

<http://gears.krs.co.kr>



*; KR's Web-based system  
(for managing GHG regulations, SIP)*

**KOREAN REGISTER**

**Future Technology Research Team**

# Contents

1. What's the KR *GEARs* ?

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2. What's the SIP (Ship implementation Plan) ?

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# What's the KR *GEARs* ?



## IMO Data Collection System

- Based on MARPOL Annex VI Reg.22 & 22A
- Development of SEEMP Part II
- Gathering data(FOC/hours underway/distance)
- Verification of annual data
- Generation of standardized format
- Issuance of Confirmation of Compliance(CoC)
- Issuance of Statement of Compliance(SoC)



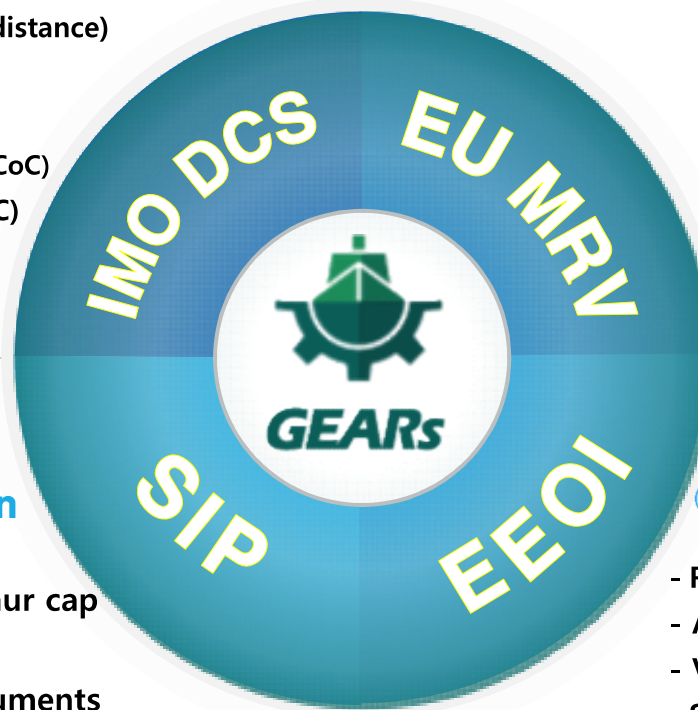
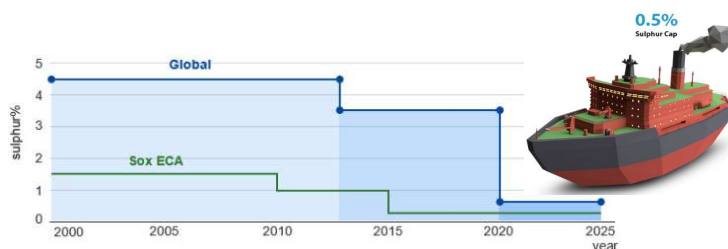
## EU Monitoring, Reporting & Verification of CO2 emission

- Based on Regulation (EU) 2015/757
- Development of Monitoring Plan
- Gathering data(FOC/CO2/time at sea/distance+α)
- Verification of voyage/annual data
- Generation of reporting format
- Issuance of Cert. for Monitoring Plan(MP)
- Issuance of Document of Compliance(DoC)



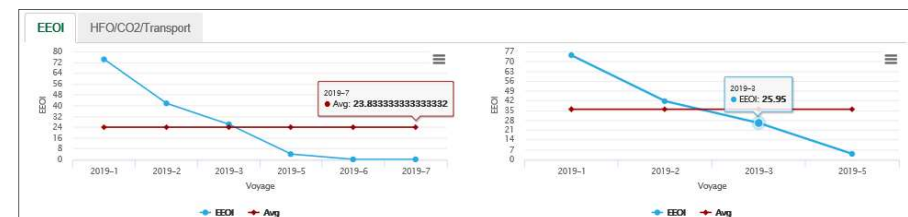
## Ship Implementation Plan

- Ready to comply with global sulphur cap
- Best solution for PSC inspection
- Providing the real life sample documents



## Energy Efficiency Operational Indicator

- Recommendation of IMO to manage efficiency
- Automatic calculation with cargo amount
- Visual checking EEOI
- Support EEOI verification for Panama discount



# What's the KR *GEARs* ?



## IMO Data Collection System

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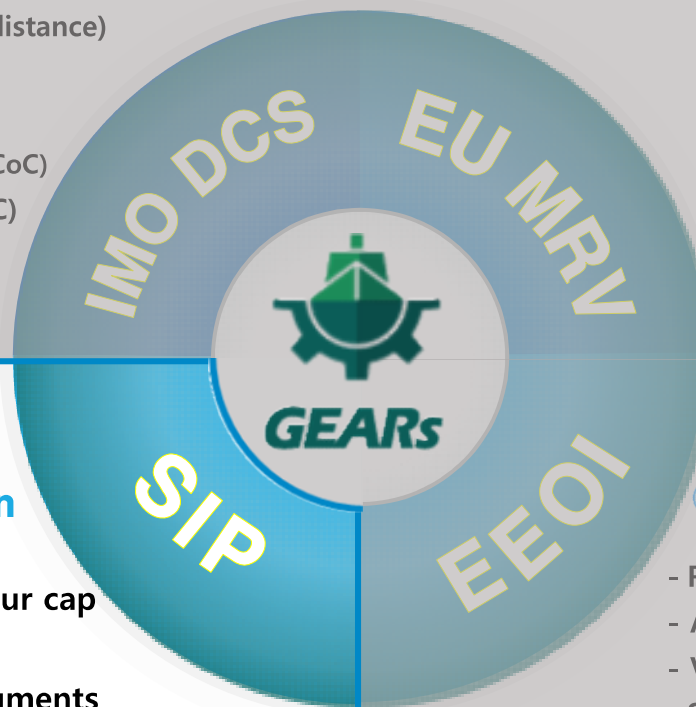
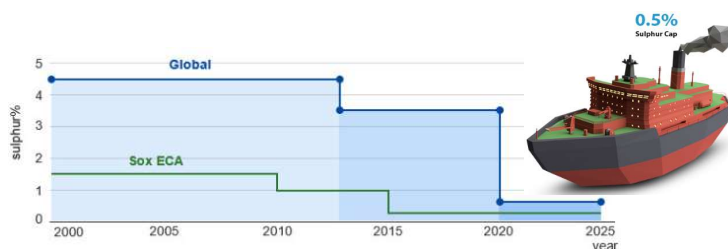
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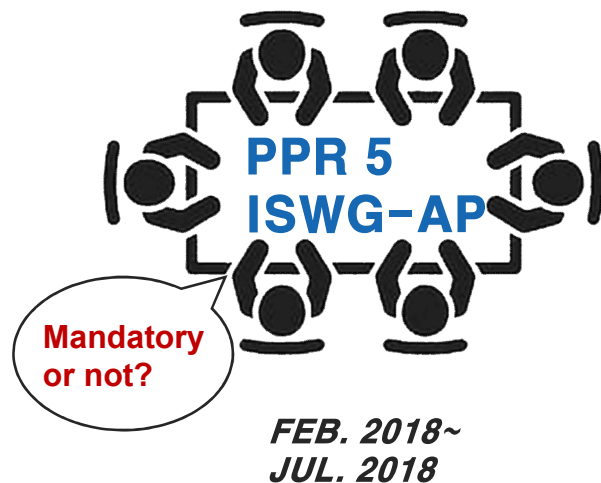


# What is the SIP?



## Ship Implementation Plan (SIP)

- To facilitate a consistent preparation of 0.5% Sulphur cap, PPR 5 proposed the development of a guidance document (the beginning of SIP).
- They wanted this SIP to be considered as the subject that needs to get approval by the administration.
- After the additional discussion, the MEPC decided **not to make mandatory requirement** on developing SIP and has released MEPC.1/Circ.878 – the guidance on the development of SIP.
- But according to the Circ.878, ***“It is still clear that PSC may take into account the SIP when verifying compliance with the 0.50% Sulphur limit.”***



***PSC can consider the SIP even it is not a mandatory***

# What is the SIP?



## *The warning letter of PSC (Paris & Tokyo, AMSA)*

### ✓ To which ship?

"The ships found not yet ready for compliance with the requirements that will enter into force on 1 JAN' 2020"

### ✓ Effect



The vessel would be recorded by PSC MOU, and further action may be taken at the next visit which may include a *detention or other enforcements of the ship.*

# SIP

is the best practice to avoid  
PSC's unnecessary action.



***Developing SIP, strongly recommended!***

PARIS MOU ON PORT STATE CONTROL

Paris MoU  
on Port State Control

To the Master of \_\_\_\_\_ Flag State \_\_\_\_\_

IMO No \_\_\_\_\_

Date \_\_\_\_\_

LETTER OF WARNING  
MARPOL Annex VI  
Sulphur Oxides (SOx) and Particulate Matter (Regulation 14)<sup>1</sup>

Dear Captain,

This letter is to bring to your attention the **new regulations** on sulphur content of fuel oils used on board from **1 January 2020**. From that date all ships subject to MARPOL Annex VI are, in principle, required to use on board fuel oils with a sulphur content of maximum 0.50% m/m in accordance with MARPOL Annex VI regulation 14<sup>2</sup>, or use alternative emission reduction and control technologies to comply with the emission standard.

From 1 January 2020 Port State Control Officers of the Paris MoU will check compliance with these regulations through the bunker delivery notes and related ships' log books and records and by means of sampling from the fuel lines.

The following check boxes indicate the areas investigated:

1 SOx records	<input type="checkbox"/>
2 Sulphur oxides	<input type="checkbox"/>
3 Sulphur content of fuel used	<input type="checkbox"/>
4 Alternative arrangements (SOx)	<input type="checkbox"/>

**From 1 January 2020** ed by the Paris MoU if the regulations were in place now.

Port State Control Officers will put further emphasis on the following items

1 That the ship carries on board fuel oil with a sulphur content depending on the area of operation
2 There are records of the bunker delivery notes (BDNs) and associated samples or records thereof are kept on board
3 There are written procedures on board covering fuel oil change over operations where appropriate
4 That the Master and ship's personnel are familiar with essential fuel oil management procedures

This list is to help you prepare for compliance by 1 January 2020. If deficiencies are recorded against any of these items from 1 January 2020 action may be taken by the Port State Control Officer which may include a detention of the ship or other enforcements or administrative or corrective measures.

**PSC can take action which may include a *detention***

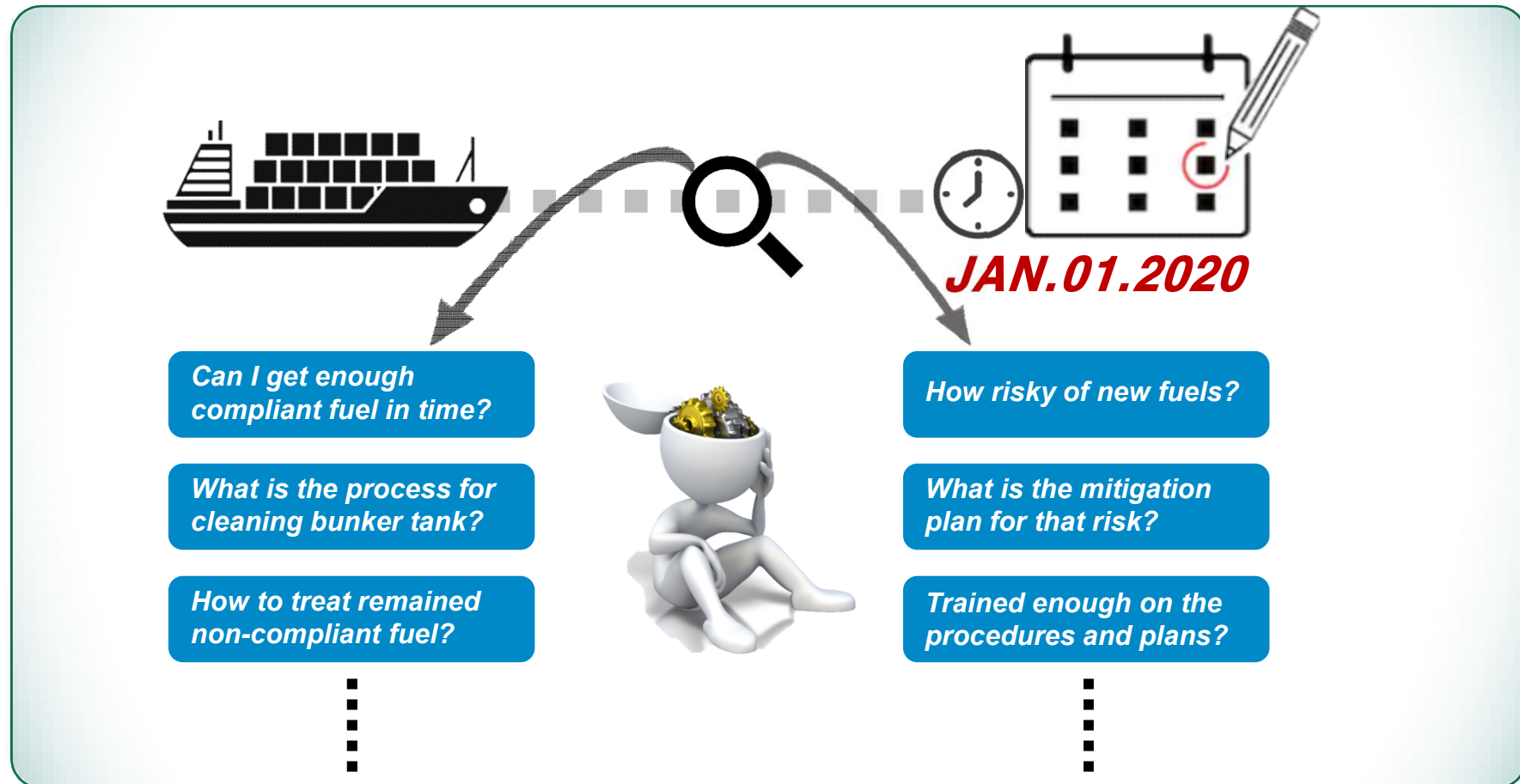
On behalf of the Maritime Authority of \_\_\_\_\_

PSCO \_\_\_\_\_ Port \_\_\_\_\_ Date \_\_\_\_\_



# What is the SIP?

## *Time to consider what to do*



***The practicality is more complex, difficult***

# What is the SIP?



## The contents of SIP in KR GEARs



**1. Risk assessment  
& mitigation plan**  
(Impact of new fuels)

**2. Fuel oil system  
modification**  
(If needed)

**3. Tank cleaning  
plan**

**4. Procurement of  
compliant fuel oil**

**5. Fuel oil  
changeover plan**

**6. Documentation  
& reporting**

MEPC.1/Circ.878 Annex, page 1	
<b>ANNEX</b>	
<b>GUIDANCE ON THE DEVELOPMENT OF A SHIP IMPLEMENTATION PLAN FOR THE CONSISTENT IMPLEMENTATION OF THE 0.50% SULPHUR LIMIT UNDER MARPOL ANNEX VI</b>	
<b>Introduction</b>	
1	MEPC 70 agreed to "1 January 2020" as the effective date of implementation for ships to comply with global 0.50% m/m sulphur content of fuel oil requirement and adopted resolution MEPC.280(70) on the Effective date of implementation of the fuel oil standard in regulation 14.1.3 of MARPOL Annex VI.
2	In this context, MEPC 73 agreed that Administrations should encourage ships flying their flag to develop implementation plans, outlining how the ship may prepare in order to comply with the required sulphur content limit of 0.50% by 1 January 2020. The plan could be complemented with a record of actions taken by the ship in order to be compliant by the applicable date.
3	Regulation 18.2.3 of MARPOL Annex VI requires a Party to take into account all relevant circumstances and the evidence presented to determine the action to take, including not taking control measures. Administrations and port State control authorities may take into account the implementation plan when verifying compliance with the 0.50% sulphur limit requirement.
4	A ship implementation plan is not a mandatory requirement. A lack of a ship implementation plan or an incomplete ship implementation plan should not be considered as "clear grounds" for a more detailed inspection.
<b>Ship implementation plan for the consistent implementation of 0.50% sulphur limit under MARPOL Annex VI</b>	
5	The ship implementation plan for 2020 could cover various items relevant for the specific ship, including, as appropriate, but not limited to:
.1	risk assessment and mitigation plan (impact of new fuels);
.2	fuel oil system modifications and tank cleaning (if needed);
.3	fuel oil capacity and segregation capability;
.4	procurement of compliant fuel;
.5	fuel oil changeover plan (conventional residual fuel oils to 0.50% sulphur compliant fuel oil); and
.6	documentation and reporting.

SHIP IMPLEMENTATION PLAN		Rev. 01
M/V "SHIP NAME" / IMO No.1000000		0000.00.00 (Revision date)
<b>Contents</b>		
1. Risk assessment and mitigation plan (impact of new fuels)		
2. Fuel oil system modification (if needed)		
3. Tank cleaning plan		
4. Procurement of compliant fuel oil		
5. Fuel oil changeover plan (conventional residual fuel oils to 0.50% Sulphur compliant fuel oil)		
6. Documentation and reporting		
<b>● Ship particulars</b>		
Name of ship		
Distinctive number or letters		
IMO Number		
Company		
Class		
Flag <sup>(optional)</sup>		
Ship's type <sup>(optional)</sup>		

***The plan is developed in accordance with IMO MEPC.1 / Circ.878***



# What is the SIP?



## The contents of SIP in KR GEARS



**1. Risk assessment & mitigation plan**  
(Impact of new fuels)

**2. Fuel oil system modification**

**3. Tank cleaning plan**

**4. Procurement of compliant fuel oil**

**5. Fuel oil changeover plan**

**6. Documentation & reporting**

Annex I. Risk Matrix and Evaluation Criteria<sup>1)</sup>

[Risk Matrix]<sup>2)</sup>

FI	Frequency	Severity Index		
		1	2	3
5	Frequent	5.0	10.0	15.0
4	Probable	4.0	8.0	12.0
3	Occasional	3.0	6.0	9.0
2	Rare	2.0	4.0	6.0
1	Improbable	1.0	2.0	3.0

[Risk Rating]<sup>3)</sup>

RI	Risk Level	Description
10~20	H	Not Acceptable Risk Additional Safety measure is "required" in order to reduce the risk.
4~9	M	ALARP Risk Additional Safety measure is "recommended" to reduce the risk. "As Low As Reasonably Practical(ALARP)".
1~3	L	Acceptable Risk No additional safety measure is required.



[Frequency Index]<sup>4)</sup>

FI	Frequency	Description
5	Frequent	Likely to occur once per 3 months on one ship.
4	Probable	Likely to occur once per 6 months on one ship.
3	Occasional	Likely to occur once per one year on one ship.
2	Remote	Likely to occur once per 5 years on one ship.
1	Improbable	Likely to occur once per 25 years on one ship.

[Severity Index]<sup>5)</sup>

SI	Severity	Definition (Effect on)	
		Ship	Environment
1	Minor	Local Damage	Partial/local environmental influence. (Takes months of environmental restoration)
2	Major	Serious Damage	Serious/local environmental influence. (Takes years of environmental restoration)
3	Critical	Critical Damage	Critical/wide environmental influence. (Takes hundreds of years of environmental restoration/Not possible)

Annex II. Sample of Risk Assessment Report

Risk Assessment						Risk Reduction & Controlling					
No	Risk Identification		Risk Evaluation			Proposed Action	Risk Evaluation				
	Event & Cause	Potential Consequence	FI	SI	RI		FI	SI	RI		
101. Procurement of compliant fuel / 규제만족 연료유의 수급											
01	Off-spec. compliant fuel to quality requirement(such as the latest version of ISO 8217) 품질기준 부적합 연료유 사용 (ISO 8217 등)	• Damage, failure of the machinery 기기의 손상 • Machinery performance deterioration 기기 효율의 저하	4	3	H	1. Set the requirements for fuel specifications(ex. ISO 8217 : 2017), when contracting compliant fuel supply 연료유 수급 계약 시, 품질기준 (ISO 8217 등) 제시 2. When receiving fuel, request fuel analysis to professional analytical agency 병커링 시 전문 분석기관에 연료유 샘플 분석 의뢰 3. Keep the list for on-spec' fuels suppliers by region 수급 지역별 양호한 연료유 공급자를 관련 현황 및 기록 관리	3	1	L		
02	Lack of stock for compliant fuel oil at bunkering port 급유 항에서의 규제 만족연료유의 재고 부족	• Failures to procure sdequate amount of compliant fuel oil 적정량의 규제 만족 연료 수급 불가 	3	3	M	1. Establish the procedure of the supply fuel oil for a specific voyage. 특정 항해 구간에 대한 선박 연료유 수급 절차 계획 수립 2. Use the alternative fuels (MGO, ULSFO(0.1%)) 대체 가능한 연료유의 사용 (MGO, ULSFO(0.1%)) 3. If additional bunkering is not possible, Fuel Oil Non Availability Report (FONAR) is to be submitted to the ship's flag state and/or competent port authority of destination(See the attached document of SIP, Appendix 6.3 FONAR) 추가적인 연료유의 공급이 불가할 시 기국 또는(그리고) 항만국에 연료유 이용 불가보고서(FONAR) 작성 및 제출(SIP Appendix 6.3 참조)  4. After FONAR, Prepare how to deal with remaining fuels exceeding the 0.10.5% Sulphur limit, based on policy of flag state at the next port of call(e.g. De-bunkering) FONAR 제출 후, 자항지 항만국의 지시에 따라 미혼수 연료유를	2	1	L		

# What is the SIP?



## The contents of SIP in KR GEARs



1. Risk assessment  
& mitigation plan

2. Fuel oil system  
modification  
(If needed)

3. Tank cleaning  
plan

4. Procurement of  
compliant fuel oil

5. Fuel oil  
changeover plan

6. Documentation  
& reporting

Schedule for meeting with class :

Date	Classification	Details	Upload File
2019-09-16	Korean Register	After the technical meeting with KR head office, we found major issues and mitigation measures as follows. 1. Potential risk	<input type="button" value="Upload"/>

Are structural modifications (installation of fuel oil system/tankage) required :

☒ Yes ☐ No

Details of modification :

**Fuel oil storage system** Fuel transfer/filtration/delivery system Combustion equipment Other

Modification Work : Fuel oil storage system

Start Date : 2019-10-01

End Date : 2019-10-02

Country : CHINA

Yard : China shipyard

Description : In order to use the low sulphur fuel oil as the main fuel of a ship instead of the high sulphur fuel oil, the name of existing fuel oil tanks were changed without any structure modification and relevant drawings were also re-approved by classification society (KR) as follows.

(1) List of renamed fuel oil tanks

Upload File :  or Drop file here

Modification	Start date	End date															
1. Fuel oil storage system <input checked="" type="checkbox"/>	2019.10.1	2019.10.2															
2. Fuel transfer, filtration and delivery sys <input type="checkbox"/>	Country	Yard name															
3. Combustion equipment <input type="checkbox"/>	China	China Shipyard															
4. Other ( ) <input type="checkbox"/>																	
Details																	
<p>In order to use the low sulphur fuel oil as the main fuel of a ship instead of the high sulphur fuel oil, the name of existing fuel oil tanks were changed without any structure modification and relevant drawings were also re-approved by classification society (KR) as follows.</p> <p>(1) List of renamed fuel oil tanks</p> <table border="1"> <thead> <tr> <th></th> <th>Before</th> <th>After</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>No.1 H.F.O. TK (S)</td> <td>No.1 L.S.F.O. TK (S)</td> </tr> <tr> <td>2</td> <td>No.1 H.F.O. TK (P)</td> <td>NO.1 L.S.F.O. TK (P)</td> </tr> <tr> <td>3</td> <td>NO.2 H.F.O. TK (P)</td> <td>NO.2 L.S.F.O. TK (P)</td> </tr> <tr> <td>4</td> <td>NO.2 H.F.O. TK (S)</td> <td>NO.2 L.S.F.O. TK (S)</td> </tr> </tbody> </table> <p>(2) List of relevant drawings to be re-approved by class (KR) surveyor</p> <p>(a) General arrangement (DWG. No. P20xx-xx-03-R0)</p> <p>(b) Engine room construction (FR.xx ~ FR.xx Sec., DWG. No. xxx0Hx02)</p> <p>(c) Engine room construction (FR.xx ~ FR.xx Sec., DWG. No. 2xxxH002)</p>				Before	After	1	No.1 H.F.O. TK (S)	No.1 L.S.F.O. TK (S)	2	No.1 H.F.O. TK (P)	NO.1 L.S.F.O. TK (P)	3	NO.2 H.F.O. TK (P)	NO.2 L.S.F.O. TK (P)	4	NO.2 H.F.O. TK (S)	NO.2 L.S.F.O. TK (S)
	Before	After															
1	No.1 H.F.O. TK (S)	No.1 L.S.F.O. TK (S)															
2	No.1 H.F.O. TK (P)	NO.1 L.S.F.O. TK (P)															
3	NO.2 H.F.O. TK (P)	NO.2 L.S.F.O. TK (P)															
4	NO.2 H.F.O. TK (S)	NO.2 L.S.F.O. TK (S)															

# What is the SIP?



## The contents of SIP in KR GEARS

### Description

#### 2.2.2 Details of modification

Modification		Start date:	End date:
1. Fuel oil storage system	<input type="checkbox"/>	2019.10.1	2019.10.5
2. Fuel transfer, filtration and delivery sys	<input checked="" type="checkbox"/>		
3. Combustion equipment	<input type="checkbox"/>	Country	Yard name
<input type="radio"/> M/E <input type="radio"/> A/E <input type="radio"/> B/LR <input type="radio"/> Others ( )	<input type="checkbox"/>		
4. Other ( )	<input type="checkbox"/>	China	China Shipyard

#### Details

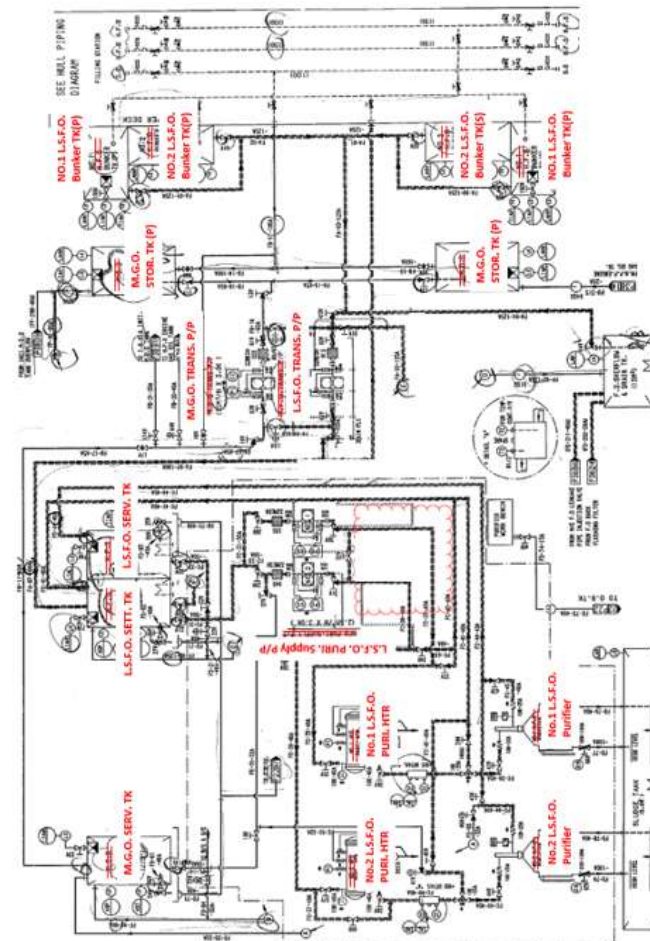
In order to prevent any problems during ship operations when the low sulphur fuel oil is used as main fuel of ship, relevant fuel oil systems were modified and also re-approved by classification society (KR) as follows.

- (1) List of modified piping lines
  - (a) F.O transfer & purifying system
  - (b) M/E & G/E F.O service system
  - (c) Aux. Boiler F.O service system
  - (d) Steam service & drain system
  - (e) F.W. service system
- (2) List of relevant drawings to be re-approved by class (KR) surveyor
  - (a) Machinery arrangement (DWG. No. 000000000)
  - (b) Piping system diagram in E/R (DWG. No. 000000000)
- (3) Details of modification
  - (a) One(1) cooler was installed before F.O supply pumps on the fuel oil service line for M/E and G/Es.
  - (b) One(1) cooler was installed before supply pumps on the fuel oil service line for the Aux. boiler.
  - (c) All inlet & outlet valves on the steam tracing line for existing H.F.O service line (M/E, G/E and Aux. Boiler) were completely closed and also inserted the blind plate into flanges on the steam inlet line.
  - (d) Inlet & outlet valves on the steam line for M/E & G/E F.O preheaters and a boiler F.O heater were completely closed and also inserted the blind plate into flanges on the steam inlet line.
  - (e) Inlet & outlet valves on the steam line for a boiler F.O heater was completely closed and also inserted the blind plate into flanges on the steam inlet line.
  - (f) Additional F.W line for two (2) coolers were installed.
  - (g) 10 um filters were installed at the inlet side of each engines (one(1) for M/E and three(3) for G/Es)
  - (h) sampling cocks were installed at the inlet side of each engine (one(1) for M/E and three(3) for G/Es)

· See the attached document (Appendix 2.2.1 Revised drawings for the LSFO)

### Attachment

#### h. Piping system diagram in E/R (F.O transfer & purifying system)



# What is the SIP?



## *The contents of SIP in KR GEARs*



1. Risk assessment  
& mitigation plan

2. Fuel oil system  
modification



3. Tank cleaning  
plan


4. Procurement of  
compliant fuel oil

5. Fuel oil  
changeover plan

6. Documentation  
& reporting

Is tank cleaning required?	
Tank	Cleaning Plan
NO.1 HFO TANK	Yes
NO.2 HFO TANK	Yes
NO.2 MGO TANK	Yes

Cleaning Schedule	Start date	End date
	2019-08-07 	2019-08-23 

Cleaning Work	Method 	Using Additives		Quantity, Spec' and Supplier details a. Quantity of the fuel additive - 1 liter per 10 tons b. Specification of the fuel additive - AMERGY 222 c. Supplier - Drew Marine
		Manual Cleaning at Dry dock	<input type="checkbox"/>	
	Manual Cleaning During service	<input type="checkbox"/>		
	Dilution During service	<input checked="" type="checkbox"/>		
Worker	Own crew	<input checked="" type="checkbox"/>		
	Hired crew	<input type="checkbox"/>		
	Riding crew	<input type="checkbox"/>		

Other description

Save



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Estimated date for first bunkering of compliant fuel oil, not later than 24:00 hrs, 31 DEC 2019

Date : 2019-06-07 

Bunkering Port : Incheon ▼

Estimated Fuel type : LightFuel ▼

Estimated Fuel Q'ty : 500

The fuel arranged by charterer

☒ Yes ☐ No

In contract, are charter party have obligation to provide compliant fuel after 01 JUN 2019 or other identified date?

☒ Yes ☐ No

Is there confirmation from bunker supplier(s) to provide compliant fuel oil on the specified date?

☒ Yes ☐ No

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### Estimated date and time (UTC) for commencement of the changeover procedure:

Date : 2019-06-05  Time : 12 Hour 34 Minute

### The maximum time period required to changeover the ship's fuel system to use compliant fuel at all combustion units.

Combustion Unit types used	Time(Hour)	Time(Minute)	
M/E	1	15	
G/E	0	30	

### Expected date and time (UTC) of completion of changeover procedure

Date : 2019-06-14  Time : 25 Hour 34 Minute

### Full document of changeover plan

Upload File :  or Drop file here



 Fuel Oil Changeover Plant for 0.50% compliant fuels.pdf



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Shipboard fuel oil tank management plans:

Upload File :  or Drop file here



 Shipboard fuel oil tank management plans.pdf

Stability booklets:

Upload File :  or Drop file here



 Stability booklets.pdf

Other:

Upload File :  or Drop file here



 FONAR (Fuel Oil Non-Availability Reporting).pdf

Upload File :  or Drop file here

Detailed description :

This report is purpose to provide evidence if a ship is unable to obtain fuel oil compliant with the provisions stipulated in regulations 14.1 or 14.4 of MARPOL Annex VI. A procedure and standard form for FONAR were described on attached

6.2 When following the implementation plan the ship has to bunker and use non-compliant fuel oil due to unavailability of compliant fuel oil safe for use on board the ship, steps to limit the impact of using non-compliant oil could be :

• Detailed description

When our ship can't receive the LSFO during ship's operation it is inevitable to use the HSFO. In this case the following measures should be taken to minimize the impact of using of the HSFO.

First step:

- In this step, the HSFO should be loaded in No.1 bunker tanks (P & S) in order to minimize the mixing of different oil in bunker tanks in consideration of the ship's operation schedule.

Second step:

- The amount of the LSFO in the L.S.F.O service tank should be minimized as much as possible in order to minimize the mixing of different oils in this tank when the HSFO is transferred to both L.S.F.O settling & service tanks.

Third step:

- The fuel oil system should be lined up to make it suitable for using the HSFO and then the bunker change should be carried out according to our standard procedure for the fuel oil change-over.

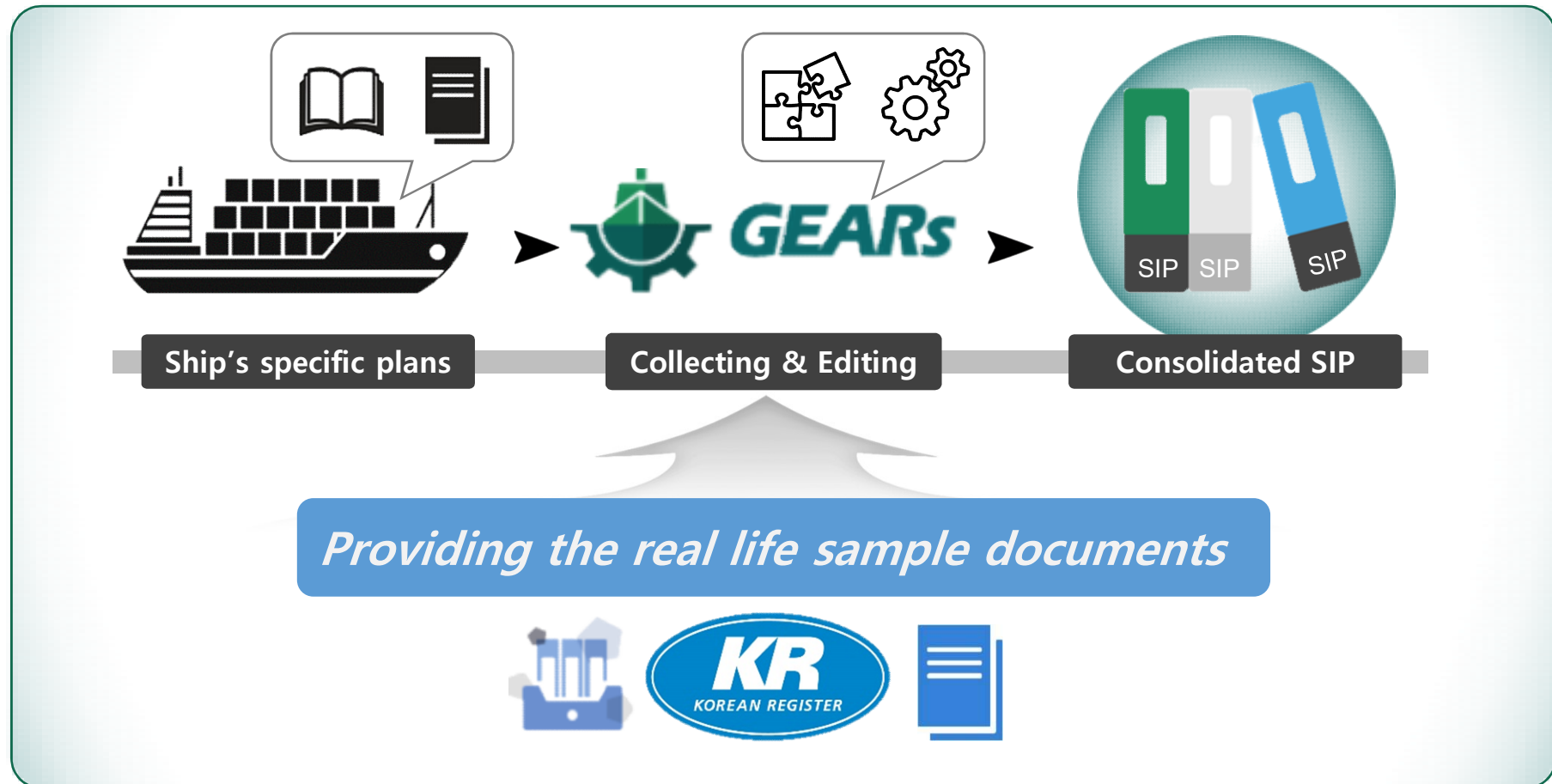
Final step:

- After the LSFO is loaded on our ship during the ship's operation proper measures should be taken to minimize the mixing of different oils in No.1 bunker tank (P&S) , L.S.F.O settling & service tanks during the bunker change.

# What is the SIP?



## *The benefits of KR GEARs SIP*



**EASY**

**SURE**

**FREE**

# With GEARs, Get GEARs!



<http://gears.krs.co.kr>

## Genius

- Covering whole steps of service
- Managing plan(MRV&DCS) & data sequentially

## Efficient

- Time/Cost saving for verification service
- Minimizing effort for generation & submission

## Accessible

- just login portal system by the internet
- Linking with KR e-fleet  
(No additional registration)

## Reliable

- Surveyors with industry-leading expertise
- Automatic generation aggregated data  
for data verification



**With GEARs, Get GEARs!**

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# Thank you

**KOREAN REGISTER**  
Future Technology Research Team