

MEGURI 2040

Safety Assessment Seminar

(2026.6.29)

Presentation 6.

Engine Room Fire Drill

Under Reduced Onboard Crewing

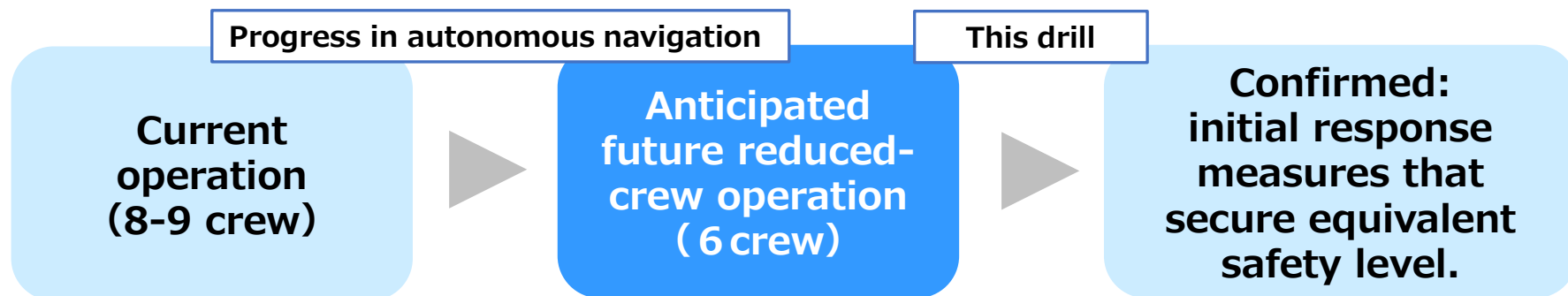
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1. Background and Purpose

◆ Demonstration of Rational Emergency Response (Fire) Under Reduced Crewing

- Even if the number of crew assigned is reduced through advances in autonomous navigation, **level of safety equivalent to that of conventional vessels** is still required in emergencies.
- It is necessary to establish response frameworks that work with reduced crew without imposing excessive burden.
- Using the newly-built container ship Genbu, the initial response under a reduced **crew (6-person configuration)** was verified.



Points confirmed:

- Identifying the rational balance between crew response capability and required equipment
- Obtaining data that will feed into future rulemaking and the systematization of training

1. Background and Purpose

◆ Positioning and Key Notes

■ Caveats of This Report

- A summary of drill results conducted on an actual vessel under specific conditions
- The aim is to verify and organize the emergency response (fire) process under the constraints of a real ship operating with a reduced crew

■ Scope of Application

- These results pertain only to the conditions set for the drill, and do not guarantee response outcomes under all situations

■ Positioning of This Report

- The findings obtained here are positioned as reference material that will contribute to future regulatory study, operational design, and the development of education and training frameworks

1. Background and Purpose

■ Purpose

- Based on the required crewing derived from desktop study (6-person configuration), verify on an actual ship whether response is possible using **existing drill procedures**
- Measure the time required for the procedural sequence up to CO₂ release (target: 10 minutes)
- From the perspectives of action, judgment, and communication, organize a rational emergency response under reduced crewing and the conditions that enable it
- Apply the obtained data to future standardization and training development

■ Scope and Coverage

- In scope: Response process assuming an engine room fire
- Out of scope: Verification of the firefighting effectiveness of CO₂ release (its capability/effectiveness)

☞ Outlook for Future Development

- At this stage, emphasis is on operational optimization that avoids over-engineering of systems and equipment
- In a future fully-unmanned phase, additional equipment that does not rely on human crew may need to be considered

2. Overview of the Drill

Date

October 29, 2025 (Wed)

Location

The newly built container ship
 “Genbu” berthed at Harumi No.
 1 Quay, Tokuyama Port



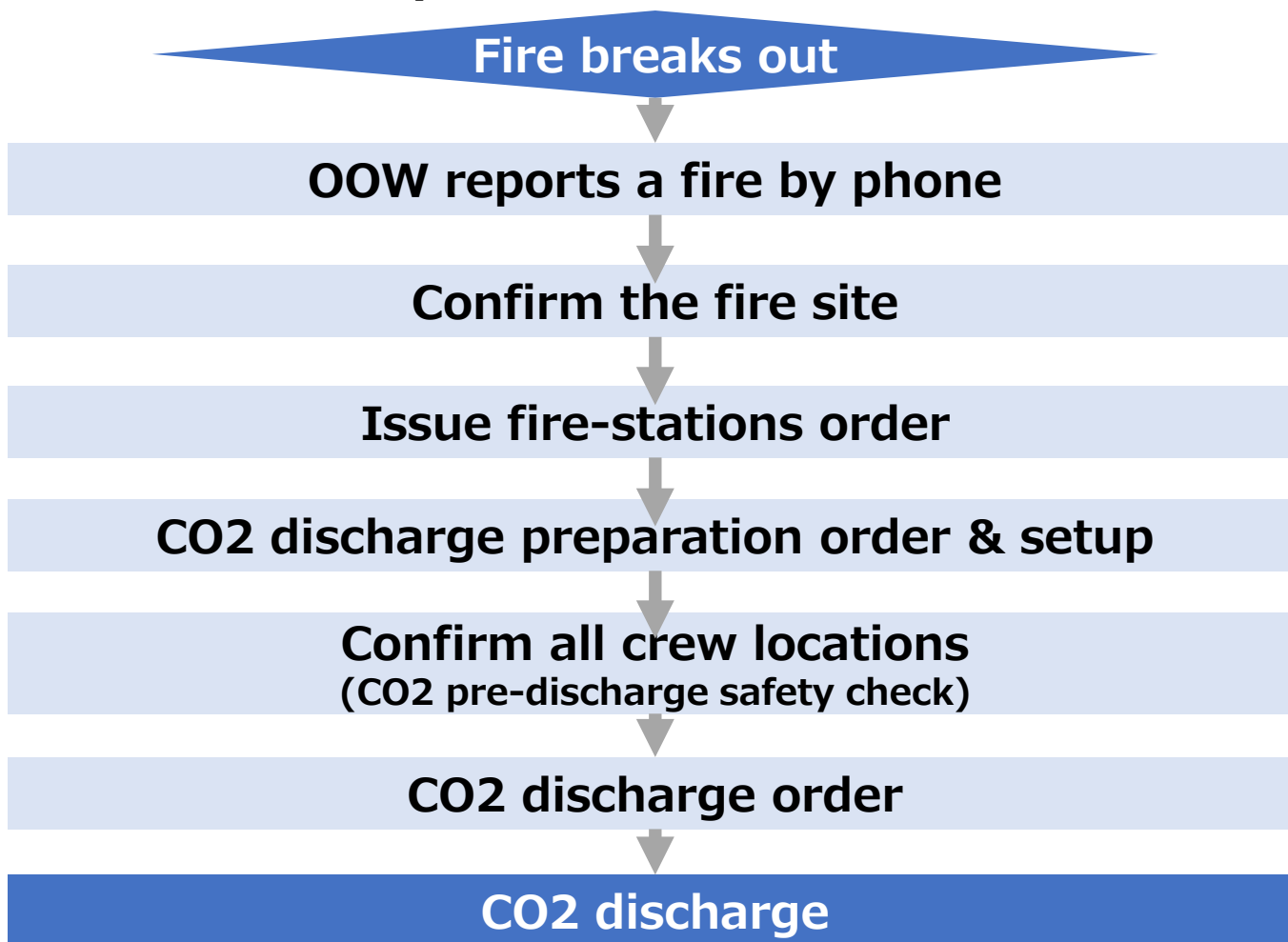
Role Assignment of Participants

Participants are the crew of the “Genbu,” with MEGURI2040 ocean-going ship seafarers and others providing support as needed

Position	Role
Master	Overall command, roll call, emergency call to the coast guard, alerting other vessels
C/O	On-scene command, assisting the Master, closing dampers and doors
2/O	Officer on watch (OOW), issuing fire-station orders, closing dampers and doors
3/O	Closing dampers and doors
C/E	Command of the fire control room, CO2 discharge
1/E	On-scene confirmation, closing doors, CO2 discharge support

2. Overview of the Drill

◆ Drill (Basic Scenario※1) – Flow of the Main Events



※1An additional scenario (including casualty response) is conducted separately

※2Conducted in parallel with the above: emergency call to the coast guard, alerting nearby vessels(VHF), displaying not-under-command signals, etc.

2. Overview of the Drill

◆ Scenes from the drill



Checking the fire control panel



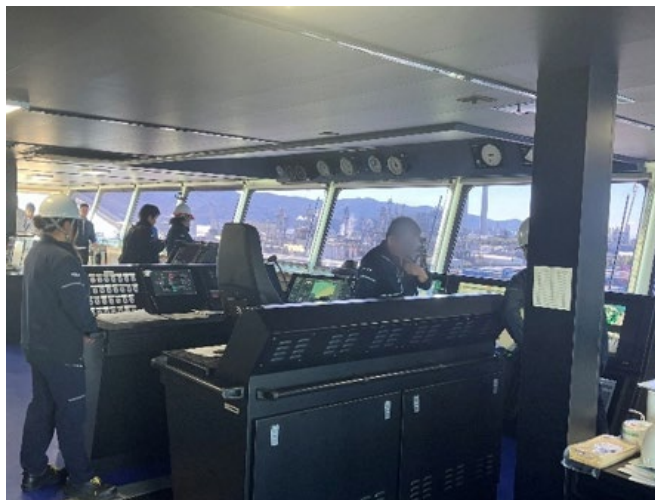
Onboard notification of the fire



Issuing fire-stations order



Communication with the fire control room



Instructions from the bridge



CO2 startup preparation

2. Overview of the Drill

◆ Results Summary

✓ Preconditions

- Target: Newly built container ship “Genbu” / 6-person team
- Conducted: basic scenario, 2 times
- Based on the results of the 1st trial, information sharing and roll call were tightened, and the 2nd trial was run under strengthened confirmation procedures

✓ Results

Trial	Time from fire outbreak to CO2 discharge
1st	7'27"
2nd	7'28"

2. Overview of the Drill

◆ Event Log (Summary)

Event	Planned	1st	2nd
Fire alarm activated (drill start)	0'00"	0'00"	0'00"
Fire-stations order issued	3 '00"	2 '41"	2'12"
Emergency shut-off switch (ES2) activation order, CO2 release preparation order		3'33"	3'06"
ES2 activation report		4'53"	4'32"
Damper closure completion report		5'07"	4'52"
Roll call (CO2 pre-activation safety check)	8'00"	6'02"	6'08"
CO2 release order	9'00"	6'07"	6'15"
CO2 release report (drill end)	10'00"	7'27"	7'28"

2. Overview of the Drill

◆ Comparison of time required by event

Event	1st	2nd	Difference	Trend
Damper closure	5:07	4:52	▲ 12 sec	Shortened
CO2 release order	6:07	6:15	+8 sec	About the same
CO2 release report	7:27	7:28	+1 sec	About the same

◆ Log Analysis Results

- Earlier events trended faster
- Even with added safety-check steps, no significant delay in the final discharge time was observed
- 2 trials both met the target time (10 minutes)

2. Overview of the Drill

◆ Summary

□ Safety and speed are compatible

- Even in the 2nd trial with tightened operational procedures (7 min 28 sec), the time required was roughly the same as the 1st (7 min 27 sec)
- Even with a reduced crew, with proper proficiency and standardized procedures, emergency response can be carried out safely and quickly

□ Feasibility of emergency response on “Genbu”

- This verification was conducted using the existing equipment of “Genbu”
- With optimized operational procedures, emergency response by a 6-person team in this scenario is possible without adding new equipment

3. Additional Scenario (casualty response)

◆ Background for the additional scenario

- In the basic scenario, the 6-person team was confirmed capable of responding within the target time
- Meanwhile, actual operations may involve simultaneous events (injury, loss of communication, etc.)

◆ Purpose

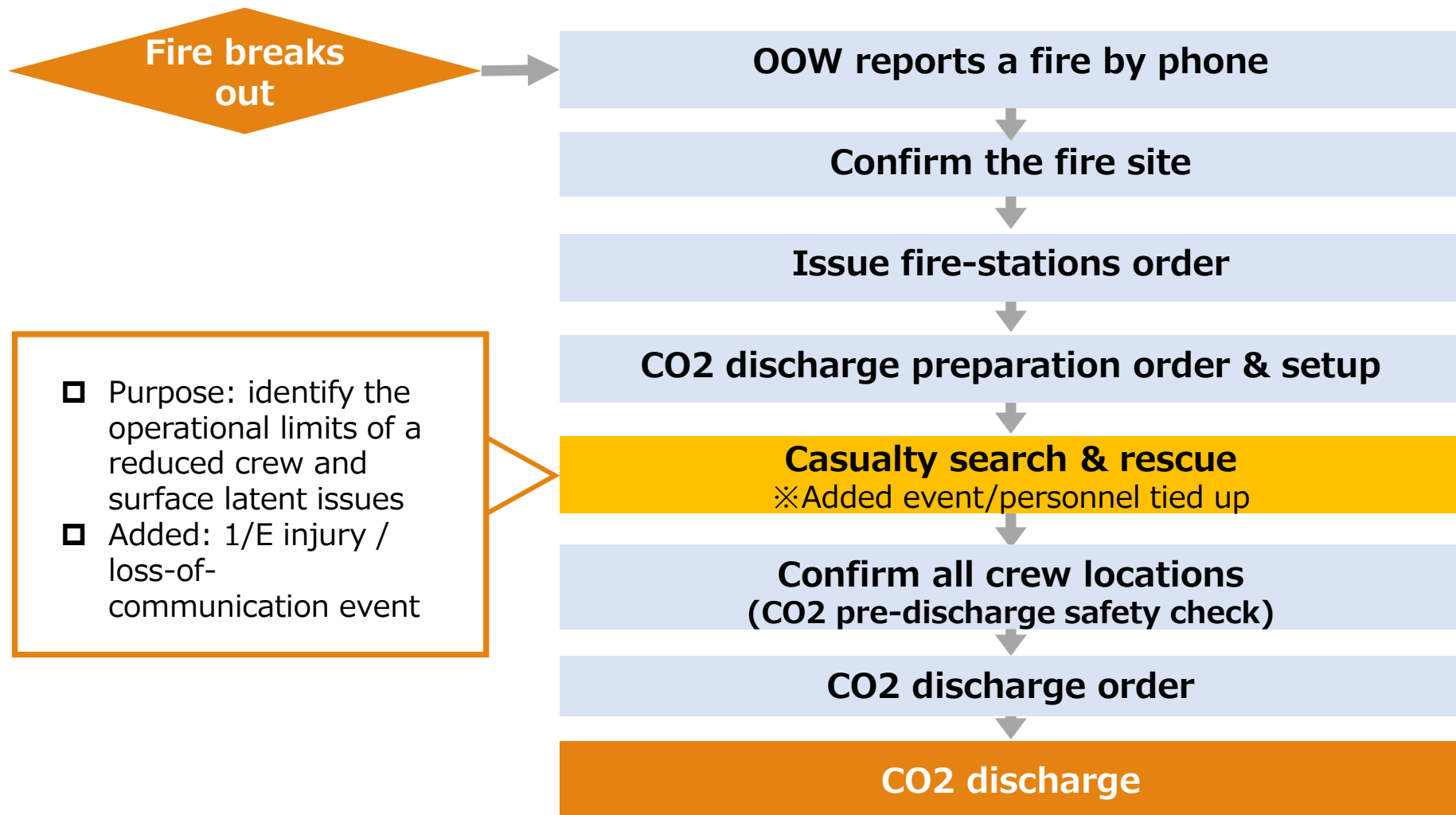
- Identify the limits of decision-making, instruction, and personnel deployment under a reduced crew
- Whether response is possible through operations alone/organize the need for additional measures
- Obtain baseline data for future rule-making, training, and systemization studies

◆ Additional conditions

- Assume the first engineer is injured and loses communication
- A scenario in which casualty rescue occurs in parallel with fire response

3. Additional Scenario (casualty response)

◆ Additional scenario (the 3rd) – Flow of the Main Events



※Conducted in parallel with the above: emergency call to the coast guard, alerting nearby vessels(VHF), displaying not-under-command signals, etc.

3. Additional Scenario (casualty response)

◆ Event Log (summary)

Event	Additional scenario
Fire alarm activated (drill start)	0' 00"
Fire-stations order issued	3' 31"
Rescue event occurs (report: 1/E missing)	4' 50"
Emergency shut-off switch (ES2) activation order, CO2 release preparation order	<u>None</u>
ES2 activation report	8' 36"
Rescue event occurs (report: 1/E regained consciousness)	8' 45"
Damper closure completion report	10' 06"
Roll call (CO2 pre-activation safety check)	<u>None</u>
CO2 activation order	<u>None</u>
CO2 activation report (drill end)	11' 32"

3. Additional Scenario (casualty response)

◆ Issues in the additional scenario

□ Physical shortage of resources for casualty rescue

- Under a reduced crew, personnel must be allocated to searching for, rescuing, and tending to the casualty
- Moving the casualty to a safe place must be handled by only a few people

□ Difficulty of covering vacated roles

- The injured person's role must be taken over by other crew members
- Prompt instructions on personnel reallocation are required

□ Confusion in the chain of command

- Command must also be exercised over casualty response in parallel with fire response, so decision-making resources become strained
- ES2 activation order, location checks, and CO2 discharge orders were not given clearly, posing challenges for information sharing

4. Summary and Recommendations for the Future

◆ Summary of the drill results

- ❑ **In the drill using the basic scenario**, with the existing equipment of “Genbu,” optimized operational procedures and crew proficiency confirmed that 6-person team operation is feasible.
- ❑ **The additional scenario**, which included casualty response, brought to light issues such as a physical shortage of resources and confusion in the chain of command.

◆ Recommendations for the future

- ❑ When situations grow more complex, responses that rely on human judgment and attention (the operational, or “soft,” side) may make it difficult to ensure safety
- ❑ It may also be necessary to consider systems that physically prevent human error and achieve a safe, rapid response (a hardware-based solution)