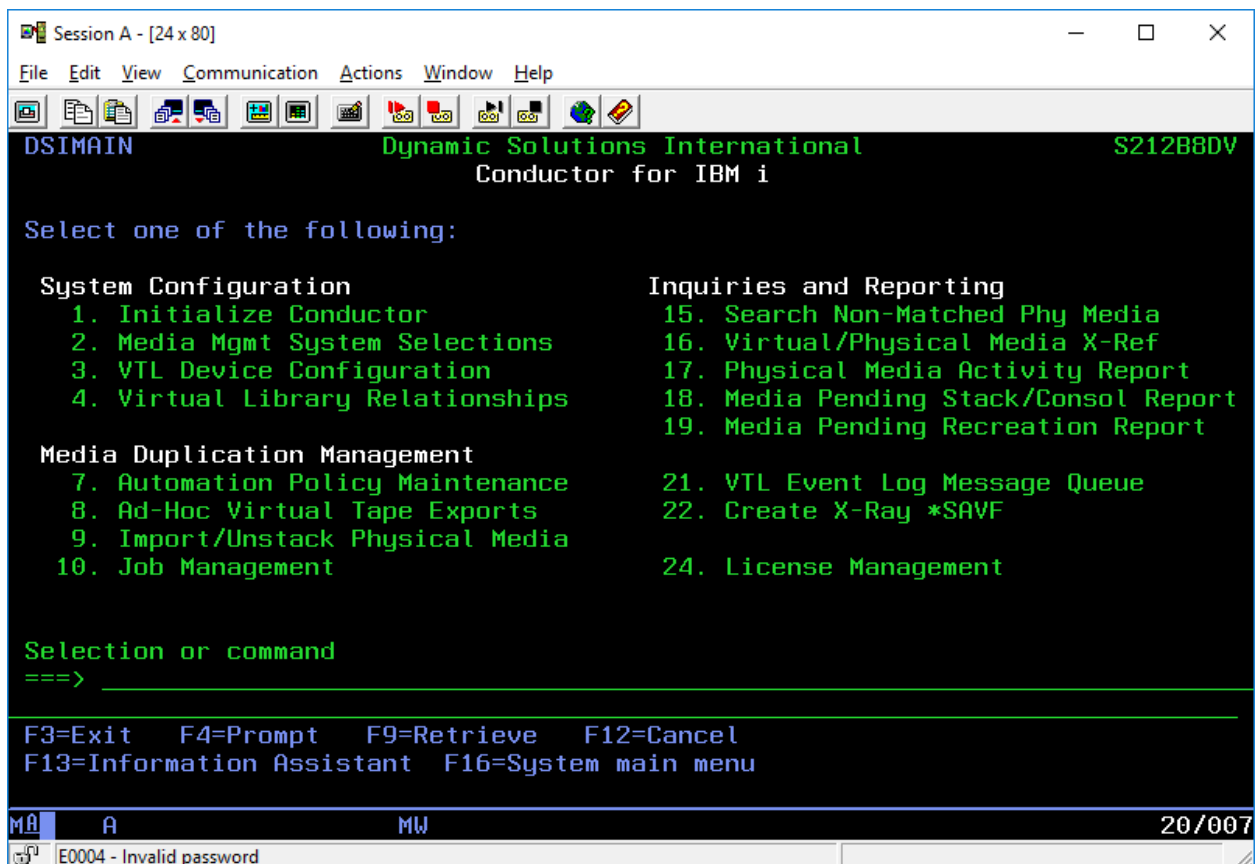
Figure 3: The Conductor System Management Menu

The Conductor System Management Menu consists of three application groups:

1. **System Configuration**: Set up the software operating environment; virtual tape devices; relationships between servers/partitions, VTL library devices and applicable media management systems; and configuring DVMM properties.

2. **Media Duplication Management**: Create/maintain duplication/archival policies; execute ad-hoc tape export activities; perform physical-to-virtual import activities and gain access to job management functions.

3. **Inquiries and Reporting**: Perform archival tape searches, download virtual/physical tape cross-reference data, run reports, local access to the VTL event log and X-Ray file creation.

3.2 Initializing the Conductor Software

The first step in configuring Conductor is to provide a few system operating defaults. Use option 1. Initialize Conductor to provide values for the properties displayed on the interface presented in figure 4:

Figure 4: Software Operating Properties

Field Descriptions/Values:

Server Name: This value must match the local location name from the host's network attribute configurations.   If BRMS is in use, this should be the name by which BRMS knows the local host.

Log File Retention: The number of days to retain system log information. Log information is not directly accessible to the end user but is helpful to DSI when using X-RAY data to interpret potential system issues.

Purge Job Archive: The number of days to retain or display *COMPLETED job information.   Job data for export jobs are retained until the source virtual or target volumes (physical) are re-used; job information for these jobs is suppressed from the Job Management displays once they age past this value.   All other *COMPLETED jobs are purged when they reach the entered age limit.

Max Concurrent MMS duplication jobs (BRMS): For some activities Conductor may utilize the DUPMEDBRM command.   This value indicates the maximum number of these DUPMEDBRM jobs the host server can (or should) run at one time. When not applicable, set the value to '1'. This value should not exceed the number of available drives / 2.

Max Concurrent MMS consolidation jobs (BRMS): This value will determine how many *CONSOL jobs and/or *DUPLICATE with APPEND jobs can run simultaneously. By keeping this value at 1, you can be sure you'll generate the fewest number of consolidated tapes, but processing takes longer.   By increasing this value multiple tapes can be used by larger consolidations to save processing time. When not applicable, set this value to '1'.

Report Media Activity: When exporting to tape using VTL-Attached physical libraries and using the "Report Physical Media Activity" option (either via automation or the Ad-Hoc export application) data on physical media usage can be provided to one-to-three email recipients and/or sent to the *OUTQ of your choice in *SPLF form via the execution of the MOVRPTDSI command.

This is a replacement for IBM move management functions for VTL-attached libraries, if desired; Conductor updates BRMS with move information when physical tapes exports complete as per media policy; BRMS can continue to be used for VTL-attached physical media moves, where desired.

If DVMM is enabled, the same recipients will get email notifications when media is deleted and/or created/recreated as per DVMM activity.

SMTP delivery requires at least one email address be provided and for SMTP to be properly configured on the host server.

Dynamic Virtual Media Management (DVMM): This option is defaulted to 'N' (no). To enable Conductor's automated media management capabilities, change this value to 'Y' (yes).

By enabling DVMM, the Conductor media services will periodically evaluate the state of your virtual libraries and ensure that they match the state described by the current media information from the integrated MMS. This can cover everything from initializing a pristine virtual world to stepping into and converting an existing media information set "on the fly".

This enables a capability called "Dynamic Library Storage Management". With DLSM, redundant volumes with a low likelihood of future need may be deleted from primary or backup VTL libraries in advance of media expiration, freeing up space on those libraries while leaving media management status and content information for the volumes intact.

Should restoration from an archival copy become necessary, BRMS or Tracker are ready to go; just import, link or use a physical device to perform the restoration. Conductor will replace removed source volumes when the media manager needs them.

Default Report OutQ: These values identify where to deliver reports produced by Conductor's service jobs.

Once you're satisfied with your entries, press ENTER and in a few moments you'll receive a message indicating system initialization is complete. Use F3 to return to the main menu.

An example of a completed form is shown in figure 5 below. In this case:

1. log file retentions are set to 7 days;
2. job information is kept for 7 days;
3. up to three (3) DUPMEDBRM jobs may be active at any one time;
4. up to one (1) *CONSOL-type or *DUPLICATE w/APPEND jobs may run at any one time;
5. the DSI Physical Media Usage Reporting will be utilized with optional email delivery of usage information to the indicated email address;
6. Conductor will manage media creation and movement automatically; and
7. System-produced reports are routed to *OUTQ "DSISYS/DSIOUTQ".

```
Session A - [24 x 80]                                              —   □   ×
File  Edit  View  Communication  Actions  Window  Help
□  ▣▣  ▣▣  ▣▣  ▣▣  ▣  ▣▣  ▣▣  ▣▣  ▣▣
 DSI015S1                  Dynamic Solutions International          S212B8DV
 WRKCFGDSI            VTL Conductor Software Configuration

 Type choices, press Enter.

  Server name  . . . . . . . . . . . S212B8DV
  Log file retention (days)  . . . █_7
  Purge job archive after (days) . __7
  Max concurrent MMS dup jobs  . .  _3
  Max concurrent MMS consol jobs .  _1
  Report media activity  . . . . . Y
    Report via SMTP  . . . . . . . Y
      Recipient address 1. . . . . TESTUSER@DYNAMICSOLUTIONS.COM
      _____

      Recipient address 2. . . . . _____
      _____

      Recipient address 3. . . . . _____
      _____

  Auto-manage virtual inventory  . Y
  Default report *OUTQ . . . . . . DSIOUTQ___
    Library  . . . . . . . . . . . DSISYS____

 F3=Exit                                                          F12=Cancel
 The requested action was successful.
MA    A                 MW                                          07/036
🖳  E0004 - Invalid password
```

Figure 5: A completed configuration form

3.3 MMS System Integration

Use option **2-Media Mgmt System Selections** from the main menu to select the Media Management software product to which Conductor will be integrated. V1R2 of Conductor integrates with IBM's *BRMS* and DSI's *Tracker*.

Note: *Only one product should be enabled for use at any one time.*

The initial view of this interface is displayed in figure 6 below:
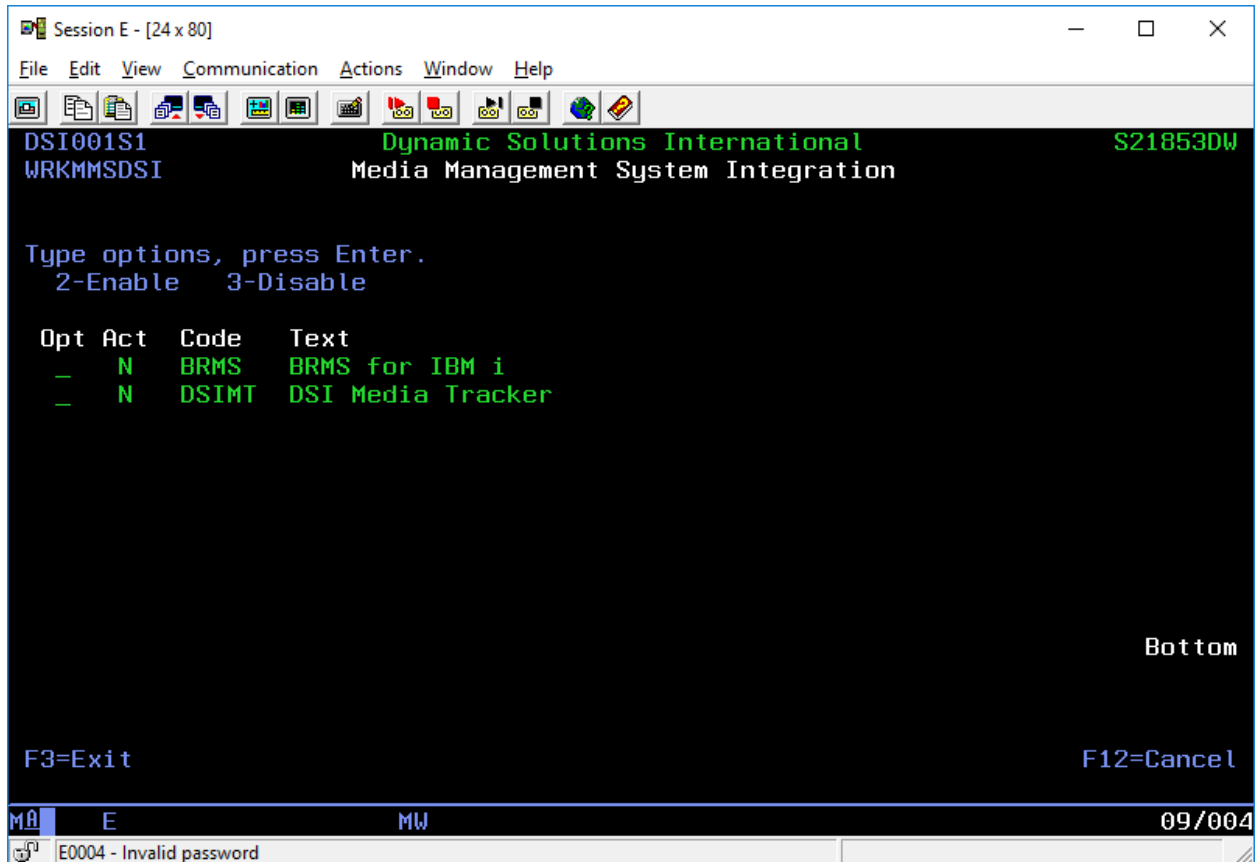
Figure 6: MMS Integration Selection(s)

Press ENTER after entering option '2' on the BRMS list entry; the "Act" (Active) column will change to 'Y', indicating BRMS processing is enabled and eligible for relationship configuration (see section 3.5, Defining VTL/MMS/System Relationships).

At any time after configuration is complete, this state can be changed to "disabled" (option 3-Disable) in order to temporarily or permanently suspend all Conductor/BRMS automated integration activities or to allow for a refresh of BRMS configuration data (after re-enabling).

Disabling the DSIMT-DSI Media Tracker option will prevent duplication policies from qualifying Tracker media. When this value disabled, it is recommended any relationships for the Tracker integration are also disabled if DVMM is active and these libraries are not to be actively managed.

The display shown in figure 7 below shows the MMS selection after having used option '2' to enable the desired MMS (BRMS) and having pressed ENTER:
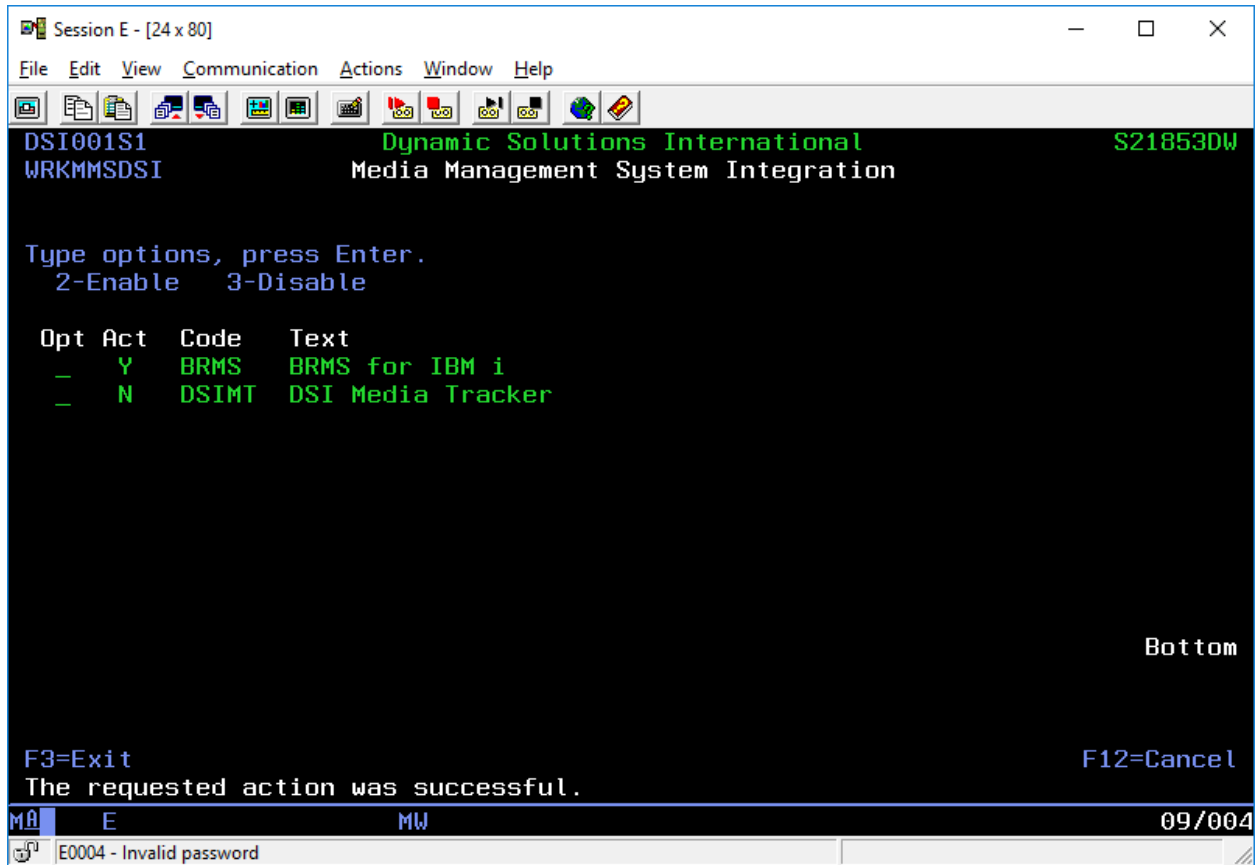
Figure 7: Post-Activation view of the selected MMS

Note*: To refresh Conductor's understanding of your BRMS installation, always disable and re-enable the BRMS option after creating new storage locations, media policies, move policies or media classes on any BRMS instance in the network.*

3.4 VTL Device Configuration

Using option **3-VTL Device Configuration** from the Conductor System Management menu starts an application that manages VTL device configurations.

Conductor qualifies VTL devices by their usage type.   There are three classes of VTL that can be configured in Conductor:

- *PRIMARY – a virtual library device used for backup purposes by the host server or by a node in a networked environment;
- *REMOTE – a virtual library device used to store copies of *PRIMARY virtual volumes (e.g. DR sites, backup VTL);

37

- *MONITOR – a virtual device that is not a direct participant in host or network backup/archival activities but where device monitoring from the IBM host is desirable.

Select option **3-VTL Device Configuration** from the Conductor System Manager menu, then follow the steps below to add your VTL device(s) to the Conductor software configuration.

3.4.1 Adding a Virtual Device to your Conductor Software

The initial "Manage Virtual Tape Devices" interface is presented in figure 8:
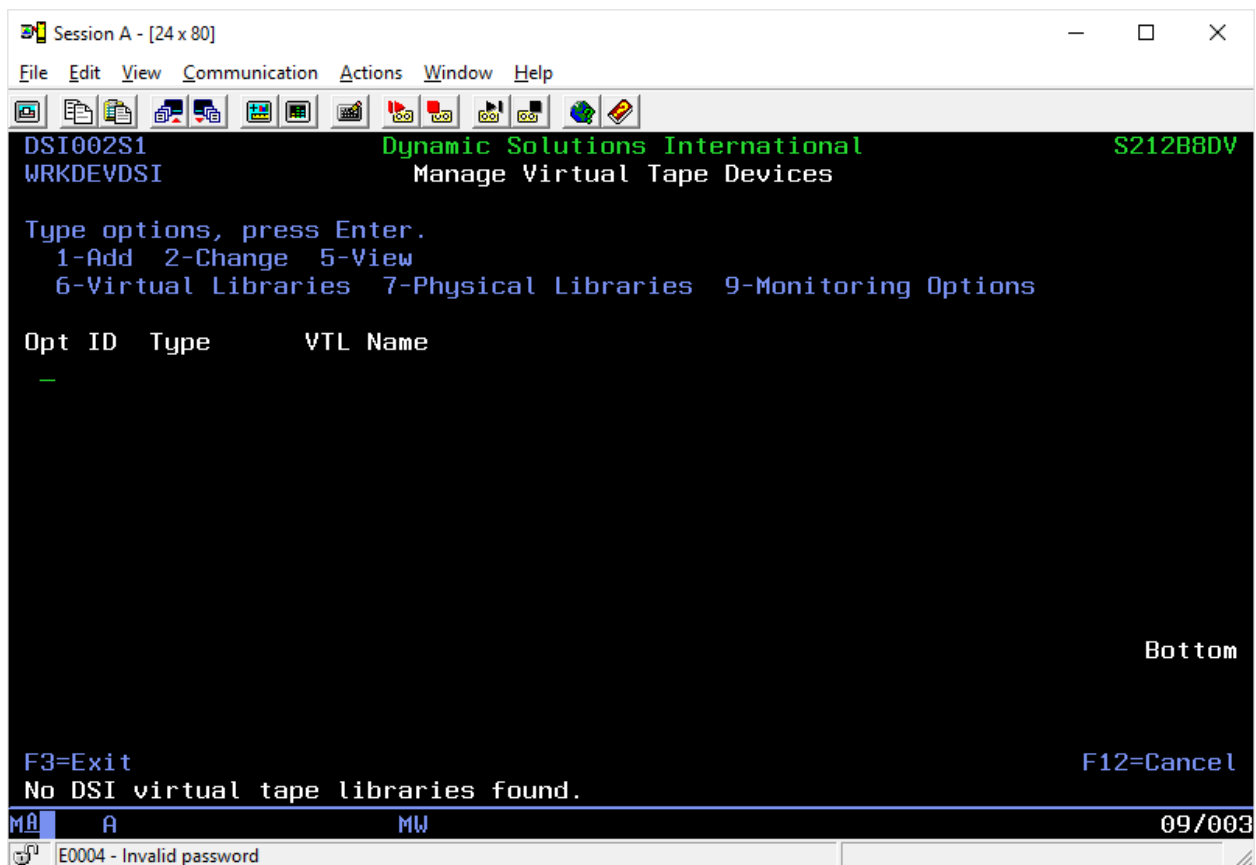
Figure 8: The VTL Device management panel

To add your *PRIMARY backup device(s), enter '1' into the list option field and press ENTER; the user interface shown in figure 9 is presented (displayed with required entries already made).   After entering the correct values for your installation, press ENTER.

38
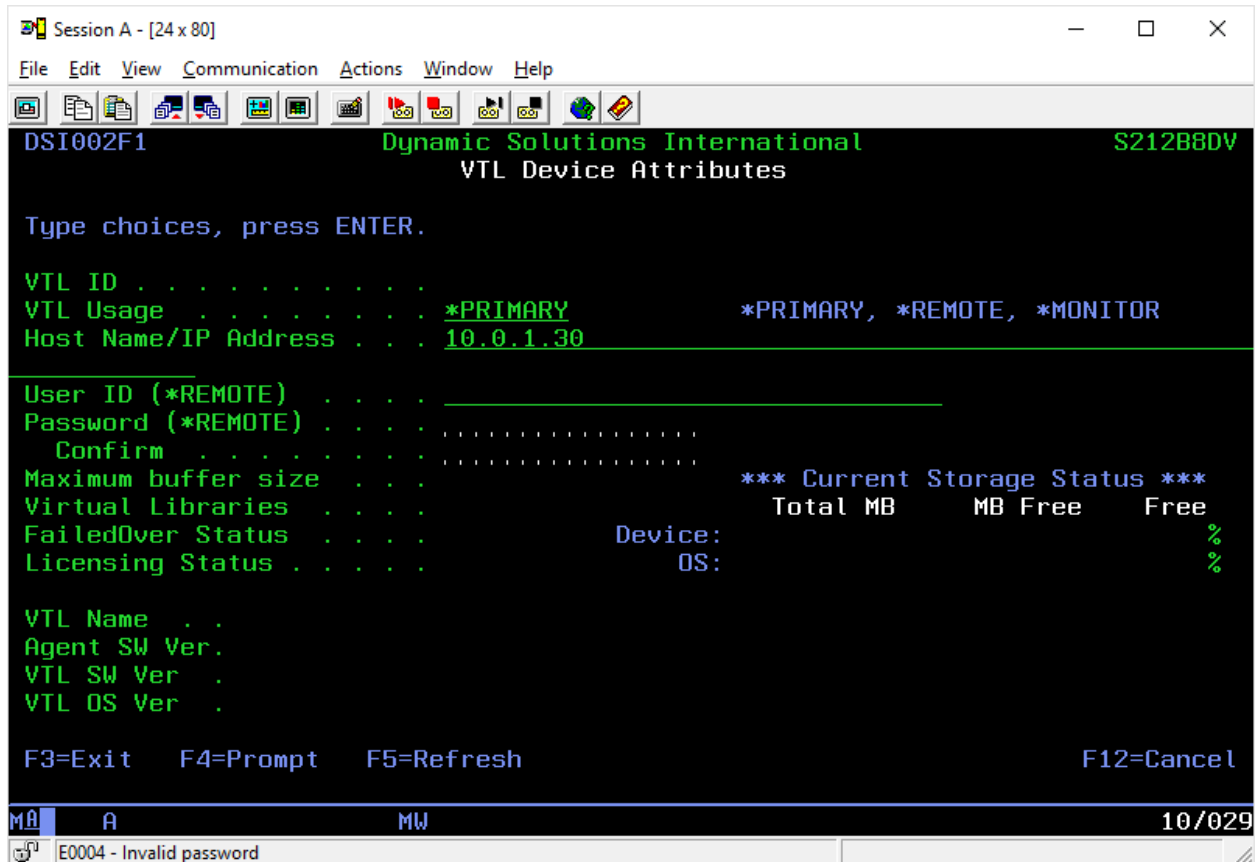
Figure 9: VTL Device information panel

Field Descriptions/Values:

VTL ID: This is a system-generated value that will be assigned to the device upon successful configuration of the device.

VTL Usage: Identifies the type of device being configured. A list of valid entries from which this selection can be made is displayed when F4 is pressed with the cursor in this field.

- *PRIMARY – a library device used for backup purposes.
- *REMOTE – a library device used to store copies of *PRIMARY media (DR sites, for example).
- *MONITOR – a library device not directly involved in backup/archival activities, but where monitoring of the device status is desired.

Host Name/IP address: Host names must be resolvable by the IBM host. If there is not a host name available, use an IP address.

User ID: This value is required for *REMOTE devices only; it represents the User ID with which a *PRIMARY VTL Device will authenticate to this *REMOTE device.

39

Password: This value is required for *REMOTE devices only; the password with which a *PRIMARY VTL Device will authenticate to this *REMOTE device.

Once the appropriate fields have been entered, press ENTER. The UI will appear as shown in figure 10 as it confirms communication to the hostname/IP entered:
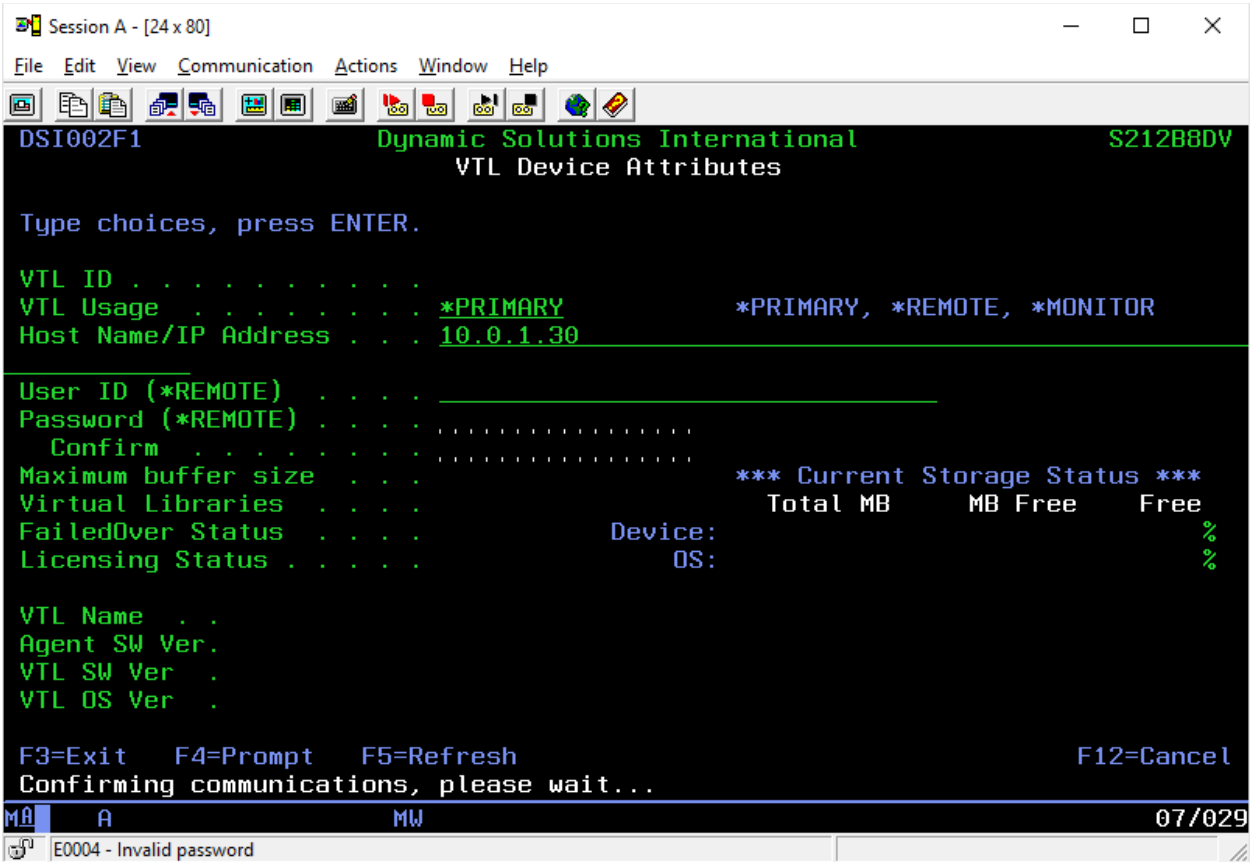
Figure 10: Auto-configuring a VTL Device

Should the software be unable to communicate successfully with a device at the indicated host name/IP, an error message will be displayed after TCP/IP times out.

Upon confirming communications, the UI as shown in figure 11 is presented while the software imports and processes device configuration data:
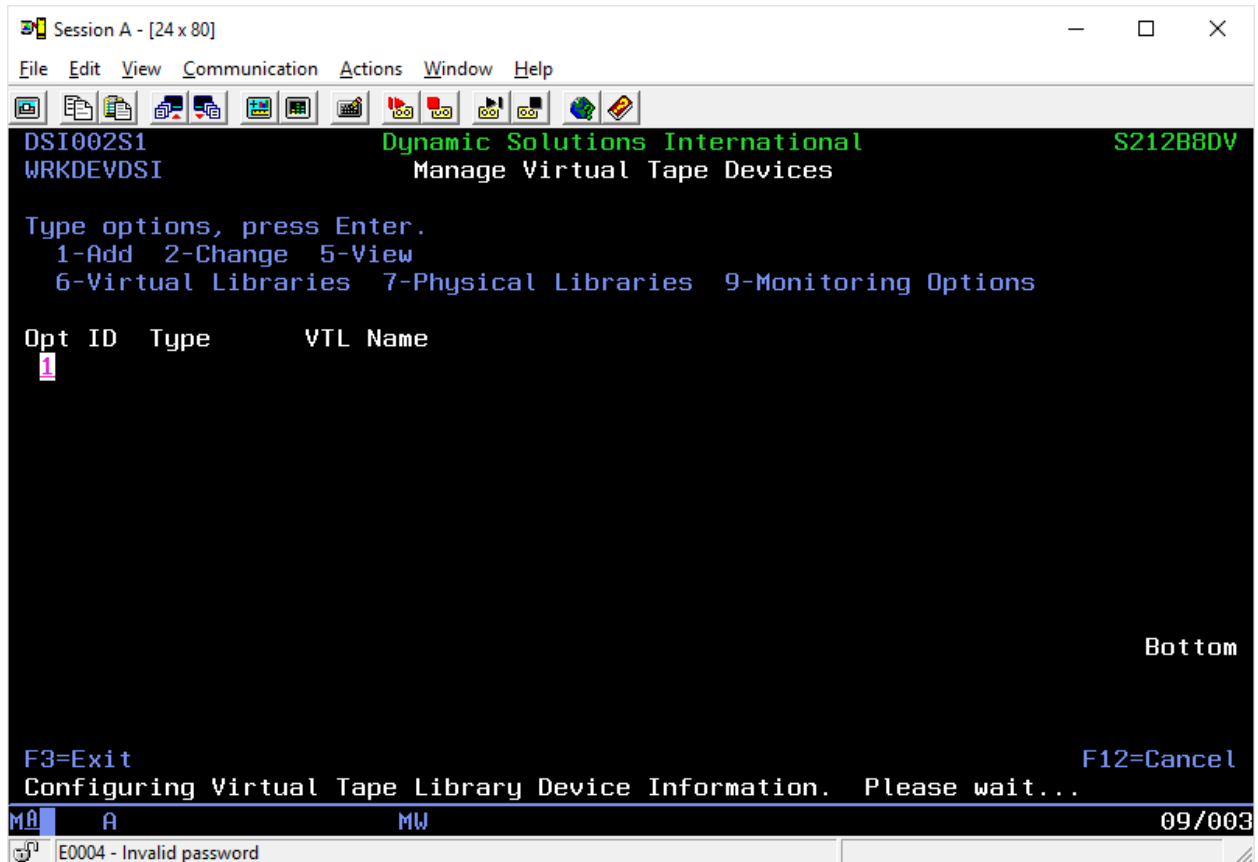
Figure 11: Importing VTL information to Conductor

Once successfully configured the UI will appear as shown in figure 12:
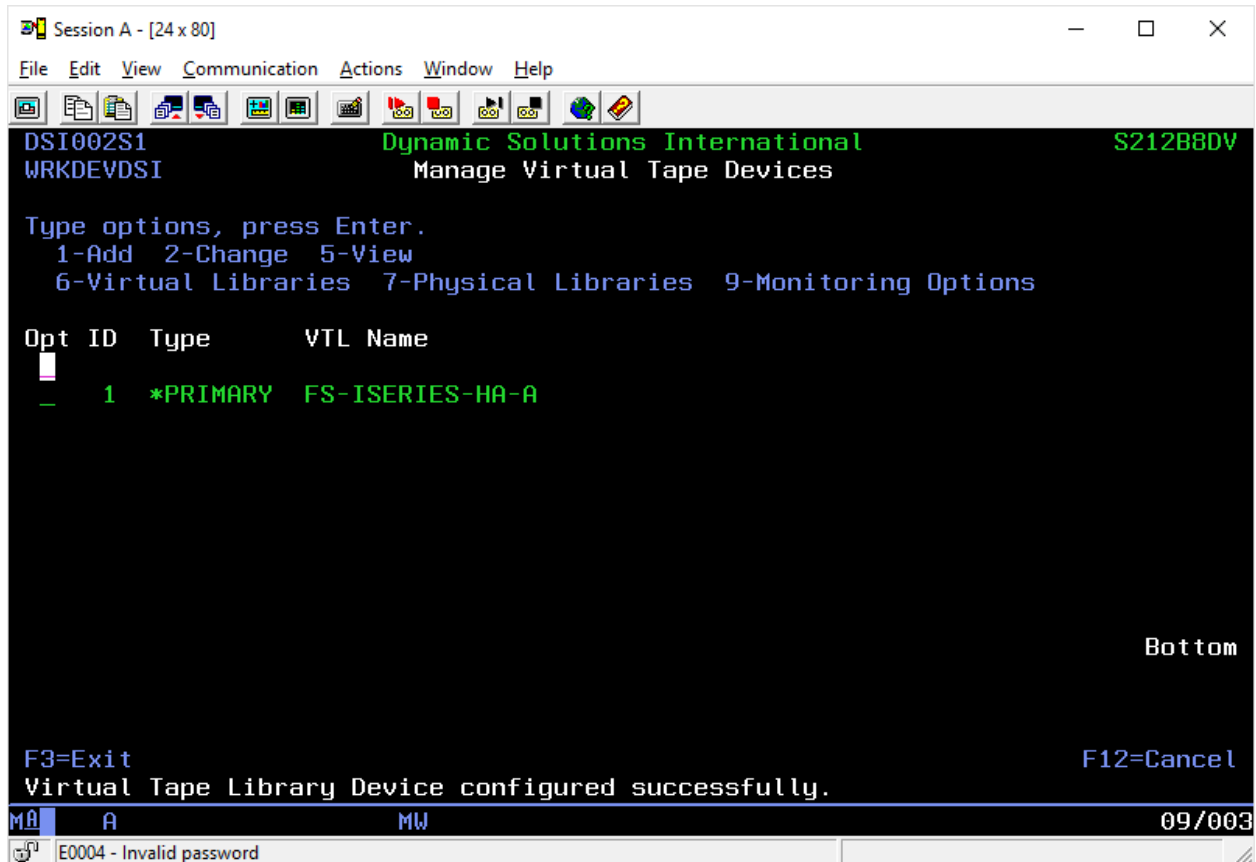
Figure 12: Result of a successful configuration

To add additional *PRIMARY, *REMOTE or *MONITOR devices, repeat the above steps.

Once each of your devices is configured, advance to the "Selecting Virtual Libraries to Manage" section below.

Once device configuration and system relationships have been defined (see section 3.5, Defining VTL/MMS/System Relationships) and after the DSISYS subsystem has been successfully started, the current usage statistics of the VTL device and VTL software information can be reviewed via option "5 – View" as shown in figure 13 below:
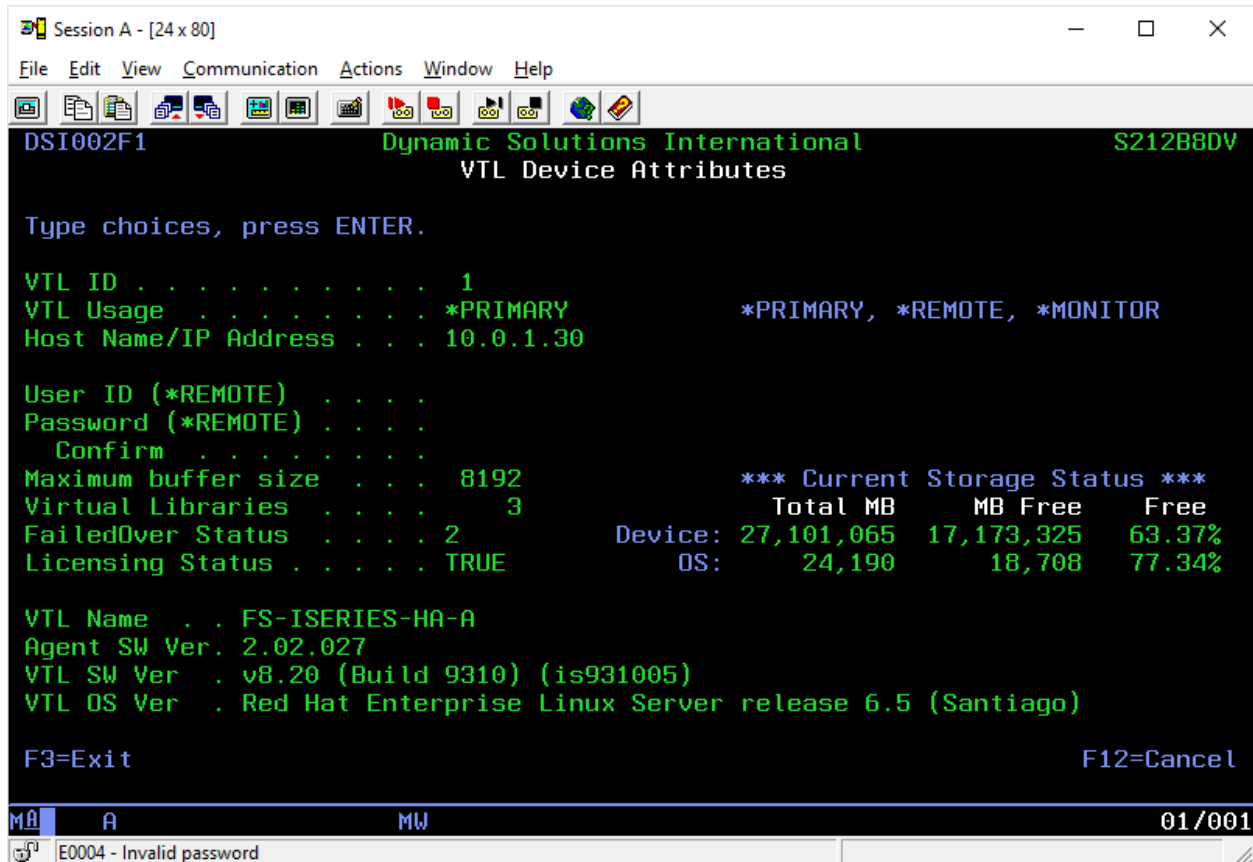
Figure 13: VTL Information Display

3.4.2 Selecting Virtual Libraries to Manage

For *PRIMARY and *REMOTE devices, the libraries to integrate into Conductor must be identified to the Conductor software.

For *MONITOR devices a virtual library must be selected through which message monitoring will be managed.

Use option **6-Virtual Libraries** on each library device to review and select from available virtual libraries configured on the device. Conductor-compatible libraries will appear in GREEN; non-compatible libraries will appear in RED (if your display is set to use a custom color scheme, these colors may or may not be represented).

Only IBM-compatible libraries can be enabled for *PRIMARY and *REMOTE devices.   If an attempt is made to use option **2-Enable** on a non-compatible library, an error message will be issued. For *MONITOR devices, any library may be selected thru which to monitor.

Use option **2-Enable** to permit the library integration with Conductor software.

In the figure 14 example below, option 2 has been applied to three of the libraries to indicate those libraries are to be managed by the Conductor software:
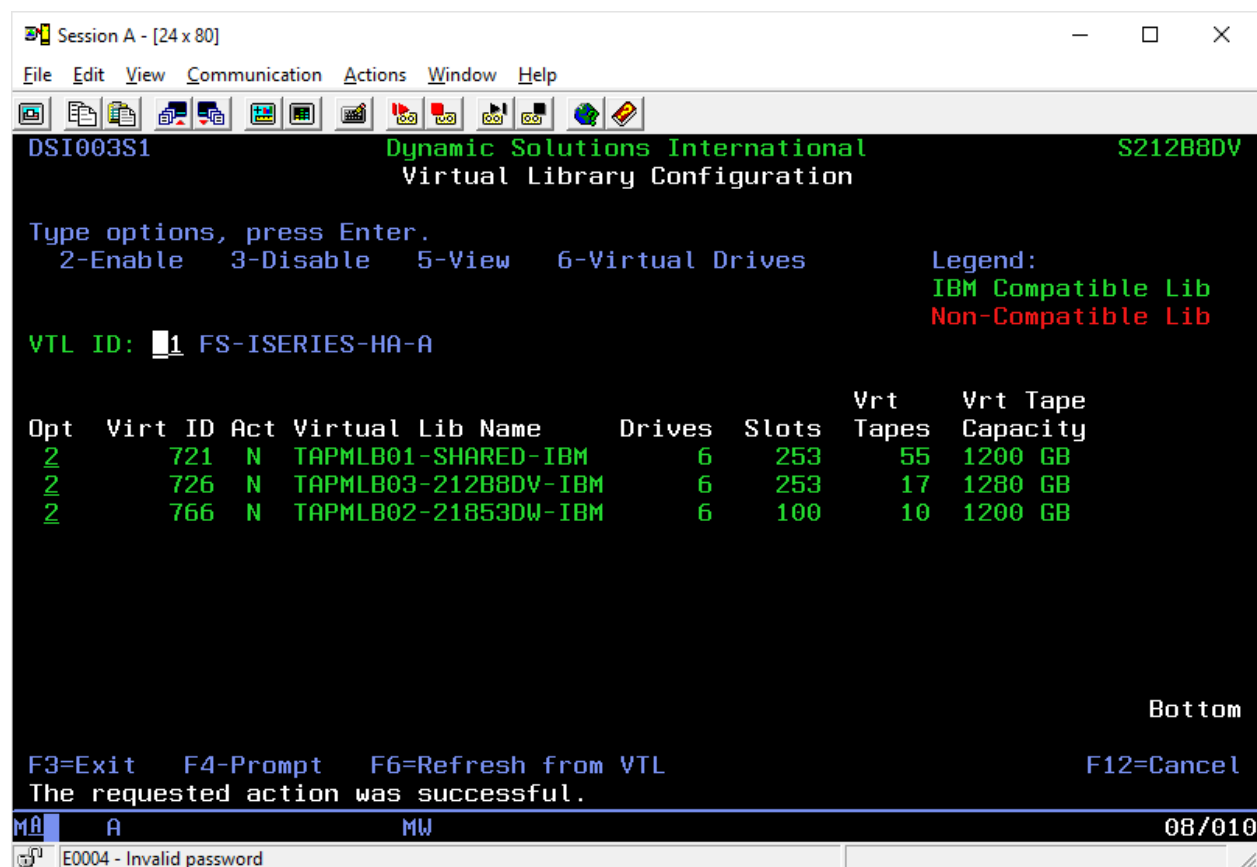
Figure 14: Displaying/selecting available libraries

After pressing ENTER the selected virtual libraries should indicate 'Y' in the "Act" (Active) column of the display as shown below in figure 15:
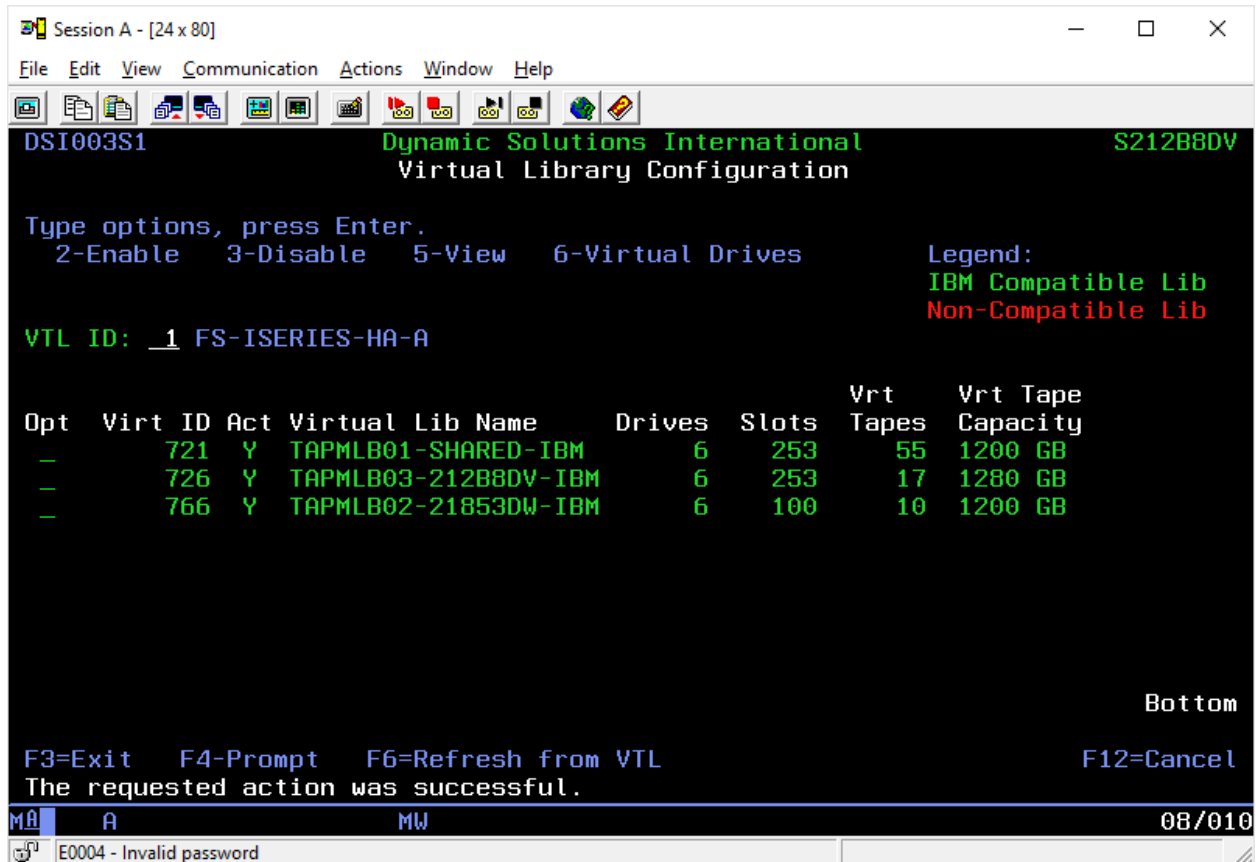
Figure 15: Libraries selected for integration

Repeat this step for each *PRIMARY, *REMOTE, and *MONITOR device added. For *REMOTE devices, enable each and any virtual library that is to be the target of a remote copy operation; for *MONITOR devices, enable only one library through which Conductor will receive status/information updates for that device.

If you have more than one virtual device configured, the "VTL ID" entry at the top of the UI can be used to point this UI to another *PRIMARY VTL device.

Note: *If you use the VTL Console software to change the name of the virtual library(ies) after the device configuration has been imported into Conductor follow this procedure to update the library names in Conductor (optional):*

1. *Use the "3-Disable" option on each library to be renamed.*
2. *Use the "F6=Refresh from VTL" command to retrieve updated information from the VTL.*
3. *Use the "2-Enable" option on each library disabled in step 1.*

3.4.3 Confirming Physical Library Configuration

Use option **7-Physical Libraries** on each device which has an attached physical library to confirm the library device was imported into the configuration.   The UI presented in figure 16 appears.

Note: *This step can be ignored if no physical libraries are attached to the VTL Device.*
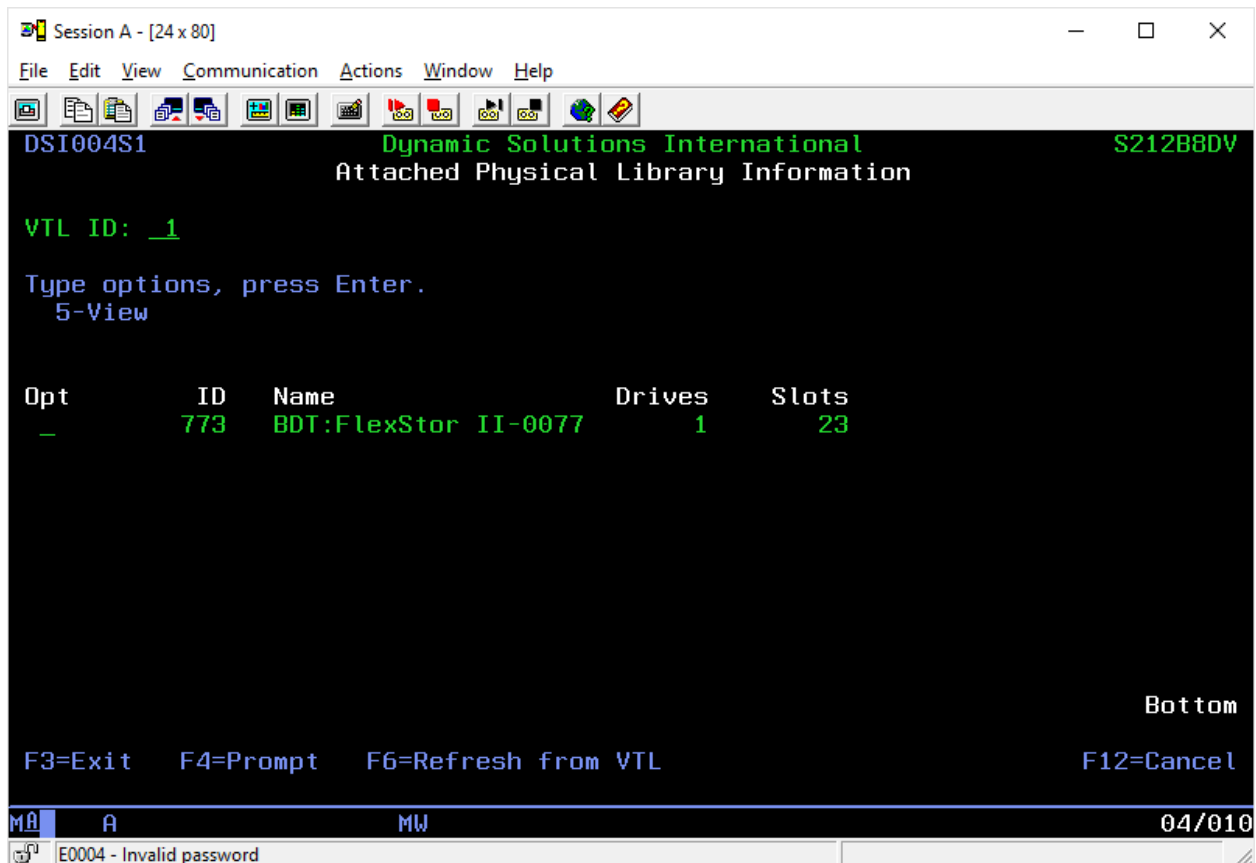
Figure 16: VTL-attached Physical Library Configuration

Use option **5-View** to review the details of a physical library configuration:
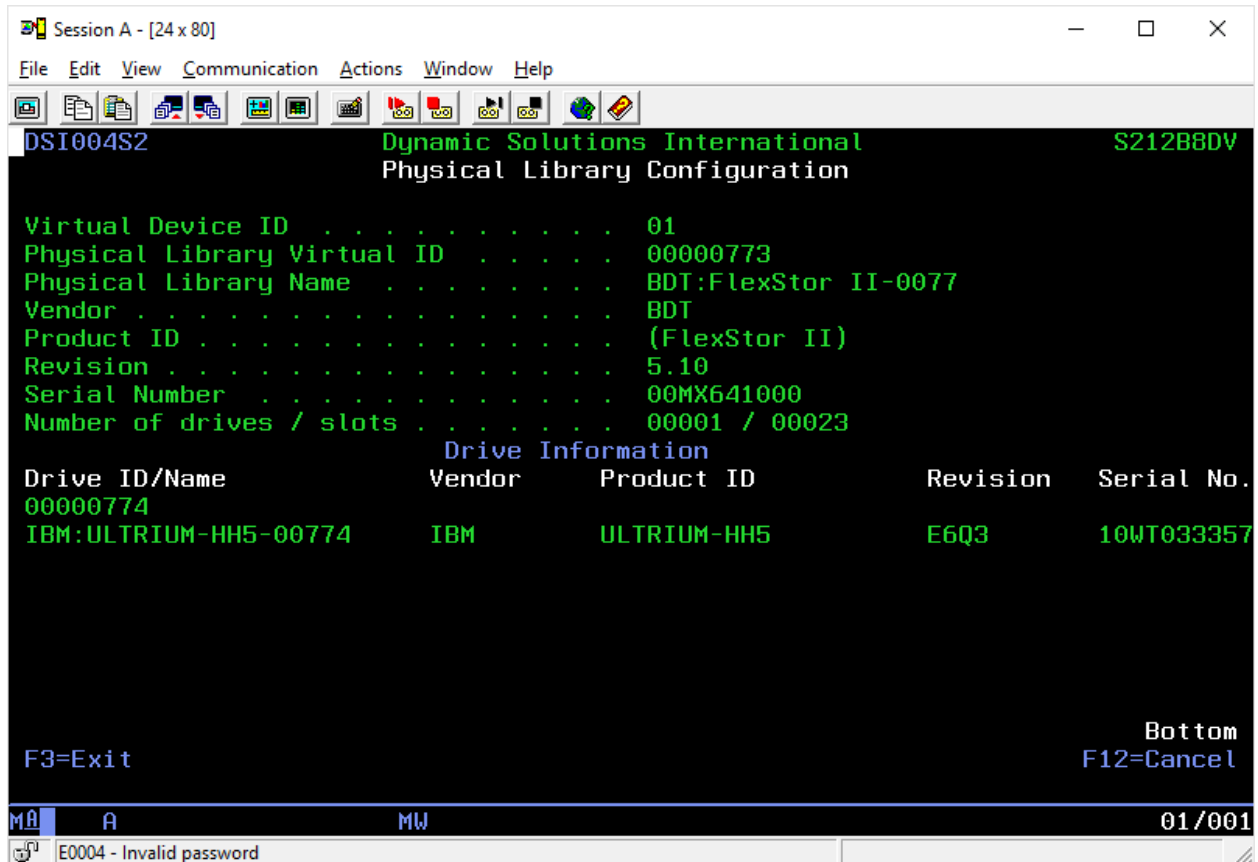
Figure 17: Physical Library Configuration Details

3.4.4 Configure Monitoring

Each of the integrated *PRIMARY, *REMOTE or *MONITOR devices communicates back to the Conductor software via TCP/IP through one active library per device.   This "monitoring" library will default to the first library activated on each device.

To change this selection or to review/change which information from the VTL device is passed on to the IBM host, use option **9-Monitoring Options** from the "Manage Virtual Tape Devices" UI, shown in figure 18.

Note: *If you disable or remove a virtual library that is currently set as the "monitoring" library, use option 9 on the library device to identify a currently-available library thru which to perform monitoring.*
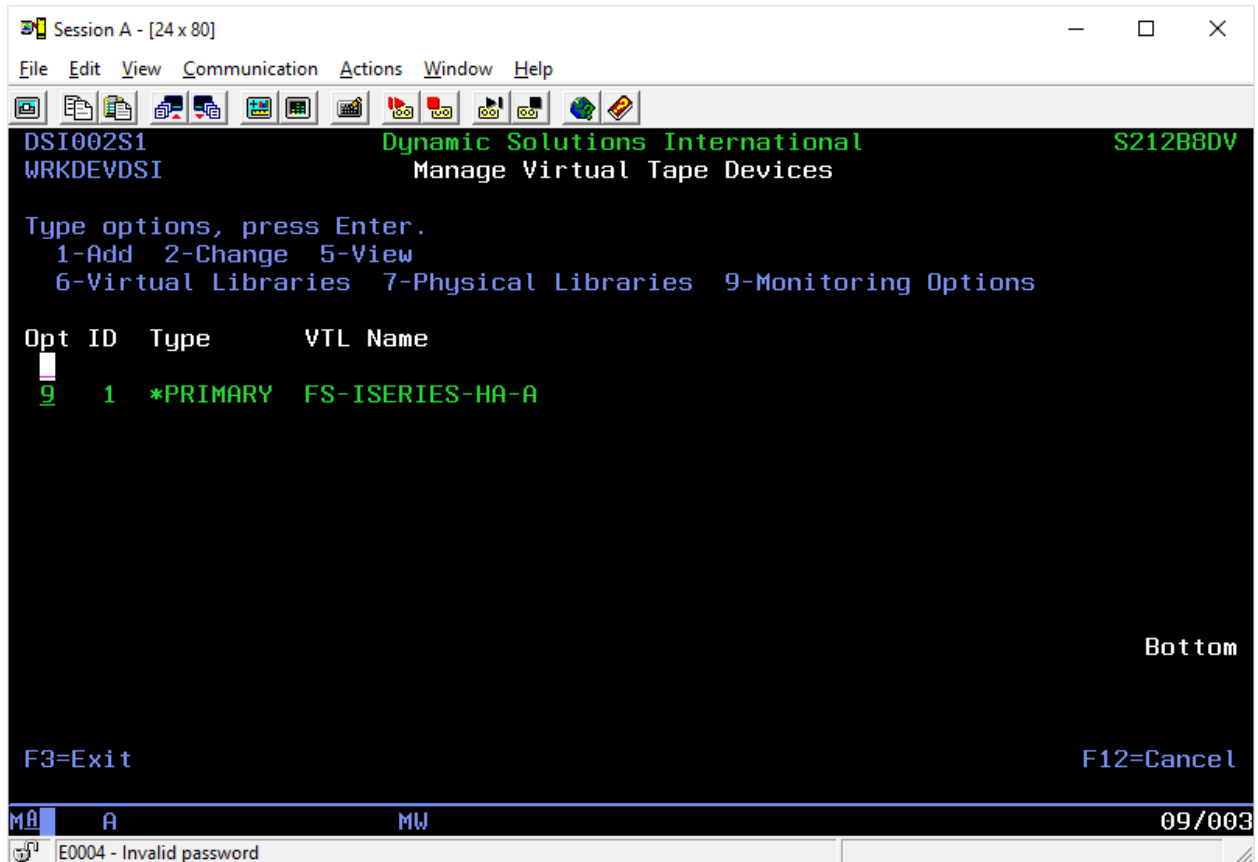
Figure 18: Change/Review Monitoring Options

After selecting option **9-Monitoring Options** on a device the UI presented in figure 19 will appear:

```
DSI002F2                Dynamic Solutions International              S212B8DV
                        VTL Message Monitoring Options

VTL ID:   1 FS-ISERIES-HA-A

Type choices, press Enter.

Monitor via Virtual Library ID. . . .    █      721 TAPMLB01-SHARED-IBM

Message Types:                          Opt        Messaging Options:
  Monitor information messages. . . .    0          0 - Log Message Only
  Monitor warning messages. . . . .     0          1 - Informational Message
  Monitor error messages. . . . . .     1          2 - Inquiry (no job wait)
  Monitor critical messages . . . .     2
  Storage Space . . . . . . . . . .     0
    Check storage space frequency . .   30 (minutes)
  Storage Critical Threshold  . . . .   15 (percent of space remaining)

Service Attributes:
  Service Delay interval  . . . . . .   15 (seconds)
  TCP/IP error retry interval . . . .  120 (seconds)

F3=Exit    F4=Prompt                                          F12-Cancel

MA    A                  MW                                        08/042
E0004 - Invalid password
```

Figure 19: Device monitoring options

Field Descriptions/Values:

Monitor via Virtual Library ID:
This entry determines which of the virtual library communication services will be monitored for VTL system messages. Only one library per device may be selected for monitoring. The value defaults to the first library enabled. Should the currently-assigned library be disabled or removed, be sure to reset this value to an actively managed library.

The next section of the UI allows you to identify which of the "VTL Event Log" messages (see the VTL Console software/manual) will be presented to your QSYSOPR message queue.   It is recommended that ERROR and CRITICAL messages be delivered to the *SYSOPR queue.

Message Monitoring Options:
0 – Log to DSI Message Queue only
1 – Send a copy (informational) to the QSYSOPR queue
2 – Send a copy (inquiry) to the QSYSOPR message queue

DSI recommends leaving the "Storage Space "option to 0; the next two settings will ensure that the system operator is notified should the disk usage on the applicable VTL exceed customer-specified levels.

All VTL event log messages are logged into the message queue DSISYS/DSIMSGQ, which can be reviewed via option 19 of the Conductor System Management menu. Inquiry messages delivered to QSYSOPR (and their responses, where applicable) can be reviewed by using the DSPMSG DSISYS/DSIRPYQ command.

Note: *If Conductor has been installed to a library with a name other than DSISYS, please use the install library name in the commands presented above.*

Check Storage Space frequency: This value identifies how often the VTL will return storage space statistics to Conductor.

Storage Critical Threshold: This value indicates when to send an *INQ message to the QSYSOPR message queue indicating a critical storage condition. This determination is based upon the percentage of storage space remaining available to the VTL device.

Service Delay Interval: The delay interval for DSISYS service jobs.   15 seconds is recommended.

TCP/IP error retry interval: The delay interval for TCP/IP connection retries after a TCP/IP connection failure. This value defaults to 120 seconds.

3.5 Defining Virtual Library Relationships

Use option **4-Virtual Library Relationships** to identify the relationships between your IBM i server(s)/partition(s), your media management system and the virtual libraries to be managed by Conductor.   Once relationships are defined, DVMM's nominal media requirement information can be applied to each server-specific relationship.

A system-named relationship should be configured for each virtual library for which Conductor will be performing automated media maintenance and/or media duplication activities. This includes one relationship for each host utilizing a shared virtual library managed by DVMM.

As relationships are created, the applicable duplication policy types for the relationships will be created, where applicable, enabling automated duplication management for each library from the Conductor host.

To create a relationship, use option 1 to add a new relationship from the initial UI as shown in figure 20 below.
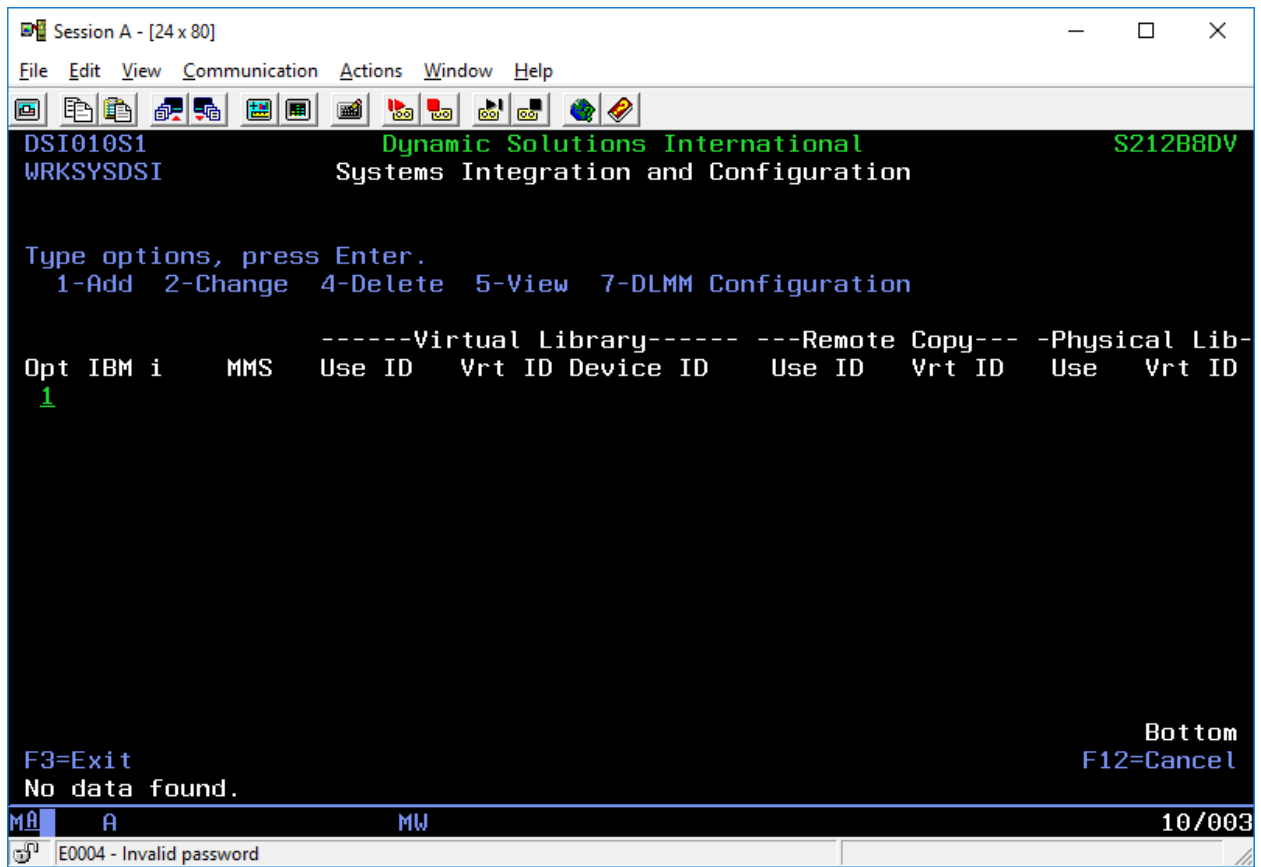
Figure 20: Creating a new relationship

Upon entering option "1" and pressing ENTER the UI presented in figure 21 is displayed:
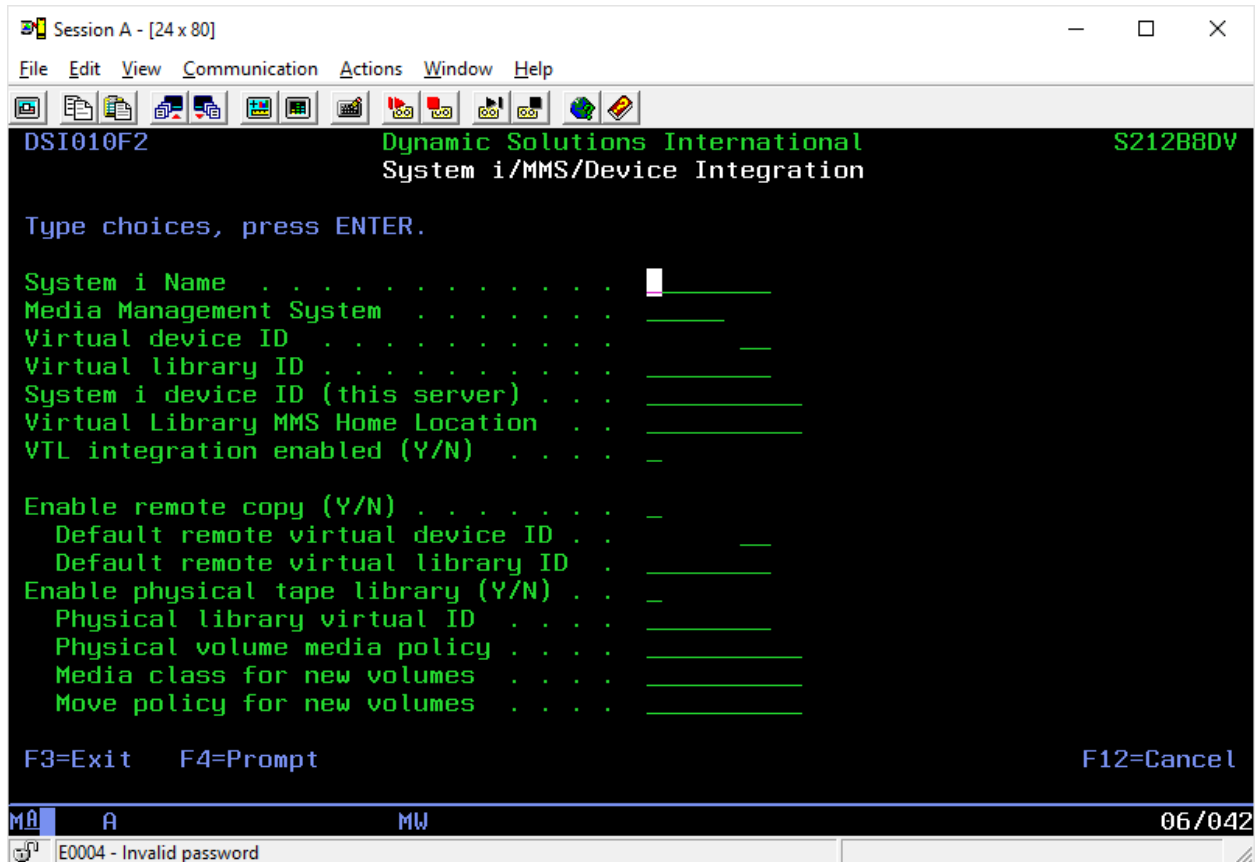
Figure 21: User Interface for relationship creation

Field Descriptions/Values:

Note: *Prompt-able fields are designated with an "*":*

System i Name*: The name of the server/partition that a relationship is being created for. A directly-named relationship MUST be created for each partition/virtual library/system that is to be managed. These named relationships are required to support automated media management.

When Conductor is managing shared virtual libraries from a single host partition in a BRMS network environment, *ALL can be used for the "System i name" value to indicate that duplication policy items created for this relationship apply to classes/volumes created from any server/partition utilizing the library.

In shared network environments where media duplication requirements are consistent for all media regardless of class or for specific media classes from host to host, this allows a single policy item to manage media written from all servers.

Both *ALL and host-specific relationships/policy groups can co-exist, allowing for both enterprise and server/partition-specific policy definition and execution, where necessary.

Note: *Creating the *ALL relationship in no way eliminates the need for the named relationship for each partition sharing the library; it simply creates a foundation for generic duplication policy creation.*

Note: *When using *ALL relationships, *REMCOPY and *ARCHIVE policies will only allow the 'Scheduled source volume delete' option to be selected if the source media class is defined for DVMM in the *ALL relationship. This is the only purpose the *ALL relationship DVMM entries serves. The required system-named relationship DVMM info controls media creation/re-creation ability, and will also be required in order to use the 'Scheduled source volume delete' options from policies for those relationships. Each class identified in a system-named relationship should also appear in any related *ALL relationships.*

Media Management System*: Select the MMS software to which this relationship will integrate.

Virtual Device ID*: This is the system-generated value for the device that manages the virtual library to be selected.   A *PRIMARY device must be selected.

Virtual Library ID*: This is the ID of the virtual library to add to the relationship.

System I device ID (this server): The device name of the virtual library on the Conductor software host.   If no device description exists on the host for the logical library being maintained, leave this value blank.

Note: *When a local device name for a virtual library is configured and entered here, the *DUPLICATE and *CONSOL policy group types are enabled for the relationship. Configuring devices for each of your virtual libraries on the Conductor host increases operational flexibility.*

Virtual Library MMS Home Location*: This identifies the home location for the virtual library being managed by the relationship (BRMS) or the library device name (Tracker).

Only *ACTIVE virtual tapes found in this location/library and marked for duplication will be evaluated for automation policies.   **DSI requires home locations match the name of the library device to which it is associated.**

VTL Integration Enabled (Y/N): Enter Y or N to identify whether this relationship is "active" or "inactive". Once configured, all automation activity for the described relationship can be suspended by setting this value to 'N'.

Enable Remote Copy (Y/N): Enter Y or N to identify whether this relationship can utilize *REMCOPY policy groups/policy items. These types manage replication of media to external virtual devices/libraries.

Default remote virtual device ID*: This is the system-generated device ID of the *REMOTE VTL device. This value will be used to set the default remote library when creating new *REMCOPY policy items as well as pre-load the Ad-Hoc export selections UI.   This value can be overridden in policy item definitions and on the Ad-Hoc export UI if using more than one *REMOTE VTL device.

Default remote virtual library ID*: This is the ID of the virtual library to be the default target of remote copy operations for this relationship.   This value will be used to set the remote library value when creating new *REMCOPY policy items as well as pre-load the Ad-Hoc export selections UI. This value can be overridden in policy item definitions and on the Ad-Hoc export UI if using more than one *REMOTE VTL device or more than one virtual libraries.

The value '0' (zero) can be used to indicated the virtual vault on the remote device as your target media location.

Enable Physical Tape Library: If a physical library is attached to VTL device and this relationship expects to use the physical library for exports, enter Y; otherwise enter N.

Note: *When enabling an attached physical library, the *ARCHIVE and *STACK policy groups will be created for the relationship.*

Physical Library virtual ID*: This identifies the ID of a physical library attached to the *PRIMARY VTL device. This value is required if "Enable Physical Tape Library" is set to "Y". The value entered will become the default and can be overridden in policies and from the Ad-Hoc UI, when applicable.

Media Policy*: This identifies the default media policy for the exported volume (BRMS) or the default media category to apply to the exported physical media (Tracker). In the BRMS case this identifies the media class to be used for the export.

This value acts as a default for the Ad-Hoc and policy item creation applications. This value can be overridden in each when required. While it is optional, it is recommended this value be provided whenever using VTL-attached libraries and non-matched export types.

The Media Policy value, along with the two properties that follow describe how Conductor will create BRMS media information when identifying/utilizing target volumes not yet found in the BRMS inventory.

Media Class for new volumes*:   In most cases, *MEDPCY will be the value entered here indicating Conductor will use the media class assigned to the entered media policy when creating new media information.   This value can be used to override the Media Policy value. This is a default value that can be overridden in the policy Items configuration UI. This value is optional but recommended when using VTL-attached libraries. It is not used for Tracker integration.

Move policy for new volumes*: See Media Class for new volumes.

When all values have been entered, press the ENTER key to validate and save your relationship data. Figure 22 shows an example of a relationship where both remote copy and physical tape archiving are to be enabled for the relationship; default physical media values are entered.
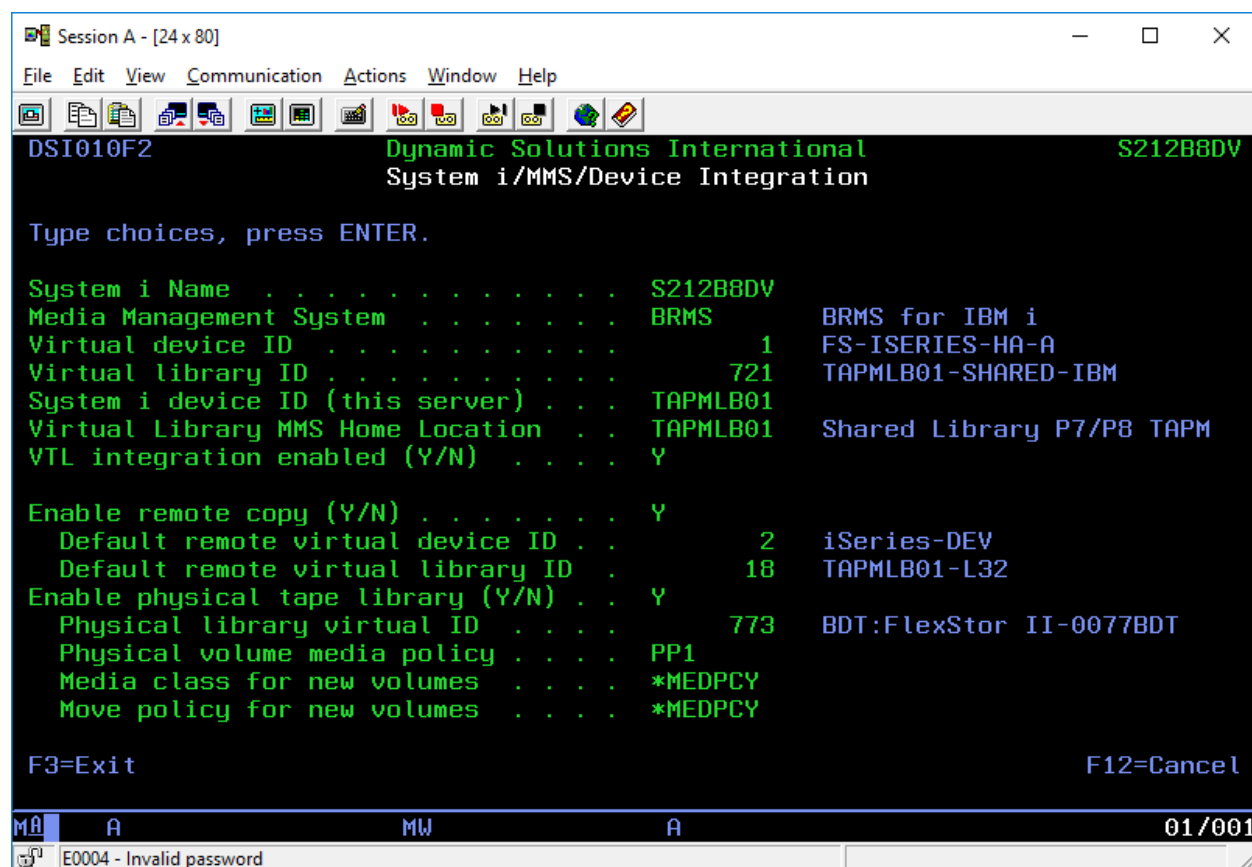
Figure 22: A completed remote copy/VTL-attached library relationship (BRMS)

3.6 Configuring Managed Classes and Nominal Requirements for DVMM

In the example relationship list shown in figure 23 below, 4 relationships have been created:

- Virtual library TAPMBL01 is a shared virtual library used by the S212B8DV and S21853DW hosts;

- Virtual library TAPMLB03 is configured as a stand-alone library for S212B8DV;

- A relationship has been created for S21853DW to a virtual library that is not device-configured on the Conductor host. This relationship uses the home location to value to identify the library to be managed.

- In the example below, Conductor is actively managing two of the configured relationships ("Use" column). Each relationship enables both replication and VTL-attached libraries, and since both are device-configured to the logical libraries, BRMS duplication capabilities are enabled.

```
DSI010S1                    Dynamic Solutions International              S212B8DV
WRKSYSDSI                Systems Integration and Configuration


Type options, press Enter.
  1-Add   2-Change  4-Delete   5-View   7-DLMM Configuration


                      ------Virtual Library------  ---Remote Copy--- -Physical Lib-
Opt IBM i     MMS    Use ID   Vrt ID Device ID     Use ID   Vrt ID   Use   Vrt ID

 _    S212B8DV BRMS   Y    1      721 TAPMLB01       Y    2       18   Y       773
 _    S21853DW BRMS   N    1      721 TAPMLB01       Y    2       18   Y       773
 _    S212B8DV BRMS   Y    1      726 TAPMLB03       Y    2       98   Y       773
 _    S21853DW BRMS   N    1      766               Y    2       18   Y       773








                                                                          Bottom
 F3=Exit                                                               F12=Cancel
```

Figure 23: Configured Relationships View

Note there is no device name configured for the last relationship above.   Conductor and DVMM can manage the device without a description, but BRMS-based duplication capabilities will be disabled for this relationship.

From the relationship list panel, use option 7-DVMM Configuration to access the media configuration application.

Conductor's automated library reconciliation will do everything on its own but create tapes. DVMM needs to know for which virtual media classes Conductor should manage media creation. This can mean initializing systems, re-creating policy-removed volumes at expiration or automatically ensuring expired media is available to the media manager.   Conductor also needs to know the nominal expired tape requirements for each media class. These entries are made at the System/Library level.

 A sample configuration is displayed in the figure below:
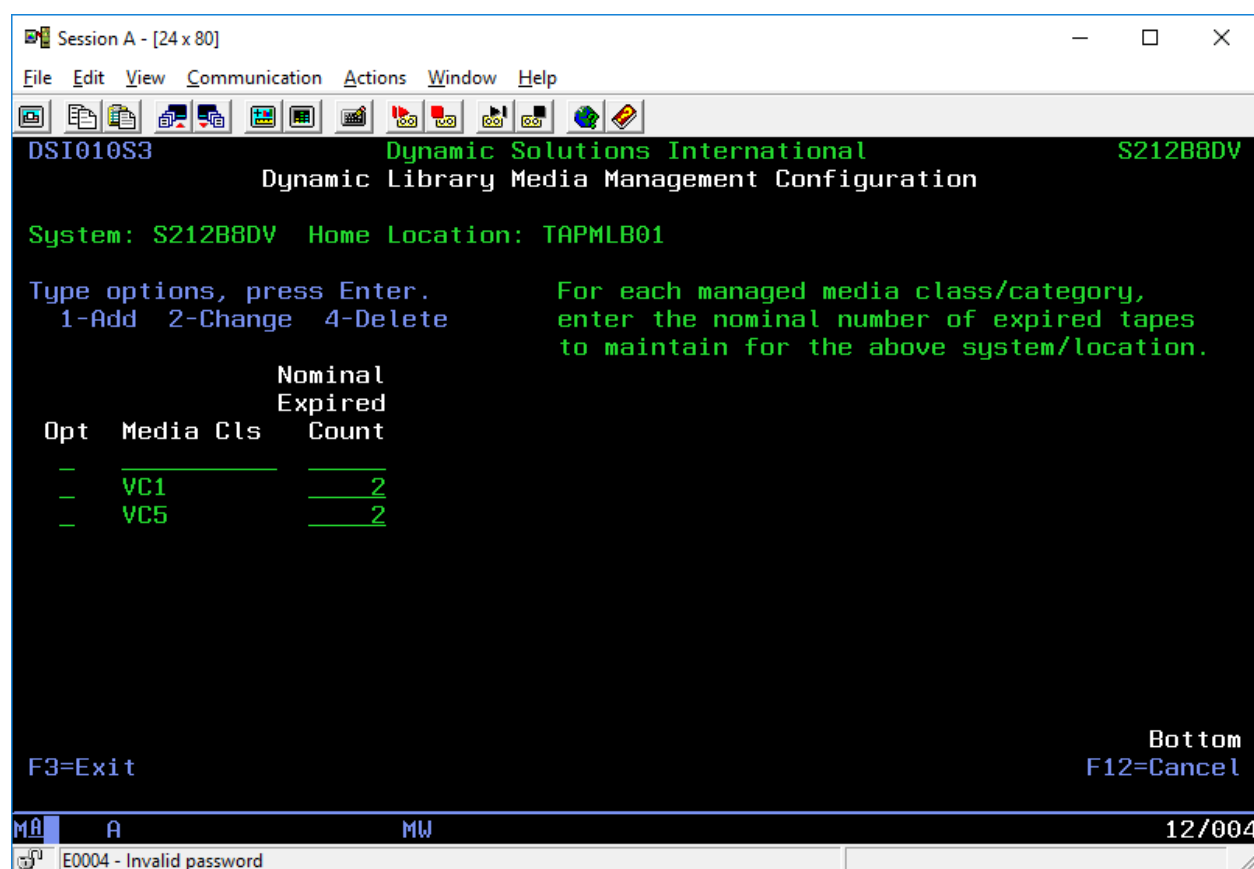
Figure 24: Sample DVMM media class configuration

In the example above, Conductor and DVMM will ensure that there are always a minimum of two expired volumes of the VC1 and VC5 media classes available to BRMS (library space and available library slots permitting).   If DLSM is used to remove volumes in advance of expiration, these settings also allow DVMM to automatically recreate policy-removed expired media.

When using nominal counts and where Conductor is working in a new virtual environment, it will automatically create the first two tapes for each class, register the tapes with BRMS and initialize them automatically. As BRMS uses media, new volumes will be added until the media inventory reaches equilibrium plus the nominal expired count.

If Conductor is migrating an existing media environment or working in an environment is has initialized, should expired media counts fall below the indicated levels for any reason, DVMM can use these values to ensure that new tapes will be made available automatically as may be required, preventing backup failures automatically.

3.6 Configuration Complete

Once each of the above configuration steps have been completed for each logical library to be managed by Conductor, the DSISYS subsystem can be started and Conductor will begin managing your device(s).

Conductor will keep an eye on your libraries, reporting information to the QSYSOPR queue and to the DSI message queues as indicated by configuration and will ensure your library media behaves as indicated by your media manager (when media automation is enabled).

You may configure media duplication policy groups/items (where applicable) after starting the subsystems.

When configuring a DSI VTL and Conductor for the first time, it is a good idea to shut down and restart the Agent software running on the VTL before starting the DSISYS subsystem. See VTL documentation for more information on managing the Agent software.

Start the Conductor subsystems manually using the command

>   QSYS/STRSBS <your Conductor library>/DSISYS

after restarting the Agent software, if necessary.

3.7 Managing Virtual Media

There are a variety of ways to create your virtual media.   Use the information below to choose the method that works best in your environment. Each assumes that your software is configured and that the DSISYS subsystem is active.

When defining starting/ending barcode ranges for logical libraries, be sure to follow the guidelines as indicated in section **1.2.4.4 Logical Library Barcode Ranges**.

Note: B*e sure to configure virtual media classes to "initialize media upon expiration" to ensure the most efficient use of VTL storage. This will release the space used by the tape at expiration automatically and allow BRMS to auto-initialize tapes it finds in *INZ status when STRMNTBRM is executed, acting as a "backup initializer" should an automated initialization process fail (a remote system not available, for example).*

3.6.1 Creating Media In BRMS-integrated Systems

There are a variety of ways to create media for BRMS-managed libraries:

1. When DVMM is enabled and virtual library relationships have been configured with nominal counts for media classes, there's nothing to do. Conductor and DVMM will automatically create media as needed as per configuration.

2. DVMM can automatically create media from BRMS media information. Use the ADDMEDBRM command to add the specified number of **uninitialized** volumes to your library home location; where applicable, assign media by system name. Ensure the media is added as expired media. Conductor will create, load and initialize your new media automatically. This method would be used, for example, to create virtual volumes using specific barcodes; when using matched volume exports, it may be easier to match the virtual barcodes to new physical media than the other way around.

   a. Each virtual library has a defined allowable volume range. If a library's defined range is limited, be sure to use a starting volume serial number and a number of volumes to create that are compatible with the library-defined range.

3. To drive media creation from the device-side, create the number of volumes required via the VTL Console; when the media creation has been recognized by Conductor, it will:

   a. Automatically load and initialize the volume as per the BRMS media information, where BRMS information exists for the volume.

   b. When no BRMS media information exists, Conductor will add the media to the library and initialize using default device values. The media exists, but is not registered with BRMS.

      i. An *INFO message will be sent to QSYSOPR indicating media was added to the system that is not BRMS-registered.

c. Should an error occur during the library load/initialize steps, an appropriate *INQUIRY message will be sent to QSYSOPR indicating manual processing of media into the library is required.

4. When DVMM is disabled, all media management responsibility falls on the Admin. Creating, registering, initializing and moving media, where applicable, must all be accomplished manually.

5. New media can be created via the import of physical tapes into the virtual library. This can be done either via the VTL console or via the Conductor Physical Media Import application.

   a. If importing via the VTL Console, once the media has been successfully imported use the IBM ADDMLMBRM command to process the media into the BRMS inventory.

   b. When importing via the Conductor Import application, media can automatically be added to BRMS via job configuration, where desired.

3.6.2 Creating Media In Tracker-integrated Systems

There are a multiple ways to create media for BRMS-managed libraries:

1. When DVMM is active and managed media categories are assigned to the virtual library relationship, Conductor will automatically create media until library equilibrium is reached, plus the nominal expired volume count.

2. When DVMM is not active, use the VTL Console software to create the number of volumes required; Conductor will auto-initialize the new media for you; Tracker will self-register the media.

3. If Conductor is managing the Tracker virtual library, the Tracker Media management application can be used to create media directly (and delete media as well). See the Tracker manual for more information.

4. New virtual media can be created by importing from physical tape.

3.6.3 Deleting Virtual Media (BRMS)

When Conductor's DVMM is enabled, follow these steps to remove virtual media from BRMS systems:

1. Remove the media information for the to-be-deleted volumes from BRMS. If this step is performed from a remote system in a managed network, wait for the Conductor host BRMS instance to be updated with the media inventory changes from the node before continuing.

2. Use the VTL GUI to delete the desired volumes once the media information no longer resides on the Conductor host BRMS instance.

If you fail to remove the media information Conductor will re-create the media where expired and in the home location of the library. if you accidentally delete the wrong volumes, DVMM will correct your error and recreate any valid, expired media when it is domiciled in the home location.

When not using Conductor's DVMM, media can be deleted directly via the VTL GUI. It is recommended the media information be removed from the media management system to ensure the media is not recreated with the activation of DVMM.

4. Automated Media Duplication Management

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

4.1 Automated Duplication Policies

As you create system relationships (see the prior section) Conductor automatically creates applicable "Policy Groups" for those relationships.   Figure 26 below presents the policy groups enabled by the relationship created in the previous section.

- As the example relationship was defined with "Remote Copy" enabled a *REMCOPY group was created for the relationship.

- As the example relationship indicated use of a VTL-attached physical library to export media, each of the applicable VTL-attached physical export policy groups were created (*ARCHIVE, *STACK).

- Since we provided a device name for the virtual library defined in the relationship above and BRMS is our Media Manager, device-attached policy groups were created (*DUPLICATE, *CONSOL).

"Policy Items" (specific policy-based actions to take for specific media classes) are created/maintained within these groups.   The groups' default setting is "inactive".
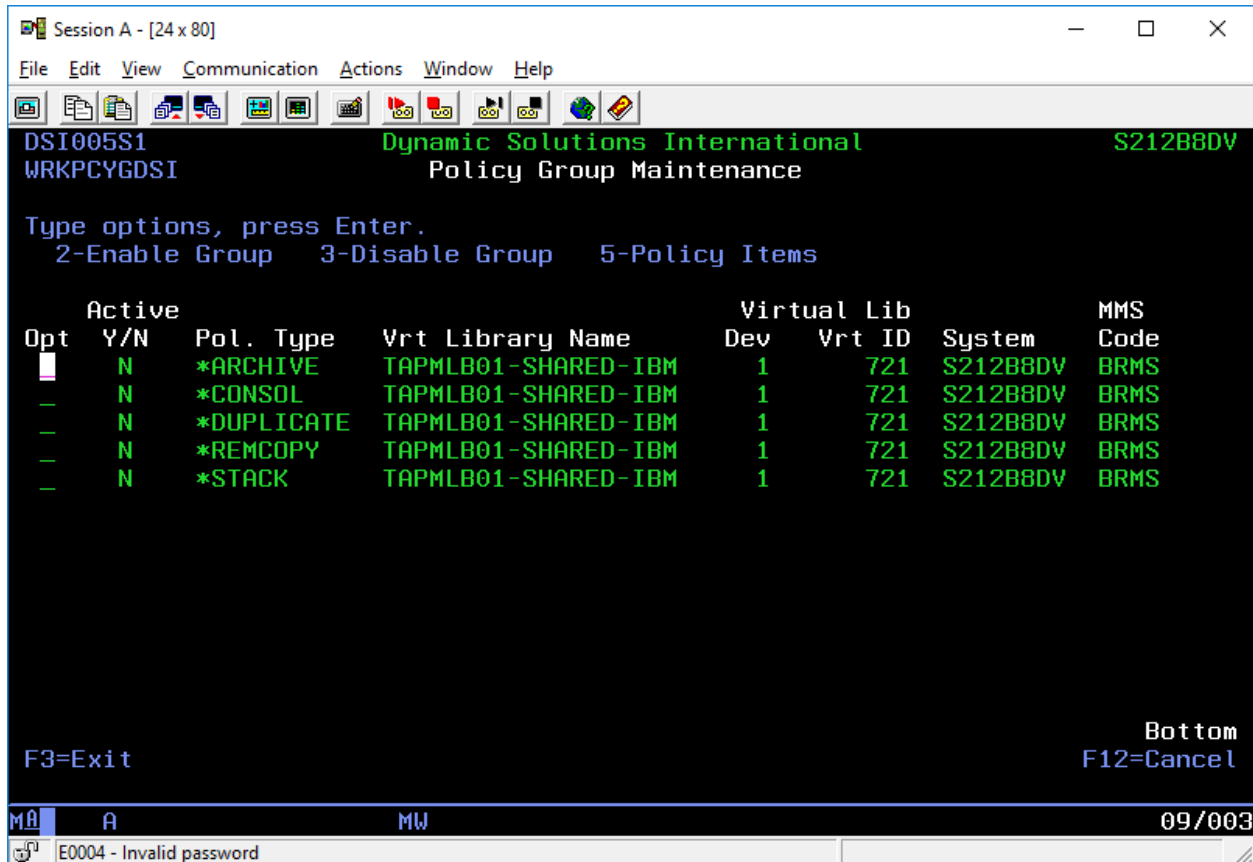
Figure 25: Available Policy Groups

4.1.1 Dynamic Storage Management and Media Replication/Archival

When using *REMCOPY or *ARCHIVE policies, Conductor offers the option to delete a source virtual volume in advance of expiration. This may be acceptable after some period for rarely- or unlikely-to-be-required primary backup media when replica copies of that media exists.

For example, if matched-volume *ARCHIVAL policies are used to export virtual media to physical tape for long-term archival, the Administrator may not want the local virtual copy taking up valuable VTL space for the entirety of the media archival retention period. Conductor policies allow for the removal of the local virtual volume while leaving the media manager database intact, allowing for simple BRMS/Tracker restores from the physical volume via import/link to virtual or from a physical drive/library.

There are four restrictions to this capability:

1. Conductor requires the scheduled delete date selections evaluate to a date less than the source virtual volume expiration.   At job-creation time, if the desired delete date falls on or after the

volume's expiration date, the cancel job will not be created and a message will be issued to QSYSOPR explaining why not.

2. When the scheduled delete job's time comes to run, Conductor will ensure that a backup of the media remains available via replica or physical/virtual tape before issuing the delete command. Should Conductor determine that a source virtual volume intended for delete no longer has any backup media available it will cancel the source delete job and issue a QSYSOPR message indicating why the cancelation occurred.

3. Should the source virtual volume become inactive prior to the execution date of scheduled delete jobs, Conductor will cancel all pending delete jobs for the volume.

4. Media classes for which advanced deletes are desired must be configured for DVMM under the applicable named relationship. Conductor will not allow advanced deletes of non-managed classes.

5. When using *ALL relationships for shared libraries, media classes to be deleted/recreated must be recorded in the DVMM configuration for the *ALL relationship. This would include any potential media class used by an *ALL duplication policy.

When the media manager expires the now-deleted virtual volume and indicates the volume is domiciled in the home location of any library on the device, DVMM will automatically re-create the media into the indicated device, ensuring the library matches the media manager's available media inventory.

When using *REMCOPY policies, there is an additional option allowing for the remote replica of a virtual volume to be removed upon source volume expiration, allowing the Administrator to manage space on the backup VTL in a similar way. This allows non-live media to be removed from the remote device automatically, ensuring efficient use of the remote VTL storage.

Note: *When creating multiple *REMCOPY and/or *ARCHIVAL policy items for the same system/media class (or for all media classes in BRMS environments), only one policy item per class (or one policy item per server when using BRMS and all class policies) should be selected to create the scheduled delete job. If deletes are scheduled by different types managing the same media class(es), the first policy to execute will create the delete job.*

4.1.2 Policy Group Types

Varying with specific relationship configurations, two or more of the following Policy Groups will be enabled for a relationship. Each group type is discussed below.

Note that policy executions can be "stacked"; for example, using a *DUPLICATE policy to consolidate weekly save data onto fewer virtual tapes, then utilizing a weekly-scheduled *ARCHIVE policy to export the consolidation media to physical media via a VTL-attached library. Then delete the virtual consolidation work media, recreating it upon expiration. All automatically.

*ARCHIVE: The "*ARCHIVE" type performs a direct copy of the contents of a virtual volume to a physical volume via a VTL-attached physical media library.

There are two different approaches that can be utilized:

> **Matched Exports:** Matched-export activities require that a volume-serial-matched media cartridge be loaded into the physical library in order to complete the export. Conductor will only export to a physical volume matching the volume serial number of the applicable source virtual volume when "Match Virtual/Physical Volumes" is set to "Y." Physical media policy (BRMS) settings are ignored for matched volume exports, as the physical media may be of any class so long as it shares the virtual volume ID.

> When using matched exports in a BRMS environment, both the virtual and physical tapes are represented by one BRMS media record. This implies the virtual and physical volumes share the same creation, retention and tape content history information. This model is generally applicable to the use of physical media to back up a virtual volume or where long-term archival of matched physical media is desired without the overhead of retaining the virtual volume for the entire retention period; Conductor can automatically remove the virtual volume as per configuration and recreate it upon expiration, leaving all media information intact thru expiration.

> **Non-matched exports:** When using the non-matched approach, the export is done to a physical volume serial number that does not match the volume serial number of the virtual tape.

> BRMS: Only physical volume serial numbers that do not fall into any defined virtual library barcode range will be considered for qualifying as non-matched export media.

> Tracker: Only physical media that does not match any known virtual media cartridge ids will be considered for qualifying as non-matched export media.

> Using non-matched exports enables different retention periods for the virtual media and physical volume copies. This is helpful in long-term archival situations as fewer virtual tapes (e.g. a smaller VTL) can be used to manage long-retained backup data across a large number of physical volumes.

When using non-matched exports, media data is automatically added and/or maintained in the BRMS media tables to allow BRMS to continue to manage both creation, retention and move information for these physical volumes. Tape content history for non-matched physical media is kept in and is available from the Conductor database.

When restoring from non-matched exports, physical media should be imported back to its virtual volume with restorations then performed from the virtual volume. The physical volume may also be "linked' to an imported virtual volume if full importation is not desired (see the VTL Console documentation).

If restoring from a physical device is desired for non-matched media, use IBM restore commands via a *TAP device and make sure that any virtual volume sharing the barcode of the magnetic label of the physical tape has been moved into the virtual vault before issuing the RST* command. It may be advantageous to temporarily disable BRMS' media monitoring while performing the restore.

*CONSOL (BRMS): The *CONSOL policy is a periodically-executed policy item where multiple source virtual volumes are combined onto fewer media in batch mode. The target may be virtual media to be loaded in preparation for a subsequent export to physical tape or may be physical media in a device-attached physical library. When using virtual media as consolidation media, DSI recommends using a different media class within the same library.

This policy type uses BRMS' DUPMEDBRM command from within Conductor; unlike *ARCHIVE, *STACK and *REMCOPY policy types, it requires IBM cycles to complete the duplications.

*DUPLICATE (BRMS): The *DUPLICATE policy duplicates virtual media to other virtual media, to physical media in a device-attached physical library or to another compatible output device (e.g. a tape drive or optical library) where the target appliance has a device description on the Conductor host server. When using virtual media as consolidation media, DSI recommends using a different media class within the same library.

This policy type uses BRMS' DUPMEDBRM command from within Conductor; unlike *ARCHIVE, *STACK and *REMCOPY policy types, it requires IBM cycles to complete the duplications.

*DUPLICATE policies can be executed with "APPEND" set "on", meaning data is "stacked" onto *ACTIVE media of the target class (when available) or with "APPEND" set "off", which equates to a tape-to-tape duplication.

*DUPLICATE policies are run "on-the-fly" as per scheduling and can consolidate data onto media with each media qualification/execution of the policy item.

When the target of a *DUPLICATE execution is a virtual volume, that virtual media may then be automatically processed via an *ARCHIVE policy that runs on a schedule to migrate consolidated virtual data to physical media.

*REMCOPY: The *REMCOPY type of policy item will automatically replicate virtual media to a *REMOTE VTL device (a virtual library at a DR site or an on- or off-site backup VTL library). Media can be targeted to a compatible library or to the virtual vault.

Note: *For *REMCOPY policies to execute, neither the local nor the remote volume can be mounted. If Conductor detects a source volume is mounted at execution time, it will patiently wait for the dismount before executing. If it detects a remote volume it needs to delete is mounted, it will issue a *SYSOPR message informing the ADMINISTRATOR to unload the volume(s). Once the problem condition has been corrected the *REMCOPY job will be created and executed.*

*STACK: The *STACK archival group allows the system to periodically, upon a user-defined schedule, export small virtual volumes onto a non-matched tape "stack", where multiple virtual volumes are stored on fewer physical volumes. This policy type is recommended for archival uses when virtual tapes created by BRMS backups are often less than 50% of the capacity of the virtual tape.

Use of *STACK, *DUPLICATE and/or *CONSOL policies can greatly reduce the media required to archive data.

Note: *When Conductor is in "enterprise mode", this policy group allows consolidation of volumes from shared libraries written from different servers/partitions onto the same physical media stack (this type of "mixed" consolidation is not yet possible using device-attached *DUPLICATE or *CONSOL policies).*

4.1.3 Creating Automation Policy Items

The steps for creating policy items are identical for each type of policy group; only the properties of the various item types change. Each type is discussed below. Differences between Media Management System selections are presented where relevant.

Conductor incorporates scheduling capabilities for each of the available policy items.   Policy item templates offer different scheduling options depending on the activity being scheduled.

The following rules apply to the job scheduling options:

- When using the *IMMED option, newly-created jobs will be executed immediately upon source volume qualification unless there are jobs already running for the source volume.   When *SUBMITTED jobs are utilizing the source volume, Conductor will queue the new job(s) and release *QUEUED job(s) as their source volume(s) become available.

- Other scheduling options can be used to realize job prioritization.   For example, if a particular media class has multiple post-processing activities to execute, configure the activity with the highest priority as an *IMMED execution.   Use the *TODAY, *TOMRW or the *SUN-*MON options along with a time value to ensure lower priority jobs run after *IMMED jobs.

- If a *SCHEDULED job is released and its source media is in use, the *SCHEDULED job will be *QUEUED until the source volume becomes available.

- If a virtual volume qualifies for two or more job executions and each of those policy items is defined with *IMMED scheduling or are scheduled to run at the same time the jobs created will run in an unpredictable order.

- When scheduling source virtual volume deletes for virtual media on jobs that are themselves scheduled, be sure to take into account the delay before the primary job will execute and schedule the delete appropriately.

    o For example, if you are creating an *ARCHIVE job to be *SCHEDULED for *TOMRW at 2:00am, configure the delete of the source volume such that the delete does not occur until after the primary job is expected to complete.   In such a case scheduling the delete for 2 days hence would be appropriate.

4.1.4 Creating a *REMCOPY (VTL to VTL) Policy Item

To create a remote copy policy item, use option "5-Policy Items" on the *REMCOPY group for which you wish to create the policy item, as shown in figure 27:

```
Session A - [24 x 80]                                          —   □   ×

File  Edit  View  Communication  Actions  Window  Help

 ▣   ▣▣ ▣▣  ▣▣ ▣▣  ▣ ▣  ▣   ▣▣ ▣▣  ▣▣ ▣▣  ▣ ▣

DSI005S1              Dynamic Solutions International          S212B8DV
WRKPCYGDSI                  Policy Group Maintenance

Type options, press Enter.
  2-Enable Group    3-Disable Group    5-Policy Items

     Active                                  Virtual Lib         MMS
Opt  Y/N   Pol. Type    Vrt Library Name    Dev  Vrt ID  System  Code
 _    N    *ARCHIVE     TAPMLB01-SHARED-IBM   1    721   S212B8DV BRMS
 _    N    *CONSOL      TAPMLB01-SHARED-IBM   1    721   S212B8DV BRMS
 _    N    *DUPLICATE   TAPMLB01-SHARED-IBM   1    721   S212B8DV BRMS
 5    N    *REMCOPY     TAPMLB01-SHARED-IBM   1    721   S212B8DV BRMS
 _    N    *STACK       TAPMLB01-SHARED-IBM   1    721   S212B8DV BRMS



                                                              Bottom
 F3=Exit                                                  F12=Cancel

MA    A                  MW                                     13/003
 ⌨  E0004 - Invalid password
```

Figure 26: Accessing Policy Items within a Policy Group

Upon making the selection and pressing ENTER, the policy item UI is presented as shown in figure 28:

Figure 27: Policy Item Configurations

The top section of the UI allows you navigate through your available policy groups; the bottom half allows you to manage policy item(s) for the current policy group selection.   To create a new policy item for the current group, enter '1' on the option line and press Enter. The applicable policy item template is presented as shown in figures 29/30:

```
┌─────────────────────────────────────────────────────────────────────────────────┐
│ ■▄  Session A - [24 x 80]                                         —    □    ✕       │
├─────────────────────────────────────────────────────────────────────────────────┤
│ File  Edit  View  Communication  Actions  Window  Help                             │
├─────────────────────────────────────────────────────────────────────────────────┤
│ [icons toolbar]                                                                    │
│  DSI005F3            Dynamic Solutions International              S212B8DV          │
│                       Maintain Remote Copy Policy                                  │
│                                                                                    │
│  Type choices, press Enter.                                                        │
│  System Identifier . . . . . . . .  S212B8DV                                       │
│  Media Management System ID  . . .  BRMS          BRMS for IBM i                    │
│  Virtual Device ID . . . . . . . .        1       FS-ISERIES-HA-A                   │
│  Virtual Library ID. . . . . . . .      721       TAPMLB01-SHARED-IBM               │
│  Sequence Number . . . . . . . .                                                   │
│  Policy description . . . . . . .   _____               │
│  Policy active (Y/N) . . . . . . .  Y                                              │
│  Media class . . . . . . . . . .    _____                                      │
│  Ignore mounted volumes  . . . . .  Y                                              │
│  Remote VTL ID . . . . . . . . . .        2       iSeries-DEV                       │
│  Remote virtual library ID . . . .       18       TAPMLB01-L32                      │
│  Schedule job to run . . . . . . .  *IMMED        Jobs submitted immed             │
│    Scheduled time (non-*IMMED) . .    :00         (24 hour)                         │
│  Delete remote copy when expired .  N                                              │
│                                                                                    │
│  Schedule source volume delete . .  N                                              │
│    Units/Time period . . . . . . .  ____  *DAYS   Number of days out               │
│                                                                                    │
│  F3=Exit                                                         F12=Cancel        │
│                                                                                    │
│ MA▌    A                 MW                                           10/037        │
│ ⌨  E0004 - Invalid password                                                        │
└─────────────────────────────────────────────────────────────────────────────────┘
```
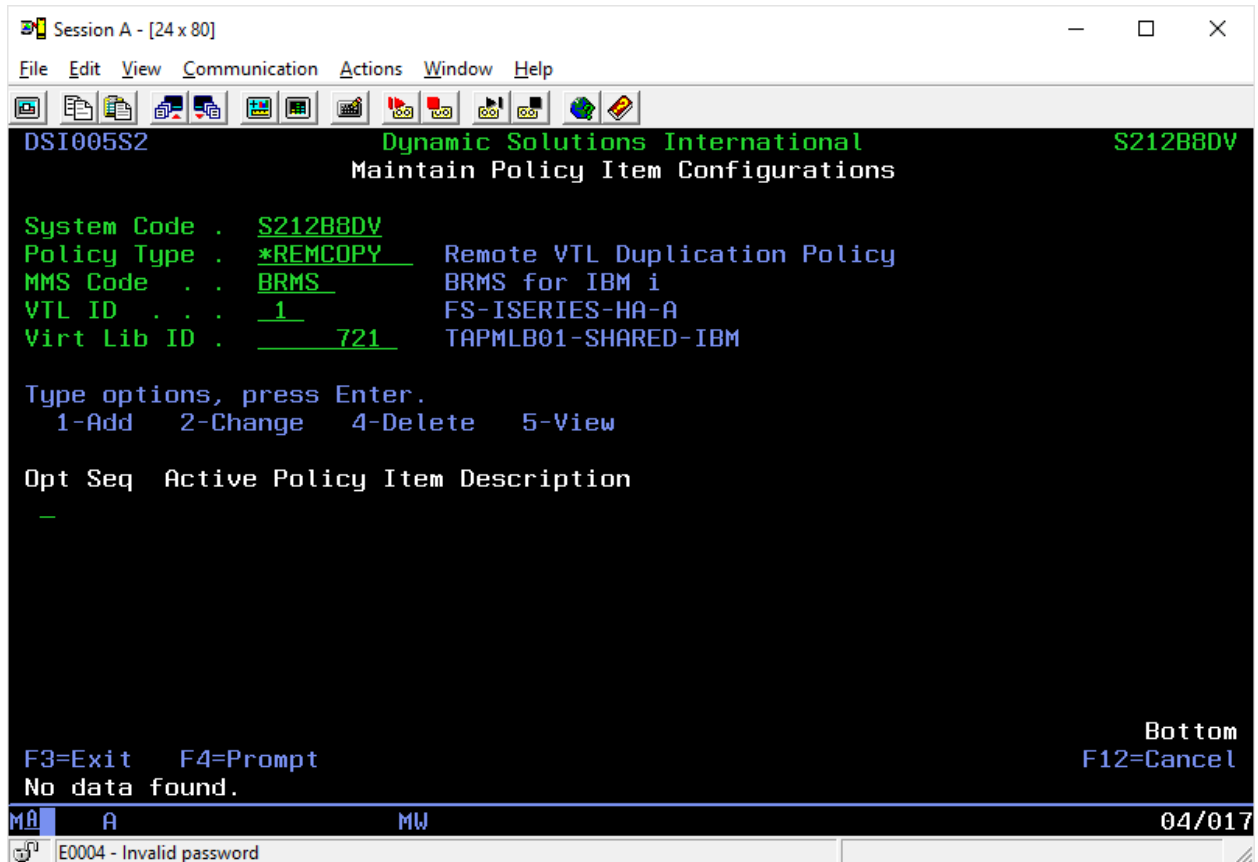
Figure 28: *REMCOPY policy item template – BRMS

```
DSI005F3              Dynamic Solutions International         S212B8DV
                      Maintain Remote Copy Policy

Type choices, press Enter.
System Identifier . . . . . . .   S212B8DV
Media Management System ID . . .  DSIMT        DSI Media Tracker
Virtual Device ID . . . . . . .          1     FS-ISERIES-HA-A
Virtual Library ID. . . . . . .        721     TAPMLB01-SHARED-IBM
Sequence Number . . . . . . . .
Policy description . . . . . . ▮_____
Policy active (Y/N) . . . . . .  Y
Virtual media category . . . .   _____
Ignore mounted volumes . . . .   Y
Remote VTL ID . . . . . . . . .          2     iSeries-DEV
Remote virtual library ID . . .         18     TAPMLB01-L32
Schedule job to run . . . . . .  *IMMED        Jobs submitted immed
  Scheduled time (non-*IMMED) .   __:00        (24 hour)
Schedule remote volume delete . .  N
  Units/Time period . . . . . .   _____  *DAYS__  Number of days out
Schedule source volume delete . .  N
  Units/Time period . . . . . .   _____  *DAYS__  Number of days out

F3=Exit                                                   F12=Cancel

MA   A                 MW                                    10/037
⌨  E0004 - Invalid password
```

Figure 29: *REMCOPY policy item template - Tracker

Field Descriptions/Values:

Note: *Fields containing the '*' indicator can be prompted via F4:*

Sequence Number: A system-designated value created at save time.

Policy Description: A short description of what the policy item does.

Policy Active (Y/N): This policy will be executed when set to "Y"; no activity occurs when set to "N".

Ignore Mounted Tapes/Sets: The VTL device requires source and virtual volumes to be in slots or the virtual vault to process a *REMCOPY request. For this reason, the value for this field is set to 'Y' and the field is protected from input.

Note: *If any member of a source tape set is mounted, none of the tapes in that set will be processed until all volumes in the set are unmounted.*

Media Class*: The BRMS media class this policy item will process. If left blank, all media classes found marked for duplication in the library's home location will qualify for processing.

Virtual Media Category*: The IBM media category this policy item will process (Tracker).

Remote VTL ID*: The Conductor device ID identifying the virtual device that contains the applicable virtual library upon which to write the remote copy. If a default value was provided in the relationship defined earlier, that value will be presented here.

Remote Virtual Library ID*: This field identifies the remote virtual library the virtual volume will be copied to. If a default value was provided in the relationship defined earlier, that value will be presented here.

Note: *A value of 0 indicates the destination target as the virtual vault.*

The remote library selected must be of the same type as the source library (if copying from an ULTRIUM5 volume, the target library must be an ULTRIUM5 library).

Schedule Job to Run: The user has three options:

- *IMMED – the job will be sent the VTL as soon as the volume has been identified as requiring processing. If another job is already using the virtual source volume, the new job will be *QUEUED and released when the source volume becomes available.

- *TODAY – used in conjunction with a time entry, allows the user to dictate the time at which the job is to be run.
    - Be sure to use a time value that is beyond the normal restart-after-backup time for your system to prevent confusion (if a job is scheduled for 0100 (1:00AM), and the subsystems restart at 2am, it's effectively the same as using the *IMMED setting).

- *TOMRW – used in conjunction with a time entry, this allows the user to dictate the time at which the job is to be run on the next calendar day.
    - Be sure to use a time value that is beyond the normal restart-after-backup time for your system to prevent confusion (if a job is scheduled for 0100 (1:00AM), and the subsystems restart at 2am, it's effectively the same as using the *IMMED setting).

- *MON-*SUN: Used in conjunction with a time entry, the job will run on the next *MON, *TUE, etc.

Delete remote volume when expired: Setting this property to 'Y' (YES) will result in a scheduled delete job for the remote volume being created by this policy. This job will execute on the day the source volume expires to remove the remote volume when it is no longer required.

Schedule Source Volume Delete: Used with a period units qualifier (number of *DAYS, *MONTHS, *YEARS), this option allows the user to schedule an advanced delete of the local virtual volume. This option may be desirable when local copies of virtual save media are no longer required on the local VTL device. For example, if a remote copy exists or the virtual volume has been archived to physical media, the local volume may be released in advance of its expiration/re-initialization. This requires the source media class be configured for DVMM under the appropriate relationship.

In BRMS and Tracker cases, all media information is retained; should restoration from the deleted volume become necessary it can be restored to the virtual library from the remote copy or physical export.

Note: *When Conductor's DVMM is disabled, there is no automated mechanism to recreate deleted tapes. Use BRMS expiration reports to guide manual tape recreation.*

Once these entries have been made, press ENTER to validate and save. Any fields in error will be highlighted and a message presented on line 24. Once successfully saved, use F12 to back up and create the next item; use F12 again to return to the Group Policy maintenance UI.

Below find an example of a completed *REMCOPY policy. This policy item will:

- process media of class VC1 written by BRMS from system S212B8DV;
- wait for the virtual tape(s) to be dismounted before creating the job;
- copy the qualifying volumes to VTL ID 2/library ID 18;
- run the job immediately upon qualification (or queue the job if the volume is active);
- delete the remote volume upon expiration;
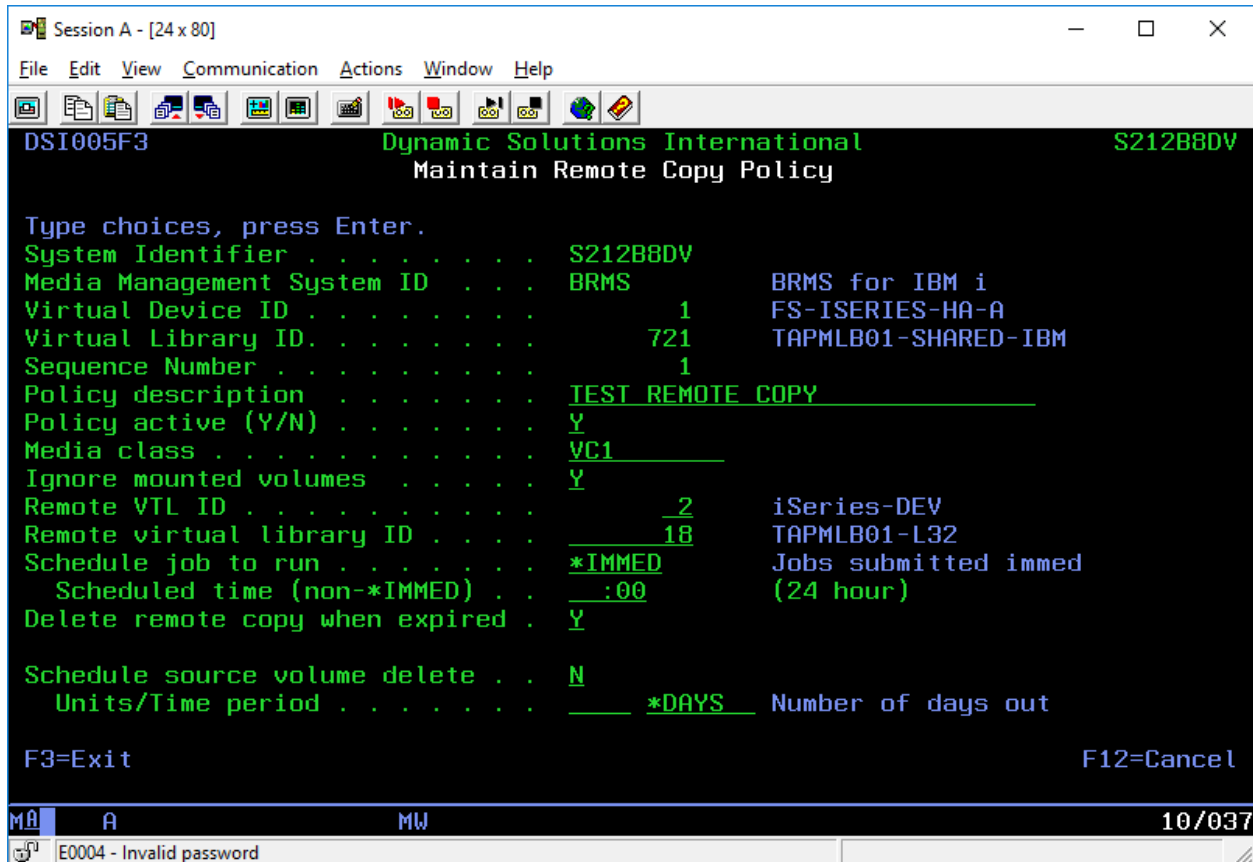- Not delete the local source volume in advance of BRMS expiration.

Figure 30: *REMCOPY template, completed (BRMS)

4.1.5 Creating an *ARCHIVE (virtual media to physical media) Policy Item

There are two types of *ARCHIVE policies: Matched (virtual/physical volumes are the same) and non-matched (virtual volumes are written to physical volumes with a non-matched volume serial number). Options vary slightly for each type.

Follow the same steps for creating a Remote Copy policy item, instead using option "5-Policy Items" on the *ARCHIVE policy group for the applicable relationship.

Alternatively, if already on the list screen for another policy group, change the type to *ARCHIVE and press Enter.

The applicable panel (as shown in figures 32/33 below) appear:

Figure 31: *ARCHIVE policy item template – BRMS

Figure 32: *ARCHIVE policy item template – Tracker

Field Descriptions/Values:

Note: *Fields containing the '*' indicator can be prompted via F4:*

Sequence Number: A system-designated value created at save time.

Policy Description: A brief description of what the policy item does.

Policy Active (Y/N): This field indicates whether or not volumes matching this policy are processed.

Media Class*: The BRMS media class to be processed by this policy item. If left blank, all media classes found marked for duplication in the library's home location will qualify for processing.

Virtual Media Category*: The IBM media category this policy item will process (Tracker).

Virtual ID of Physical Library*: The ID of the virtual library to utilize. If a default value was provided when configuring this relationship that value will be presented as a default.

Physical Media Category: The IBM media category to assign to the physical volume used for the export (Tracker).

Ignore Mounted Tapes/Sets: This tells Conductor to ignore processing volumes where those volumes are mounted.   If a qualified volume is part of a tape set, each member of the set must be unloaded before processing will occur.

It is strongly recommended this value be set to "Y" and your BRMS control groups are configured to *UNLOAD tapes when complete to prevent Conductor from trying to unload a tape that may be actively in use.

Match Vol Ser Number: When set to "Y", Conductor will only export virtual media to a physical volume with the same serial number as the source volume. When set to "N", Conductor will only export to a physical volume that does not match the virtual volume serial number.

When using non-matched policy types the MedPcy/MedClas/MovePcy values determine which class of physical tape to use (or to create, when necessary) and qualifies the expiration/move information for the physical media.

Report physical media usage: If selected, information about the job's physical media can be emailed or printed. Use "Y" here to enable this policy to create this data.

Save Object History: When VTL-attached libraries are in use Conductor always saves File-level history to support tape content searches from within Conductor.   If your BRMS backup is saving object-level data, Conductor can extract that information from the source tape history and make it available to the Conductor tape search function to support searching down to the object/member level.

Eject Tape after Export: This setting can be used to eject the physical tape after the job completes.

MedPcy/New Vol MedCls/MovePcy: For non-matched exports, enter the Media Policy to use to identify target media or the properties of which that will be used to create new BRMS media data when Conductor uses new media (BRMS).

Schedule Job to Run: The user has these options:

- *IMMED – the job will be sent the VTL as soon as the volume has been identified as requiring processing. If another job is already using the source volume, the new job will be *QUEUED and released when the source volume becomes available.

- *TODAY – used in conjunction with a time entry, this allows the user to dictate the time at which the job is to be run.
  - Be sure to use a time value that is beyond the normal restart-after-backup time for your system to prevent confusion (if a job is scheduled for 0100 (1:00AM), and the subsystems restart at 2am, it's effectively the same as using the *IMMED setting).

- *TOMRW – used in conjunction with a time entry, this allows the user to dictate the time at which the job is to be run on the next calendar day.
  - Be sure to use a time value that is beyond the normal restart-after-backup time for your system to prevent confusion (if a job is scheduled for 0100 (1:00AM), and the subsystems restart at 2am, it's effectively the same as using the *IMMED setting).

- *MON-*SUN: Used in conjunction with a time entry, the job will run on the next *MON, *TUE, etc.

Schedule Source Volume Delete: This value is used with a period units qualifier (number of *DAYS, *MONTHS, *YEARS) to schedule a delete of the source virtual volume in order to free VTL space in advance of virtual volume expiration.   This requires the source media class be configured for DVMM under the appropriate relationship.

Note: *When Conductor's DVMM is disabled, there is no automated mechanism to recreate deleted tapes. Use BRMS expiration reports to guide manual tape recreation.*

Encryption Key Name/Pwd: Provide values if encryption is desired. Leave blank otherwise.

Figure 34 below presents an example of an *ARCHIVE policy item that will:

- process qualified volumes of class VC1 written by BRMS from system S212B8DV to library 1/721;
- ignore mounted source tapes until they are dismounted;
- export virtual media content to a physical tape on physical library ID 733;
- select physical volume(s) matched to the virtual volumes to process;
- create physical media usage data upon job completion;
- save object-level history into the DSI Conductor search tables (if present in BRMS);
- leave the physical media in the library upon completion;
- runs the job immediately upon qualification (or is queued until the source volume is available);
- remove the virtual volume from the virtual library 14 days after the export is triggered.
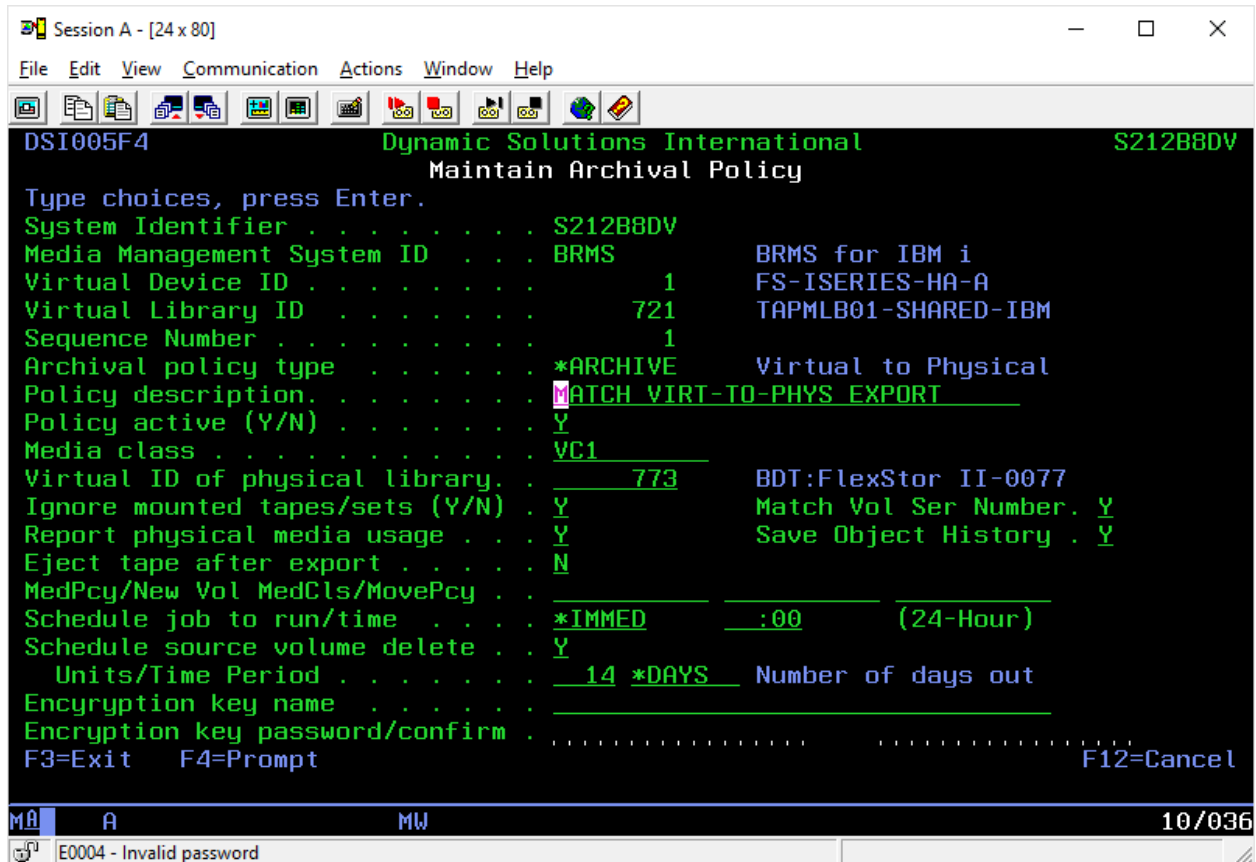
Figure 33: *ARCHIVE polity item, completed (BRMS)

To alter this policy item to utilize a non-matched export volume, the "Match Vol Ser Number" value would be set to "N". This change which will require the entry of the MecPcy/New Vol MedCls/MovePcy fields (BRMS) or the Physical media category field (Tracker) to enable Conductor to know which class of tape to use and/or how to create and manage media records for new physical media, when encountered.

4.1.6 Creating a *CONSOL (device-to-device) Policy Item (BRMS)

*CONSOL policy items allow for scheduled automation of device-to-device tape consolidations in batch mode. One or more virtual tapes can be consolidated onto fewer media. BRMS will use *ACTIVE media of the appropriate target class, when available.   Media targets can be physical media or can be virtual media (perhaps in preparation for a later export policy execution).

Follow the same steps for creating a Remote Copy policy item, instead using option "5-Policy Items" on the *CONSOL policy group for the applicable system. The UI presented in figure 35 appears:

```
Session A - [24 x 80]                                                  —    □    ×

File  Edit  View  Communication  Actions  Window  Help

┌──┐ ┌──┬──┐ ┌──┬──┐ ┌──┬──┐ ┌──┐ ┌──┬──┐ ┌──┬──┐ ┌──┐ ┌──┐
└──┘ └──┴──┘ └──┴──┘ └──┴──┘ └──┘ └──┴──┘ └──┴──┘ └──┘ └──┘

 DSI005F7              Dynamic Solutions International           S212B8DV
                        Maintain Consolidation Policy

  Type choices, press Enter.

  System Identifier . . . . . . . . S212B8DV
  Media Management System ID  . . . BRMS          BRMS for IBM i
  Virtual Device ID . . . . . . . .         1     FS-ISERIES-HA-A
  Virtual Library ID  . . . . . . .        721    TAPMLB01-SHARED-IBM
  Sequence Number . . . . . . . . .
  Archival policy type  . . . . . . *CONSOL       MMS Tape Consolidati

  Policy description. . . . . . . . _____
  Policy active (Y/N) . . . . . . . Y
  Media class . . . . . . . . . . . _____
  Target library device ID  . . . . _____
  Target media policy . . . . . . . PP1_____

  Schedule job (units/period/time). ___0  *DAYS___  _____  (24-hour)



  F3=Exit    F4=Prompt                                          F12=Cancel

 MA    A                    MW                                       13/036
 ⚙ E0004 - Invalid password
```

Figure 34: *CONSOL policy item template

Field Descriptions/Values:

Note: *Fields containing the '*' indicator can be prompted via F4:*

Sequence Number: A system-designated value created at save time.

Policy Description: A brief description of what the policy item does.

Policy Active (Y/N): Whether or not volumes matching this policy are processed.

Media Class*: The BRMS media class to be processed by this policy item. If left blank, all media classes found marked for duplication in the library's home location will qualify for processing.

Target Library Device: The IBM device name for the target of the duplication.

Target Media Policy: The properties of the target media to utilize when selecting target media.

Schedule Job to Run: The user has these options:

- *DoM – day of month.   Used with the units qualifier, this determines which day of the month to run the stack job on.

- *DAYS, *MONTHS, *YEARS – used with the units qualifier, the number of days, months or years into the future to schedule the job; based on the initial volume qualification time (the date/time the first volume qualifies for the policy item execution). A units qualifier of 0 (zero) and a period selection of *DAYS as showin in the example indicates to run the job "today" at the time provided.

- *MON-*SUN: Used in conjunction with a time entry, the job will run on the next *MON, *TUE, etc.

A *CONSOLINI job for the qualifying policy item will be scheduled using these values based on the date the first qualifying volume is identified and the scheduled time setting; subsequent qualifying volumes will append to the job's media list until the job's scheduled time at which point all queued volumes will be consolidated.

Figure 36 presents an example of a *CONSOL policy item that will:

- process qualified volumes of class VC5 written by BRMS from system S212B8DV,
- consolidate the source media to a volume on device TAPMLB03,
- use the attributes of media policy PP2 for the target media,
- schedule the job to run seven days after the first virtual media is qualified at 2:30am.
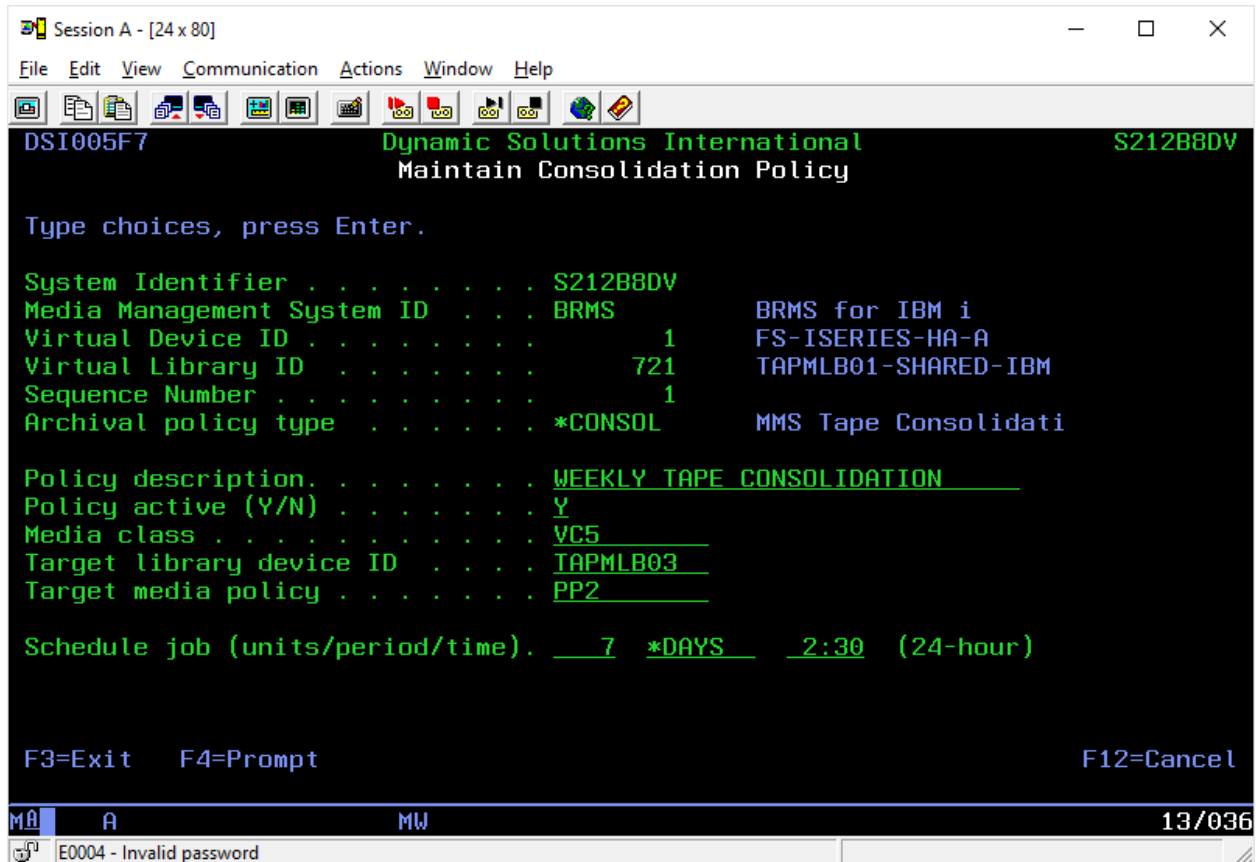
```
Session A - [24 x 80]                                      —   □   ×

File  Edit  View  Communication  Actions  Window  Help

[toolbar icons]

 DSI005F7              Dynamic Solutions International        S212B8DV
                       Maintain Consolidation Policy

  Type choices, press Enter.

  System Identifier . . . . . . . . .  S212B8DV
  Media Management System ID  . . .  BRMS         BRMS for IBM i
  Virtual Device ID . . . . . . . .        1      FS-ISERIES-HA-A
  Virtual Library ID  . . . . . . .      721      TAPMLB01-SHARED-IBM
  Sequence Number . . . . . . . . .        1
  Archival policy type  . . . . . .  *CONSOL      MMS Tape Consolidati

  Policy description. . . . . . . .  WEEKLY TAPE CONSOLIDATION
  Policy active (Y/N) . . . . . . .  Y
  Media class . . . . . . . . . . .  VC5
  Target library device ID  . . . .  TAPMLB03
  Target media policy . . . . . . .  PP2

  Schedule job (units/period/time).    7   *DAYS     2:30   (24-hour)



  F3=Exit    F4=Prompt                                       F12=Cancel

 MA    A              MW                                          13/036
 [icon] E0004 - Invalid password
```

Figure 35: *CONSOL template, completed

4.1.7 Creating a *DUPLICATE (device-to-device) Policy Item (BRMS)

*DUPLICATE policy items allow for scheduled automation of device-to-device duplications.   Virtual tapes can be duplicated to any compatible target device.   This can include copying a virtual tape from library A to another virtual tape in Library A, to a virtual tape in another virtual library, to a physical tape in a device-configured physical library or any other compatible target device.

The *DUPLICATE policy can be utilized in two ways: The "Append" option determines whether to add the data from the source tape to an *ACTIVE target volume (Append = "Y") or to do a discrete media-to-media copy (Append = "N").

Follow the same steps for creating a Remote Copy policy item, instead using option "5-Policy Items" on the *DUPLICATE policy group for the applicable system. The UI presented in figure 37 appears:

Figure 36: *Duplicate policy item template (BRMS)

Field Descriptions/Values:

Note: *Fields containing the '*' indicator can be prompted via F4:*

Sequence Number: A system-designated value created at save time.

Policy Description: A brief description of what the policy item does.

Policy Active (Y/N): Whether or not volumes matching this policy are processed.

Media Class*: The BRMS media class to be processed by this policy item. If left blank, all media classes found marked for duplication in the library's home location will qualify for processing.

Ignore Mounted Tapes/Sets: This tells Conductor to ignore processing volumes where those volumes are mounted.   If a qualified volume is part of a tape set, each member of the set must be unloaded before processing will occur.

Target Library Device: The IBM device name for the target of the duplication.

Target Media Policy*: The properties of the target media to utilize when selecting target media.

APPEND to *ACTIVE volumes: When "Y", Conductor will instruct BRMS to try and append source data to an existing, *ACTIVE volume. When "N", Conductor instructs BRMS to do discrete tape duplication.

Save Media Information*:   Conductor will instruct BRMS to append media information to the end of the volume.   See the BRMS documentation for more information.

Schedule Job to Run*: The user has the following options:

- *IMMED – the job will be sent the VTL as soon as the volume has been identified as requiring processing. If another job is already using the source volume, the new job will be *QUEUED and released when the source volume becomes available.

- *TODAY – used in conjunction with a time entry, this allows the user to dictate the time at which the job is to be run.
    - Be sure to use a time value that is beyond the normal restart-after-backup time for your system to prevent confusion (if a job is scheduled for 0100 (1:00AM), and the subsystems restart at 2am, it's effectively the same as using the *IMMED setting).

- *TOMRW – used in conjunction with a time entry, this allows the user to dictate the time at which the job is to be run on the next calendar day.
    - Be sure to use a time value that is beyond the normal restart-after-backup time for your system to prevent confusion (if a job is scheduled for 0100 (1:00AM), and the subsystems restart at 2am, it's effectively the same as using the *IMMED setting).

- *MON-*SUN: Used in conjunction with a time entry, the job will run on the next *MON, *TUE, etc.

Below is an example of a *DUPLICATION policy item that will:

- process qualified volumes of class VC1 written by BRMS from system S212B8DV;
- ignore mounted source tapes until they are dismounted;
- duplicate the source media to a volume on device TAPMLB30;
- use the attributes of media policy PP2 for the target media;
- append the source data to an *ACTIVE tape, if available;
- will use the *BKUPCY default when evaluating the SAVMEDINF value, and
- schedule the job to run "tomorrow" at 4:30am.

```
⊞ Session A - [24 x 80]                                                  —   □   ✕
File  Edit  View  Communication  Actions  Window  Help
⊡ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮
 DSI005F6              Dynamic Solutions International          S212B8DV
                        Maintain Duplication Policy

  Type choices, press Enter.

  System Identifier . . . . . . . . . S212B8DV
  Media Management System ID  . . . BRMS       BRMS for IBM i
  Virtual Device ID . . . . . . . .        1   FS-ISERIES-HA-A
  Virtual Library ID  . . . . . . .      721   TAPMLB01-SHARED-IBM
  Sequence Number . . . . . . . . .        1
  Archival policy type  . . . . . . *DUPLICATE Library-to-Library D
  Policy description. . . . . . . . OFFLOAD TO PHYSICAL MEDIA
  Policy active (Y/N) . . . . . . . Y
  Media class . . . . . . . . . . . VC1
  Ignore mounted tapes/sets (Y/N) . Y
  Target library device . . . . . . TAPMLB03
  Target media policy . . . . . . . PP2
  Append To *ACTIVE volumes . . . . Y
  Save media information  . . . . . *BKUPCY
  Schedule job to run . . . . . . . *TOMRW    Time (24hr):  4:30



  F3=Exit    F4=Prompt                                        F12=Cancel

 MA    A                    MW                                        12/036
 ⊡ E0004 - Invalid password
```
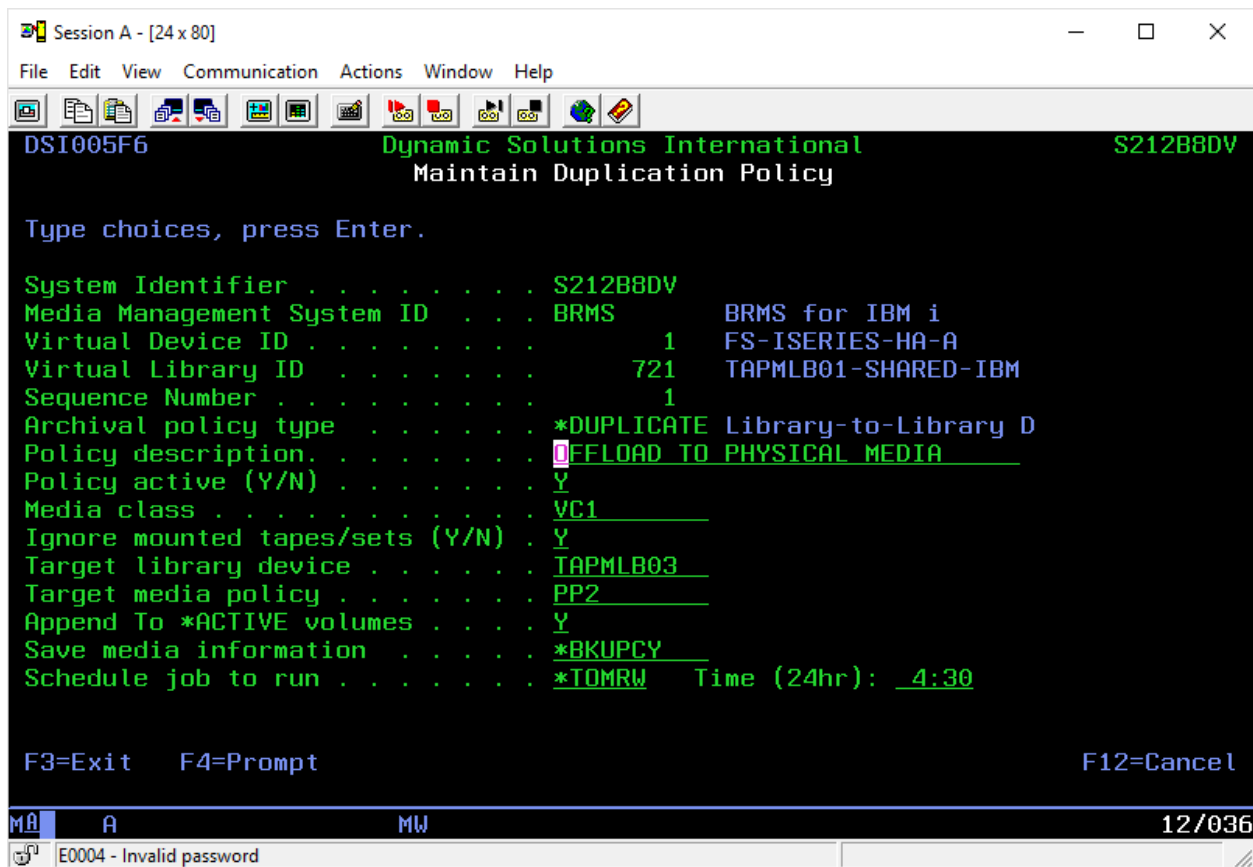
Figure 37: *DUPLICATE template, completed

4.1.8 Creating a *STACK (virtual media consolidation to physical media) Policy Item

Follow the same steps for creating a Remote Copy policy item, instead using option "5-Policy Items" on the *STACK policy group for the applicable system. The applicable UI from figures 39/40 appears:

```
 Session A - [24 x 80]                                          ─   □   ✕

File  Edit  View  Communication  Actions  Window  Help
  ▣  ▣▣ ▣▣  ▣▣ ▣▣  ▣▣  ▣▣ ▣▣  ▣▣ ▣▣  ▣ ◈
 DSI005F5           Dynamic Solutions International          S212B8DV
                      Maintain Stacking Policy

 Type choices, press Enter.
 System Identifier . . . . . . . . S212B8DV
 Media Management System ID  . . . BRMS          BRMS for IBM i
 Virtual Device ID . . . . . . . .        1      FS-ISERIES-HA-A
 Virtual Library ID  . . . . . . .       721     TAPMLB01-SHARED-IBM
 Sequence Number . . . . . . . . .
 Archival policy type  . . . . . . *STACK        Virtual to Physical
 Policy description. . . . . . . . _____
 Policy active (Y/N) . . . . . . . Y
 Media class . . . . . . . . . . . _____
 Virtual ID of physical library. .       773     BDT:FlexStor II-0077
 Save object history . . . . . . . N
 Eject tape after export . . . . . N
 Report physical media usage . . . N
 Phy Media Policy/Class/Move Pcy . PP1_____    *MEDPCY____   *MEDPCY____
 Schedule job (units/period/time).     0         *DAYS_____    _____ (24-hour)
 Encryption key name  . . . . . . _____
 Encryption key password/confirm . ................     ................

 F3=Exit   F4=Prompt                                          F12=Cancel

MA   A                    MW                                      11/036
  E0004 - Invalid password
```

Figure 38: *STACK policy item template (BRMS)

Figure 39: *STACK policy item template - Tracker

Field Descriptions/Values:

Note: *Fields containing the '*' indicator can be prompted via F4:*

Sequence Number: A system-designated value created at save time.

Policy Description: A brief description of what the policy item does.

Policy Active: Whether or not volumes matching this policy are processed.

Media Class: The BRMS media class to be processed by this policy item. If left blank, all media classes found marked for duplication in the library's home location will qualify for processing.

Virtual Media Source Category: The IBM category this policy item will process (Tracker).

Virtual ID of Physical Library: the ID of the target physical library to perform the export to. If a default value was provided when configuring this relationship that value will be presented as a default.

Save Object History: If the original BRMS backup saved object history, this setting enables Conductor to copy out very thin view of that history to support object/member level physical media content searches.

Eject Tape after Export: If your library supports direct ejecting of tapes or has multiple I/O slots, this setting can be used to move the physical tape accordingly after the job completes.

Report Physical Tape Usage: If this option is selected, upon successful job completion the volume(s) used will be reported on the Physical Media Usage Report.

Phy Media Policy/Class/Move Pcy: Identifies the media policy and class to use when selecting existing expired media and/or the values to use when creating new media (when applicable). If default values were provided when configuring this relationship those values will be presented by default.

Physical Media Target Category: the IBM category to assign to physical media (Tracker).

Schedule Job to Run: The user has three options:

- *DoM – day of month.   Used with the units qualifier, this determines which day of the month to run the stack job on.

- *DAYS, *MONTHS, *YEARS – used with the units qualifier, the number of days, months or years into the future to schedule the job. The use of a qualifier of 0 (zero) and period of *DAYS as shown in the example indicates the job will be scheduled "today" at time provided.

- *MON-*SUN: Used with a time entry, the job will run on the next *MON, *TUE, etc.

Encryption Key Name/Pwd: Use the fields with encryption key names defined on the VTL to produce encrypted physical media. Leave blank if encryption is not desired.

A *STACKINIT job for the qualifying policy item will be scheduled using these values based on the date the first qualifying volume is identified and the scheduled time setting; subsequent qualifying volumes will append to the job's media list until the job's scheduled time at which point all queued volumes will be stacked.

Note: *When using *STACK policies, ensure the virtual media expiration extends beyond the expected schedule date of the stack job execution if history retention via Conductor is desired.*

Below is presented an example *STACK policy item that will:

- Process virtual volumes of class VC1 written by BRMS from server S212B8DV;
- eject physical media upon job completion;
- use the attributes of the PP1 media policy when selecting target tapes, or the indicated class/move policy when creating new physical media information;
- be scheduled to run 7 days after the identification of the first qualifying volume @ 23:45 (11:45PM), and
- not be encrypting tapes.

Figure 40: *STACK template, completed (BRMS)

Repeat the above for each media class for which automated processing is desired.

Finding Your Recovery Data in the *Stacked World

Using Conductor's simple but powerful Physical Media Search option can zero you right in onto the physical media containing the objects you need and the date your need them from.   In addition, if non-matched exports are being utilized, a "virtual-to-physical" volume serial cross-reference table can be downloaded.   See section 6.1 below for more information.

4.3 Reviewing/Managing Conductor Job Activity

Use option "10-Job Management" to review and/or manage your Conductor jobs. The initial view is of all *SUBMITTED jobs.   Use the filter entries at the top of the panel to change the default view to *QUEUED, *SCHEDULED or *ALL jobs.   Job types and results can also be filtered.

*COMPLETED jobs are available for review in the archival view (F11).

Figure 42 below shows an example Job Inquiry and Maintenance UI displaying the LIVE view and *SUBMITTED jobs:
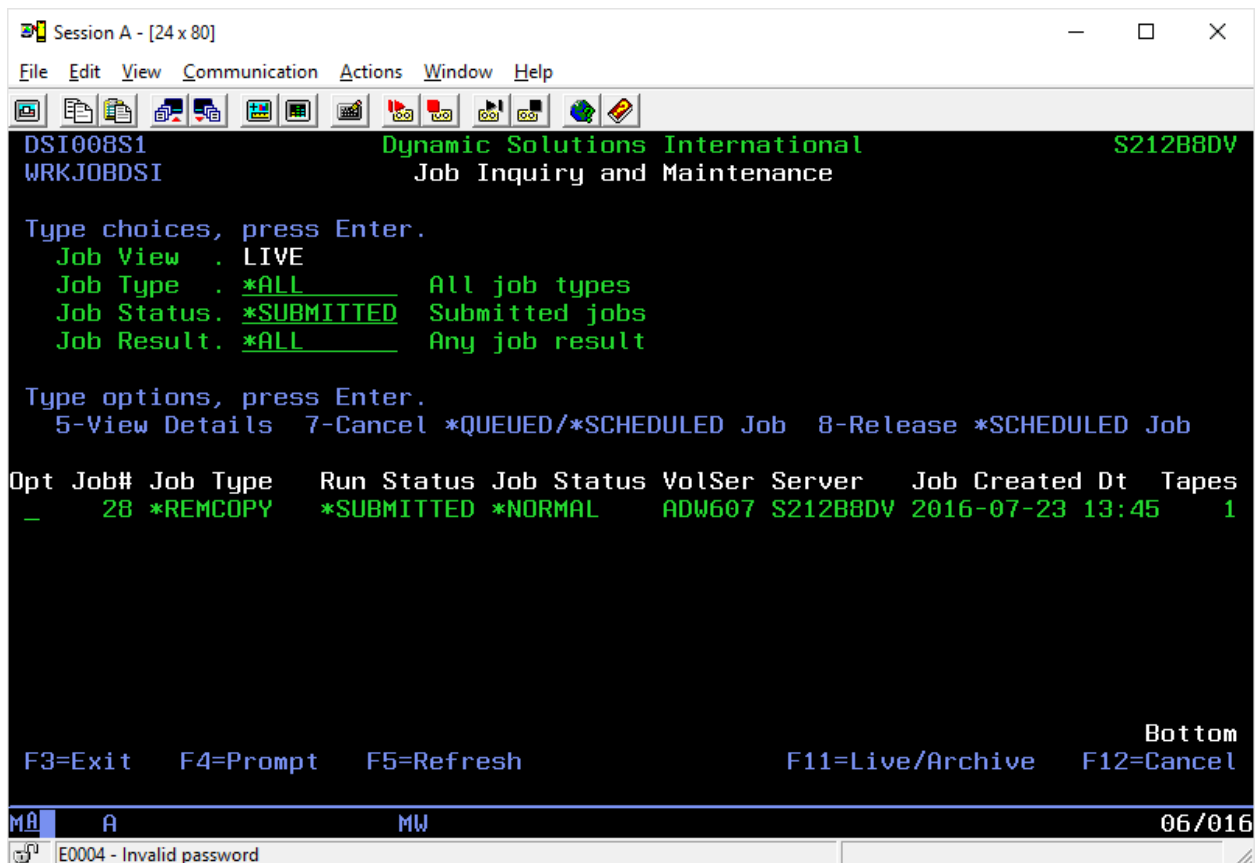

Figure 41: Reviewing Conductor Job Activity

Use the F11 key to swap between *LIVE and *ARCHIVE job views.

Jobs may have "Run Status" values of:

- *QUEUED – the job is awaiting volumes to free from other jobs before it can run
- *SCHEDULED – the job has been scheduled for a specific date/time

91

- *SUBMITTED – the job has been submitted to the VTL and is executing or awaiting execution
- *COMPLETED – the job has completed (ARCHIVE view only)

These status values have potential "Job Result" values of:

- *NORMAL – the job has been processed normally to the reported point
- *FAILED – an error was detected and the job has been shut down. Jobs with *FAILED states can be restarted using option "9-Resubmit Failed Job" upon corrective action having been taken (archival view only).
- *CANCELED – the job was canceled, either by using option "7-Cancel *QUEUED/*SCHEDULED Job" from the Job Management UI or by using the cancel option from the VTL console.

Note: *The list entries can be filtered by changing one or more of the filter criteria at the top of the UI and pressing ENTER or F5.*

4.3.1 Viewing Job Details

To view job details, including the volume(s) in use by their job and current status, use option "5-View" on the applicable job entry.   Unless your backups are generating tape sets or the job being reviewed is a *STACK or *CONSOL job, most jobs will only have one volume.
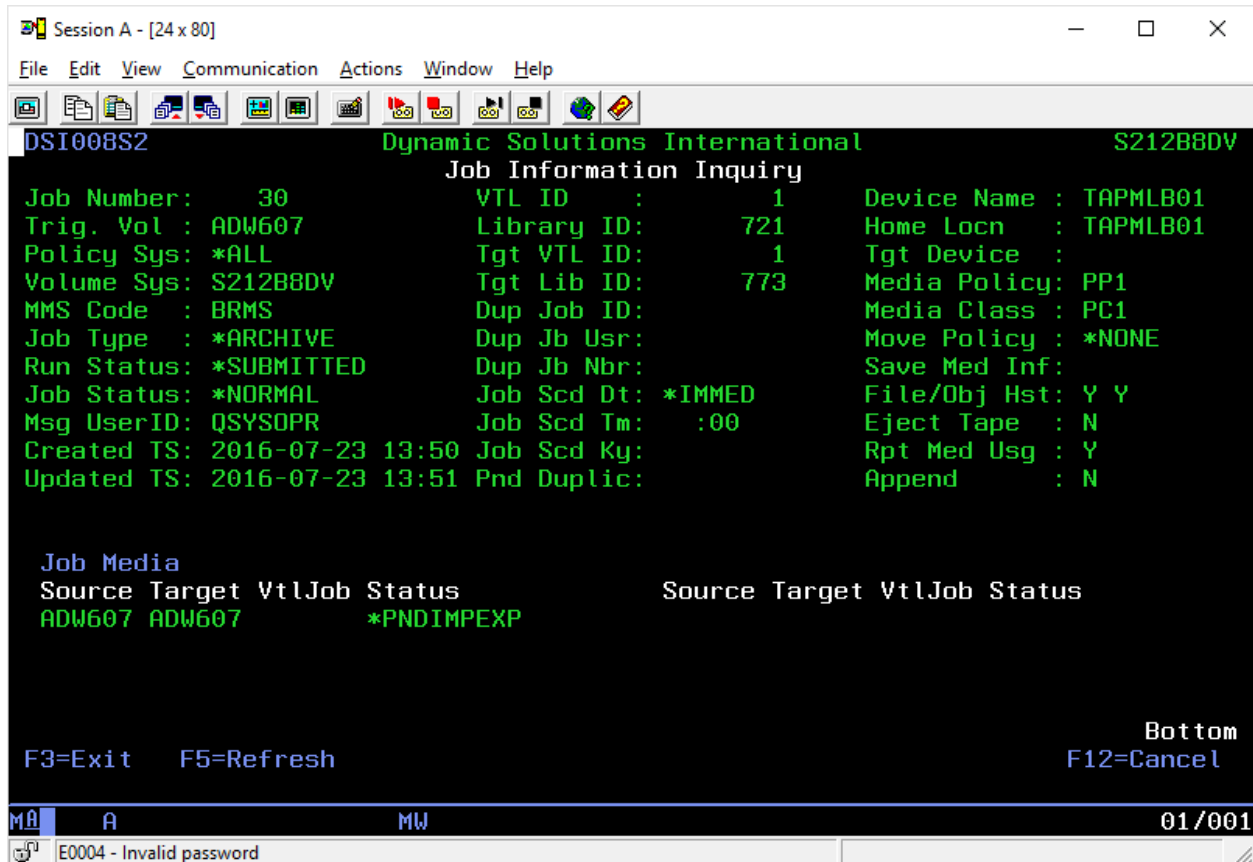
Figure 42: Job Management Detail/Media View

The panel presented in figure 43 will display the job media in use by the job, the current state of the job media as well as the internal VTL job number for each volume (N/A for *REMCOPY, *CONSOL or *DUPLICATE jobs), allowing for audits of Conductor activity against VTL job activity.

Job Media Status values and their meanings:

*COMPLETED   The media was processed successfully.
*PNDLIBRARY   The applicable volume is pending move to the virtual library.
*PNDVAULT   The applicable volume is pending move to the virtual vault.
*PNDIMPEXP   The import or export step for the job is running or awaiting execution.
*PNDDUP   A tape duplication step is underway. See the system job fields above for job details.
*PNDDELETE   The applicable virtual volume is pending a delete action.
*FAILED   The expected result was not achieved; the job either failed or was canceled.

4.3.2 Canceling *QUEUED or *SCHEDULED Jobs

To cancel a queued or scheduled job, follow these instructions:

For *SCHEDUELD or *QUEUED *REMCOPY/*ARCHIVE jobs with a *SCHEDULED *DLTVOLUME job associated, use option "7-Cancel Queued/Schd Job" on the *REMCOPY/*ARCHIVE job ONLY. This will cancel both the *REMCOPY*ARCHIVE job and the associated * DLTVOLUME job(s).

For *DLTVOLUME jobs, use option 7 on the *DLTREMVOL job ONLY. Any associated *REMCOPY/*ARCHIVE job will not be canceled.

Use option 7 for any other *QUEUED or *SCHEDULED job type.

Jobs canceled from this application will go to *CANCELED status briefly before they system moves them to the job archive.

4.3.3 Releasing a *SCHEDULED Job

*SCHEDULED jobs may be released upon demand by using option **8-Release *SCHEDULED Job.** Should another *SUBMITTED or *QUEUED job exist that is utilizing the *SCHEDULED job volume(s), the job will be released to *QUEUED status. If the source volume(s) can be used directly, the job will execute immediately upon release.

4.3.4 Restarting a *FAILED Job

Jobs in *FAILED status can be resubmitted by using option "9 – Resubmit failed job" from the ARCHIVE view of the Job Management application (*FAILED jobs will always be in the ARCHIVE view). This option is limited to jobs in *FAILED status.   This option should only be used once the corrective action for the original failure has taken place.

4.4 Ad-Hoc Duplication Activities

There may be instances that require ad-hoc actions on *ACTIVE, policy-qualified volumes or there may be a need to *REMCOPY or export an *EXPIRED or non-qualifying volume.   Those activities can be performed from the option **8- Ad-Hoc Virtual Tape Exports** application.

Selecting option **8-Ad-Hoc Virtual Tape Exports** opens up the UI presented in figure 44. The *REMCOPY export is provided as are the VTL-attached physical library export types.   The display will default to the first library upon the first device it finds and use the default values from that relationship to load control values (target VIDs, other attributes).   These values can be overridden if desired.

Note: *Not all properties are valid for all export types. For example, only the "Remote Copy VTL ID" and "Remove Copy Library ID" are required to perform a *REMCOPY export. Review the "Automated Duplication Policy" section to determine which control fields apply to which export type.*
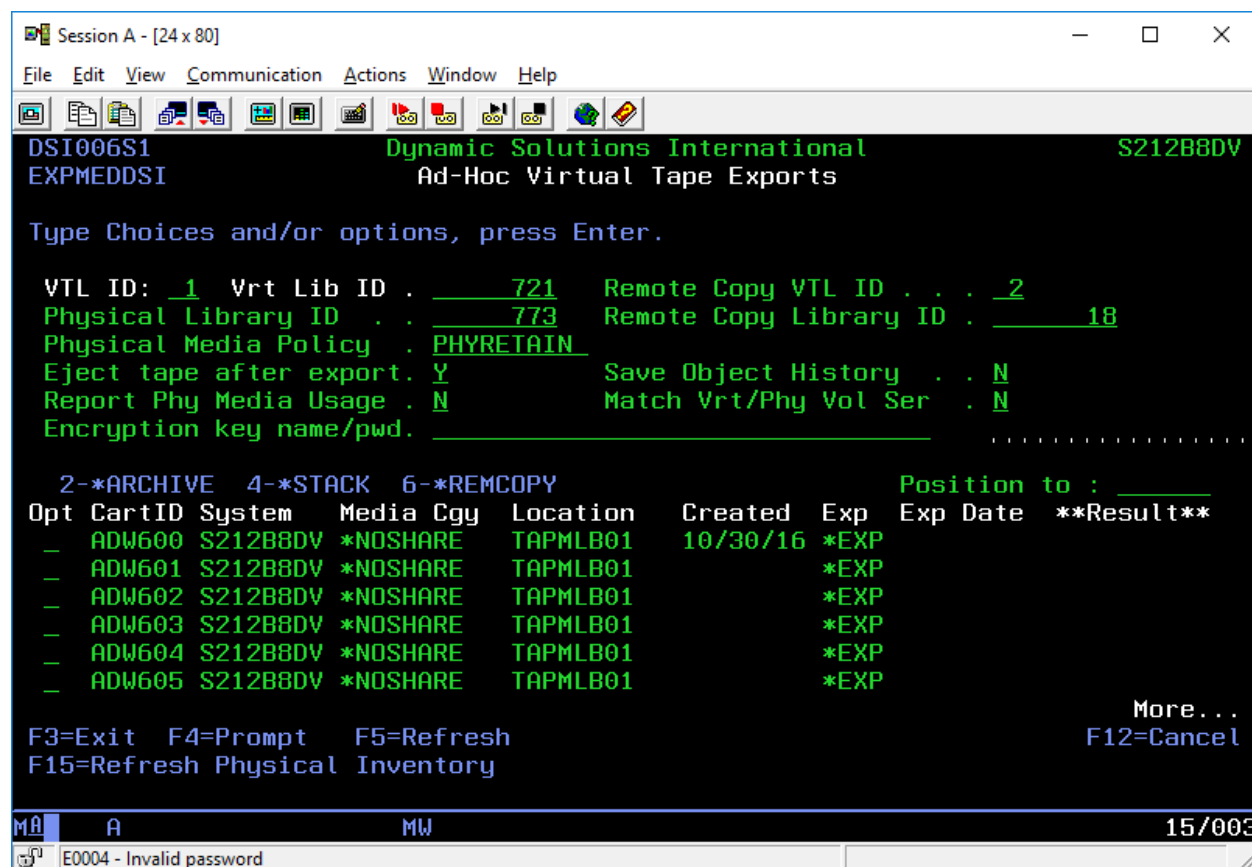

Figure 43: The Ad-Hoc export panel

This UI presents a list of all of the virtual media known to BRMS for the VTL ID/VRT Library ID selected at the top of the UI.   Upon making one or more selections and pressing Enter, use the command key "F6=Review Selections" to limit the list to the volumes selected for processing. After visually confirming selections, use command key "F7=Accept" to process the selected volumes into the selected job types.

Using the options shown, any of four job types can be created:

Option 2 – Archive allows the user to select either a matched or non-matched *ARCHIVE export using the *ARCHIVE model (described in the Policy Item Maintenance section above) in VTL-attached physical library configurations. The required entries at the top of the UI will be presented upon making an option "2" selection (if missing or invalid).

Option 4 – Stack allows the user to select a *STACK export (combining 2+ virtual volumes onto a fewer number of physical volumes) in VTL-attached physical library configurations. The required entries at the top of the UI will be presented upon making an option "4" selection (if missing).

Note: *All tapes selected for option 4 will be considered as part of the same "stack"; where more than one physical tape is required to complete the job, one Conductor job will be created for each physical tape required.*

Note: *Conductor uses a special algorithm to ensure the most efficient use of physical media is executed by the stack. For example, there are over 360,000 ways to organize nine items. Conductor checks each sequence of volumes/usage and uses the most efficient stacking model possible for up to nine volumes at a time. When more than nine volumes are to be stacked, a rolling evaluation is performed (first nine, next x).*

Note: *Conductor will not close out a canceled/failed *STACK job If that job:*

- *is canceled from the VTL Console or fails before the first virtual tape has been successfully written to the physical tape;*
- *has no prior stack history for the physical tape being written;*
- *was initiated from Conductor;*
- *and more than one *STACK job is in *SUBMITTED status in Conductor when the cancel/fail message is processed by Conductor.*

To correct, wait at least ten minutes after the stack job on the VTL has completed shutting down to allow post-processing activities to occur, including processing of the cancel message by Conductor.

Upon completion of all *STACK jobs, Conductor will submit a *STACKINFO job to reconcile the stacking results.   Once you see the *STACKINFO job for the failed/canceled job in *SUBMITTED status the corrective actions indicated in the next paragraph can be taken.

To close the *STACK job and return any job virtual volumes back to their original locations, use option 'X' from the Job Maintenance application on the applicable job(s).   Option 'X' will force a shutdown of these jobs in this case.   Do not rely on the *STACK job results when the job has been canceled or fails as the VTL may return erroneous information.   This is the only time use of option 'X' is recommended.

Note: *Do not use option 'X' to try and cancel a *STACK job (or any other job) that has already started on the VTL.   It is not intended for that usage.*

Note: *When a *STACK job fails or is canceled,   Conductor will release physical media if no virtual tapes were successfully stacked; if one or more virtual tapes were successfully stacked, the physical media is considered acceptable. Manually expire the physical media to return it to the scratch pool if the output media is not to be retained.*

Each stack job produces the PHYSTKRPT spoolfile in the OUTQ defined in the system configuration. This report can be run manually from the "Import/Unstack" application for tapes that show Stacked Content = TRUE. Below is an example stacking report, showing the virtual volumes that were stacked onto physical volume SIT030:

```
PHYSTKRPT                    CONDUCTOR for IBM i                DATE:  3/22/2106
                                STACKING REPORT                    TIME: 10:14:38
PHYSICAL VOLUME: SIT030                                            PAGE: 0001
```

SYSTEM	VOLUME	MEDIA CLASS	DATE CREATED	DATE EXPIRES	VTL JOB	EXPORT STATUS
S212B8DV	ADW600	FMT3592A2	16/03/03	16/04/20	1425	*COMPLETED
S212B8DV	ADW602	FMT3592A2	16/03/03	16/04/07	1425	*COMPLETED
S212B8DV	ADW611	FMT3592A2	16/03/03	16/04/07	1425	*COMPLETED

<center>*** END OF REPORT ***</center>

Option 6 - *REMCOPY – allows the user to select a *REMCOPY job using the *REMCOPY rules (described in the Policy Item Maintenance section above).   The "Remote Copy VTL Device ID" and "Remote Copy Target Lib ID" values are required when requesting *REMCOPY activity, and all volumes selected will go to the identified library. Be sure to create multiple jobs for multiple target libraries, where applicable.

Note: *Each selection will be processed using the device/attribute information displayed at the top of the UI when the F7 key is pressed.   If exports with different target devices or properties are required, each target/property will require discrete submission.   For example, if the goal is to create two remote copy jobs with one target device of Virtual Library X and another targeted to Virtual Library Y, you must do them independently, changing the target Virtual library before each submission.*

4.4.1 Creating Ad-Hoc Jobs

Figure 45 below shows an example where volume ADW601 is to be exported using an *ARCHIVE job type.   Option '2' and the control values entered indicate:

- *ARCHIVE export processing;
- A matched target volume serial number will be required;
- The creation of physical usage data will occur;
- Virtual volume object history will not be retained in Conductor; and
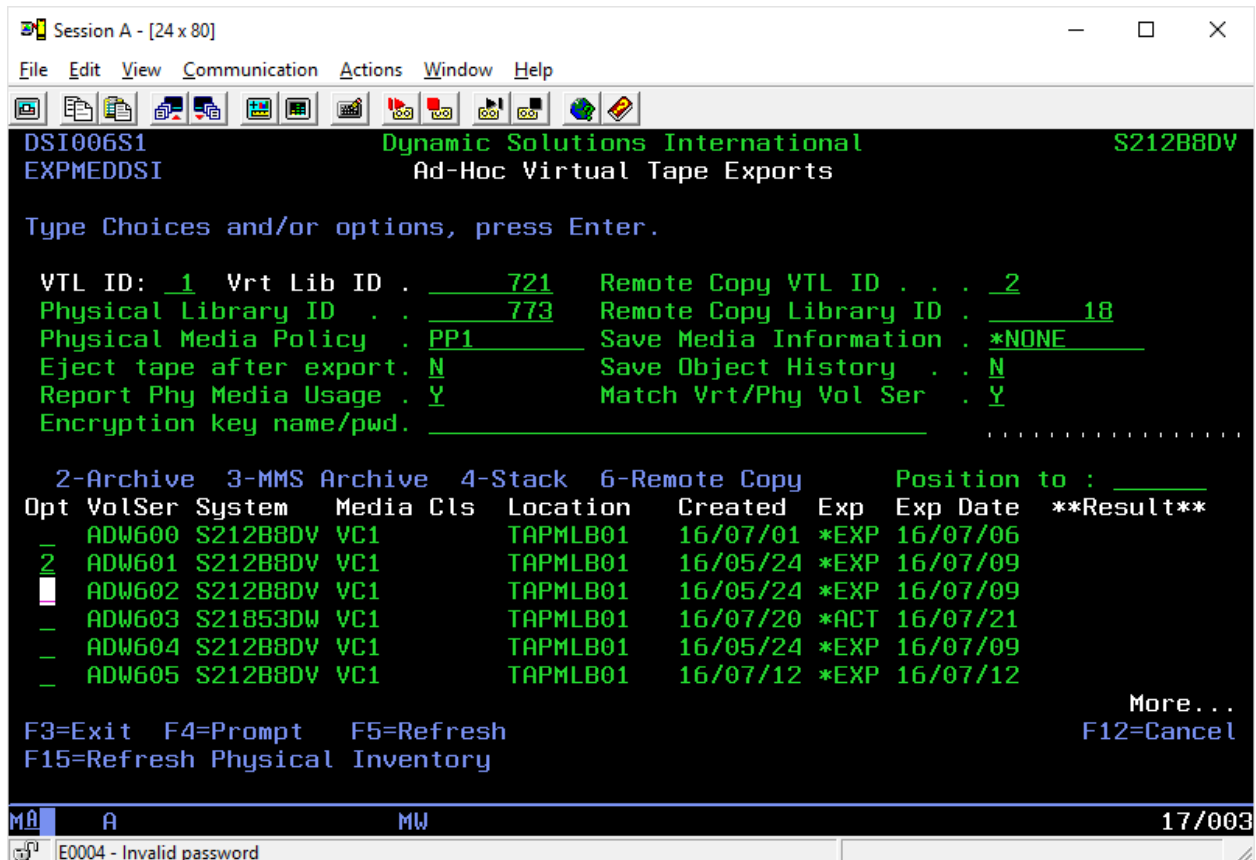- The tape will not be ejected upon job completion.

<p align="center">Figure 44: Ad-Hoc *ARCHIVE example</p>

Once ENTER is pressed and values validated, the "F6-Review Selections" Command Key appears:
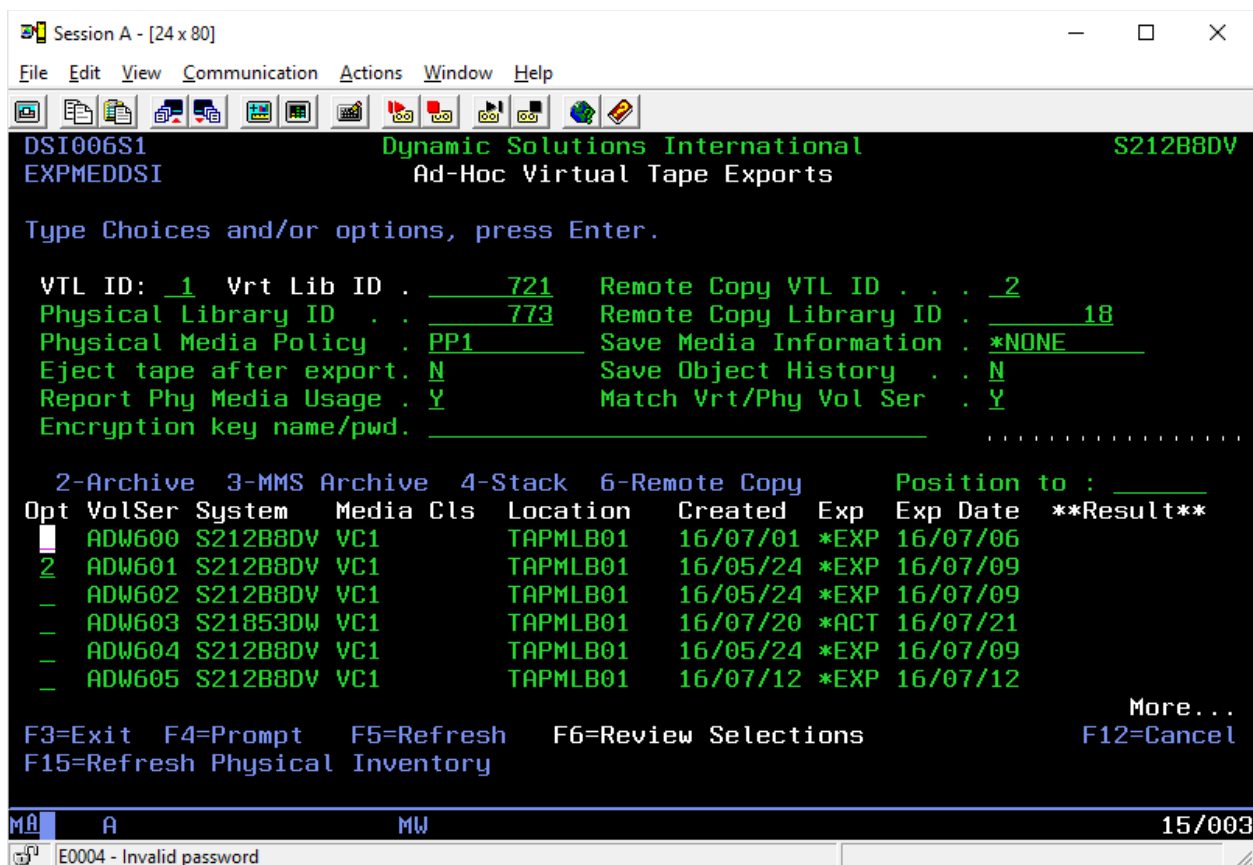


```
Session A - [24 x 80]                                                 —    □    ×

File  Edit  View  Communication  Actions  Window  Help

□  ▣▣  ▦▦  ▦▦  ▦  ▦▦  ▦▦  ▦▦

DSI006S1                 Dynamic Solutions International          S212B8DV
EXPMEDDSI                   Ad-Hoc Virtual Tape Exports

Type Choices and/or options, press Enter.

  VTL ID: _1_  Vrt Lib ID . _____721    Remote Copy VTL ID . . . _2
  Physical Library ID  . . _____773    Remote Copy Library ID . _____18
  Physical Media Policy  . PP1_____    Save Media Information . *NONE_____
  Eject tape after export. N            Save Object History  . . N
  Report Phy Media Usage . Y            Match Vrt/Phy Vol Ser  . Y
  Encryption key name/pwd. _____    . . . . . . . . . . . . . . . .


  2-Archive  3-MMS Archive  4-Stack  6-Remote Copy        Position to : _____
Opt VolSer System    Media Cls   Location    Created  Exp  Exp Date  **Result**
 █   ADW600 S212B8DV VC1         TAPMLB01    16/07/01 *EXP 16/07/06
 2   ADW601 S212B8DV VC1         TAPMLB01    16/05/24 *EXP 16/07/09
 _   ADW602 S212B8DV VC1         TAPMLB01    16/05/24 *EXP 16/07/09
 _   ADW603 S21853DW VC1         TAPMLB01    16/07/20 *ACT 16/07/21
 _   ADW604 S212B8DV VC1         TAPMLB01    16/05/24 *EXP 16/07/09
 _   ADW605 S212B8DV VC1         TAPMLB01    16/07/12 *EXP 16/07/12
                                                                      More...
F3=Exit  F4=Prompt    F5=Refresh    F6=Review Selections           F12=Cancel
F15=Refresh Physical Inventory

MA   A                    MW                                          15/003
    E0004 - Invalid password
```

Figure 45: Ad-Hoc export, selection confirmation

Pressing F6 limits the display to the selected volume(s) and enables "F7-Sumbit" as shown in figure 47:
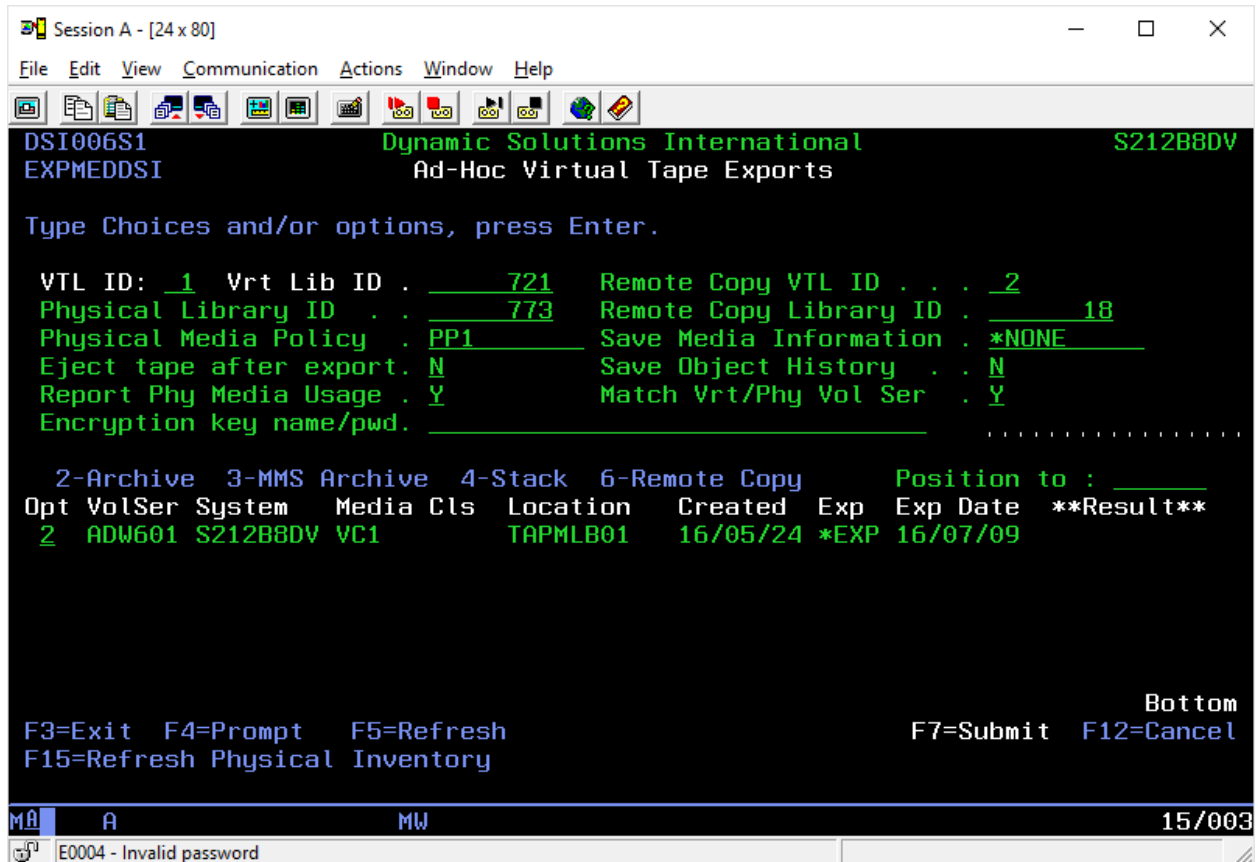
Figure 46: Ad-Hoc submit job option

Upon pressing F7, each request is run thru the job creation protocols.

If a job is created, the Job Number created is returned in the "**Result**" column. Should no available media of the type indicated by the physical media policy be available, you'll receive a "*NOMEDIA" message return.

In the example result shown in figure 48 note an error response to our request; no physical media of the class indicated by Media Policy PP1 was available for use when the request was processed:
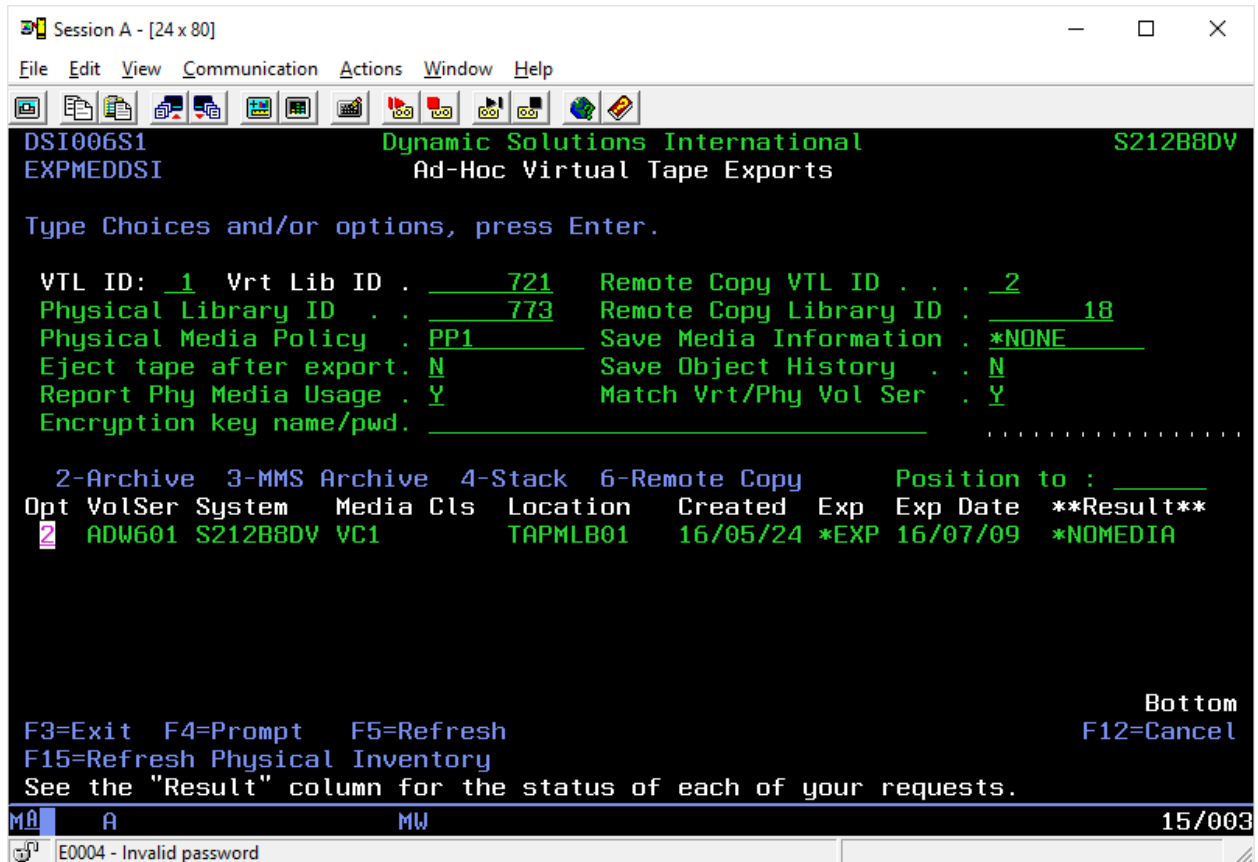
Figure 47: Ad-Hoc exception example

To determine the detailed reason for the rejection, see your QSYSOPR message queue.

A normal submission will return the job number created by the request in the "**Result**" column, as shown in figure 49 below:
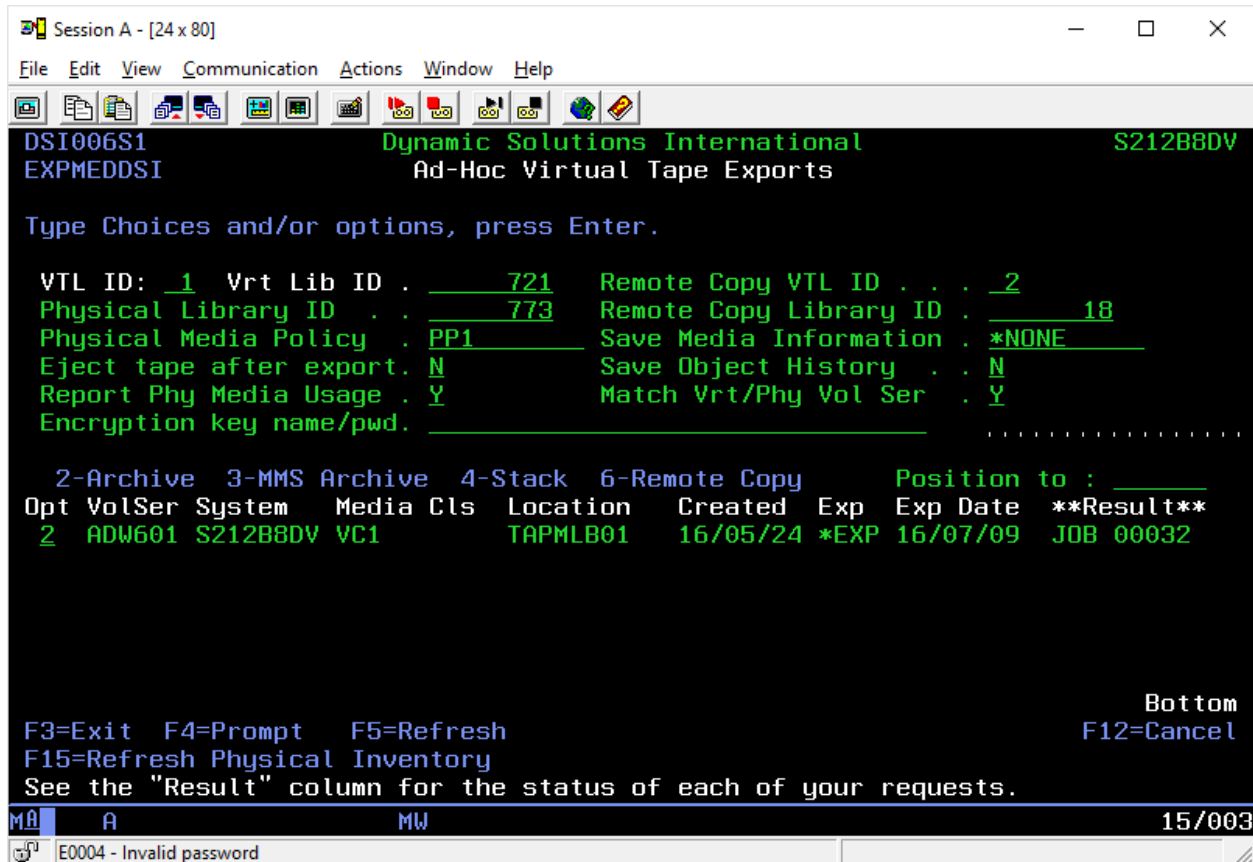
Figure 48: Ad-Hoc job creation information

Use the command "F5=Refresh" to refresh the UI and create additional jobs.

If selections have been made and additional selections are desired, use the "position to" field to reposition the list to your desired volumes, make those selections, press enter and then use the command key "F6-Review Selections" to redisplay the selected volumes.

To clear any selections and start over, use the command key "F5=Refresh" to reload and begin again. Any current selections are lost when pressing F5.

4.5 Import/Unstack Physical Media

Option "**9 – Import/Unstack Physical Media**" allows the user to bring back into the virtual world tapes previously exported by Conductor as well as tapes from the outside world.   As shown in figure 50, the UI will present a list of all physical media it knows to be loaded in the physical library identified at the top of the panel and the virtual volume serial information on the virtual tapes contained within, where known.   If this list does not match the volume serial number that are believed to be loaded into the

physical library, use the F15=Refresh Physical Inventory command to update the current physical library inventory and this list.
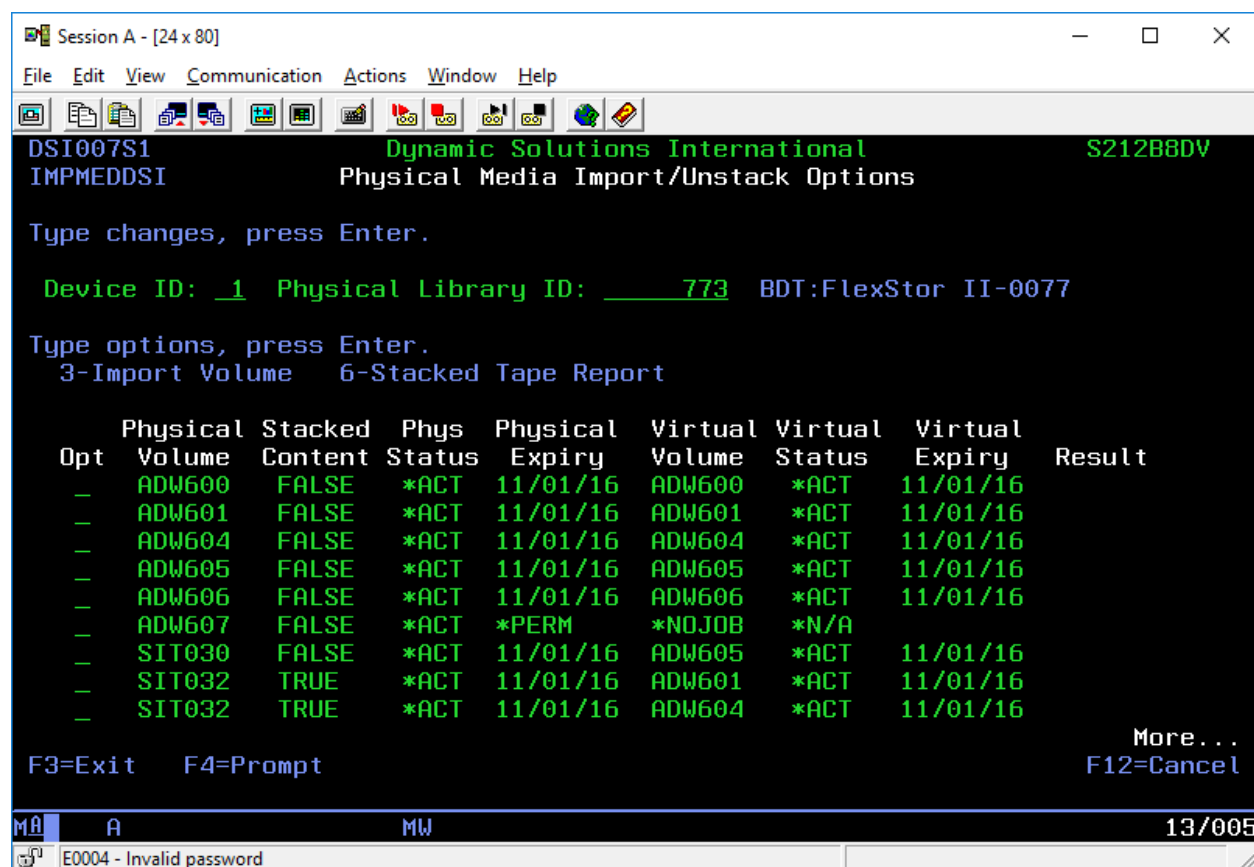

Figure 49: Import Physical Media - tape selection

4.5.1 BRMS Media Import Considerations

BRMS is very particular about matching external cartridge labels with internal volume IDs. For this reason, it is recommended that Conductor-produced physical media be imported to the original virtual barcode. When that original barcode is active and contains data that does not match what is being imported, it is recommended that the virtual volume be duplicated and the imported volume then be expired before import. Media information can then be extracted via BRMS command, if necessary.

Conductor will manage this pre-replacement duplication/expiration where a device name for the library is known to Conductor.

4.5.2 Tracker Media Import Considerations

If media must be imported to a virtual barcode that does not match the internal volume label, this volume can only be used for input operations in a stand-alone drive. The imported magnetic volume ID should not be a part of the BRMS inventory (or the volume should be in the virtual vault); IBM commands must be used to restore content from these tapes. Disabling BRMS' media monitoring during the restoration may prove time-saving.

4.5.3 Importing a physically-stored volume to a volume serial number known to BRMS

To import a physical volume over a known virtual volume, use option 3 on the line representing the physical and virtual volumes from which the import will occur. Generally, this action would be taken to restore the previous content of the virtual volume from the physical volume.

Our example will perform an import of the content of physical volume serial number ADW607 back to virtual volume ADW607. Assume that BRMS indicates the ADW607 volume is currently *EXPIRED.

Having pressed ENTER on the display above after having made the '3' selection on physical volume ADW607, the import details UI is presented as shown in figure 51:
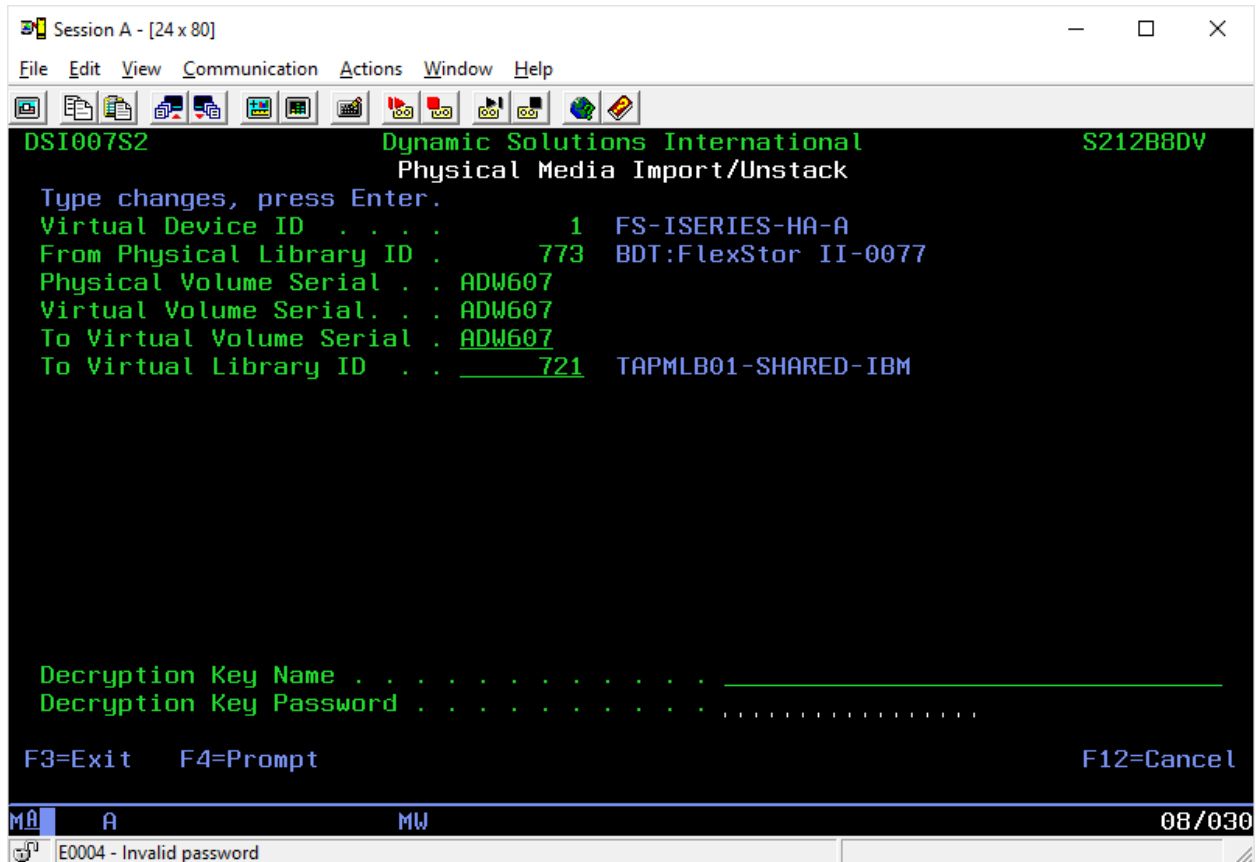
Figure 50: Importing Physical Media

Conductor will default the "To Virtual Volume serial" value to the physical barcode and provide a default "To Virtual Library ID" value. These values should be confirmed before pressing the ENTER key.

In this case, since the to-volume serial number is known to BRMS and the volume is *EXPIRED, there is no additional information required to import the volume. Upon pressing ENTER a job would be created to import the physical ADW607 volume to the indicated virtual library (any existing virtual volume in virtual library ID 721 with barcode ADW607 would be deleted before the import of the new ADW607 is initiated).

In the next example we'll assume that at Conductor knows the device name of the virtual library, the virtual ADW607 volume is *ACTIVE and the virtual volume exists on the VTL in a BRMS environment. In this scenario a modified UI will be presented upon pressing ENTER, as shown in figure 52 below:
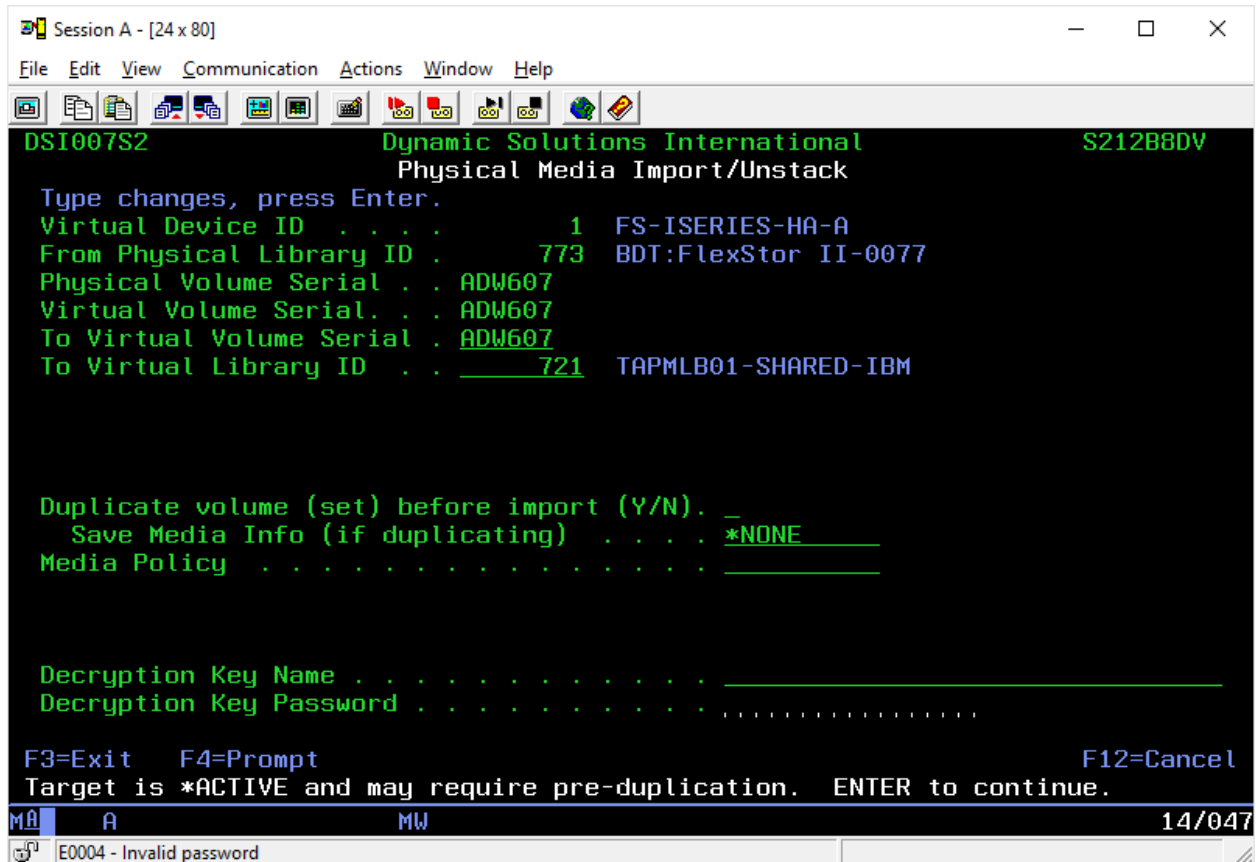
Figure 51: Pre-import target volume duplication option

In this case it must be decided what to do with the data that currently resides on the *ACTIVE virtual volume to be replaced.

If the physical tape contains an exact replica of the virtual volume (matched export), then pre-duplication of the existing virtual volume is not necessary. This action would normally be taken to recover a virtual tape that has been damaged or otherwise requires restoration.

If the data on the virtual volume to be replaced is *ACTIVE, does not match the data on the physical volume and requires retention before the virtual volume is replaced, Conductor offers the ability to automatically duplicate the virtual volume for you before replacing it with the contents of the physical volume. The Media Policy entry is required for the BRMS system to select the appropriate media for the duplication target.

In addition, an option to schedule a delete of the imported virtual volume is presented. If the tape imported is intended for temporary usage, this option can be used to ensure the tape is automatically purged and its space recovered when no longer necessary.

If the physical media was exported using encryption, the correct encryption key name and password will be required to decrypt the physical media content.

Upon pressing Enter, the job requirements will be evaluated and a job created.

Note: *If the virtual volume has been determined to be *ACTIVE in BRMS but does not exist on the virtual library (e.g. removed after the matched export job to preserve VTL space) the import UI will not present duplication options. Restoration of the current virtual volume data is assumed.*

Note: *When importing non-matching data over an *ACTIVE BRMS volume, it is the user's responsibility to *EXPIRE the BRMS media and re-import (ADDMEDIBRM/EXTMEDIBRM) the media contents as necessary.*

Note: *If no local device description exists for the target virtual device or Tracker is in use, the duplication options will not be presented; instead, the message indicating manual duplication of the target media may be required. If pre-duplication of the target volume is desired, it is the responsibility of the user to perform that activity manually for the server owning the volume prior to running the import.*

4.5.2 Importing a physical volume to a virtual volume not known to BRMS

When importing external physical media to your library/BRMS inventory, it is recommended you always import using the volume ID of the magnetic label on the tape, should It differ from the external barcode.

Conductor, when importing to unknown volume serial numbers, does all of the work for you, including the creation of BRMS media information when indicated. Just load your tape into the physical library and use option '3' to identify the volume you wish to import.   After pressing Enter to accept the default target volume (SIT030), the UI displayed in figure 53 will appear:
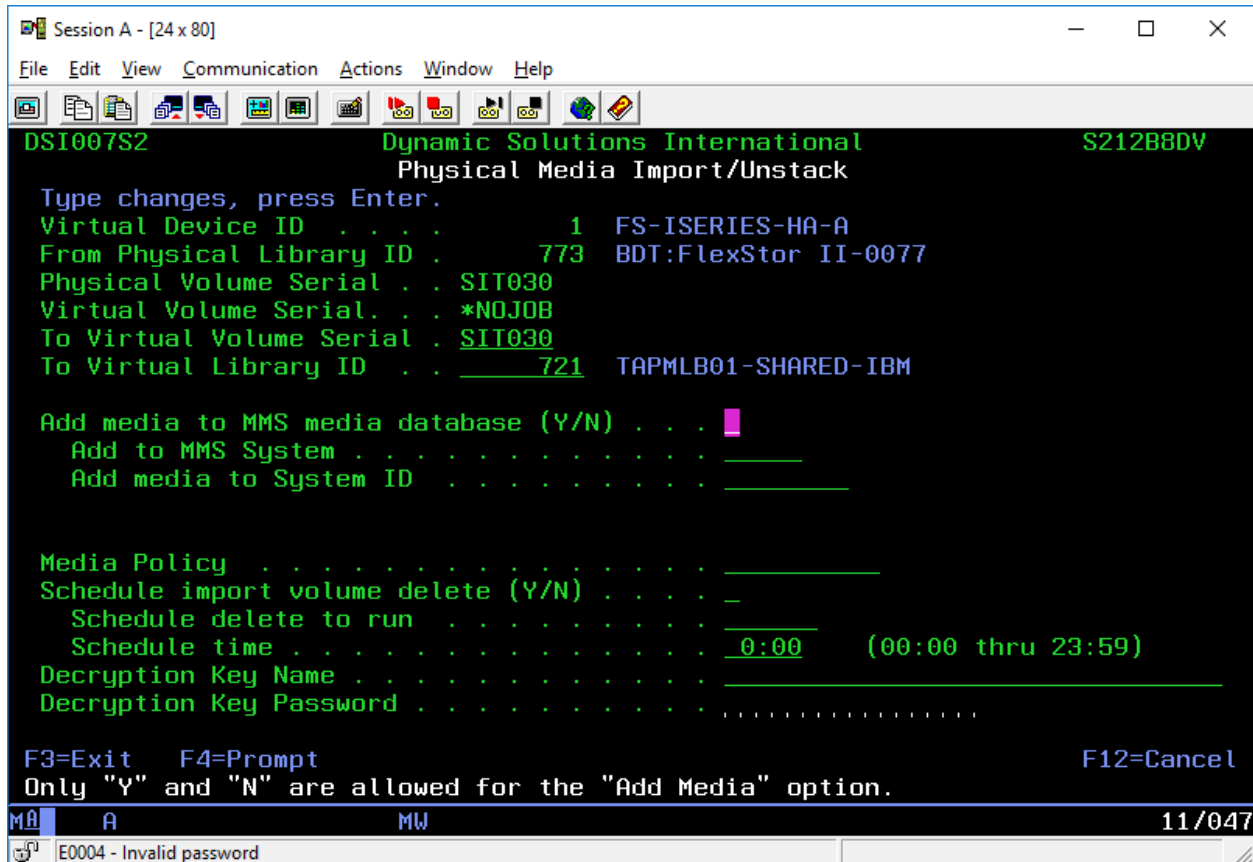
Figure 52: Importing External Media

In this case physical volume SIT030 with an unknown volume id is being imported to virtual volume SIT030, where SIT030 is not currently registered with BRMS.

If it is desired to have this volume added to the BRMS media database, provide a "Y" (yes) to the "add media" prompt and enter the System identifier and the MMS code (BRMS) to apply when adding the new media. The Media Policy entry will allow Conductor to properly configure the new media entry.

Note: *When using Tracker to manage media, there is no requirement to add media to the database. Media is managed automatically. The "add media" fields will not be presented.*

The user is also presented the option to automatically delete the imported volume after some period of time. To delete an imported volume:

- Enter "Y" in the "schedule import volume delete" field.
- Select (F4=Prompt) or enter the time value (*TODAY, *MON-*SUN) (can schedule the delete up to week after the import)
- Enter the time to perform the delete (24-hour clock).

Press Enter to submit the job.   A completed UI appears below.   This request will import the volume to the physical barcode, does not indicate the media needs to be registered with BRMS and will schedule a delete of the imported volume "tomorrow" at 23:45 (11:45PM).

If this volume is to be retained, the preferred settings should be set as Add Media = "Y" (yes, with the system/mms qualifier) and Schedule Delete = "N" (no).
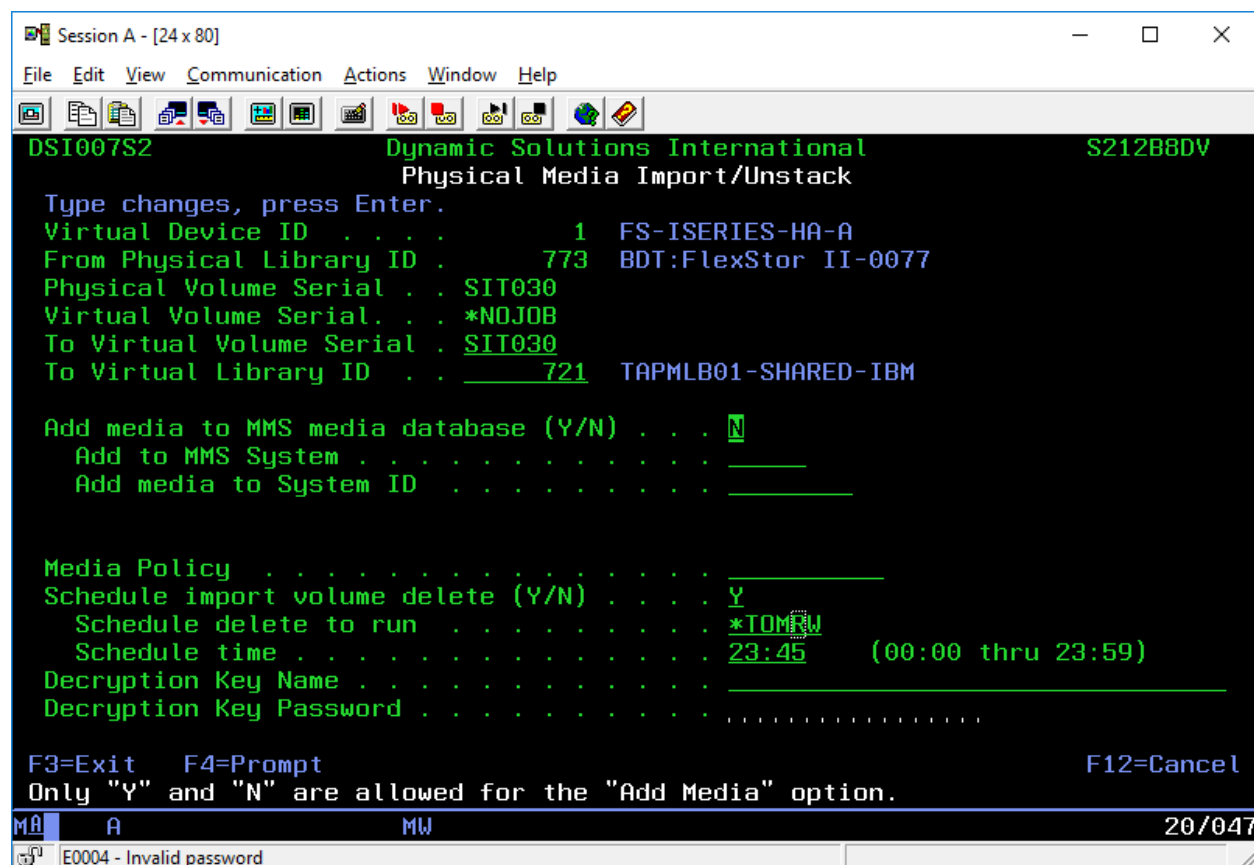
```
DSI007S2                    Dynamic Solutions International              S212B8DV
                            Physical Media Import/Unstack
 Type changes, press Enter.
 Virtual Device ID  . . . .        1   FS-ISERIES-HA-A
 From Physical Library ID .      773   BDT:FlexStor II-0077
 Physical Volume Serial . . SIT030
 Virtual Volume Serial. . . *NOJOB
 To Virtual Volume Serial . SIT030
 To Virtual Library ID  . .      721   TAPMLB01-SHARED-IBM

 Add media to MMS media database (Y/N) . . . N
    Add to MMS System . . . . . . . . . . . . _____
    Add media to System ID  . . . . . . . . . _____


 Media Policy  . . . . . . . . . . . . . . . . . _____
 Schedule import volume delete (Y/N) . . . . Y
    Schedule delete to run  . . . . . . . . . *TOMRW
    Schedule time . . . . . . . . . . . . . . 23:45     (00:00 thru 23:59)
 Decryption Key Name . . . . . . . . . . . . _____
 Decryption Key Password . . . . . . . . . . ...................

 F3=Exit    F4=Prompt                                              F12=Cancel
 Only "Y" and "N" are allowed for the "Add Media" option.
MA    A              MW                                                20/047
     E0004 - Invalid password
```

Figure 53: Importing External Media - BRMS

4.5.3 Importing from Stacked Tapes

The process for importing from *STACK media is identical to the process described for importing from traditional physical media. The stacked media will appear in the media list just as do the traditional types with the exception that one or more virtual tapes will share the physical tape volume serial number.   There is no procedural difference to the user when importing from stacked or non-stacked tapes.   The import panel will default the to-volume to match the virtual volume being unstacked. If BRMS is managing this virtual volume, be sure to import to the original virtual volume.

In figure 55 below find an import UI showing volume SIT032 as a stacked tape source. Note the physical volume repeats and the "Stacked Content" field indicates "TRUE" for stacked volumes.

Note: *Using option **6-Stacked Tape Report** will produce a hardcopy of the results of the job that stacked the selected physical tape.   The selection is only required on one of the applicable stacked list entries for each tape for which this reporting Is desired.*
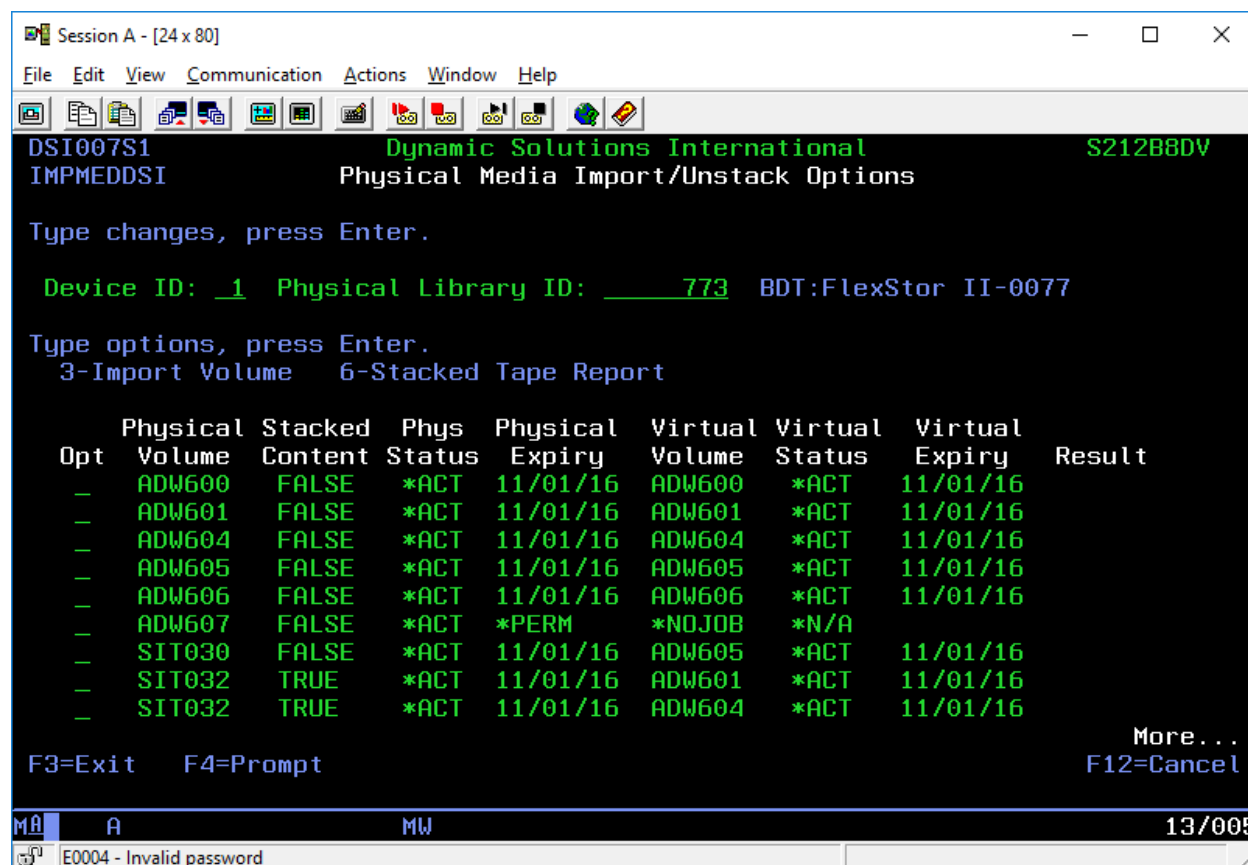


```
DSI007S1                 Dynamic Solutions International            S212B8DV
IMPMEDDSI           Physical Media Import/Unstack Options

Type changes, press Enter.

 Device ID: _1  Physical Library ID: _____773  BDT:FlexStor II-0077

Type options, press Enter.
  3-Import Volume    6-Stacked Tape Report

     Physical Stacked  Phys  Physical  Virtual Virtual  Virtual
 Opt  Volume  Content Status  Expiry   Volume  Status   Expiry   Result
  _   ADW600  FALSE   *ACT  11/01/16   ADW600  *ACT   11/01/16
  _   ADW601  FALSE   *ACT  11/01/16   ADW601  *ACT   11/01/16
  _   ADW604  FALSE   *ACT  11/01/16   ADW604  *ACT   11/01/16
  _   ADW605  FALSE   *ACT  11/01/16   ADW605  *ACT   11/01/16
  _   ADW606  FALSE   *ACT  11/01/16   ADW606  *ACT   11/01/16
  _   ADW607  FALSE   *ACT  *PERM      *NOJOB  *N/A
  _   SIT030  FALSE   *ACT  11/01/16   ADW605  *ACT   11/01/16
  _   SIT032  TRUE    *ACT  11/01/16   ADW601  *ACT   11/01/16
  _   SIT032  TRUE    *ACT  11/01/16   ADW604  *ACT   11/01/16
                                                                 More...
F3=Exit   F4=Prompt                                           F12=Cancel
```

Figure 54: Importing from a *STACK tape - selection

5. Inquiries and Reporting

5.1 Search DSI Tape History

Each time Conductor executes a VTL-attached non-matched tape export policy it saves just enough data from each virtual tape exported to enable an efficient search of physical media content.

Use Option "15 – Search DSI Tape History" to access the UI presented in figure 56. Shown are the physical media returned from a search beginning in July, 2016 and looking for a library called "DSIV1R1M0P":

```
🅱 Session A - [24 x 80]                                              —    □    ✕
File  Edit  View  Communication  Actions  Window  Help
▣ ▤▥ ☐▦ ▦ ⌨▦ ▣▦ 🌐⬦
 DSI009S1                Dynamic Solutions International              S212B8DV
 WRKHSTDSI                  Physical Tape Content History

 Type choices, press Enter.
    System i    S212B8DV
    From Date   16/07/01          YYMMDD
    Lib/Type    DSIV1R1M0P        *SAVSYS, *SAVCFG, *SAVSECDTA, Library Name...
    Object      *NONE             *NONE, Name
    Member        *NONE           *NONE, Name

       MMS  VrtVol BegVol Backup Grp Library/Tp  Seq Save Date/Time   PhyVol
       BRMS ADW604 ADW604 *NONE       DSIV1R1M0P 0009 16/07/23 17:50   SIT030
       BRMS ADW607 ADW607 *NONE       DSIV1R1M0P 0009 16/07/23 17:49   SIT030

                                                                     Bottom
 F3=Exit    F4=Prompt                                          F12-Cancel

MA    A                    MW                                         05/015
⬚ E0004 - Invalid password
```

Figure 55: Searching non-matched media content

The following search qualifiers are required:

- A system designator;
- The starting date for the search;
- A Library Name or Control Group Item Name (e.g. *SAVSYS or QGPL);

Searches can be done at the object/member level if:

- The library name is entered;
- BRMS is saving media information to that level;
- Conductor export policy items indicate "Save Obj History = Y".

5.2 Virtual/Physical Tape Cross-Reference

For data security strategies that utilize non-matched *ARCHIVE exports and/or *STACKs, Conductor offers the ability to create a downloadable table containing a current map of virtual volumes and their host physical volumes.

Use Option "16 – Virtual Physical Media X-Ref" to create the downloadable table. The message response will indicate the name of the table available for download, as shown in figure 57:
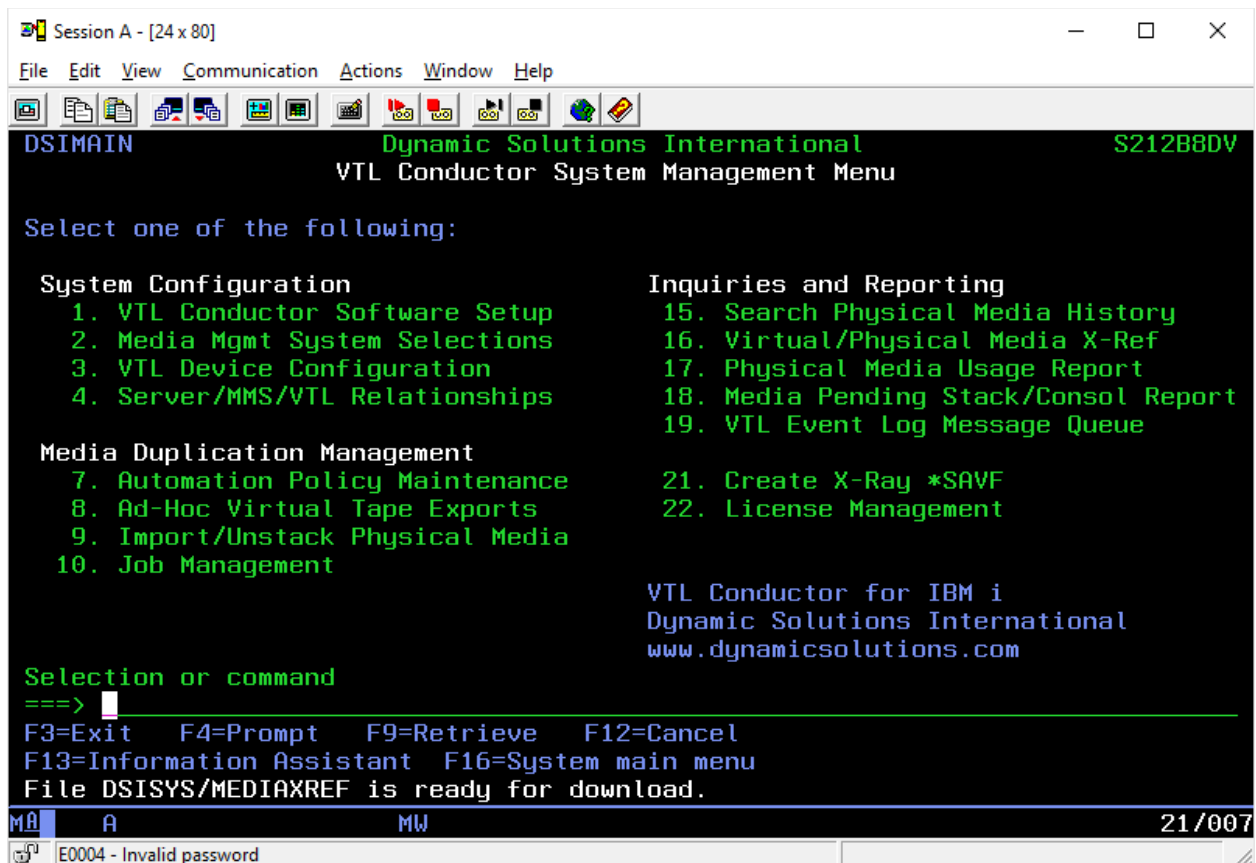
Figure 56: Virtual/Physical Cross Reference File Identification

An example of this data presented in Excel (having used the EXCEL data tab to download):

IBM_I	MEDIA_MGMT_SYS TEM	VIRTUAL_TAPE_LIB RARY	VIRTUAL_LIBRARY_ NAME	JOB_TY PE	VRT_VOL_ SER	PHY_VOL_ SER	SAVED_TIMEST AMP
S212B8 DV	*BRMS	iSeries-DEV	TAPMLB12	*STACK	ADW600	SIT030	3/22/2016 10:02
S212B8 DV	*BRMS	iSeries-DEV	TAPMLB12	*STACK	ADW602	SIT030	3/22/2016 10:02
S212B8 DV	*BRMS	iSeries-DEV	TAPMLB12	*STACK	ADW611	SIT030	3/22/2016 10:02
S212B8 DV	*BRMS	iSeries-DEV	TAPMLB12	*STACK	ADW600	SIT032	3/22/2016

DV							10:57
S212B8							3/22/2016
DV	*BRMS	iSeries-DEV	TAPMLB12	*STACK	ADW602	SIT032	10:57
S212B8							3/22/2016
DV	*BRMS	iSeries-DEV	TAPMLB12	*STACK	ADW611	SIT032	10:57
S212B8				*ARCHI			3/22/2016
DV	*BRMS	iSeries-DEV	TAPMLB12	VE	ADW600	ADW600	13:18
S212B8				*ARCHI			3/22/2016
DV	*BRMS	iSeries-DEV	TAPMLB12	VE	ADW602	ADW602	13:18

5.3 Viewing the VTL Event Log on the IBM host

Use option "19 – View VTL Message Queue" to display VTL event log messages from each of the active *PRIMARY, *REMOTE and/or *MONITOR VTL devices. Use command key F1 on specific messages for VTL and message details. An example of this display is presented in figure 58:
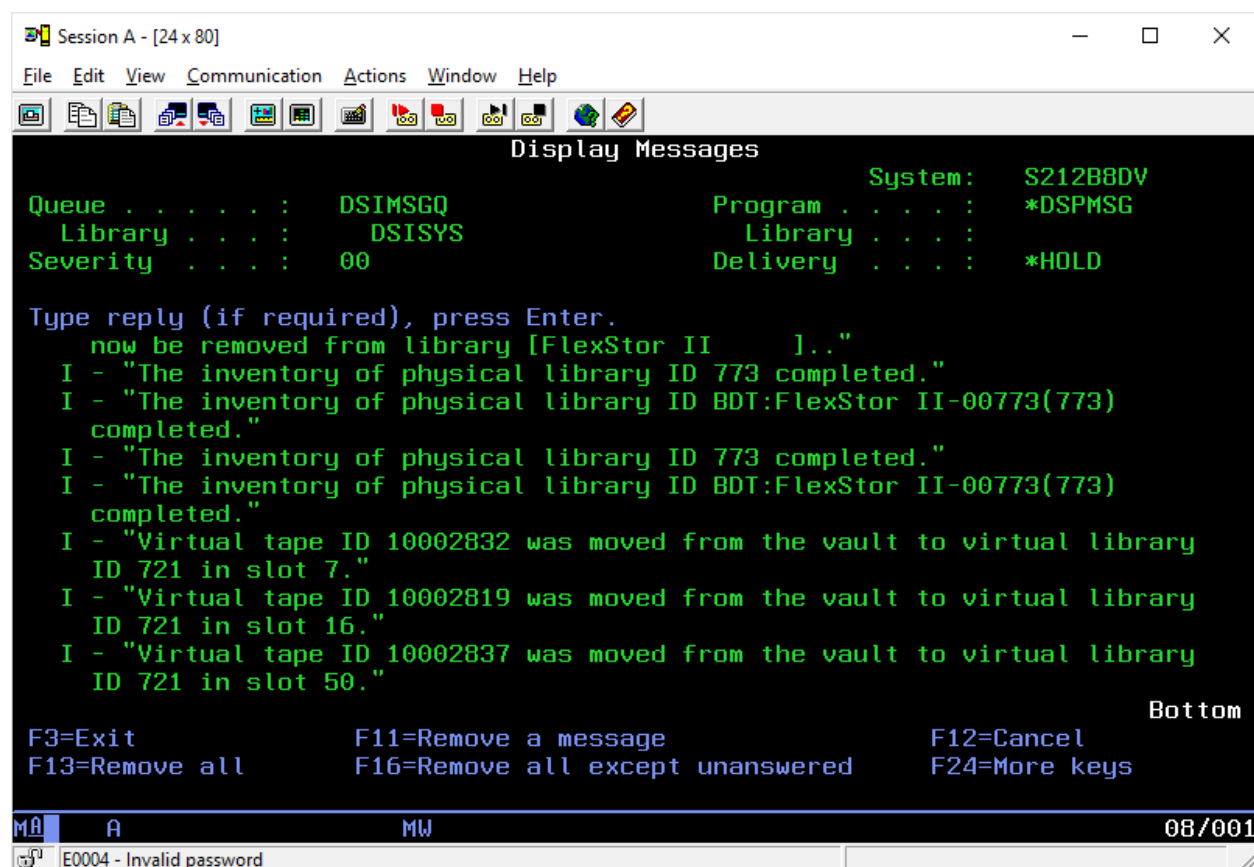
Figure 57: Viewing the VTL Event Log on the IBM host

5.4 Physical Media Usage Report

When automated policy exports or ad-hoc exports are executed with the "Report Physical Tape Usage" option set to "Y" (yes), Conductor keeps a log of tapes successfully written.   The contents of that log can be:

- printed (via the PHYUSGRPT command or Menu Option 17);
- emailed and a printed report generated by executing the MOVRPTDSI command (see the "Commands" section).
- Either option requires media reporting be enabled via Conductor configuration.

An example report follows.

```
PHYUSGRPT                    CONDUCTOR for IBM i                    DATE:  3/22/2016
                       PHYSICAL MEDIA USAGE REPORT                  TIME: 15:09:33
                                                                    PAGE: 0001

SYSTEM   VOLUME MEDIA CLASS  DATE CREATED  DATE EXPIRES  MOVE LOCATION


S212B8DV SIT030 FMT3592A2P   16/03/22      16/04/26      VAULT
S212B8DV SIT032 FMT3592A2P   16/03/22      16/04/26      VAULT


                        *** END OF REPORT ***
```

5.5 Virtual Tapes Pending Stacking/Consolidation Report

Each time a policy-driven *STACK job completes it will produce this report   This report will help guide the user to manually *STACK pending virtual media when desired or necessary. This report can be run from Main Menu option 18 on demand.

```
PNDSTKRPT           CONDUCTOR for IBM i                    DATE:  7/23/16
                VIRTUAL VOLUMES PENDING STACKING           TIME: 18:24:21
                VIRTUAL VOLUMES PENDING CONSOL             PAGE: 0001


SYSTEM   VOLUME MEDIA CLASS  DATE CREATED  DATE EXPIRES  PCY SYSTEM  PCY SEQ


S212B8DV ADW600 DEDUPE       16/04/06      16/05/11      S212B8DV    01
S212B8DV ADW601 DEDUPE       16/04/06      16/05/11      S212B8DV    01


                        *** END OF REPORT ***
```

5.6 Virtual Tapes Pending Recreation Report

When using DVMM/DLSM, this report indicates removed media pending recreation. It provides information for all managed virtual libraries. An example report follows.

6. Support Options

6.1 X-Ray

Should Conductor fail to operate as expected, option "21. Create X-Ray *SAVF will collect all of the relevant data about your Conductor installation and activity and place it in the *SAVF indicated by the completion message.

This *SAVF can then be delivered to DSI Support using your preferred upload/delivery mechanism.

In figure 59 below find an example notification message indicating the *SAVF creation/location:
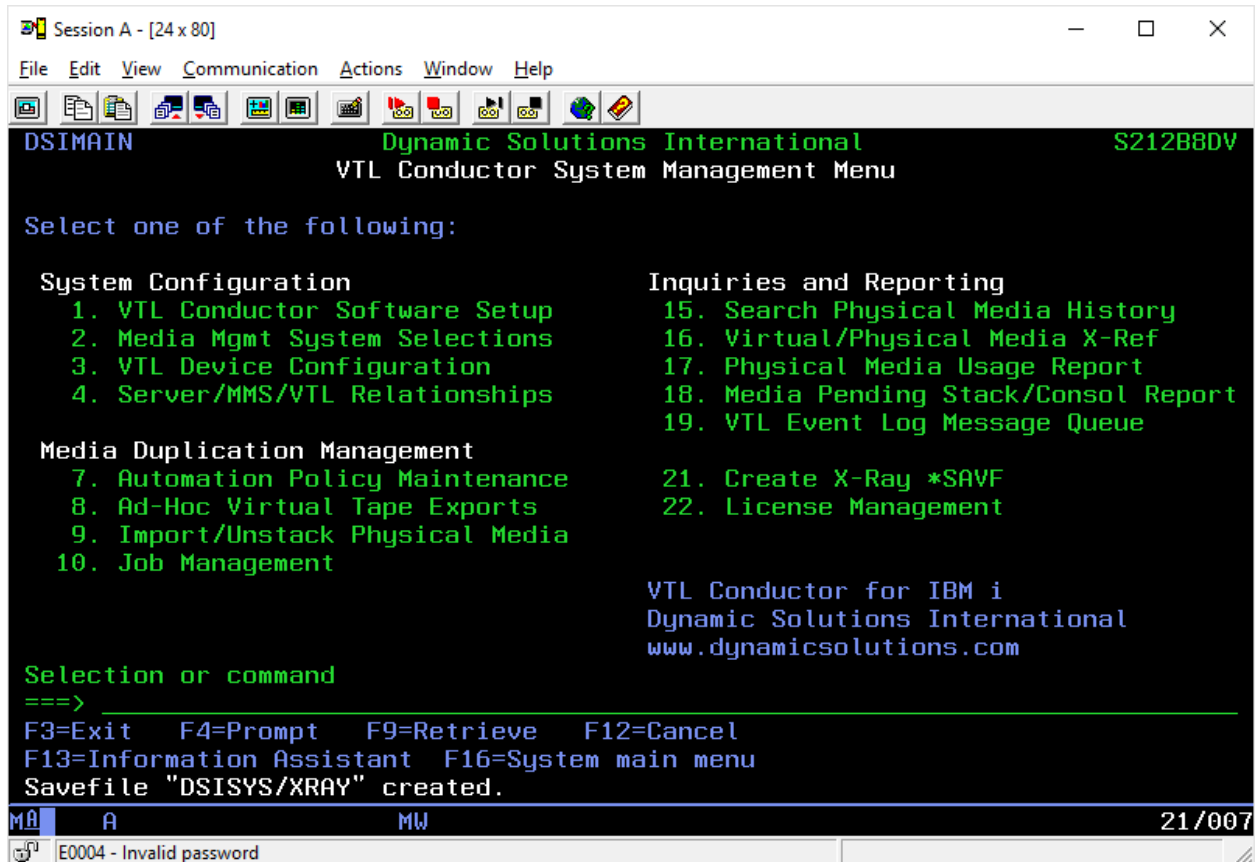
Figure 58: X-RAY *SAVF creation

6.2 Troubleshooting

6.2.1 Duplication Policy Troubleshooting

If it appears properly-configured policy items are not qualifying virtual media correctly, one or more of the following conditions/solutions may apply.

- Ensure that the applicable VTL is online, that COMMSVC jobs are running in the DSISYS subsystem, that the TRIGSVC service is running in the DSIMON subsystem.

- Ensure the Media Policy or override used by the applicable control group is set to "Mark volume for duplication" = *YES. Virtual volumes must be marked for duplication in order to be qualified by Conductor.

- Ensure virtual tapes are not moved to the virtual vault before the DSIMON subsystem is restarted. Conductor requires virtual volumes remain in the logical library until it has completed post-save processing activities.

- Once a virtual tape is qualified for a job or a set of jobs, that same tape cannot be qualified again until all Conductor jobs have completed for that volume.   Ensure no *SCHEDULED jobs for the volume exist using the Job Management UI; if found, use option 7-Cancel *QUEUED/*SCHEDULE job to cancel the pending job(s) or await their execution. Either way, once the pending jobs have *COMPLETED the triggering mechanism will create new jobs for the volume.

- Policies can be configured to ignore mounted virtual volumes.   If your trouble volume is mounted and the applicable policy item indicates "ignore mounted volumes = 'Y', dismount the virtual volume.

- Confirm other policy item attributes are set as desired/correctly.

- There are four distinct "active" flags that will need to be reviewed to ensure each applicable entity is set to "Y" (active, enabled).

  - Use option **2-Media Mgmt System Selections** from the main menu to confirm BRMS is enabled.
  - Use option **4-Server/MMS/VTL Relationships** to ensure the relationship applicable to the library containing the trouble volume is marked active ("Act" column = 'Y').
  - Use option **7-Automation Policy Maintenance** to confirm the relevant policy groups for the applicable library are enabled.
  - From within the policy group application, use option **5-Policy Items** to confirm each policy item(s) qualifying the volume's class are marked active.

If none of the above items solves your issue, please use option **21-Create X-RAY *SAVF** from the Conductor System Management menu to take a system snapshot and send the file along with a problem description to DSI support.

6.2.2 VTL "Agent" Software Troubleshooting

Conductor is dependent on the VTL Agent software; should Conductor detect that the Agent software is not functioning normally, Conductor will perform a self-shutdown and issue an *INQUIRY message to QSYSOPR.   This message will include the recovery steps necessary to attempt restarting both systems or direct you to DSI support should those steps not remediate the Agent situation.

7. Conductor Commands

Note: *If the Conductor library is not part of your system or user library lists, prefix the commands with the Conductor library name.*

ADDMLMDSI (Add Media Library Media using DSI) : This command is used to move physical tapes from library IE slots to library slots in VTL-attached physical library configurations where the physical device is not device-configured on the IBM host.

This command helps keep move management processes flowing normally by ensuring newly-loaded physical media move into library slots without human intervention. This command replaces the BRMS "**ADDMLMBRM**" command in these cases.

If you share your physical library with your IBM host and the VTL device, use of this command is not required; continued us of the ADDMLMBRM command is recommended.

This command uses the following form:

> ADDMLMDSI LOCATION(<BRMS Location Name>) LIBID(<physical library virtual ID>) IESLOTS(x)

Where each of the parameters are required:

- LOCATION identifies the home location of the physical media library to load. This will be the home location of the virtual library for which physical volumes are being loaded.

- LIBID identifies the virtual library ID of the physical media library to load. VTL devices may have multiple physical libraries configured. This value identifies the library to manage.

- IESLOTS identifies either the maximum number of IE slots in the library or the largest numbered slot to check for move processing.

Note: *When using move management for non-matched physical volumes this command should be added to your current move process, positioned after having executed BRMS movement activities for the indicated location and after replacement physical media has been loaded into the physical library.*

Note: *When there are empty IE slots when this command runs, "tape move" errors will appear in the DSIMSGQ (option 19 on the Conductor System Management Menu) and depending on which messages are being forwarded to the QSYSOPR message queue, they may be seen there as well. These messages can be ignored.*

ADDMLMDSI Exception Messages:

> **DSI0013 – The Physical Library Virtual ID is required.**

This *ESCAPE message will be issued If the physical library virtual ID parameter value is not provided.

DSI0023 – Library ID *N is not found on the specified device.

This *ESCAPE message will be issued If the physical library ID value is not found on the virtual device associated with the home location provided in the LOCATION parameter.

DSI0024 – Unable to communicate with device *N via TCP/IP.

This *ESCAPE message will be issued If the virtual device associated to the home location provided in the LOCATION parameter is not responding to TCP/IP requests.

DSI0025 – The Location entry is required.

This *ESCAPE message will be issued If the home location parameter value is not provided.

DSI0026 – The IESLOTs value is required.

This *ESCAPE message will be issued If the IESLOTS parameter value is not provided.

DSI0027 – No active Conductor relationship/device found for location *N.

This *ESCAPE message will be issued If no active Conductor relationship exists for the LOCATION provided, or relationships exist but are not active for physical export operations.

EXPMEDDSI (Export Media using DSI): This command is a shortcut to main menu option "8. Ad-Hoc Virtual Tape Exports'. It accepts no parameters.

IMPMEDDSI (Import Media using DSI): This command is a shortcut to main menu option "9. Import/Unstack Physical Media".   It accepts no parameters.

MOVRPTDSI (Physical Media Usage Report; email option): This command will execute the SMTP movement report (if configured) and produce a hardcopy of the Physical Media Usage Report. Upon completion it clears the usage log data.

PHYUSGRPT (Physical Media Usage Report): This COMMAND generates a *SPLF of the Physical Media Usage Report without clearing the usage log data.

PNDCRTPRT (Virtual Tapes Pending Recreation Report): Use this command to create a copy of this report on demand to review volumes pending recreation.

PNDSTKPRT (Virtual Tapes Pending Stacking Report): Use this command to create a copy of this report on demand to review currently pending *STACK policy volumes.

WRKCFGDSI (Work with DSI Configuration): This command is a shortcut to main menu option "1. Conductor Software Setup'.

WRKDEVDSI (Work with Devices using DSI): This command is a shortcut to main menu option "3. VTL Device Configuration". It accepts no parameters.

WRKHSTDSI (Work with Physical Media History using DSI): This command is a shortcut to menu option "17. Search Physical Media History". It accepts no parameters.

WRKJOBDSI (Work with VTL Jobs using DSI): This command is a shortcut to menu option "10. Job Management". It accepts no parameters.

WRKMMSDSI (Work with Media Management Systems using DSI): This command is a shortcut to the main menu option "2. Media Mgmt System Selections". It accepts no parameters.

WRKPCYGDSI (Work with Policy Groups using DSI): This command is a shortcut to main menu option "7. Automation Policy Maintenance". It accepts no parameters.

WRKSYSDSI (Work with system relationships using DSI): This command is a shortcut to main menu option "4. Virtual Library Relationships". It accepts no parameters.

Index