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**Economic Commission for Europe**

English

**Inland Transport Committee**

21 January 2015

**Working Party on the Transport of Dangerous Goods****Joint Meeting of Experts on the Regulations annexed to the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (ADN Safety Committee)****Twenty-sixth session****Geneva, 27-30 January 2015****Item 4 (b) of the provisional agenda****Implementation of the ADN:****Special authorizations, derogations and equivalents**

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## **LNG as fuel - Evaluation reports**

**Transmitted by the Government of the Netherlands**

### **I. Introduction**

1. Five vessels which use LNG as fuel are currently operational: “Argonon”, “Greenstream” (I-Tanker 1401), “Greenrhine” (I-Tanker 1402), “Sirocco” (Chemgas 851) and the Eiger.

2. The Recommendations issued by the ADN Administrative Committee include preconditions the vessel has to comply with. One of the preconditions is to send an annual evaluation report to the ADN Safety Committee. These reports have to provide all information on the safety of the vessel relevant for the ADN Committee, including but not limited to any system failure, leakage, bunkering data and any abnormalities. Such a report was provided for the Argonon during the 22nd session of the ADN Safety Committee (January 2013, INF.21 & INF. 35).

### **II. Evaluation reports**

3. Attached are the evaluation reports for the following vessels:

- ‘Argonon’, operated by Deen Shipping B.V, in service since November 2011. The report describes operations during 2013. The report for the year 2014 will be filed at the August 2015 session of the ADN Committee;
- ‘Greenstream’ (in service since April 2013 and the ‘Green Rhine’ (since September 2013) are both operated by Interstream Barging B.V.

## 2<sup>nd</sup> evaluation report inland waterway tanker barge 'Argonon'



### General data

Chemical Tanker Type C

Length 110 m

Breadth 16.20 m

Depth 6.23 m

Draught 5.00

Deadweight 6100 t

Propulsion 2 \* Caterpillar DF3512 engines, 2 \* 1127 kW

In service since November 25<sup>th</sup> 2011

The barge is classed by Lloyd's Register, and the statutory certificates are issued by Lloyd's Register on behalf of the Netherlands Shipping Inspectorate.

General information of the LNG system is part of the recommendation. For reference purposes this description is added as Annex 1 to this report.

**System failure**



Since commissioning on November 2011 there hasn't been a single system failure in the LNG system. So there hasn't been the need for any system modification due to failure.

Leakage



There hasn't been any leakage in both the LNG and the natural gas system. The natural gas system is checked by the ships' crew on a two week cycle by testing the connections in the natural gas lines in the engine room with soap. The data of these inspections are recorded on board. The piping and valves in the cold box are visually checked on a weekly basis. Also during bunkering there hasn't been any leakage of LNG.

### Bunkering data



The barge sails on a mixture of 81 % LNG and 19 % gas oil (EN590). This mixture has been optimised for using the maximum percentage of LNG without decreasing the engine characteristics. The engines are Caterpillar DF3512 engines which haven't been changed for the use of natural gas. The natural gas is mixed with the combustion air before injection in the engine. During the first few weeks of the barge sailing this mixture has been changed from a 60-40 % to the final 81-19 %.

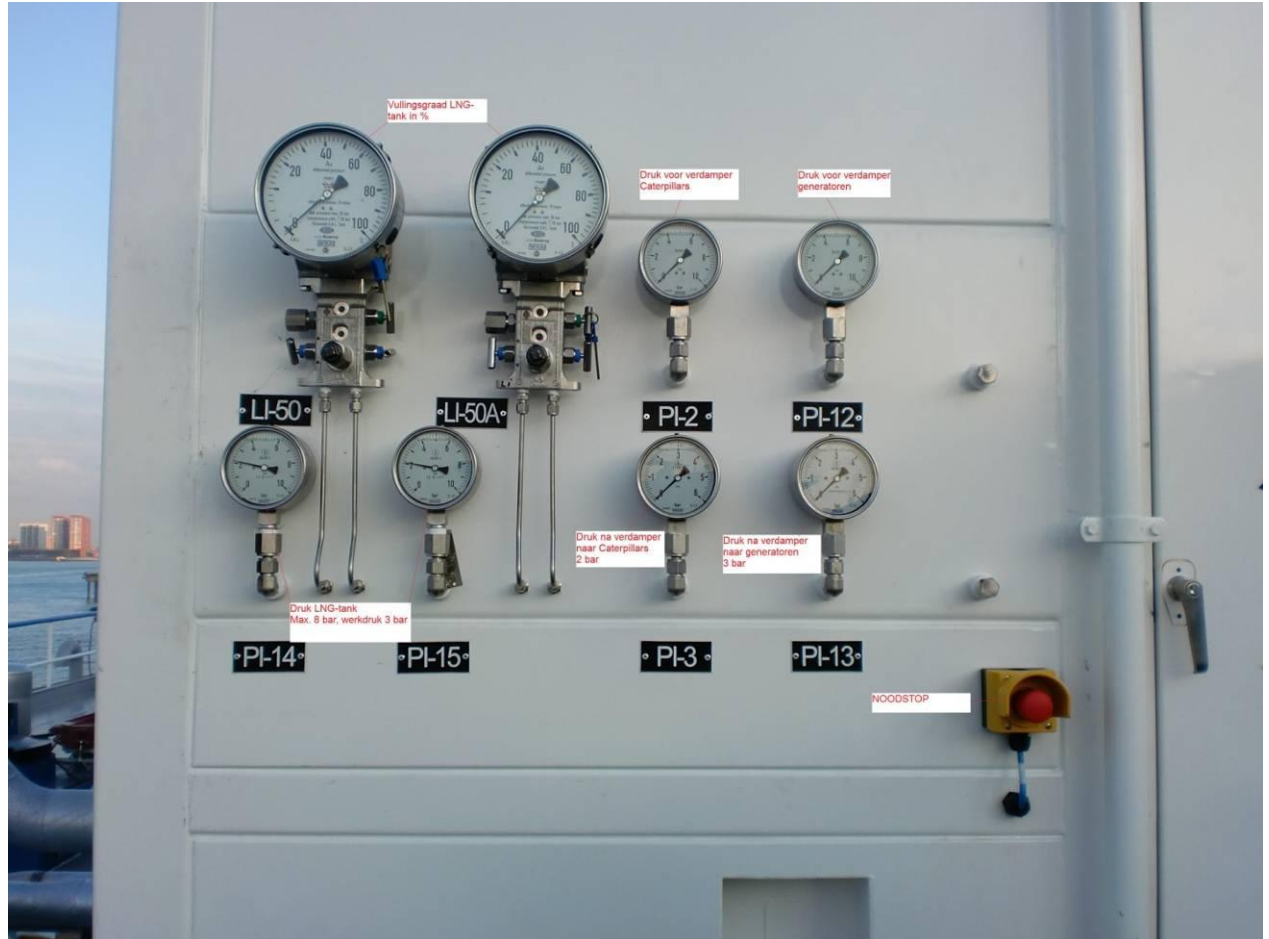
The bunkering with LNG is done by a truck. The total bunkering procedure takes approximately 1.5 hours. This is including the completion of the bunkering checklist, the purging of the bunkering lines and the coupling and decoupling of these lines. The LNG flows into the storage tank on the barge by the pressure difference between the truck and the storage tank. No pumping is needed. An average of 15 Tons LNG is bunkered each time. Every bunkering has been done without any mistakes or failures. The bunkering procedure is followed each time and has proven to be useful and applicable.

The first bunkering was done at the premises of a bunkering station in Zwijndrecht, The Netherlands. The other bunkering operations were done on a dedicated location in the Port of Rotterdam. The first bunkering with LNG took place on November 22<sup>nd</sup> 2011. This bunkering has been witnessed by Lloyd's Register. Since then 22 times a bunkering with LNG has been done.

A total of 305 Tons LNG has been bunkered (62 Tons has been used for the micro turbines only). A total of 80 M<sup>3</sup> of gas oil for the use of the main engine has been bunkered. Since January 2013 the Argonon is permitted to bunker also in the port of Antwerp. In the last year the Argonon bunkered five times on this dedicated location in Antwerp.



**Pressure data**



The LNG is stored in the tank at a temperature between -158 and -162 degrees Celsius with a pressure of 3.5 bar. The system is equipped with a pressure build up unit which keeps this pressure on this level. The safety valves on the tank have a pressure setting of 8 bar, but this pressure has never been reached. So no LNG or natural gas has escaped from the storage tank. The maximum tank pressure during the operation of the vessel was 3.5 bar.

The LNG is evaporated in the cold box into natural gas which is transported at ambient temperature with a pressure of 3.5 bar to the engine room.

At the entrance in the engine room the pressure is reduced to 1.0 bar.

Direct on the engine the pressure is reduced to atmospheric pressure, and mixed with the combustion air and injected into the engine.

**Abnormalities, repairs and modifications**



The installation on board has been done according the approved plans. The commissioning of the system has been done under the supervision of Lloyd's Register. As a requirement of some oil majors the direction of outlet of the safety relieve valve is modified from horizontal to vertical. As the whole system is operating as expected no repairs or further modifications of whatever kind have been necessary during this first year. The LNG system isn't modified in any way since the installation on board.

### Insolation flange

After consideration with several parties ( Lloyds , Shell, TNO, Dutch flag auth, Port auth)  
We decided to change the electric isolation between Tank truck and Barge.  
There is no connection anymore between Tank truck and Barge via an earth cable.  
The Tank truck is connected with an earth cable to a copper pin in to the earth.  
The barge is insulated with an insulation flange between bunker hose and bunker manifold .  
The barge will lose his electric conductance trough the water.  
In this respect the bunker procedure has been reviewed .  
The text in 1002-660-4 LNG Trailer to Tank filling procedure under point 2 is changed in  
“Driver connects earth cable to copper pin next to the tank trailer”



### Operations data

The engines have 2685 running hours since November 25<sup>th</sup> 2011. This relatively limited number of sailing hours is due to the service operation of the vessel. The vessel mainly operates as a bunker tanker in the ports of Rotterdam, Amsterdam and Antwerp, and this includes a large number of non-sailing hours.



### Survey report

As this is the first dual fuel inland waterway barge, it has the special attention of Lloyd's Register. Therefore the average numbers of surveys and visits on board have been increased. The annual survey of the LNG system has been done by Lloyd's Register in December 2013. This survey has been done according the Lloyd's Register Rules and Regulations for the Classification of Natural Gas Fuelled Ships (July 2012). Although the vessel has been build according the provisional version of these rules from 2007, the now final version of the rules doesn't have any influence on the system as it is installed on board. The survey report is attached as Annex 2 to this report.

### Emission data



**" IEDERE KILOMETER VAREN  
IS CO2 BESPAREN!"**

The use of LNG as fuel obviously leads to a significant reduction of emission of CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> and Particulates Matter (PM). In the first 794 days since entering into service the 'Argonon' has saved 340 tons CO<sub>2</sub>. This is compared to a similar vessel which runs on gas oil only. As the owner of the 'Argonon' has several nearly similar vessels into service on the same trade this equation can be easily made.

The emissions are measured by SGS Environmental Services in the spring of 2013 at the Calandcanal in Rotterdam. The emissions are measured according the "ISO 8178 Test Cycles Types and Mode Weighting Factors" on an E3 Marine Propeller Law. The weighted average values on this cycle can be found in the table below.

DF Starboard eng.		E3 Cycle	CCR2	
E3 Weightfactor	[-]	100%	g/kWh	
NOx	[g/kWh]	3,47	7,3	-52%
PM10	[g/kWh]	0,10	0,2	-49%

As can be read the reductions on the emissions that directly affect the air quality are substantial. The NOx emissions are reduced with over 50% over the cycle compared to the CCR requirements. The emission of particles is reduced with almost 50%. The level of SOx is not measured, but this is lowered equal to the rate of substitution, since gas has nearly none sulphur content. Due to the use of EN590 the original value was already low.

The emissions of hydrocarbons are measured but cannot be benchmarked according legislations at the moment. The emissions are  $\gg 1$  g/kWh as is specified as HC emissions for diesel engines. Alternatively the emissions caused by the methane slip are  $> 6$  g/kWh, which is considered to be the point of a neutral GHG balance. The reason for this can mainly be found in the fact that when the Argonon project started LNG was not allowed as a fuel. Therefore the technology selection in 2009 was limited and maintaining diesel engine operation was dominant above emissions in general, and methane slippage in specific.

In the early stage of the project a methane (oxidation) catalyst was selected to reduce methane slip. Based on experiences from full gas engines at high load, constant speed in other applications, it was expected that this solution could function for the dual fuel option as well. With progressing insights the incorporation of oxidation catalyst proved to be challenging in combination with the dual fuel engines transient loads and low exhaust gas temperatures. A additional concern raised about what happens with the diesel soot and methane that is being buffered at low temperatures, when the temperature rise under high load. To prevent the low exhaust temperatures, burners could be installed. Burners raise the exhaust gas temperature by burning fuel directly in the exhaust. However the energy that this option needs minimizes the reduction of the greenhouse gasses and adds substantial operational costs. Due to the concerns about operational safety and the additional energy consumption, the oxidation catalysts installed initially on the Argonon are not put into operation.

Thanks to, among others, this project a lot of engine technology is developed over the past 5 years and further developments are speeding up. With for instance developments in the motor management systems, the NOx levels can be further decreased with an expected end result of 70% reduction. By setting regulatory targets for the methane slippage, engines can be developed towards such limits. 6 g/kWh from the source can be reached in the near future with similar technology. The slippage of methane is not an environmental problem only, but also a cost issue, because of unburned fuel leaving the system. It is therefore in the interest of all parties to find the solution at the source (in the engine), rather than using a costly exhaust solution.

On the barge also two Capstone turbines of 30 kW are installed. These run on natural gas only. The NOx emission of these turbines is 0.29 gr/kWhr. This is approximately 15 % of the expected CCNR IV value. The emitting of particles is none.

The reduction of the fuel costs is approximately 25 % compared to a similar barge which runs on gas oil only.



### **Training of crew**

Before the vessel came into service the crew has been trained at a recognised training institute. This training consists of a one day theoretical training and a practical training on board.

The training level of the crew has proven to be sufficient but is still under evaluation by the authorities. The staff and crew of the Argonon are involved in many working groups to share the experience with colleagues how to work safe with LNG. In total 12 crewmembers has followed the theoretical and practical LNG training.

**Promotion**



The Argonon participated this year again in various promotional activities . The Argonon was present at the opening of Maasvlakte II in the summer of 2013.

January 2014

G.C.M. Deen  
CEO Argonon Shipping B.V. Zwijndrecht



# Evaluation report Inland Waterway Tanker Vessels 'Greenstream' and 'Green Rhine'

**Date: November 2014**

## **Introduction**

The 'Greenstream' is the first inland waterway barge with a LNG electric propulsion. The 'Green Rhine' is a sister vessel and was the second inland waterway barge with LNG-electric propulsion. As the two vessels are identical and have been commissioned shortly after each other, it was decided to submit one evaluation report for both vessels.

The use of Liquefied Natural Gas (LNG) as fuel on board of these vessels is allowed according Recommendation nos. 2/2012 and 3/2012 of the Central Commission for the Navigation of the Rhine, dated February 24<sup>th</sup> 2012.

Item no. 11 of this recommendation holds the obligation to submit an annual evaluation report to be sent in by the applicant, Peters Shipyard Kampen. This is the first annual evaluation report. Due to the bankruptcy of the shipyard in April 2014 this report is made by Lloyd's Register, based on the information from the shipyard, the ships' manager Exho, the ships' charter party Interstream, and observations by class surveyors. Along with some general information, the several topics as mentioned in item 11 of the recommendation are described.





## General data of the vessels

Loa 110 m  
Boa 11.45 m  
D 5.45 m  
T 3.45 m  
Dw 2875 t  
Propulsion 4 x Scania SGI 16 engines, output 4 x 285 kW  
Class notation +A1 IWW Tanker Type C, Pv +50 kPA, s.g. 1. 0, in association with a list of defined cargoes, [+] LMC

The 'Greenstream' is in service since April 2013 and the 'Green Rhine' since September 2013. The barge is classed by Lloyd's Register, and the statutory certificates are issued by Lloyd's Register on behalf of the Netherlands Shipping Inspectorate.



*Overview of the tanker deck looking forward*

## **System failure**

No LNG related system failure has occurred on one of the vessels since the date of delivery. Not a single warranty claim has been send to the supplier of the LNG tanks and coldbox.

During the first months after commissioning the propulsion system of the 'Greenstream' has experienced some unstable behaviour. This was not related to the hardware or safety of the natural gas system, but failures were caused by the dynamical interaction between the engines and the common DC-bus. Measures to improve this behaviour have been implemented after thorough investigations of the problem, and it has been solved. Since then the vessel sails without technical issues.



*Engine room with the two Scania gas engines*

## Leakage

Only during the very first bunkering of the 'Greenstream' at the shipyard a minor leakage on a flanged connection has occurred due to cooling down and shrinking of the material. Leakage has been solved immediately by tightening all the bolts of the flanged connections. Since delivery no leakages have been discovered. Not in the liquefied gas system and not in the natural gas part of the system.



*Looking aft over the two LNG storage tanks*



## Pressure data

The working pressure of the tanks is always between 4.5 and 5 bar. The pressure relieve valves are set at 8 bar. This relieve valves have never been opened. In case of a quite large waiting time at a terminal with pressure build up above 5 bar, the pressure was reduced by running an engine on that side. The automatic pressure build up system has worked perfectly, and no gas has ever escaped.



*Front side of the engine rooms with the gas valve units*

## **Bunkering data**

Since the commissioning of the vessels until the end of October 2014 the 'Greenstream' has taken bunkers 51 times and the 'Green Rhine' 33 times. An average of 16 tons has been bunkered each time. All the times the ships have been bunkered through a truck which delivers the LNG from the terminal at Zeebrugge. The bunkering locations are Rotterdam, Mannheim, Antwerp and Amsterdam.

The variety of bunkering checklists demanded by the different authorities involved at the various bunkering locations were causing difficulties for the operator of the vessel. Furthermore being a tanker the restrictions that were raised in case the tanker was sailing with a blue cone makes it to a logistic challenge to plan for the bunker moment.



*Bunker connection prior to the bunkering, with the hose (left) coming from the delivery truck*



### **Abnormalities, repairs and modifications**

As the liquefied natural gas system and the gas system both have worked without any issues, no abnormalities can be reported.

On demand of the charter party additional non return valves have been installed at the bunker line at PS and SB. This has been done shortly after the first vessel has entered into service. Although this modification is not necessary according class rules, Lloyd's Register has accepted it.



*Bunkering connection with (from left to right) the connection flange, Nitrogen connection, dry break away coupling and two non-return valves. The additional non-return valve is pointed at with the blue arrow*

## **Operational data**

The vessels have been operated from the Amsterdam-Rotterdam-Antwerp area up to Basel, but mainly between ARA and Köln Wesseling and Köln Godorf. All 4 main engines of the 'Greenstream' have approximately 7000 running hours until the end of October, and the 4 main engines of the 'Green Rhine' have approximately 5000 running hours each. This means they are quite intensively used, keeping in mind that most of the time not all engines are used.

At the first operational sailing voyage of the 'Greenstream' a grounding has occurred resulting in the loss of one of the thrusters. A new thruster has been fitted immediately and the vessel was able to sail again within a few days. The lost thruster has been examined, but no deficiencies were found in the construction. The incident wasn't related to the LNG system at all, and it can be described as 'bad luck'.



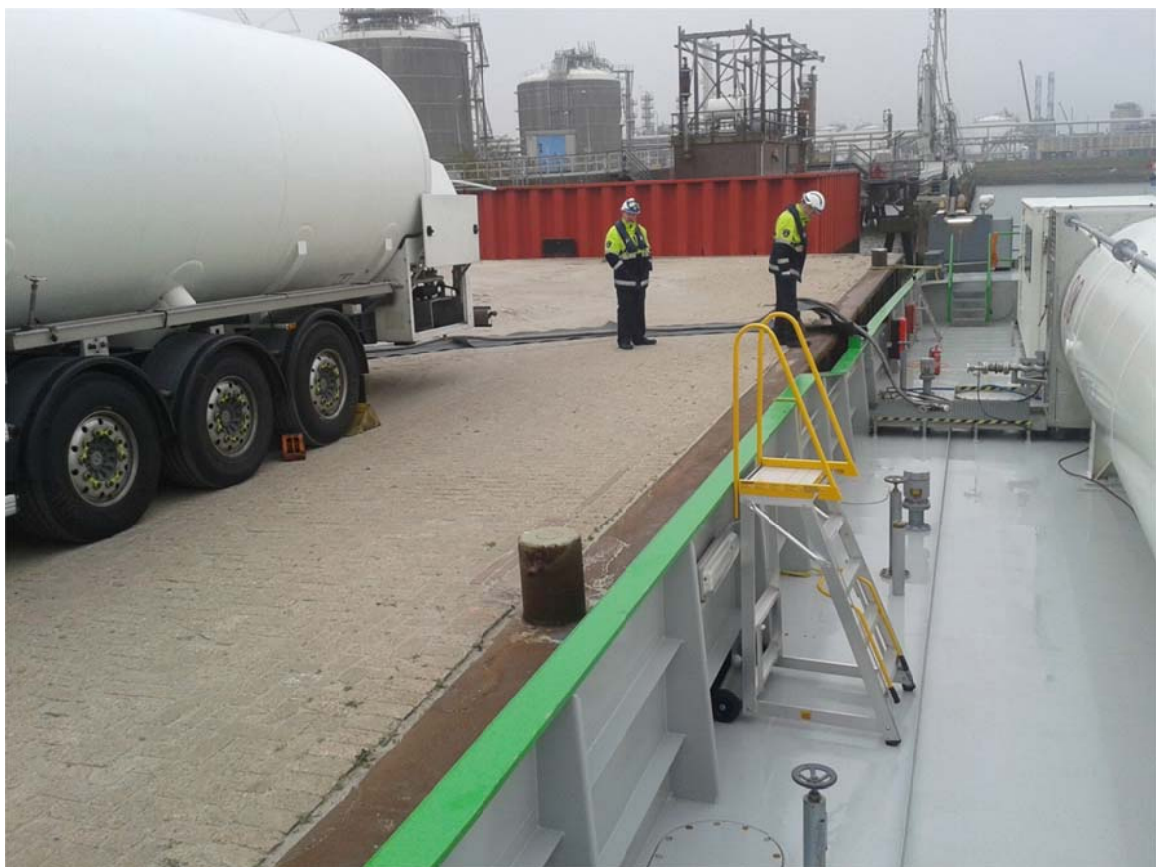
*Damaged thruster after recovery*

## Survey report

The 'Greenstream' has been surveyed for the annual survey of the LNG installation. This survey has been done during a bunkering operation in Rotterdam in order to witness the bunkering procedure as well. No deficiencies of the LNG installation were found during the surveys. It was observed that the crew on board is well-trained and follows the bunkering procedures as described.

The survey report of the 'Greenstream' is attached to this report as Annex 1.

As there is a window of three months for the annual survey, the survey of the 'Green Rhine' is still due, but will be done before the end of 2014.



*Bunkering from truck at the Seine Harbour, Rotterdam*



## **Emission data**

Although it's no obligation from the CCNR recommendation to report on the emission data, it's recognised that this subject is highly interesting for the authorities involved.

Emission data has been collected at the 'Greenstream' on September 17<sup>th</sup> 2014. The data are attached in a table as Annex 2. These data are nearly the same as on the test bank before the engines were installed on board. The data aren't translated to values of gr/kWhr as this needs much more testing. However, it can be concluded that the emission values are as may be expected from these gas engines, and are below the CCNR II values of diesel engines.



*View in the wheelhouse*

- Annex 1: Survey report Lloyd's Register 'Greenstream'
- Annex 2: Emission data 'Greenstream'
- Annex 3: Recommendation CCNR 2/2012 dated 24-2-2012

Ship's Name: GREENSTREAM  
LR/IMO Number: 9664990

Port of Survey: Rotterdam

Date of Build: 08/04/2013  
Port of Registry: Rotterdam  
Gross Tons: 2,500

Certificate Number: ROT1402217  
First Visit: 28/10/2014  
Last Visit: 28/10/2014

I have carried out the surveys listed below. All recommendations made by me have been dealt with to my satisfaction. I am recommending that class be maintained with new records as follows.

	Surveys Held	Status	New Record
MCHY	MACHINERY Verification LNG installation	Complete	28-10-2014

Condition of Class

No Conditions of Class for this Report.

\*\*\* END \*\*\*

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The above recommendation is made subject to any outstanding conditions of class being dealt with as previously recommended.

Signed:

R.van de Velde

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Date: Printed from Class Direct Live on: November 24, 2014



Engine No. 1 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	84	147	189	242
Engine speed n	[min-1]	1500	1500	1500	1500
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	392	419	438	438
<b>Exhaust gas analyses</b>					
CO	[ppm]	278	227	236	230
CO2	[%]	7,62	7,48	7,65	7,76
CxHy	[ppm]	170	160	0	0
λ	-	1,54	1,56	1,53	1,53
NO	[ppm]	344	488	904	1153
NO2	[ppm]	50,0	58,3	73,3	53,9
NOx	[mg/m3]	1056	1501	2626	3249
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 1 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	90	150	185	270
Engine speed n	[min-1]	1800	1800	1800	1800
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	403	423	440	441
<b>Exhaust gas analyses</b>					
CO	[ppm]	251	265	239	228
CO2	[%]	7,58	7,62	7,66	7,60
CxHy	[ppm]	120	160	140	0
λ	-	1,54	1,54	1,53	1,54
NO	[ppm]	393	1040	1641	1779
NO2	[ppm]	57,2	80,0	75,2	76,4
NOx	[mg/m3]	1223	3021	4604	5019
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 2 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	84	147	189	242
Engine speed n	[min-1]	1500	1500	1500	1500
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	411	442	447	450
<b>Exhaust gas analyses</b>					
CO	[ppm]	308	228	222	185
CO2	[%]	8,69	7,57	7,63	7,67
CxHy	[ppm]	110	40	0	130
λ	-	1,44	1,54	1,53	1,52
NO	[ppm]	1426	353	475	903
NO2	[ppm]	66,0	64,4	60,3	38,0
NOx	[mg/m3]	3530	1132	1443	2522
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 2 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	90	150	185	270
Engine speed n	[min-1]	1800	1800	1800	1800
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	419	437	440	450
<b>Exhaust gas analyses</b>					
CO	[ppm]	258	258	257	225
CO2	[%]	7,64	7,54	7,41	7,67
CxHy	[ppm]	180	170	100	70
λ	-	1,53	1,55	1,58	1,53
NO	[ppm]	419	556	487	1322
NO2	[ppm]	64,0	64,6	65,2	62,2
NOx	[mg/m3]	1299	3021	4604	5019
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 3 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	84	147	189	242
Engine speed n	[min-1]	1500	1500	1500	1500
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	411	439	446	451
<b>Exhaust gas analyses</b>					
CO	[ppm]	374	305	293	227
CO2	[%]	8,10	7,73	7,53	7,68
CxHy	[ppm]	170	90	0	0
λ	-	1,35	1,51	1,55	1,52
NO	[ppm]	1176	1110	915	1595
NO2	[ppm]	64,0	81,1	74,2	70,2
NOx	[mg/m3]	3147	3169	2701	4456
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 3 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	90	150	185	270
Engine speed n	[min-1]	1800	1800	1800	1800
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	426	437	447	448
<b>Exhaust gas analyses</b>					
CO	[ppm]	337	330	305	275
CO2	[%]	7,88	7,53	7,44	7,39
CxHy	[ppm]	40	220	120	100
λ	-	1,49	1,55	1,57	1,58
NO	[ppm]	959	556	487	1648
NO2	[ppm]	77,2	82,7	90,2	76,2
NOx	[mg/m3]	2704	3392	4173	4796
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 4 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	84	147	189	242
Engine speed n	[min-1]	1500	1500	1500	1500
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	402	448	450	470
<b>Exhaust gas analyses</b>					
CO	[ppm]	285	239	219	232
CO2	[%]	7,47	7,34	7,31	7,89
CxHy	[ppm]	390	50	110	0
λ	-	1,57	1,59	1,60	1,48
NO	[ppm]	187	274	312	1619
NO2	[ppm]	60,3	57,2	52,1	46,0
NOx	[mg/m3]	680	928	1025	4339
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1

Engine No. 4 recording data		Load cycle			
Emission tests 17 september 2014					
Load P	[%]	25	50	75	100
Pb	[kW]	90	150	185	270
Engine speed n	[min-1]	1800	1800	1800	1800
<b>Exhaust</b>					
Exhaust gas temperature after turbo chargers	[C]	427	434	444	450
<b>Exhaust gas analyses</b>					
CO	[ppm]	253	250	226	234
CO2	[%]	7,11	7,06	7,08	7,24
CxHy	[ppm]	180	160	180	100
λ	-	1,65	1,66	1,65	1,62
NO	[ppm]	165	256	360	845
NO2	[ppm]	58,4	54,8	53,6	56,8
NOx	[mg/m3]	647	256	1201	2560
<b>Ambient conditions</b>					
Ambient pressure	[mBar]	1012,1	1012,1	1012,1	1012,1





RV (12) 18  
RV/G (12) 39  
JWG (12) 37  
16 March 2012  
Or. en fr/de/nl/en

INSPECTION REGULATIONS COMMITTEE  
INSPECTION REGULATIONS WORKING GROUP  
JOINT WORKING GROUP

## **Recommendation Type I-Tanker 1402**

Communication from the Secretariat

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The Secretariat is pleased to distribute for information the annexed recommendation drawn up by the Inspection Regulations Working Group pursuant to Article 2.19 of the Rhine Vessels Inspection Regulations (RVIR).

**CENTRAL COMMISSION FOR THE NAVIGATION OF THE RHINE**

**RECOMMENDATION TO INSPECTION BODIES  
RELATING TO THE RHINE VESSELS INSPECTION REGULATIONS**

**RECOMMENDATION No. 3/2012  
of 24 February 2012**

**TYPE I-TANKER 1402**

The motor tanker "Type I-Tanker" (yard no. 1402 of Peters Shipyard Kampen, European vessel identification number to be obtained), type C tanker as referred to in the ADN, is herewith authorised to use liquefied natural gas (LNG) as fuel for the propulsion installation.

Pursuant to article 2.19 (3) the vessel is authorized to deviate from the articles 8.01 (3), 8.05 (1), 8.05 (6), 8.05 (9), 8.05 (11) and 8.05 (12) until 30-06-2017. The use of liquefied natural gas is deemed sufficiently safe if the following conditions are met at all times:

1. The vessel is constructed and classed under the supervision and in accordance with the applicable rules of a recognized classification society, which has special rules for liquefied natural gas installations. The class shall be maintained.
2. The liquefied natural gas propulsion system shall be annually surveyed by the classification society which has classed the vessel.
3. A full HAZID study by the classification society which has classed the vessel (see **annex 1**), has been carried out.
4. The liquefied natural gas propulsion system is in conformity with the IGF Code, (IMO Resolution MSC 285(86), June 1<sup>st</sup> 2009), except for the items listed in **annex 2**.
5. The two liquefied natural gas storage tanks shall comply with the requirements of the European standard EN 13458-2 : 2002. The tanks shall be connected to the vessel in a way that they remain attached to the vessel under all circumstances.
6. The bunkering of liquefied natural gas shall be done according to the procedures laid down in **annex 3**.
7. The maintenance of the liquefied natural gas propulsion system shall be carried out in accordance with the manufacturer's instructions. The instructions are to be carried on board. Before re-commissioning after a substantial modification or repair, the liquefied natural gas propulsion system shall be examined by the classification society which has classed the vessel.
8. All crewmembers shall be trained on the dangers, the use, the maintenance and the inspection of the liquefied natural gas propulsion system according to the procedures laid down in **annex 4**.
9. A safety rota shall be provided on board the vessel. The safety rota describes the duties of the crew and includes a safety plan.

10. All data related to the use of the liquefied natural gas propulsion system shall be collected by the carrier and shall be kept for at least five years. The data shall be sent to the competent authority on request.
11. An annual evaluation report that includes all collected data, is sent to the secretary of the CCNR for distribution amongst the member states. The evaluation report shall contain at least the following information:
  - a) system failure;
  - b) leakage;
  - c) bunkering data (liquefied natural gas);
  - d) pressure data;
  - e) abnormalities, repairs and modifications of the liquefied natural gas system including the tanks;
  - f) operation data;
  - g) inspection report by the classification society which has classed the vessel.

(The technical data on which this recommendation is based are in document RV/G (11) 69 rev. 3.)

**Attachments** (all in one document):

- Annex 1: Report No. ROT/11.M.0090 Issue 2, dated May 23<sup>rd</sup> 2011
- Annex 2: Overview of deviations from the IGF Code (IMO Resolution MSC.285(86), June 1<sup>st</sup> 2009)
- Annex 3: Liquefied natural gas bunkering procedure
- Annex 4: Description of the training of the crew on board of liquefied natural gas driven inland waterway vessels
- Annex 5: General information liquefied natural gas system on board of the type I-tanker 1402

Annexes are located on website under  
and

RV 2012 EN rv12\_18en\_2  
RVG 2012 EN rvg12\_39en\_2  
JWG 2012 EN jwg12\_37en\_2

Les annexes sont enregistrées sur le site sous  
et

RV 2012 EN rv12\_18en\_2  
RVG 2012 EN rvg12\_39en\_2  
JWG 2012 EN jwg12\_37en\_2

Die Anlagen stehen auf der Website unter  
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## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on the Transport of Dangerous Goods

Administrative Committee of the European Agreement  
concerning the International Carriage of Dangerous  
Goods by Inland Waterways (ADN)

#### Ninth session

Geneva, 31 August 2012

### Report of the Administrative Committee of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways on its ninth session\*

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## **I. Attendance**

1. The Administrative Committee of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) held its ninth session in Geneva on 31 August 2012 under the chairmanship of Mr. H. Rein (Germany) and vice-chairmanship of Mr. B. Birkhuber (Austria). Representatives of the following Contracting Parties took part in the work of the session: Austria, Bulgaria, Croatia, France, Germany, Netherlands, Poland, Romania, Russian Federation, Serbia and Ukraine.

2. The Administrative Committee noted that the representatives of Contracting Parties attending the session had been accredited and that the quorum of half the number of Contracting Parties required for taking decisions had been reached.

3. In accordance with article 17, paragraph 2 of ADN, and following a decision by the Committee (ECE/ADN/2, para. 8), a representative of the Central Commission for the Navigation of the Rhine (CCNR) also took part in the session as an observer.

## **II. Adoption of the agenda (agenda item 1)**

*Documents:* ECE/ADN/19 and Add.1

4. The Administrative Committee adopted the agenda prepared by the secretariat.

## **III. Status of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (agenda item 2)**

5. The Administrative Committee noted that the number of Contracting Parties remained at 17: Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, Luxembourg, Netherlands, Poland, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Switzerland and Ukraine.

## **IV. Matters relating to the implementation of ADN (agenda item 3)**

### **A. Recognition of classification societies**

6. The Committee noted that no new information on the recognition of classification societies had been received from Contracting Parties since the eighth session of the Administrative Committee.

### **B. Special authorizations, derogations and equivalents**

7. The Administrative Committee noted the recommendation by the ADN Safety Committee that, taking into consideration the information provided by the Netherlands and the recommendations made by CCNR, derogations be granted for three vessels for the use of LNG for propulsion (Informal document INF.29 issued during the twenty-first session of the Safety Committee). In accordance with the procedure foreseen in 1.5.3.2, the Administrative Committee decided to authorize the Government of the Netherlands to issue derogations for the tank vessels *Damen River Tanker 1145 Eco Liner* (ID number 54314),

*I-Tanker* (ID number 54309) and *I-Tanker* (ID number 54310) authorizing them on a trial basis to use LNG as fuel for the transport of dangerous goods (see Annexes I, II and III).

8. It was noted that no new multilateral agreements had been initiated since the last session.

9. It was recalled that the text of special authorizations, special agreements, derogations and equivalents, as well as their status, and of notifications, was available on the secretariat's website at the following link: <http://www.unece.org/trans/danger/danger.htm>.

### **C. Miscellaneous notifications**

10. The Committee requested new Contracting Parties which had not yet done so to transmit to the secretariat the information required by the annexed Regulations, notably as regards the competent authority (para. 1.8.4 of the annexed Regulations) and recognized classification societies (para. 1.15.2.4 of the annexed Regulations) (see also ECE/ADN/4, annex).

11. The secretariat was asked to prepare a list for the tenth session of the Administrative Committee of those States that were still expected to submit information to the secretariat.

## **V. Work of the Safety Committee (agenda item 4)**

12. The Committee took note of the report of the Safety Committee on its twenty-first session (ECE/TRANS/WP.15/AC.2/44) and adopted:

(a) Proposed amendments for the purpose of bringing the Regulations annexed to ADN in line with the amended versions of ADR and RID that should be applicable as of 1 January 2013 (see ECE/TRANS/WP.15/AC.2/44, para. 7). The secretariat was requested to publish them as an addendum to document ECE/ADN/18 (ECE/ADN/18/Add.1) and to ensure their communication to Contracting Parties no later than 1 September 2012 in accordance with the procedure outlined in article 20, paragraph 5 (a) of ADN, so that they could enter into force on 1 January 2013, i.e. one month after acceptance by Contracting Parties.

(b) All proposed corrections to the previously notified amendments to the Regulations annexed to ADN (ECE/ADN/18) (see ECE/TRANS/WP.15/AC.2/44, paras. 10-11). As these corrections are subject to the acceptance of the amendments listed in ECE/ADN/18 and ECE/ADN/18/Corr.1, the secretariat was requested to publish them as a corrigendum to document ECE/ADN/18 (ECE/ADN/18/Corr.2) and to arrange for their communication to Contracting Parties on 1 October 2012 (date of acceptance of the amendments) for acceptance in accordance with the usual procedure for corrections so that they could become effective at the latest by 1 January 2013.

(c) All proposed corrections to the Regulations annexed to ADN, as listed in ECE/TRANS/WP.15/AC.2/44, annex I. The secretariat was requested to arrange for their communication no later than 1 October 2012 to Contracting Parties for acceptance in accordance with the usual procedure for corrections so that they could become effective at the latest by 1 January 2013.

13. The Committee noted that the ADN Safety Committee had adopted amendments to the Regulations annexed to ADN for entry into force on 1 January 2015 (ECE/TRANS/WP.15/AC.2/44, annex II). Since additional work had to be performed in relation to some of these amendments, and since additional amendments were expected to be adopted by the Safety Committee at its future sessions for entry into force on 1 January 2015, the Committee decided to consider them at a later stage.

**VI. Programme of work and calendar of meetings  
(agenda item 5)**

14. The Committee noted that its next session was scheduled to take place in the afternoon of 25 January 2013 and that the deadline for submission of documents for that meeting was 19 October 2012.

**VII. Any other business (agenda item 6)**

15. The Committee requested the secretariat to take account of all corrections and amendments adopted at the session in the new consolidated "2013" edition of ADN which was being prepared.

**VIII. Adoption of the report (agenda item 7)**

16. The Administrative Committee adopted the report on its ninth session on the basis of a draft prepared by the secretariat and sent to delegations for approval by e-mail after the meeting.



## Annex I

### **Decision of the ADN Administrative Committee relating to the tank vessel *Damen River Tanker 1145 Eco Liner***

#### **Derogation No. 2/2012 of 31 August 2012**

The competent authority of the Netherlands is authorized to issue a trial certificate of approval to the motor tank vessel *Damen River Tanker 1145 Eco Liner*, ID number 54314 and BV register number 20629A, type C tanker, as referred to in the ADN, for the use of liquefied natural gas (LNG) as fuel for the propulsion installation.

Pursuant to paragraph 1.5.3.2 of the Regulations annexed to ADN, the above-mentioned vessel may deviate from the requirements of 7.2.3.31.1 and 9.3.2.31.1 until 30 June 2017. The Administrative Committee has decided that the use of LNG is sufficiently safe if the following conditions are met at all times:

1. The vessel has a valid certificate of approval according to the Rhine Vessel Inspection Regulations, based on recommendation 9/2012 of the CCNR.
2. A HAZID study by the recognized classification society <sup>1</sup> shows that the safety level of the LNG propulsion system is sufficient. This study covered but was not limited to, the following issues:
  - Interaction between cargo and LNG;
  - Effect of LNG spillage on the construction;
  - Effect of cargo fire on the LNG installation;
  - Different types of hazard posed by using LNG instead of diesel as fuel;
  - Adequate safety distance during bunkering operations.
3. The information that LNG is used as fuel is included in the dangerous goods report to traffic management and in emergency notifications;
4. All data related to the use of the LNG propulsion system shall be collected by the carrier. The data shall be sent to the competent authority on request;
5. An evaluation report shall be sent to the UNECE secretariat for information of the Administrative Committee. The evaluation report shall contain at least information on the following:
  - (a) system failures;
  - (b) leakages;
  - (c) bunkering data (LNG);
  - (d) pressure data;
  - (e) abnormalities, repairs and modifications of the LNG system including the tank;
  - (f) operational data;
  - (g) inspection report by the classification society which classed the vessel.

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<sup>1</sup> “Assessment of hazard identification study chemical tanker design Ecoliner”, dated 23 April 2012 (available in informal document INF.13 submitted to the twenty-first session of the ADN Safety Committee).

## Annex II

### Decision of the ADN Administrative Committee relating to the tank vessel *I-Tanker 1401*

#### Derogation No. 3/2012 of 31 August 2012

The competent authority of the Netherlands is authorized to issue a trial certificate of approval to the motor tank vessel *I-Tanker 1401*, ID number 54309, type C tanker, as referred to in the ADN, for the use of liquefied natural gas (LNG) as fuel for the propulsion installation.

Pursuant to paragraph 1.5.3.2 of the Regulations annexed to ADN, the above-mentioned vessel may deviate from the requirements of 7.2.3.31.1 and 9.3.2.31.1 until 30 June 2017. The Administrative Committee has decided that the use of LNG is sufficiently safe if the following conditions are met at all times:

1. The vessel has a valid certificate of approval according to the Rhine Vessel Inspection Regulations, based on recommendation 2/2012 of the CCNR.
2. A HAZID study by the recognized classification society <sup>2</sup> shows that the safety level of the LNG propulsion system is sufficient. This study covered but was not limited to, the following issues:
  - Interaction between cargo and LNG;
  - Effect of LNG spillage on the construction;
  - Effect of cargo fire on the LNG installation;
  - Different types of hazard posed by using LNG instead of diesel as fuel;
  - Adequate safety distance during bunkering operations.
3. The information that LNG is used as fuel is included in the dangerous goods report to traffic management and in emergency notifications;
4. All data related to the use of the LNG propulsion system shall be collected by the carrier. The data shall be sent to the competent authority on request;
5. An evaluation report shall be sent to the UNECE secretariat for information of the Administrative Committee. The evaluation report shall contain at least information on the following:
  - (a) system failures;
  - (b) leakages;
  - (c) bunkering data (LNG);
  - (d) pressure data;
  - (e) abnormalities, repairs and modifications of the LNG system including the tank;
  - (f) operational data;
  - (g) inspection report by the classification society which classed the vessel.

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<sup>2</sup> Report No. ROT/11.M.0090 Issue 2, dated 23 May 2011 (available in informal document INF.3 submitted to the twentieth session of the ADN Safety Committee).

## Annex III

### Decision of the ADN Administrative Committee relating to the tank vessel *I-Tanker 1402*

#### Derogation No. 4/2012 of 31 August 2012

The competent authority of the Netherlands is authorized to issue a trial certificate of approval to the motor tank vessel *I-Tanker 1402*, ID number 54310, type C tanker, as referred to in the ADN, for the use of liquefied natural gas (LNG) as fuel for the propulsion installation.

Pursuant to paragraph 1.5.3.2 of the Regulations annexed to ADN, the above-mentioned vessel may deviate from the requirements of 7.2.3.31.1 and 9.3.2.31.1 until 30 June 2017. The Administrative Committee has decided that the use of LNG is sufficiently safe if the following conditions are met at all times:

1. The vessel has a valid certificate of approval according to the Rhine Vessel Inspection Regulations, based on recommendation 3/2012 of the CCNR.
2. A HAZID study by the recognized classification society<sup>3</sup> shows that the safety level of the LNG propulsion system is sufficient. This study covered but was not limited to, the following issues:
  - Interaction between cargo and LNG;
  - Effect of LNG spillage on the construction;
  - Effect of cargo fire on the LNG installation;
  - Different types of hazard posed by using LNG instead of diesel as fuel;
  - Adequate safety distance during bunkering operations.
3. The information that LNG is used as fuel is included in the dangerous goods report to traffic management and in emergency notifications;
4. All data related to the use of the LNG propulsion system shall be collected by the carrier. The data shall be sent to the competent authority on request;
5. An evaluation report shall be sent to the UNECE secretariat for information of the Administrative Committee. The evaluation report shall contain at least information on the following:
  - (a) system failures;
  - (b) leakages;
  - (c) bunkering data (LNG);
  - (d) pressure data;
  - (e) abnormalities, repairs and modifications of the LNG system including the tank;
  - (f) operational data;
  - (g) inspection report by the classification society which classed the vessel.

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<sup>3</sup> Report No. ROT/11.M.0090 Issue 2, dated 23 May 2011 (available in informal document INF.4 submitted to the twentieth session of the ADN Safety Committee).