QuantityWare

BCG 3.0 Test Manual

Test Cases for BCG Test Installations

Notes

The latest version of this documentation can be found in the QuantityWare Knowledge Base. All documentation is kept current for the combinations of latest BCS release with the latest supported SAP Oil, Gas, & Energy release. For all currently supported combinations see Note #000086 “Support and Release (Lifecycle) details” page 2, “Release Lifecycle”.

Your release level can be determined via:

“/o/QTYW/COCKPIT” -> “Cockpit” -> “Support Package Level”

Version History

Version	Date	Description
00	2015-06-01	Initial version
01	2017-12-01	Editorial changes
02	2019-06-25	Editorial changes
03	2020-07-14	Usage key terminology
04	2021-04-24	S/4HANA 2020 / 2020_EX validity confirmed - modern QW document style applied. 30A CSP02 / 30B CSP01 changes
05	2023-11-01	30A CSP03 / 30B CSP02 changes

Contents

1. Introduction

You have obtained a free-of-charge test usage key(s) for QuantityWare BCG – Bulk Calculations Gas. Your technical team has installed the software package in one of your test systems, following the Technical Installation Guide. In the QuantityWare template client 045, the BCG BC set has been activated. Your task is now to test BCG within the next 4 weeks (possibly with an extension period granted by QuantityWare).

QuantityWare provides three major customizing and configuration documents along with the BCG software package:

- The BCG Project and Implementation Guidelines – BCG PAIG
- The BCG Supported Standards Manual
- The BCG Documentation Reference Manual

If you decide to conclude a usage agreement for BCG, it is strongly recommended that you consider all the above documents - following the PAIG Methodology to implement BCG into your system landscape as well as familiarizing yourself with the BCG Supported Standards Documentation and the BCG Documentation Reference Manual.

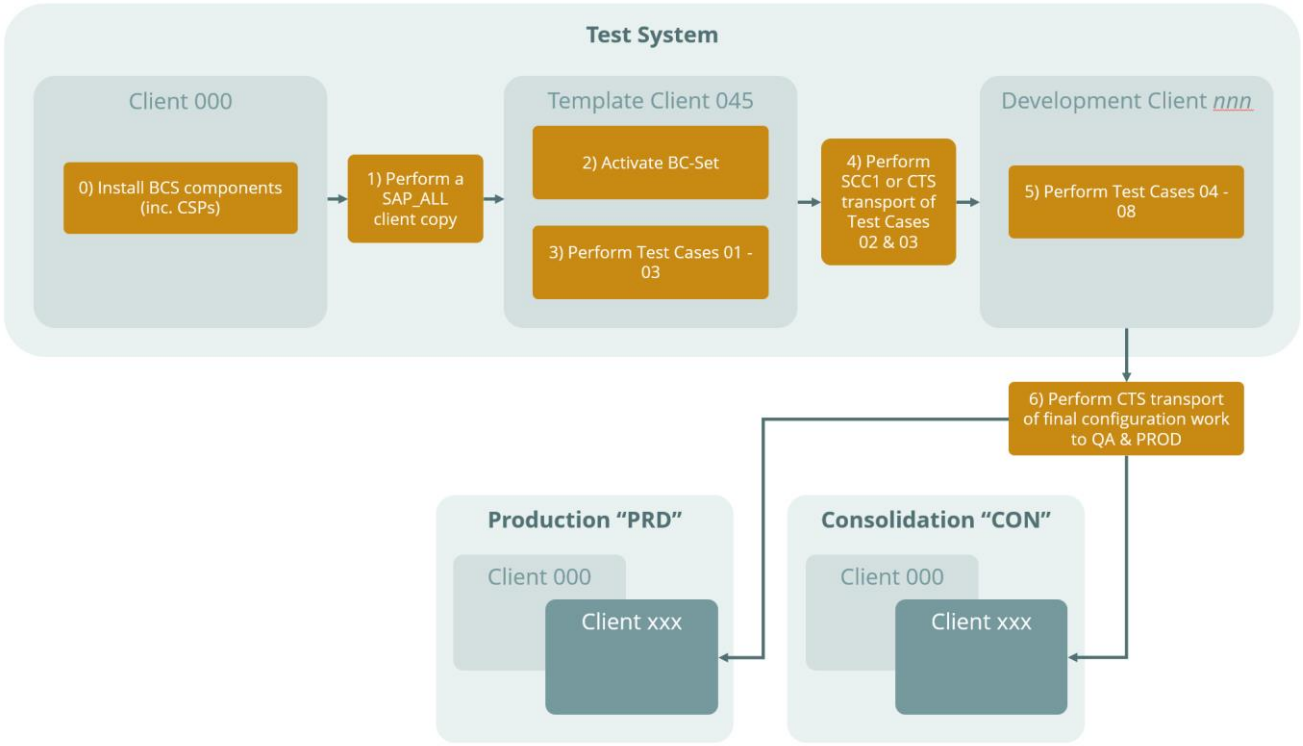
QuantityWare strongly recommends that a certified BCG consultant is employed for the implementation project, or that before implementation, you attend the appropriate BCG certification course.

During the 4-week testing period, you may not have a certified BCG consultant available, and may not have attended a certification course. Typically, testing time budgets are limited and detailed quantity conversions' configuration knowledge is not commonplace; in order to provide detailed guidance for your testing efforts, this document - the BCG Test Manual - provides a sequence **of eight (8) test cases** which you may execute in your system (client 045 and your own development/test client) in order to define a production ready conversion group in your development/test client – including automated test cases - based on the BCG template configuration.

The Gas Measurement Cockpit (GMC) is the central access point to for the configuration and testing of all quantity conversion settings in your system, thus all test cases are executed via the GMC. The only exception to this rule is test case 08, where you require the authority to assign a conversion group and UoM group to a material in the material master.

Each test case contains a sequence of actions to be performed in the BCG Gas Measurement Cockpit, illustrated with screen shots to ensure that you can easily identify all steps and execute the test case.

To execute the test cases in your test system, you require access to the QuantityWare **template client 045 and to your development client** (where all your business process' configuration data is available), as illustrated below:



In summary, through execution of the 8 test cases you:

- Learn how to selectively probe the rich BCG template in client 045
- Learn how to copy required conversion group configuration data to your Z* name space
- Transport that data to your development client for additional tests and final configuration.

To execute the test cases, you must be familiar with SAP customizing transactions and have knowledge of working with SAP customizing transports. Additionally, good SAP QCI knowledge is required. To reduce the number of required screen shots for this document, customizing actions such as copying an object typically omit obvious steps.

The total execution time for all 8 test cases – if your use ID is equipped with all required authorizations – is estimated to be **8 hours** if you fulfill the above noted requirements.

If your organization is unfamiliar with the requirements for quantity conversions or has no documentation / experience concerning existing system configuration in this area, QuantityWare strongly recommends using the services of a QuantityWare certified consultant. QuantityWare can provide your organization with a list of companies and independents offering such consulting. QuantityWare does not offer such consulting services itself and support will not provide remote consulting through the service portal.

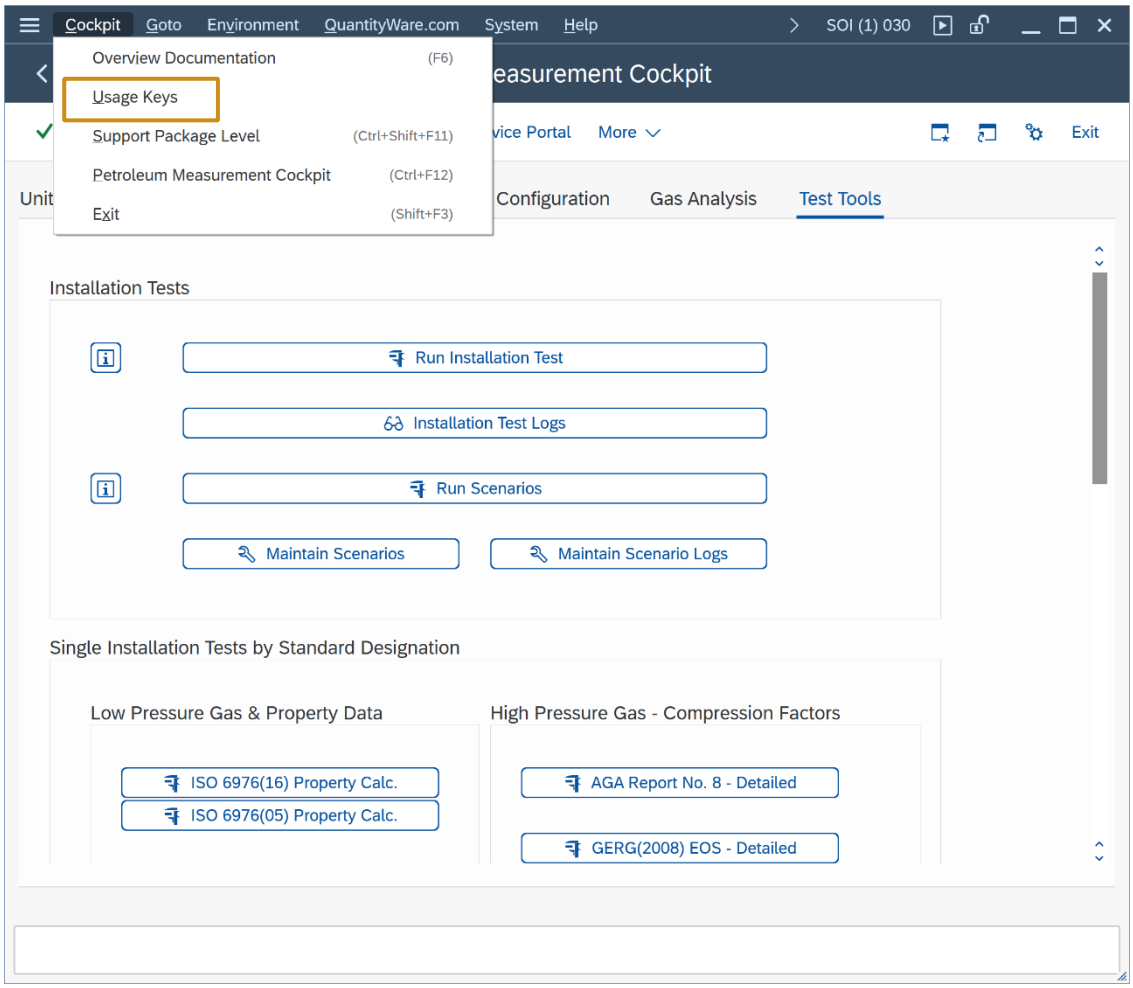
If you are planning to run BCG within your SAP PRA installation, test case 08 is not relevant for you. SAP PRA requires the assignment of a conversion group to a delivery network and is designed for low pressure natural gas quantity conversions – property data entry. Read the QuantityWare working paper "PRA Measurement System Integration" and QuantityWare note 000059 for additional guidance. From a product point of view, QuantityWare CTG is the solution of choice for SAP PRA installations.

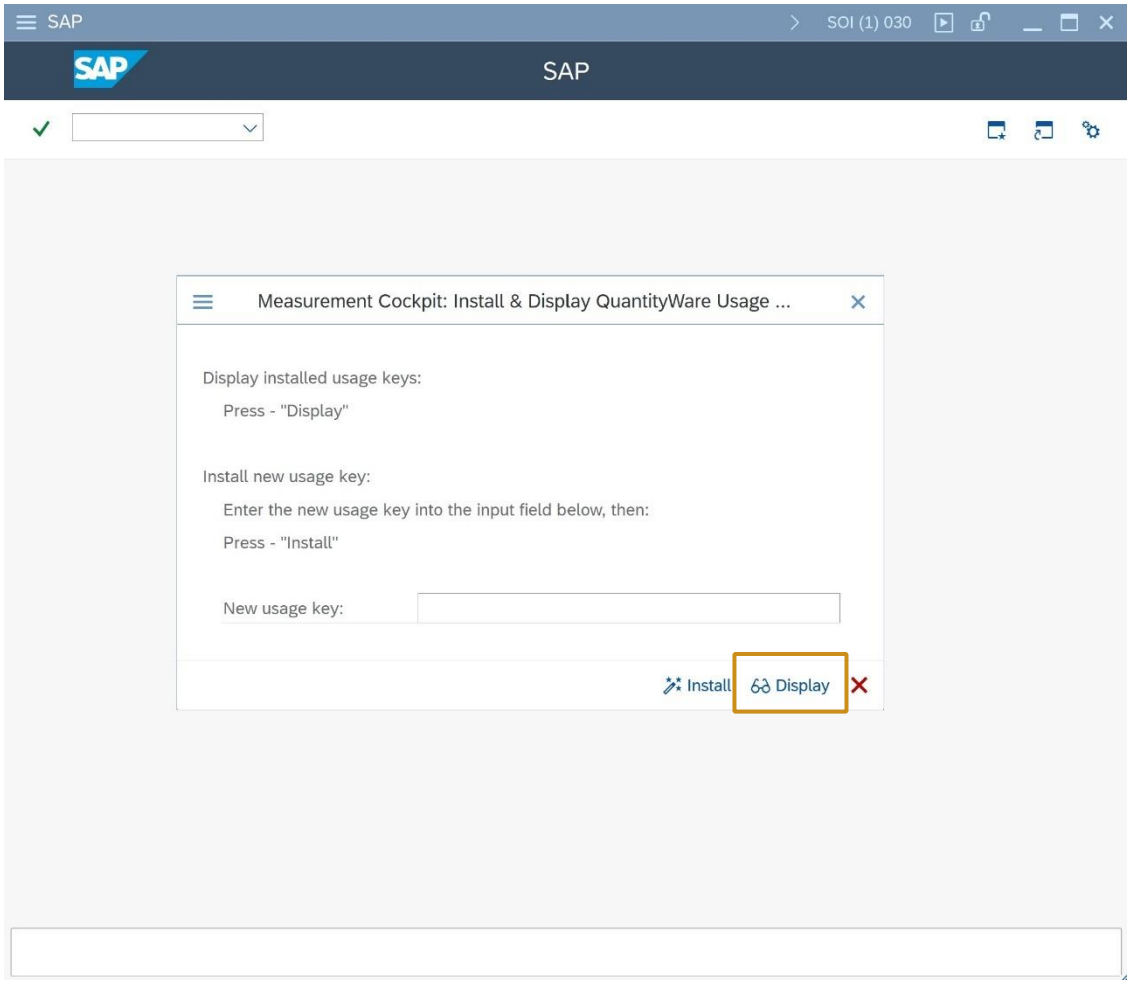
2. Test Cases

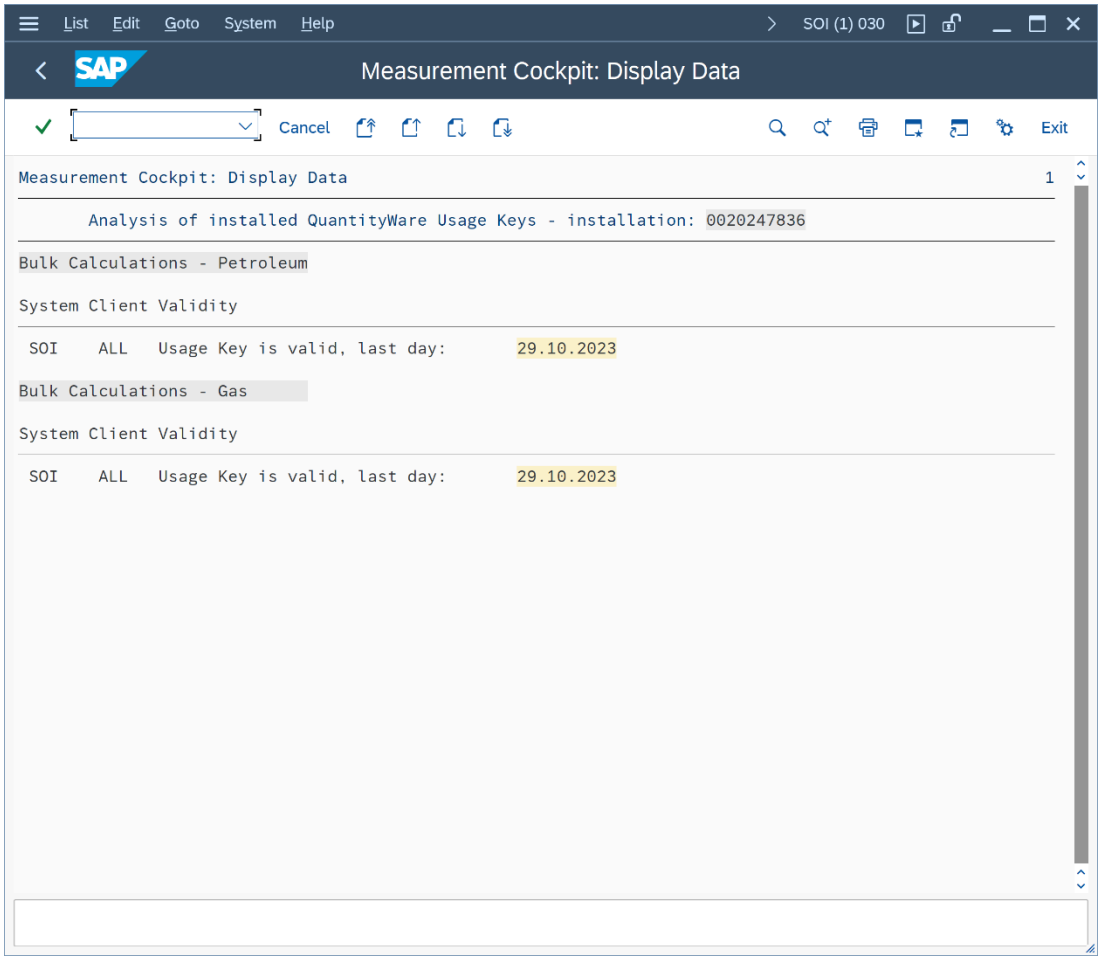
2.1. Test Case 01 – Run Installation Test - Template

Estimated test case execution time: 10 minutes

Part 1 - Log on to your template client 045 and launch the Gas Measurement Cockpit (GMC) – Transaction /n/qtyw/cockpit_gas. You first need to check if your basis team has installed the BCG test usage key. From the Gas Measurement Cockpit (GMC) menu select: Cockpit -> Usage Key. Then, select "Display" and note the list display:

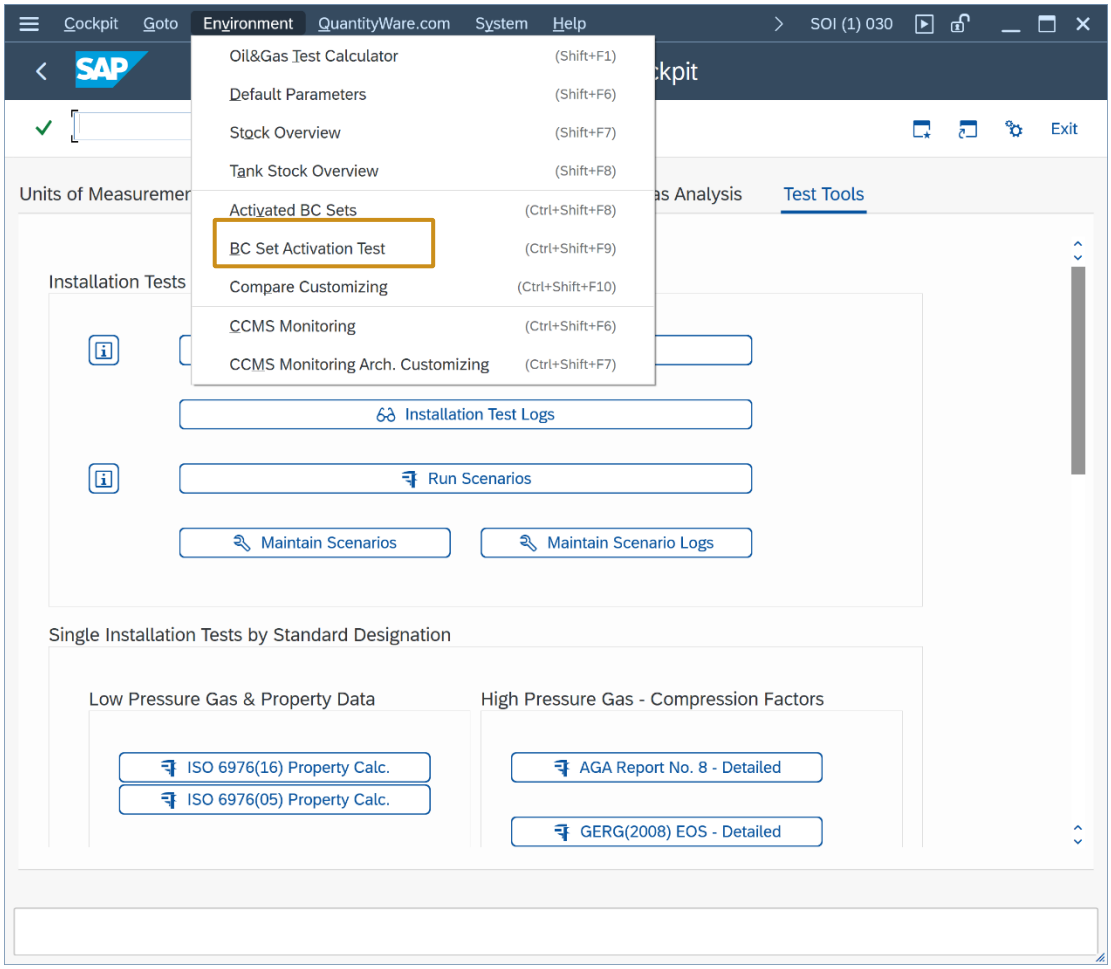


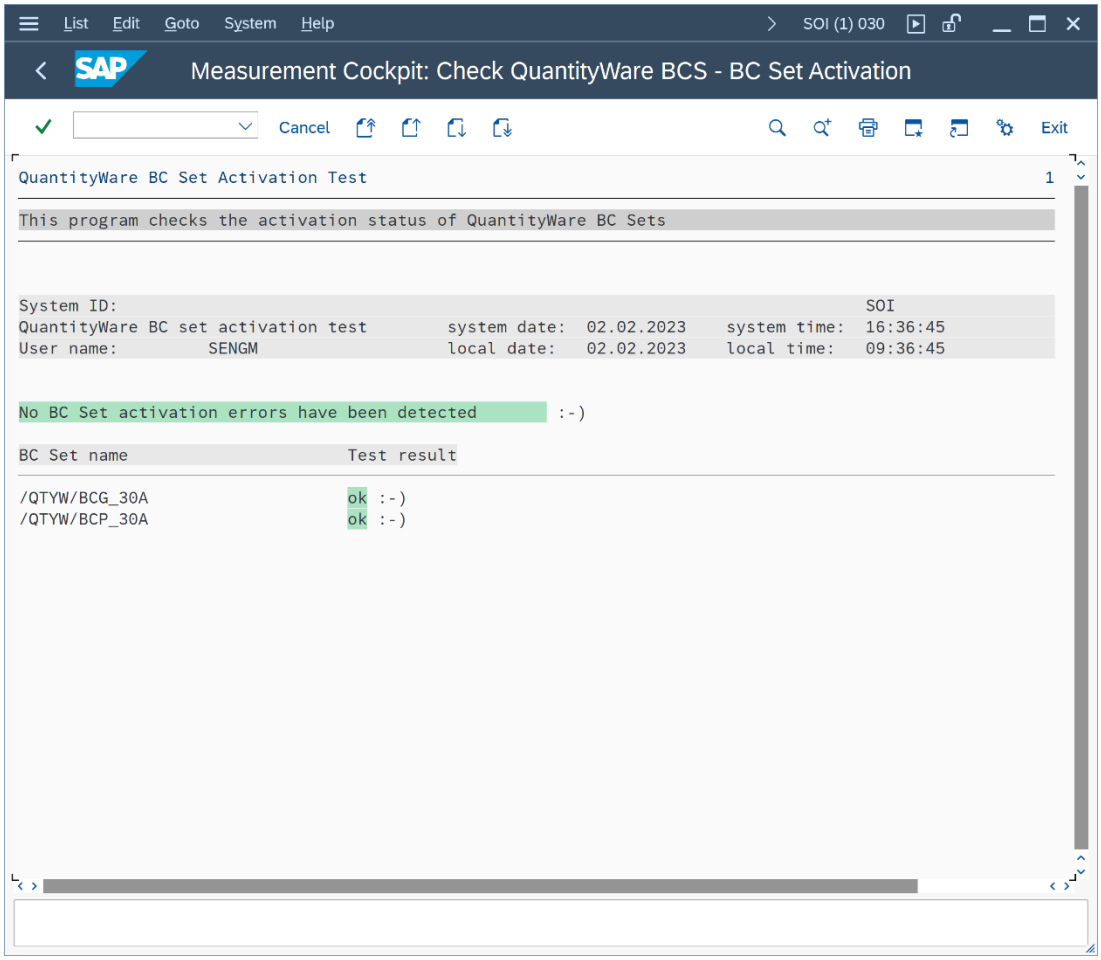

SAP
SOI (1) 030
SAP
Measurement Cockpit: Install & Display QuantityWare Usage ...
Display installed usage keys:
Press - "Display"
Install new usage key:
Enter the new usage key into the input field below, then:
Press - "Install"
New usage key:
Install
Display



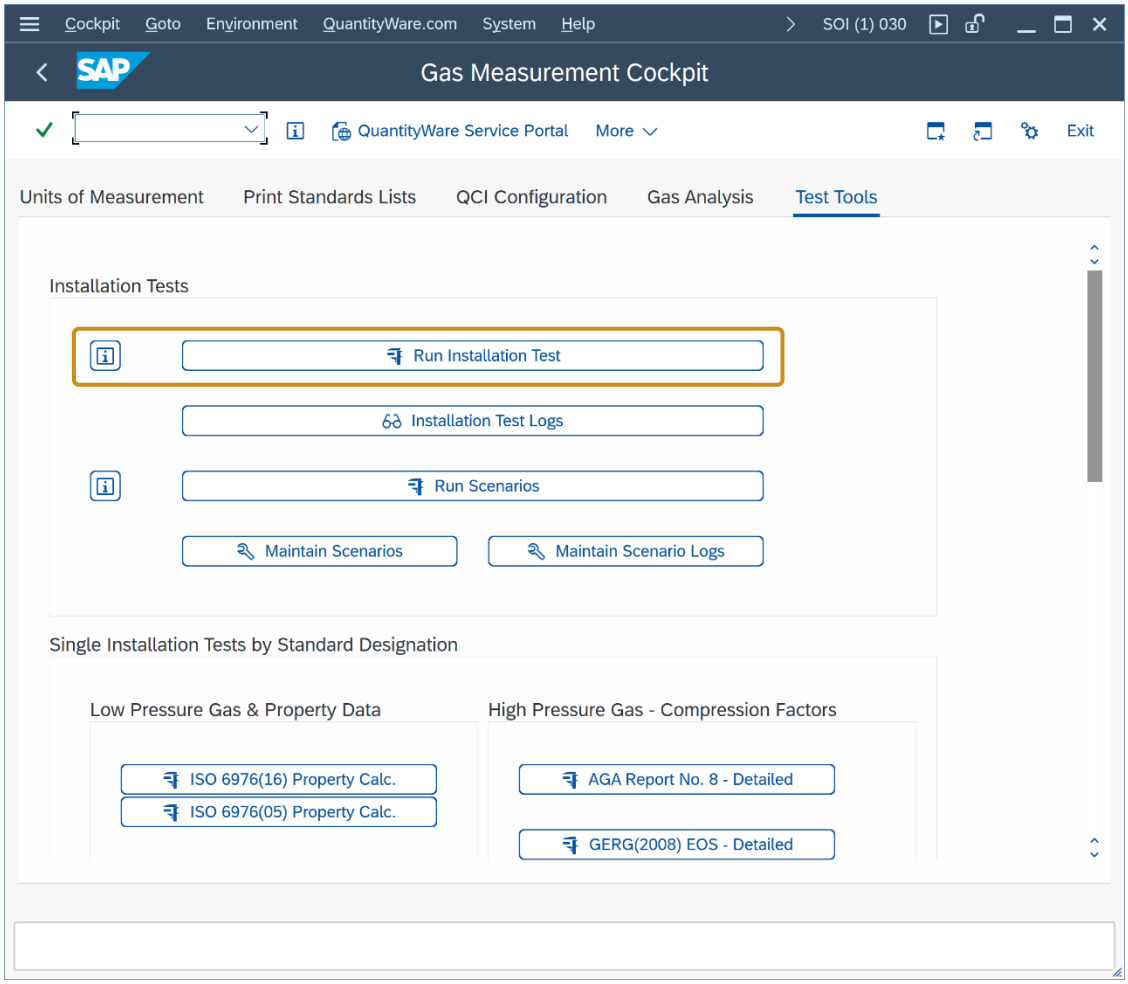
This looks good 😊, a BCG usage key is in place - in our example we also have a BCP usage key installed, which is not required.

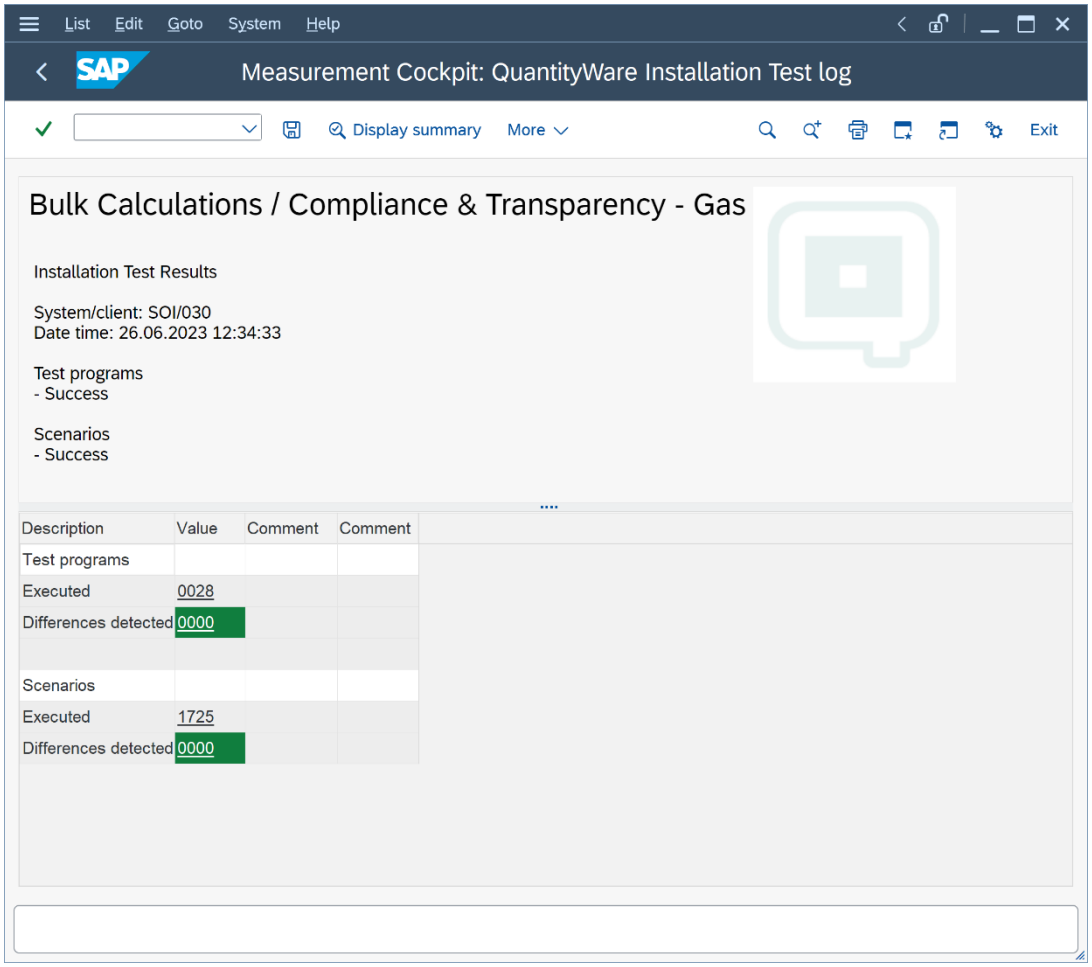
Part 2: From the Gas Measurement Cockpit menu select: Environment -> BC Set Activation Test – is performed by the basis team, but a 4-eyes principle is always good.



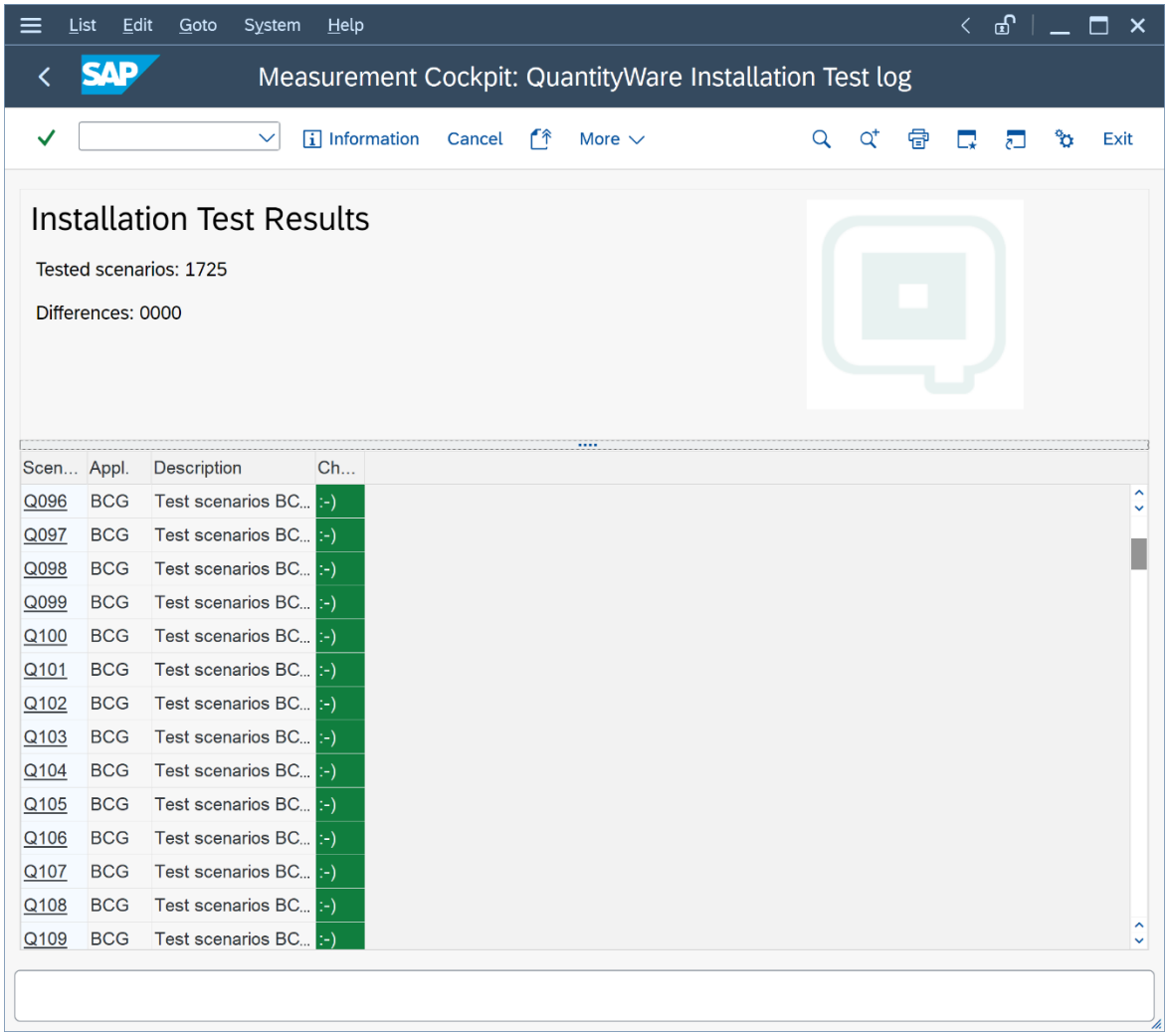

List Edit Goto System Help
SOI (1) 030
Measurement Cockpit: Check QuantityWare BCS - BC Set Activation
Cancel
Exit
QuantityWare BC Set Activation Test 1
This program checks the activation status of QuantityWare BC Sets
System ID: SOI
QuantityWare BC set activation test system date: 02.02.2023 system time: 16:36:45
User name: SENGM local date: 02.02.2023 local time: 09:36:45
No BC Set activation errors have been detected :-)
BC Set name Test result
/QTYW/BCG_30A ok :-)
/QTYW/BCP_30A ok :-)

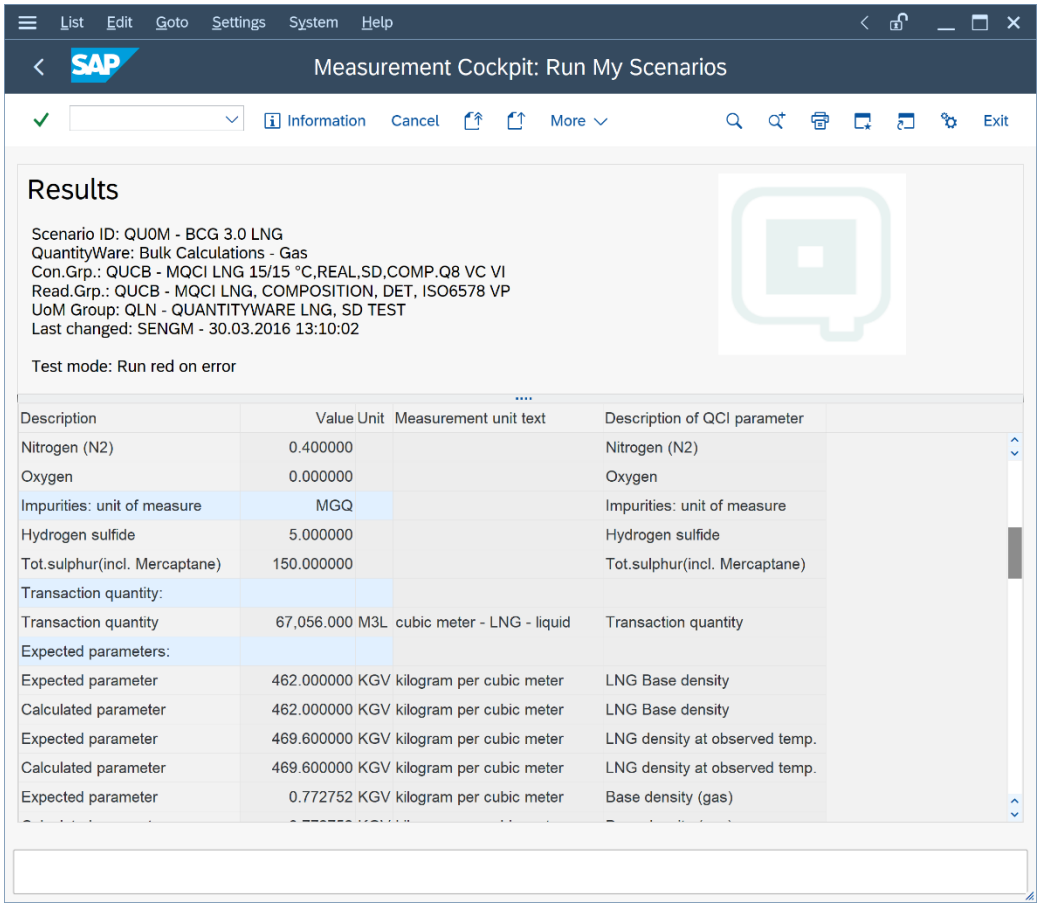
Part 3: Now you can run the QuantityWare BCG Installation Test. Select the GMC "Test Tools" tab strip and select the "Run Installation Test" push button.





All test programs and all 1 725 test scenarios must run “green” i.e., without error. By clicking on the result line, you obtain a list detailing all scenarios:


List Edit Goto System Help
Measurement Cockpit: QuantityWare Installation Test log
Information Cancel More Exit
Installation Test Results
Tested scenarios: 1725
Differences: 0000
Scen... Appl. Description Ch...
Q096 BCG Test scenarios BC... :-)
Q097 BCG Test scenarios BC... :-)
Q098 BCG Test scenarios BC... :-)
Q099 BCG Test scenarios BC... :-)
Q100 BCG Test scenarios BC... :-)
Q101 BCG Test scenarios BC... :-)
Q102 BCG Test scenarios BC... :-)
Q103 BCG Test scenarios BC... :-)
Q104 BCG Test scenarios BC... :-)
Q105 BCG Test scenarios BC... :-)
Q106 BCG Test scenarios BC... :-)
Q107 BCG Test scenarios BC... :-)
Q108 BCG Test scenarios BC... :-)
Q109 BCG Test scenarios BC... :-)



Description	Value	Unit	Measurement unit text	Description of QCI parameter
Nitrogen (N2)	0.400000			Nitrogen (N2)
Oxygen	0.000000			Oxygen
Impurities: unit of measure	MGQ			Impurities: unit of measure
Hydrogen sulfide	5.000000			Hydrogen sulfide
Tot.sulphur(incl. Mercaptane)	150.000000			Tot.sulphur(incl. Mercaptane)
Transaction quantity:				
Transaction quantity	67,056.000	M3L	cubic meter - LNG - liquid	Transaction quantity
Expected parameters:				
Expected parameter	462.000000	KGV	kilogram per cubic meter	LNG Base density
Calculated parameter	462.000000	KGV	kilogram per cubic meter	LNG Base density
Expected parameter	469.600000	KGV	kilogram per cubic meter	LNG density at observed temp.
Calculated parameter	469.600000	KGV	kilogram per cubic meter	LNG density at observed temp.
Expected parameter	0.772752	KGV	kilogram per cubic meter	Base density (gas)

You may select any scenario to inspect its details.

If the BCG installation test (validating the BCP template) does not run “green”, do NOT proceed with the following 7 test cases. Before continuing with the steps described in this document, the issues causing the “red” test runs must be resolved. In such cases, the experience and multi-customer knowledge of a certified BCG consultant can pay for itself in time and effort saved.

2.2. Test Case 02 – Identify & Copy LNG Conversion Group - Template

Estimated test case execution time: 60 minutes

Introduction:

The QuantityWare BCG template contains more than 270 conversion groups for **dry natural gas, hydrogen, NGL (Natural Gas Liquids)** and **LNG (Liquefied Natural Gas)** quantity conversions, mapping all meaningful BCG supported measurement standard combinations.

All QuantityWare template conversion groups are defined in the Q* name range.

In the template client, QuantityWare also delivers test UoM groups, allowing you to perform test calculations for each template conversion group in that client without having to perform additional intricate configuration. A complete template of more than 390 UoM definitions (4 languages) is provided as a part of the delivery.

Each **NGL** conversion group is comprised of 4 different measurement standards:

- UoM conversion standards
- Mass–to–weight conversion standards
- CT(P)L standards (“Corrections for the effect of Temperature and Pressure on Liquid”)
- Calculation model standards

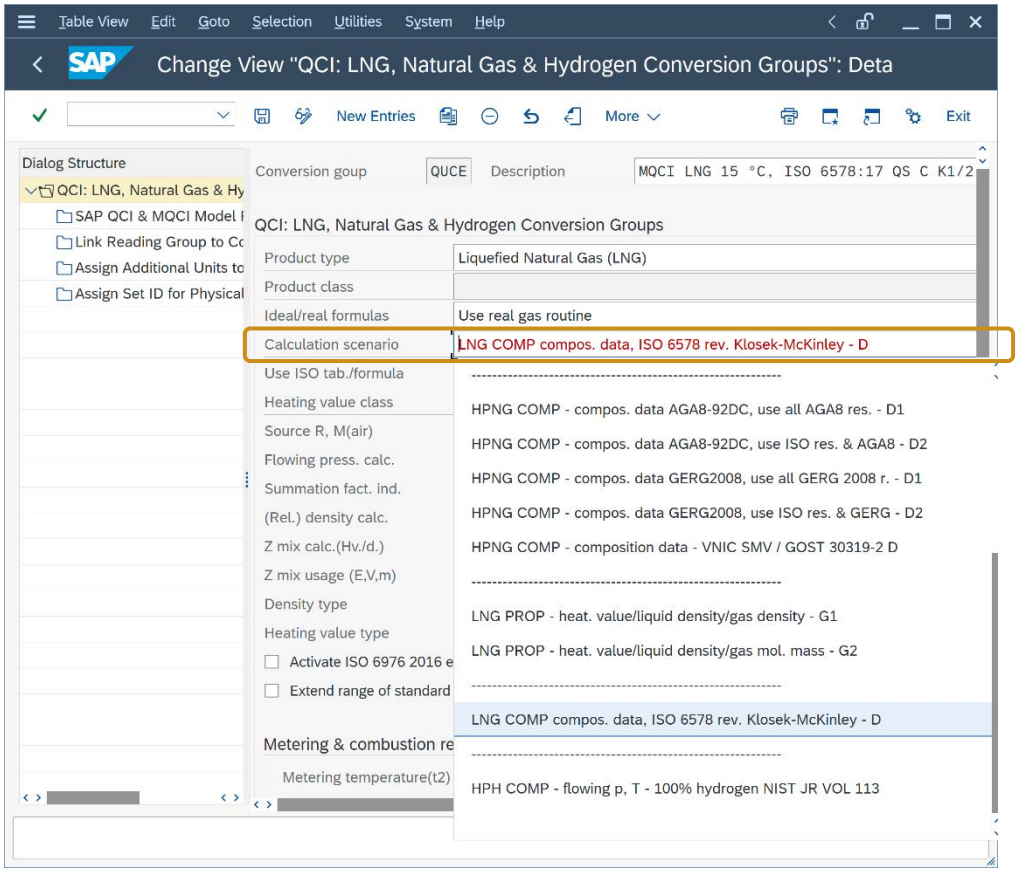
Natural gas conversion groups fall into four main categories:

- Low pressure dry natural gas – LPNG (including natural gas / hydrogen mixtures)
- High pressure dry natural gas – HPNG (including natural gas / hydrogen mixtures)
- Liquefied natural gas – LNG
- High pressure hydrogen – HPH (100 % hydrogen)

For each category, two types of conversion groups are available:

- Conversion groups configured to perform quantity conversions based on **complete chemical composition** and flowing conditions of the dry natural gas (LP/HP)H / NG / LNG - COMP
- Conversion groups configured to perform quantity conversions based on **physical properties** (heating value, density) and **possibly partial** chemical composition and flowing conditions of the dry natural gas (LP/HP)NG / LNG - PROP

The BCG template **MQCI** conversion groups for natural gas (LP/HP) NG and LNG are identified via 17 different calculation scenarios (considering the relevant combinations of natural gas calculation standards):



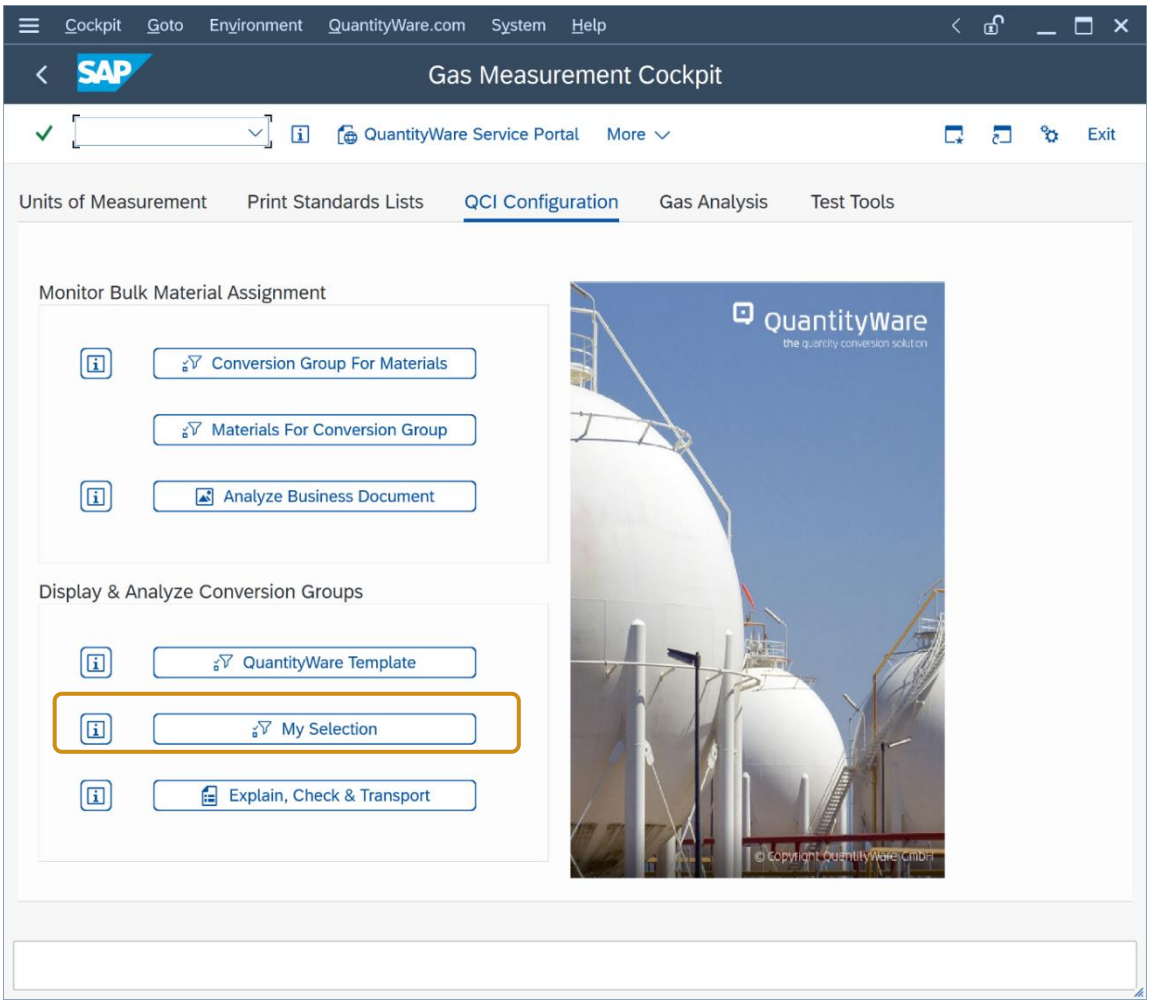
These 17 calculation scenarios are mapped in the following table to the 7 possible classification combinations (as defined above):

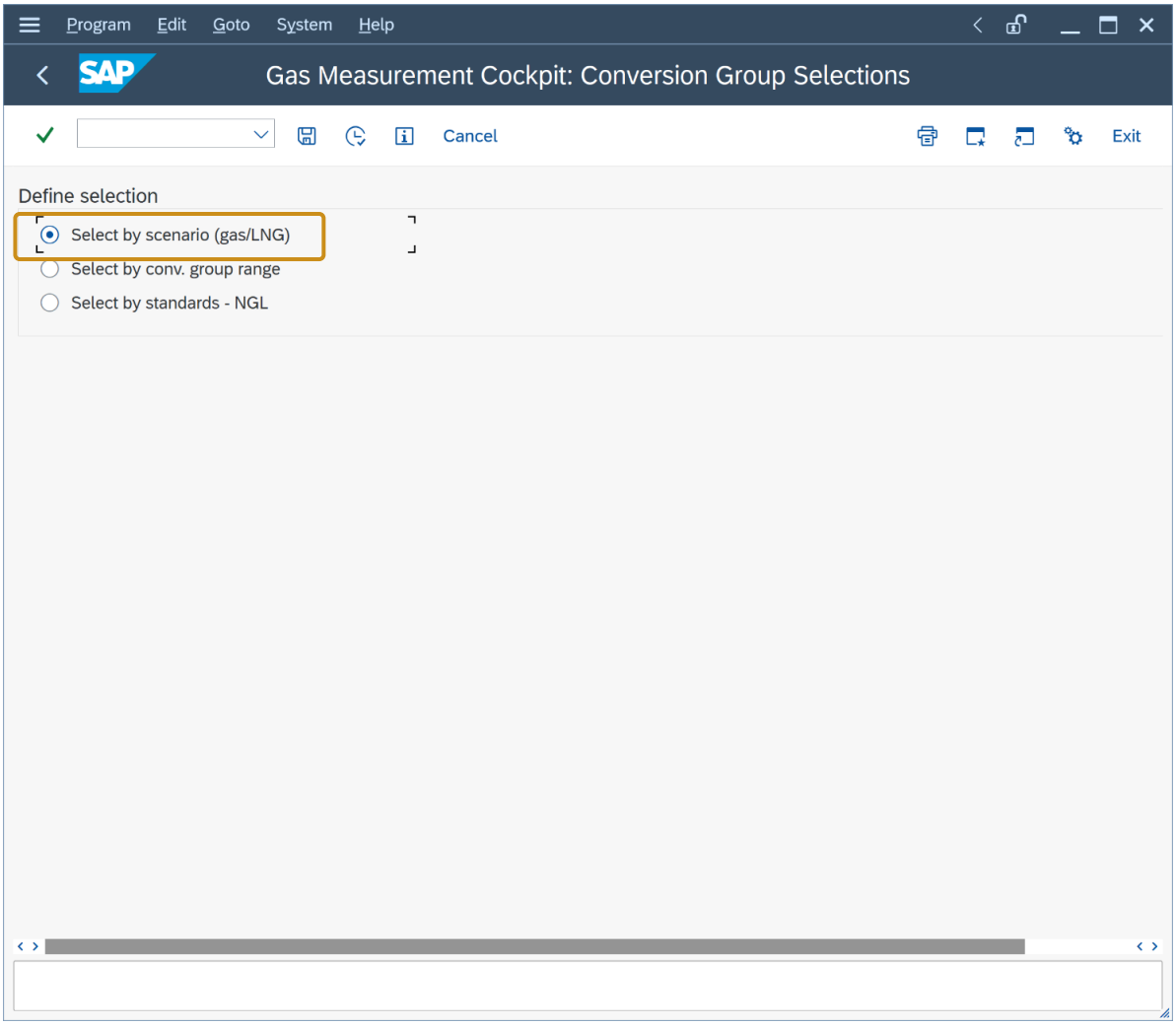
Category	Type	Conversion group calculation scenario
LPNG	COMP	complete composition data
LPNG	PROP	heating value & density
HPNG	COMP	compos. data AGA8-92DC, use all AGA8 res. - D1
HPNG	COMP	compos. data AGA8-92DC, use ISO res. & AGA8 - D2
HPNG	COMP	compos. data GERG2008, use all GERG 2008 r. - D1
HPNG	COMP	compos. data GERG2008, use ISO res. & GERG - D2
HPNG	COMP	composition data - VNIC SMV / GOST 30319-2 D
HPNG	PROP	heating value/density/CO2/H2 - SGERG 88 - G
HPNG	PROP	heating value/density/CO2/H2 - SGERG-mod-H2 - G
HPNG	PROP	heating value/density/CO2/H2 - AGA8 - G1
HPNG	PROP	heating value/density/CO2/CO/H2 - AGA8 - G2
HPNG	PROP	density/N2/CO2 - GERG 91 / GOST 30319-2 G1
HPNG	PROP	density/N2/CO2 - NX19 modified /GOST 30319-2 G2
LNG	COMP	compos. data, ISO 6578 rev. Klosek-McKinley - D
LNG	PROP	heat. value/liquid density/gas density - G1
LNG	PROP	LNG PROP - heat. value/liquid density/gas mol. mass - G2
HPH	COMP	flowing p, T - 100% hydrogen NIST JR VOL 113

The most challenging task during BCG implementation is the correct choice of a QuantityWare template conversion group for a material (group of materials). Here, certified BCG consultants bring years of experience to your project.

Once this assignment is made, you simply copy the Q*** template conversion group and associated configuration objects (e.g., reading group) to your Z*** name space in the template client. In this document, we assume that you know exactly which measurement standards are relevant for your materials; if this is not the case, see the BCG PAIG documentation for the required additional time.

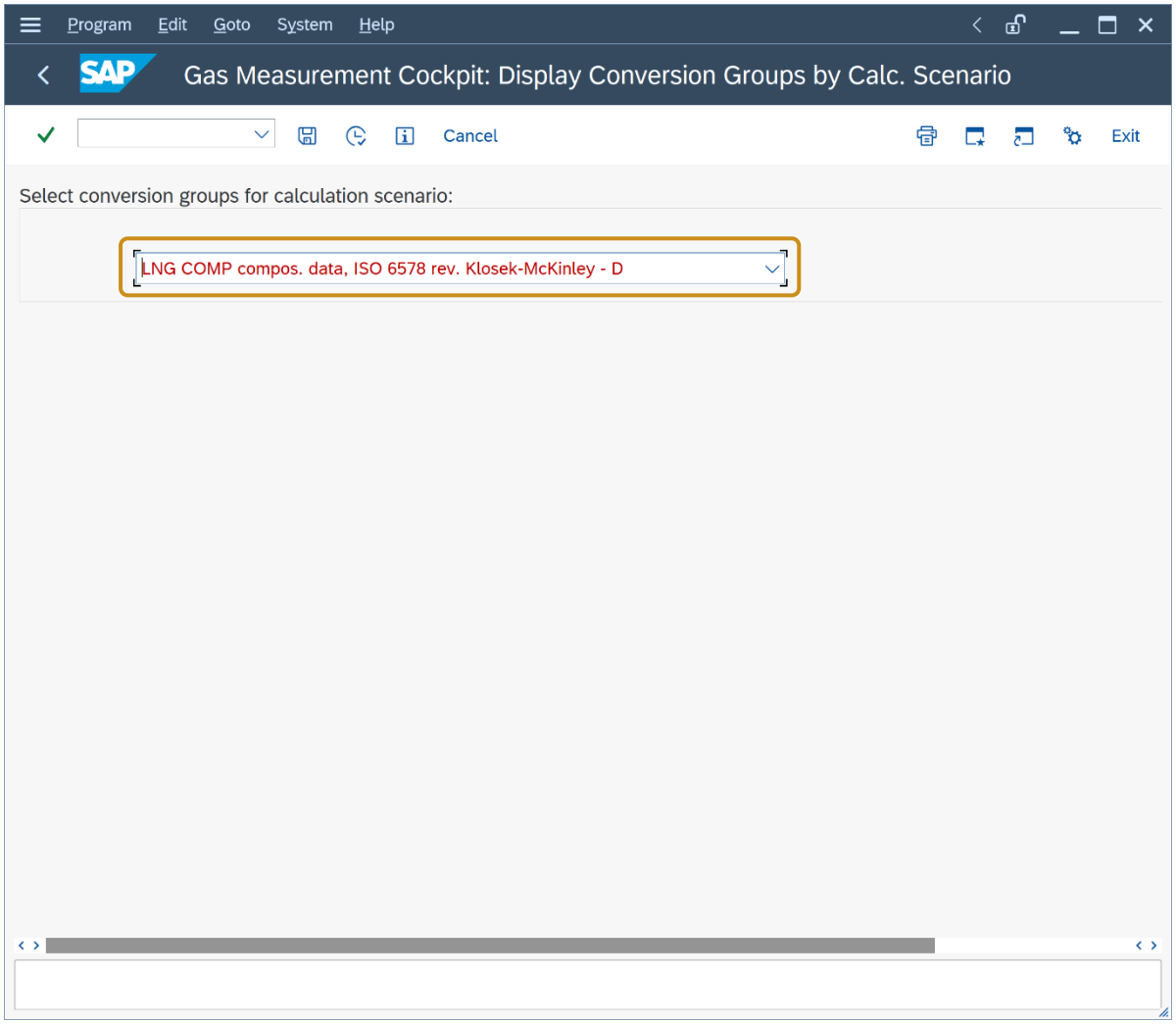
Part 1: Select the GMC "QCI Configuration & Products" tab strip. Three selections are available to display defined subsets of the template conversion groups. Select "My selection", followed by the selection "Select by scenario (gas/LNG)":

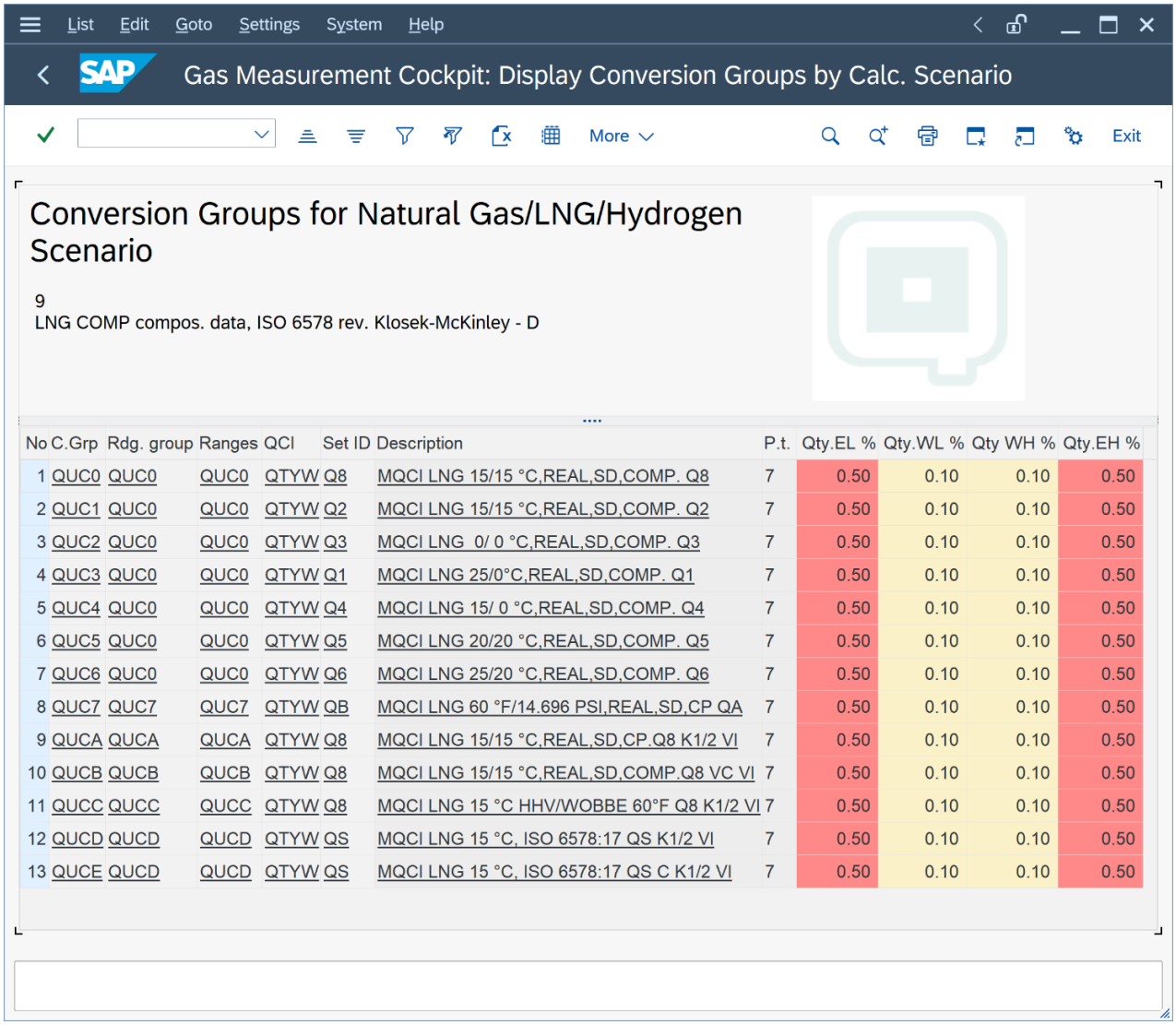




With this selection, you probe the MQCI natural gas template conversion groups by calculation scenario. As described above, 17 calculation scenarios are available.

For this test case, we wish to find an LNG MQCI conversion group at ISO base conditions (15 °C, 101.325 kPa) where we can enter the complete LNG chemical composition for the quantity conversions, and we thus select “LNG COMP compos. Data, ISO 6578 rev. Klosek-McKinley - D” from the list of the 17 calculation scenarios and then “select “Execute” (F8):

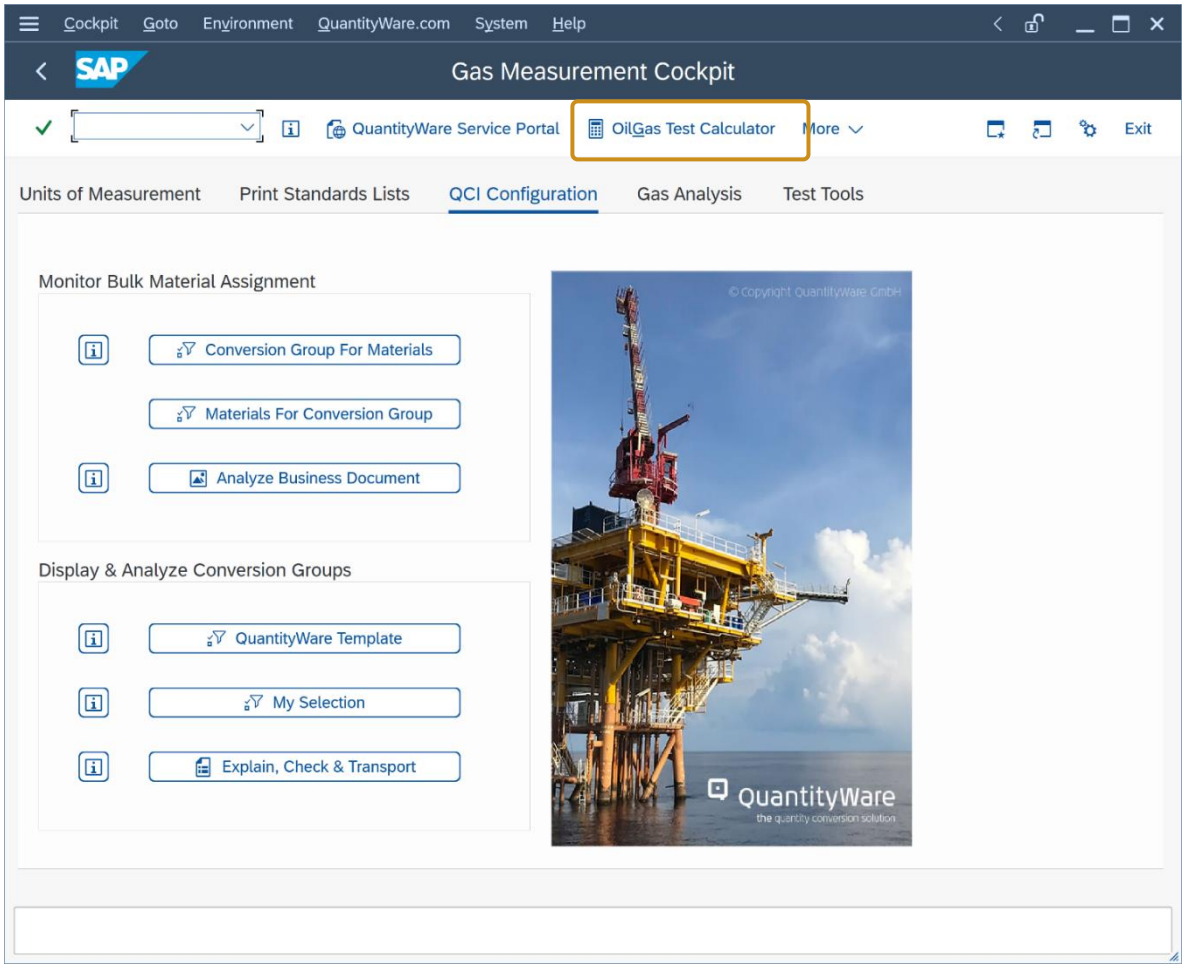


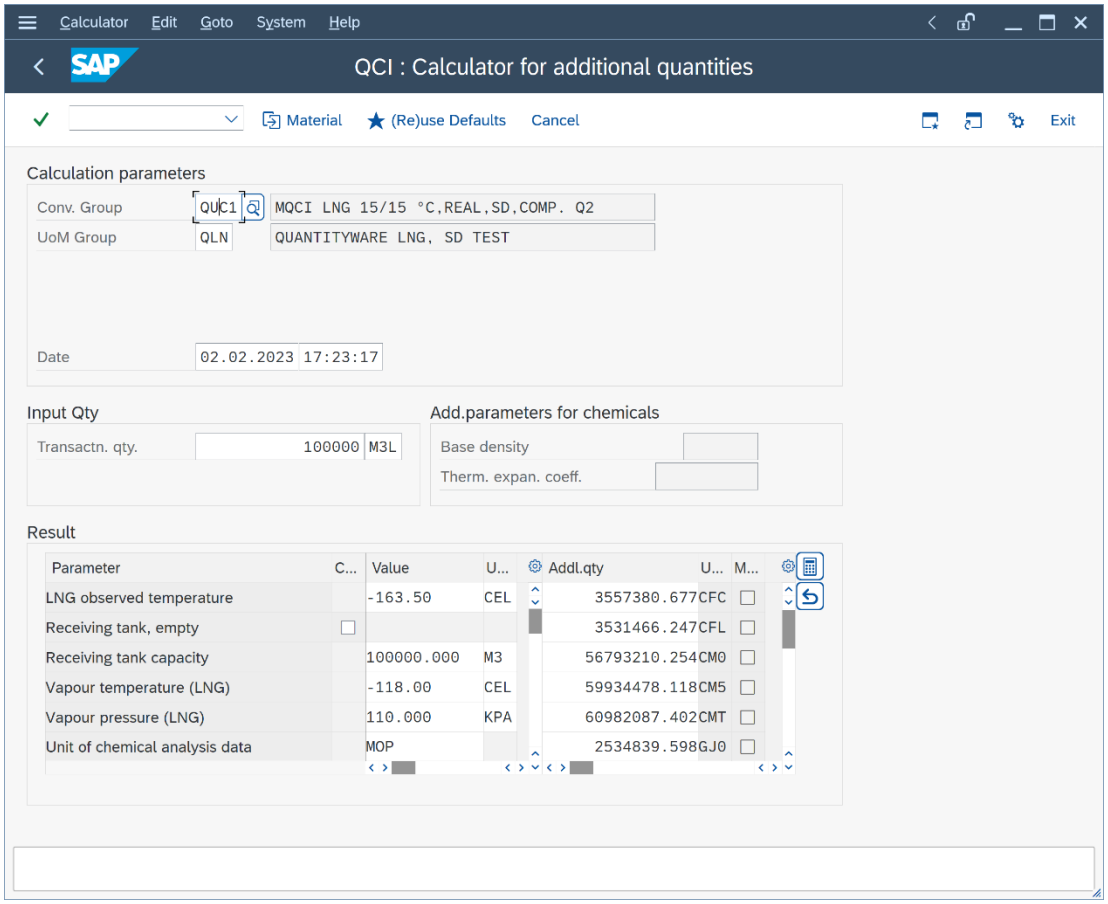


No	C.Grp	Rdg. group	Ranges	QCI	Set ID	Description	P.t.	Qty.EL %	Qty.WL %	Qty WH %	Qty.EH %
1	QUC0	QUC0	QUC0	QTYW	Q8	MQCI LNG 15/15 °C,REAL,SD,COMP. Q8	7	0.50	0.10	0.10	0.50
2	QUC1	QUC0	QUC0	QTYW	Q2	MQCI LNG 15/15 °C,REAL,SD,COMP. Q2	7	0.50	0.10	0.10	0.50
3	QUC2	QUC0	QUC0	QTYW	Q3	MQCI LNG 0/ 0 °C,REAL,SD,COMP. Q3	7	0.50	0.10	0.10	0.50
4	QUC3	QUC0	QUC0	QTYW	Q1	MQCI LNG 25/0°C,REAL,SD,COMP. Q1	7	0.50	0.10	0.10	0.50
5	QUC4	QUC0	QUC0	QTYW	Q4	MQCI LNG 15/ 0 °C,REAL,SD,COMP. Q4	7	0.50	0.10	0.10	0.50
6	QUC5	QUC0	QUC0	QTYW	Q5	MQCI LNG 20/20 °C,REAL,SD,COMP. Q5	7	0.50	0.10	0.10	0.50
7	QUC6	QUC0	QUC0	QTYW	Q6	MQCI LNG 25/20 °C,REAL,SD,COMP. Q6	7	0.50	0.10	0.10	0.50
8	QUC7	QUC7	QUC7	QTYW	QB	MQCI LNG 60 °F/14.696 PSI,REAL,SD,CP QA	7	0.50	0.10	0.10	0.50
9	QUCA	QUCA	QUCA	QTYW	Q8	MQCI LNG 15/15 °C,REAL,SD,CP.Q8 K1/2 VI	7	0.50	0.10	0.10	0.50
10	QUCB	QUCB	QUCB	QTYW	Q8	MQCI LNG 15/15 °C,REAL,SD,COMP.Q8 VC VI	7	0.50	0.10	0.10	0.50
11	QUCC	QUCC	QUCC	QTYW	Q8	MQCI LNG 15 °C HHV/WOBBE 60°F Q8 K1/2 VI	7	0.50	0.10	0.10	0.50
12	QUCD	QUCD	QUCD	QTYW	QS	MQCI LNG 15 °C, ISO 6578:17 QS K1/2 VI	7	0.50	0.10	0.10	0.50
13	QUCE	QUCD	QUCD	QTYW	QS	MQCI LNG 15 °C, ISO 6578:17 QS C K1/2 VI	7	0.50	0.10	0.10	0.50

13 template conversion groups are available for this calculation scenario. By clicking on the description text, a detailed description of the conversion group is displayed. In this case it is informing you that conversion group QUC0, QUC1 and QUCA to QUCE are configured with ISO base conditions (15 °C, 101.325 kPa) for the gas phase. For this test case, we select **QUC1**, which carries physical property data set Q2 and does not require as much configuration data from the template client to be migrated to our development client. In a real-life project, this selection process takes much more time since detailed requirements need to be gathered from several departments, **including contractually defined calculation data for LNG.**

Let's perform a trial conversion using conversion group QUC1. In the GMC, select push button "Oil & Gas Test Calculator".

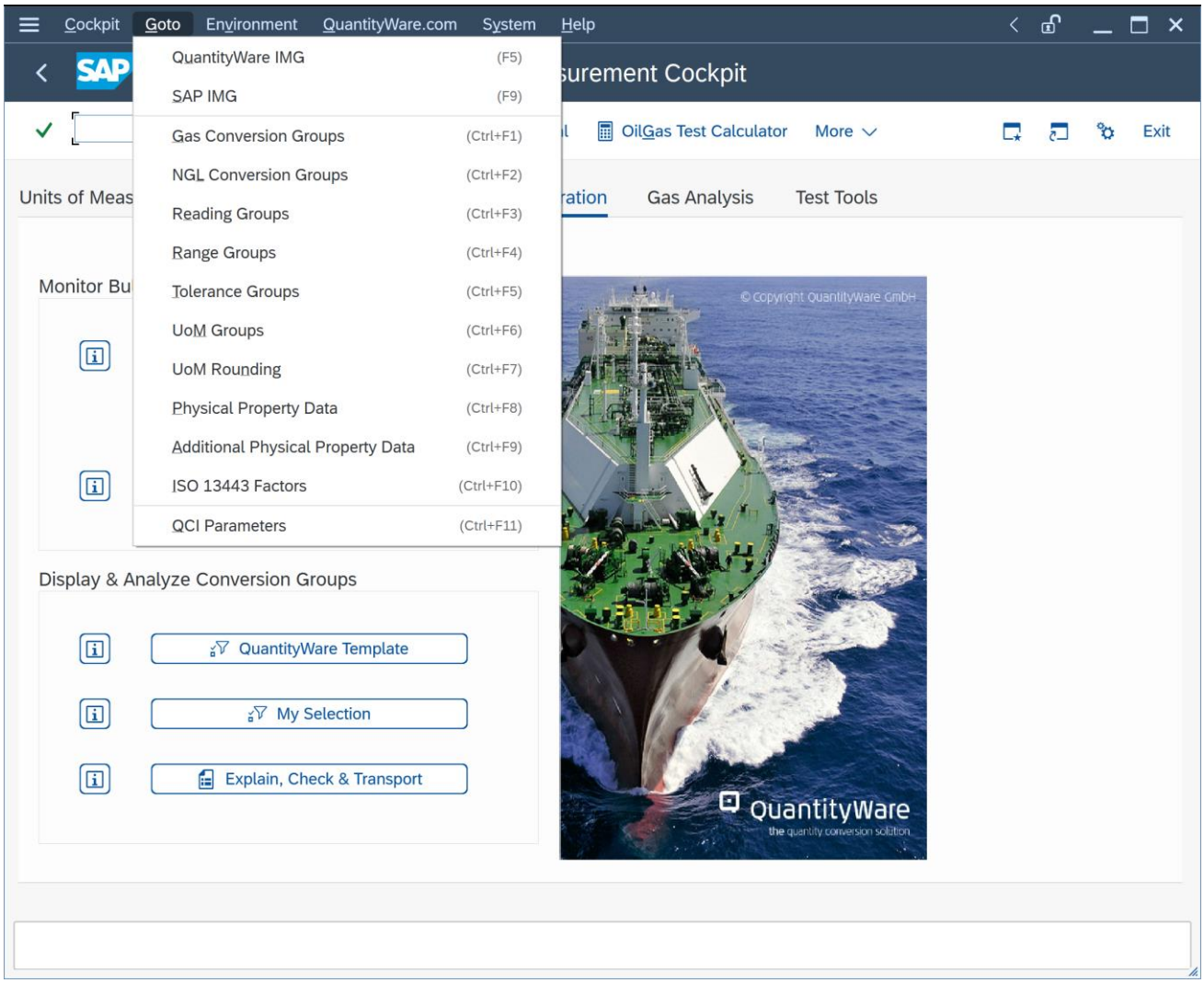

Cockpit
Goto
Environment
QuantityWare.com
System
Help
Gas Measurement Cockpit
QuantityWare Service Portal
OilGas Test Calculator
More
Exit
Units of Measurement
Print Standards Lists
QCI Configuration
Gas Analysis
Test Tools
Monitor Bulk Material Assignment
Conversion Group For Materials
Materials For Conversion Group
Analyze Business Document
Display & Analyze Conversion Groups
QuantityWare Template
My Selection
Explain, Check & Transport
© Copyright QuantityWare GmbH
QuantityWare
the quantity conversion solution

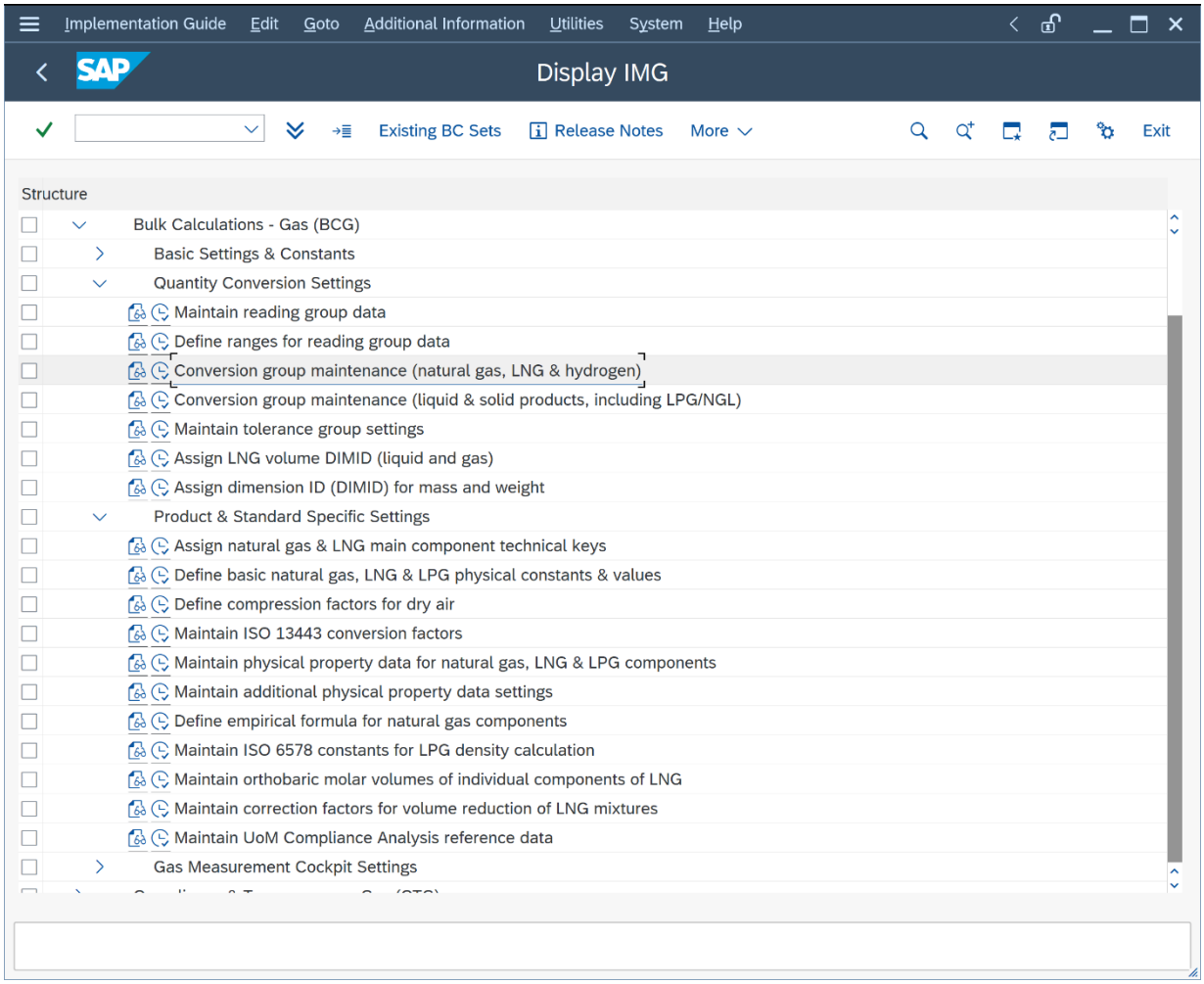


Enter conversion group QUC1 and test UoM group QLN and a transaction quantity of e.g., 100,000 M3L (Cubic meter, liquid phase). The quantity values for all UoM defined in UoM group QLN are readily calculated.

For LNG quantity conversions, UoM quantity values for **four** different SAP Dimensions (quantities) may be calculated: Energies, masses, liquid volumes, and gaseous volumes

Part 2: Now let's copy template conversion group QUC1 in the template client to the customer name range – ZUC1. You have two options. Either navigate to the QuantityWare IMG via menu path: Goto -> QuantityWare IMG:

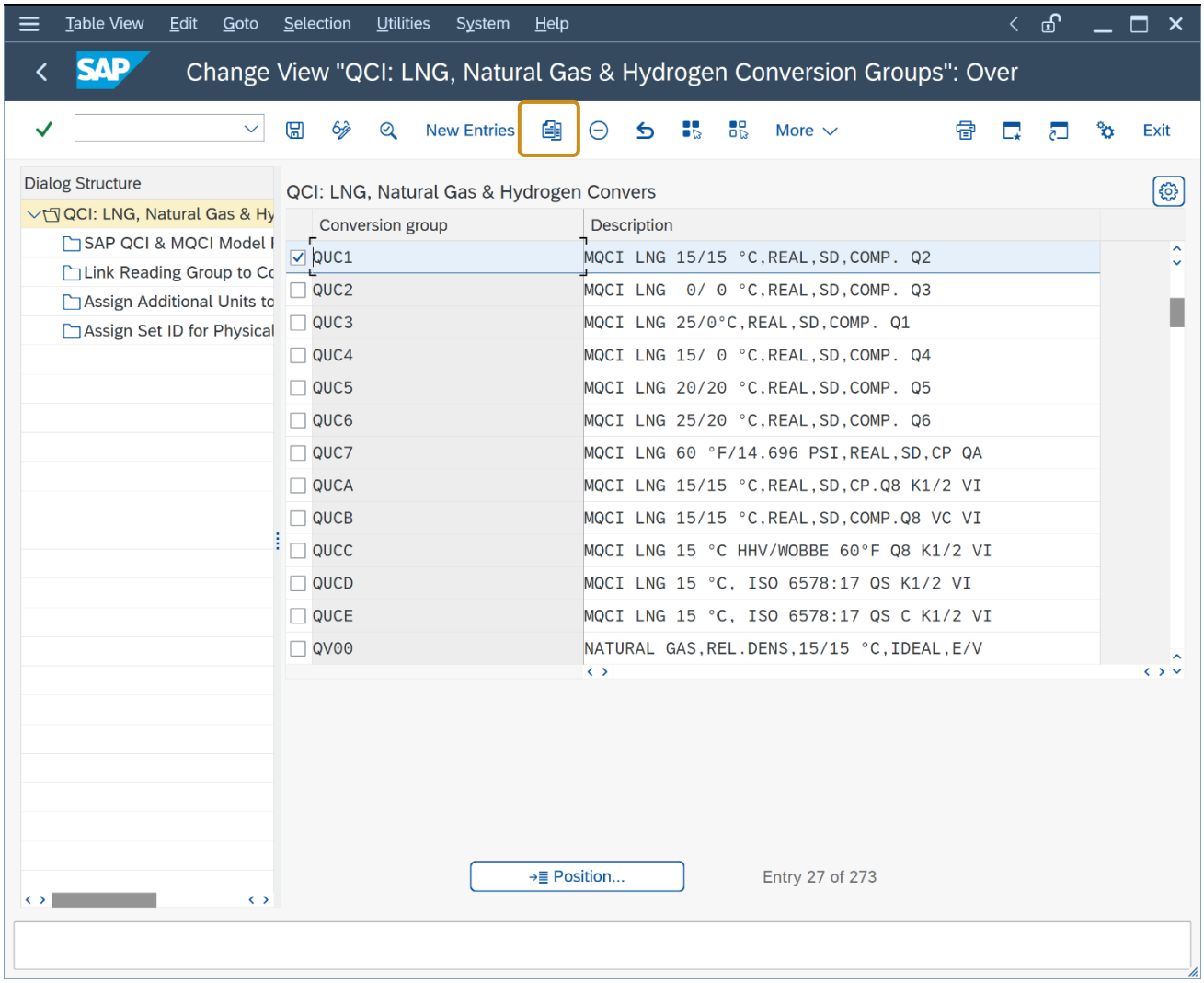


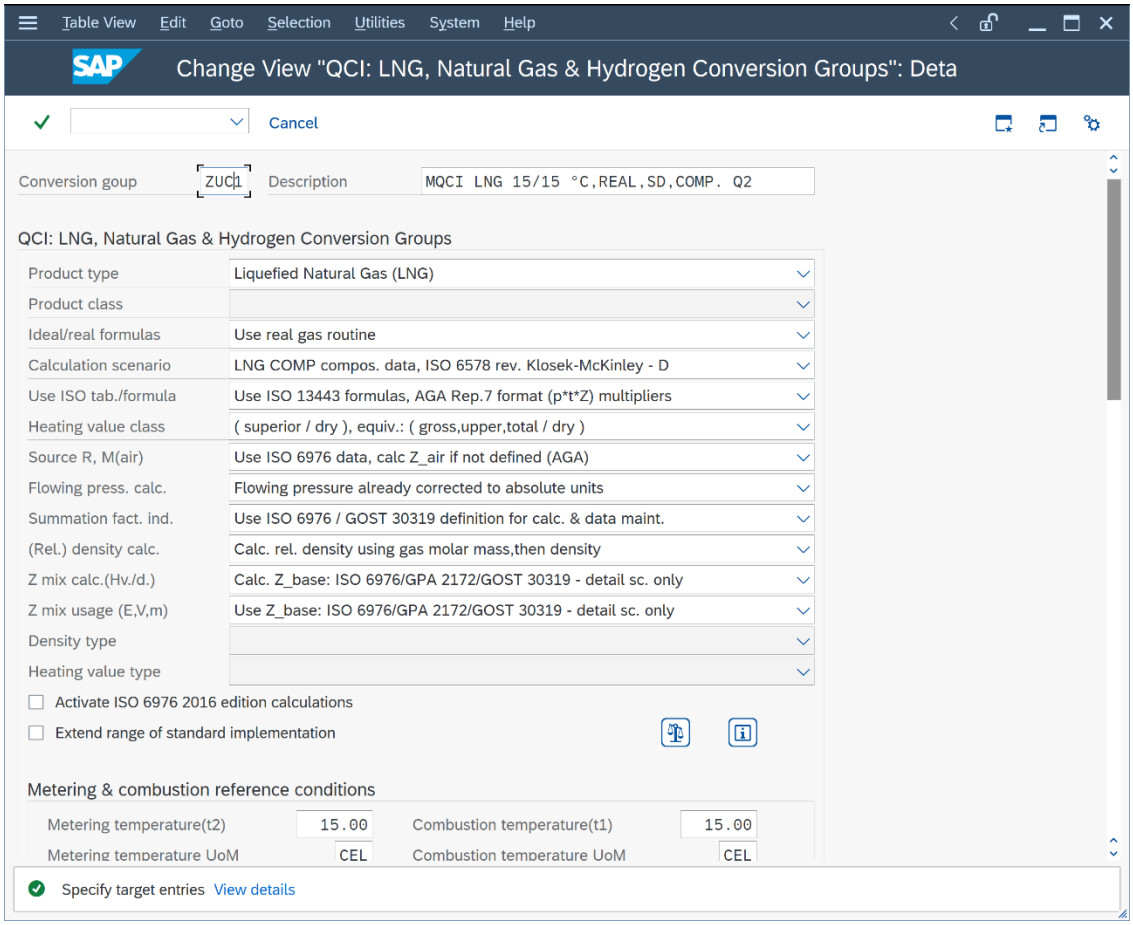


and select the relevant customizing nodes, or directly access the three main nodes via the direct menu path access: **Goto -> Gas Conversion Groups / Reading Groups / Range Groups**. The second option is faster, so here goes 😊

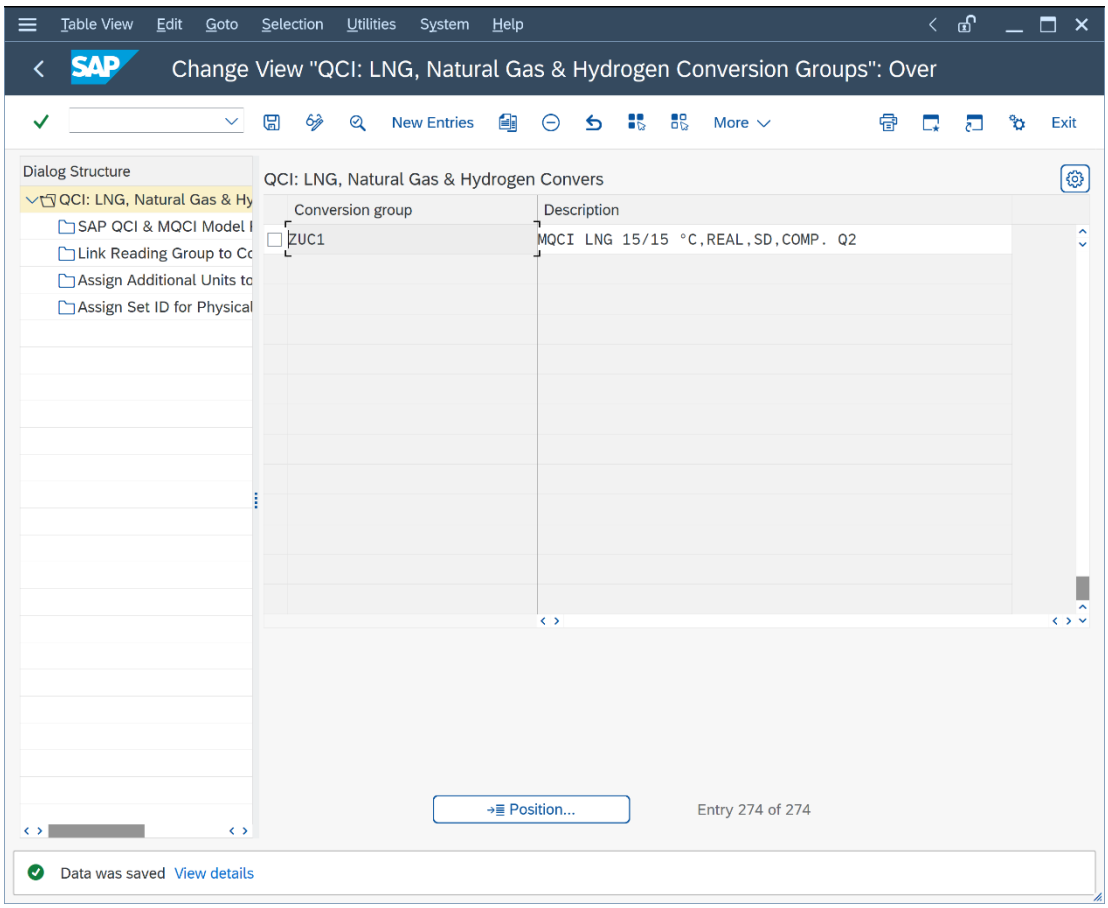
Goto -> Gas Conversion Groups:

In “Change” mode, select conversion group QUC1 and select “Copy As … (F6):





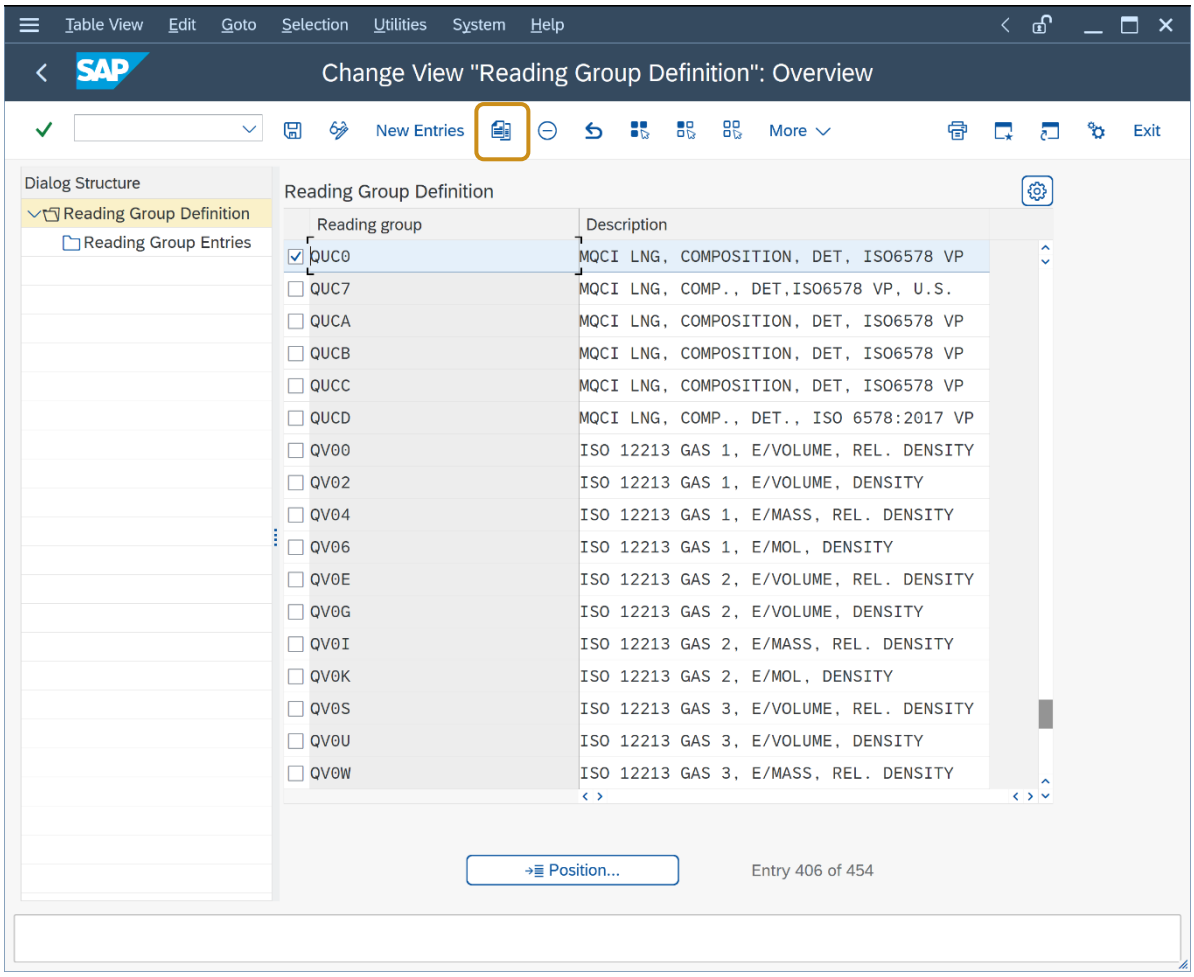
In the details screen, enter ZUC1 as target name and select “copy all” after you press “Return”.

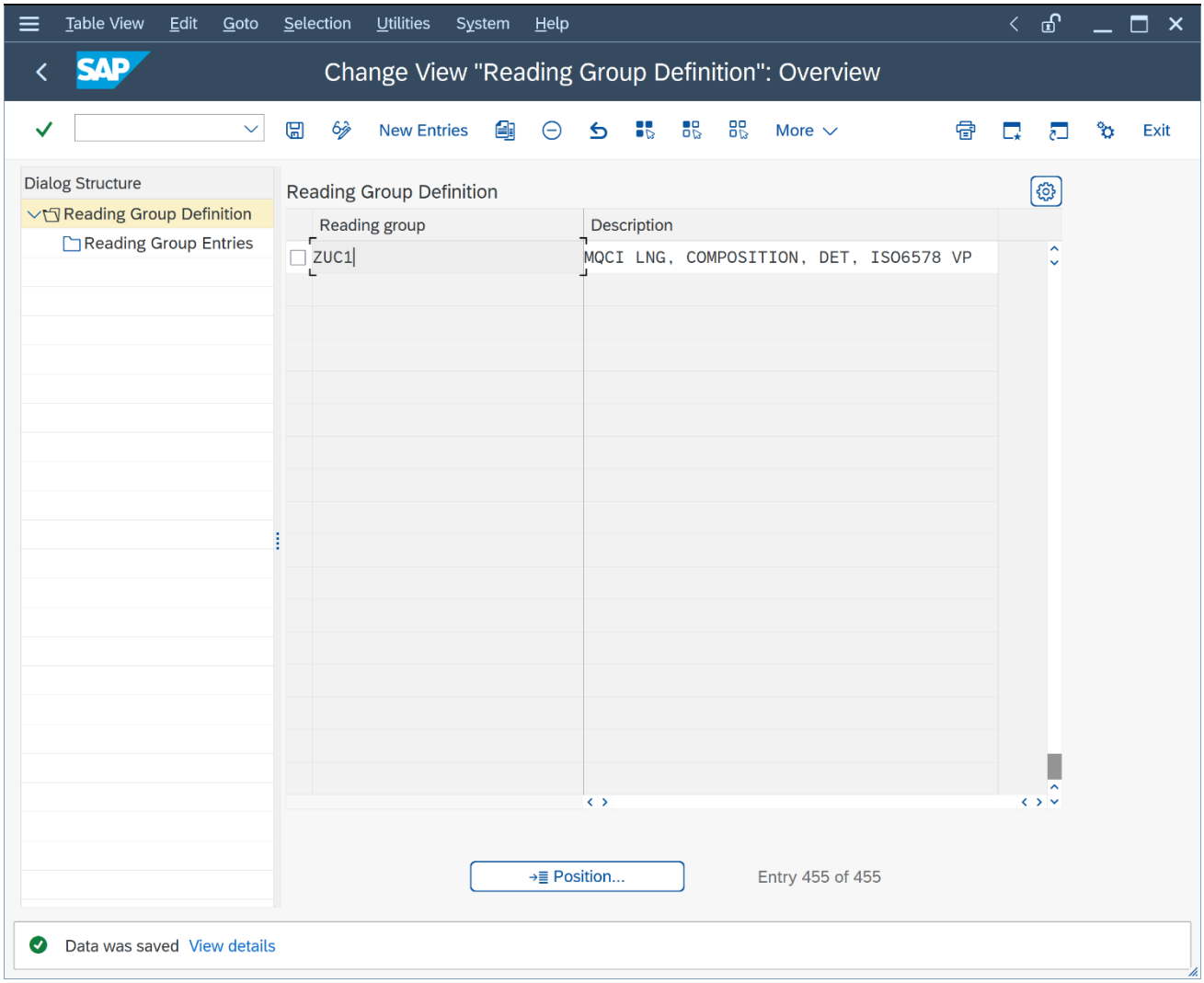


Save your actions and select an appropriate customizing transport.

Goto -> Reading Groups:

Repeat the copy procedure as described above and copy reading group QUC0 (Conversion group QUC1 utilizes reading group QUC0!) to ZUC1:

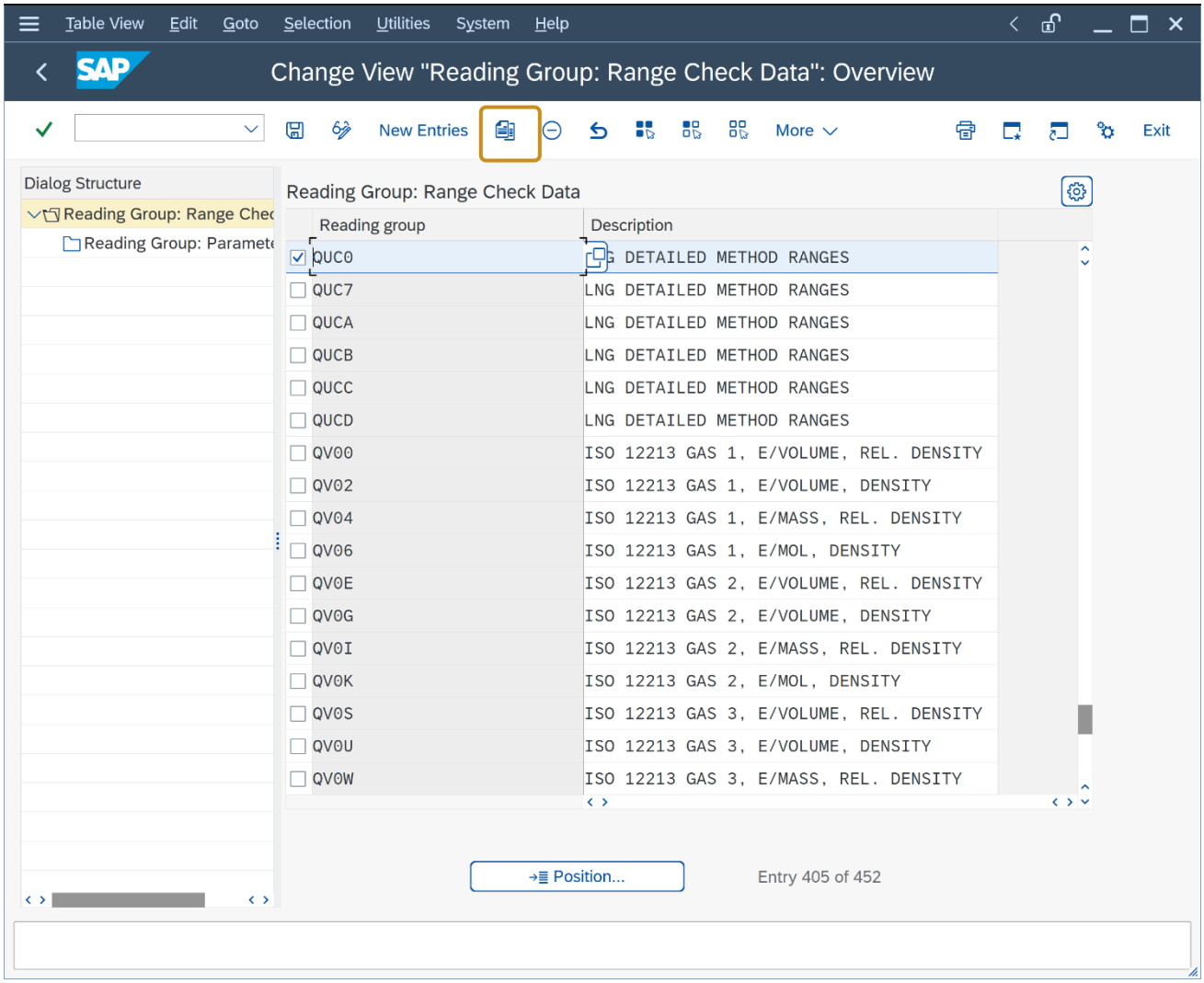


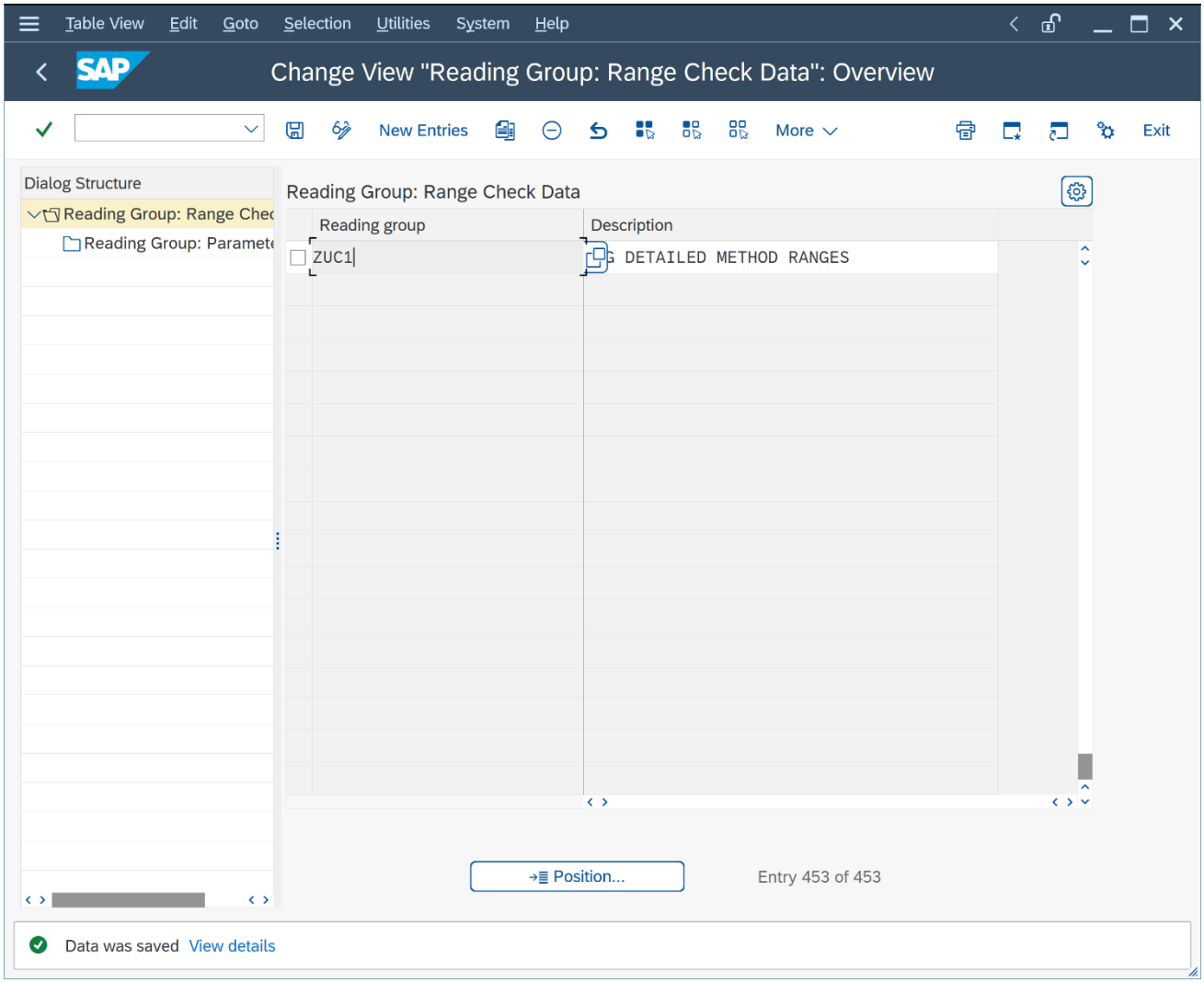


Save your copy actions and select an appropriate customizing transport.

Goto -> Range Groups:

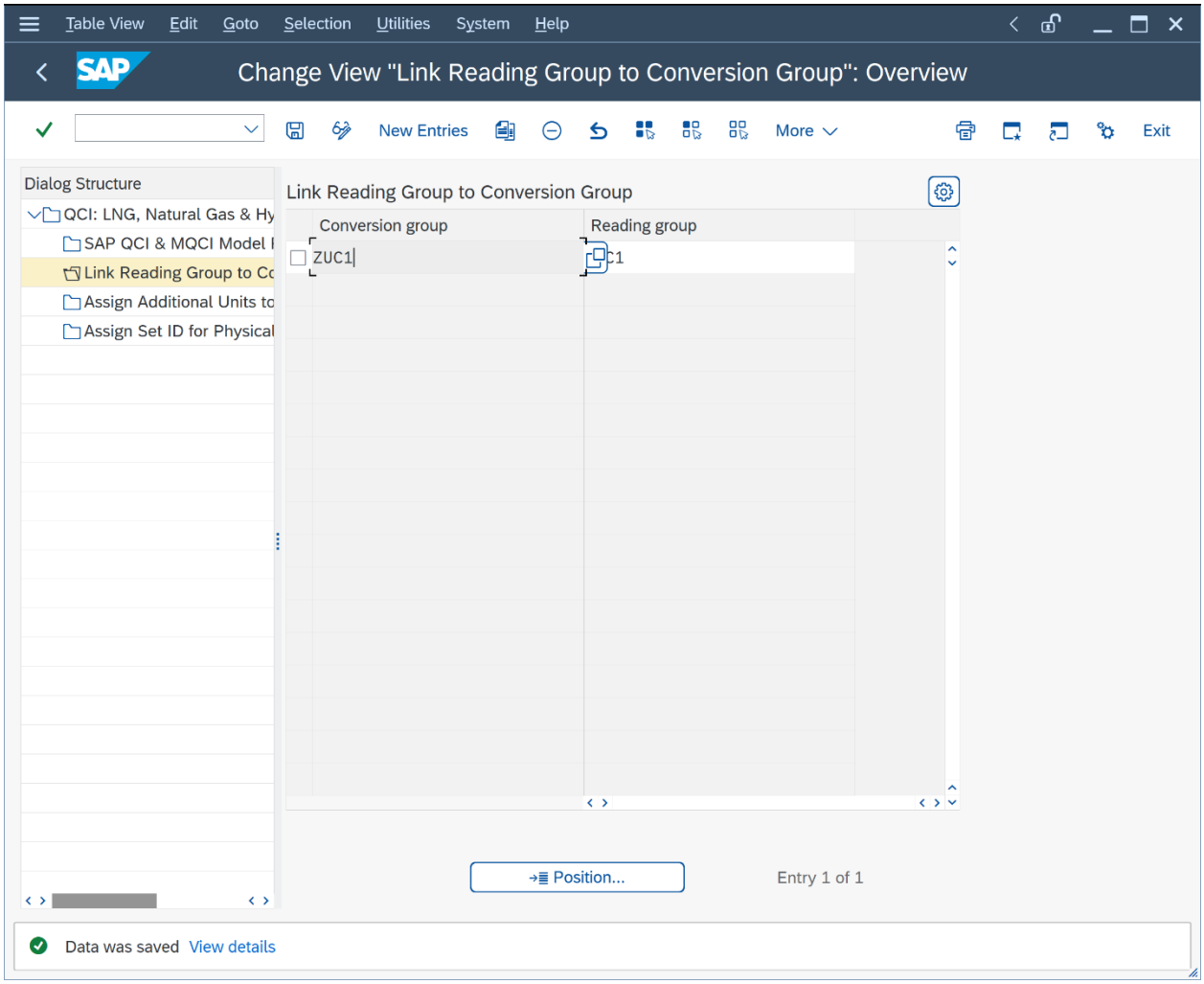
Repeat the copy procedure for range group QUC0 (copy to ZUC1):





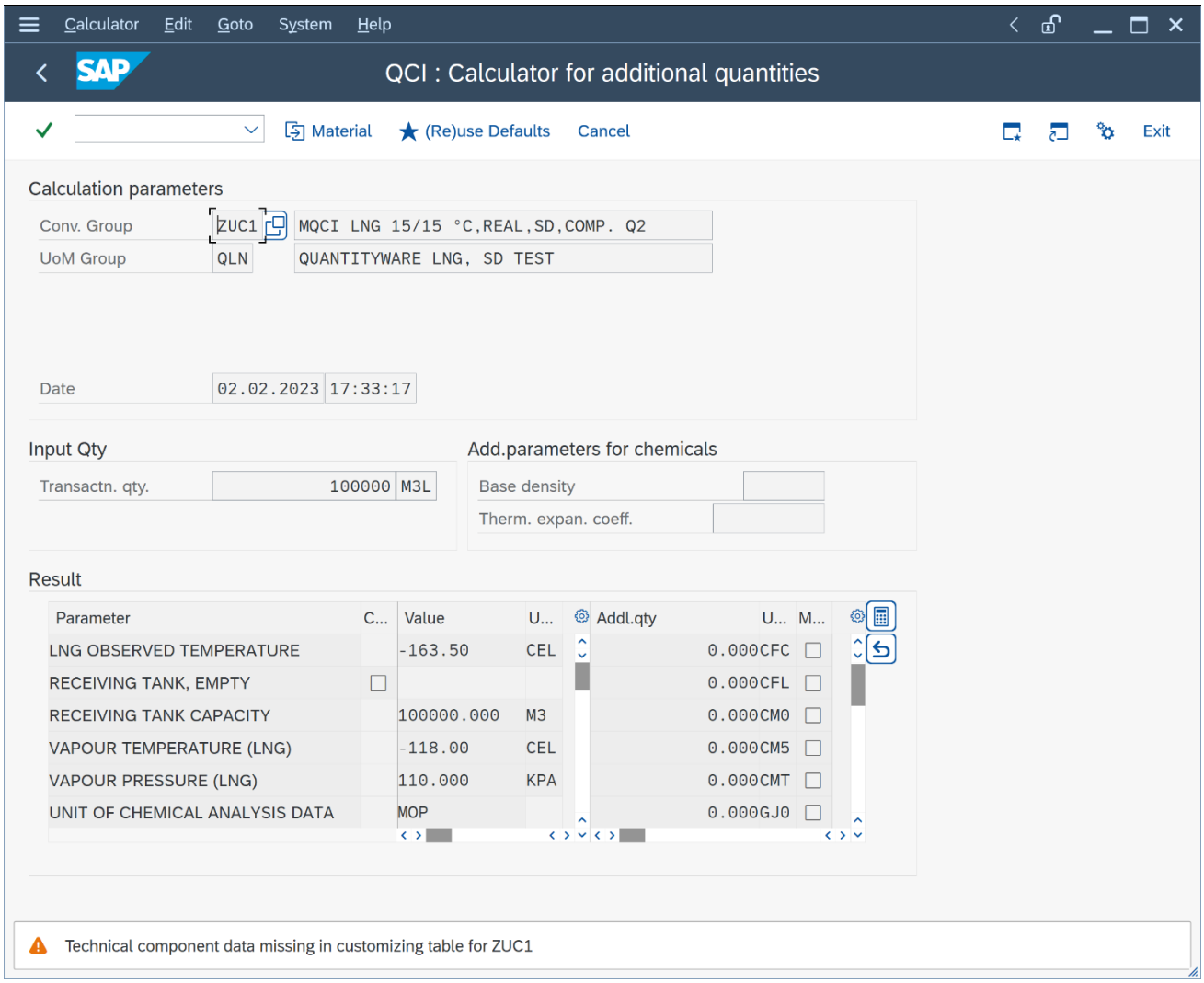
Save your copy actions and select an appropriate customizing transport.

Finally, go back to the conversion group configuration via GMC menu path: Goto -> Gas Conversion Groups and select “Link reading group to conversion group” for your new conversion group ZUC1:

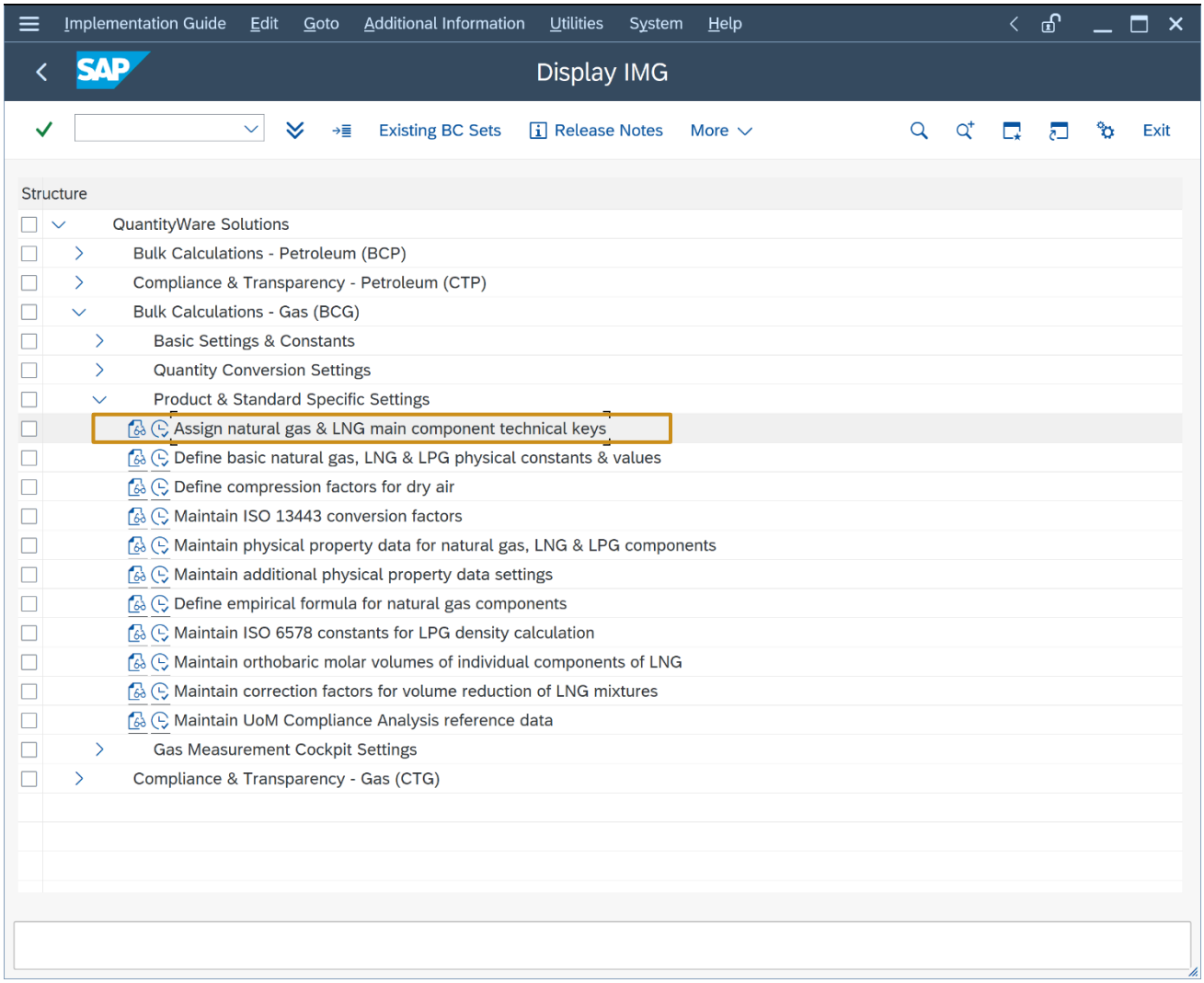


Change the assignment from QUC0 to ZUC1. Save your actions and select an appropriate customizing transport.

Now you have finished copying template conversion group QUC1 to ZUC1. A test calculation (via the GMC push button “Oil & Gas Test Calculator”) should produce identical results when compared with the test calculation for conversion group QUC1:



Apparently, we are still missing some settings for ZUC1. The “Technical Component Data” is missing. To solve this, we navigate to the QuantityWare BCG IMG:


Implementation Guide
Edit
Goto
Additional Information
Utilities
System
Help
Display IMG
Existing BC Sets
Release Notes
More
Exit
Structure
QuantityWare Solutions
Bulk Calculations - Petroleum (BCP)
Compliance & Transparency - Petroleum (CTP)
Bulk Calculations - Gas (BCG)
Basic Settings & Constants
Quantity Conversion Settings
Product & Standard Specific Settings
Assign natural gas & LNG main component technical keys
Define basic natural gas, LNG & LPG physical constants & values
Define compression factors for dry air
Maintain ISO 13443 conversion factors
Maintain physical property data for natural gas, LNG & LPG components
Maintain additional physical property data settings
Define empirical formula for natural gas components
Maintain ISO 6578 constants for LPG density calculation
Maintain orthobaric molar volumes of individual components of LNG
Maintain correction factors for volume reduction of LNG mixtures
Maintain UoM Compliance Analysis reference data
Gas Measurement Cockpit Settings
Compliance & Transparency - Gas (CTG)

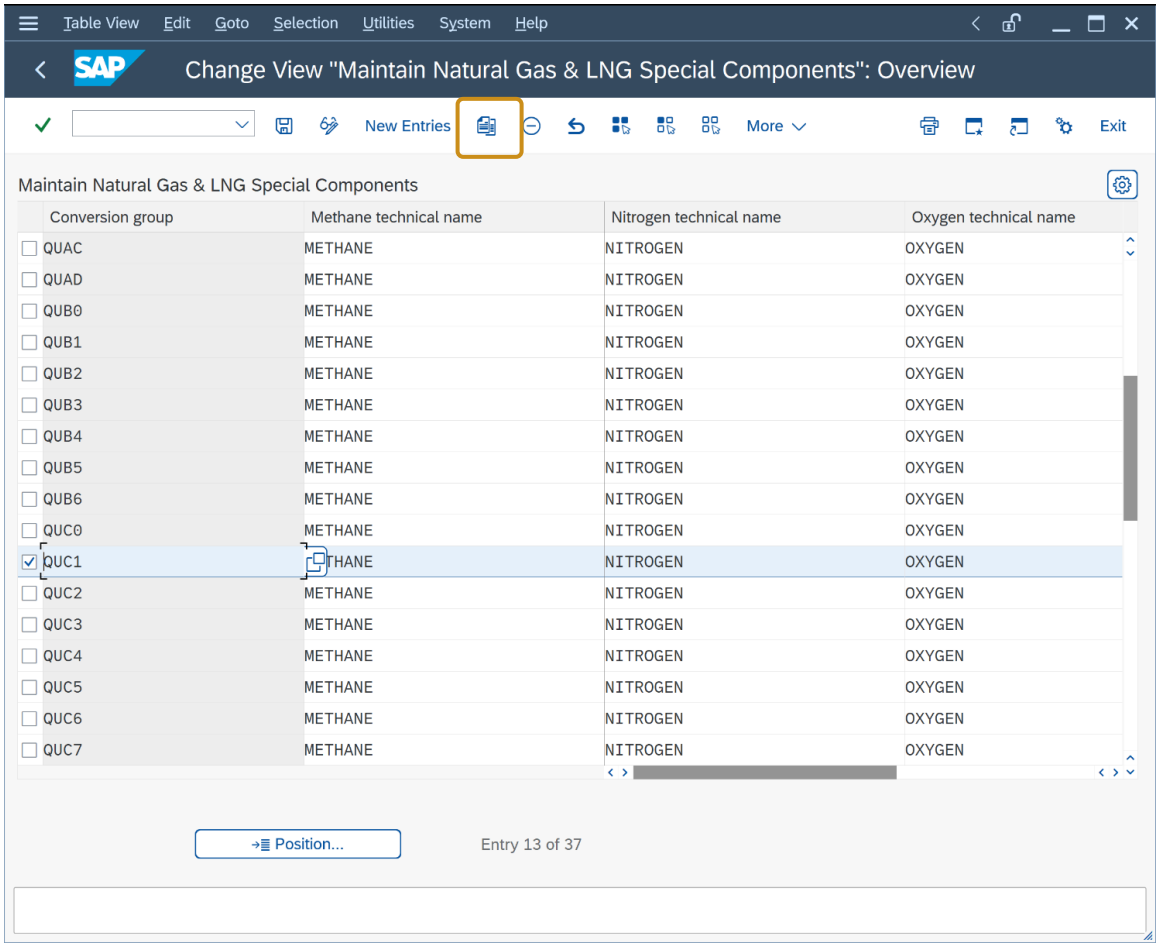
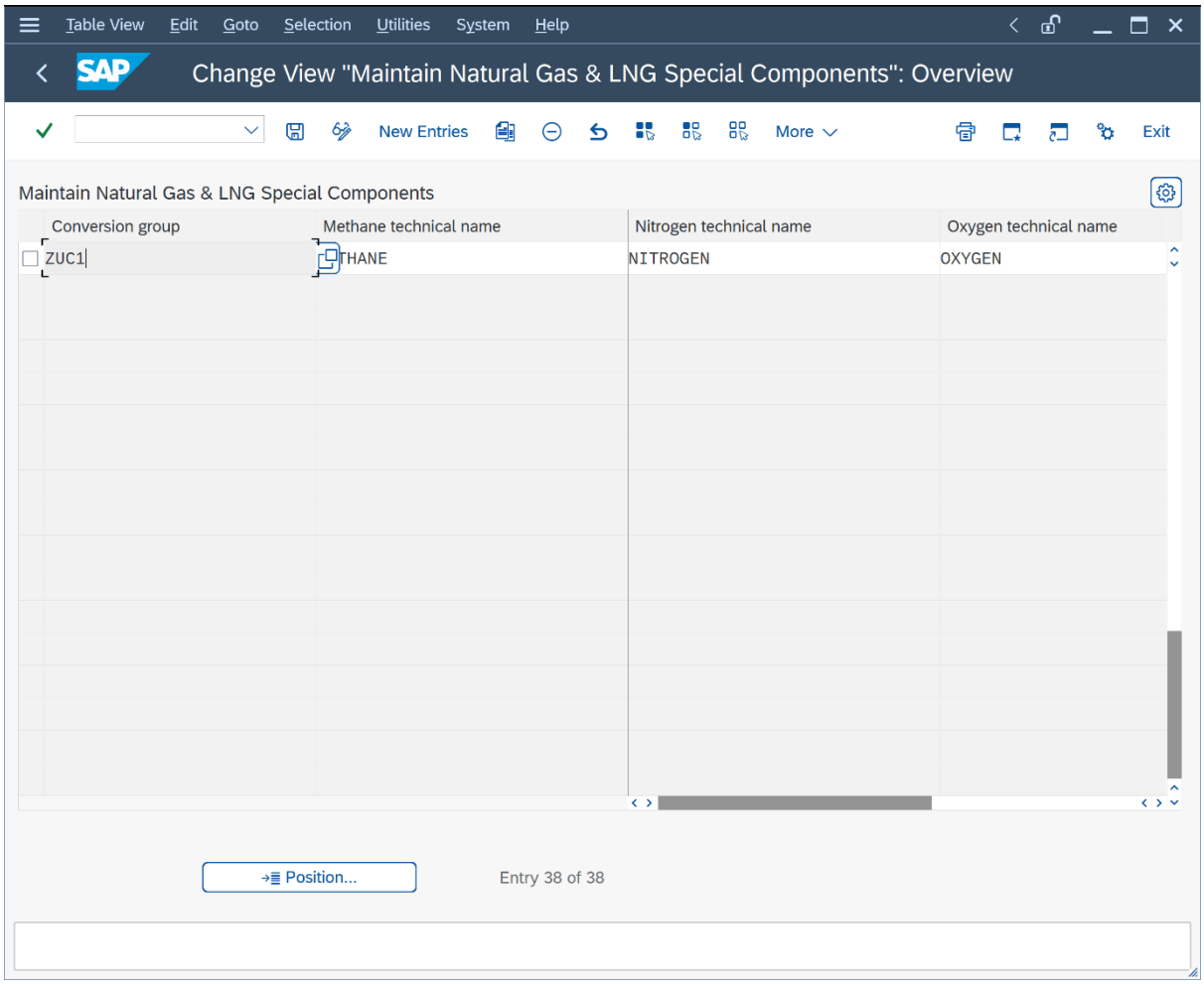


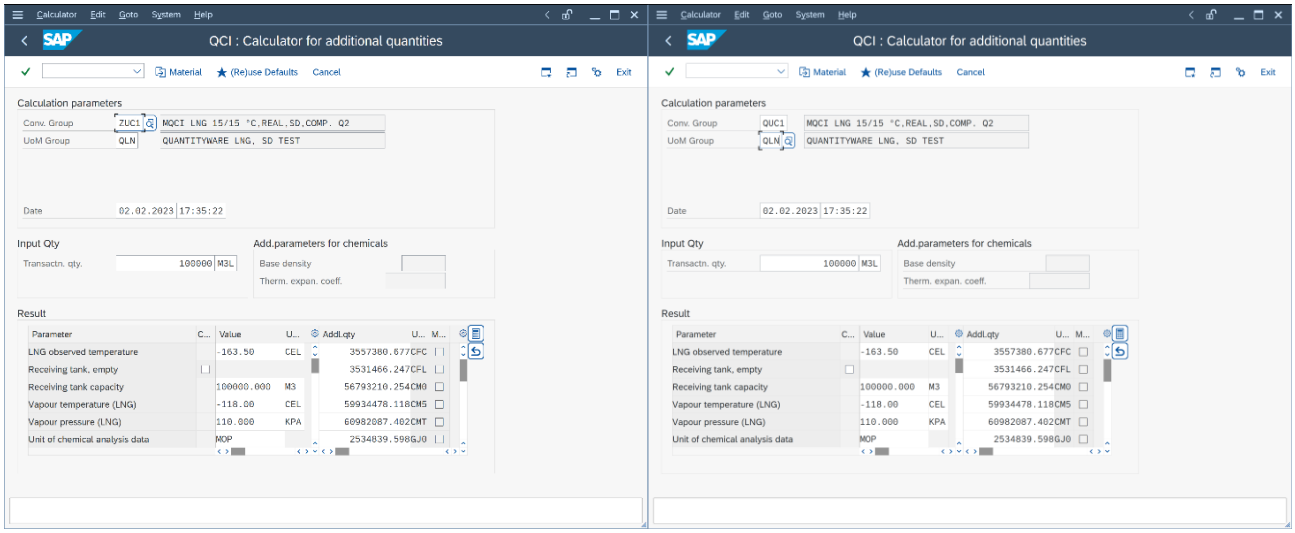
Table View Edit Goto Selection Utilities System Help
Change View "Maintain Natural Gas & LNG Special Components": Overview
New Entries
More
Exit
Maintain Natural Gas & LNG Special Components
Conversion group
Methane technical name
Nitrogen technical name
Oxygen technical name
QUAC METHANE NITROGEN OXYGEN
QUAD METHANE NITROGEN OXYGEN
QUB0 METHANE NITROGEN OXYGEN
QUB1 METHANE NITROGEN OXYGEN
QUB2 METHANE NITROGEN OXYGEN
QUB3 METHANE NITROGEN OXYGEN
QUB4 METHANE NITROGEN OXYGEN
QUB5 METHANE NITROGEN OXYGEN
QUB6 METHANE NITROGEN OXYGEN
QUC0 METHANE NITROGEN OXYGEN
QUC1 METHANE NITROGEN OXYGEN
QUC2 METHANE NITROGEN OXYGEN
QUC3 METHANE NITROGEN OXYGEN
QUC4 METHANE NITROGEN OXYGEN
QUC5 METHANE NITROGEN OXYGEN
QUC6 METHANE NITROGEN OXYGEN
QUC7 METHANE NITROGEN OXYGEN
Position...
Entry 13 of 37

Here, we select: Product & Standard Specific Settings -> Assign natural gas & LNG main component keys. Apparently, an entry is defined for our source conversion group QUC1, it needs to be present for ZUC1 as well. Thus, you now copy this entry to ZUC1:



Save your actions and select an appropriate customizing transport.

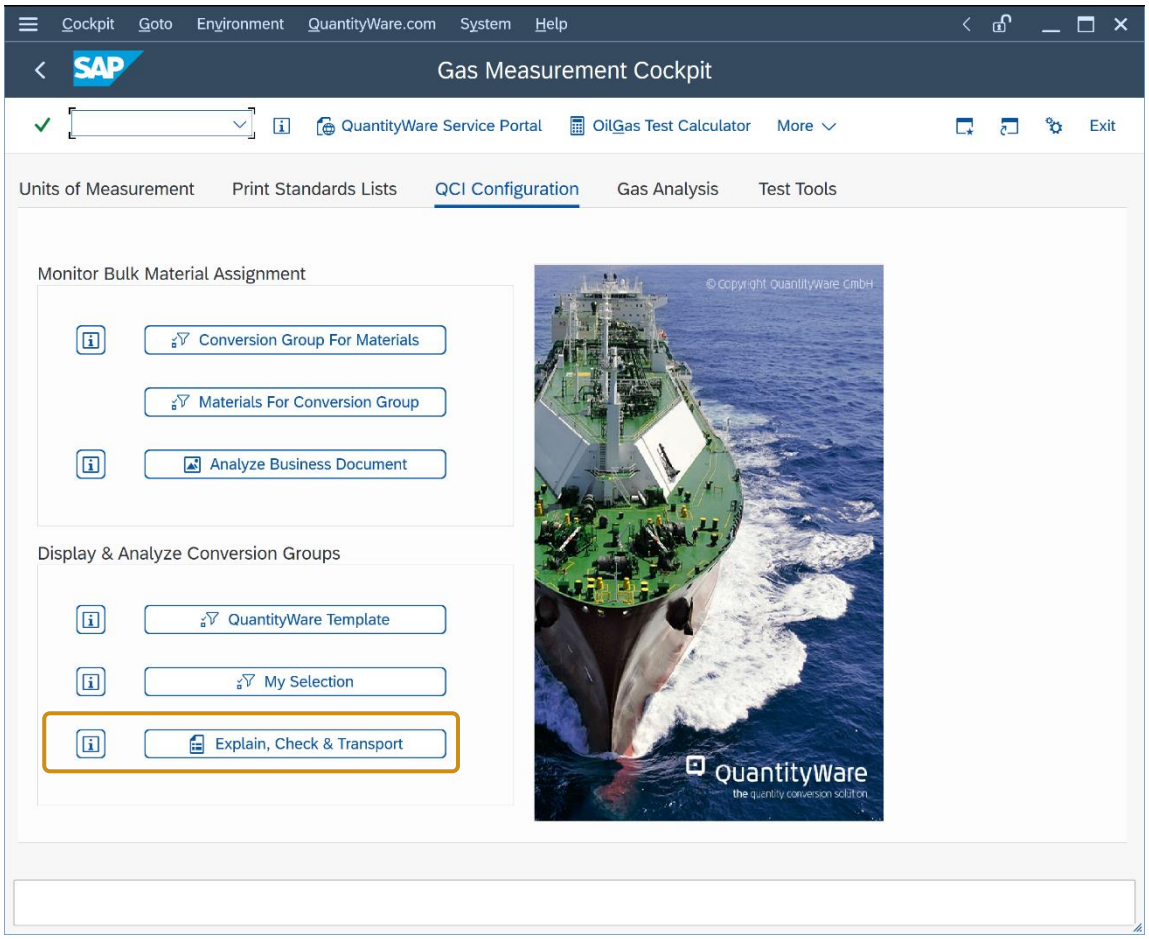
Now the trial calculation is working with the expected identical results:

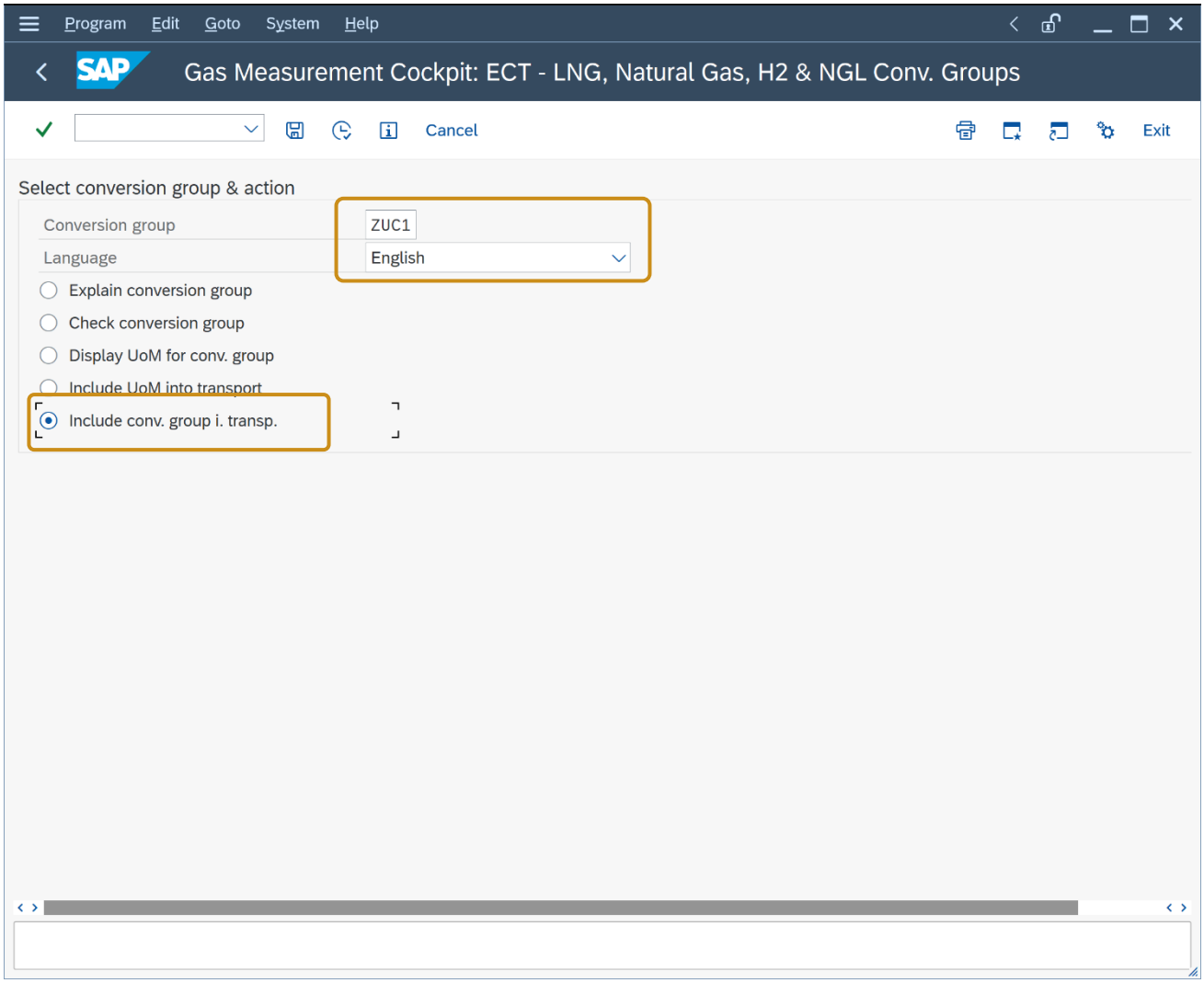


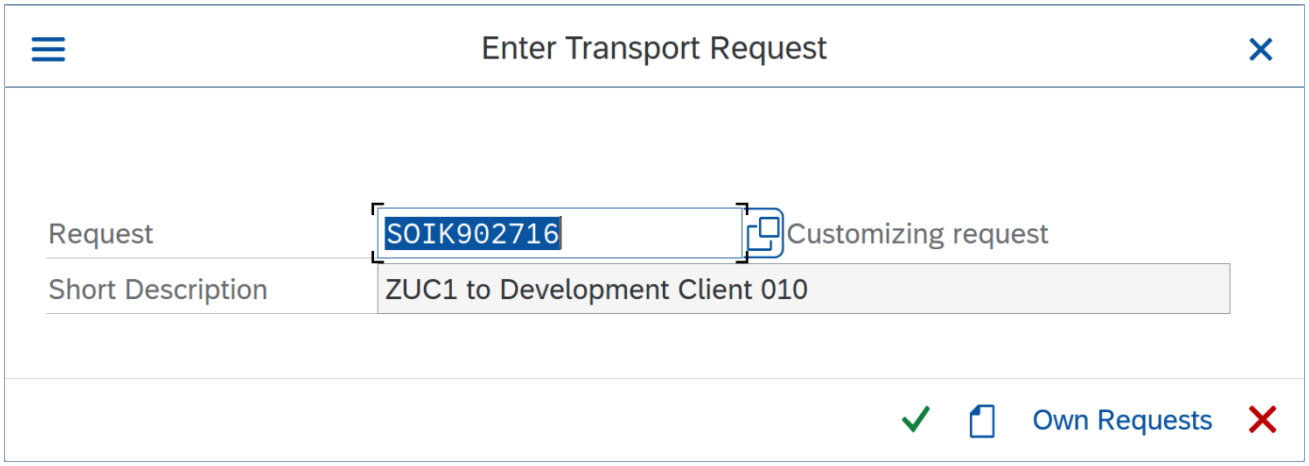
2.3. Test Case 03 – Build Transport for LNG Conversion Group - Template

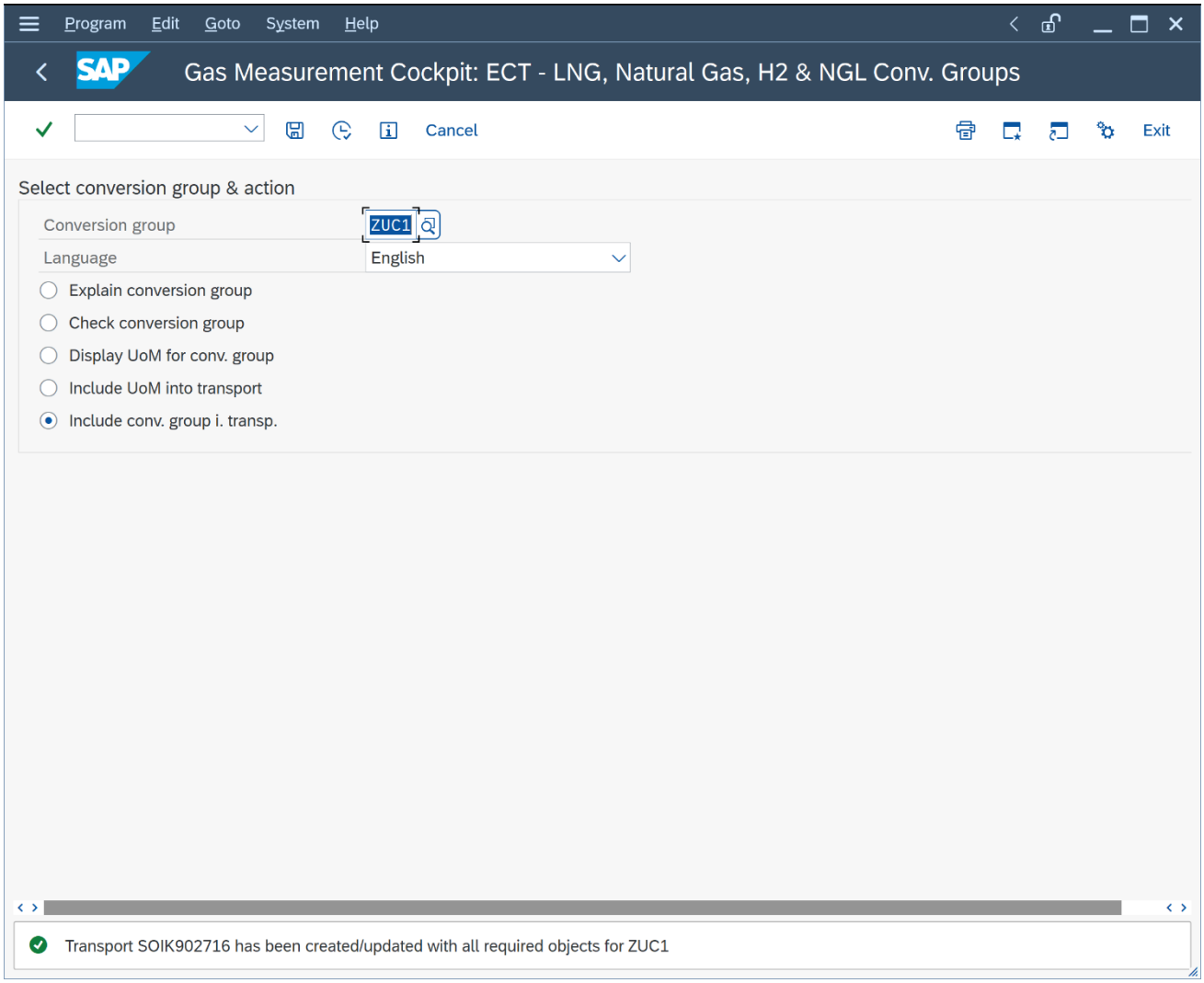
Estimated test case execution time: 150 minutes

Part 1 The GMC contains the “Explain, Check and Transport” Tool, which simplifies the collection of all relevant template configuration data for a conversion group. This is useful as a conversion group is a complex configuration object which may require additional data from many different tables - not only the ones you touched during test case 02 execution. Select the GMC “QCI Configuration & Products” tab strip and select “Explain Check & Transport” - ECT.




Program Edit Goto System Help
Gas Measurement Cockpit: ECT - LNG, Natural Gas, H2 & NGL Conv. Groups
Cancel
Exit
Select conversion group & action
Conversion group
ZUC1
Language
English
Explain conversion group
Check conversion group
Display UoM for conv. group
Include UoM into transport
Include conv. group i. transp.

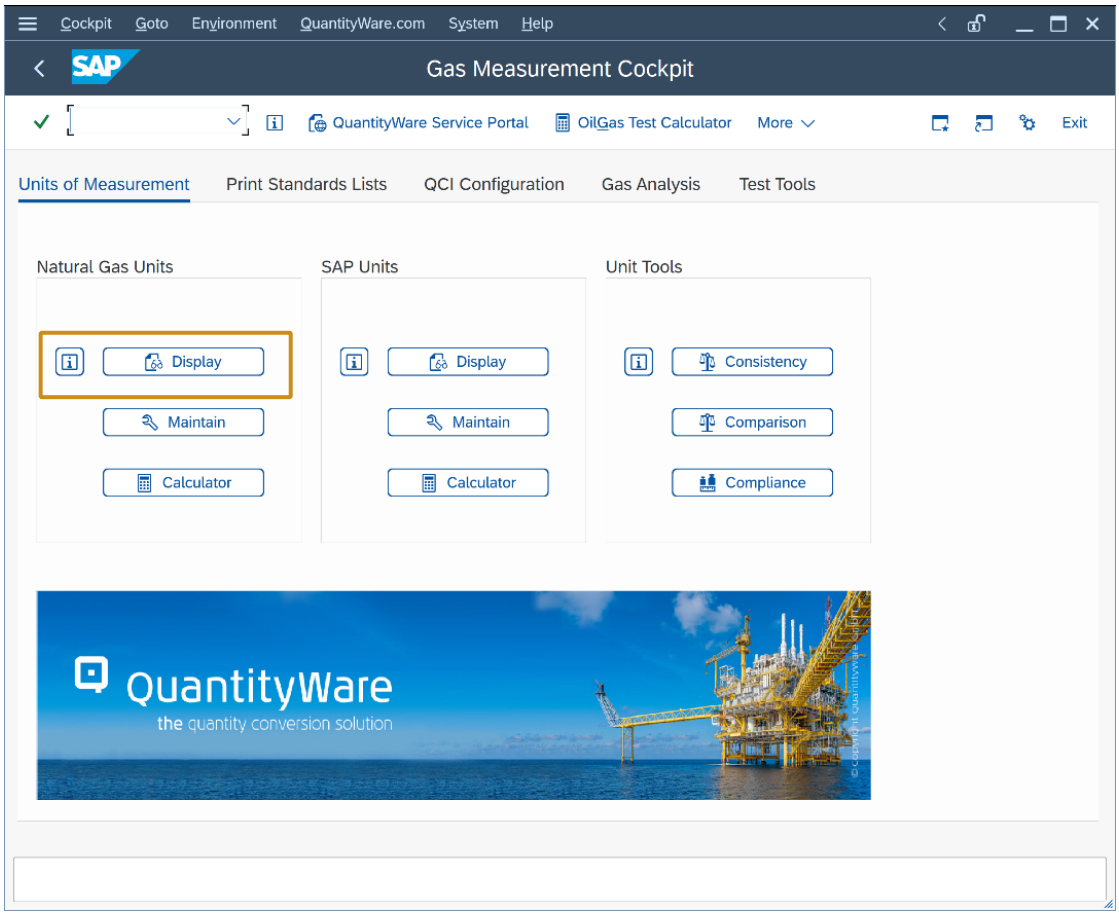

Enter Transport Request
Request
SOIK902716
Customizing request
Short Description
ZUC1 to Development Client 010
Own Requests

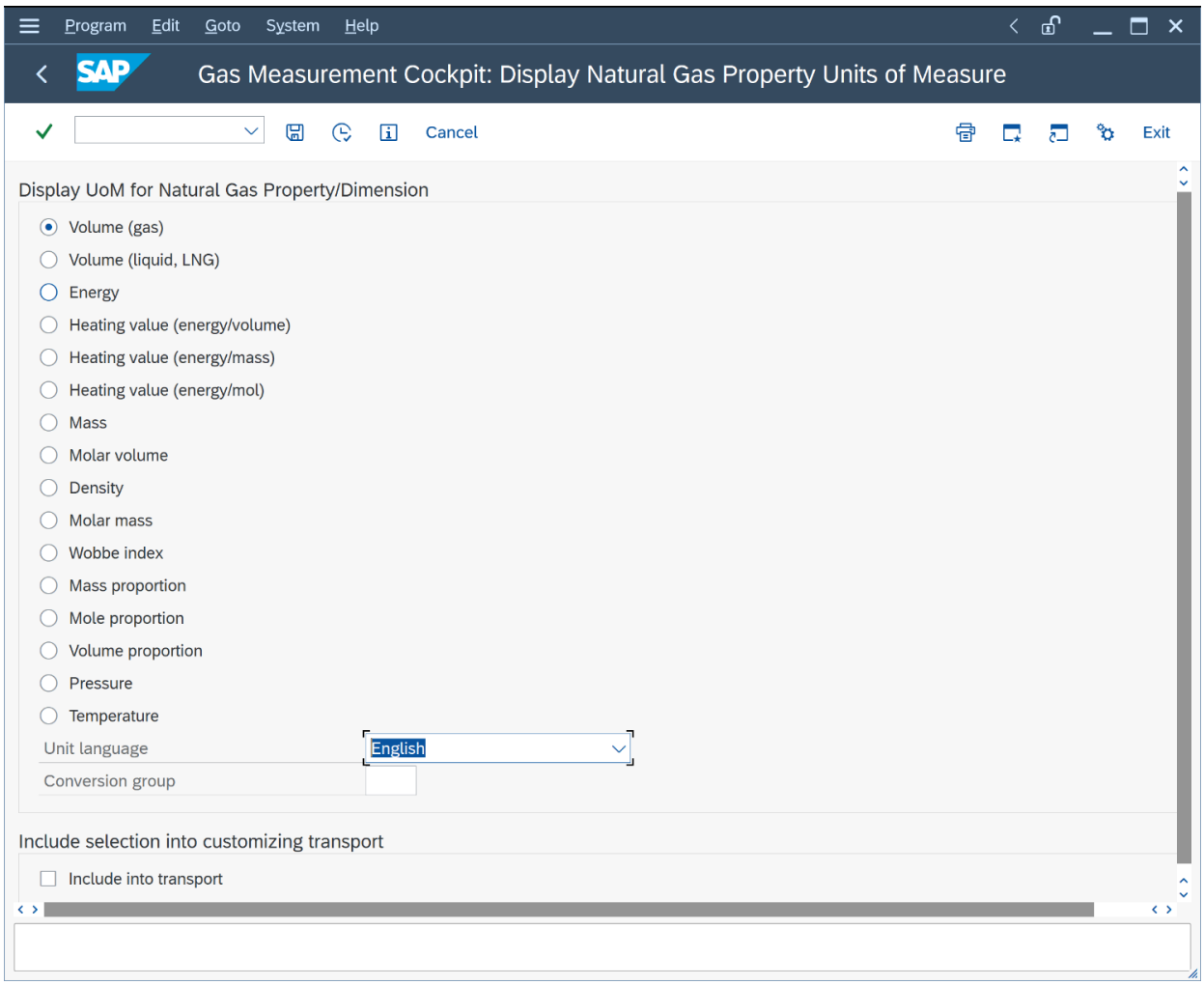


Enter your new ZUC1 conversion group and select “Include conv. group i. transp.”. Select an empty/new customizing transport. **Follow your in-house procedures to have this transport imported into your development client.**

With the "Check, Explain and Transport" tool, you may also include all required UoM data for a conversion group into a single customizing transport. Since your development client typically contains previously configured UoM data, it is strongly recommended to **only copy UoM data for UoM that are NOT already present** into your development client from client 045. Otherwise, you may overwrite your existing and (hopefully) validated UoM data in that client with the QuantityWare template UoM configuration, which is validated using NIST SP 811.

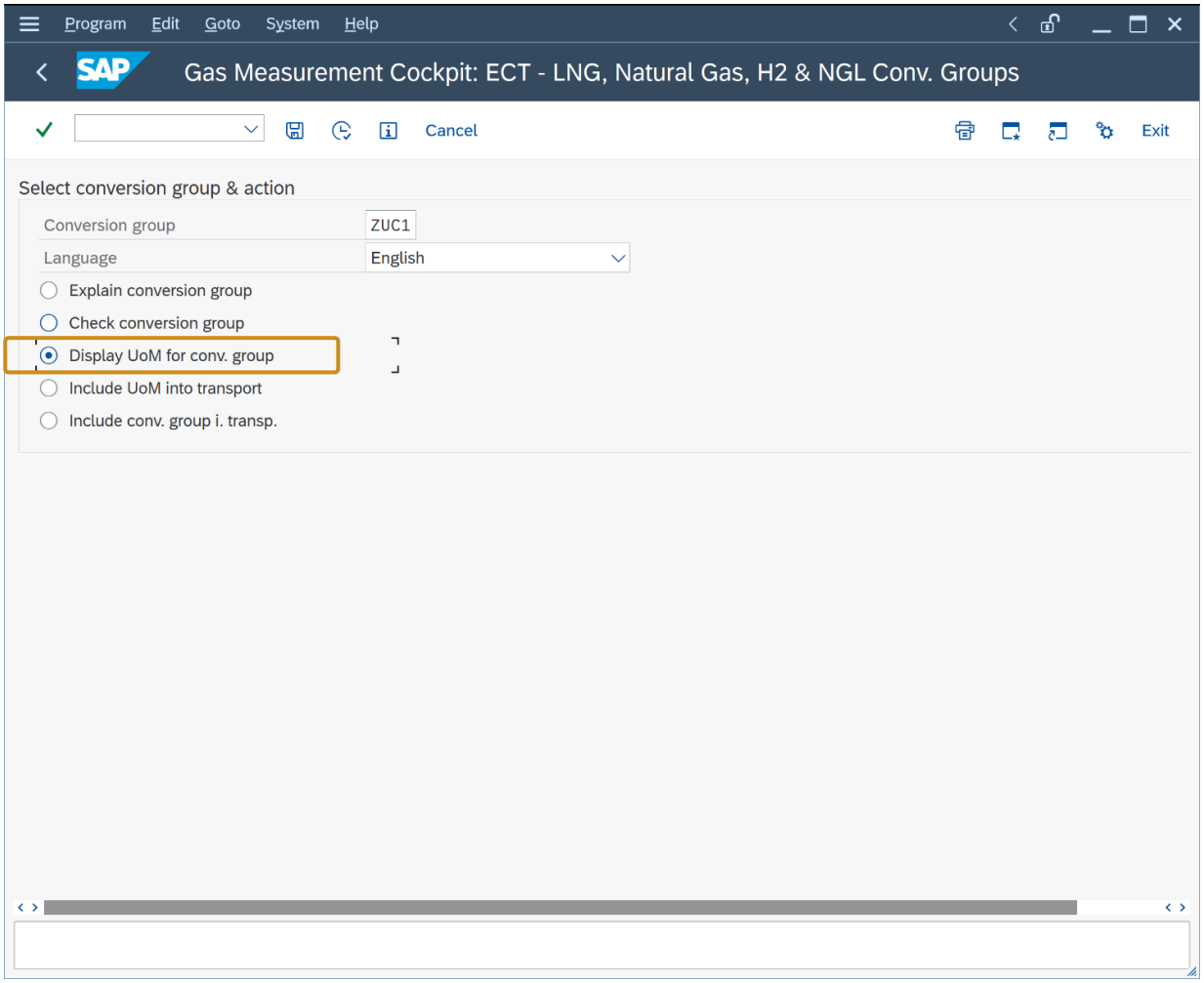
Part 2: Natural gas quantity conversions may require several new SAP Dimension IDs and associated UoM definitions, which are delivered with the BCG Template in client 045. **To prepare the configuration in your development client**, you should thus **merge & migrate** all additional SAP Dimension ID and associated UoM from the template client 045 to your development client. To identify the required Dimension ID and UoM, Select the GMC "Units of Measurement" tab strip and select "Natural Gas Units – Display":

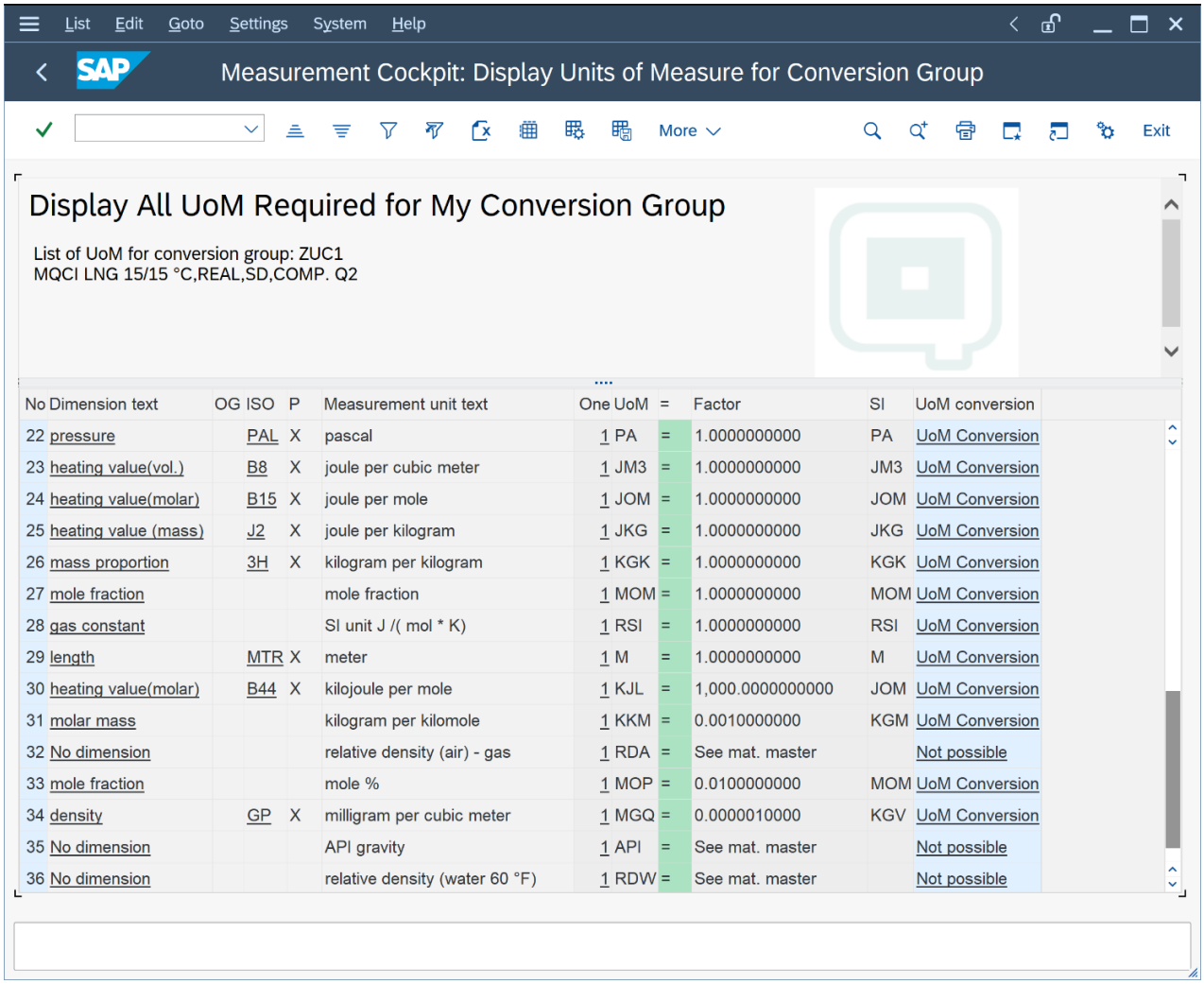




Compare the available UoM for all SAP Dimension ID (Volume, Volume (liquid, LNG), Energy … Pressure, Temperature) with those available in your development client. If Dimension ID or UoM are missing in your development client, collect the missing data in client 045 and **follow your in-house procedures to have this transport imported into your development client.**

Alternatively, you can list the UoM and SAP dimension ID's which are required for conversion group ZUC1 using the ECT tool again:





No	Dimension text	OG	ISO	P	Measurement unit text	One	UoM	=	Factor	SI	UoM conversion
22	pressure		PAL	X	pascal	1	PA	=	1.0000000000	PA	UoM Conversion
23	heating value(vol.)		B8	X	joule per cubic meter	1	JM3	=	1.0000000000	JM3	UoM Conversion
24	heating value(molar)		B15	X	joule per mole	1	JOM	=	1.0000000000	JOM	UoM Conversion
25	heating value (mass)		J2	X	joule per kilogram	1	JKG	=	1.0000000000	JKG	UoM Conversion
26	mass proportion		3H	X	kilogram per kilogram	1	KGK	=	1.0000000000	KGK	UoM Conversion
27	mole fraction				mole fraction	1	MOM	=	1.0000000000	MOM	UoM Conversion
28	gas constant				SI unit J /(mol * K)	1	RSI	=	1.0000000000	RSI	UoM Conversion
29	length		MTR	X	meter	1	M	=	1.0000000000	M	UoM Conversion
30	heating value(molar)		B44	X	kilojoule per mole	1	KJL	=	1,000.0000000000	JOM	UoM Conversion
31	molar mass				kilogram per kilomole	1	KKM	=	0.0010000000	KGM	UoM Conversion
32	No dimension				relative density (air) - gas	1	RDA	=	See mat. master		Not possible
33	mole fraction				mole %	1	MOP	=	0.0100000000	MOM	UoM Conversion
34	density		GP	X	milligram per cubic meter	1	MGQ	=	0.0000010000	KGV	UoM Conversion
35	No dimension				API gravity	1	API	=	See mat. master		Not possible
36	No dimension				relative density (water 60 °F)	1	RDW	=	See mat. master		Not possible

You may selectively collect this UoM data in client 045 and **follow your in-house procedures to have this transport imported into your development client.**

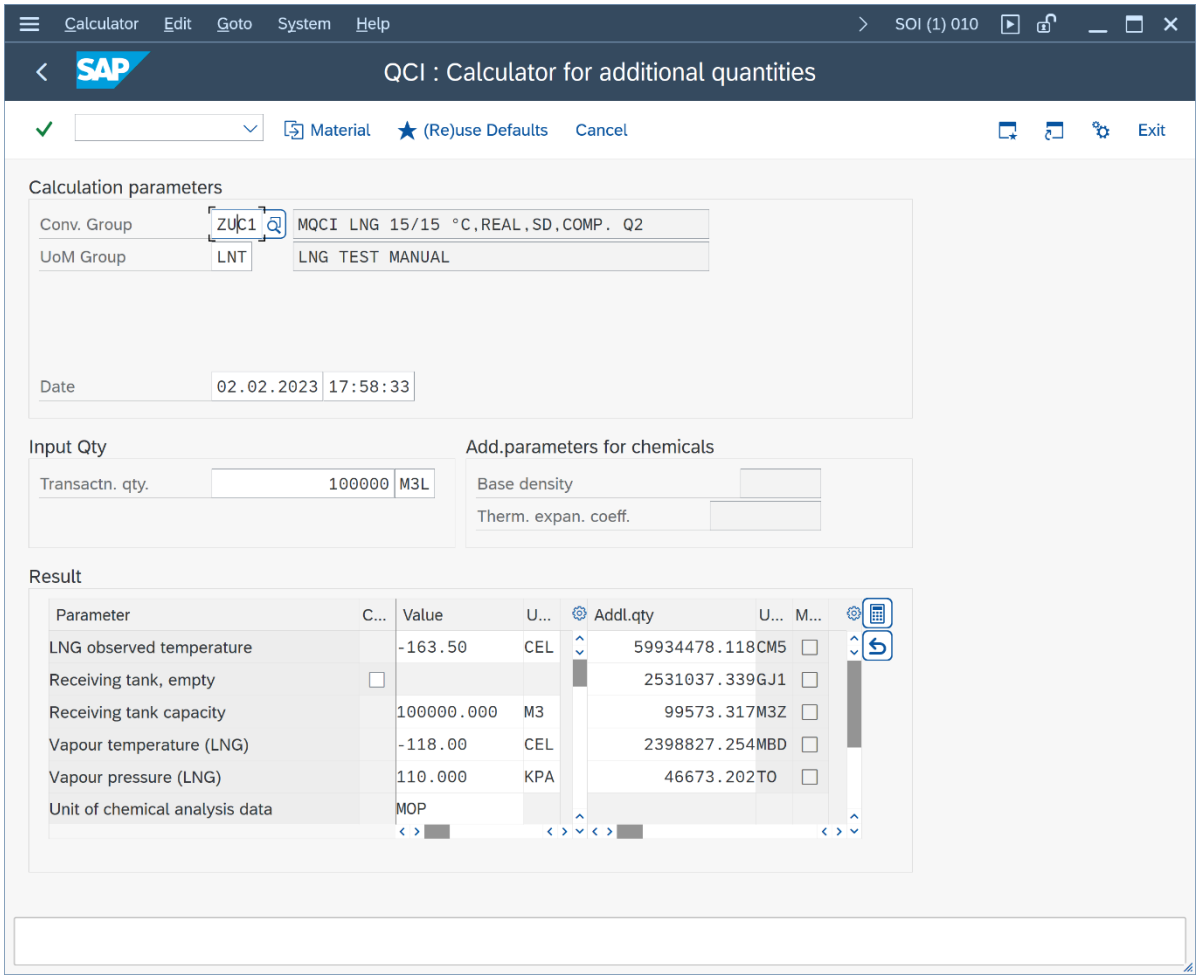
In the following test cases, your material and plant data definitions as well as available UoM groups/definitions may differ from those used in the screen shots

2.4. Test Case 04 – Test LNG Conversion Group in Development Client

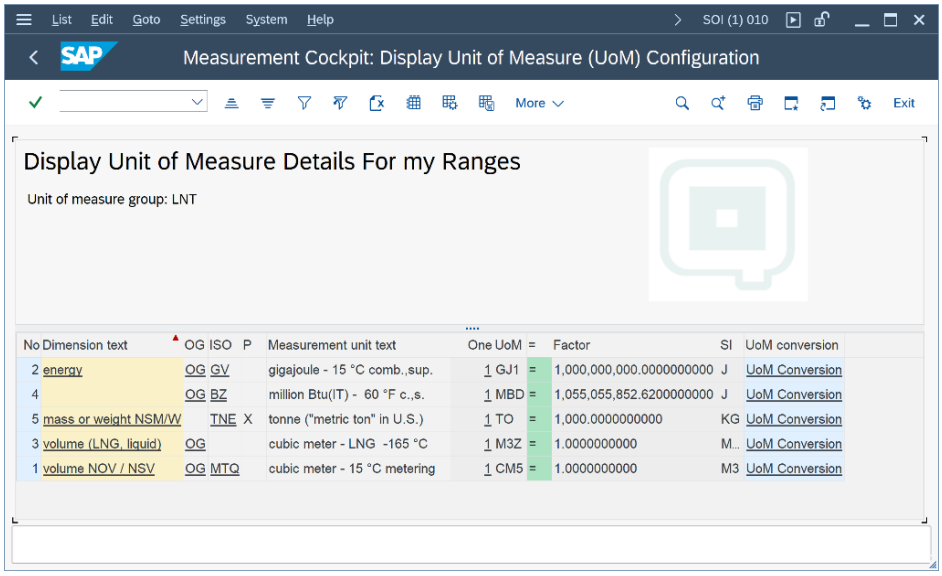
Estimated test case execution time: 60 minutes

After your ZUC1 conversion group has been successfully transported to your development client, log on to that client and start the Gas Measurement Cockpit (GMC) using transaction /n/qtyw/cockpit_gas. Note that in this client, the GMC will show less options than in client 045 (where the QuantityWare template is available). For example, the BCG installation test is not available in this client, since it requires the complete QuantityWare BCG template.

Part 1: Go to the "Oil & Gas Test Calculator" and check if conversion group ZUC1 has been transported correctly to your development client, i.e., perform several trial calculations:

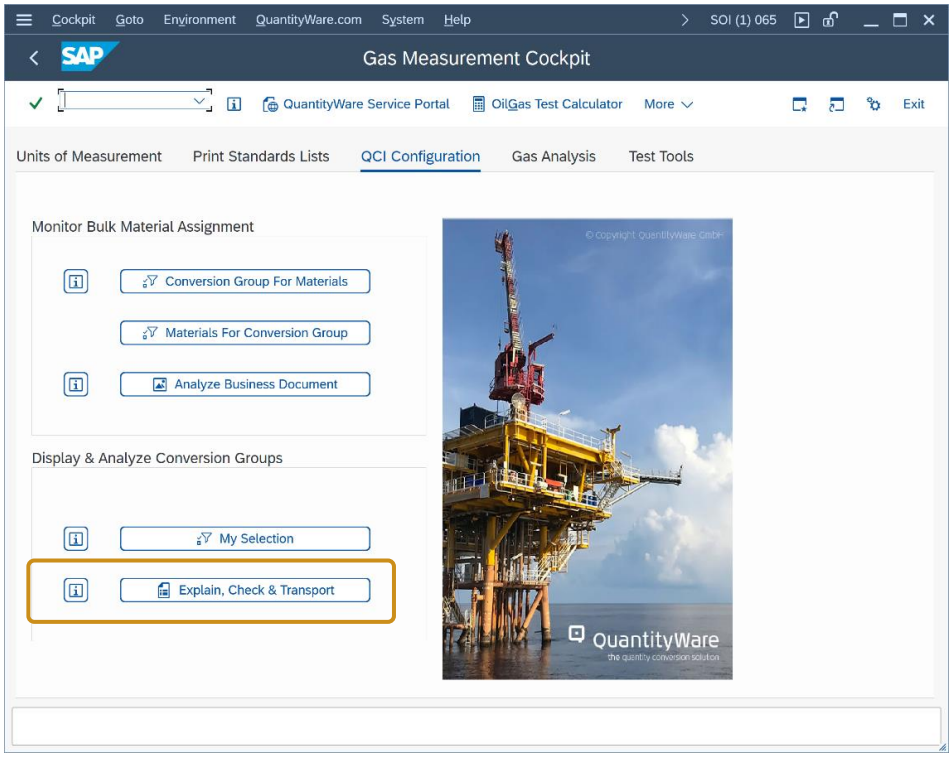


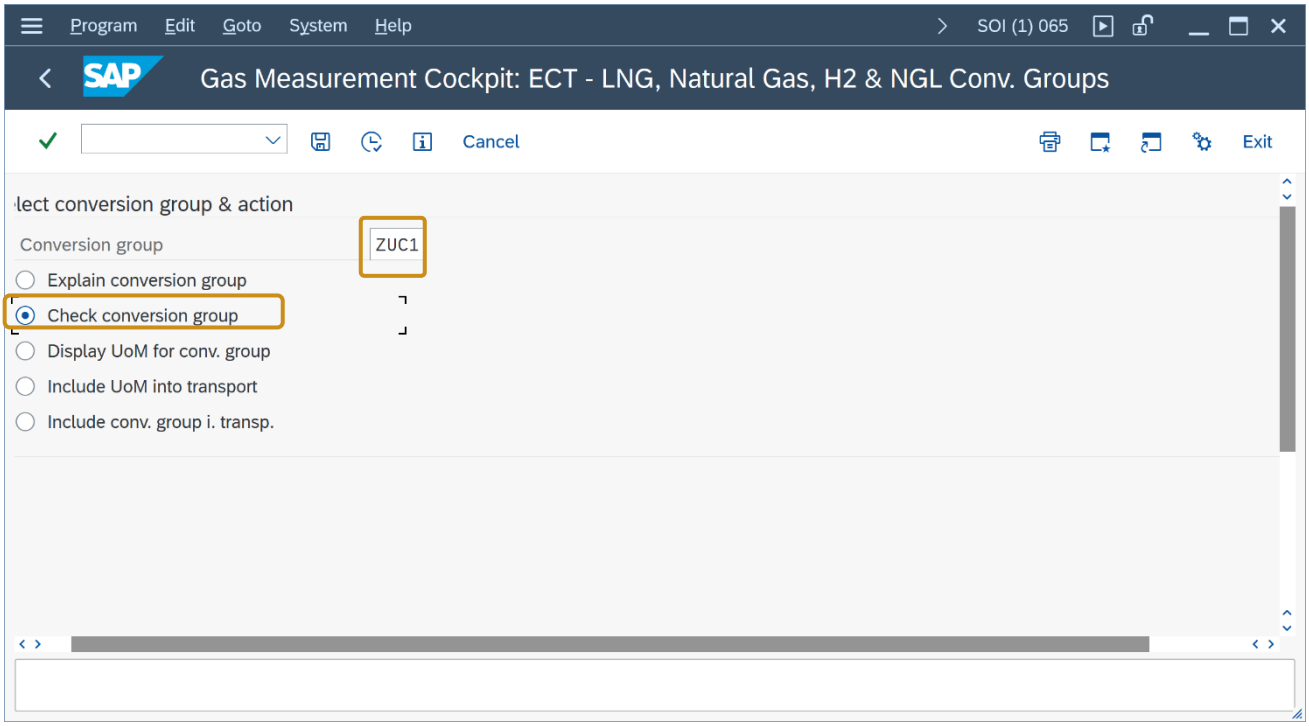
Note that we did not transport test UoM group QLN and are using a newly defined UoM group LNT instead. UoM group LNG contains 5 different UoM of four different SAP dimensions:

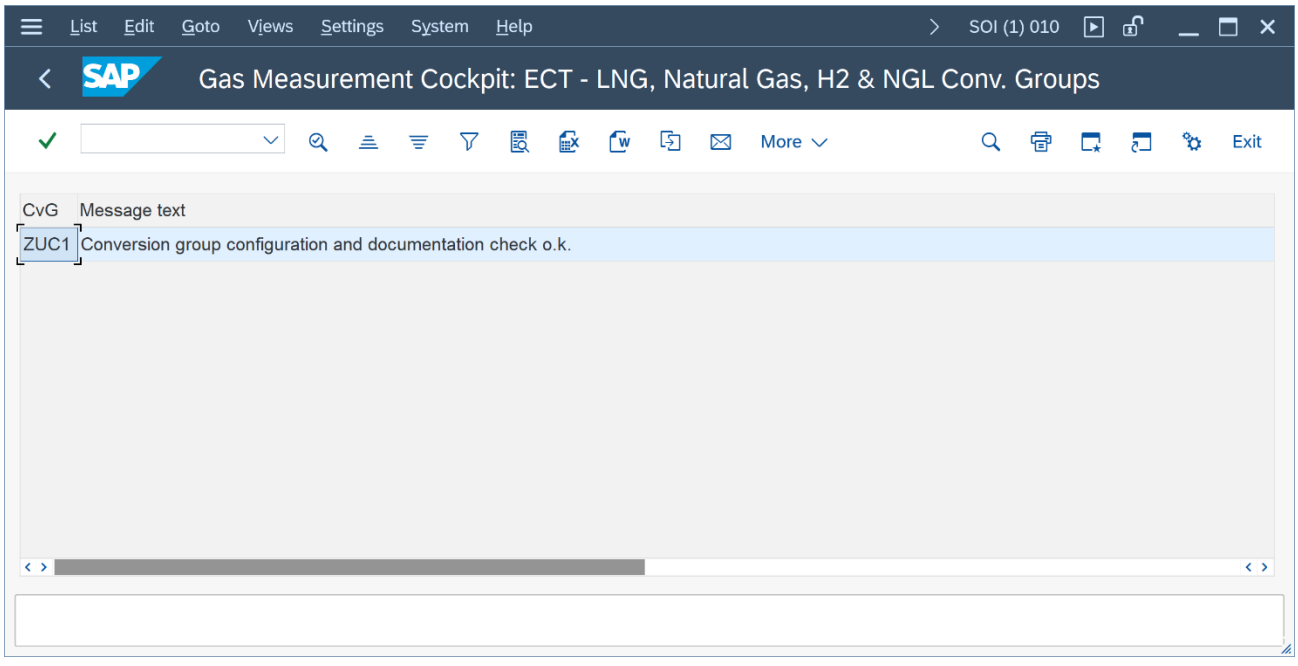


In your development client, you should define a UoM group like UoM group LNG for testing purposes.

Part 2: Once you have manually validated that conversion group ZUC1 is running in your development client, perform the automated validation test. Select the GMC "QCI Configuration" tab strip and select "Explain Check & Transport". Enter ZUC1 as conversion group, select "Check conversion group" and then "Execute" (F8)





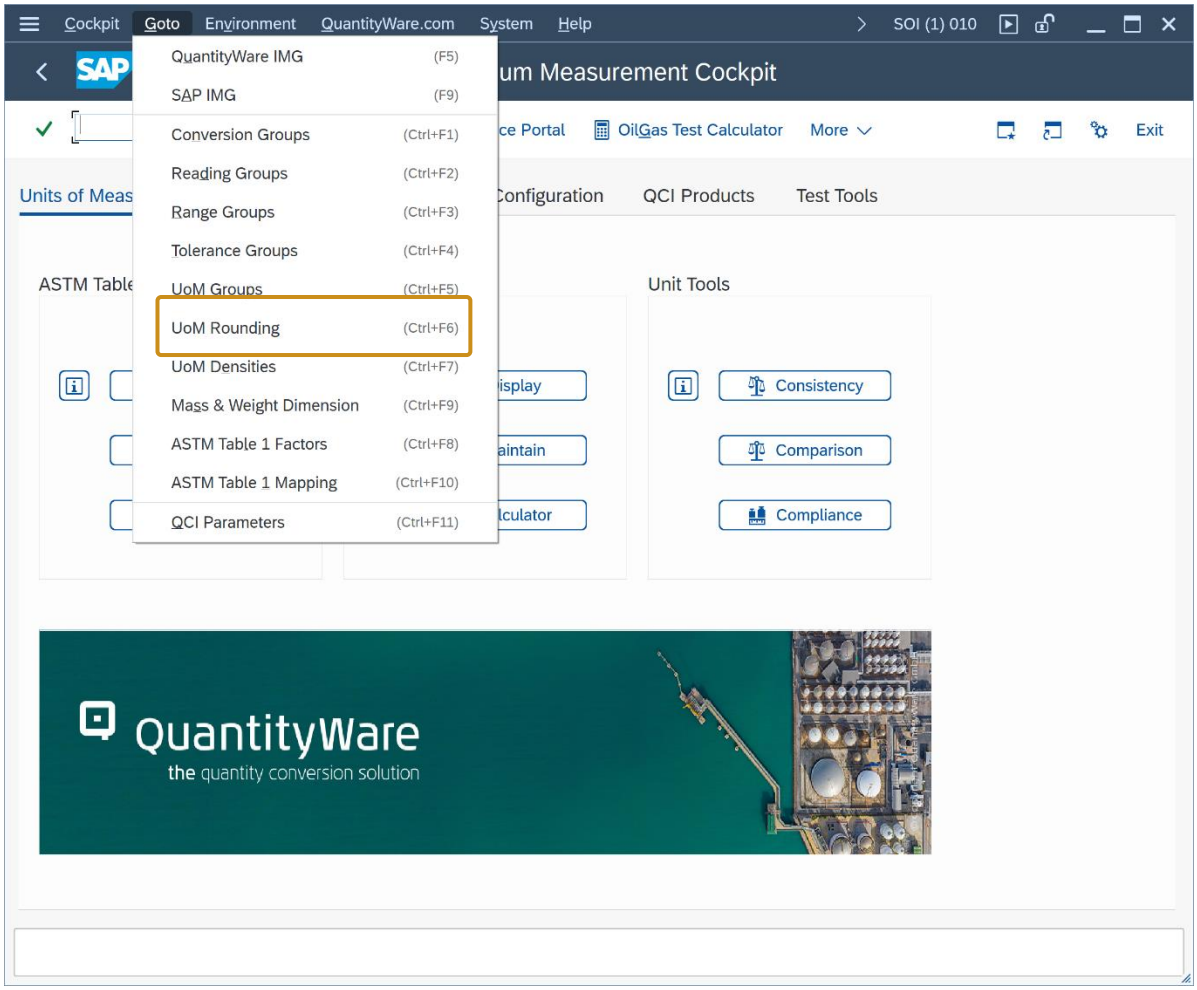


Ensure that no error or warning messages are present. **This test should produce identical results when compared with the results for ZUC1 in client 045.**

2.5. Test Case 05 – Define UoM Rounding - Development

Estimated test case execution time: 10 minutes

In your development client, define the appropriate UoM rounding for your UoM group. From the GMC menu, select: Goto -> UoM Rounding and enter the UoM M3Z, MBD, GJ1, CM5 and TO with 1 / 0 (Space) decimal places rounding:



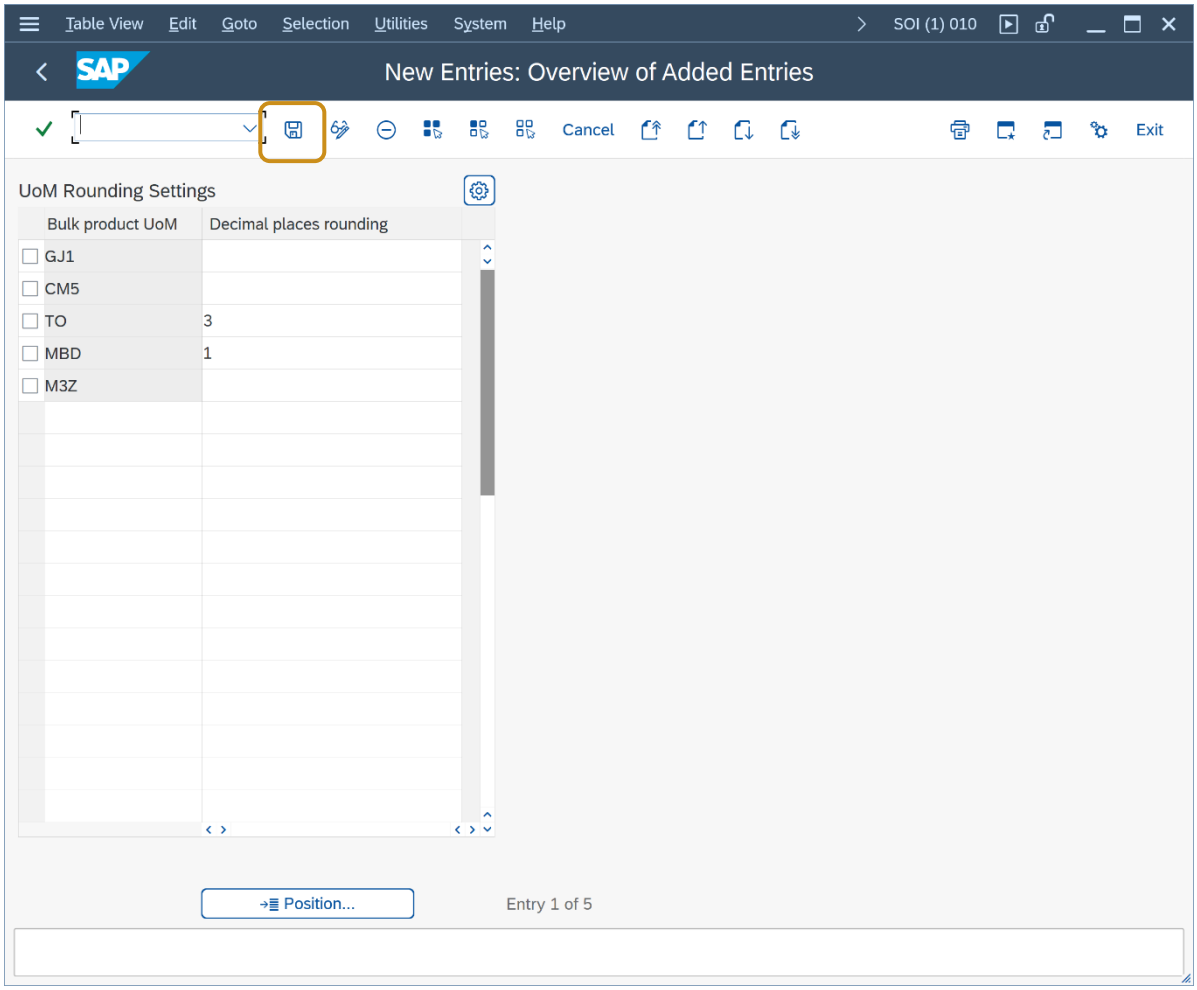
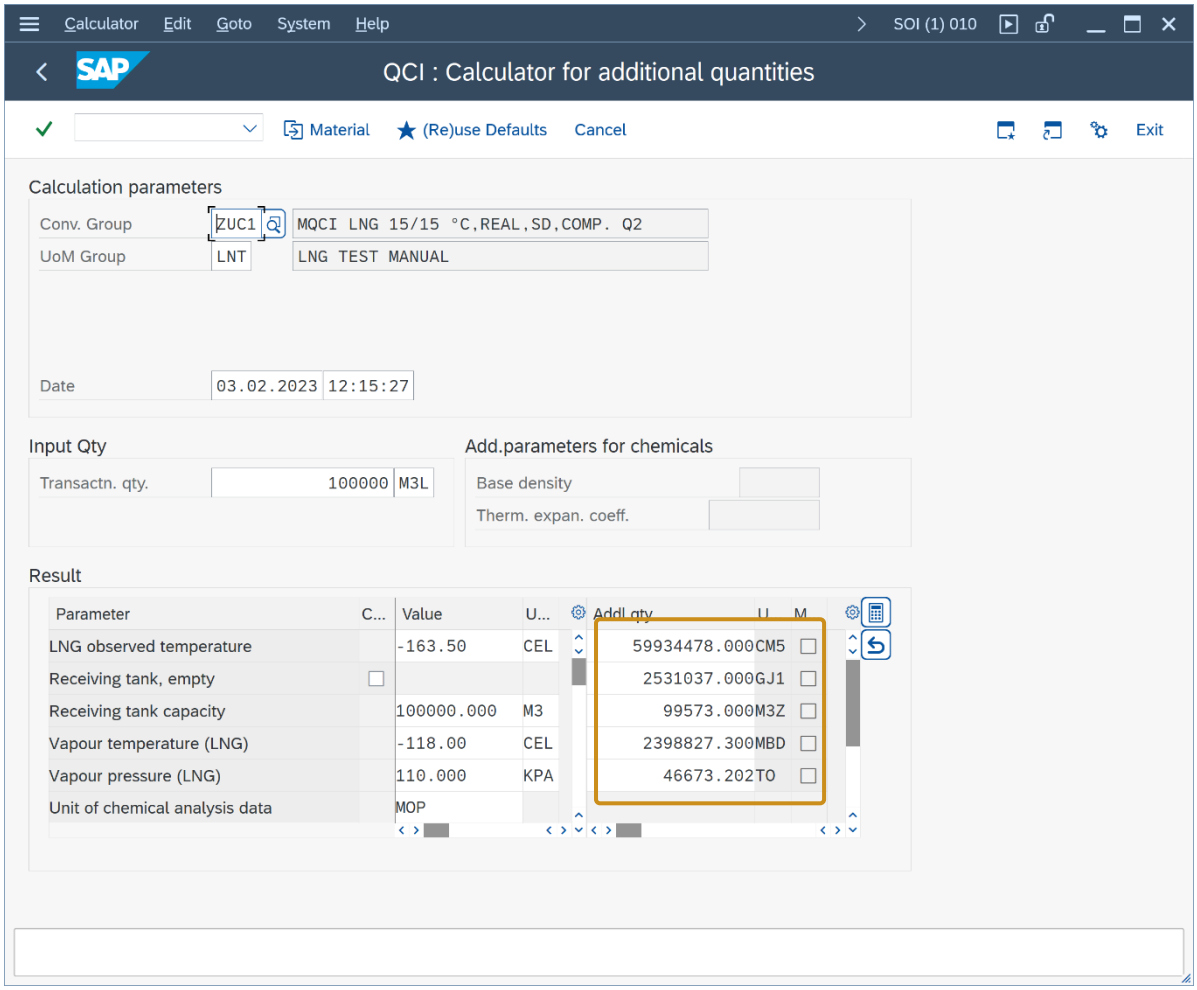


Table View
Edit
Goto
Selection
Utilities
System
Help
SOI (1) 010
New Entries: Overview of Added Entries
Cancel
Exit
UoM Rounding Settings
Bulk product UoM
Decimal places rounding
GJ1
CM5
TO
3
MBD
1
M3Z
Position...
Entry 1 of 5

Check that the rounding settings are working by performing another trial calculation (via GMC push button “Oil & Gas Test Calculator”):

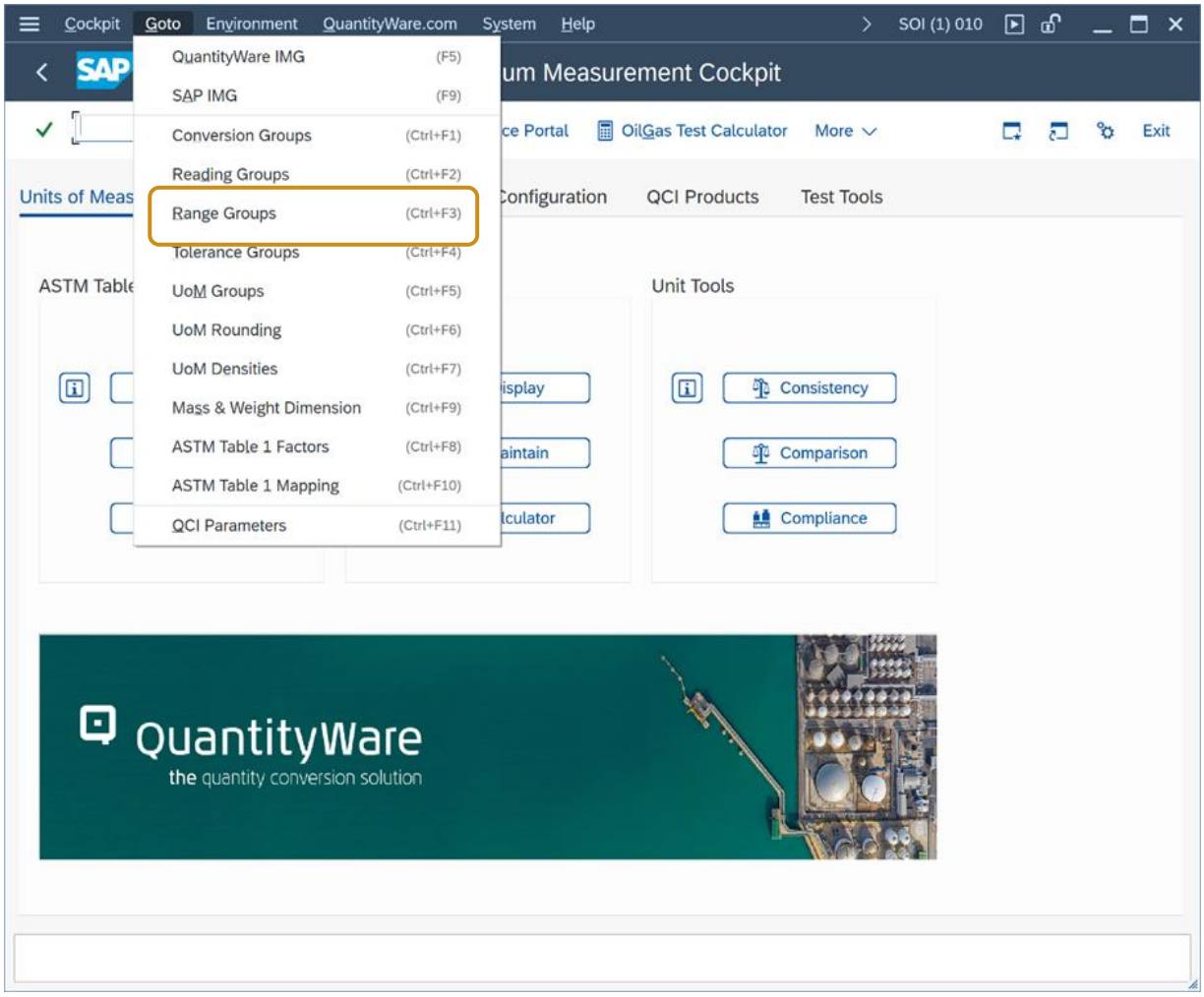


Via transaction CUNI, you may also change the display decimal settings for all UoM, such that trailing zeros are no longer displayed (as shown in the screen print above).

2.6. Test Case 06 – Define Ranges for LNG Conversion Group - Development

Estimated test case execution time: 20 minutes

In your development client, define the appropriate range limits for three of the input parameters. From the GMC menu, select: Goto -> Range Groups and define range limits for the LNG observed temperature (liquid), LNG methane fraction (CH4) and LNG Tot. Sulphur (incl. Mercaptan) fraction:



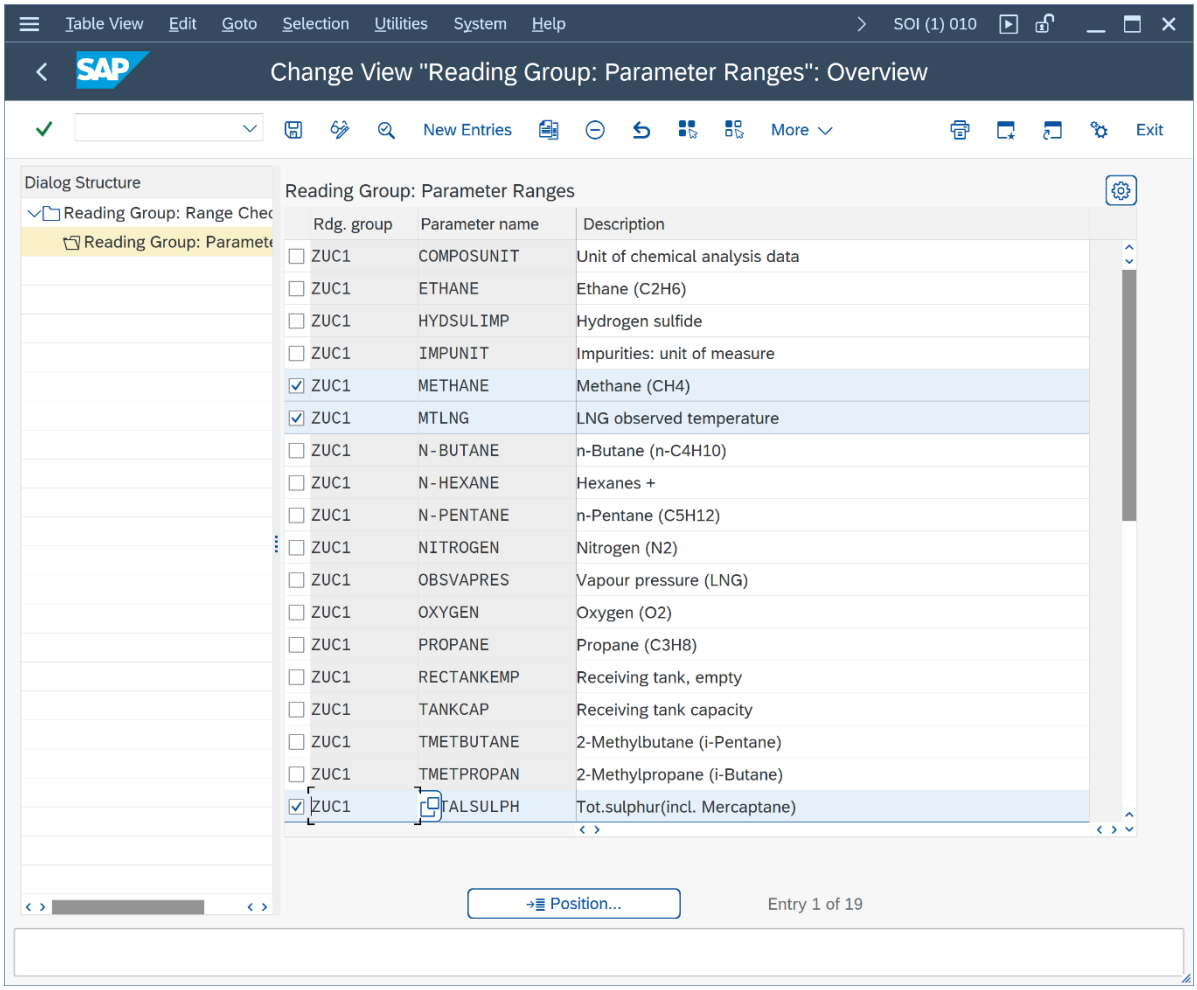


Table View Edit Goto Selection Utilities System Help
SOI (1) 010
Change View "Reading Group: Parameter Ranges": Overview
New Entries
More
Exit
Dialog Structure
Reading Group: Range Chec
Reading Group: Paramete
Reading Group: Parameter Ranges
Rdg. group
Parameter name
Description
ZUC1 COMPOSUNIT Unit of chemical analysis data
ZUC1 ETHANE Ethane (C2H6)
ZUC1 HYDSULIMP Hydrogen sulfide
ZUC1 IMPUNIT Impurities: unit of measure
ZUC1 METHANE Methane (CH4)
ZUC1 MTLNG LNG observed temperature
ZUC1 N-BUTANE n-Butane (n-C4H10)
ZUC1 N-HEXANE Hexanes +
ZUC1 N-PENTANE n-Pentane (C5H12)
ZUC1 NITROGEN Nitrogen (N2)
ZUC1 OBSVAPRES Vapour pressure (LNG)
ZUC1 OXYGEN Oxygen (O2)
ZUC1 PROPANE Propane (C3H8)
ZUC1 RECTANKEMP Receiving tank, empty
ZUC1 TANKCAP Receiving tank capacity
ZUC1 TMETBUTANE 2-Methylbutane (i-Pentane)
ZUC1 TMETPROPAN 2-Methylpropane (i-Butane)
ZUC1 TALSULPH Tot.sulphur(incl. Mercaptane)
Position...
Entry 1 of 19

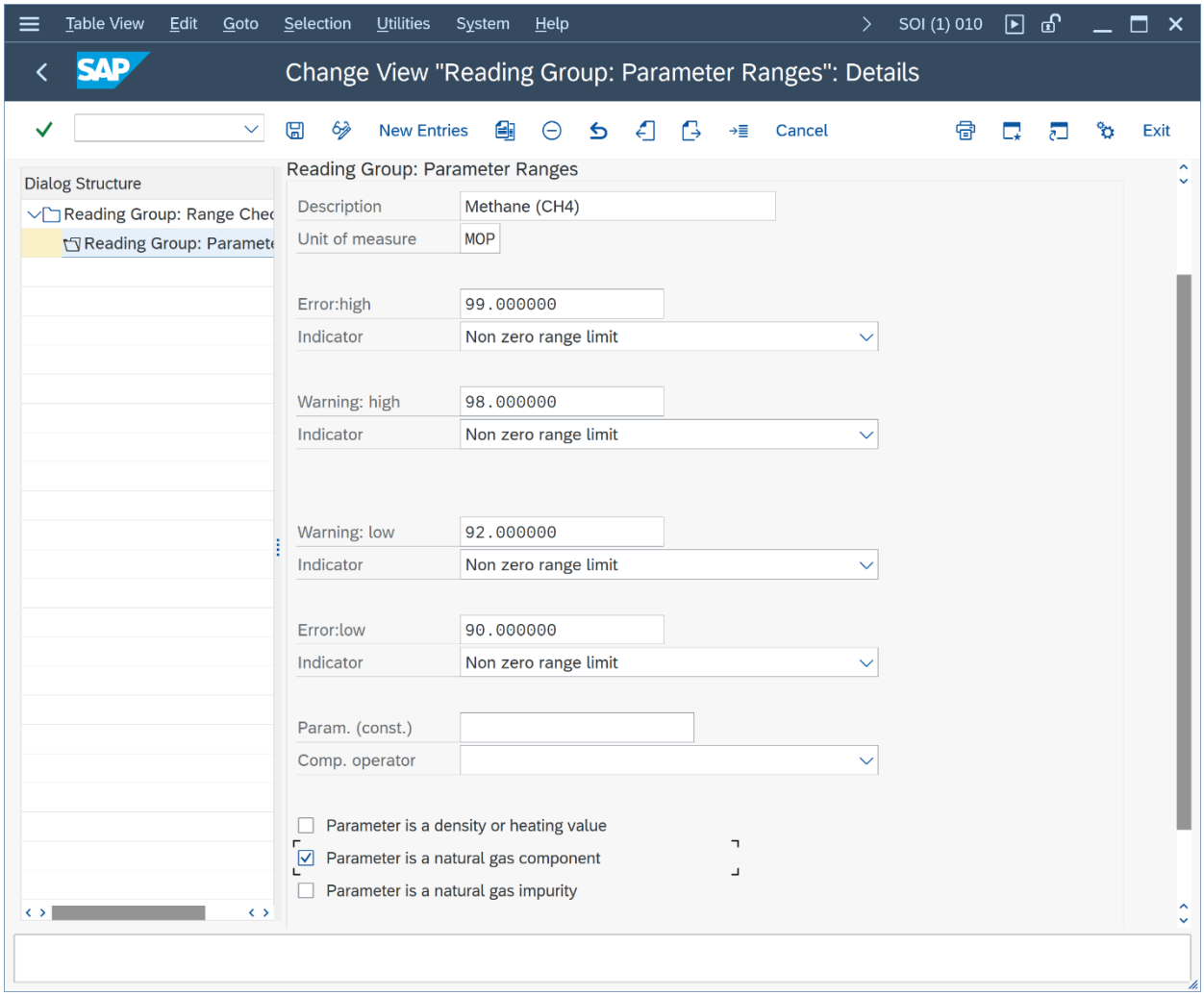


Table View Edit Goto Selection Utilities System Help
SOI (1) 010
Change View "Reading Group: Parameter Ranges": Details
New Entries
Cancel
Exit
Dialog Structure
Reading Group: Range Chec
Reading Group: Paramete
Reading Group: Parameter Ranges
Description
Methane (CH4)
Unit of measure
MOP
Error:high
99.000000
Indicator
Non zero range limit
Warning: high
98.000000
Indicator
Non zero range limit
Warning: low
92.000000
Indicator
Non zero range limit
Error:low
90.000000
Indicator
Non zero range limit
Param. (const.)
Comp. operator
Parameter is a density or heating value
Parameter is a natural gas component
Parameter is a natural gas impurity

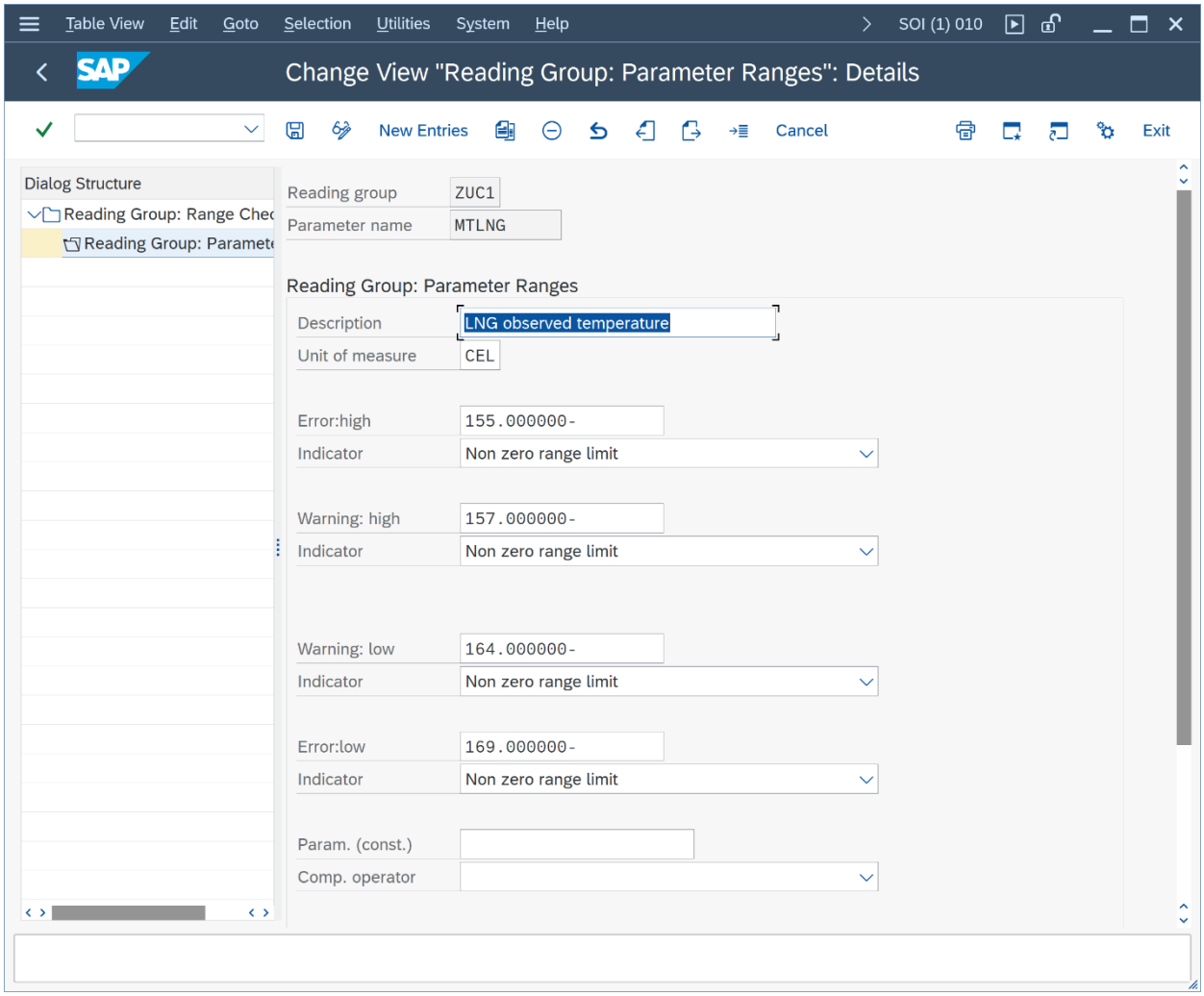


Table View Edit Goto Selection Utilities System Help SOI (1) 010
Change View "Reading Group: Parameter Ranges": Details
New Entries Cancel Exit
Dialog Structure
Reading Group: Range Chec
Reading Group: Paramete
Reading group ZUC1
Parameter name MTLNG
Reading Group: Parameter Ranges
Description LNG observed temperature
Unit of measure CEL
Error:high 155.000000-
Indicator Non zero range limit
Warning: high 157.000000-
Indicator Non zero range limit
Warning: low 164.000000-
Indicator Non zero range limit
Error:low 169.000000-
Indicator Non zero range limit
Param. (const.)
Comp. operator

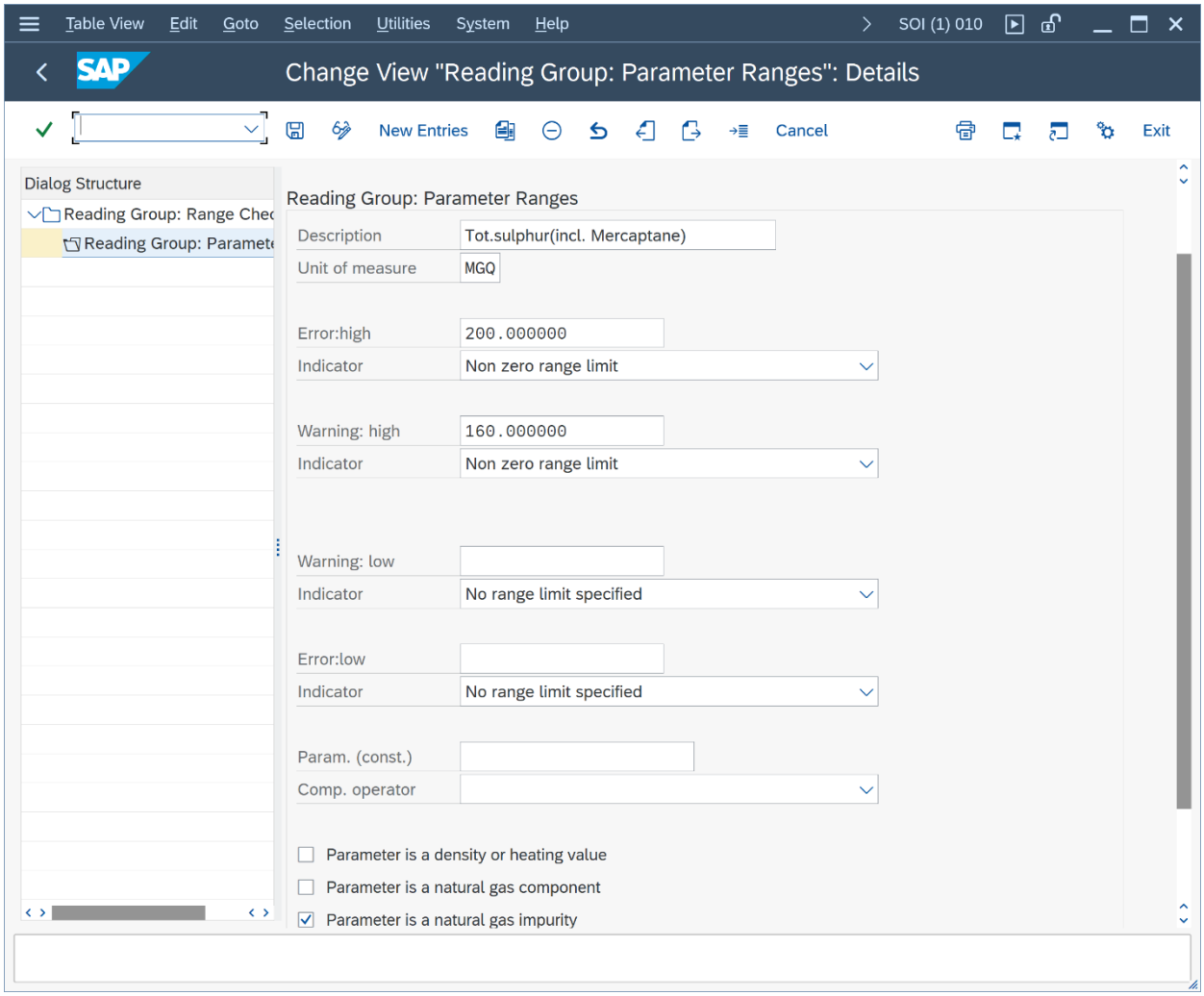
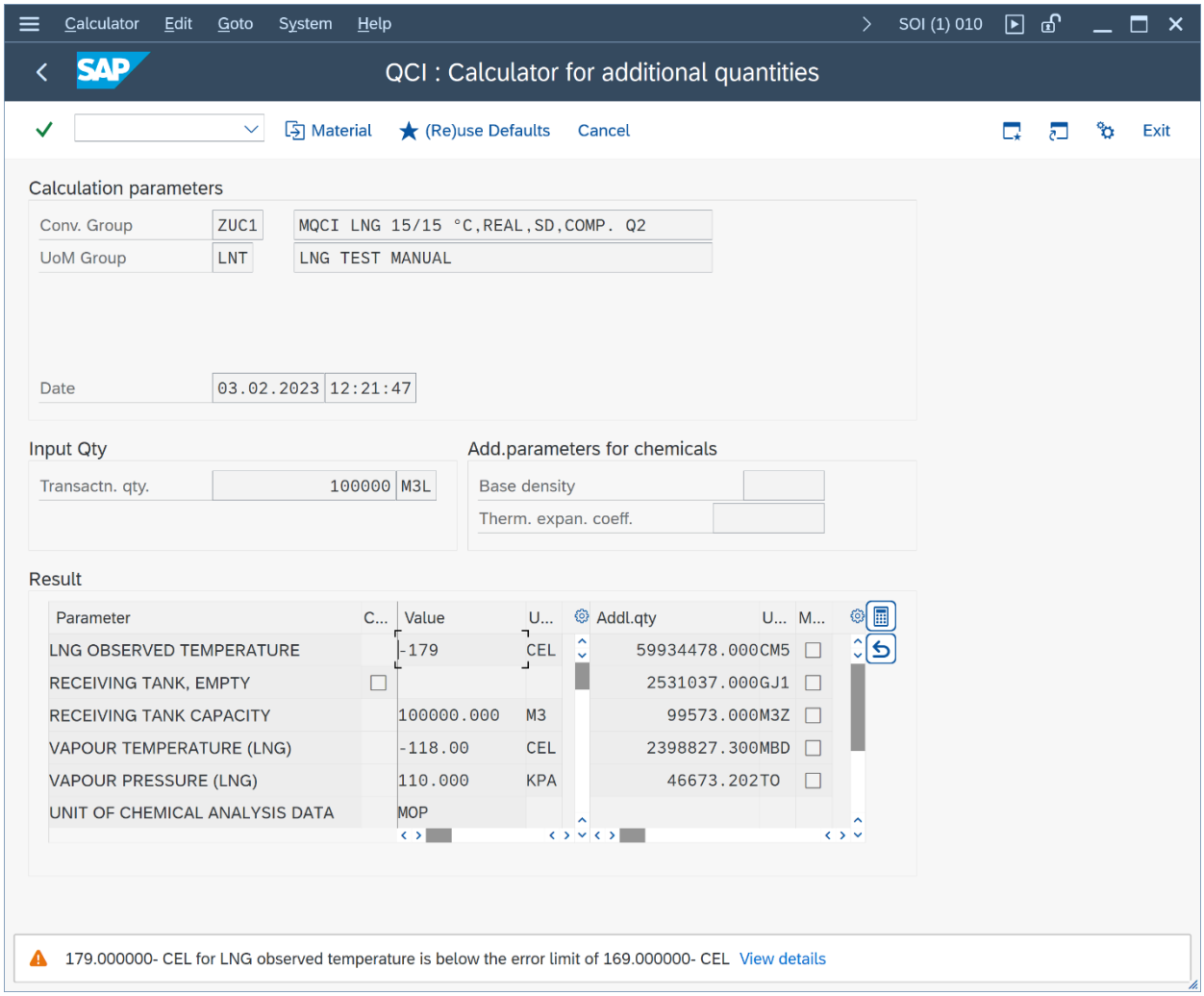


Table View Edit Goto Selection Utilities System Help
SOI (1) 010
Change View "Reading Group: Parameter Ranges": Details
New Entries
Cancel
Exit
Dialog Structure
Reading Group: Range Chec
Reading Group: Paramete
Reading Group: Parameter Ranges
Description
Tot.sulphur(incl. Mercaptane)
Unit of measure
MGQ
Error:high
200.000000
Indicator
Non zero range limit
Warning: high
160.000000
Indicator
Non zero range limit
Warning: low
Indicator
No range limit specified
Error:low
Indicator
No range limit specified
Param. (const.)
Comp. operator
Parameter is a density or heating value
Parameter is a natural gas component
Parameter is a natural gas impurity

Once you have maintained the ranges and saved your work, perform trial conversions and test that the range limits are working:

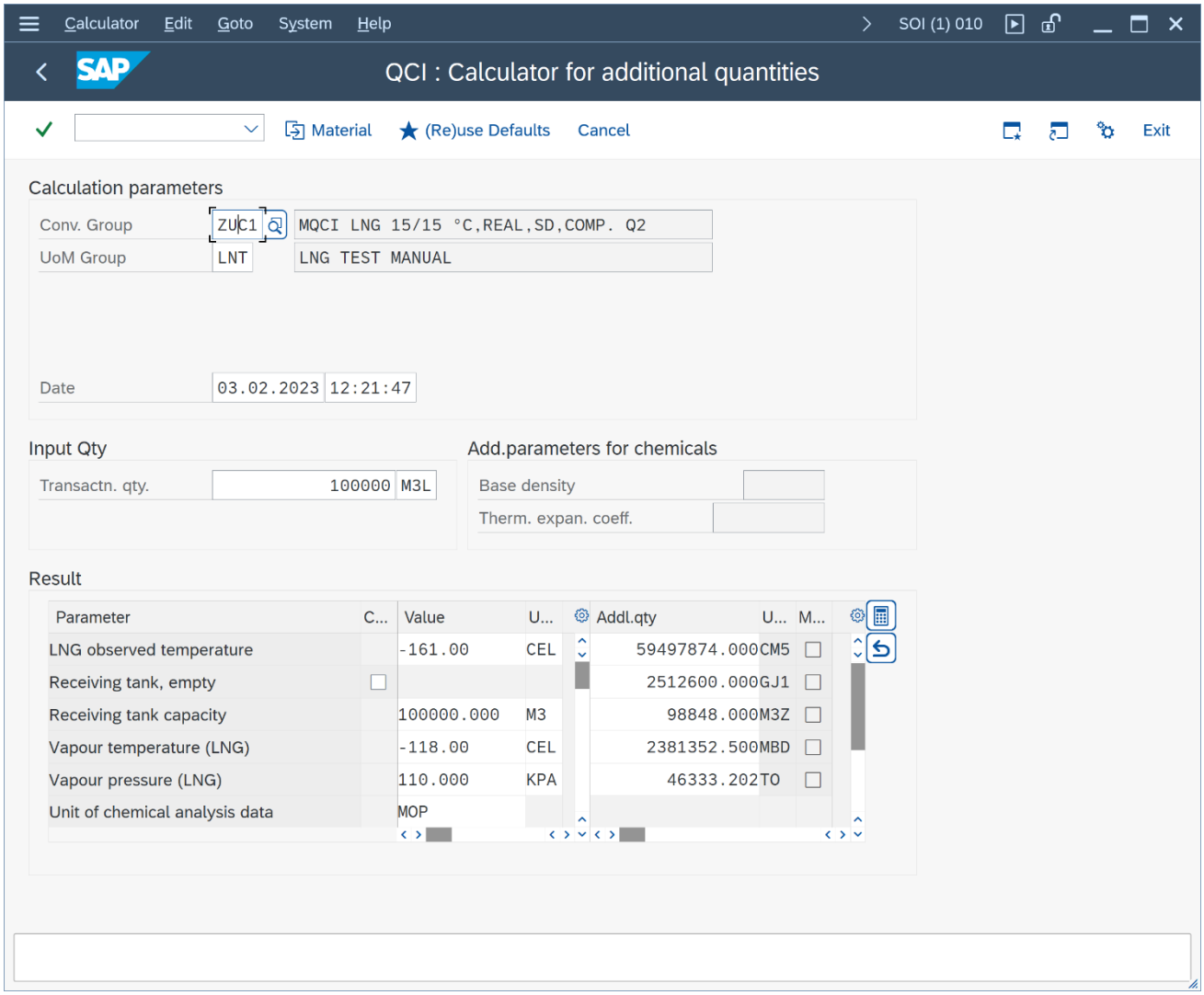


Good range data is vital to ensure good data quality e.g., for measurement values being passed from the field to the ERP system, as well as to prevent fraudulent via "open door (unrealistic) calculations". For production usage, you should define ranges for all relevant input data e.g., the complete chemical composition data as well.

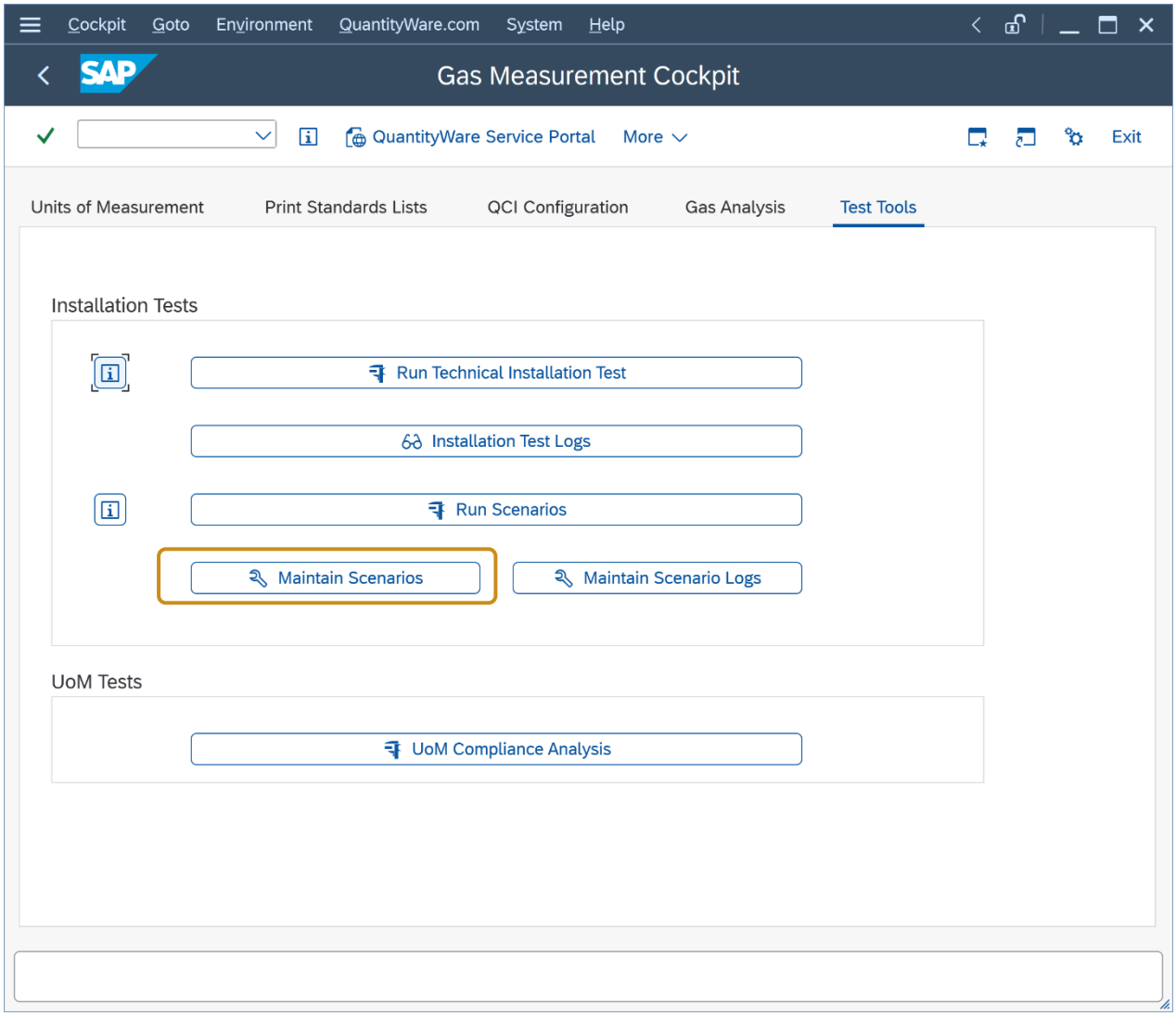
2.7. Test Case 07 – Define Test Scenarios for LNG Conversion Group - Development

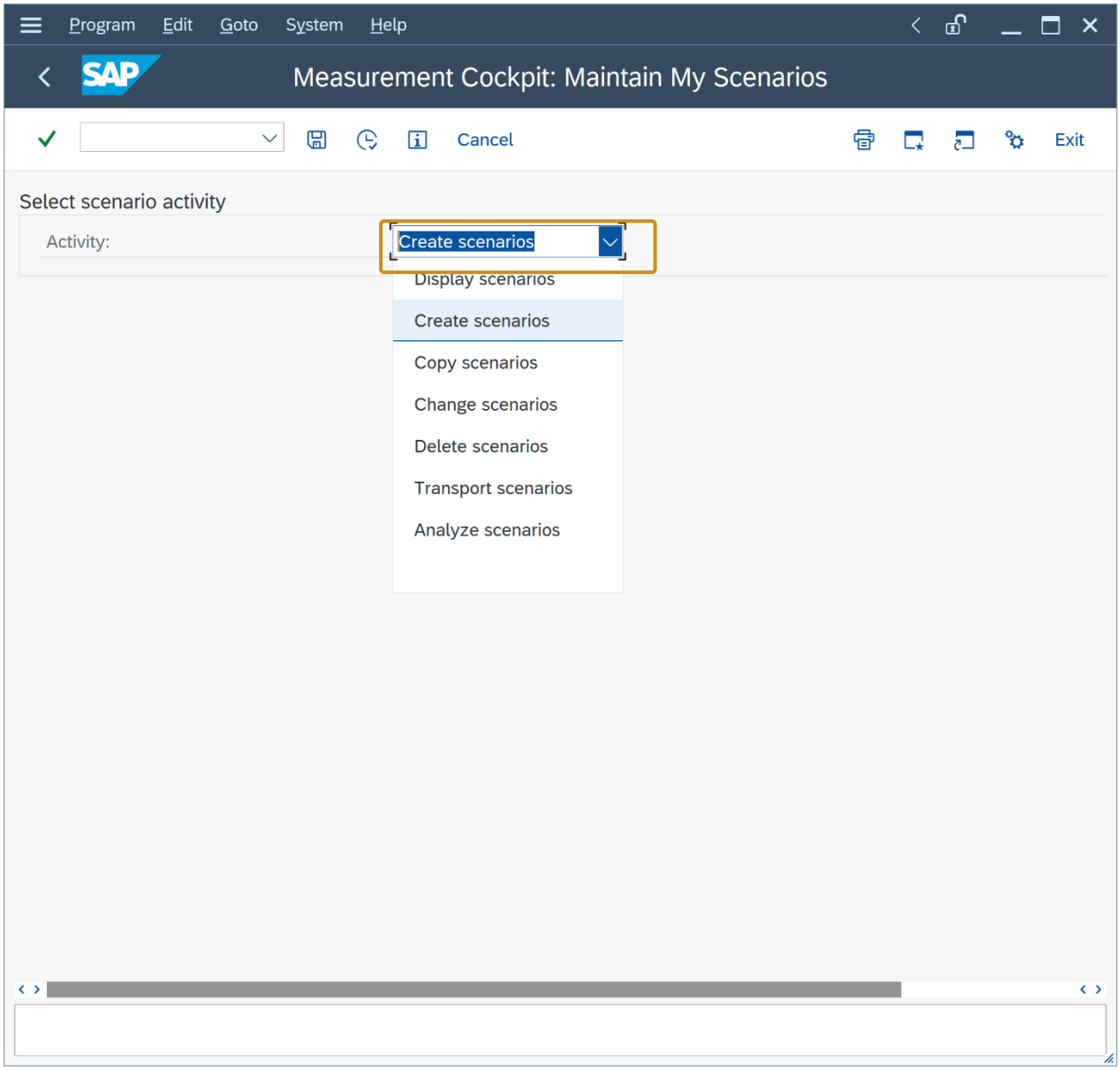
Estimated test case execution time: 60 minutes

Test scenarios are your insurance against manipulation and proof that that your quantity conversion configuration is running as designed and tested, in production. For this test case we assume that you have validated the calculations of conversion group ZUC1 (e.g., independent calculations in a spread sheet or by comparing the results with data from legacy systems, typically done by certified BCG consultants). Let's take the following test calculation - GMC push button "Oil & Gas Test Calculator" - and transfer it into our first test scenario:

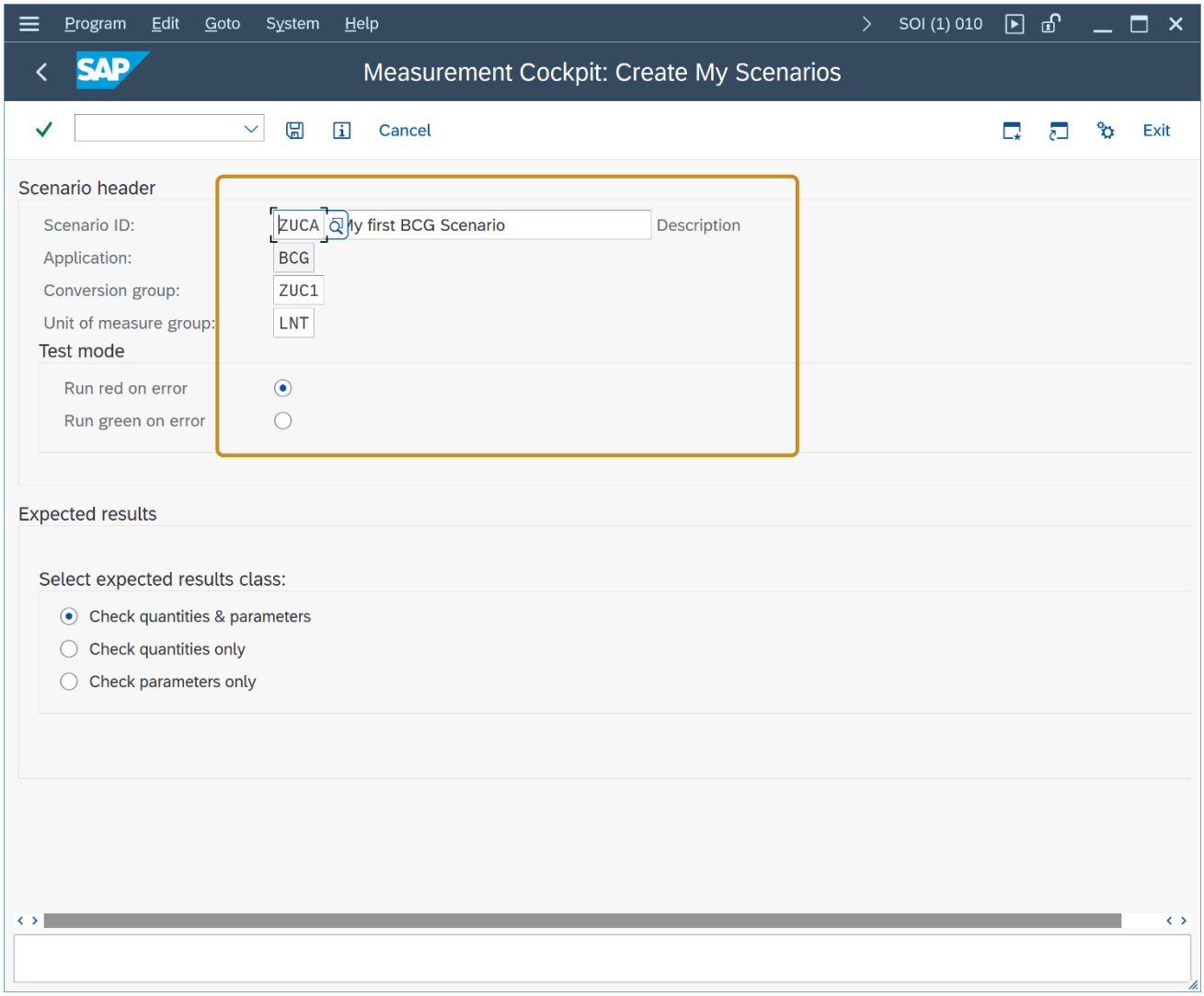


From the GMC tab strip “Test Tools” select “Maintain Scenarios”, then “Create scenarios”:

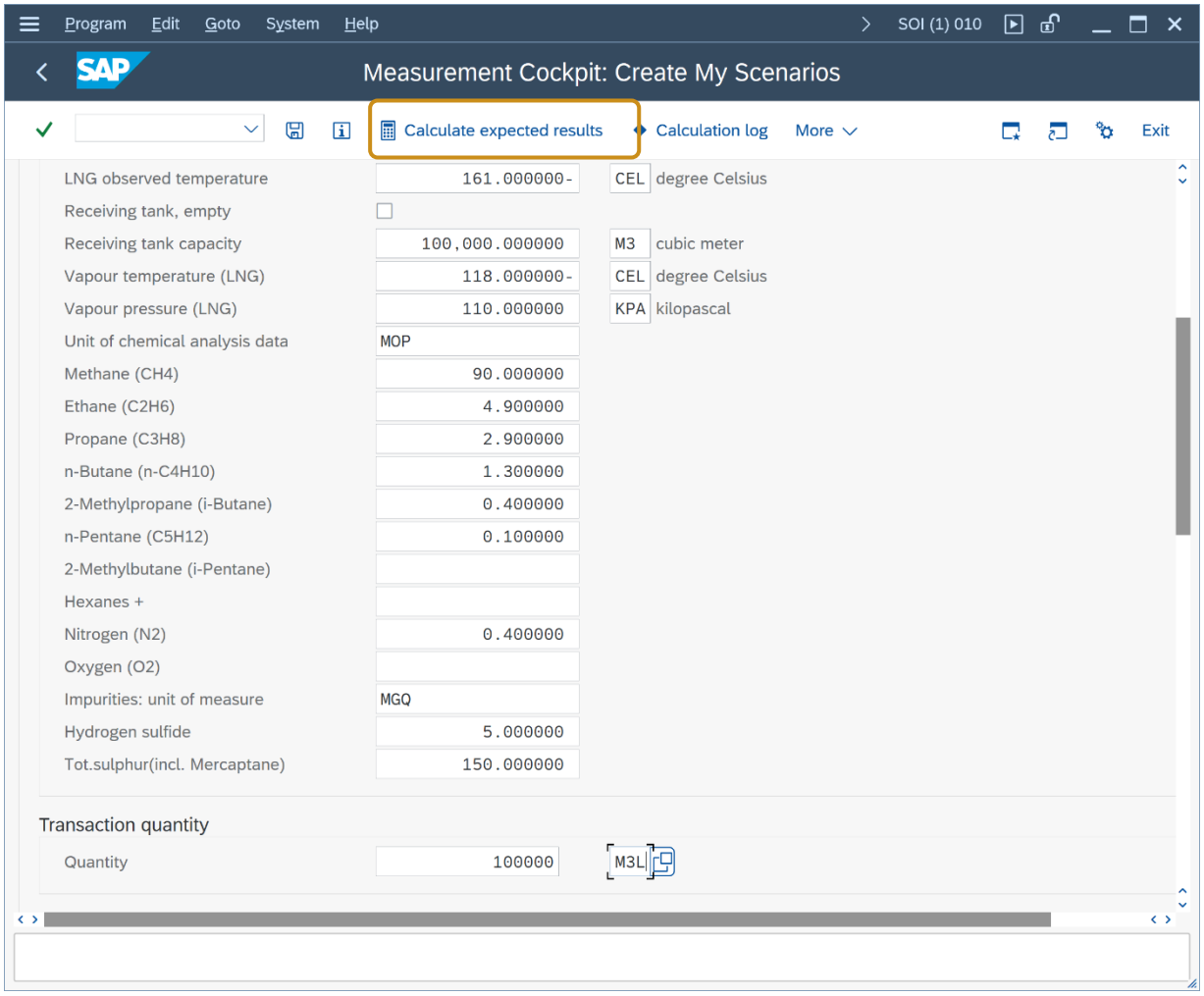


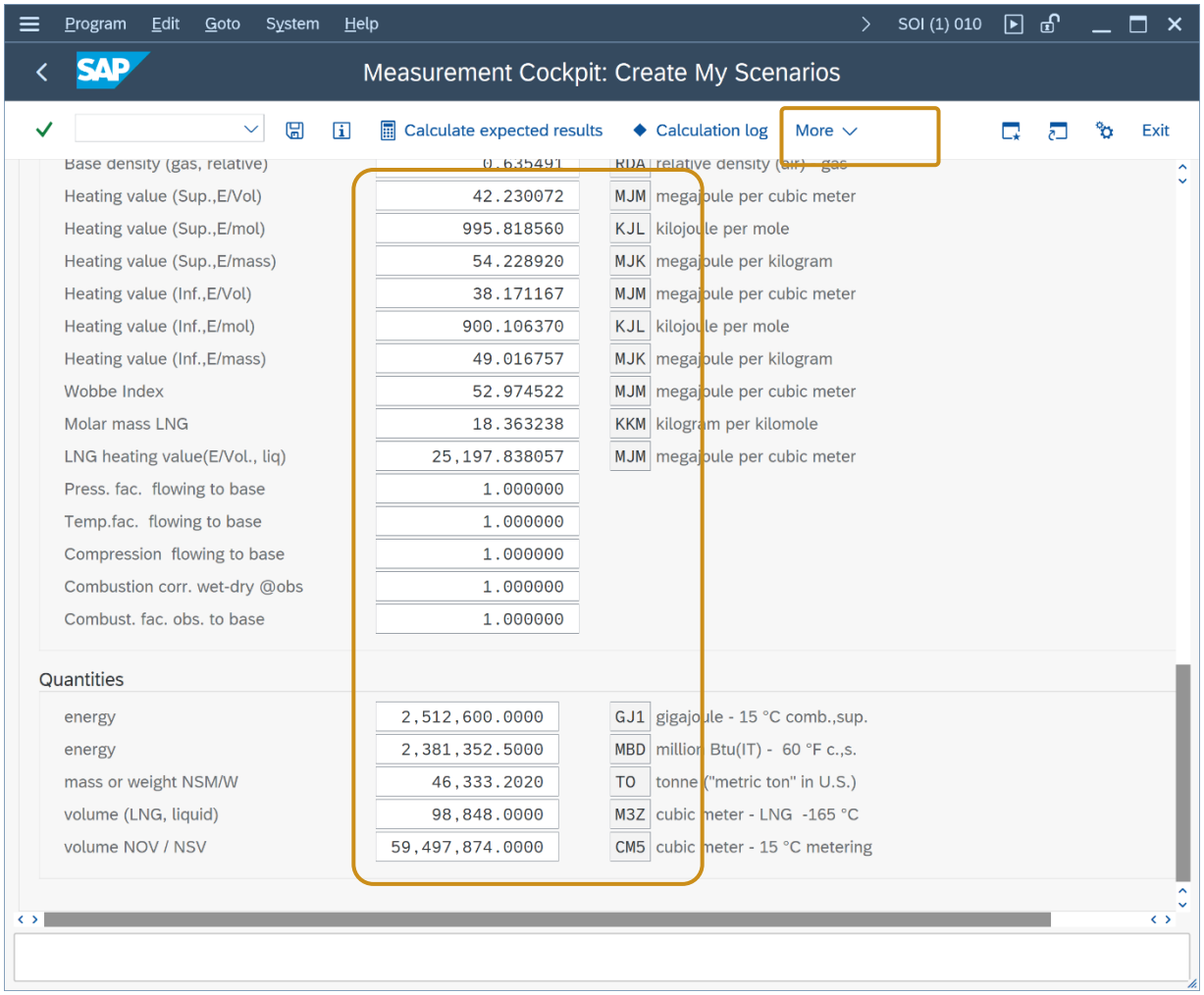

Program
Edit
Goto
System
Help
Measurement Cockpit: Maintain My Scenarios
Cancel
Exit
Select scenario activity
Activity:
Create scenarios
Display scenarios
Create scenarios
Copy scenarios
Change scenarios
Delete scenarios
Transport scenarios
Analyze scenarios

Enter the scenario ID (e.g., ZUCA), a description, the conversion group ZUC1 and UoM group LNT and press “Enter”:



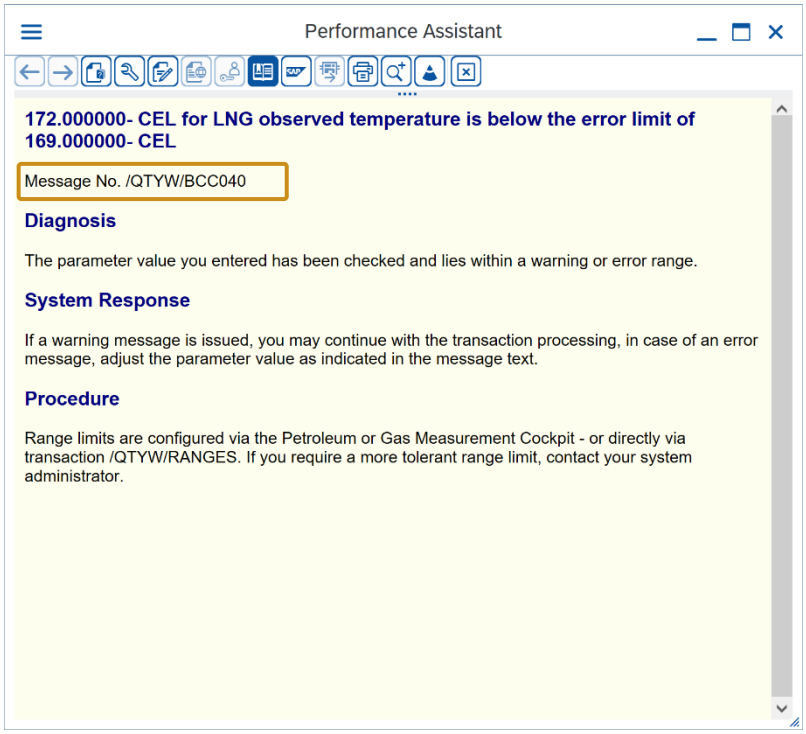
In the details screen, the reading group values are defaulted as input parameters. Now enter the LNG observed temperature as -161.000 °C and the transaction quantity of 100,000.000 M3L. Then select the “Calculate expected result” push button, confirm the calculation and save the scenario (CTRL + F4), confirming all messages:

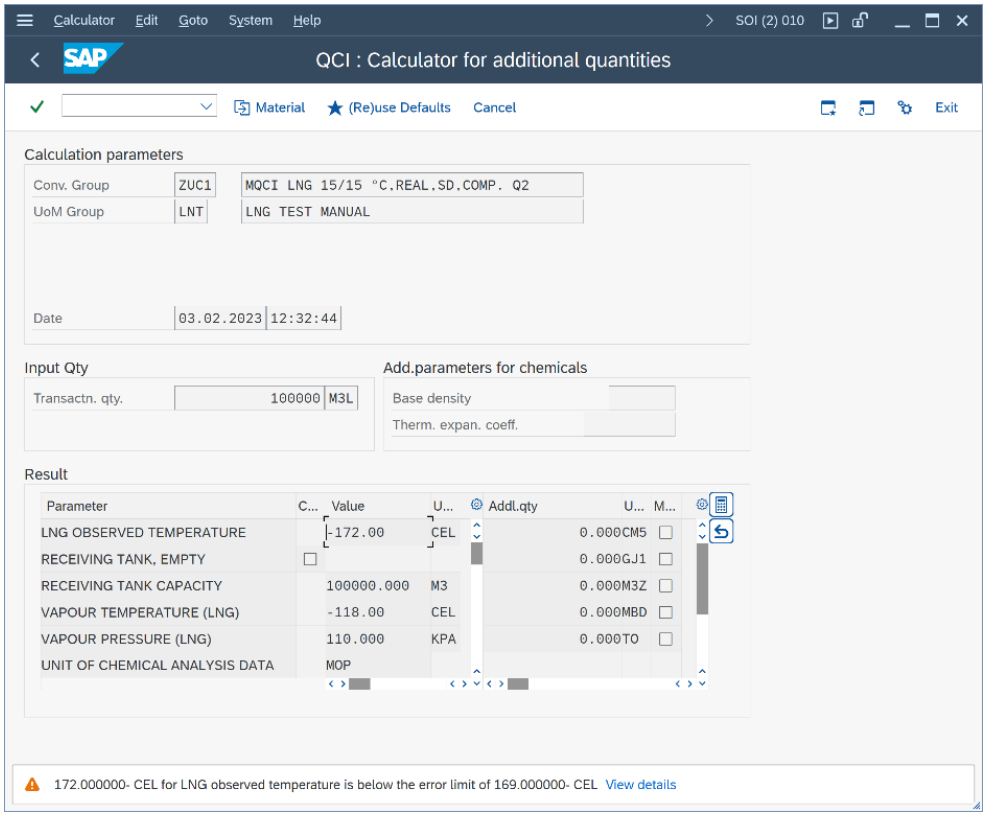




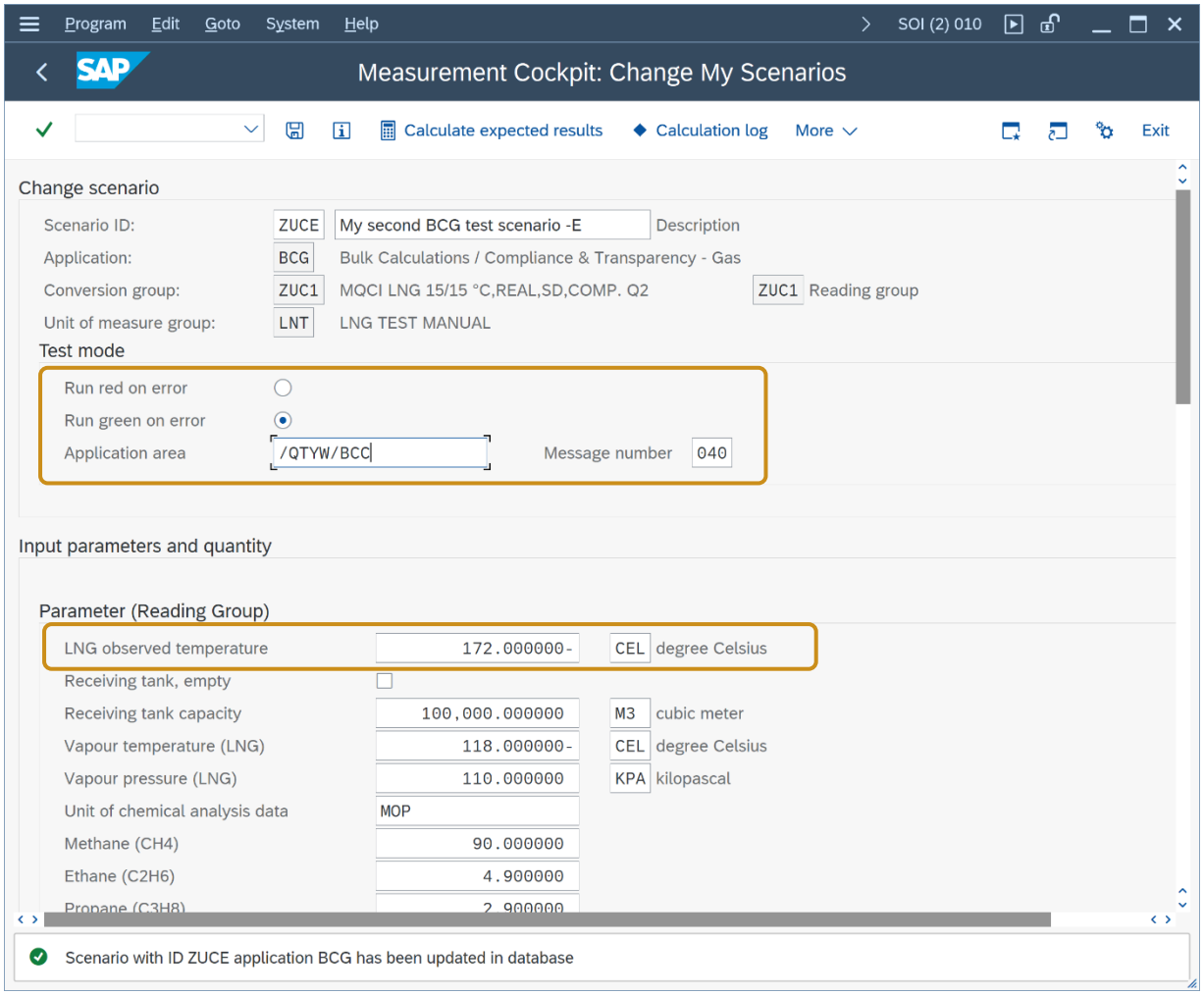
NOTE: Save the scenario via More -> Save Scenario (CTRL + F4)

For the second scenario, we want to ensure that the range check is always executed correctly (extremely important for production environments):



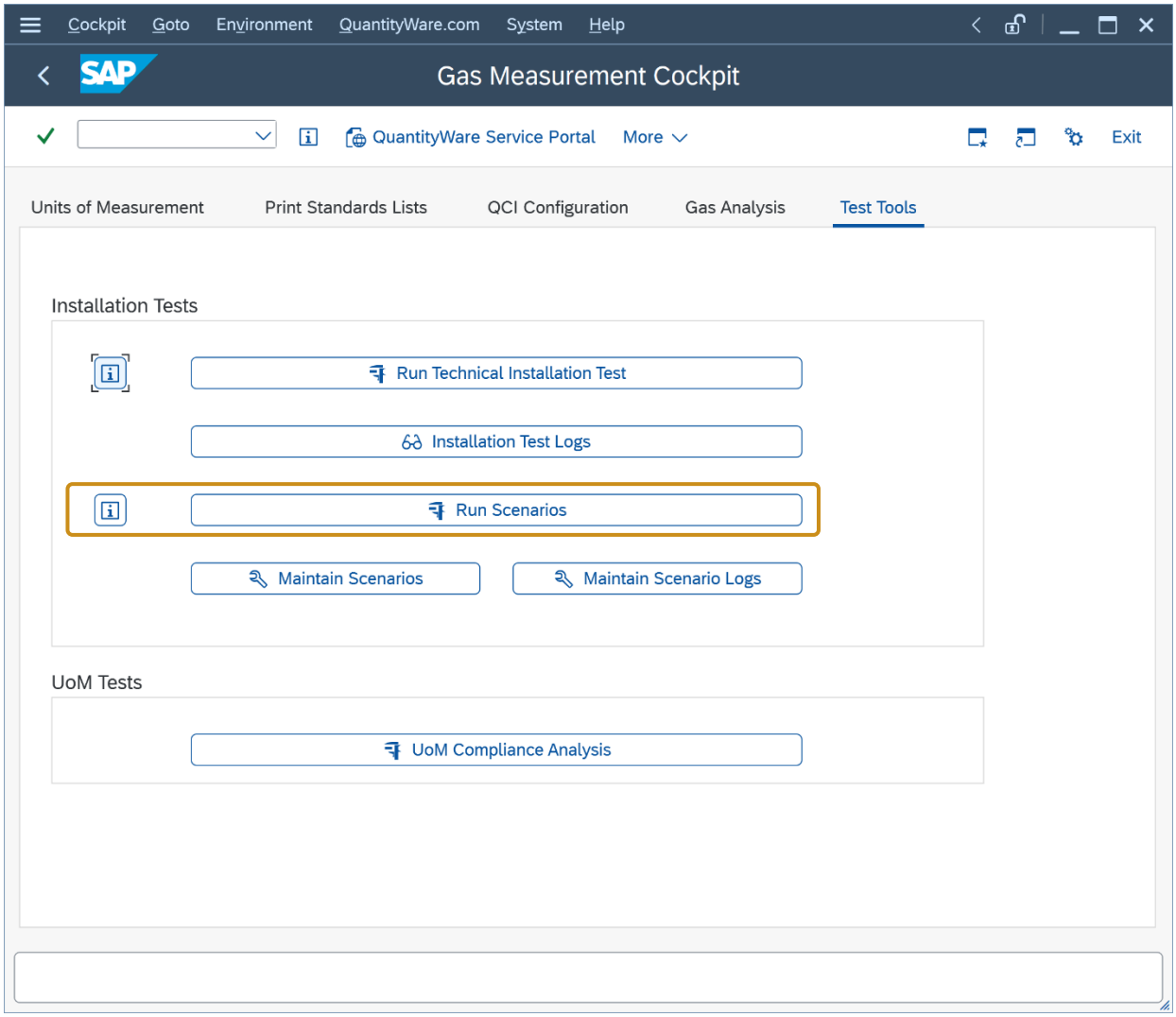


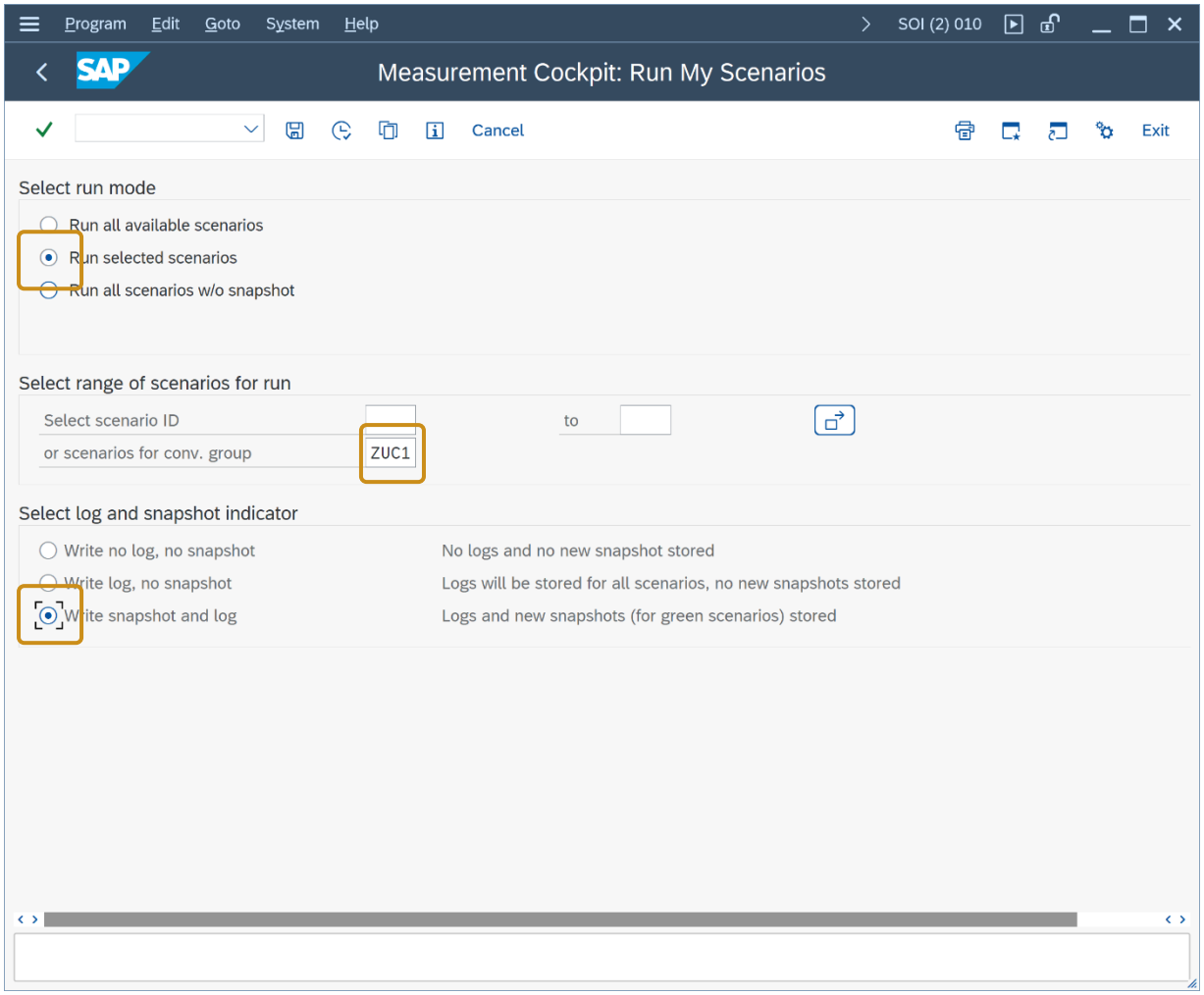
Thus, we define the following scenario:



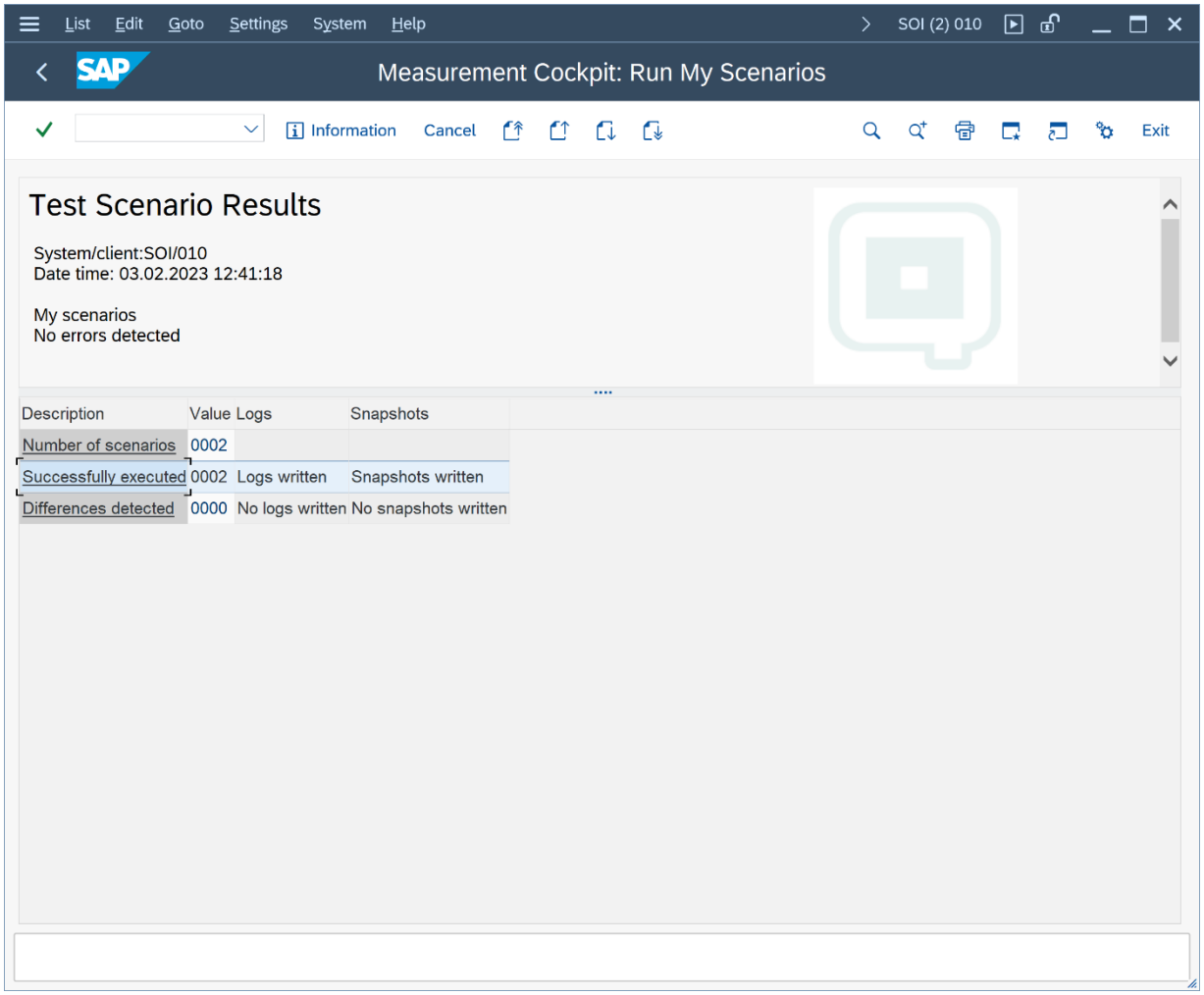
NOTE: Save the scenario via More -> Save Scenario (CTRL + F4)

Now, go back to the GMC tab strip “Test Tools” and select “Run Scenarios”. Then, select “Run selected scenarios”, enter “ZUC1” as conversion group and “Write snapshot and log”:



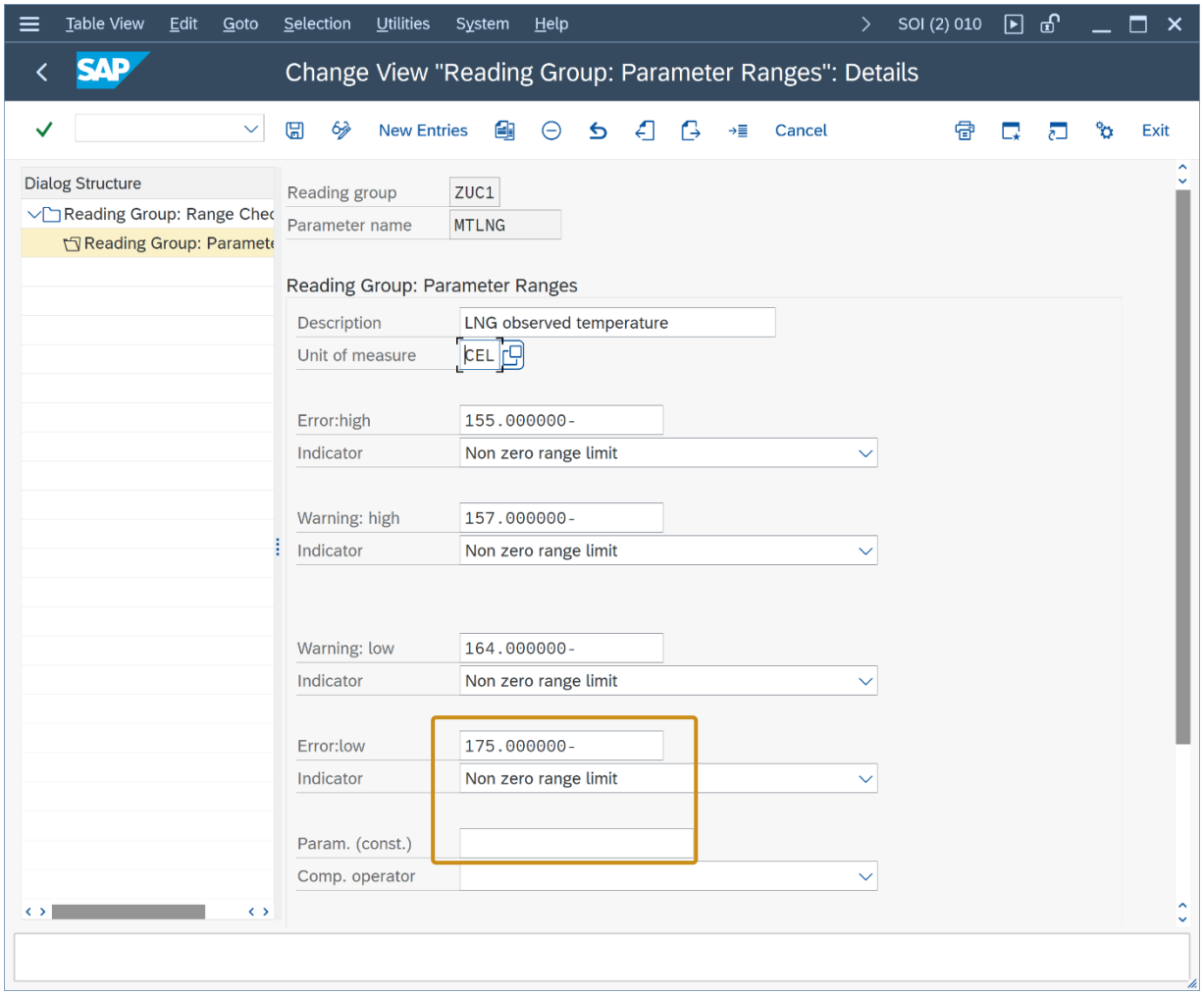

Program Edit Goto System Help
SOI (2) 010
Measurement Cockpit: Run My Scenarios
Cancel
Exit
Select run mode
Run all available scenarios
Run selected scenarios
Run all scenarios w/o snapshot
Select range of scenarios for run
Select scenario ID
to
or scenarios for conv. group
ZUC1
Select log and snapshot indicator
Write no log, no snapshot
No logs and no new snapshot stored
Write log, no snapshot
Logs will be stored for all scenarios, no new snapshots stored
Write snapshot and log
Logs and new snapshots (for green scenarios) stored

If you have maintained the two scenarios correctly, the following result will be displayed:

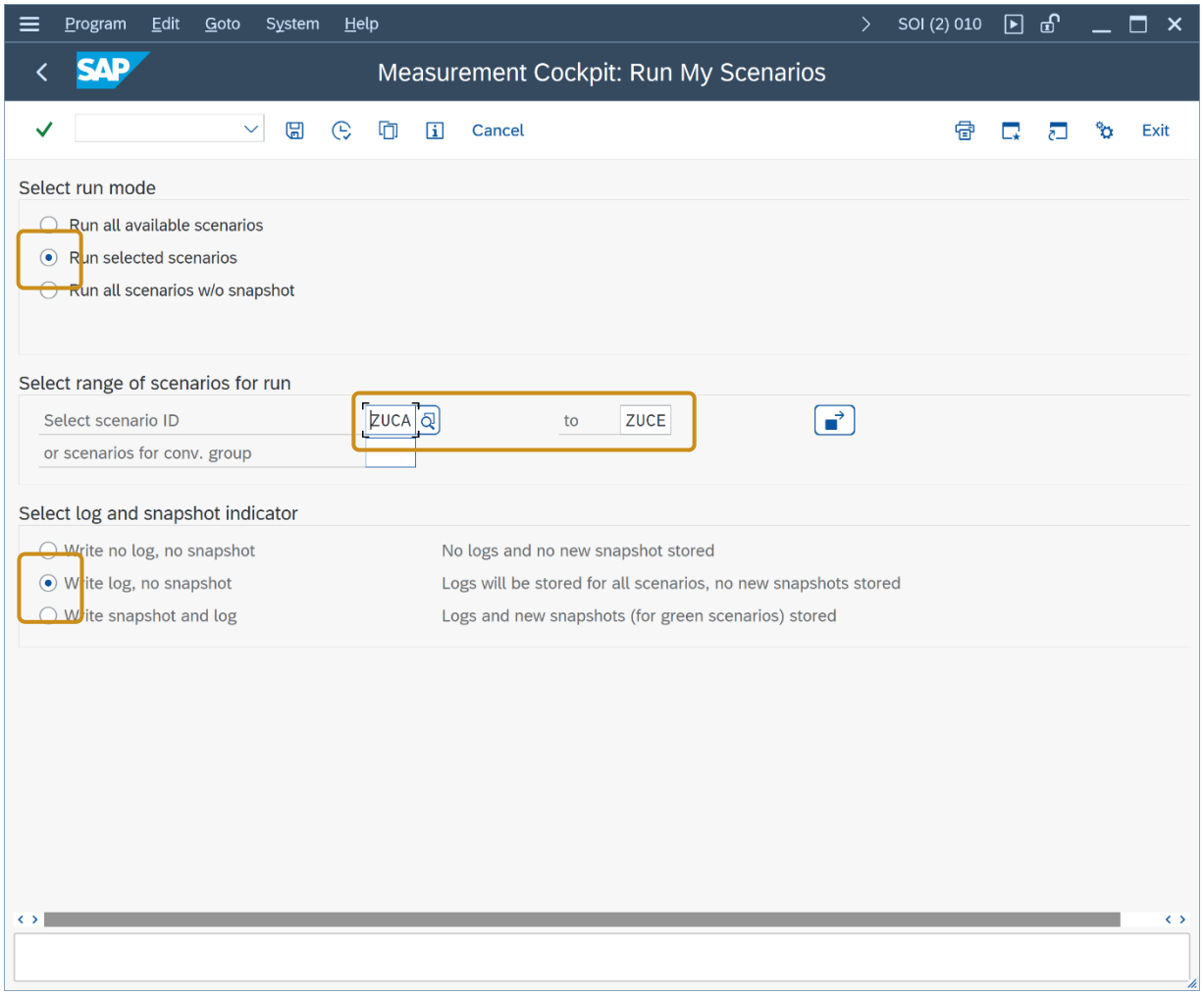


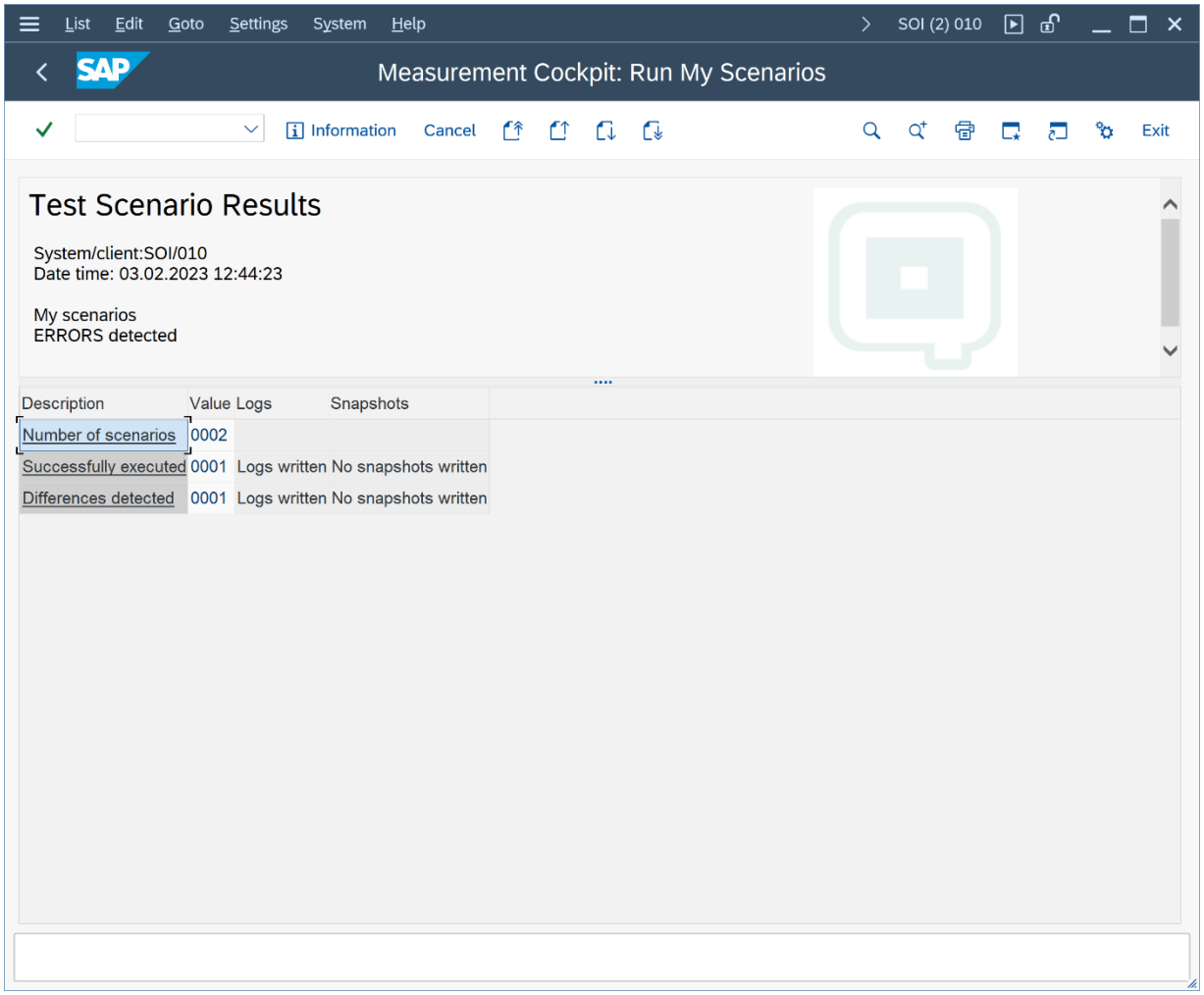
The system has performed a quantity conversion in background and compared the actual results with the expected results defined in the scenarios. Two logs have been written to the database and snapshots for successfully executed scenarios have been written to the database as well.

To test this tool, let's go back to the range data for conversion group ZUC1 (see test case 06) and change the LNG actual temperature "low" error limit to -175 °C.

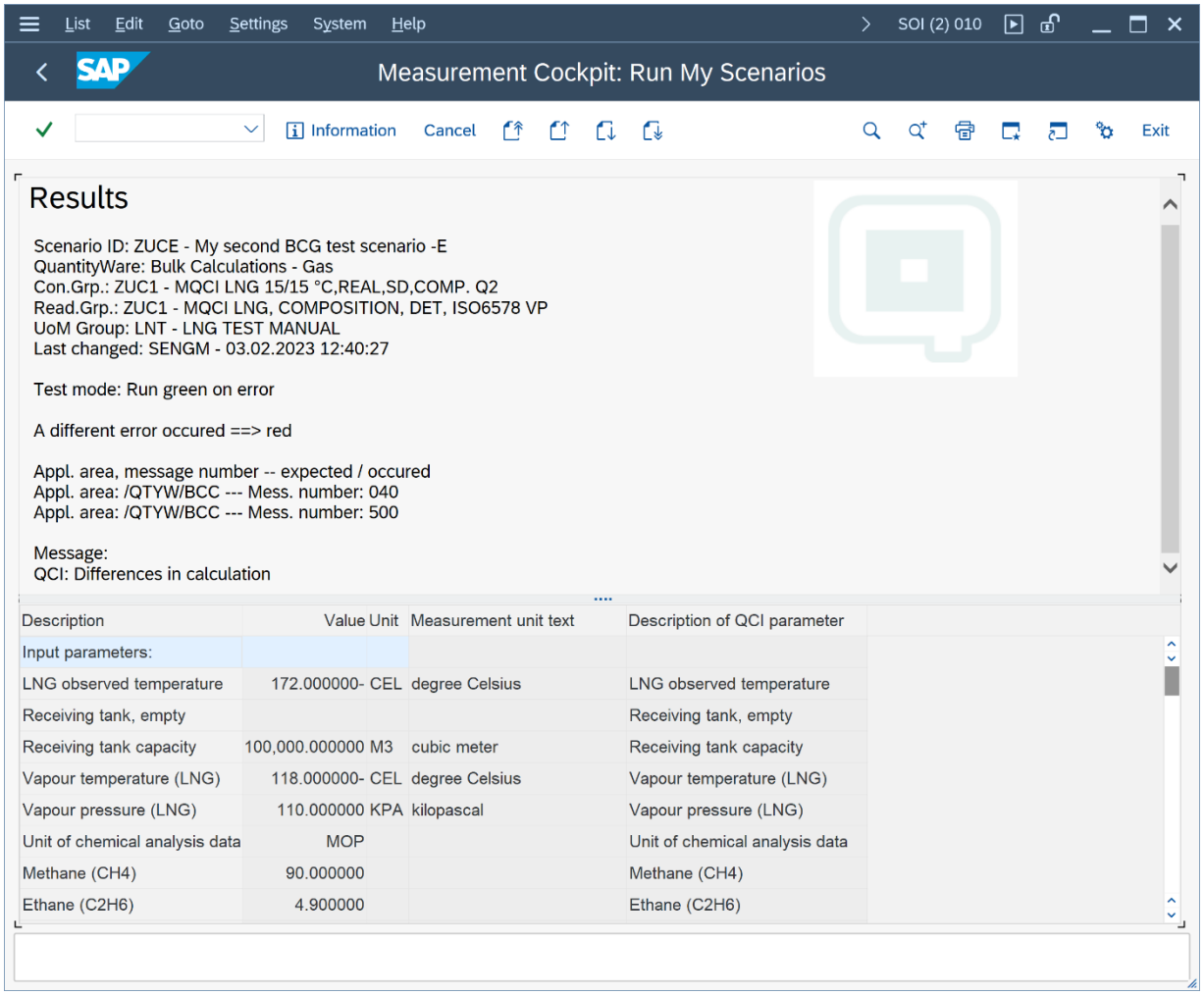


If we now run all available scenarios again, one scenario fails:



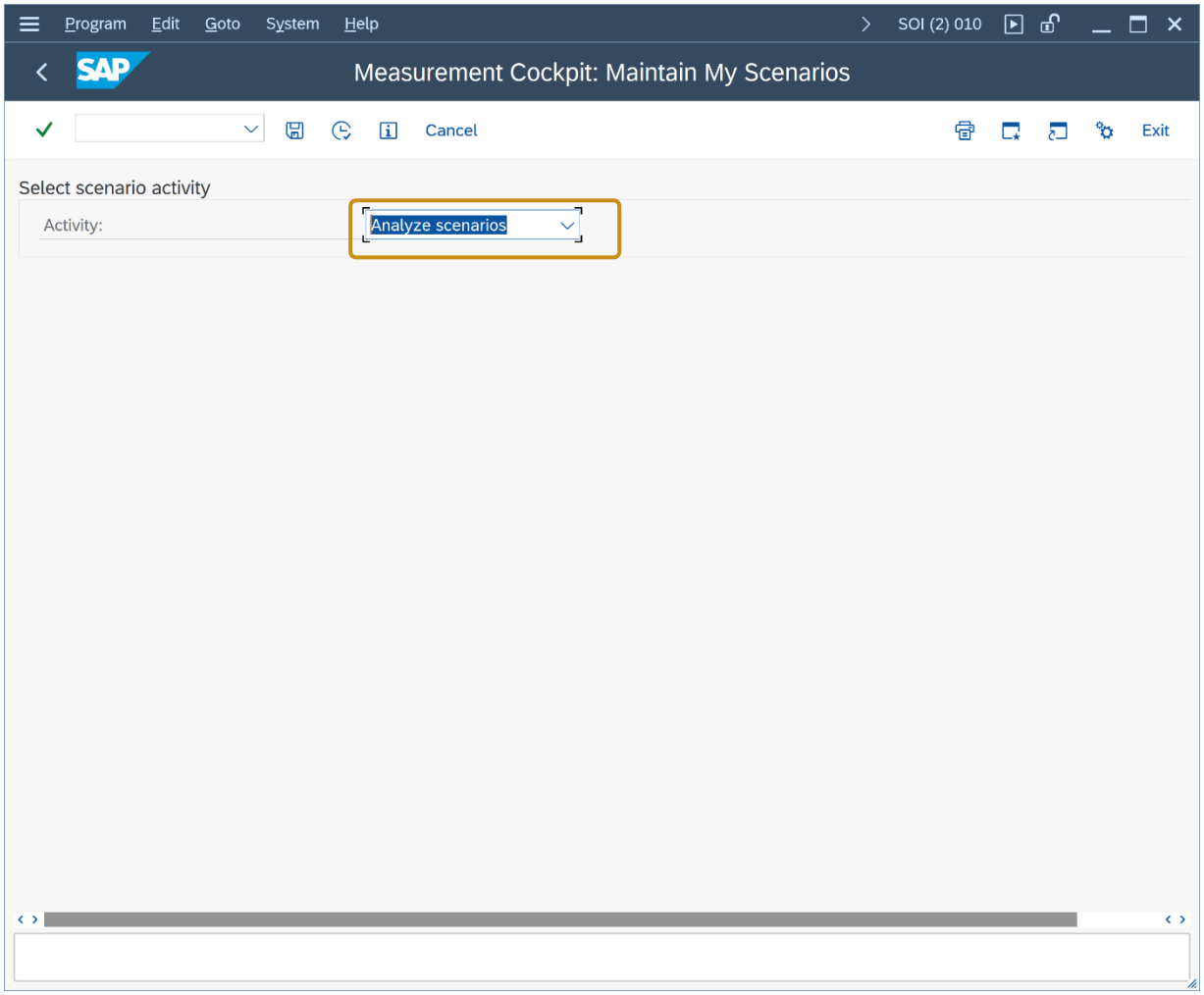

List Edit Goto Settings System Help
SOI (2) 010
Measurement Cockpit: Run My Scenarios
Information
Cancel
Exit
Test Scenario Results
System/client:SOI/010
Date time: 03.02.2023 12:44:23
My scenarios
ERRORS detected
Description
Value
Logs
Snapshots
Number of scenarios
0002
Successfully executed
0001
Logs written
No snapshots written
Differences detected
0001
Logs written
No snapshots written

The expected range error is not raised during the internal test run, which is displayed in the detail view for the scenario:

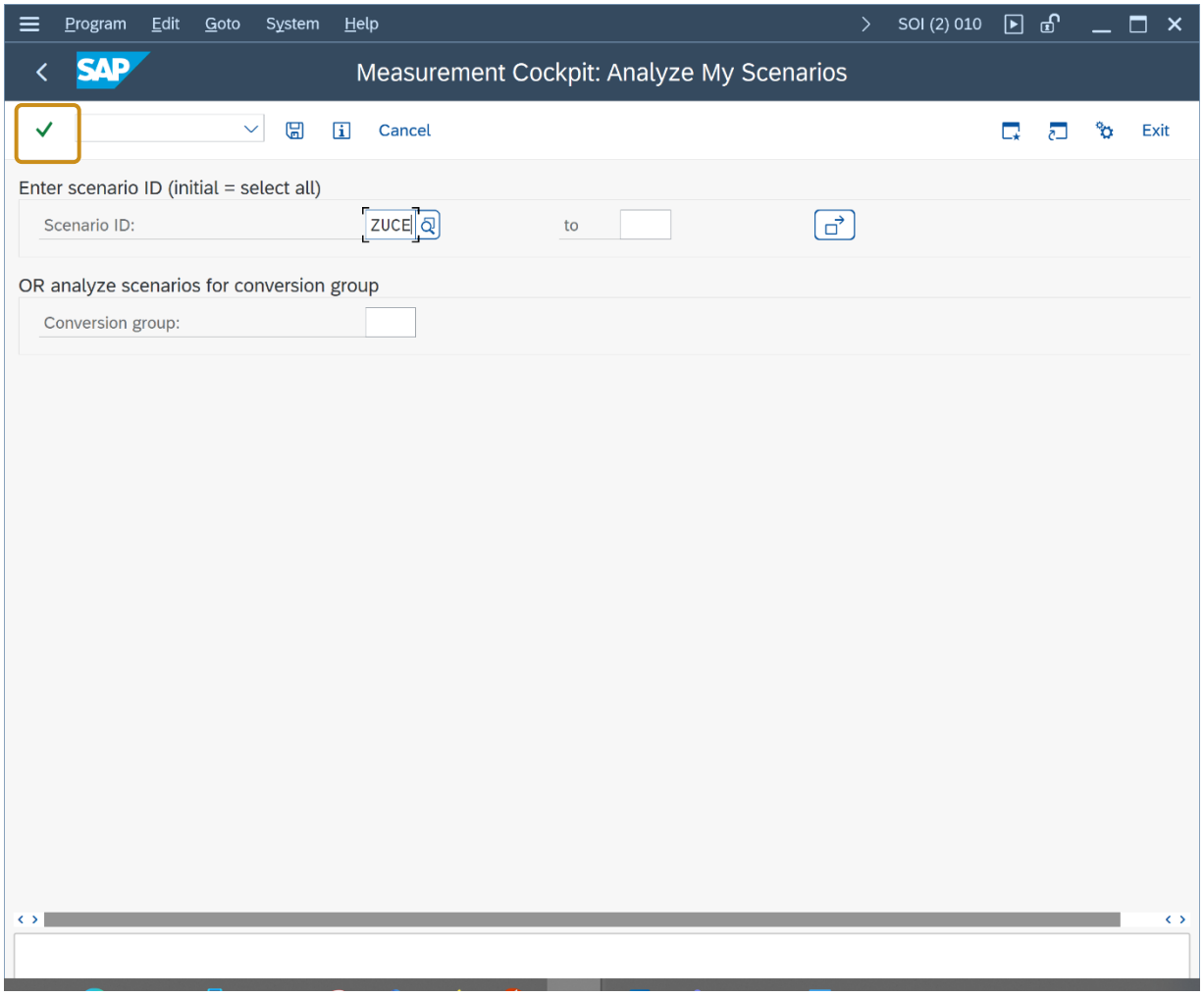


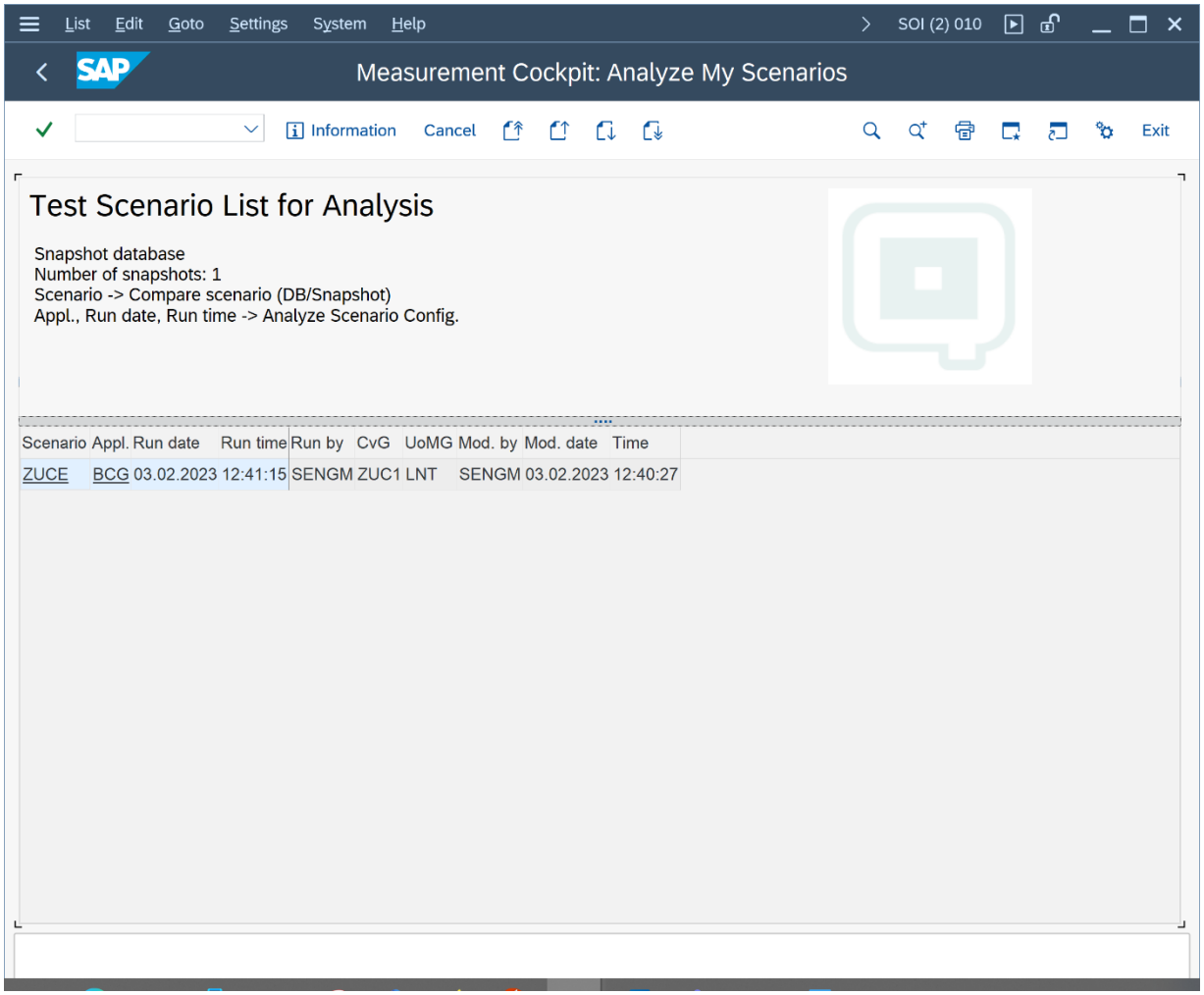
Description	Value	Unit	Measurement unit text	Description of QCI parameter
Input parameters:				
LNG observed temperature	172.000000-	CEL	degree Celsius	LNG observed temperature
Receiving tank, empty				Receiving tank, empty
Receiving tank capacity	100,000.000000	M3	cubic meter	Receiving tank capacity
Vapour temperature (LNG)	118.000000-	CEL	degree Celsius	Vapour temperature (LNG)
Vapour pressure (LNG)	110.000000	KPA	kilopascal	Vapour pressure (LNG)
Unit of chemical analysis data	MOP			Unit of chemical analysis data
Methane (CH4)	90.000000			Methane (CH4)
Ethane (C2H6)	4.900000			Ethane (C2H6)

Go back to the GMC tab strip “Test Tools” and select “Maintain my test”. Now select the “Analyze scenarios” option, such that you can compare the snapshot data with the current configuration data:

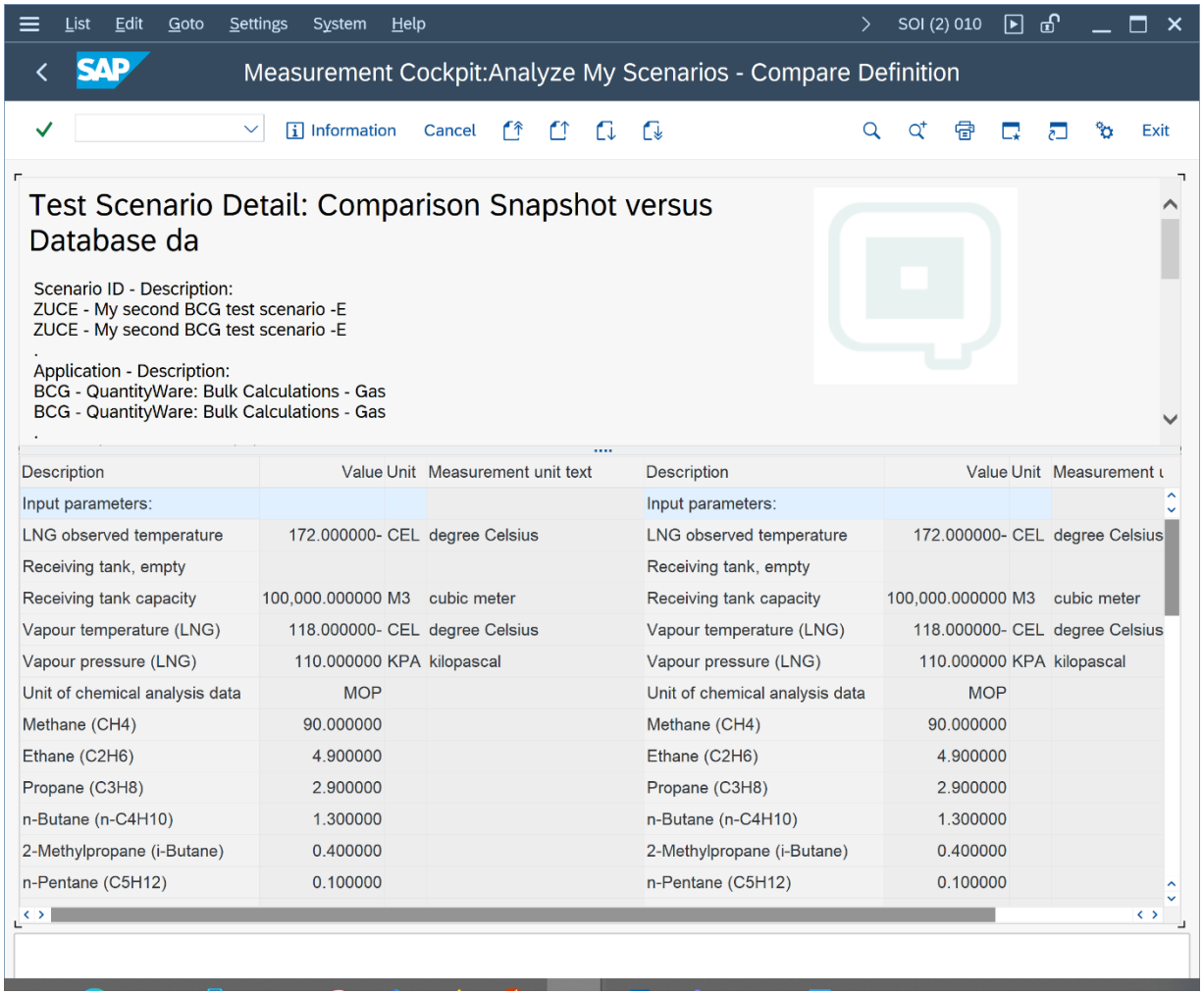


Enter the scenario ID ZUCE and select “Execute (F8) to display the snapshot header data:




List Edit Goto Settings System Help
SOI (2) 010
Measurement Cockpit: Analyze My Scenarios
Information
Cancel
Exit
Test Scenario List for Analysis
Snapshot database
Number of snapshots: 1
Scenario -> Compare scenario (DB/Snapshot)
Appl., Run date, Run time -> Analyze Scenario Config.
Scenario Appl. Run date Run time Run by CvG UoMG Mod. by Mod. date Time
ZUCE BCG 03.02.2023 12:41:15 SENGM ZUC1 LNT SENGM 03.02.2023 12:40:27

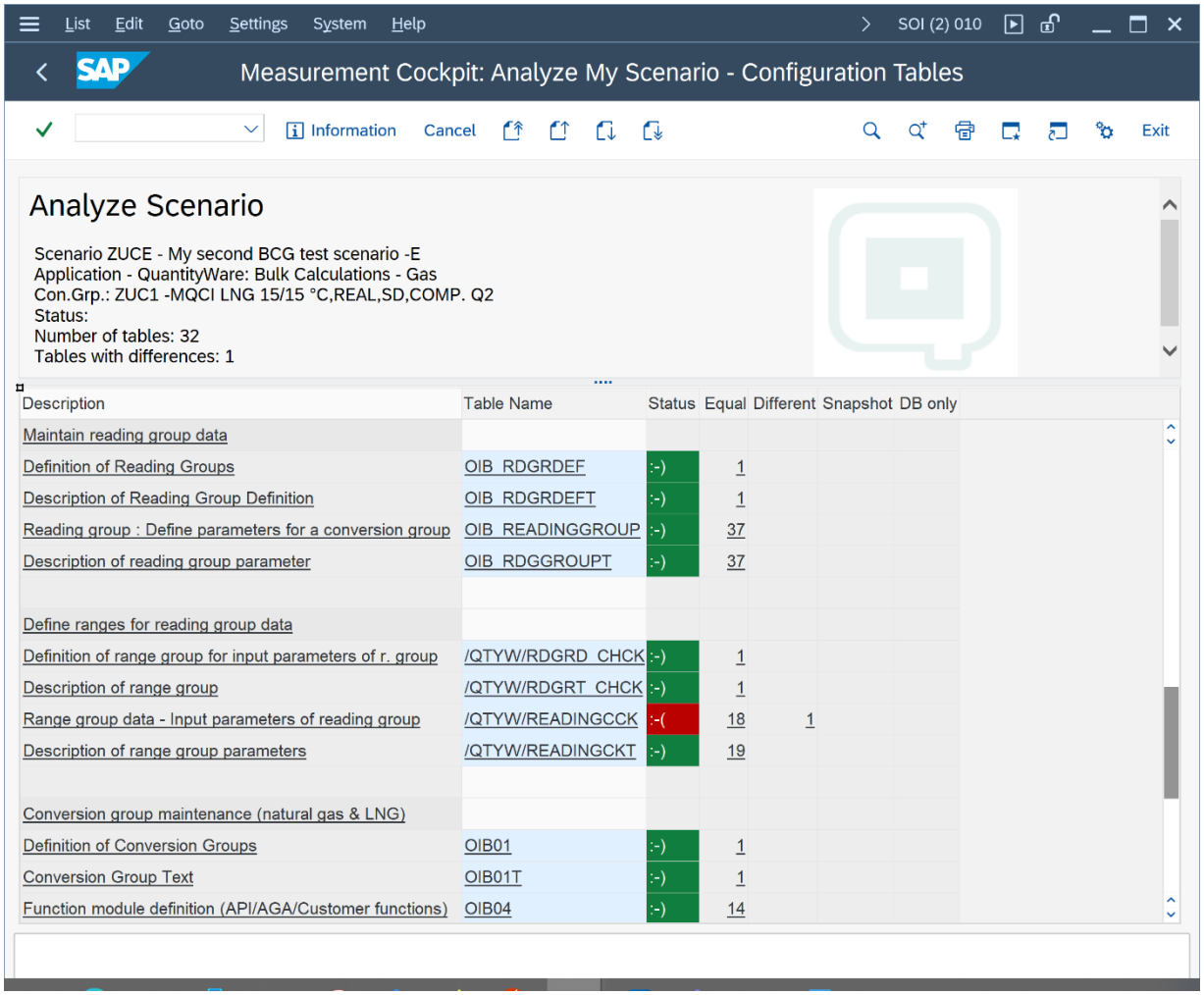
If you click the Scenario ID, the comparison of the snapshot data for the scenario and the current system scenario is displayed:



Description	Value	Unit	Measurement unit text	Description	Value	Unit	Measurement
Input parameters:				Input parameters:			
LNG observed temperature	172.000000-	CEL	degree Celsius	LNG observed temperature	172.000000-	CEL	degree Celsius
Receiving tank, empty				Receiving tank, empty			
Receiving tank capacity	100,000.000000	M3	cubic meter	Receiving tank capacity	100,000.000000	M3	cubic meter
Vapour temperature (LNG)	118.000000-	CEL	degree Celsius	Vapour temperature (LNG)	118.000000-	CEL	degree Celsius
Vapour pressure (LNG)	110.000000	KPA	kilopascal	Vapour pressure (LNG)	110.000000	KPA	kilopascal
Unit of chemical analysis data	MOP			Unit of chemical analysis data	MOP		
Methane (CH4)	90.000000			Methane (CH4)	90.000000		
Ethane (C2H6)	4.900000			Ethane (C2H6)	4.900000		
Propane (C3H8)	2.900000			Propane (C3H8)	2.900000		
n-Butane (n-C4H10)	1.300000			n-Butane (n-C4H10)	1.300000		
2-Methylpropane (i-Butane)	0.400000			2-Methylpropane (i-Butane)	0.400000		
n-Pentane (C5H12)	0.100000			n-Pentane (C5H12)	0.100000		

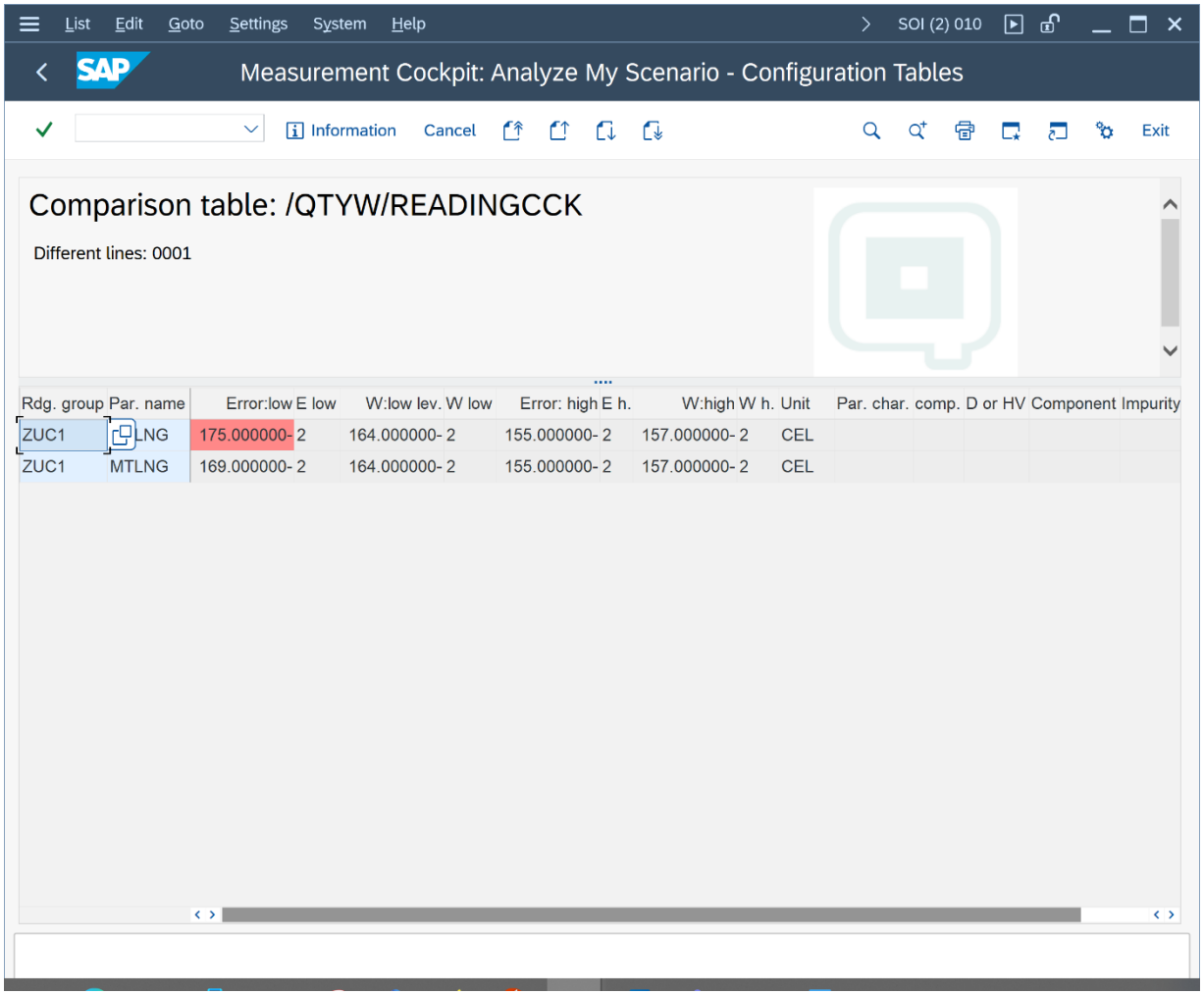
Apparently, there are no differences detectable in the scenario definition.

If you click the application (BCG), the configuration data is displayed and compared with the current system data:



Description	Table Name	Status	Equal	Different	Snapshot	DB only
Maintain reading group data						
Definition of Reading Groups	OIB_RDGRDEF	:-)	1			
Description of Reading Group Definition	OIB_RDGRDEFT	:-)	1			
Reading group : Define parameters for a conversion group	OIB_READINGGROUP	:-)	37			
Description of reading group parameter	OIB_RDGGROUPT	:-)	37			
Define ranges for reading group data						
Definition of range group for input parameters of r. group	/QTYW/RDGRD_CHCK	:-)	1			
Description of range group	/QTYW/RDGRT_CHCK	:-)	1			
Range group data - Input parameters of reading group	/QTYW/READINGCCK	:-(	18	1		
Description of range group parameters	/QTYW/READINGCKT	:-)	19			
Conversion group maintenance (natural gas & LNG)						
Definition of Conversion Groups	OIB01	:-)	1			
Conversion Group Text	OIB01T	:-)	1			
Function module definition (API/AGA/Customer functions)	OIB04	:-)	14			

As expected, the change of the range data is marked in red and by clicking the “1” in the “Different” column, the change of the reading group range is displayed.



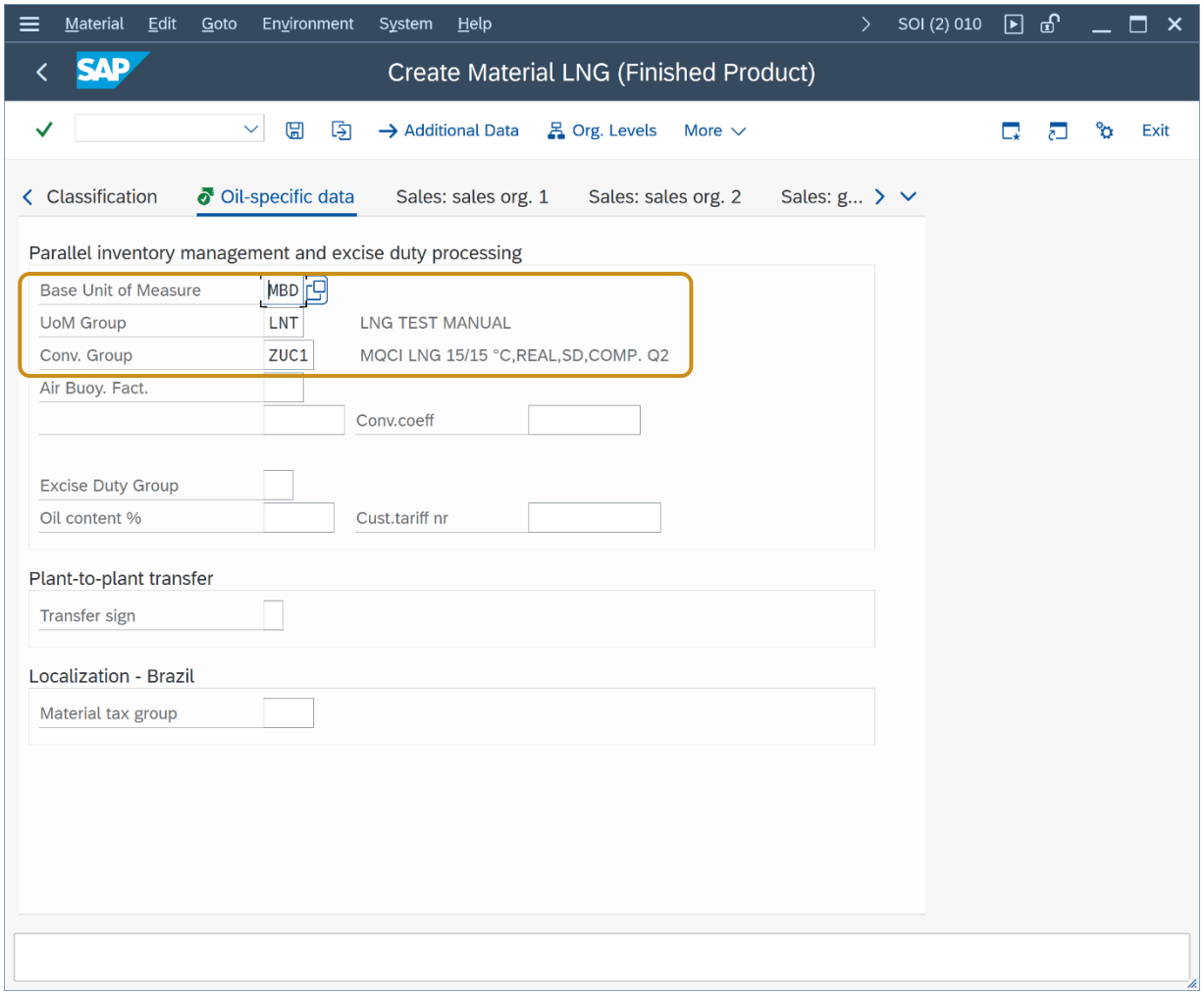
Practically seen from an application agents' perspective, this makes complex, laborious debugging of such issues a thing of the past! From a business management perspective, we have "raised the bar" in the areas of data integrity, security, and process transparence as we have an easy-to-use automated "audit" check for the most important values in our ERP system – the quantities.

2.8. Test Case 08 – Assign LNG Conversion Group to Material - Development

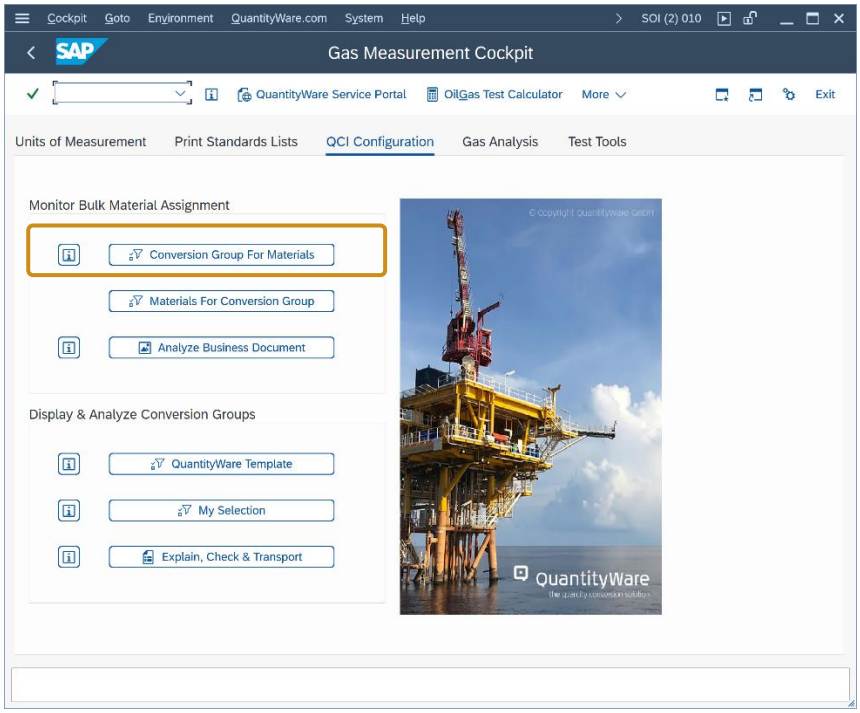
Estimated test case execution time: 30 minutes

Now that you have a well-defined conversion group ZUC1 available, including automated test scenarios (QuantityWare recommends to defined **at least 10** scenarios per conversion group), you assign the conversion group to a material in the material master at plant level (Oil specific data view).

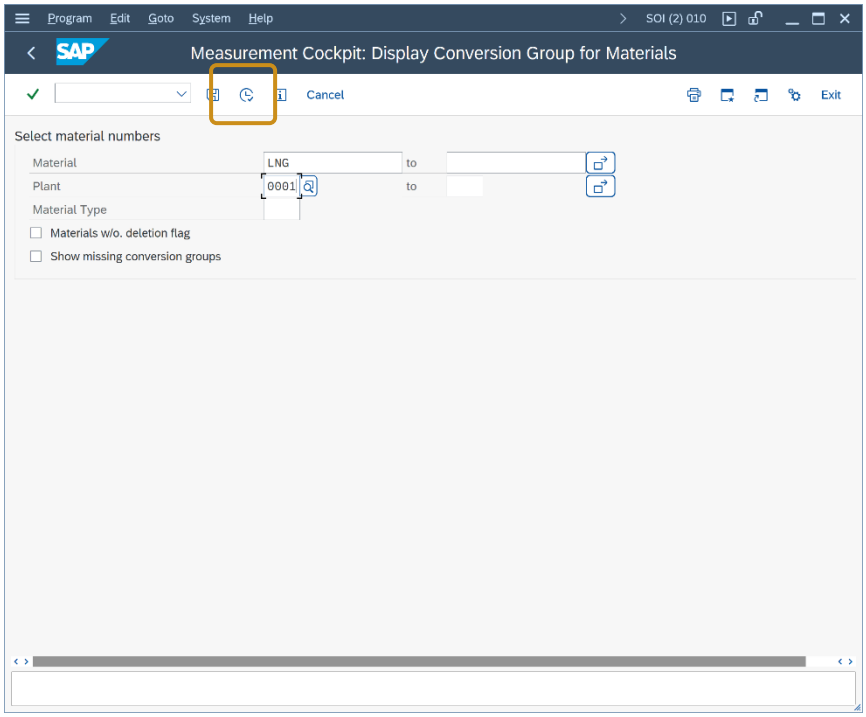
In our example development client, we utilize transaction MM02 (Change Material) and an LNG material code:

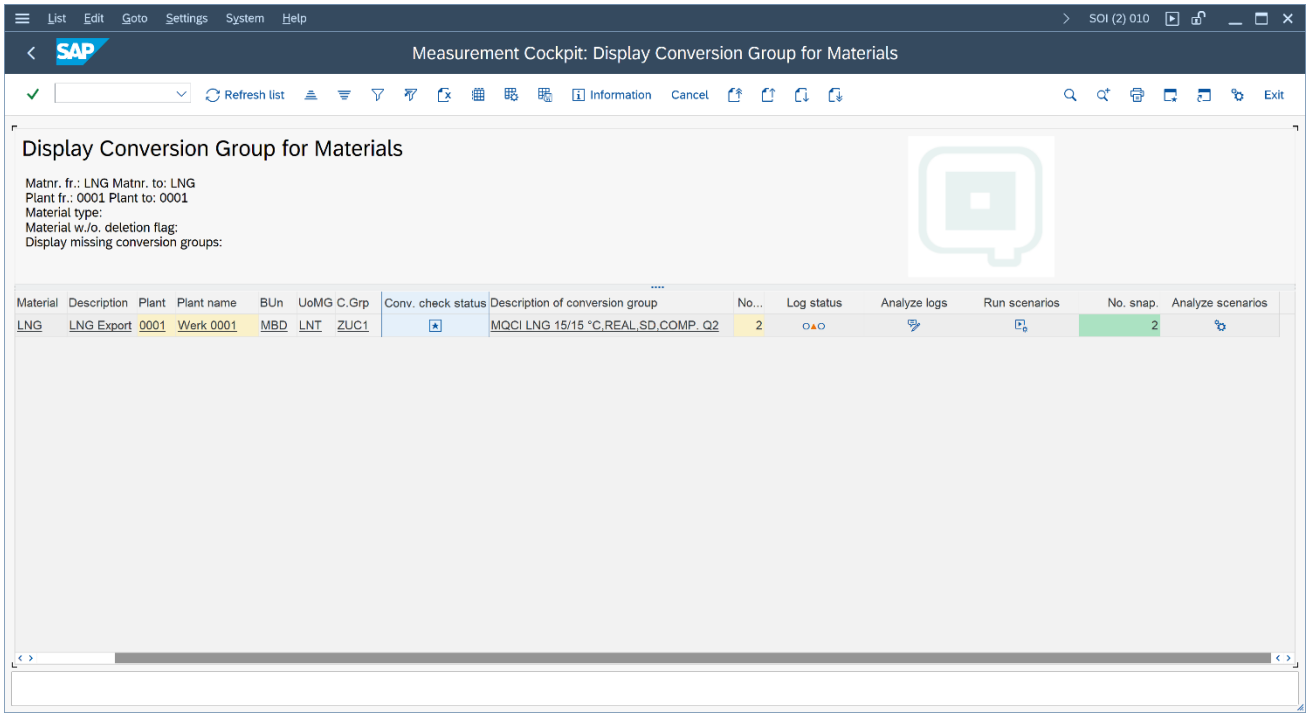


Let's go back to the Gas Measurement Cockpit, tab strip "QCI Configuration & Products" and select "Conv. group for materials":



Enter e.g., the material name (LNG) and select "Execute" (F8):





From this central list, you can monitor the quantity conversion status for all materials in production, e.g., execute test scenario runs if errors have occurred, analyze the test scenario log status (typically the test scenarios should be executed via a periodic job in background) or perform a snapshot analysis.

3. Summary

The BCG Test Manual provides overview guidance for **testing** the QuantityWare BCG solution and obtaining a detailed overview on the BCG capabilities.

The 8 test cases described in this document provide a quick and goal-oriented way to define an LNG conversion group for production usage. In addition, the importance of automated test scenarios is emphasized which is, with respect to time, typically the major effort in an implementation project (see PAIG for further details). Test scenarios can and should be transported through your system landscape together with your conversion group configuration, once defined in your development client. If your organization attributes value to auditing and auditable processes, test scenarios **must** be created, distributed, and used.

As noted in test case 02, one of the most challenging tasks is the correct assignment of a BCG template conversion group to your bulk materials. In addition, the test cases described in this document assume that no further configuration adjustments to a template conversion group is required, which is almost never the case. E.g., many template conversion groups are equipped with configuration options for specific requirements - trained experts must decide whether changes are required before moving a Z*** copy to production.

Thus, if you decide to purchase and implement QuantityWare BCG, careful inspection, validation, and implementation of BCG by certified BCG consultants or staff is strongly recommended - to save time and effort, but also to ensure that the configuration of such a fundamental system area has been performed accurately and correctly.

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