Hydrographic
Data Protection Suite

User Manual

March 2014

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1. Introduction

1.1 Purpose

This user manual is intended for users and administrators, who install, configure and operate the Hydrographic Data Protection Suite version 1.0.

1.2 Conventions

Throughout this user manual, the following conventions are used:

Note: To specify something that should be taking into account.

Warning: To alert about something that could produce an undesirable effect.

REFERENCE: A cross-reference to another part of the document.

Some Central Glossary Terms start with capital letters and are presented in italics.

Button text refers to a button on a form.

1.3 Contacts

For getting assistance or reporting an error, please contact:
support@geomaris.com

For better assistance, please have at hand the following information:

- Context in which the problem is occurring.
- Error message and detailed problem description.

2. Overview

2.1 The S-63 Data Server Role

The S-63 Data Protection Scheme operated by the International Hydrographic Organization (IHO) uses the role name *Data Server* for organizations encrypting and signing ENC data and creating *Cell Permits* for authorized software systems.

At present the data server role is often associated with a small number of data servers like national hydrographic offices or RENCs (Regional ENC Coordination Centers) like IC-ENC or PRIMAR providing ENC coverage of large areas for ocean going vessels.

S-57 based data is increasingly used in numerous fields such as a wide range of port and offshore operations, coastal and harbor surveillance, environmental monitoring, SAR or inland waterway transportation. High resolution ENCs are produced to support operations in local waters or at offshore installations.

The Hydrographic Data Protection Suite enables companies and institutions to act as Data Servers in the S-63 Data Protection Scheme. The customers can efficiently control access to their data and thus protect their economic basis.

2.2 Data Protection Suite Overview

2.2.1 Protecting Data

The Data Protection Suite provides functionality to create BASE and UPDATE *Exchange Set CD*s without worrying about any details.

The S-57 base cell files, update cell files and supplemental text and picture files are copied to a *Cell Pool Directory*. Then *Exchange Set CDs* are easily defined and can be built at the click of a button whenever new data is ready for release. Section PROTECT DATA describes the process in a step by step manner.

2.2.2 Granting Access to the Encrypted Data

The Hydrographic Data Protection Suite allows efficient management of a large number of *Customer Systems* subscribed to the data service. The systems can be organized into a hierarchical structure of *Groups* to model the real world physical and organizational structure in your system.

The agreements with your customers are entered into the system only once. The objects representing such an agreement are called *Leases*. Changes to the configuration must only be made when the composition of a *Cell Package* is changed or an aspect of an agreement changes.

All *Cell Permits* for all *Customer Systems* are created at the push of a button. The expiry date for every single *Cell Permit* is automatically selected at the time of *Cell*

Permit creation according to the rules specified in the *Lease*. Section GRANT ACCESS describes the processes in a step by step manner.

The *Cell Permit Files* can then be distributed to the customers.

2.3 Integration with Other Systems

The configuration of *Cell Packages*, *Customer Systems*, *Groups of Systems* and *Leases* clearly defines which *Cell Permits* each *Customer System* gets.

As the components are stored in local files using simple text formats the configuration can be generated by another application providing the required data. In this case the Hydrographic Data Protection Suite would only be used to execute the *Cell Permit File* creation process.

The Hydrographic Data Protection Suite supports adding custom fields to *Systems*, *Groups* and *Leases*. This information can be used by an external *Cell Permit File* distribution system.

3. Installation

3.1 General Considerations

The Hydrographic Data Protection Suite is a desktop application for single-user operation. All data is stored in local files and no network connectivity is required.

The application must be closed to make backup copies of the *Data Directory* Copying the full *Data Directory* represents a full backup including input cell data and *Exchange Set CD* build output.

The "Config" directory in the *Data Directory* contains the text files storing the *Customer Systems, Groups of Systems*, *Leases*, *Cell Packages* and *Exchange Set CD Definitions.*

3.2 Requirements

In order to install the Hydrographic Data Protection Suite on a client PC, the following requirements must be met:

Description	Required	Recommended
Memory	1 Gb	2 Gb
HDD free	55 Mb	1 Gb
Operating System	Windows 7, Windows Server 2008 or higher	
.NET Framework	.NET Framework 4.5 or higher	
Security	Must be a user domain with administrative rights on the client machine	
Connectivity	No network connectivity required	

Table 1: Installation requirements

3.3 Installation

To install Hydrographic Data Protection Suite on a client PC, follow the steps below:

1. Ensure you have the permissions to install software on your PC.
2. Start the installer on the target system.
3. Read and accept the End User License Agreement.
4. Accept or change the installation path on your computer.
5. Follow the instructions of the setup wizard and choose your desired installation options.

3.4 Initial Configuration Wizard

After installing the Hydrographic Data Protection Suite, the Initial Configuration Wizard is launched when you first start the Application. This wizard will guide you through the necessary steps to configure the Hydrographic Data Protection Suite to operate using the correct S-63 *Data Server* credentials (Figure 1).

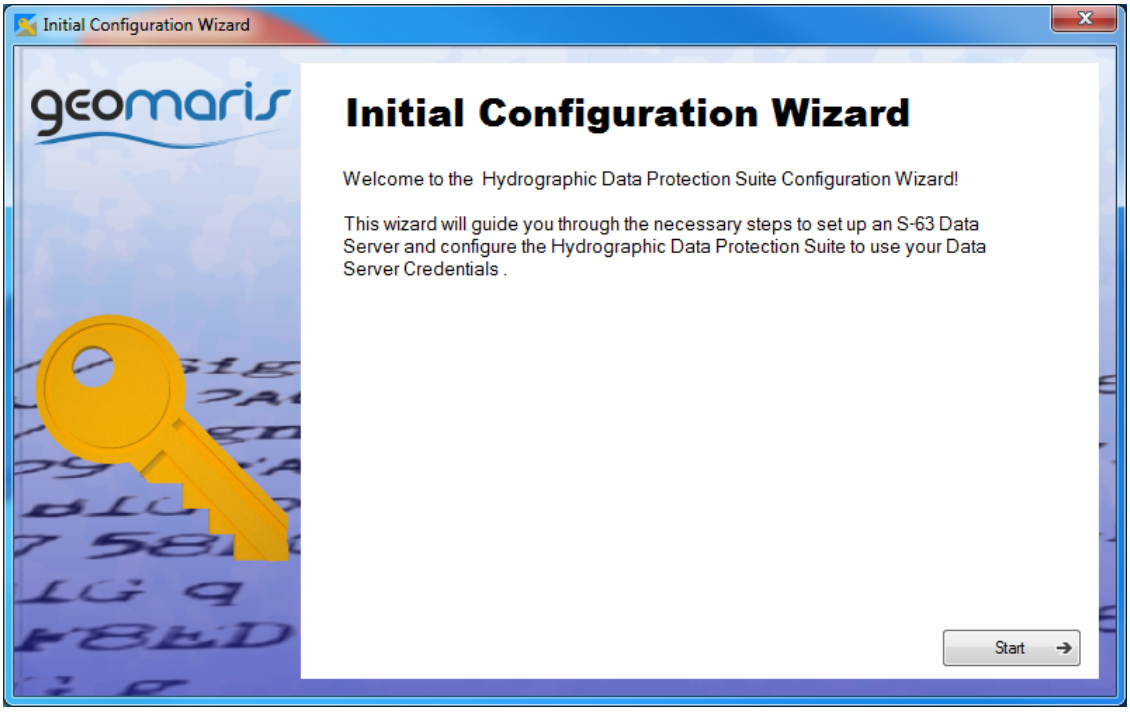

Figure 1: Initial Configuration Wizard Start Page

3.4.1 Step 1 - Enter a Data Server Name

In Step 1 enter the name of the Data Server and an acronym or short name (Figure 2).

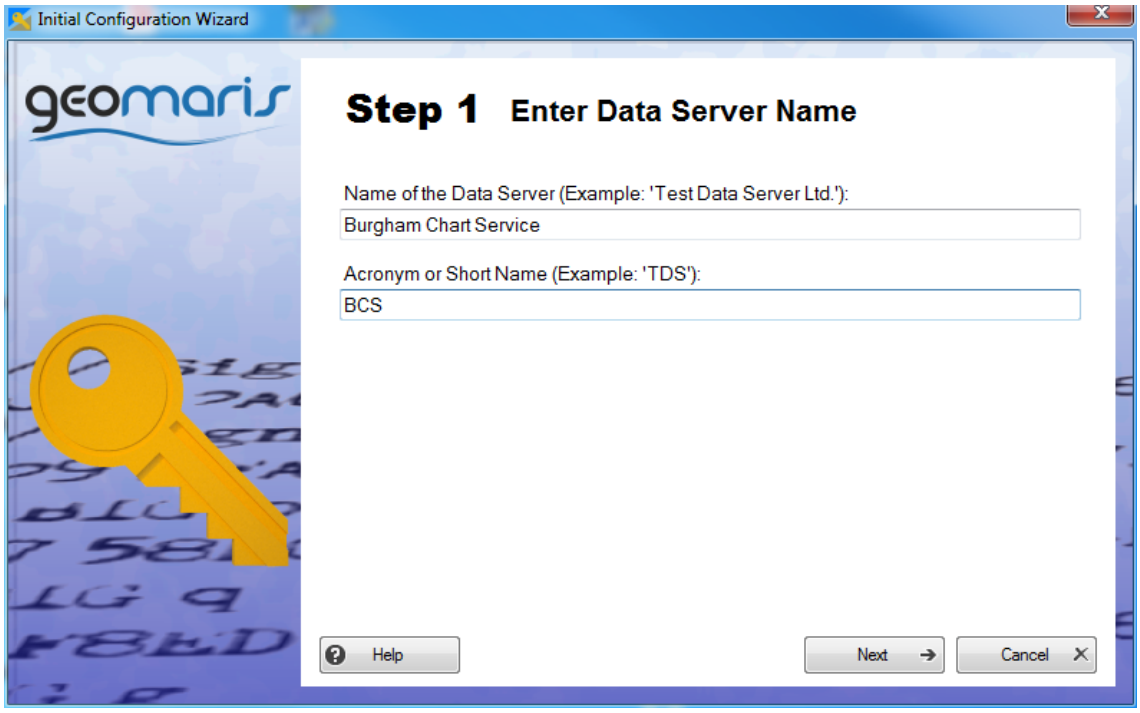

Figure 2: Enter a Data Server name

3.4.2 Step 2 - Data Server Credentials

The *Data Server* needs a private key, a public key and a *Data Server Certificate* to sign encrypted ENC cell files. At this step you have two choices:

3.4.2.1 Import Keys

If you already have received a *Data Server Certificate* from IHO you can import it along with the public key from a directory of your choice. Press the Import button on the wizard page and select the *Data Server Certificate* file 'certificate' for import. The public key file 'pubk' must reside in the same directory and will be automatically imported (Figure 3).

Note: The software assumes that the IHO *Data Server Certificate* file is named '*certificate*' and the public key file is stored in the same directory and is named '*pubk*'. If your certificate and public key files are named differently, you must rename them first.

If the *Data Server Certificate* and public key were successfully validated you must enter the *Data Server ID*, a two letter alphanumeric identifier assigned to organizations acting as *Data Server* by the IHO. The *Data Server ID* has been submitted to your organization together with the *Data Server Certificate*.

Figure 3: Import or create Data Server credentials

3.4.2.2 Generate New Keys

If you have no *Data Server Certificate* just press the Next button.

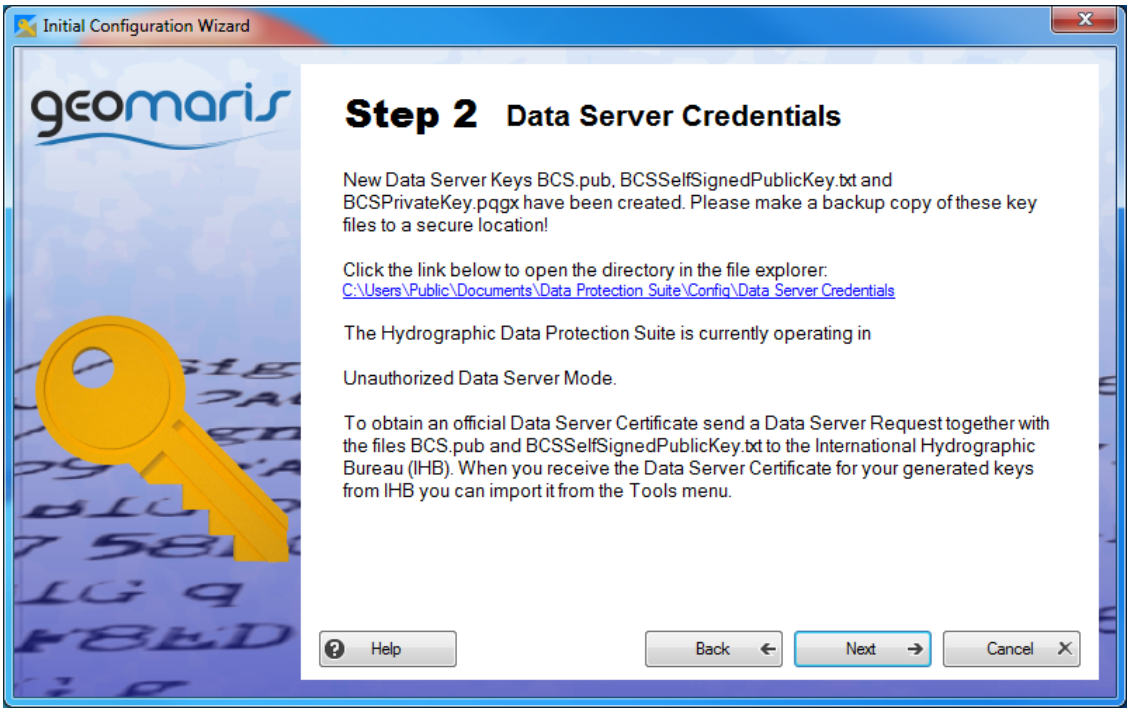

Figure 4: New Data Server credentials created.

The next wizard page is shown in Figure 4. It reports the creation of a new private and public key pair and a self signed public key and provides additional information on the *Unauthorized Data Server Mode* and the procedure of requesting the *Data Server* status at the International Hydrographic Bureau (IHB).

A link allows opening the directory in which the new *Data Server Credential* files were created in windows file explorer conveniently. Figure 5 shows a listing of the new files.

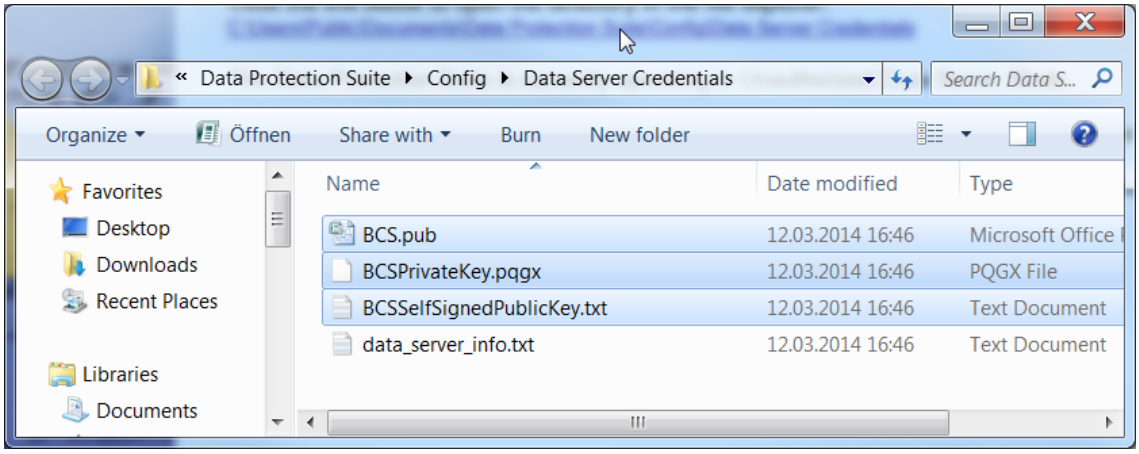

Figure 5: New Data Server key files

The *Data Server Credential* files are named:

<Short Name>.pub (public key)
<Short Name>SelfSignedPublicKey.txt (self signed public key)
<Short Name>PrivateKey.pqgx (private key)

where <Short Name> is substituted with the acronym or short name that was entered in Step 1 (Figure 2).

Note: Please make backup of these files by copying them to a secure location. After creating backup copies the private key should be deleted from the Data Server Credentials directory.

The Hydrographic Data Protection Suite is now operating in ***Unauthorized Data Server Mode***. This mode uses the auto generated self signed public key as the certificate. ECS or ECDIS systems may reject *Exchange Set CD* content signed with this auto generated certificate as it is no official IHO *Data Server Certificate*.

Before you can operate as an IHO accredited *Data Server* you must send a *Data Server Request* to the IHB. The two required documents are the “Data Server Request Form” and the “Data Server Agreement”. Templates can be downloaded from the IHO website.

The following items must be sent to the IHB:

- A Data Server Request Form
- Two copies of the Data Server Agreement with all pages signed
- The key files <Short Name>.pub and <Short Name>SelfSignedPublicKey.txt

After receiving an official *Data Server Certificate* from IHB you must import this into the Hydrographic Data Protection Suite by following the instructions in IMPORT DATA SERVER CERTIFICATE.

3.4.3 Step 3 - Load Data Server Private Key

Figure 6: Load the private key file

After Step 2 the private key file must be loaded into the Hydrographic Data Protection Suite and will be encrypted with a password. The password must be entered at every application start. Access to the private key file is required to change the password (Figure 6).

Note: If you forget the password there is no way to retrieve the private key from the Hydrographic Data Protection Suite configuration files. You must use your backup copy of the private key to reset the password.

Figure 7 shows the wizard after successfully loading the private key.

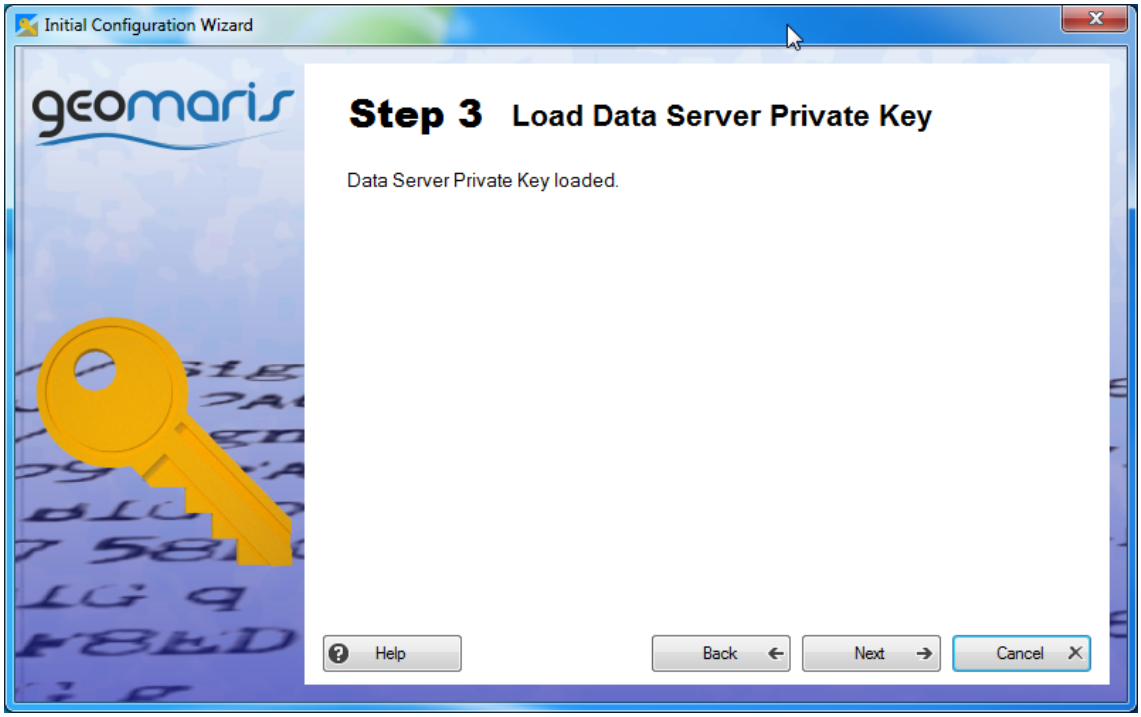

Figure 7: Successfully loading the private key

3.4.4 Step 4 – Enter License Request Information

To request a trial license enter your name, company and email address as shown in Figure 8 and press Next.

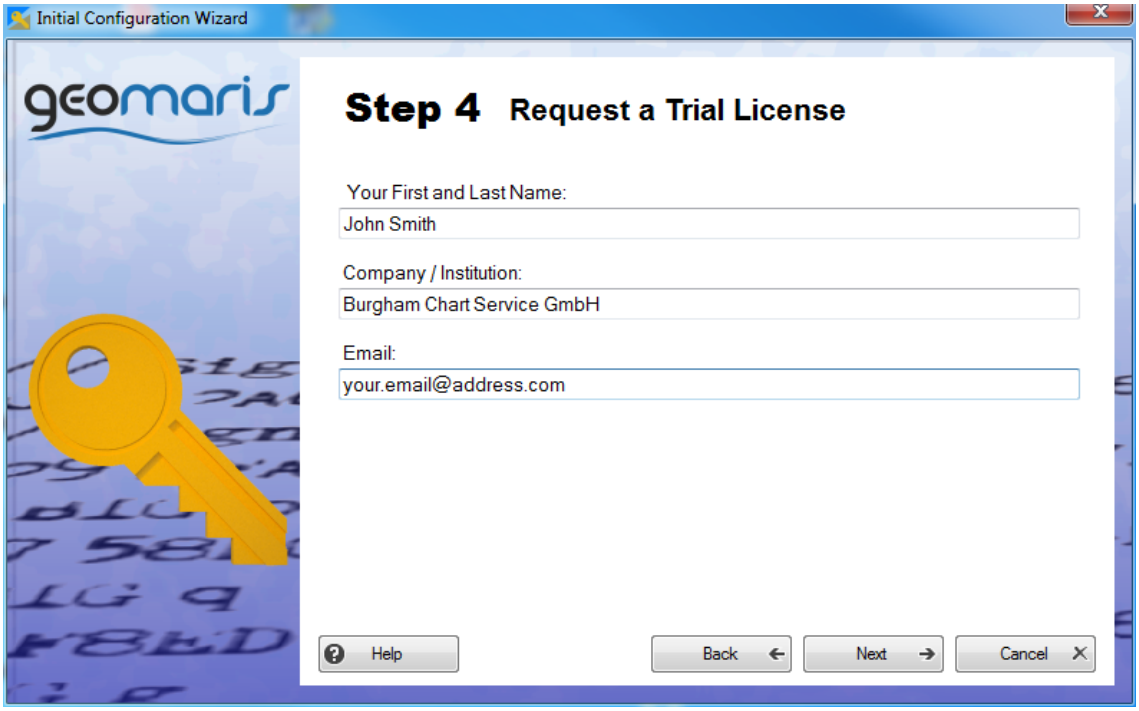

Figure 8: Enter license request information

3.4.5 Step 5 – Send License Request File to Geomaris

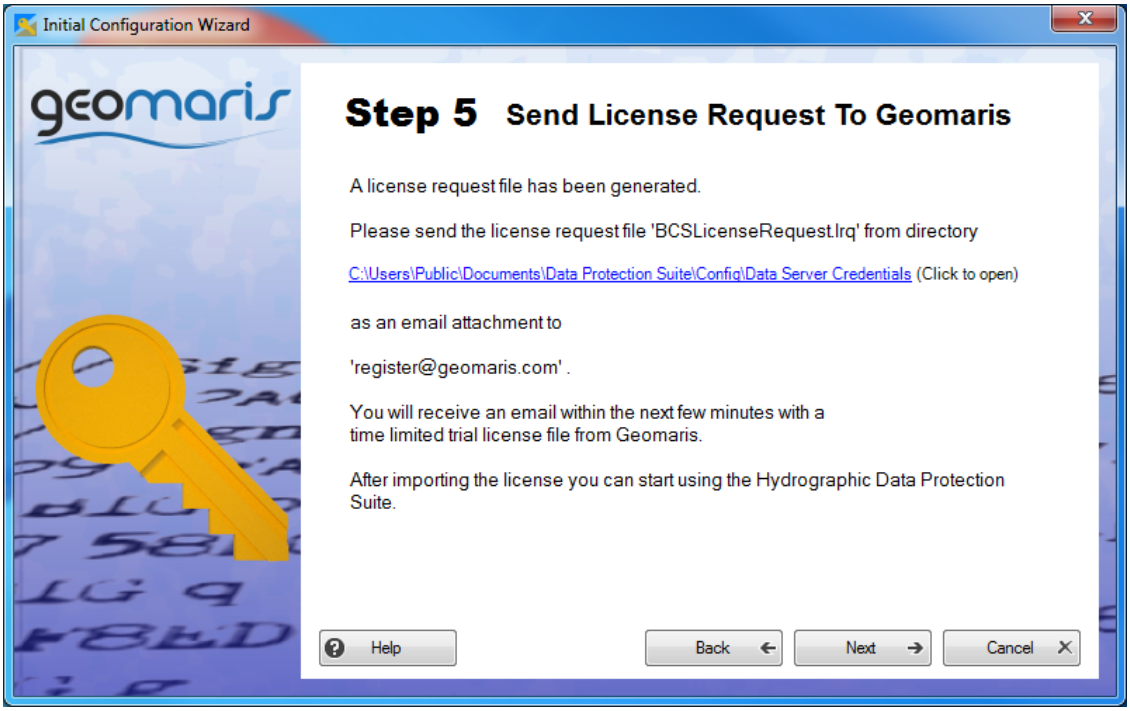

Figure 9: License Request File *.lrq generated

A license request file is generated and the next wizard page provides instructions on requesting a trial license from Geomaris and a link to conveniently open the directory (see Figure 9).

Click on the link to open the explorer window and email the license request file with file extension *.lrq* as an attachment to register@geomaris.com

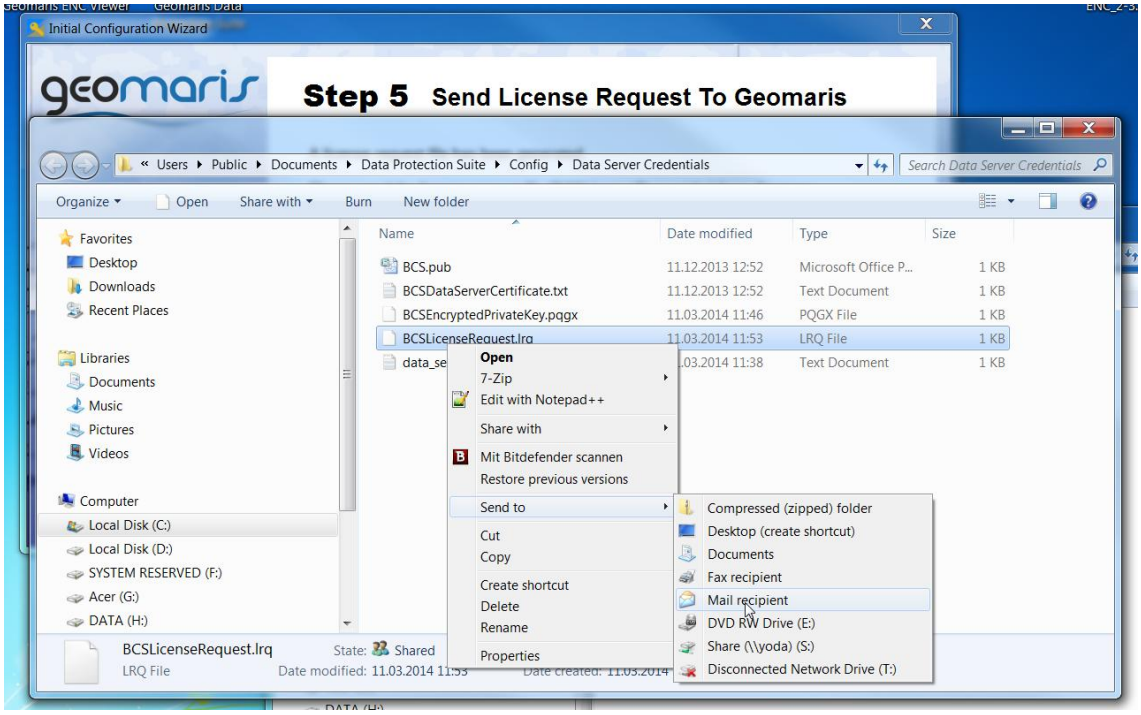

Figure 10: Send the license request to 'register@geomaris.com'

> *If you right click in the windows explorer on the license request file you can use the Send to Mail Recipient functionality if available on your system. (Figure 10)*

The reply with a trial license file attached is usually sent within a few minutes to the email address given in Step 4.

Note: If you don't receive a reply within an hour, check that your email address is correct and check your spam-folder.

Pressing Next will proceed to the Import Data Protection Suite License page (Figure 9).

If you cancel the wizard and start the Data Protect Suite again later the configuration procedure will continue from this point.

3.4.6 Step 6 – Importing Data Protection Suite License

When you receive the trial license, store the license file to a directory of your choice. If not already running, start the Hydrographic Data Protection Suite. The Import Data Protection Suite wizard page is displayed (Figure 11).

Figure 11: Import the license file

Press Import License and select the license file '*license.lic*' in the file selection dialog. After successful import you see the page shown in Figure 12.

The Done button closes the Initial Configuration Wizard and the main window of the Hydrographic Data Protection Suite is shown (Figure 13). The application is now ready to use.

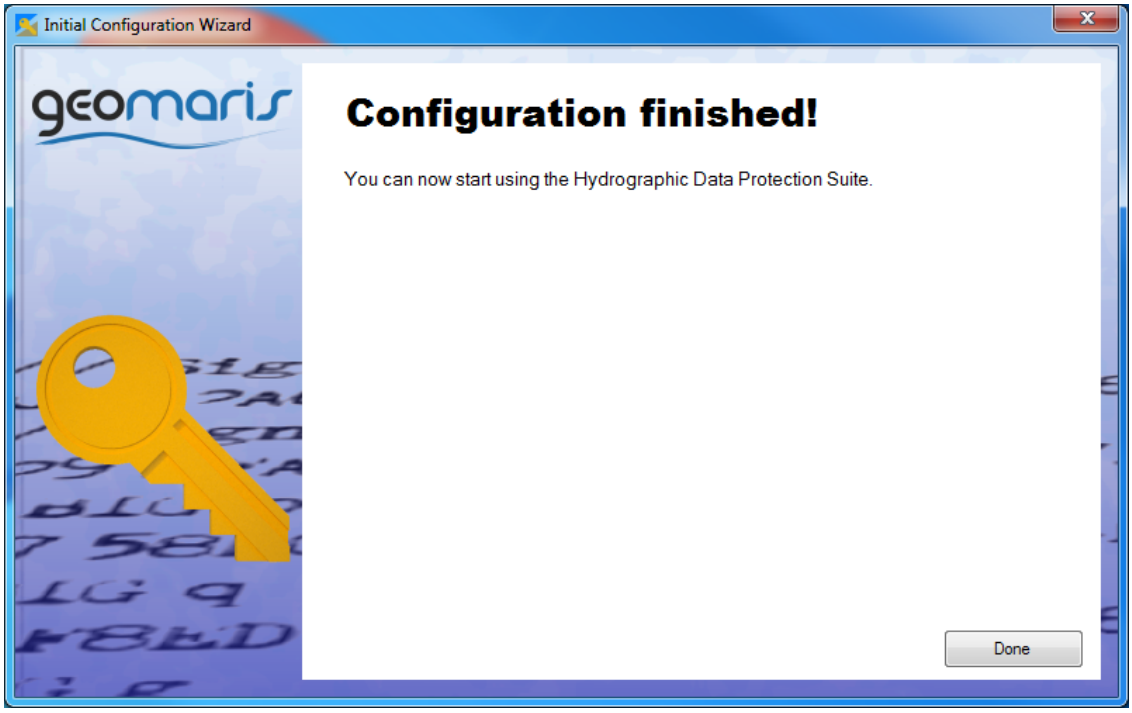

Figure 12: Wizard configuration finished

4. Using the Application

4.1 The Main Window

The Hydrographic Data Protection Suite main window (Figure 13) provides two buttons, one for each fundamental group of tasks of a *Data Server*'s service.

The Protect Data button opens the *Manage Cells and Exchange Set CDs* form for performing all actions related to encrypting cell data and building *Exchange Set CDs*. These tasks are covered in detail in section PROTECT DATA.

The Grant Access button opens the *Manage Systems, Groups and Leases* form. The form provides access to all functionality related to creating *Cell Permits* for *Customer Systems*. These tasks are covered in detail in section GRANT ACCESS.

The Tools menu provides access to the SETTINGS dialog and some special ADMINISTRATIVE TASKS.

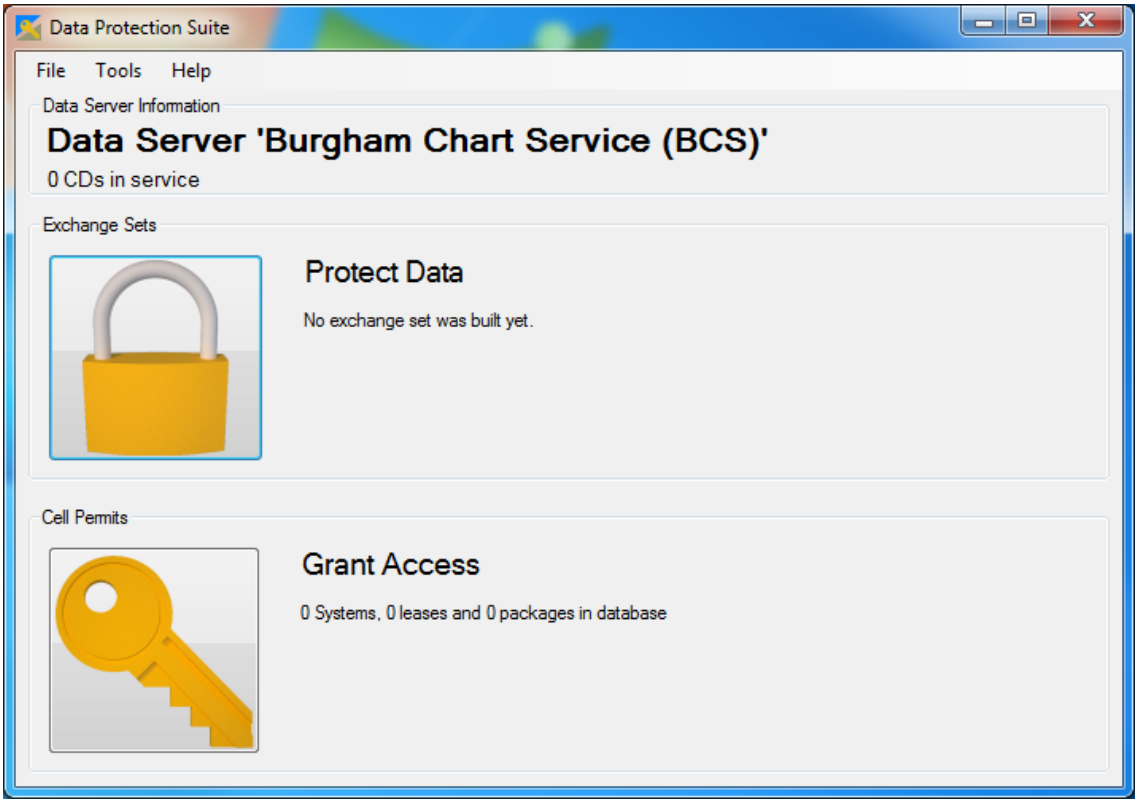

Figure 13: The Main Window

4.2 Protect Data

The Hydrographic Data Protection Suite reads all the cells it includes into S-63 *Exchange Set CDs* from a directory called the *Cell Pool Directory*. Multiple *Exchange Set CDs* can be defined each comprised of a specific subset of the *Cell Pool* cells.

A CD number is assigned to each *Exchange Set Definition* in the *Data Server's* service as demanded by the S-63 standard. In this document the terms *Exchange Set CD* and *Exchange Set CD Definition* are used instead of the simplified term *Exchange Set* used most often in everyday language.

When the user chooses to build an *Exchange Set CD* the cell data from the *Cell Pool Directory* is encrypted and packaged. Therefore the *Cell Pool* content must be carefully kept up to date and must contain only data ready for release.

Throughout this manual the usage of the Hydrographic Data Protection Suite is demonstrated by examples using NOOA cells from Hawaii.

4.2.1 Populate the Cell Pool

When the user presses the Protect Data button on the main window the *Manage Cells and Exchange Set CDs* window opens. If the *Cell Pool* is empty the *Cell Pool* tab page is active (Figure 14).

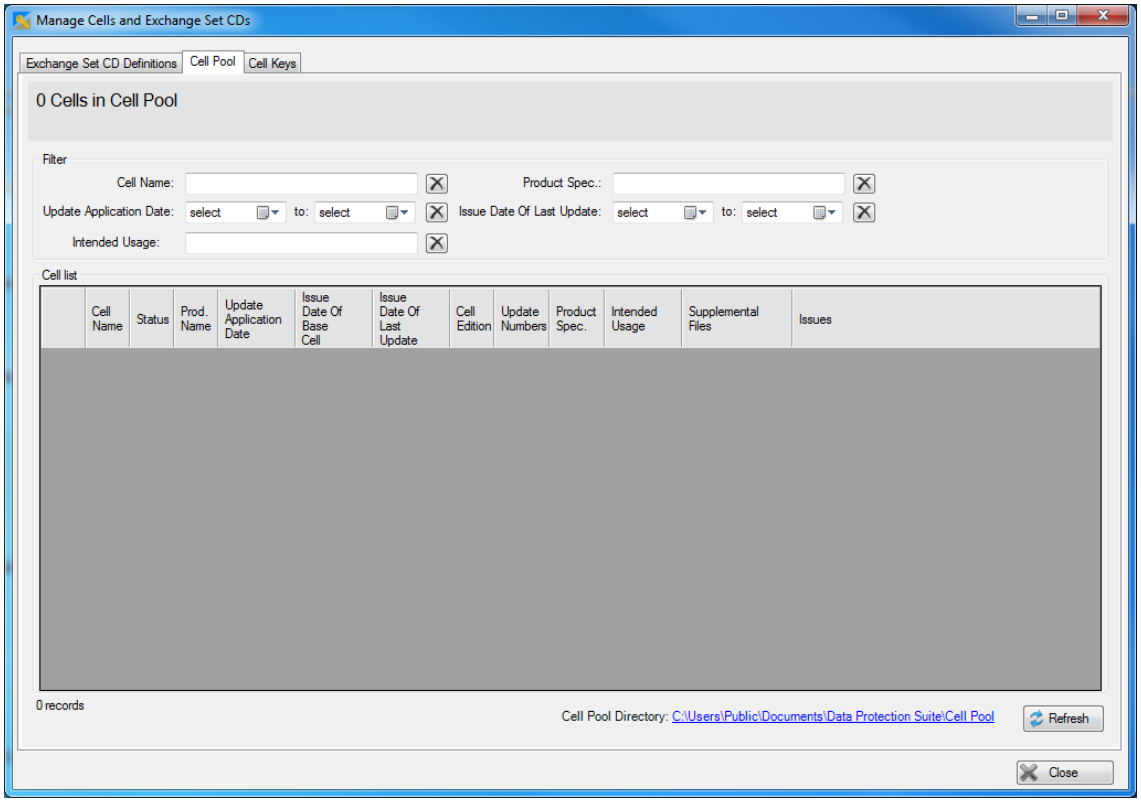

Figure 14: Empty cell pool table

The *Cell Pool* tab page consists of three parts:

Cell Table

The *Cell Table* displays various details of the cell data in the *Cell Pool*. A status column indicates if there are any issues with the cell data. Examples for incorrect data are a missing base cell file, a gap in the update sequence or incompatible edition numbers in an update cell file's DSID field. The table can be sorted by a column by clicking the column header - another click reverses the sorting order.

Filter

The filter fields can be used to display only those entries matching the specified filter criteria. If a filtered list of cell entries is displayed in the table the label under the table on the left side turns red and indicates that only a subset of the entries is shown.

Action Panel

The Action Panel provides a link to conveniently open the *Cell Pool Directory* in the file explorer and the Refresh button. Pressing the Refresh button updates the table to reflect the current state of the *Cell Pool Directory*.

For each cell a directory must be created in the *Cell Pool Directory*. The directory name must correspond to the cell name. The current versions of the base cell file, update cell files and supplemental files (.TXT and .TIF) must be copied to this directory (Figure 15).

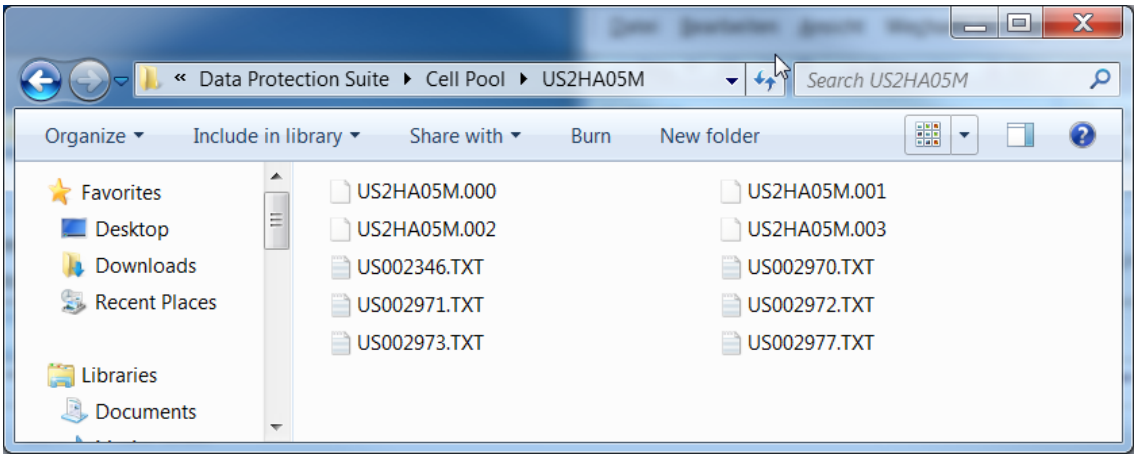

Figure 15: Cell Data Files for US2HA05M

Pressing the link at the bottom of the *Cell Pool* tab page opens the *Cell Pool Directory* in the file explorer.

Figure 16 shows the *Cell Pool Directory* content after NOAA cells of Hawaii have been copied to it.

The Hawaii cell US1HA01M and the update cell file US2HA05M.004 have not been copied yet. The files will be added later in this section to demonstrate building *UPDATE Exchange Set CDs.*

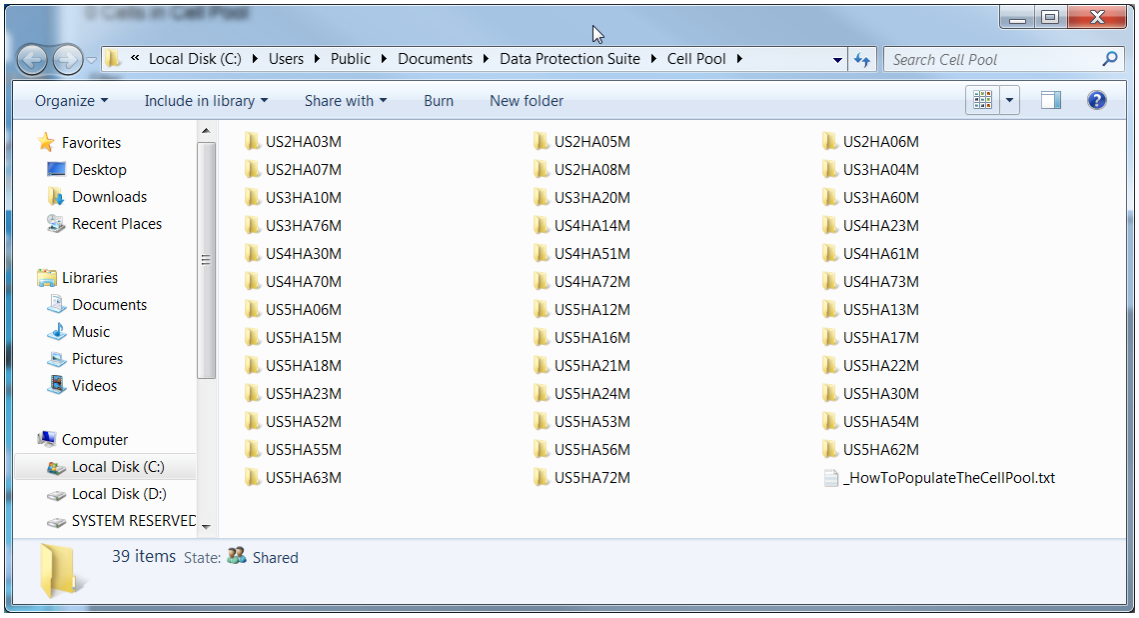

Figure 16: Hawaii Cell Directories in the Cell Pool Directory

After arranging the cell data in the *Cell Pool Directory* the Refresh button on the Action Panel is pressed to update the *Cell Pool* table (Figure 17).

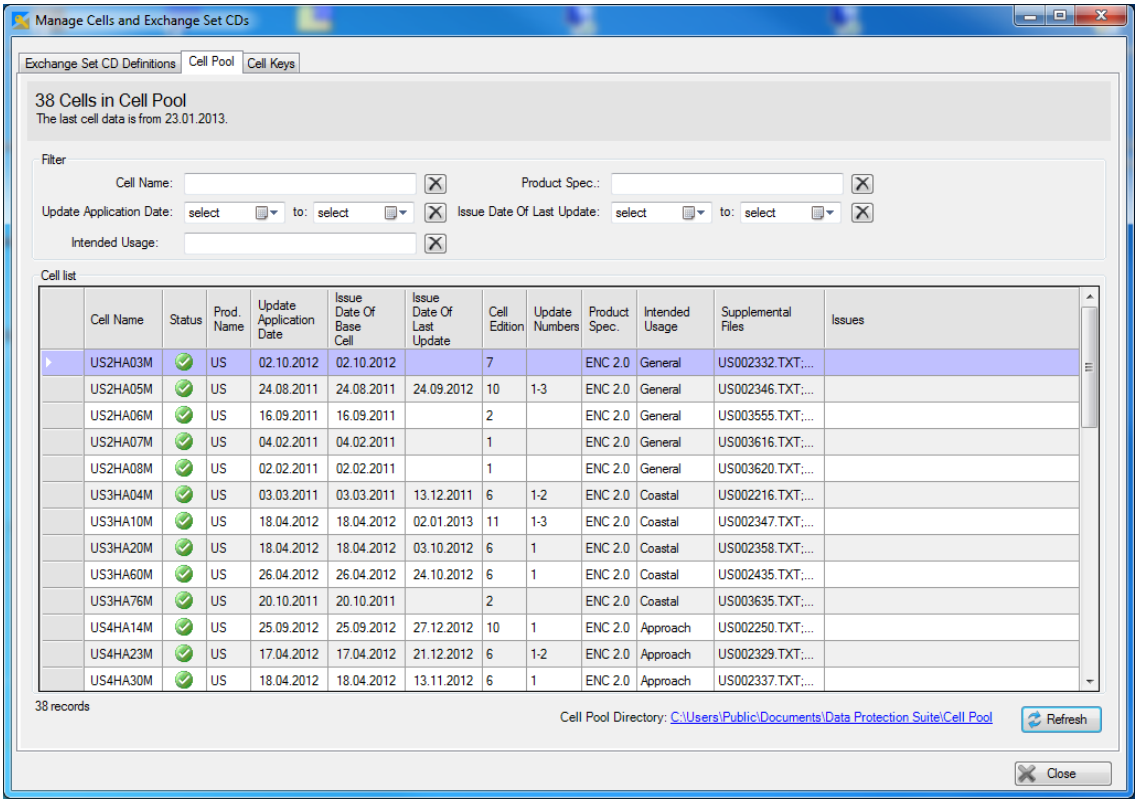

Figure 17: The updated table displaying the Cell Pool content

Now that the *Cell Pool* is populated with some data an *Exchange Set CD* can be defined.

4.2.2 Manage Exchange Set CD Definitions

The *Exchange Set CD Definitions* tab page on the *Manage Cells and Exchange Set CDs* window provides the user interface for managing and building *Exchange Set CDs*.

The *Exchange Set CD Definitions* tab page (Figure 18) consists of two parts:

Exchange Set CD Definition Table

The table displays some information on the *Exchange Set CDs* like the cells being shipped with the *Exchange Set CD* and the time the last BASE or UPDATE *Exchange Set CD* was built. A status column indicates if the referenced cell data in the *Cell Pool* is set up correctly.

Action Panel

The Action Panel provides an Add, Edit and Remove buttons and a link to conveniently open the *Exchange Set CD* build output directory.

- Clicking the Add button adds a new *Exchange Set CD Definition*.

- Double clicking a row in the table or pressing the Edit button opens the selected entry for edit.
- Pressing the Remove button removes the selected *Exchange Set CD Definition*.

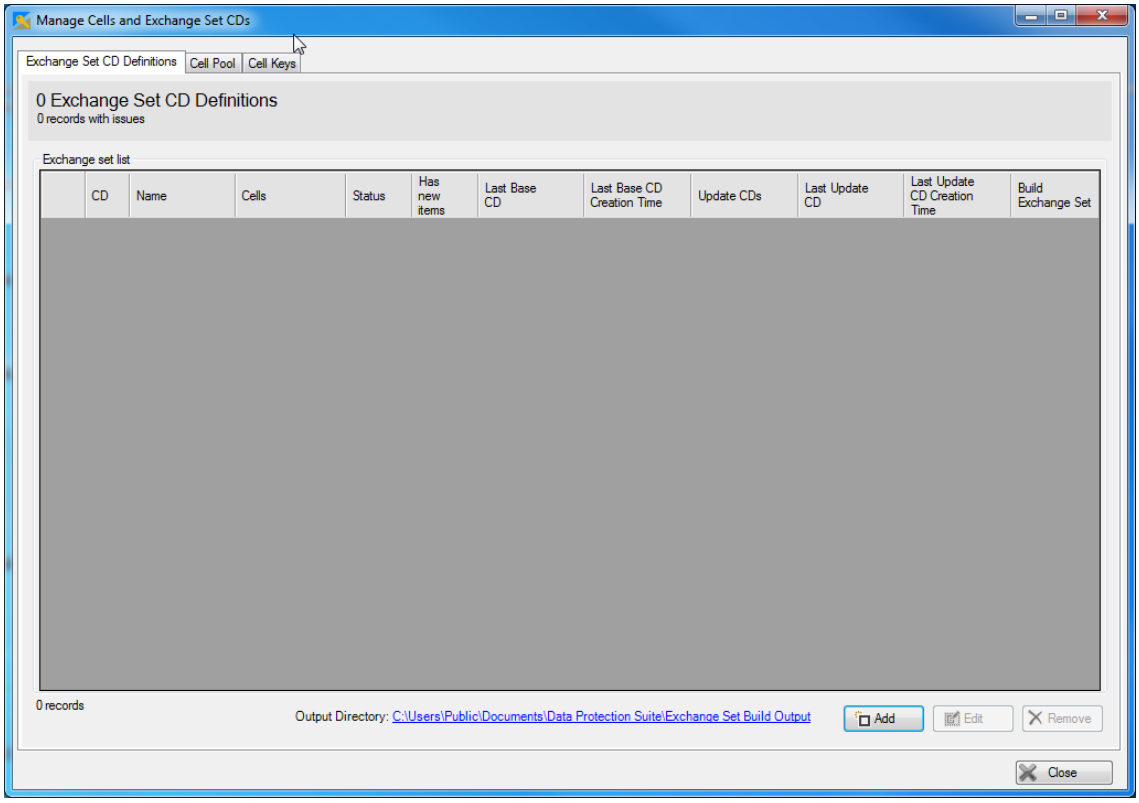

Figure 18: Add a New Exchange Set CD Definition

In this section the *Exchange Set CD Definition* “Hawaii Complete” is created containing all available cells from the *Cell Pool*.

Pressing the Add button on the Action Panel of the *Exchange Set CD Definitions* tab (Figure 18) page opens the *Exchange Set CD Detail* form (Figure 19).

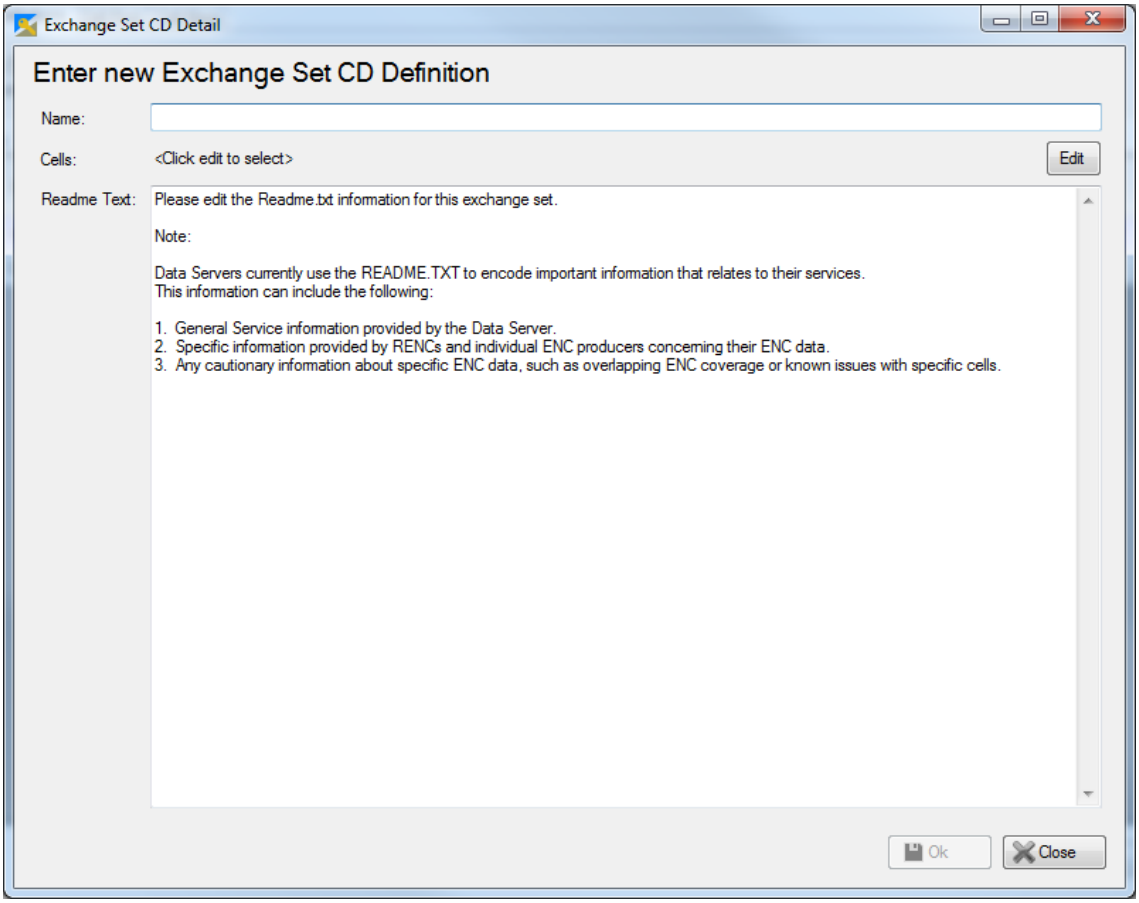

Figure 19: Enter new Exchange Set CD Definition

An *Exchange Set CD Definition* name must be entered and cells must be assigned. The **Edit** button on the right side of the Cells field opens the cell selection form shown in
Figure 20.

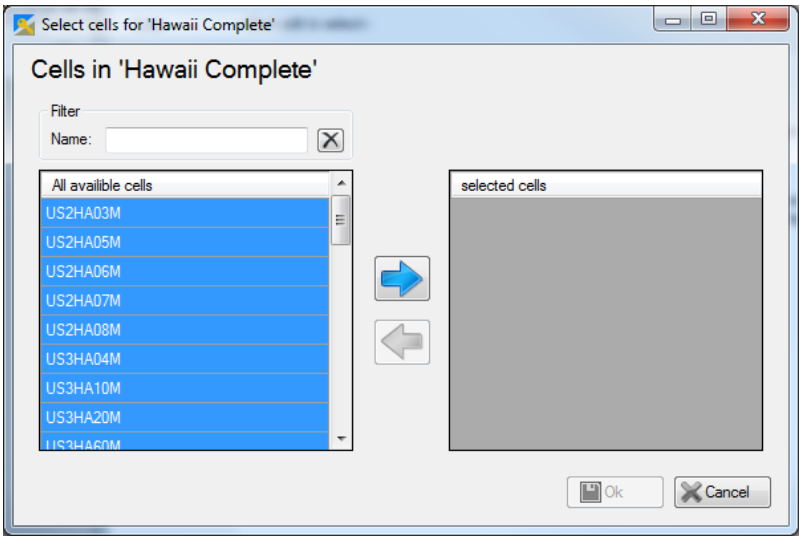

Figure 20: Cell Selector Form - Add all cells to Exchange Set CD Definition

The cells available in the *Cell Pool* and not yet assigned to the *Exchange Set CD Definition* are listed in the list on the left. The filter field above the list can be used to find the desired cells. The right list contains the cells currently part of the *Exchange Set CD Definition*.

In this example all cells are marked by pressing Ctrl + A and the arrow button adds the selection to the list of assigned cells. Pressing Ok confirms the selection and closes the Cell Selector Form.

The new *Exchange Set CD Definition* can now be saved (Figure 21).

Note: For your production Exchange Set CDs ensure that the README.TXT content is always informative and up to date.

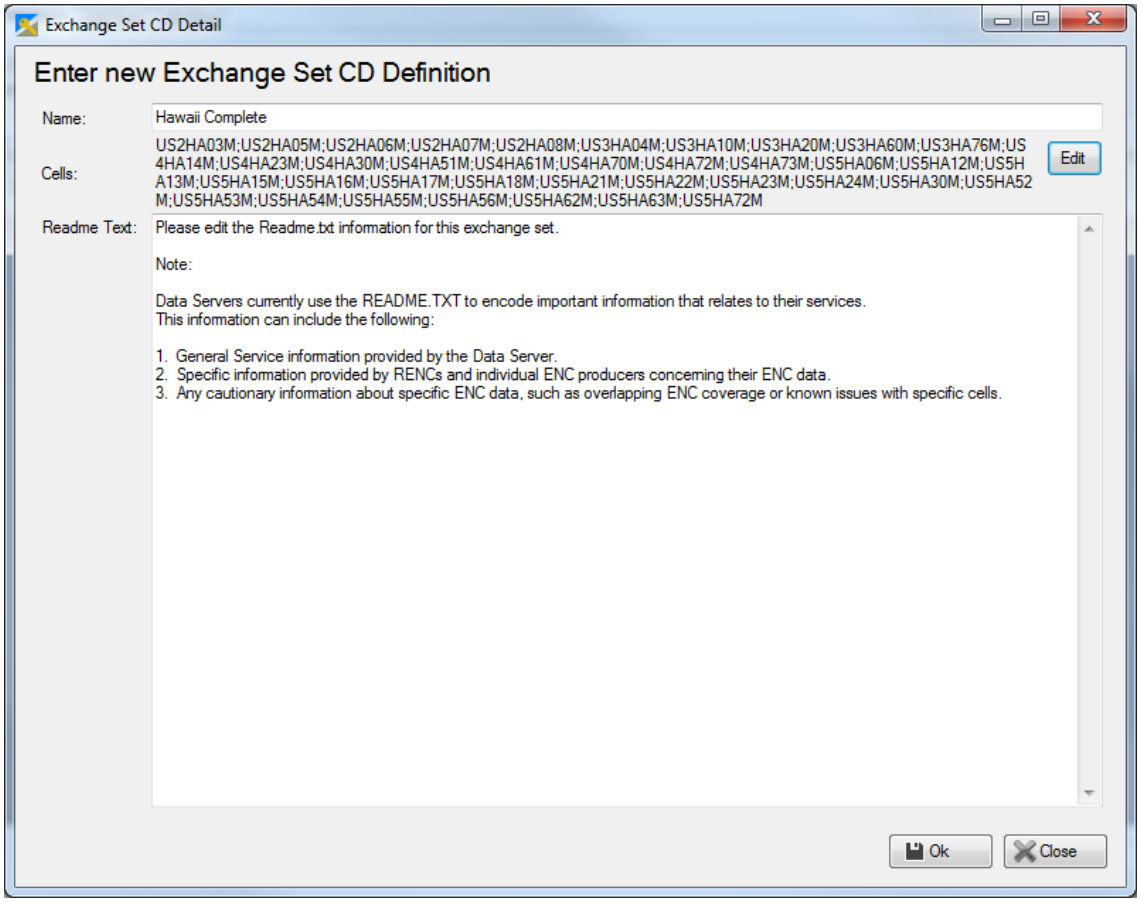

Figure 21: Enter an Exchange Set CD Definition

After pressing Ok the new *Exchange Set CD Definition* is listed in the table on the *Exchange Set CD Definitions* tab page as shown in Figure 22.

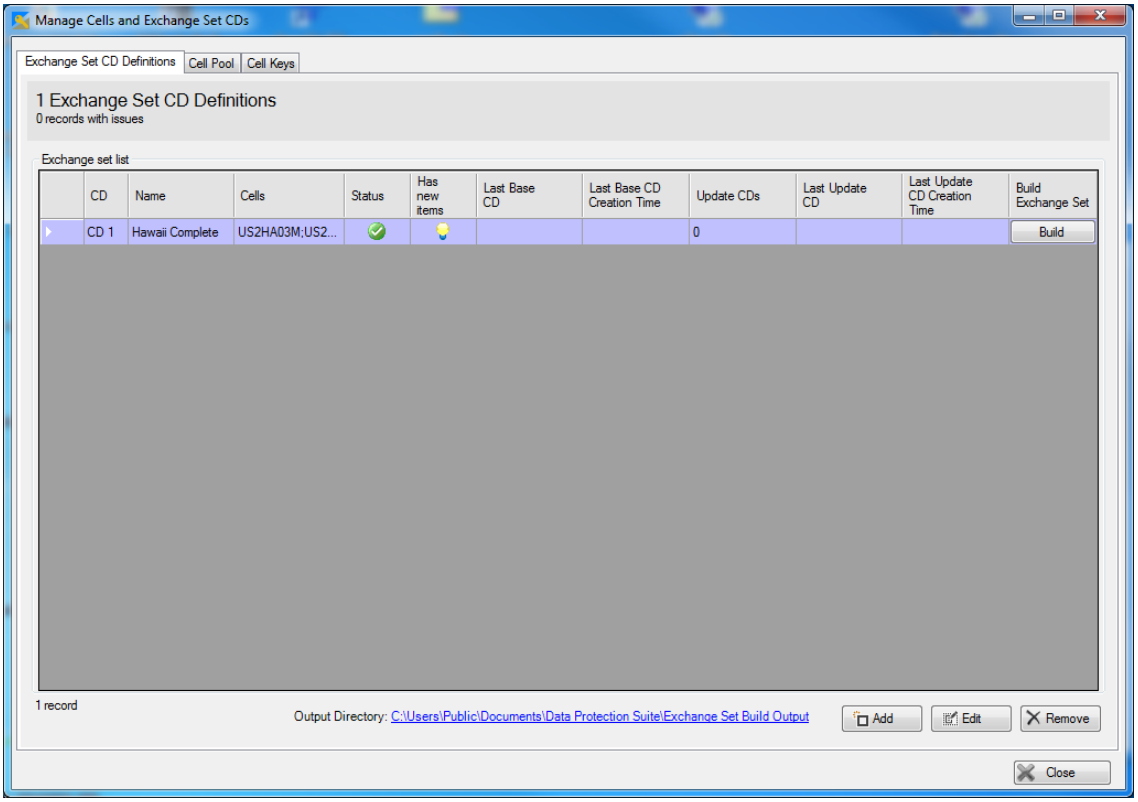

Figure 22: The new Exchange Set CD Definition was not built yet

A light bulb symbol in the “Has new items” column indicates that there is cell data available for the *Exchange Set CD* that has not been part of past builds.

In this case the *Exchange Set CD* has never been built.

4.2.2.1 Remove *Exchange Set CD Definitions*

Exchange Set CD Definitions should be created and removed very rarely. After the removal the CD number is blocked and not used for new *Exchange Set CD Definitions*.

CD number reassignment must be done explicitly as described in REASSIGN EXCHANGE SET CD NUMBERS.

Exchange Set CDs should be planned carefully and changes to the numbering should be made only very rarely for two reasons:

- *A listing of the cells belonging to the CD number is shipped with every Exchange Set CD so customers can reasonably expect the same content to be associated with the CD number.*
- *S-63 Exchange Sets do not have names, instead the identifier is built from the CD number and a string representing the week of the release. Therefore changes in the Exchange Set CD numbers can lead to ambiguities or name clashes resulting in UPDATE Exchange Set CD installation failures.*

4.2.3 Build BASE Exchange Set CDs

After pressing **Build** in the *Exchange Set CD Definition* table row the *Confirm Exchange Set CD Build* dialog is shown (Figure 23). Pressing the **Build Base CD** button starts the build of the first *BASE CD* for the *Exchange Set CD Definition*.

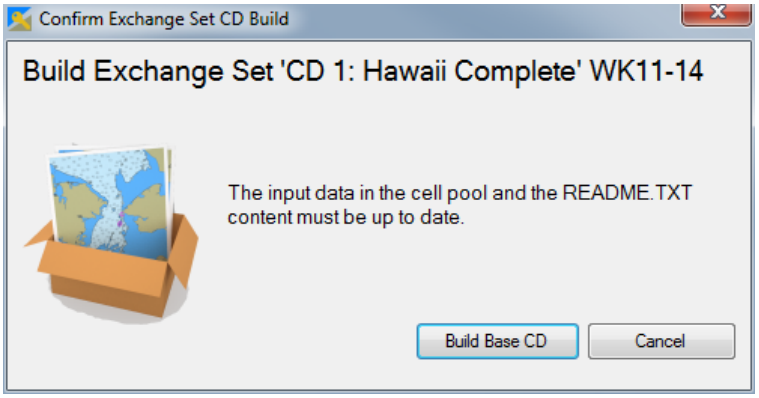

Figure 23: Confirm Exchange Set CD Build dialog

Dependent on the number of cells and the system performance the build process can take some time. After completion a build summary is shown providing a link to open the output directory in the file explorer (Figure 24).

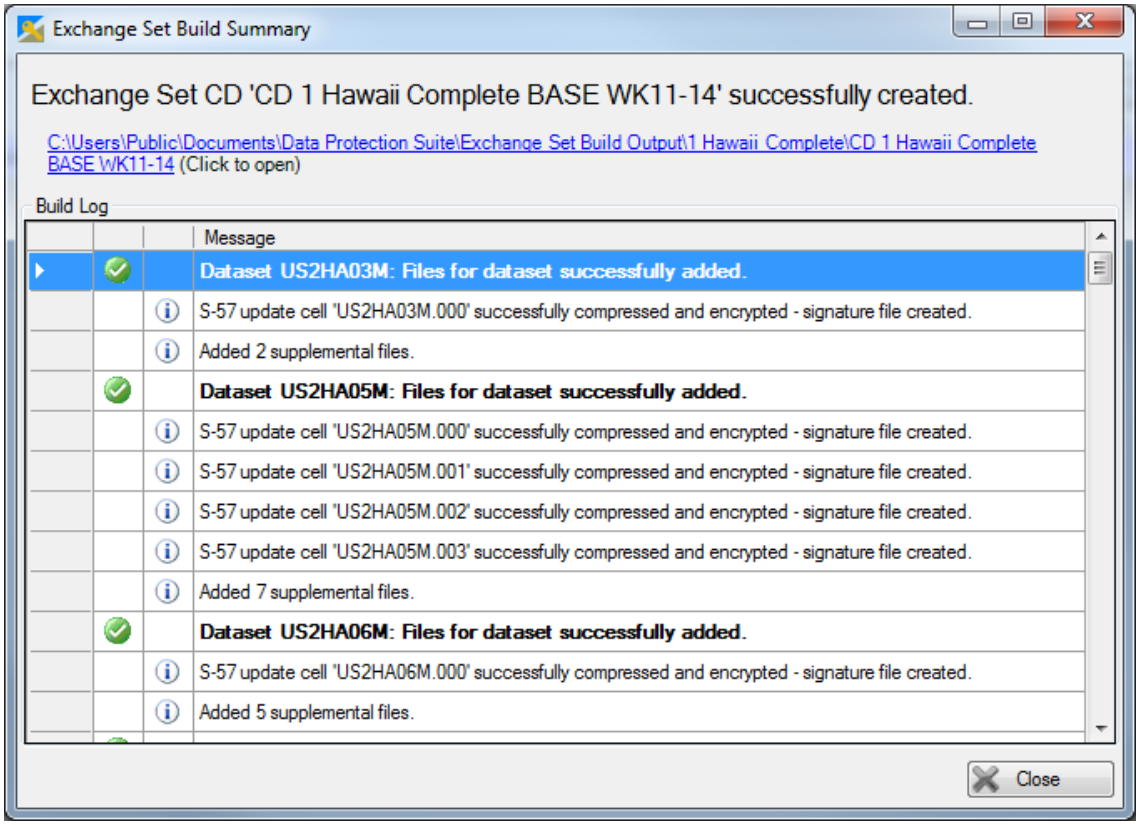

Figure 24: Exchange Set CD Build Summary form

The content of the output directory is shown in Figure 25. The content of these two folders and the SERIAL.ENC file constitute the S-63 *Exchange Set CD* to be delivered to client systems.

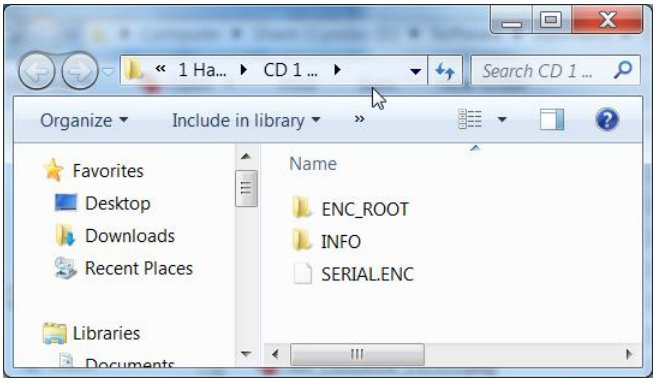

Figure 25: The Exchange Set CD deliverables

4.2.4 Build *UPDATE Exchange Set CDs*

An *UPDATE Exchange Set CD* can only be built if new cell data (base cell or update) have been added since the last *BASE Exchange Set CD* build.

After copying the NOAA cell data of US1HA01M to the *Cell Pool Directory* and adding the update file US2HA05M.004 to the cell directory US2HA05M the Refresh button on the *Cell Pool* tab page is pressed.

The *Cell Pool* table displays the new elements (Figure 26).

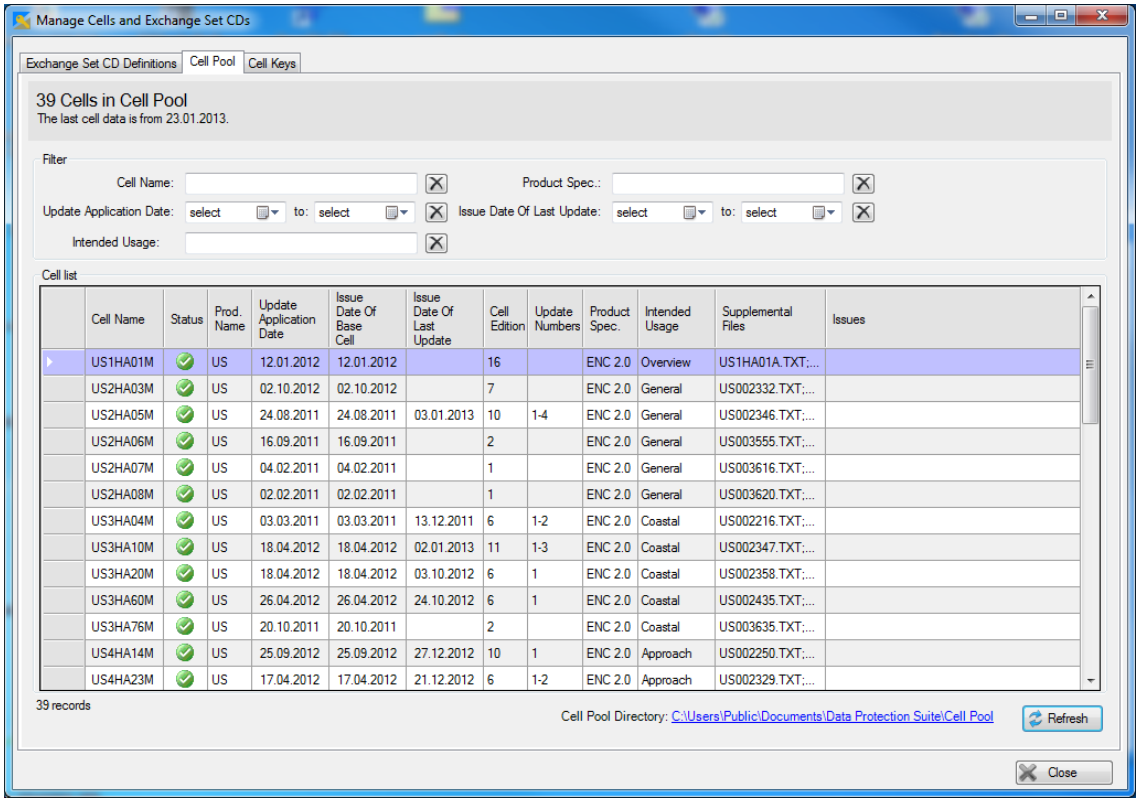

Figure 26: Updated Cell Pool containing US1HA01M and US2HA05M.004

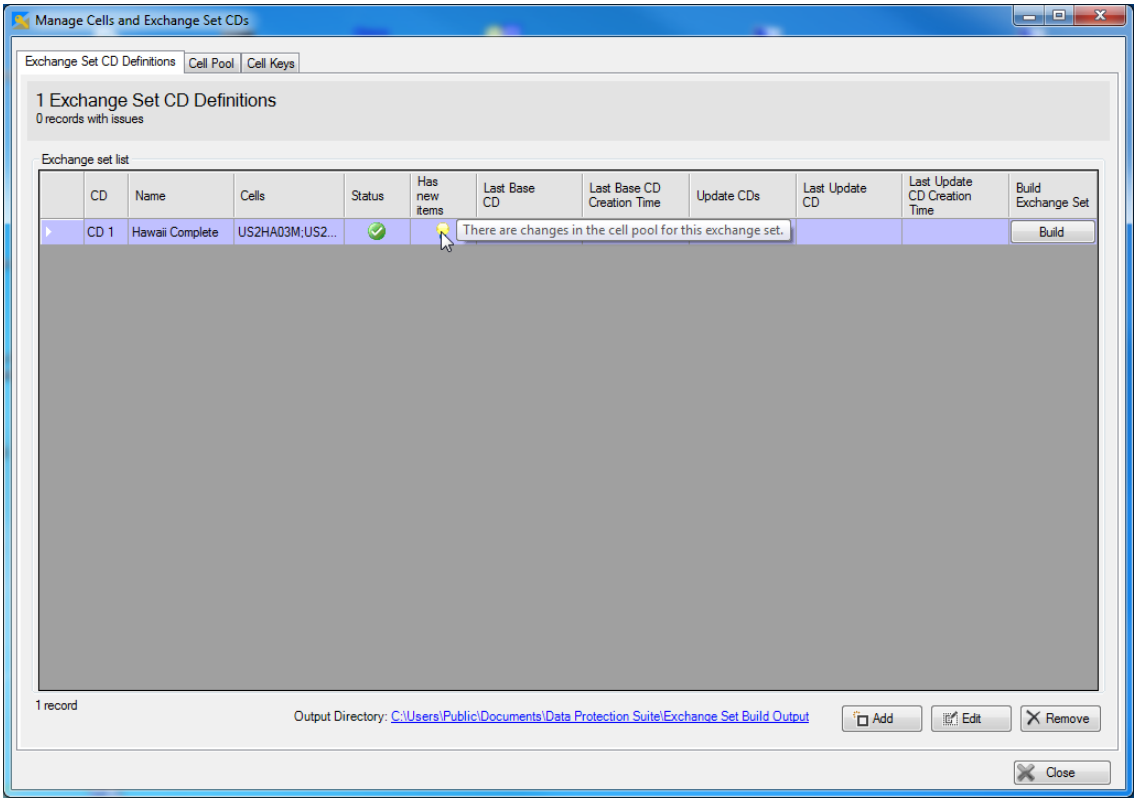

Figure 27: New Items Available for Exchange Set CD

After pressing the **Build** button in the table row the *Confirm Exchange Set CD Build* dialog provides the options to build a *BASE Exchange Set CD* or an *UPDATE Exchange Set CD* as shown in Figure 28.

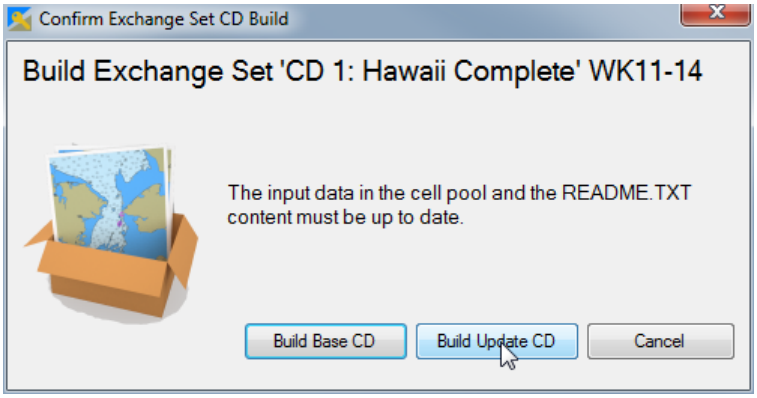

Figure 28: Choose to build BASE or UPDATE CD

Pressing the **Build Update CD** button starts the build and the build summary (Figure 29) is shown after completion.

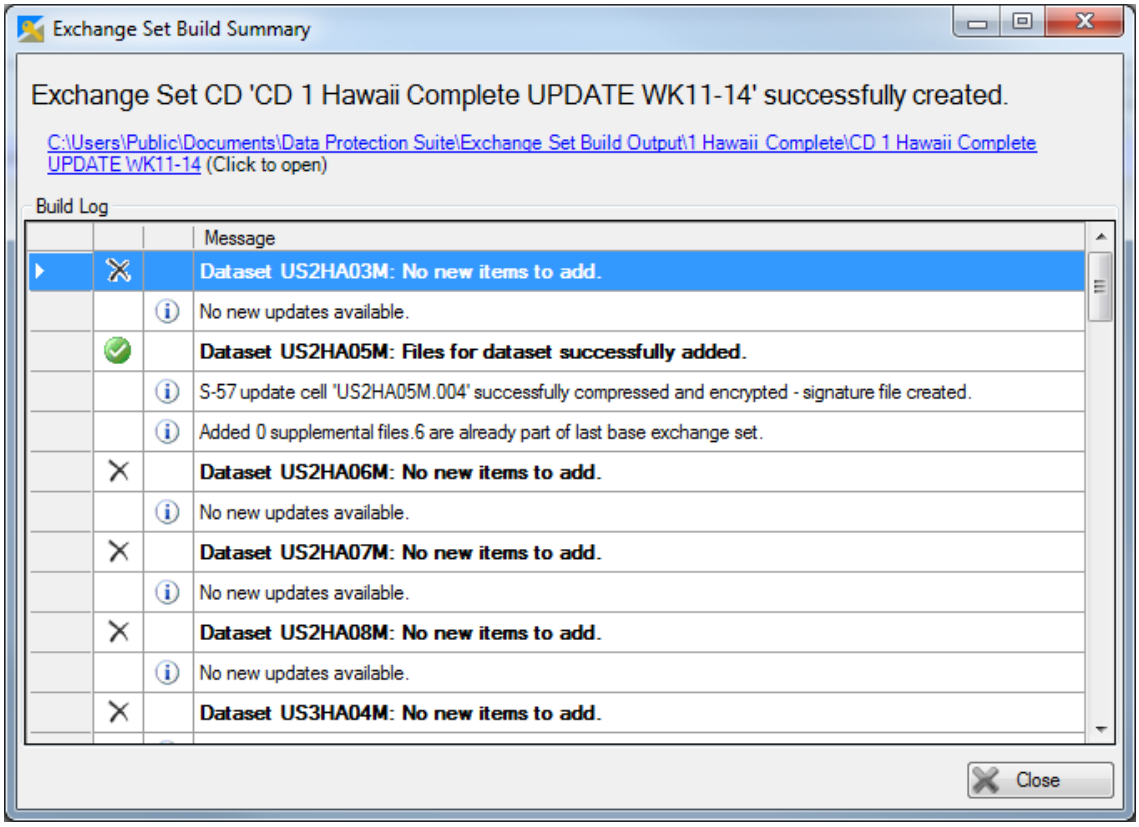

Figure 29: Build summary of the Update Exchange Set CD build

The *UPDATE Exchange Set CD* only contains the cells and updates not yet shipped with the last *BASE Exchange Set CD*. This leads to lower data volume for transfer via network.

4.3 Grant Access

In order to grant access to S-63 encrypted data the *Data Server* creates *Cell Permits* for the *Customer Systems* Each *Cell Permit* is valid for one cell to be used on one particular system and has an expiry date. S-63 compliant systems read *Cell Permits* from a text file named PERMIT.TXT.

To help users manage the configuration of customers, systems, data selections and leases efficiently and concisely the Hydrographic Data Protection Suite provides the possibility to create named groups of systems (*Groups of Systems*) and named groups of datasets (*Cell Packages*).

A *Lease* grants a number of *Customer Systems*, specified by a list of *Systems* and a list of *Groups*, access to a number of *Cell Packages*. The *Lease* additionally defines the scheme to determine the expiry date for each Cell Permit created as part of the *Lease*.

A *Lease* can be thought of as an agreement with a customer. This chapter explains the process of granting access to data in a step by step manner. An example *Lease* is fully implemented and finally *Cell Permit Files* are created for two example systems.

The agreement to be mapped in the Hydrographic Data Protection Suite is summarized in two sentences:

- Burgham Chart Service grants access to high resolution charts for five Hawaiian harbors (Nawiliwili, Honolulu, Kahului, Kona and Hilo) to the whole fleet of Caribbean Dream Cruises Inc.
- The contract is not time-limited and can be terminated by both sides with a notice period of 3 months.

4.3.1 Cell Packages – Setting up the Product Portfolio

A *Cell Package* is a named set of cells. Cells can be grouped into *Cell Packages* by geographic regions or according to any other criteria like for instance detail level, purpose or origin.

Cell Packages can be thought of as sales articles. For the Hydrographic Data Protection Suite *Cell Packages* are the smallest units of data to which access can be granted. If access shall be granted to a single cell a *Cell Package* must be created containing only this one cell.

The data being provided to Caribbean Dream Cruises in the example scenario currently consists of five cells, one for each harbor (Nawiliwili, Honolulu, Kahului, Kona and Hilo).

To create the *Cell Package* for this data the Grant Access button on the main window is pressed to open the *Manage Systems, Groups and Leases* form.

Pressing the Add button on the *Cell Packages* tab page opens the *Cell Package Detail* form (Figure 30).

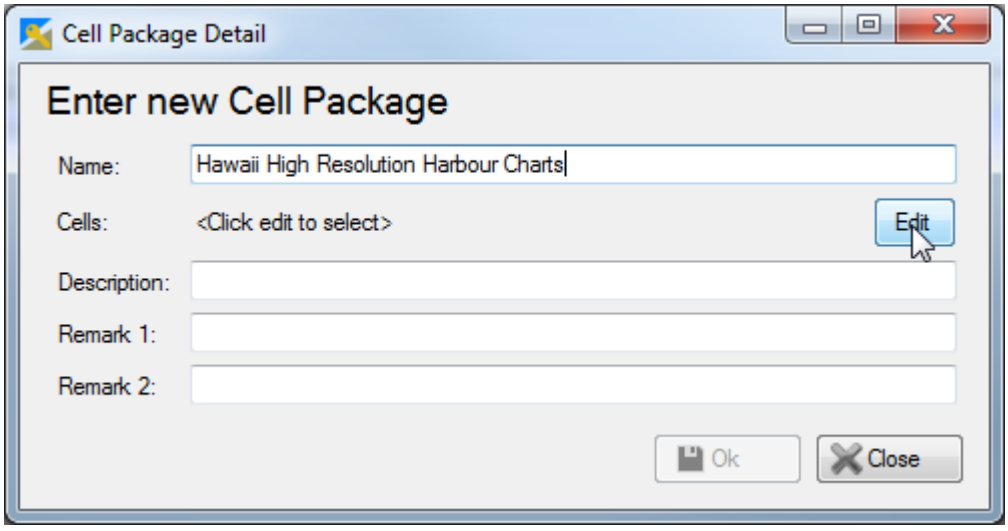

Figure 30: Cell Package Detail form

The Edit button opens the *Select Cells* form where the five harbor cells are selected as shown in Figure 31. After pressing Ok on the *Cell Package Detail* form detail the *Cell Package* can then be saved (Figure 32).

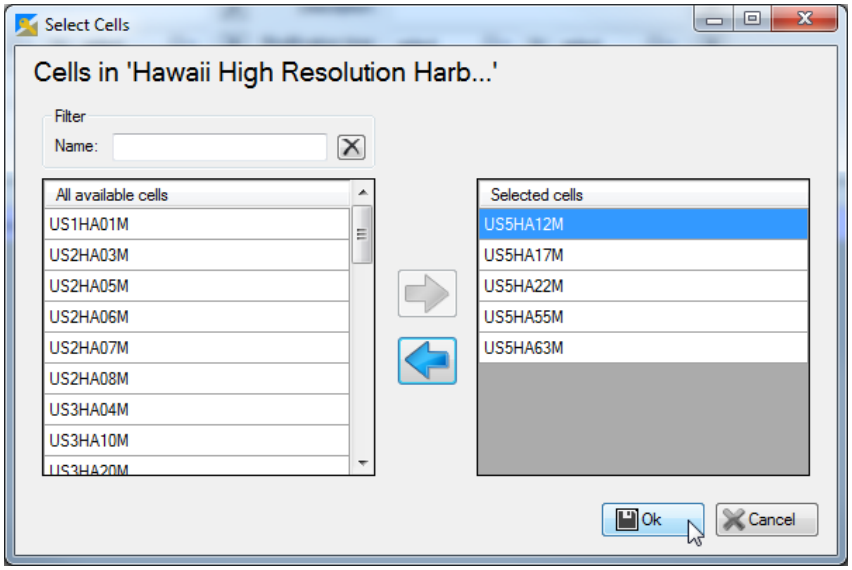

Figure 31: Select Cells for Cell Package

Figure 33 shows the *Cell Packages* tab page with the new *Cell Package*.

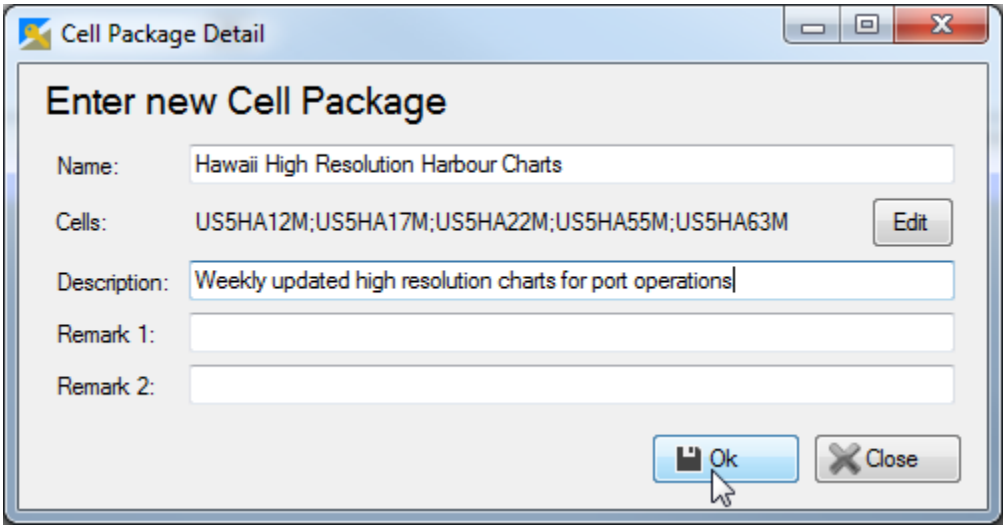

Figure 32: Save new Cell Package

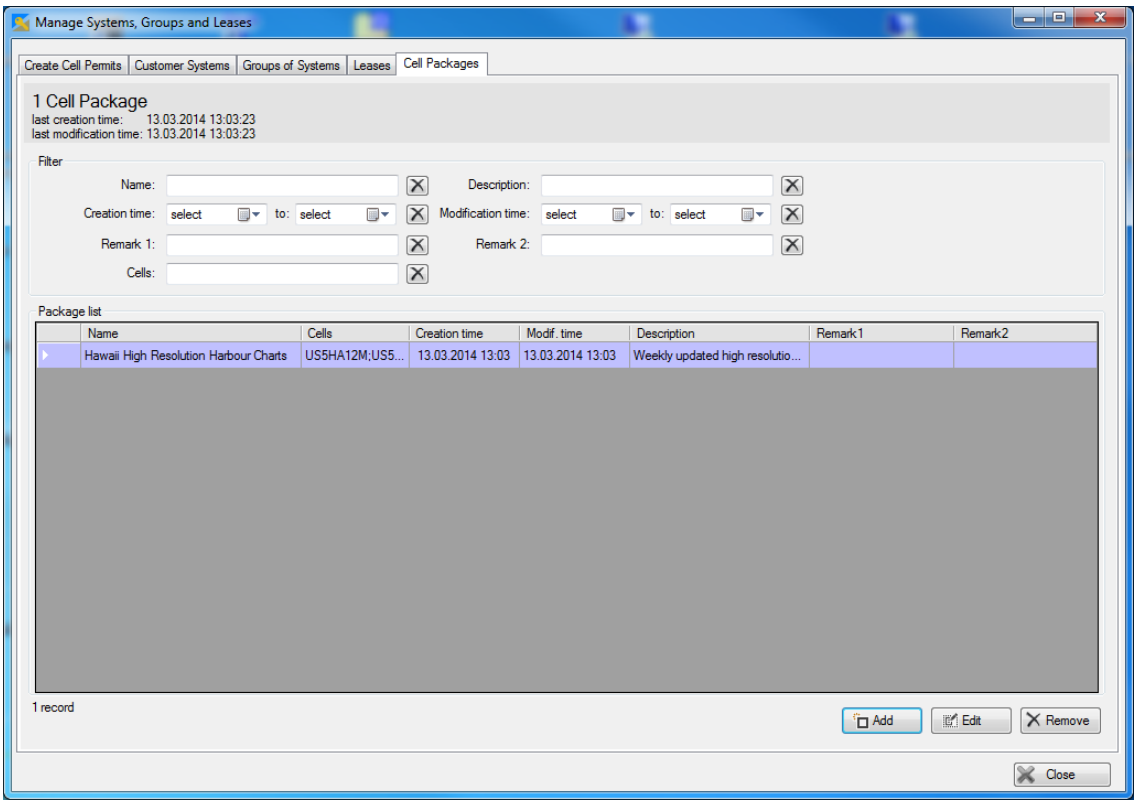

Figure 33: Cell Packages overview

4.3.2 Create a Group of Systems for the Lease

Using a top-down approach an empty *Group of Systems* is created representing all systems covered by the *Lease*. Then the *Lease* is created and finally the *Group of Systems* is populated with the *Customer Systems* for which *Cell Permits* shall be created.

Pressing the Add button on the *Groups of Systems* tab page opens the *Group Detail* dialog (Figure 34). The form provides fields for the group name, a description and two remarks and lists containing the *System Groups* and *Customer Systems* which are members of the group.

The Edit buttons below the member groups and member systems lists are inactive in Figure 34 because neither a *Group of Systems* nor a *Customer System* is defined yet. Adding and removing member groups and systems to a group is explained in section ADD CUSTOMER SYSTEMS.

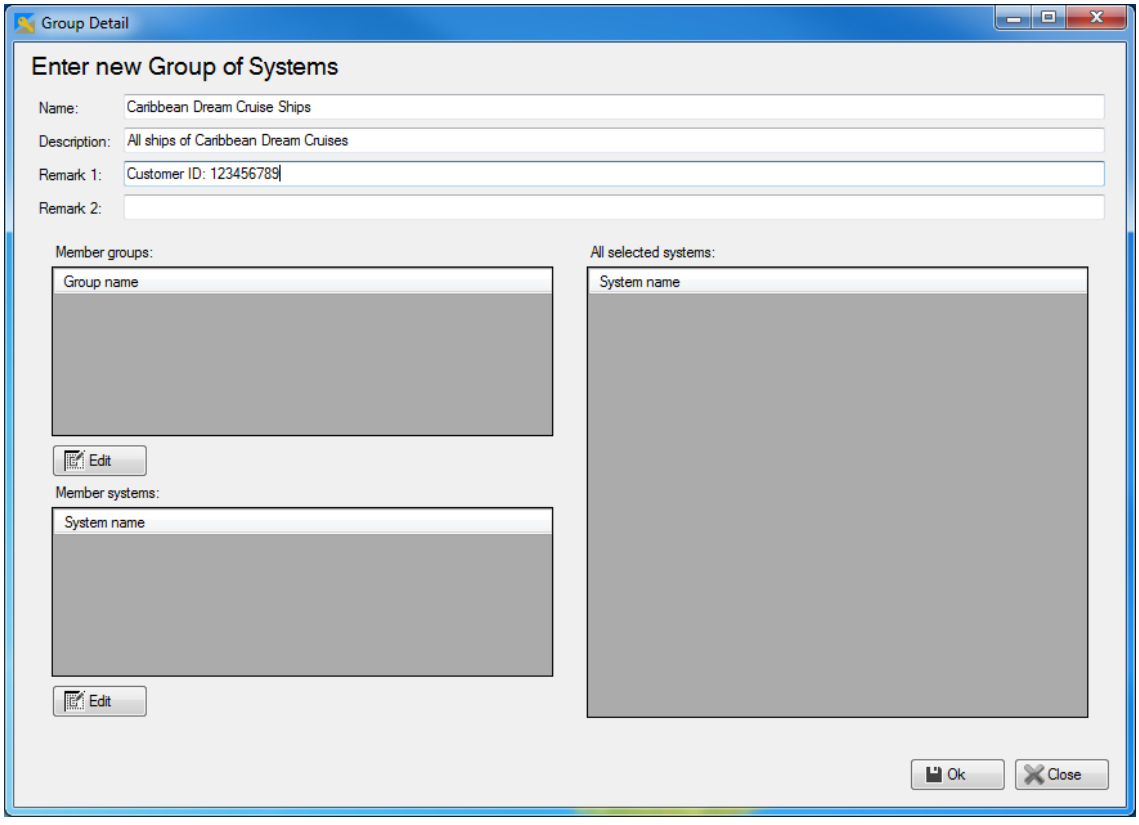

Figure 34: Group Detail form

After pressing Ok the new *Group* is now displayed in the *Groups of Systems* table (Figure 35).

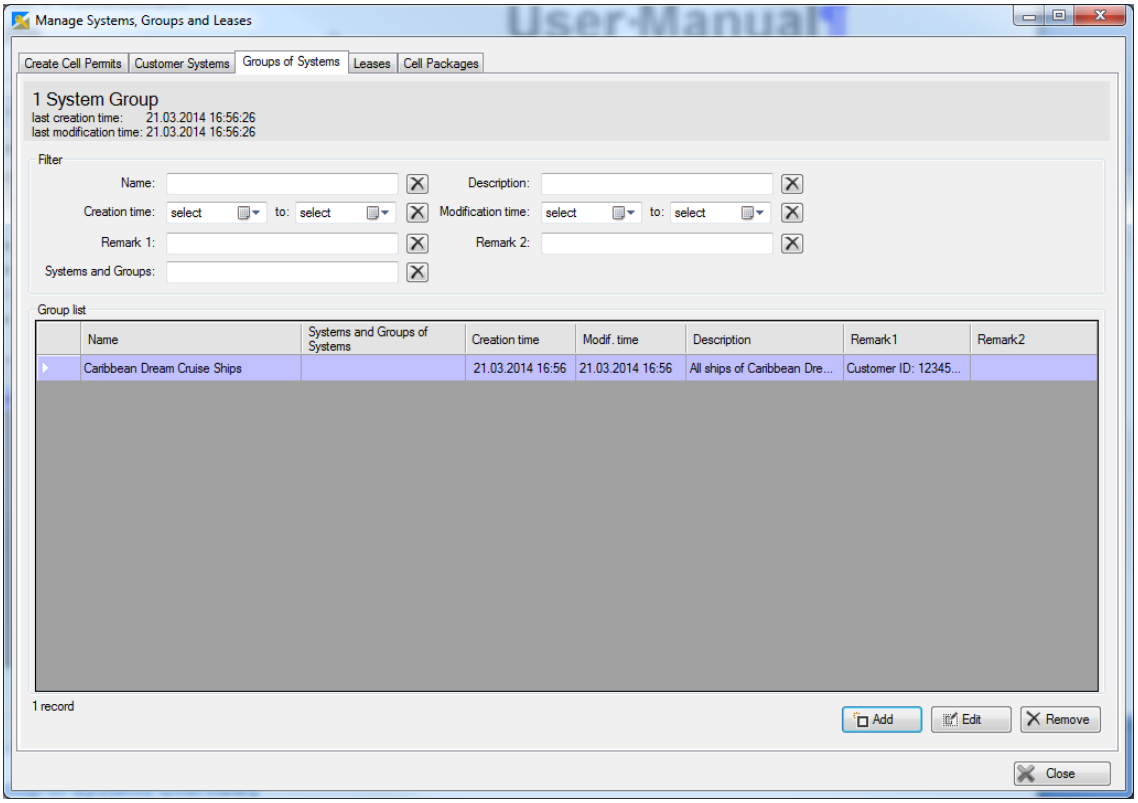

Figure 35: Group of Systems overview

4.3.3 Create a Lease

Now that a *Cell Package* exists containing the harbor cells and a *System Group* exists representing the *Customer Systems* for which *Cell Permits* shall be created the *Lease* can be created.

Pressing the Add button on the *Leases* tab page (Figure 36) opens the *Lease Detail* form (Figure 37).

An optional description field and two additional fields for remarks allow attaching information to facilitate the management of a large number of *Leases*.

The other *Lease* properties are explained in the following paragraphs using the example.

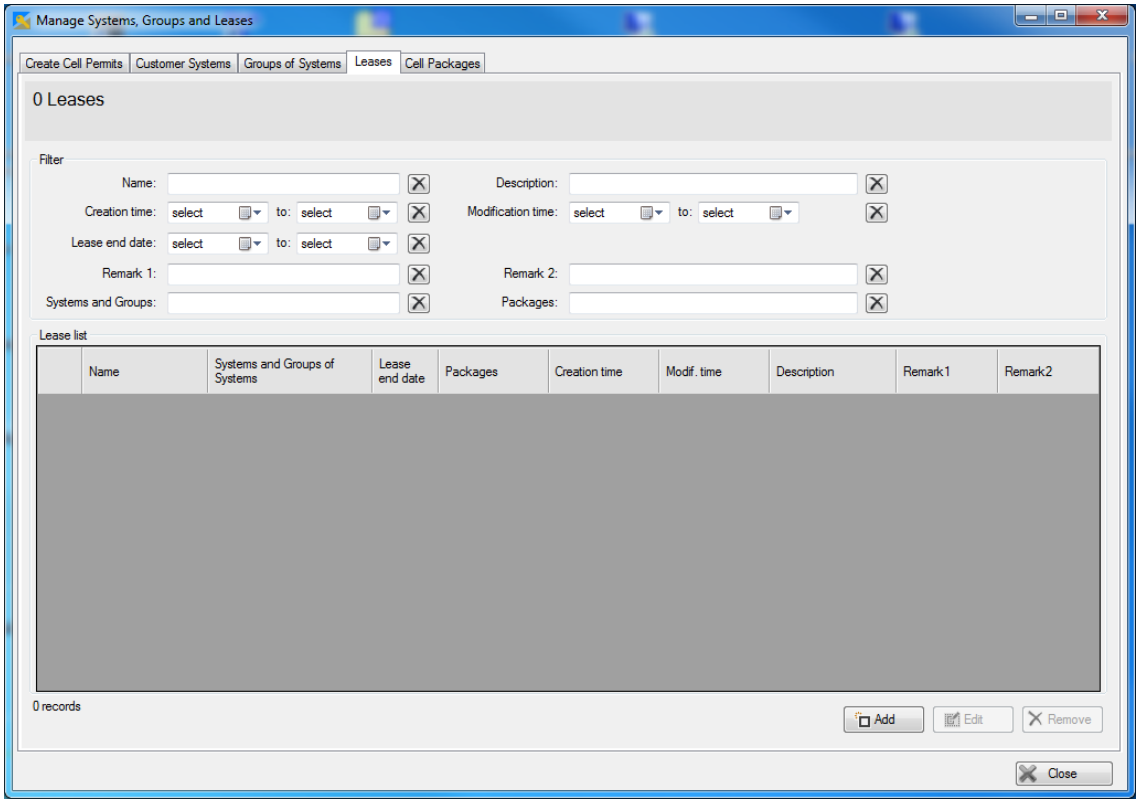

Figure 36: Leases overview

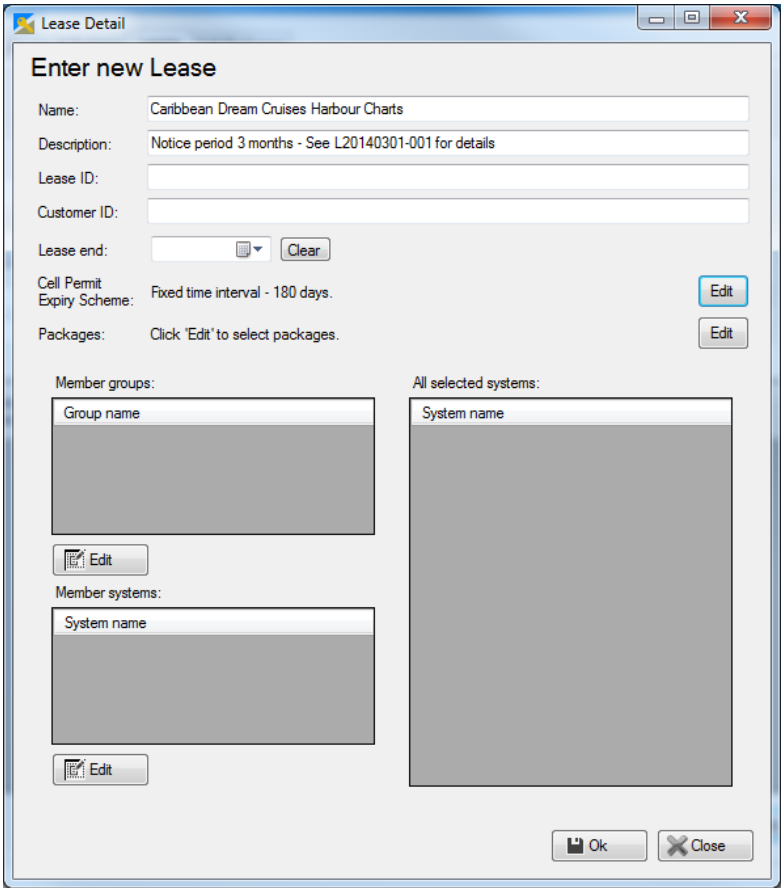

Figure 37: Lease Detail Form

4.3.3.1 Lease End Date

The *Lease* end date is the day the agreement ends. No *Cell Permit* created on the basis of the *Lease* will be valid after this day.

The absence of an end date does not mean that *Cell Permits* for the *Lease* do not expire. The next section deals with the rules the Hydrographic Data Protection Suite uses for determining *Cell Permit* expiry dates.

The *Lease* end date is not set in this example as the agreement stated in the introduction of GRANT ACCESS is not time limited. The *Lease* end date will be set when a party terminates the agreement.

4.3.3.2 Cell Permit Expiry Scheme

The concept of *Cell Permit Expiry Schemes* is explained in detail in CELL PERMIT EXPIRY SCHEMES.

Pressing the **Edit** button on the right side of the *Cell Permit Expiry Scheme* row of the *Lease Detail* form (Figure 37) opens the dialog shown in Figure 38.

A “Fixed Dates” *Cell Permit* expiry scheme is selected: *Cell Permits* expire at the end of June or at the end of December dependent on the time of *Cell Permit* creation.

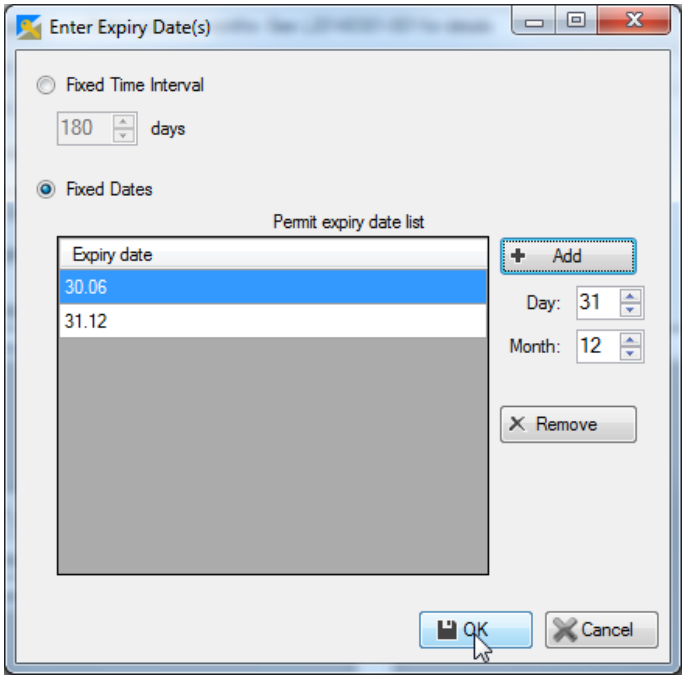

Figure 38: Select Cell Permit Expiry Date Scheme

4.3.3.3 Select Data Packages

Pressing the Edit button on the right side of the *Cell Packages* row of the *Lease Detail* form opens the *Select Cell Packages* form (Figure 39) and the *Cell Package* containing the harbor charts is selected.

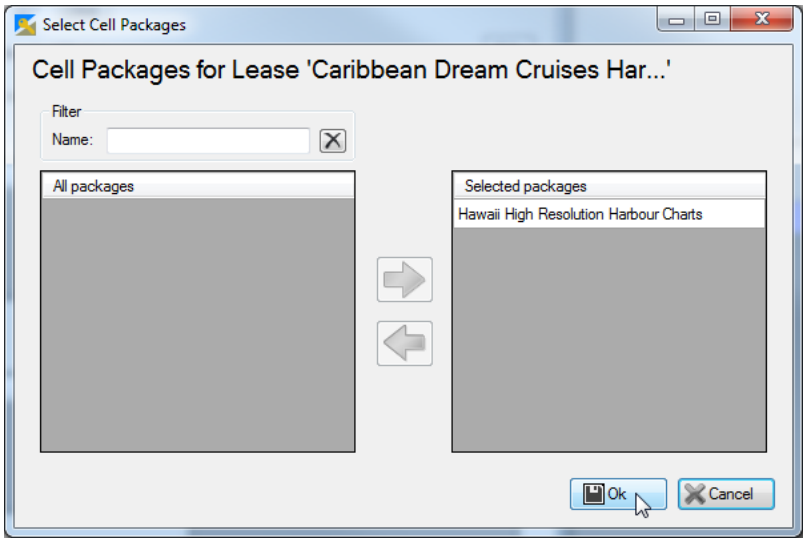

Figure 39: Select Cell Package

4.3.3.4 Save the New Lease

The *Lease Detail* form shown in Figure 40 now shows the settings we have made.

The empty list control labelled “All selected systems” shows that at the Lease does not cover any *Customer System* for which *Cell Permits* will be created.

After adding *Customer Systems* to the *Group* “Caribbean Dream Cruise Ships” the *Lease Detail* form will show these systems in the “All selected systems” list.

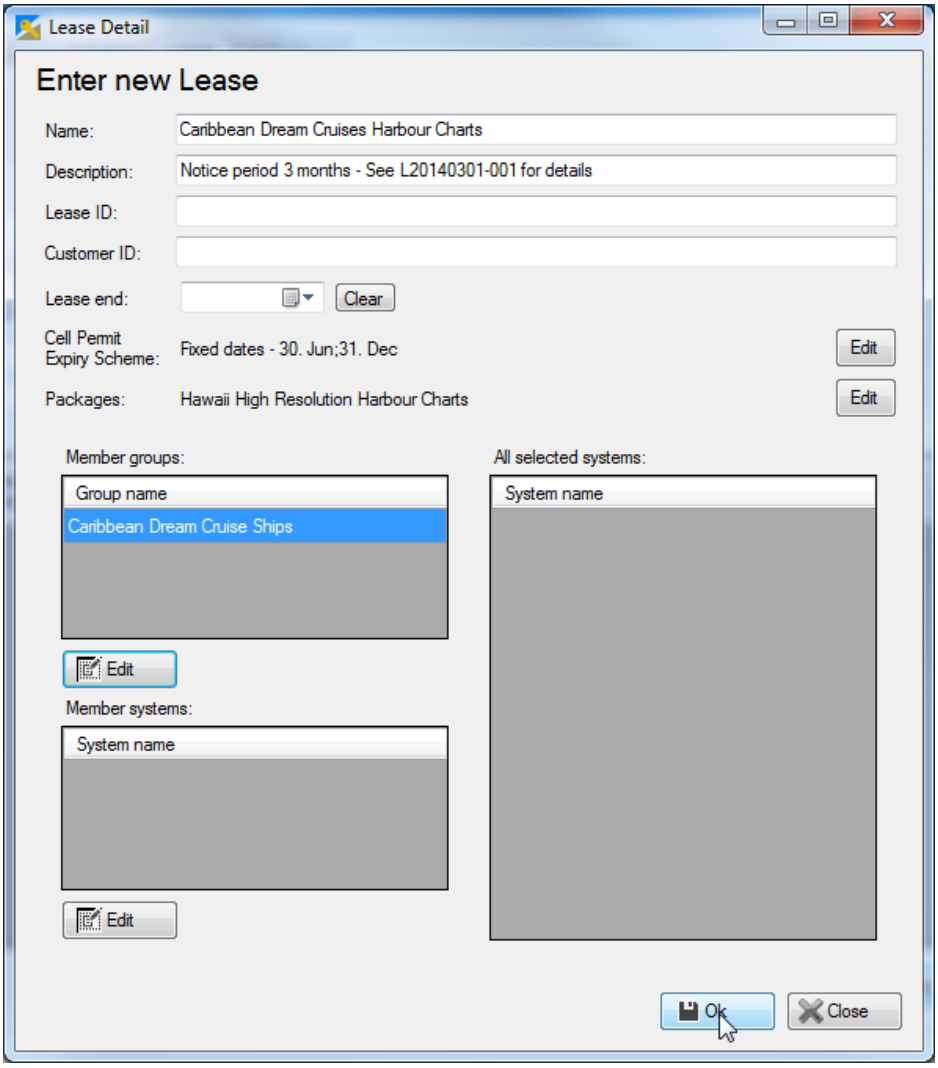

Figure 40: The Lease can be created now

The *Lease* itself needs no editing anymore and can now be saved by pressing Ok. The new *Lease* is now displayed in the *Leases* overview as shown in Figure 41.

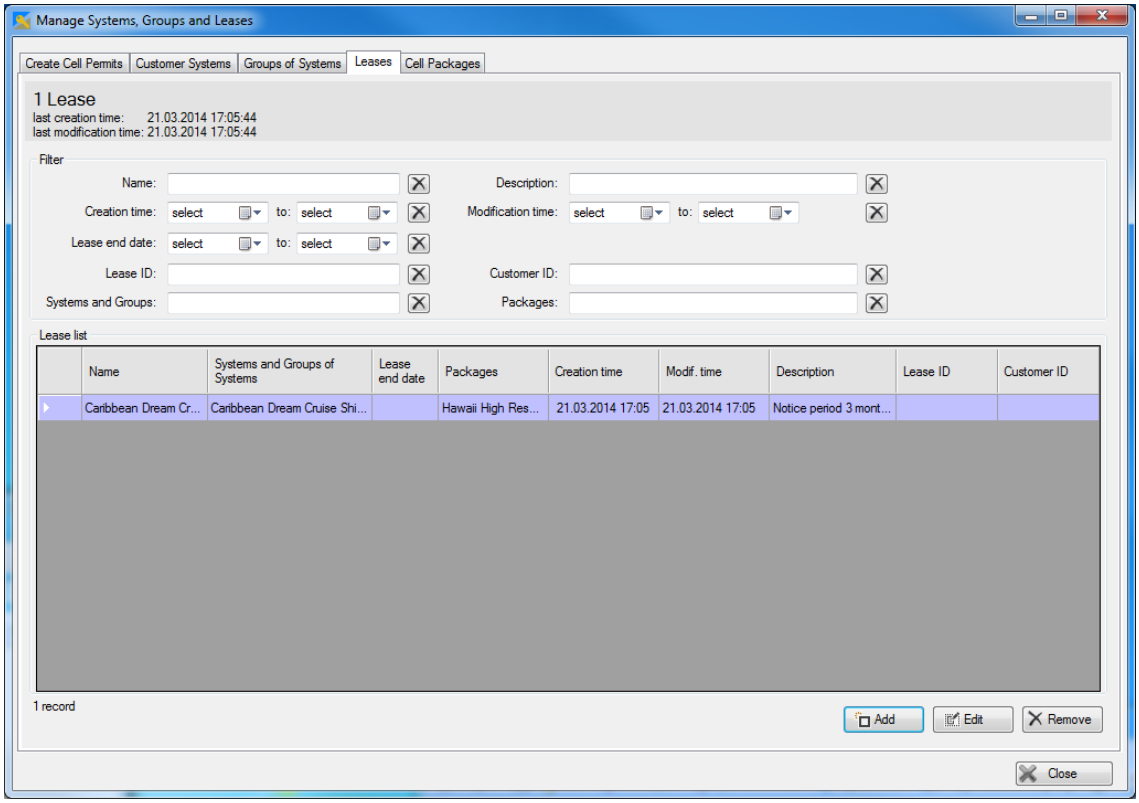

Figure 41: The new Lease in the overview table

4.3.4 Add Customer Systems

Burgham Chart Service has received a list of systems aboard all cruise ships in the Caribbean Dreams Cruises Inc. fleet. This section demonstrates as an example how systems for one ship, the MS Great Adventure, are added to the Hydrographic Data Protection Suite.

Pressing the Add button on the *Customer Systems* tab page (Figure 42) opens the *Customer System Detail* form for entering new Systems.

The forms for two example *Customer Systems* are shown in Figure 43 and Figure 44.

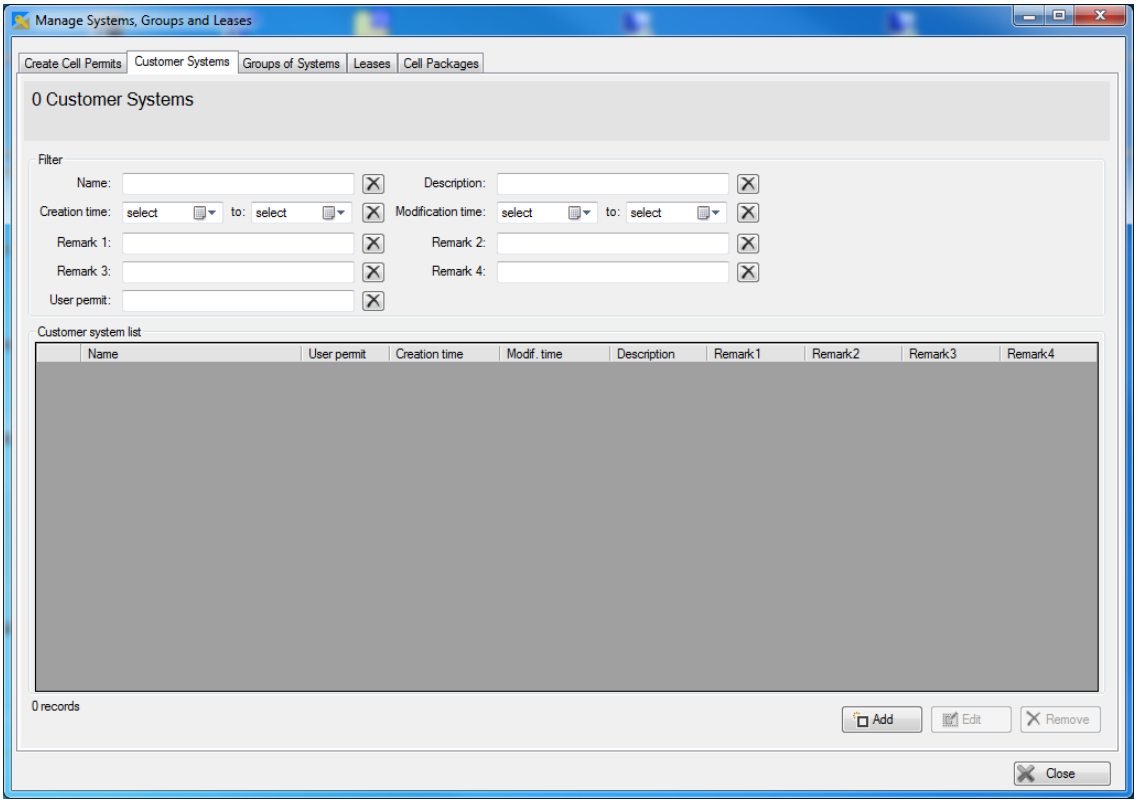

Figure 42: The empty Customer Systems overview table

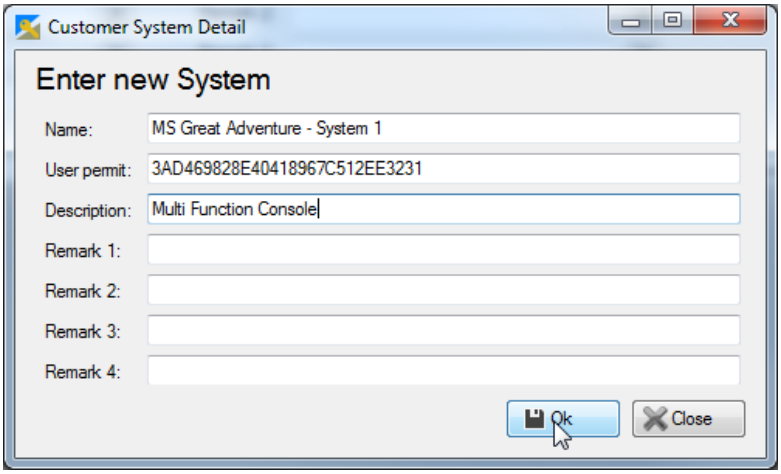

Figure 43: Customer System 1

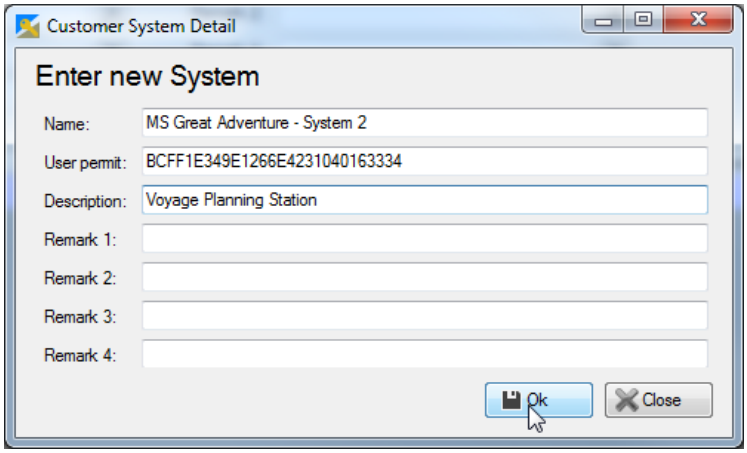

Figure 44: Customer System 2

Figure 45 shows the *Customer Systems* overview table with the two entries.

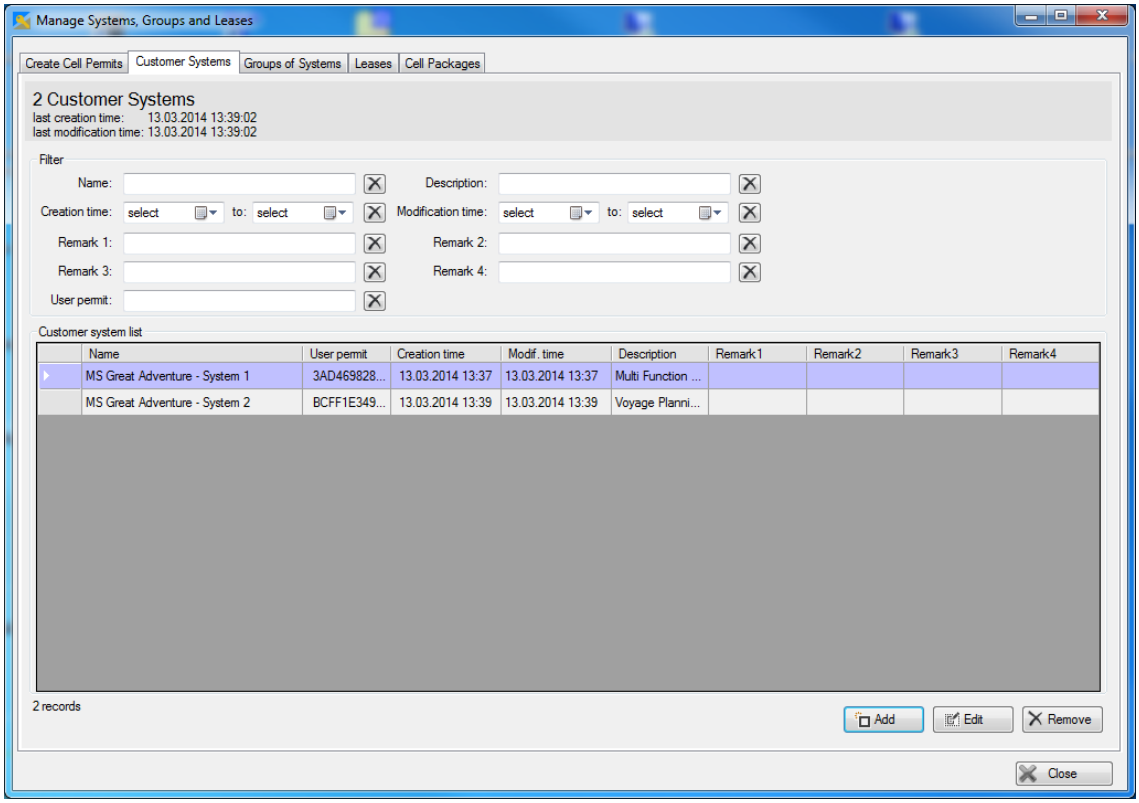

Figure 45: Two Customer Systems in the overview table

For good maintainability the *Customer Systems* are not directly added to the "Caribbean Dream Cruise Ships" group.

Instead a *Group of Systems* is created for the MS Great Adventure and the two example systems are added (Figure 46).

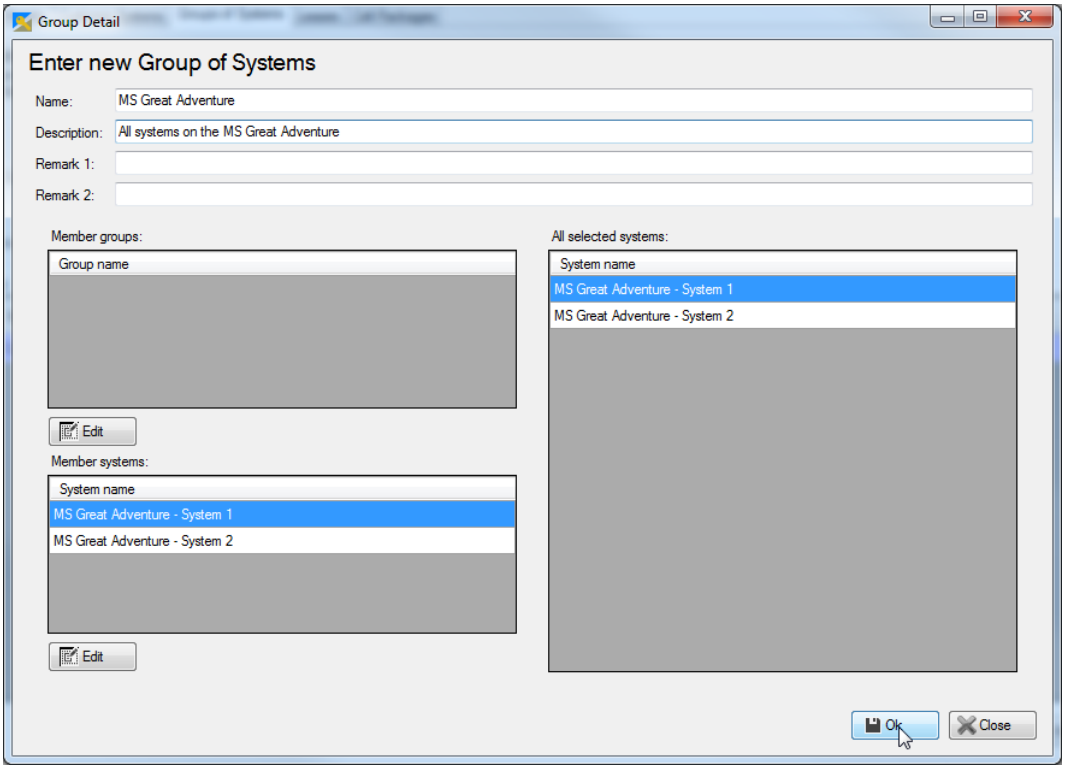

Figure 46: Create a Group for a ship and add the Systems on the ship

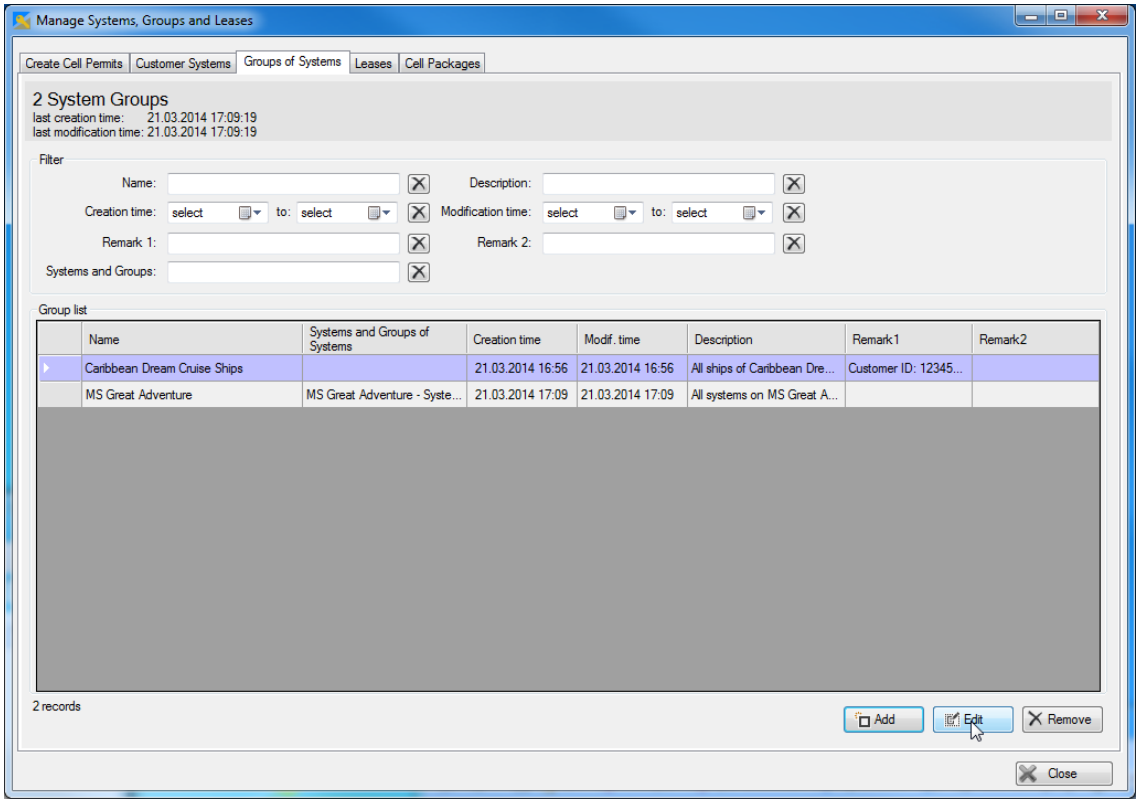

Figure 47: Double click or the Edit button opens the group for editing

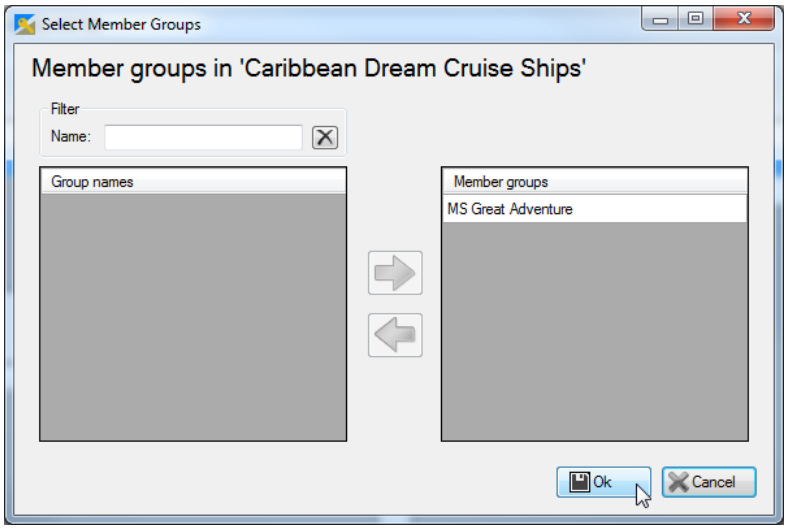

Figure 48: Selecting Member Groups

The Group “Caribbean Dream Cruise Ships” is opened for edit from the Groups of Systems overview (Figure 47) and the new group is added as a member group (**Fehler! Verweisquelle konnte nicht gefunden werden.**).

Figure 49 shows that the *Group* “Caribbean Dream Cruise Ships” now has the member group “MS Great Adventure” which contains the two *Customer Systems* on that ship.

The list labeled “All selected systems” confirms that the two member systems of the “MS Great Adventure” *Group* are correctly recognized as belonging to the “Caribbean Dream Cruise Ships” *Group*.

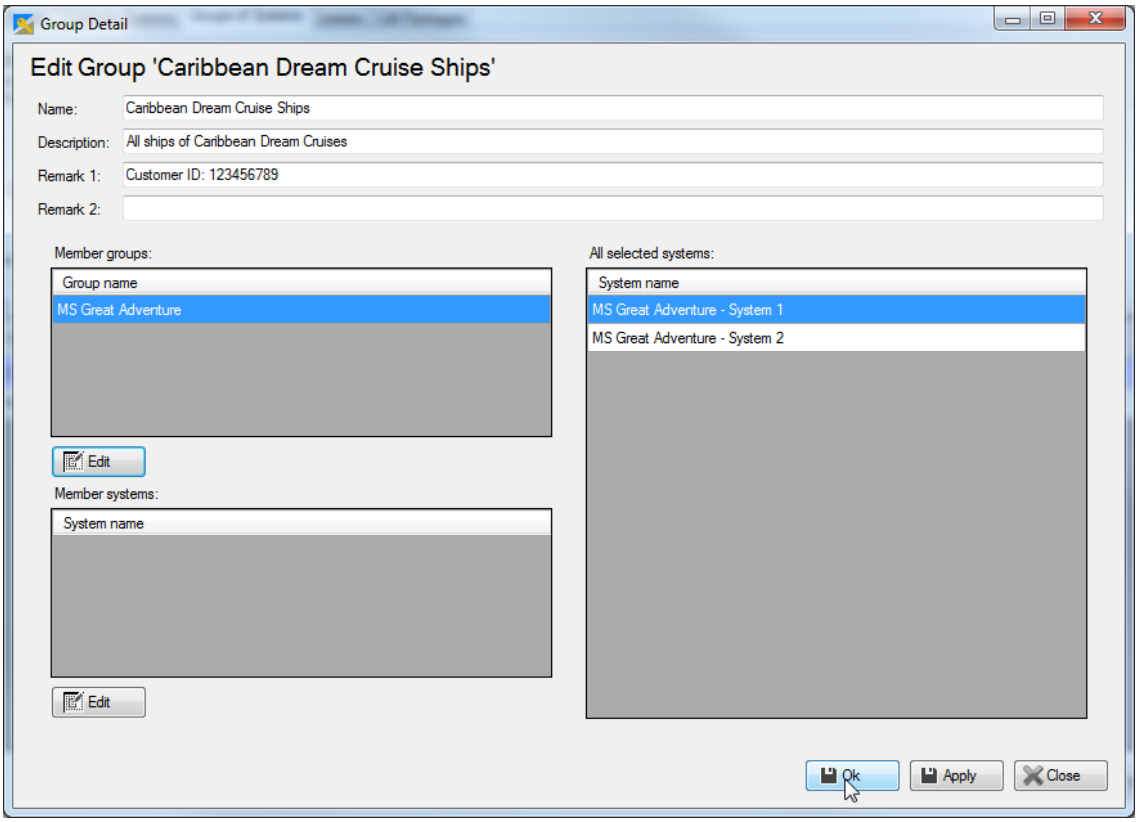

Figure 49: Add group “MS Great Adventure” to “Caribbean Dream Cruise Ships”

4.3.4.1 Verify the Configuration

Double clicking the table row or pressing the Edit button on the *Leases* tab page opens the *Lease Detail* form (Figure 50).

The “All selected systems” list now contains the two Customer *Systems* for which the *Cell Permits* can now be created.

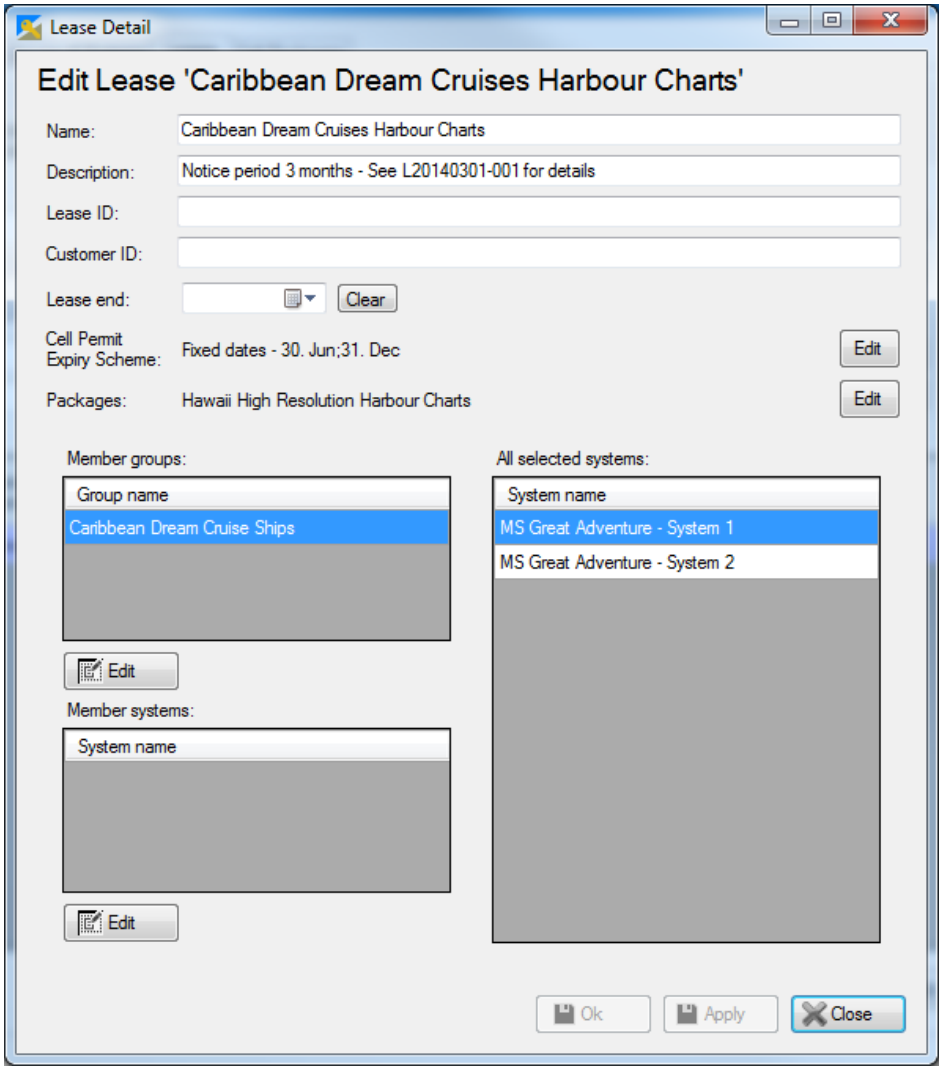

Figure 50: Lease detail with two systems

4.3.5 Create Cell Permits

The Hydrographic Data Protection Suite creates all *Cell Permits* for all *Leases* at once and creates one *Cell Permit File* (PERMIT.TXT) for each *Customer System* to which at least one *Lease* applies.

The Create Cell Permits button on the *Create Cell Permits* tab page (
Figure 51) starts the *Cell Permit* creation process. The user is prompted to confirm the *Cell Permit* creation as shown in Figure 52.

Depending on the number of *Customer Systems* the process of creating all *Cell Permits* can take some time.

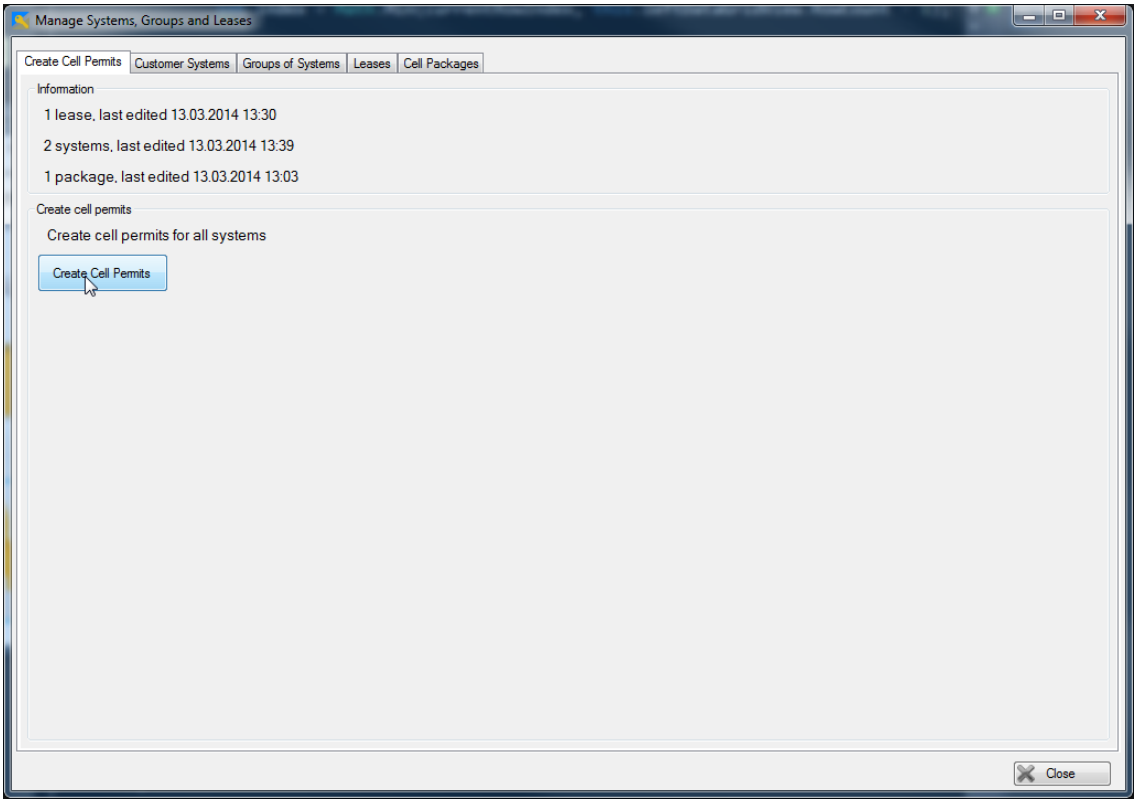

Figure 51: Create Cell Permits tab page

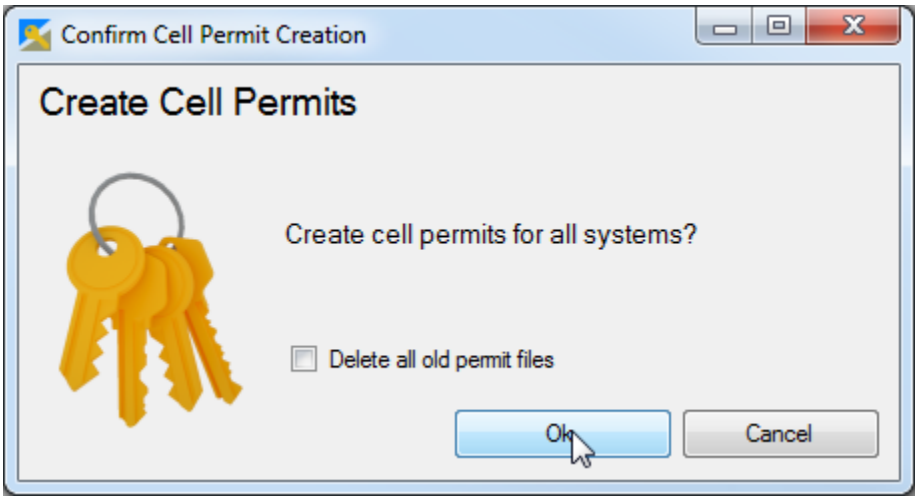

Figure 52: Confirm Cell Permit creation

After all *Cell Permit Files* have been written the *Cell Permit Creation Summary* form is displayed as shown in
Figure 53. The summary form provides a link to the *Cell Permit File* output directory and a list of log messages, one for each *Customer System*.

Note: **The warnings in the summary in Figure 53 indicate that the Cell Permit duration is shorter than defined in the Lease due to the trial license. The latest possible Cell Permit expiry date during the trial period is one week after the trial license expires.**

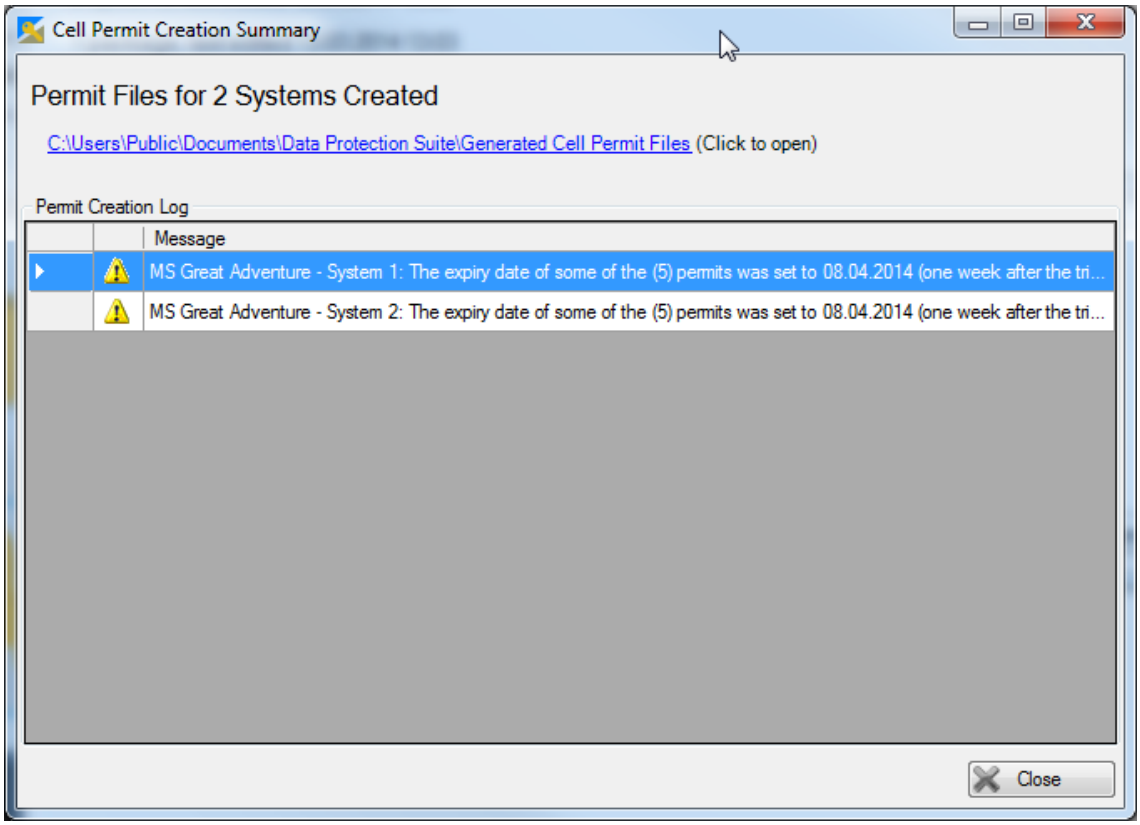

Figure 53: Cell Permit Creation Summary

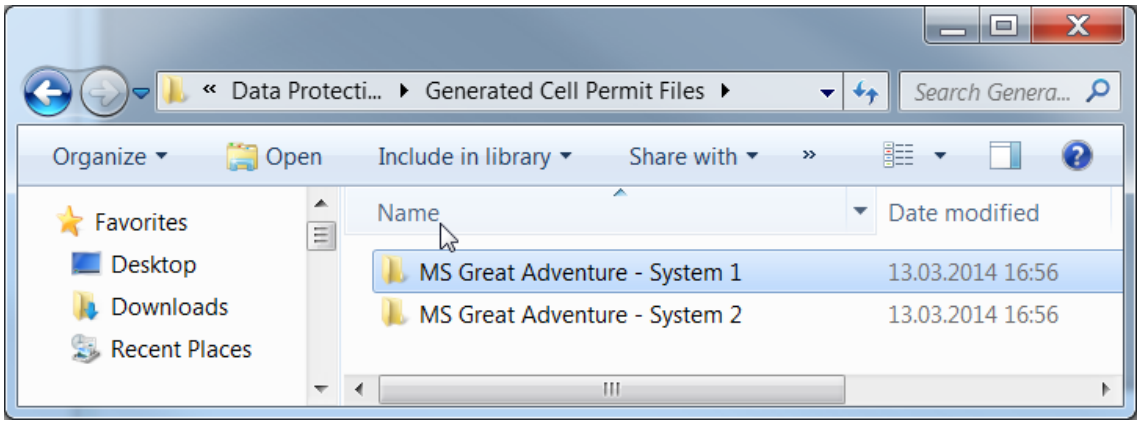

Figure 54: The output directory contains one directory for each system

Figure 54 illustrates the directory structure for the created *Cell Permit Files*. One directory is created for each *Customer System*.

The content of one of the generated *Cell Permit* files is shown in Figure 55, each line represents one *Cell Permit*.

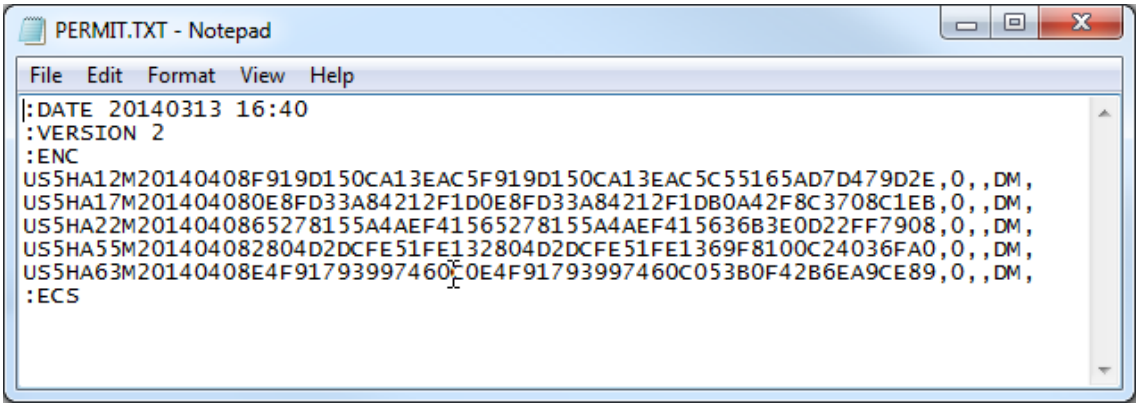

Figure 55: Cell Permit File

Note: The cell names (first 8 characters) and expiry dates (next 8 characters) are readable which allows to programmatically detect if any new or longer lasting cell permits exist in comparison with the last Cell Permit file version sent to the customer.

4.4 Administrative Tasks

4.4.1 Import Data Server Certificate

When the *Data Server Certificate* is received from the IHB it must be imported into the Hydrographic Data Protection Suite to change the operation mode from *Unauthorized Data Server Mode* to the normal operation for an IHO accredited *Data Server*.

Selecting “Administrative Tasks -> Import Data Server Certificate” form the Tools menu on the main window opens the Import *Data Server Certificate* form (Figure 56).

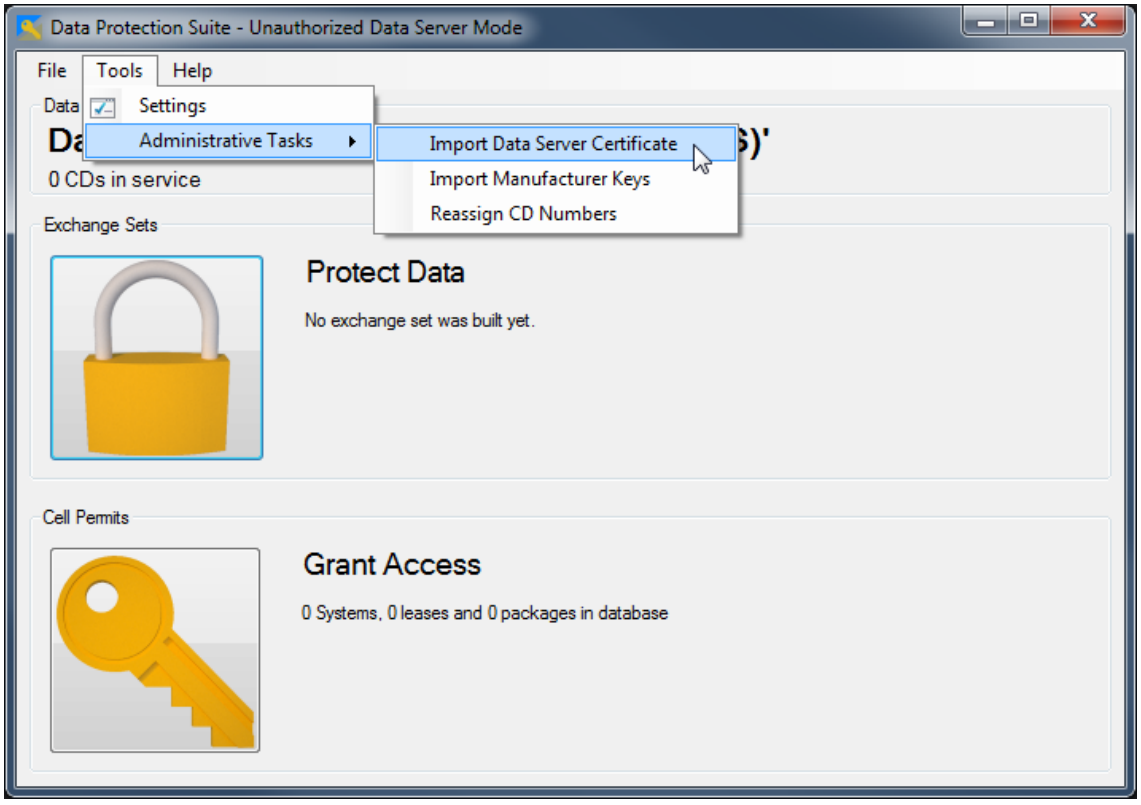

Figure 56: Import Data Server Certificate

Pressing the Open button starts a file selection dialog for the *Data Server Certificate* file ‘certificate’. The public key file ‘pubk’ must reside in the same directory and will be automatically imported.

Note: The software assumes that the IHO certificate file is named ‘*certificate*’ and the public key file is stored in the same directory and is named ‘*pubk*’ as shown in Figure 57 . If your certificate and public key files are named differently, you must rename them first.

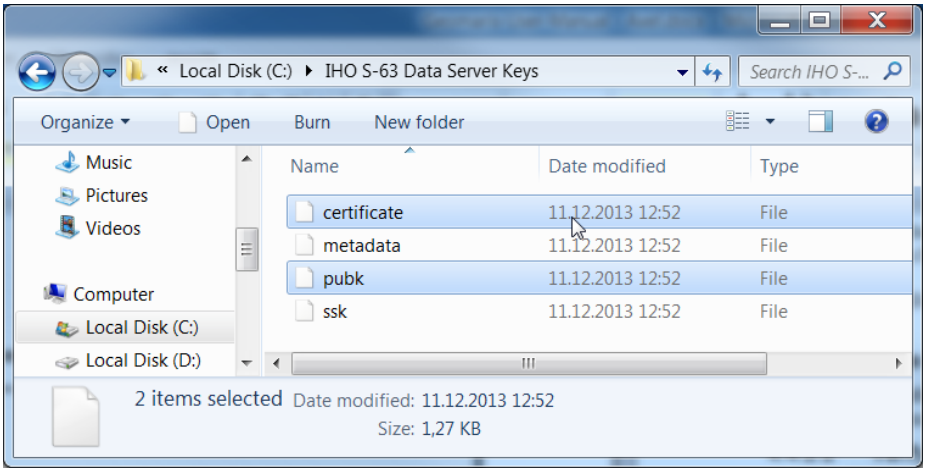

Figure 57: The Certificate and Public Key file ready for import

If the *Data Server Certificate* and public key were successfully validated the user must enter the *Data Server ID*, a two letter alphanumeric identifier. The *Data Server ID* is assigned to organizations by the IHO and is submitted to together with the *Data Server Certificate*.

Figure 58 shows the Import *Data Server Certificate* form.

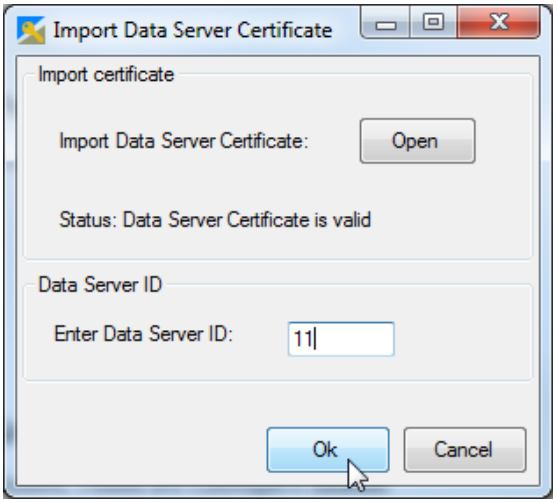

Figure 58: The Import Data Server Certificate dialog after successful validation

Note: The "11" shown as Data Server ID on the screenshot is just an example and may not be used for an installation.

After pressing Ok the "Unauthorized Data Server Mode" indicator is removed from the main window title.

The Hydrographic Data Protection Suite now produces *Exchange Set CDs* recognized as originating from an IHO accredited *Data Server* by S-63 compliant systems.

4.4.2 Import Manufacturer Key List

IHO accredited *Data Servers* frequently receive an update *Manufacturer Key* list in a password protected Excel file from IHO. Before importing the *Manufacturer Keys* into the Hydrographic Data Protection Suite it must be saved in CSV format.

The resulting CSV file can then be imported into the Hydrographic Data Protection Suite.

4.4.2.1 Save Manufacturer List to CSV (Comma Separated Values)

Export the manufacturer list worksheet to CSV format (comma delimited or semicolon delimited) as described in the documentation of the software (e.g. Excel) used for the conversion.

4.4.2.2 Verify CSV Format

Manufacturer Keys are imported from lines starting with the following format:

123,10,45678,OK,,Name of OEM Organization,…

Supported field separators are ‘,’, ‘;’ and the tab character (‘\t’).

The field contents are:

1. Any number or an empty field.
2. The two character Manufacturer ID.
3. The five digit Manufacturer Key.
4. “OK”
5. A date or an empty field.
6. The name of the organization

4.4.2.3 Import CSV File

From the Tools menu on the main window select ‘Administrative Tasks -> Import Manufacturer Keys’ as shown in Figure 59. Pressing the Open button on the *Import Manufacturer Keys* dialog (Figure 60) opens a file selection dialog for a .csv file.

The selected file is parsed and manufacturer entries matching the previously described format are displayed in the preview table for verification. Pressing the Import button then imports the new manufacturer list.

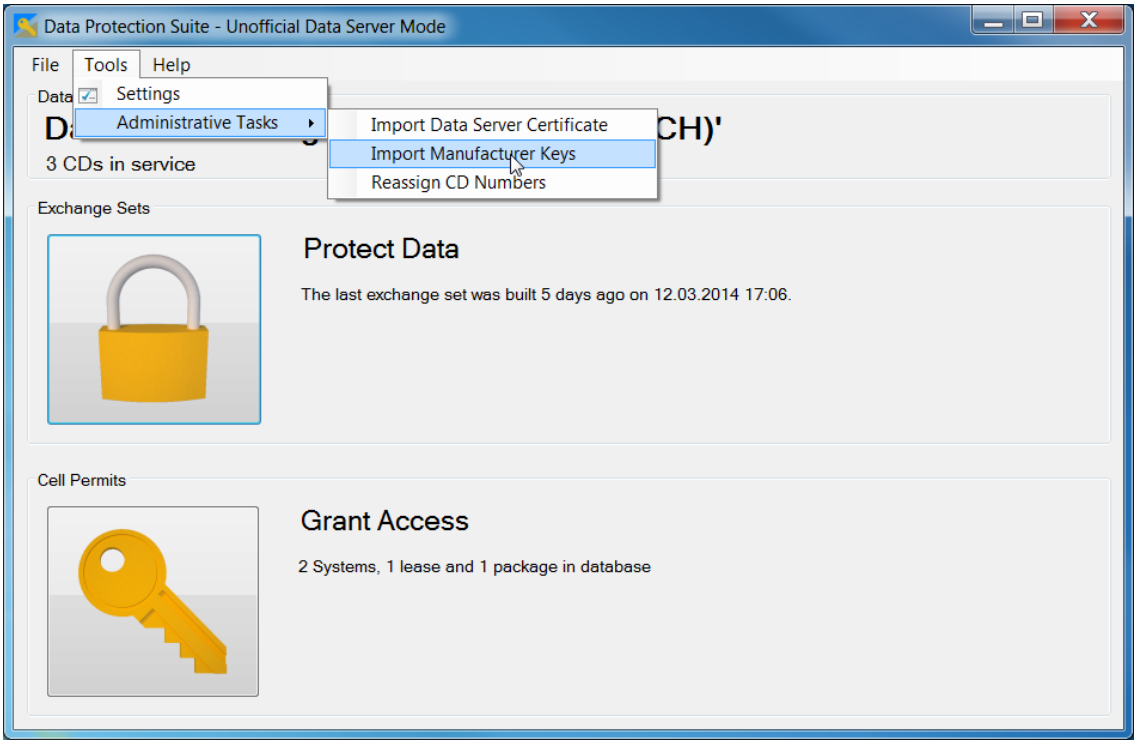

Figure 59: Import Manufacturer Keys

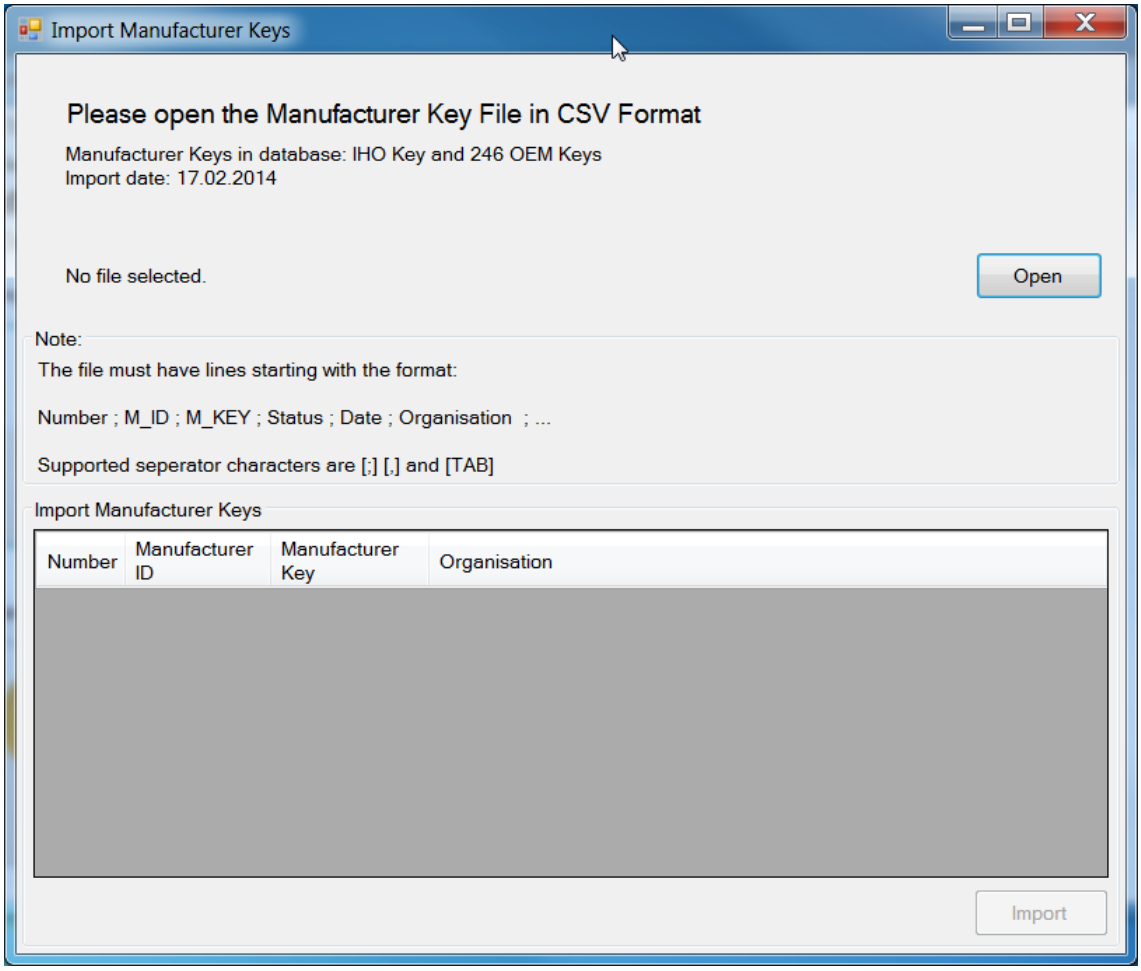

Figure 60: Import Manufacturer Keys Dialog

4.4.3 Reassign Exchange Set CD Numbers

The CD numbering of the *Exchange Set CD Definitions* in the service should only be changed very rarely. To change the CD number assignments select 'Administrative Tasks -> Reassign CD Numbers' from the Tool menu of the main form as shown in Figure 61.

The *Exchange Set CDs* can be moved up and down in the sequence using the up and down buttons (Figure 62).

After pressing Ok the CD numbers are changed. For *Exchange Set CD Definitions* with new CD numbers assigned the build history is cleared.

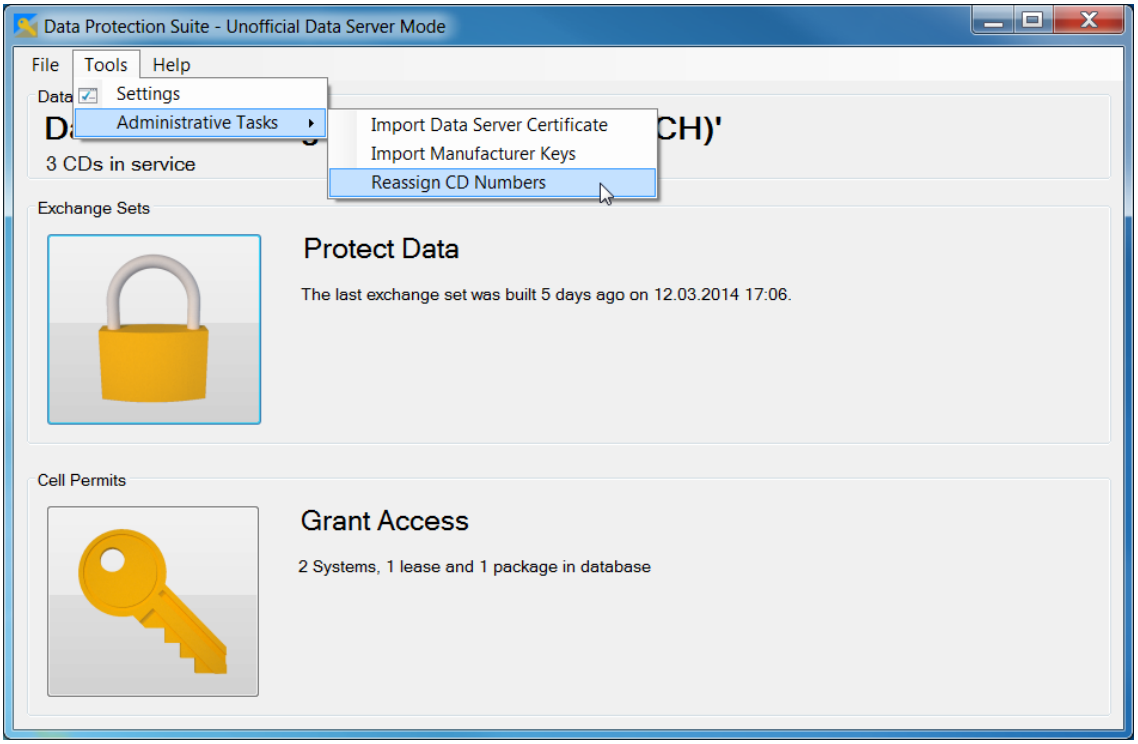

Figure 61: Start CD Number Reassignment

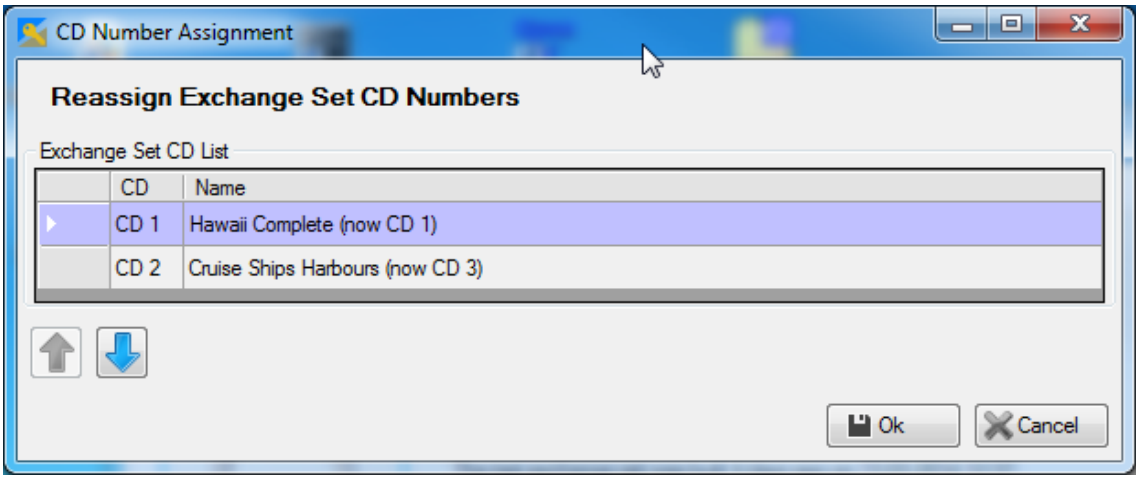

Figure 62: CD Number Reassignment Form

4.4.4 Change Cell Keys

4.4.4.1 Cell Keys and Cell File Encryption

The key used to encrypt a cell file as defined in the *IHO Data Protection Scheme (S-63)* is called the *Cell Key*. If the *Cell Key* is compromised the cell can be decrypted and used by anyone for an unlimited period without a *Cell Permit*.

In order to prevent the unauthorized use of charts the *Cell Keys* should be changed from time to time.

4.4.4.2 Cell Keys in Cell Permits

A *Cell Permit* contains two *Cell Keys* in encrypted form: the current *Cell Key* and the Cell Key used before.

By providing the last *Cell Key* in addition to the current one it is assured that *Cell Permit Files* created shortly after changing the *Cell Key* work correctly for data from *Exchange Set CDs* created both before and after changing the *Cell Key*.

If new *Cell Keys* are created twice in a short period this mechanism does not work. As a safety measure the Hydrographic Data Protection Suite does not create a new *Cell Key* if the current one is younger than the minimum *Cell Key* age specified in the settings.

Compare section MINIMUM NUMBER OF DAYS FOR CELL KEYS RENEWAL.

4.4.4.3 Change Cell Keys in the Hydrographic Data Protection Suite

The *Manage Cells and Exchange Set CDs* window is opened by pressing the Protect Data button on the main form.

Cell Key Creation is triggered from the *Cell Keys* tab shown in Figure 63.

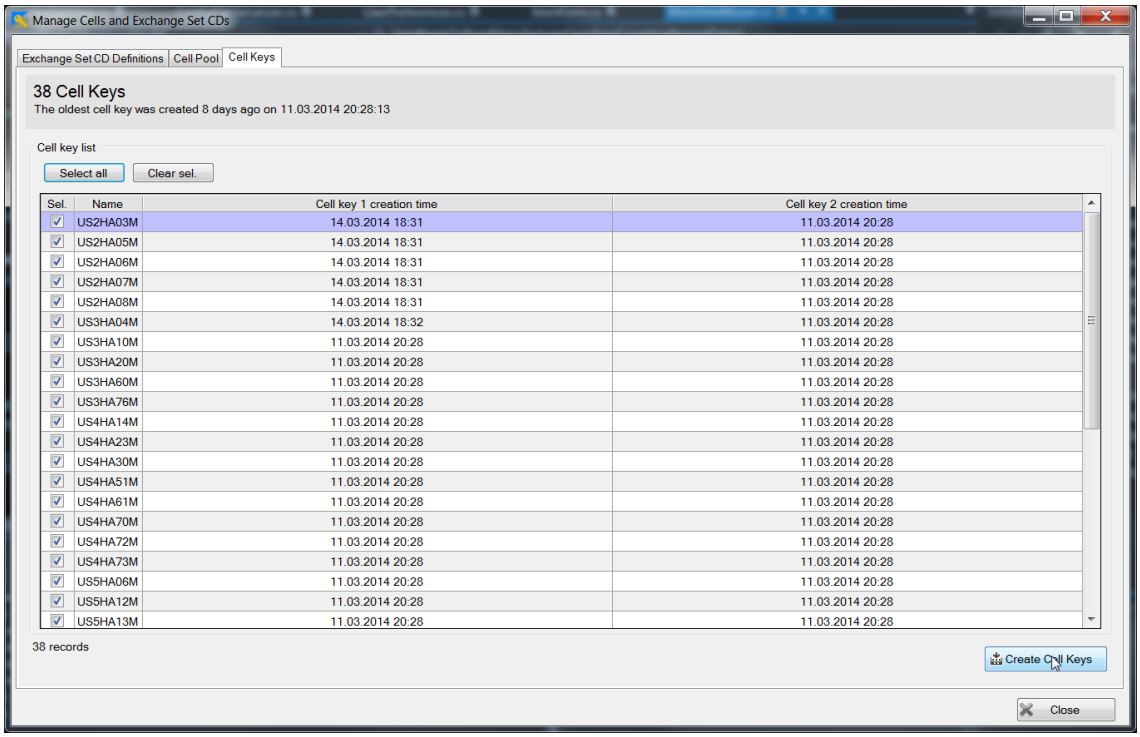

Figure 63: The Cell Keys overview

The table contains one entry for each cell and shows the creation time for the current *Cell Key* (Cell Key 1) and the last *Cell Key* (Cell Key 2). Cells can be selected and

deselected all at once using the buttons above the table or individually using the checkboxes in the leftmost column.

The *Cell Key* Creation for the selected cells is started by pressing the Create Cell Keys button on the Cell Keys tab page.

The *Cell Key Generation Log* is displayed to the user. In the case shown in Figure 64 the “Minimum number of days for cell key renewal” setting was set to 7.

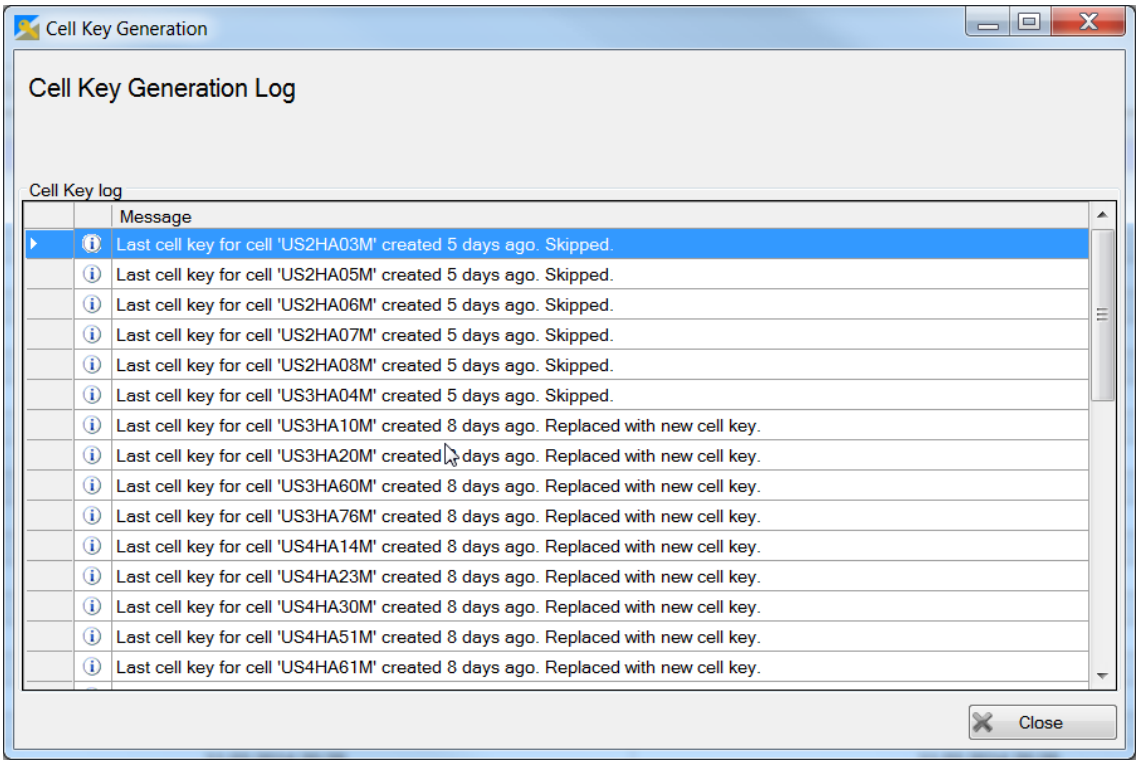

Figure 64: Cell Key Generation Log

4.5 Settings

The Settings form opened from the main window's Tools menu provides two tabs.

The *Label replacement* tab (Figure 65) allows entering custom labels replacing the labels for the remark fields.

The *Misc* tab (Figure 66) allows setting certain default values.

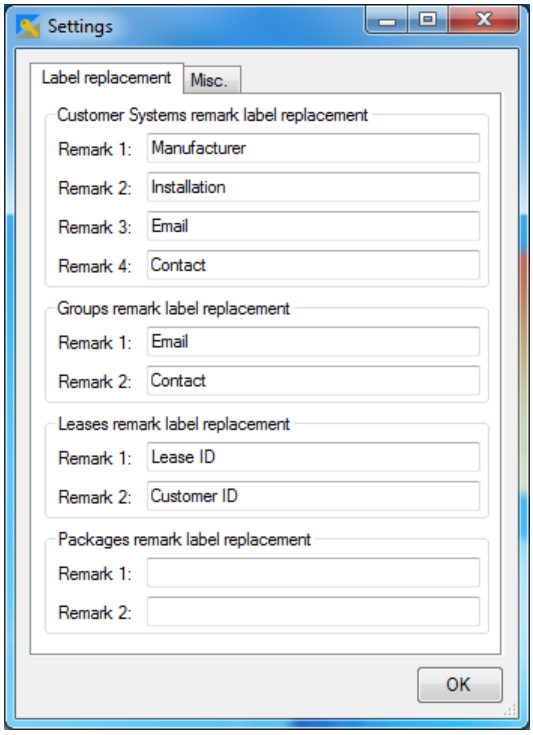

Figure 65: Label replacements

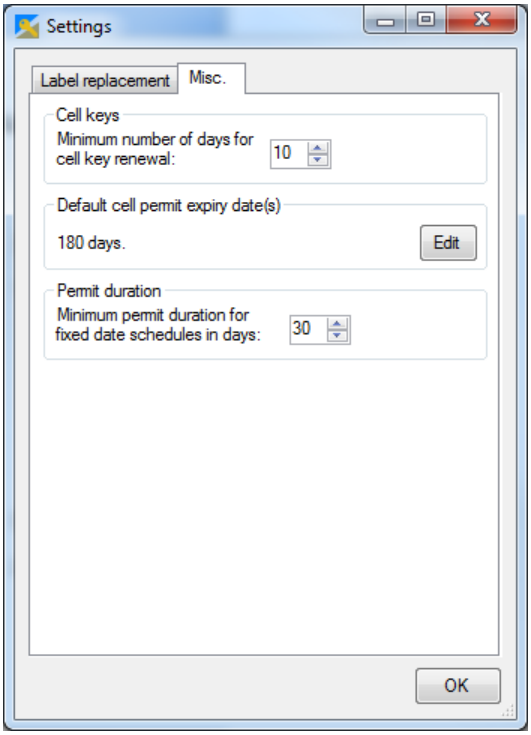

Figure 66: Miscellaneous settings

4.5.1 Remark Label Replacement

The labels for text fields and column headers on the forms for *Customer Systems*, *Groups*, *Leases* and *Cell Packages* can be customized in the *Label Replacement* tab of the settings dialog (Figure 65 and Figure 67).

The replacements are then used throughout the Hydrographic Data Protection Suite's Graphical User Interface and provide a means to define custom data fields for the user.

Figure 67 shows an example where the default labels "Remark 1" and "Remark 2" have been replaced with "Manufacturer" and "Installation" for *Customer Systems*.

The custom labels are used for the filter input fields and the column headers on the *Customer Systems* tab page and for the text boxes on the *Customer System Detail* form.

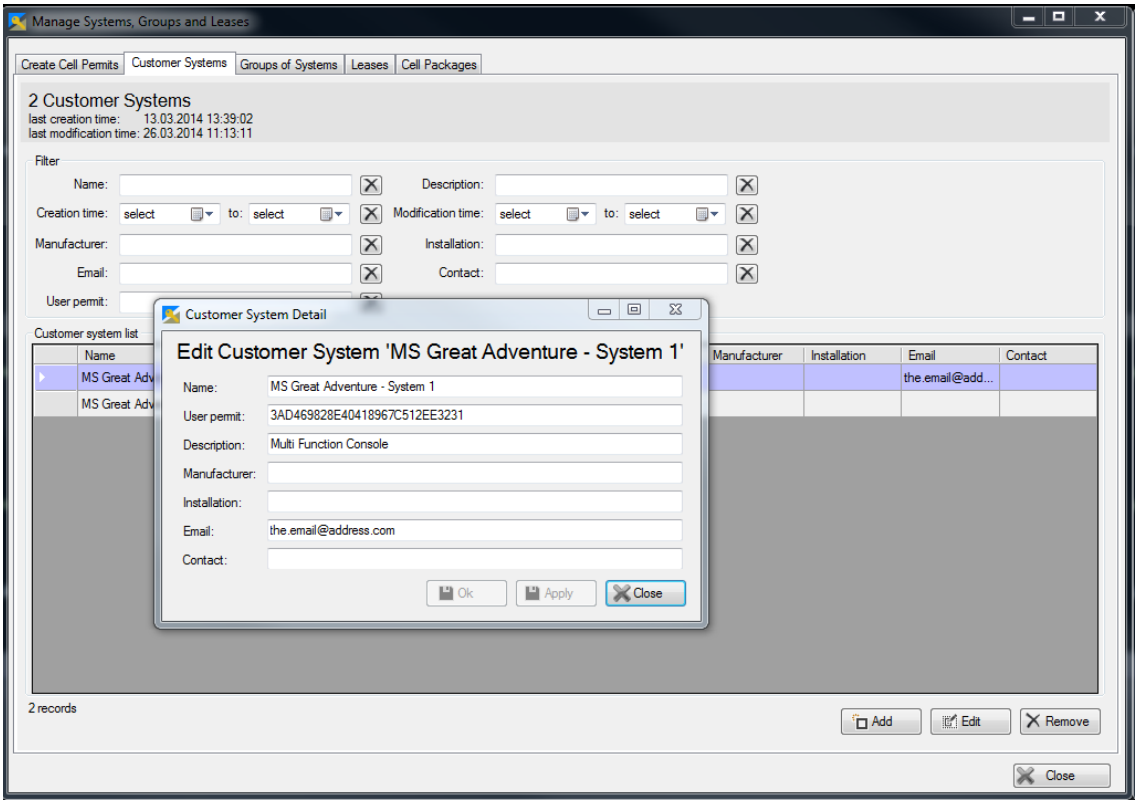

Figure 67: Custom labels replace the default remark labels for Systems

4.5.2 Miscellaneous Settings

4.5.2.1 Minimum number of days for cell keys renewal

New cell keys should be generated from time to time as explained in section CHANGE CELL KEYS.

This option sets a minimum number of days before a new *Cell Key* can be generated. The mechanism serves as a safety measure to avoid the situation that a customer cannot use *Cell Permit Files* with a fairly new *Exchange Set CD*.

4.5.2.2 Default Cell Permit Expiry Date

This field sets the default value for the *Cell Permit Expiry Scheme* The scheme will be used as a default for new *Leases* and can always be overwritten in the *Lease Detail* form.

Compare section CELL PERMIT EXPIRY SCHEMES.

4.5.2.3 Cell Permit Duration

The default *Cell Permit* duration for the fixed time interval expiry scheme. Compare section CELL PERMIT EXPIRY SCHEMES.

4.6 Cell Permit Expiry Schemes

The *Cell Permit Expiry Scheme* defines how the Hydrographic Data Protection Suite selects the cell permit expiry date at the time a *Cell Permit* is generated.

A scheme best matching the cell permit delivery requirements is assigned to each *Lease*.

One of two schemes can be chosen:

4.6.1 Fixed Time Interval

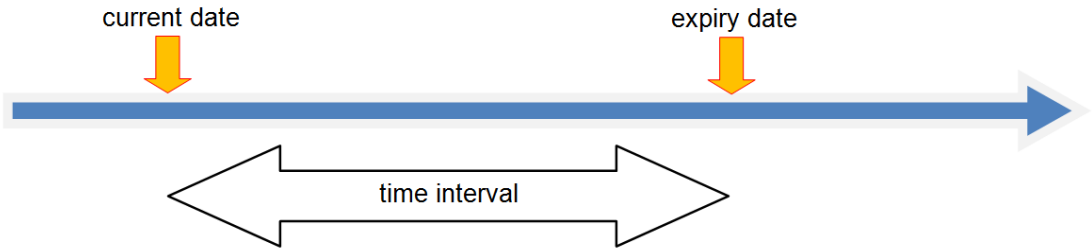

Figure 68: Fixed time interval

The cell permit expiry date is calculated from the current permit creation date plus the given time interval in days.

4.6.2 Fixed Dates

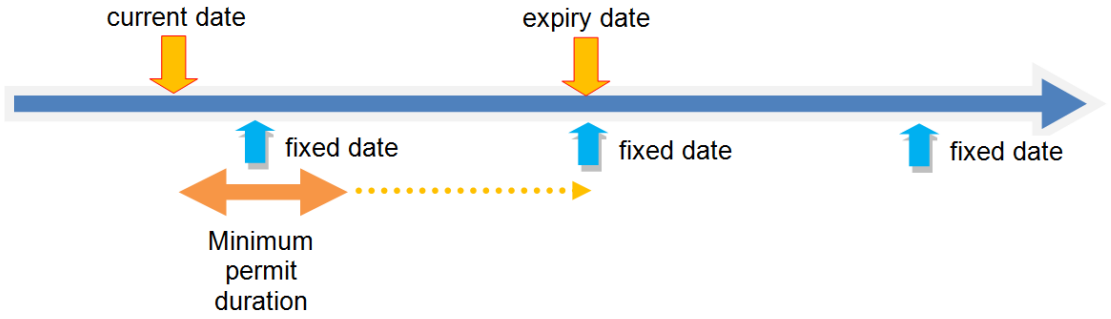

Figure 69: Fixed dates

The cell permit expiry date is the next available date from a list of dates specified by day and month.

If the time interval between the current date and the next date in the list is shorter than the “Minimum Cell Permit Duration” specified in the settings the date is skipped and the next date in the list will be used as the expiry date.

The Minimum Cell Permit Duration can be chosen in the Settings dialog as explained in

MISCELLANEOUS SETTINGS.

The *Cell Permit Expiry Date Scheme* for a *Lease* can be selected as shown in Figure 70 and Figure 71.

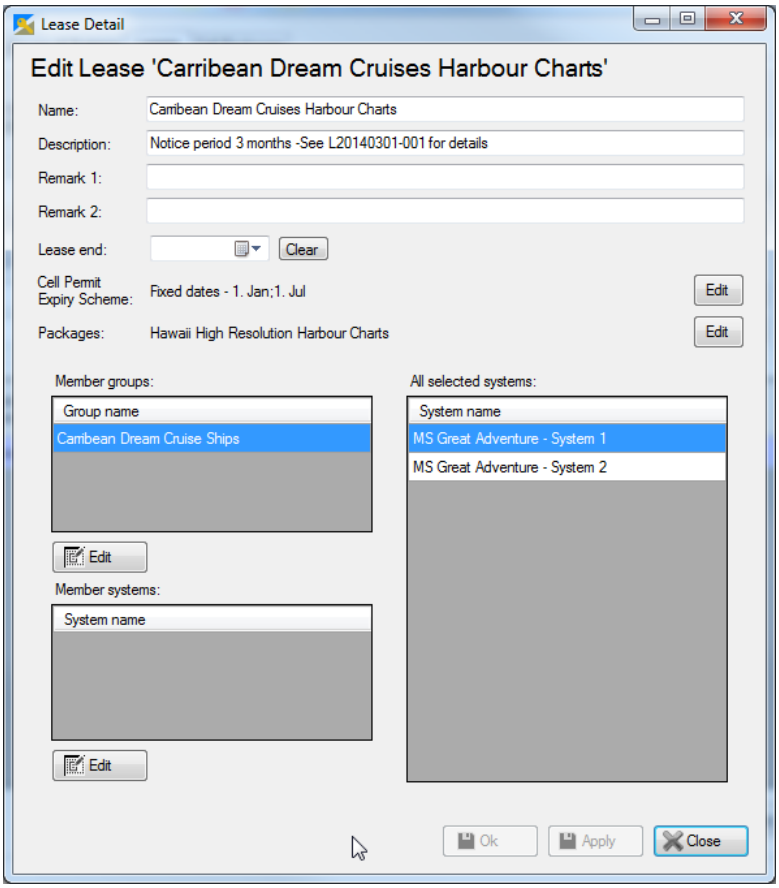

Figure 70: Open the Enter Expiry Date(s) dialog.

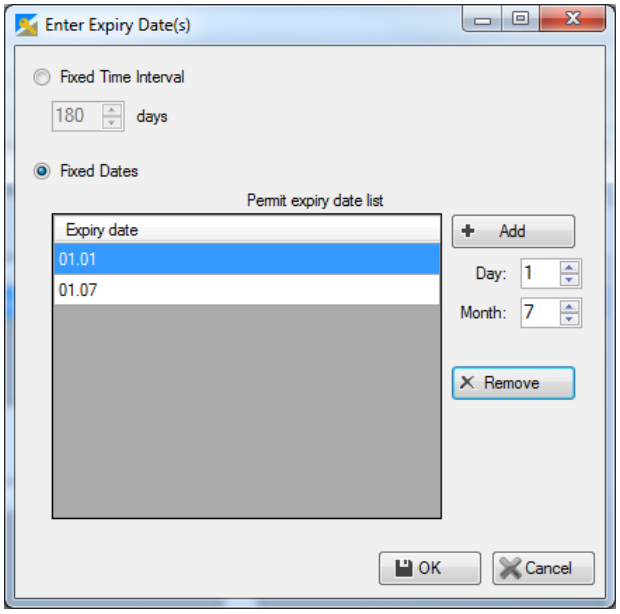

Figure 71: Editing the Cell Expiry Date Scheme.

5. Annex

5.1 References

IHO S-63: IHO Data Protection Scheme, Edition 1.1 (March 2008)

S-63 Data Server Agreement, Version 1.1.1

S-63 Data Server Request Form, Edition 1 (2003)

5.2 Glossary

Term	Definition
BASE Exchange Set CD	An Exchange Set CD containing the complete data (base cell files, update cell files and supplemental .TXT and .TIF files) for all cells being assigned to the Exchange Set CD Definition.
Cell Key	A key used to encrypt and decrypt ENCs in compliance with S-63.
Cell Package	A named set of cells. A cell package corresponds to a sales article for the Hydrographic Data Protection Suite. Cell packages are the unit of data to which access can be granted.
Cell Permit	A string token providing access to one cell for particular system for a certain time period. Contains the Cell Key in an encrypted form.
Cell Permit Expiry Scheme	A rule to determine the expiry date for Cell Permits at the time of Cell Permit creation.
Cell Permit File	A file containing a number of Cell Permits for one system. The file name must be PERMIT.TXT for import into the system.
Cell Pool	The complete cell data from which the Exchange Set CDs are built.
Cell Pool Directory	The directory containing the Cell Pool data.
Customer System	An S-63 compliant software system identified by an ENC User Permit.
Data Directory	The directory in which the Hydrographic Data Protection Suite stores all data. Typically C:\Users\Public\Documents\Data Protection Suite if installed with the “All Users” option. The Data Directory of an installation can be queried from the Help Menu on the main window.
Data Server	An organization performing the role of creating S-63 Exchange Set CD and generating Cell Permits for authorized systems.
Data Server Certificate	The Data Server’s public key signed by the IHO. Allows verifying that a file has been encrypted by an IHO accredited Data Server. At the time of writing the certificate is delivered to the Data Server in a text file named ‘certificate’.
Data Server Credentials	The set of keys required to perform the S-63 Data Server role: The public and private DSA key pair, a self signed public key and a Data Server Certificate.

Term	Definition
Data Server ID	The two character alphanumeric Data Server Identifier assigned to accredited Data Server organizations by the IHO.
ECDIS	Electronic Chart Display and Information System as defined by IMO. A certified system for navigation with ENCs.
ECS	Electronic Chart System. A system for navigation with ENCs without the ECDIS certification.
ENC	Electronic Navigational Chart as defined by the ENC Product Specification.
ENC User Permit	A 28 character hexadecimal string token identifying a system. The ENC User Permit of a system must be known in order to generate Cell Permits for the system.
Exchange Set CD	A set of encrypted ENC cells. The smallest unit of S-63 data for data delivery. An Exchange Set CD is identified by the CD number and a string encoding the week of creation (e.g. WK12-14). Not necessarily delivered on a physical CD as exchange medium.
Exchange Set CD Definition	The definition of an Exchange Set CD consisting of a name and a set of cell names. Exchange Set CDs are instances of the Exchange Set CD definition containing the most up to date versions of the cells at the time they are built.
Group	Used synonymous with Group of Systems.
Group of Systems	A group of systems containing subgroups and Customer Systems. The Groups allow organizing systems in a hierarchical structure reflecting the physical or organizational relations between systems.
IHB	International Hydrographic Bureau
IHO	International Hydrographic Organization.
Lease	A Lease grants access to certain data specified by Cell Packages to a set of systems specified by Customer Systems and Groups of Systems.
Manufacturer Key	A five digit number assigned to manufacturers by the IHO. The Manufacturer Key must be known to create valid Cell Permits for the manufacturer's systems.
Manufacturer Key List	A list of IHO accredited equipment manufacturers with their Manufacturer IDs and Manufacturer Keys. These keys are required to create Cell Permits for systems built by the manufacturers. An updated list is distributed by IHO whenever new OEMs are registered.
NOAA	The National Oceanic and Atmospheric Administration (NOAA) is a US federal agency focused on the condition of the oceans and the atmosphere.
OEM	Original Equipment Manufacturer. In the context of S-63 an IHO accredited manufacturer of S-63 compliant client software.
S-57	Transfer standard for ENC defined by IHO.
S-63 - IHO Data Protection Scheme	The publication S-63 - IHO Data Protection Scheme describes the recommended standard for the protection of ENC information. It defines security constructs and operating procedures that must be followed to ensure that the data protection scheme is operated correctly and to provide specifications that allow participants to build compliant systems.

Term	Definition
Unauthorized Data Server Mode	The Hydrographic Data Protection Suite operation mode if no Data Server Certificate was imported. The Data Server's self signed public key is used instead of the official Data Server Certificate. This mode corresponds to an S-63 Data Protection Scheme with the Data Server itself acting as the Scheme Administrator. See S-63 Data Protection Scheme document for details.
UPDATE Exchange Set CD	An Exchange Set CD containing only the new base cell files, update cell files and supplemental files not yet delivered with the last BASE Exchange Set CD.

Table 2: Glossary

5.3 List of Tables

5.4 List of Figures

5.5 Index