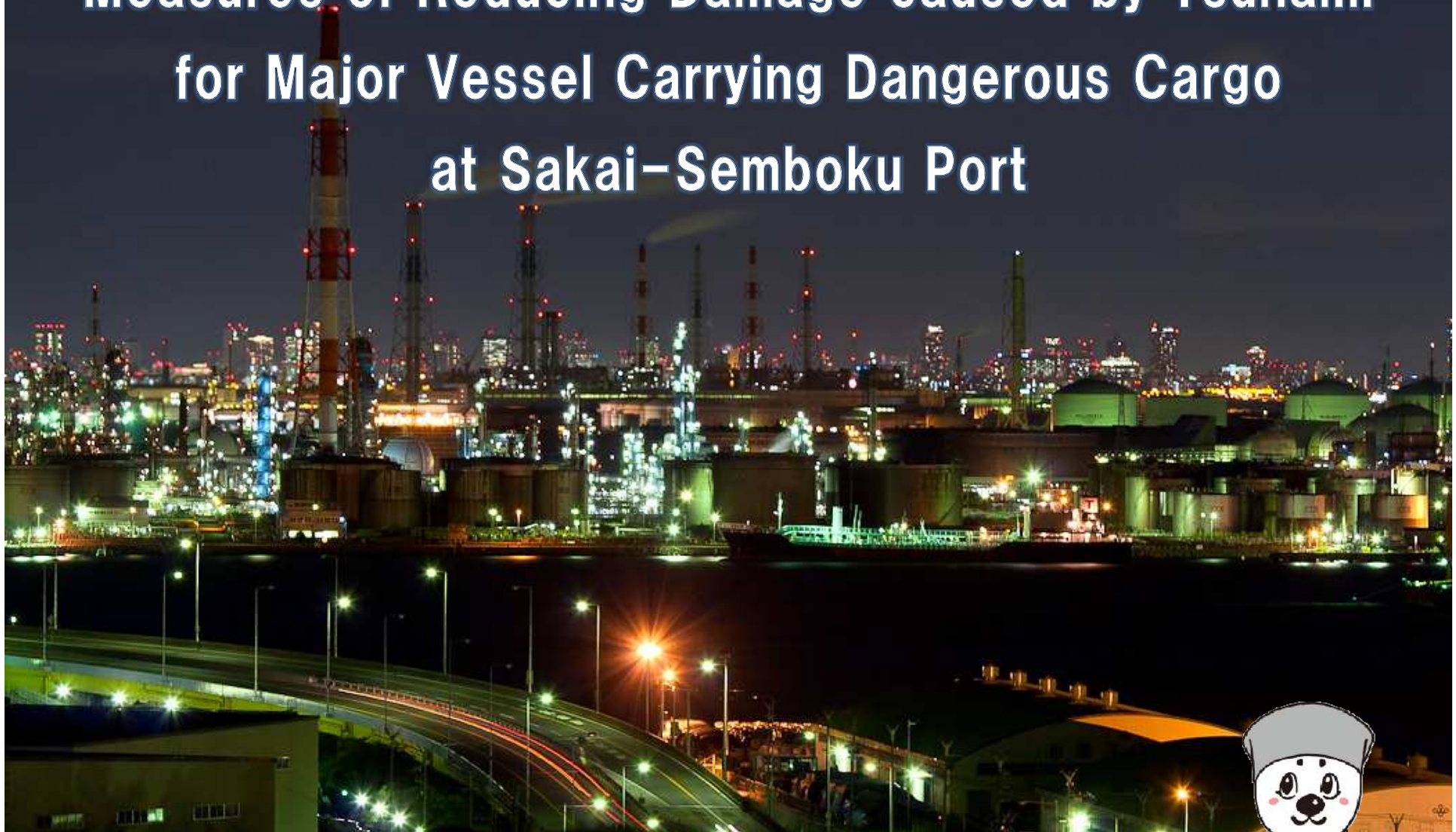


Measures of Reducing Damage caused by Tsunami for Major Vessel Carrying Dangerous Cargo at Sakai-Semboku Port



Jun. 12, 2016

Katsuyuki MIYAMOTO

Chief, Sakai Coast Guard Station, Japan Coast Guard



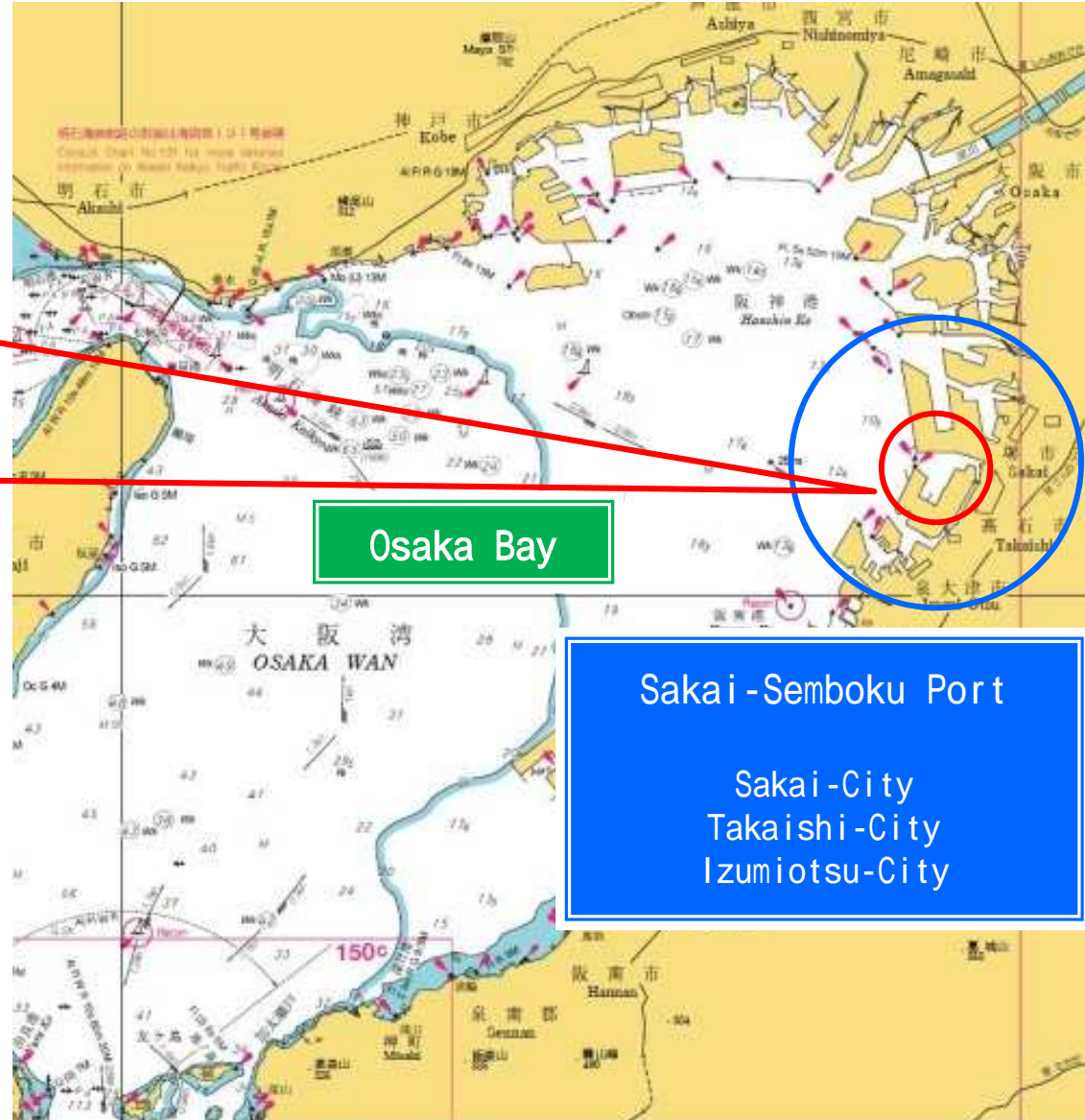
【 Contents 】

- ➡ **Sakai - Semboku Port**
- ➡ **3.1 1 Tsunami Records**
- ➡ **Estimation of Tsunami**
- ➡ **Establishment of Working Group**
 - Main Result
 - Future Initiatives

Sakai-Semboku Port



Hamadera area



Osaka Bay

Sakai-Semboku Port

Sakai-City
Takaishi-City
Izumiotsu-City

Sakai-Semboku Port

Number of vessels entered

(unit : arrivals)

	2012	2013	2014
Domestic	17,195	17,237	19,675
Overseas	2,183	2,079	2,062
Total	19,378	19,316	21,737

Breakdown of tankers

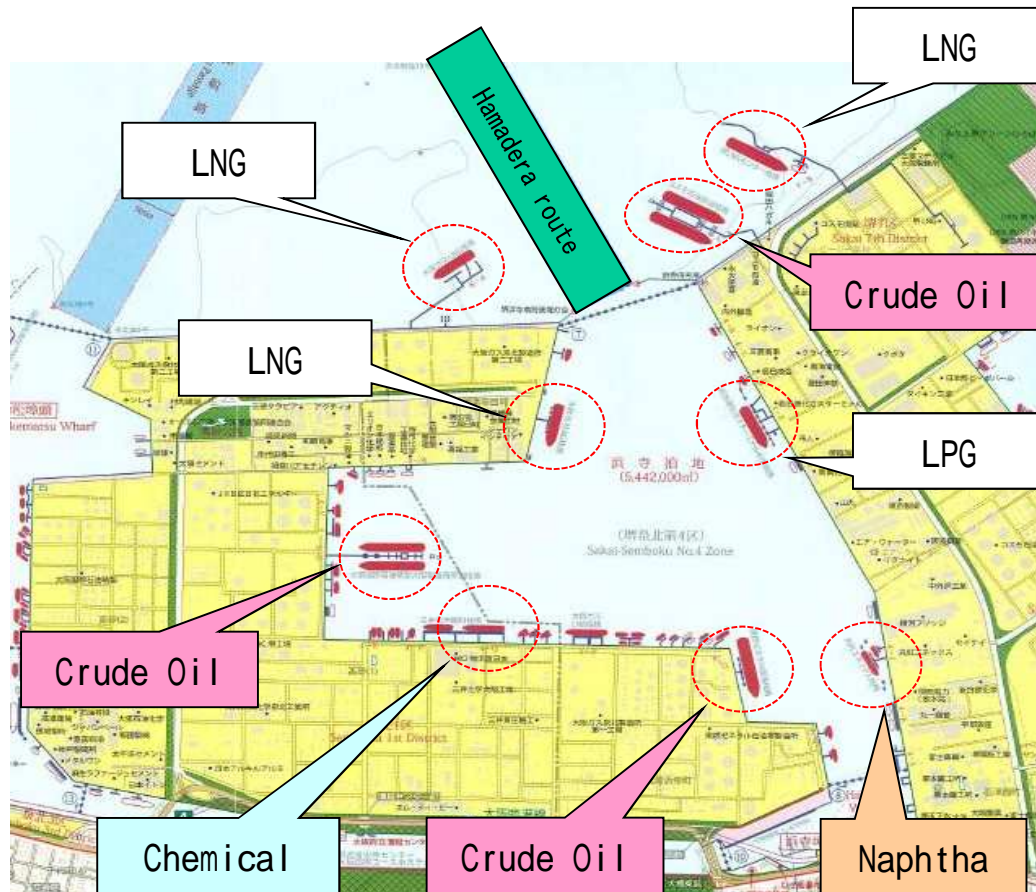
(unit : arrivals)

	2012	2013	2014
~ 100,000t	7,280	6,693	7,341
100,000 t ~	198	171	179
Total (/)	7,478 (39%)	6,864 (36%)	7,520 (35%)

Ranking for weight of loading dangerous materials / 2014

No.	Port	Weight (ton)	Number of ships
1	Chiba	78,319,513	19,574
2	Kiire	45,117,003	568
3	Sakai-Semboku	34,910,342	7,520
4	Kawasaki	31,608,236	8,597
5	Yokkaichi	30,450,501	9,147

Major berths at Hamadera



Total 11berths



LNG carrier

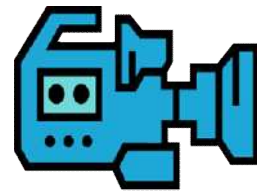


Crude Oil Tanker

3.11 *Tsunami Records*

Damage to vessels caused by the Tsunami of Great East Japan Earthquake

Shooting by JCG officer





Estimation of Tsunami

Worst Case Scenario

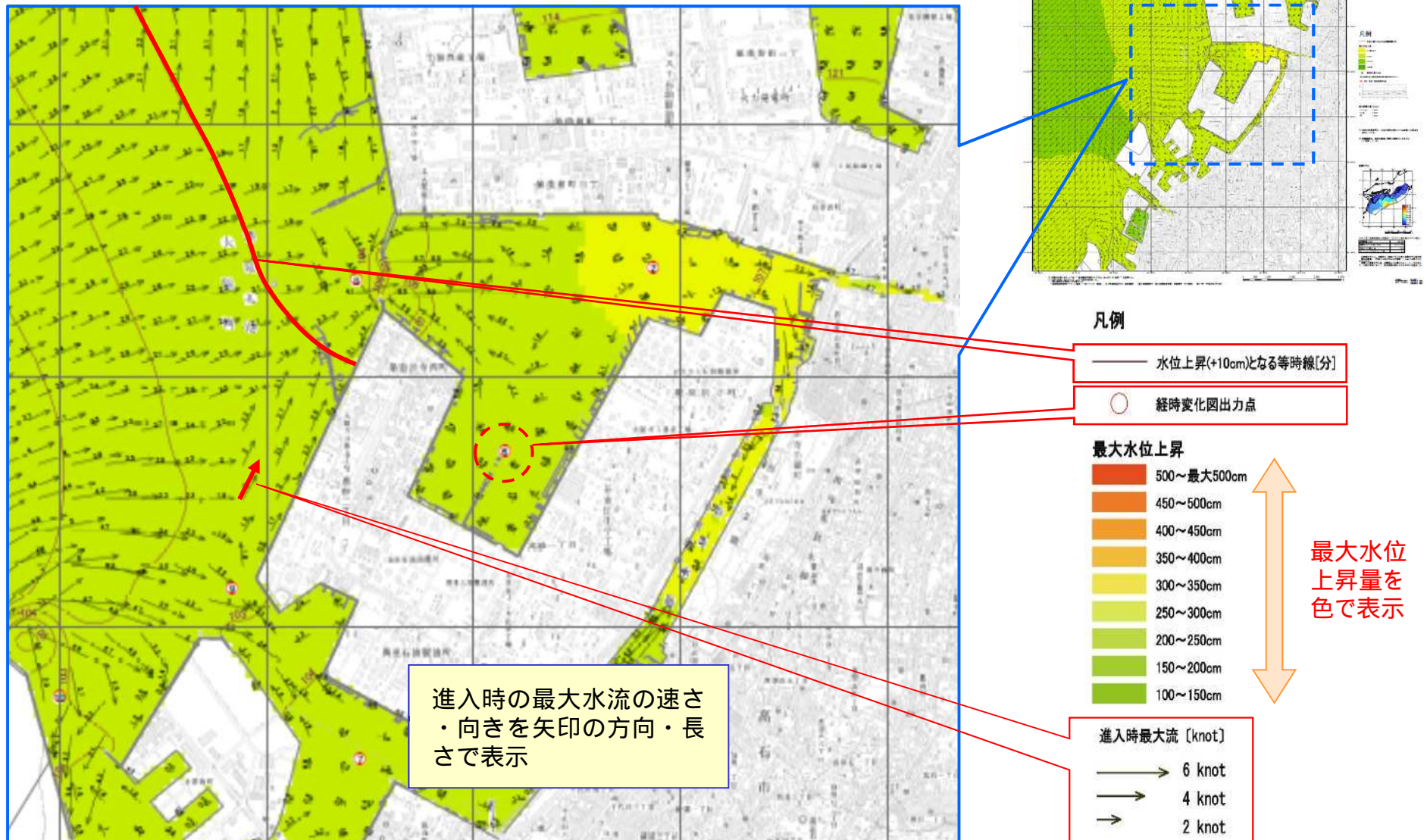
Magnitude scale of earthquake : 9.0

【Hamadera area】

Seismic Intensity	6-Lower (Japanese scale)
Shortest estimated time of arrival of Tsunami (height of 10cm)	107 minutes
Maximum rising of water level (time)	2.71m (120 minute)
Maximum lowering of water level (time)	2.40m (205 minute)
Inundation Depth	0.3m ~ 1.0m
Maximum current speed / direction (time)	2.4knots / 311degrees (189 minutes)

Tsunami Information Map

Sakai - Semboku / inflow



**Measures of Reducing Damage caused by Tsunami
for Major Vessel Carrying Dangerous Cargo**

Hamadera, Sakai - Semboku Port

Working Group

1. Establishment

February 14, 2013

Meetings were held monthly
until December 2014
(Total 21 meetings)



Working Group

2. Members

(1) Regular members from private sector

8 companies

(2) Guest members from governmental agencies

Sakai Coast Guard Station, Japan Coast Guard

Port and Harbor Bureau, Osaka Prefectural Government

Main Result

1. Improvement of member's awareness

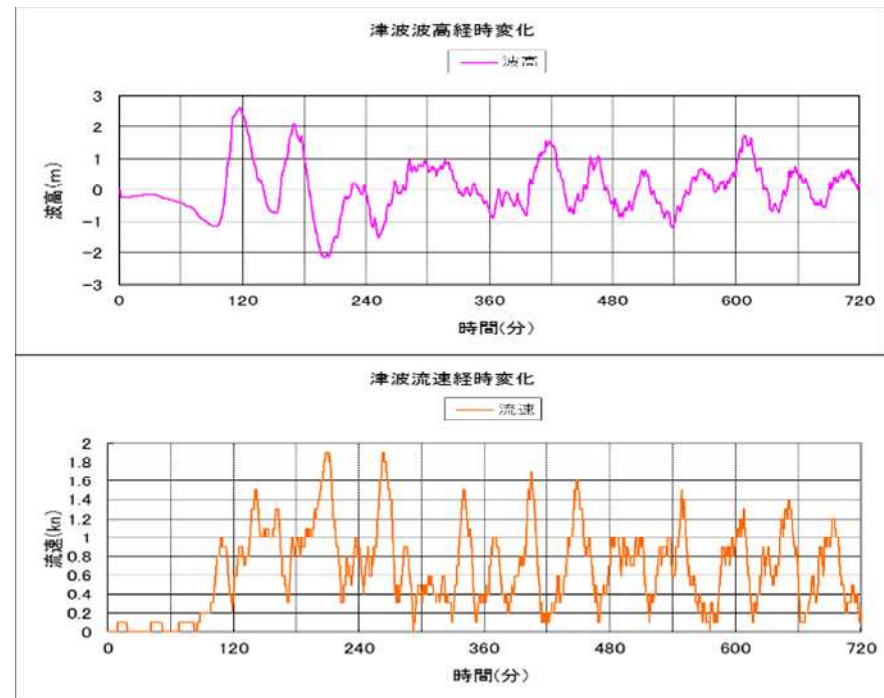
(of reducing damage caused by Tsunami for major vessels carrying dangerous cargo)

2. Simulation tests on berth of each company

Prediction of Tsunami

- maximum height
- direction and speed of the maximum flood current
- first attack time etc.

Mooring oscillation



Main Result

3. Establishment of communication methods among each company
4. Decision of unberthing order
5. Development of the guideline and the manual



guideline

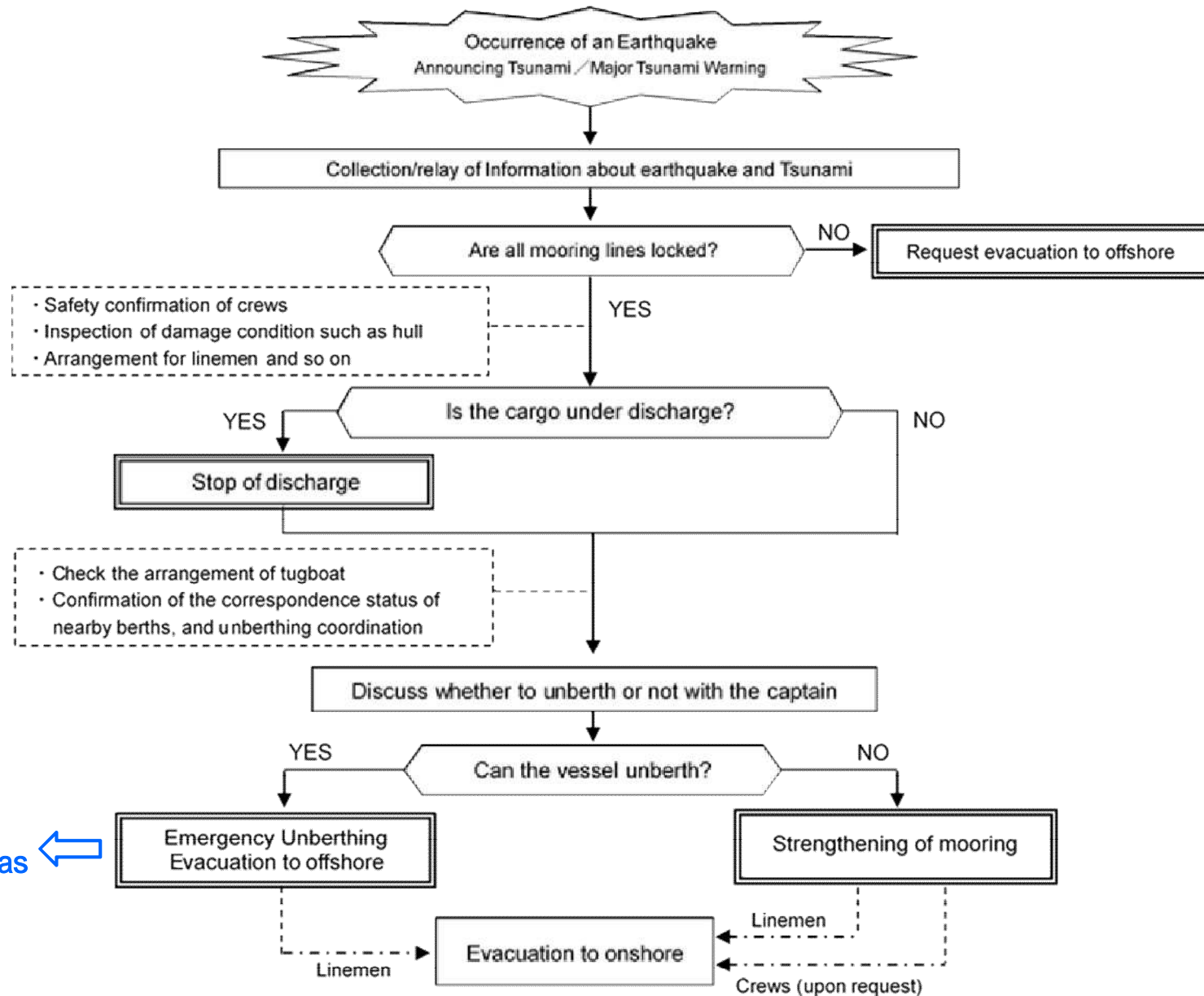
【Guideline】

Establishment of common rules and standard measures of each company regarding evacuation for vessels upon Tsunami strikes

【Manual】

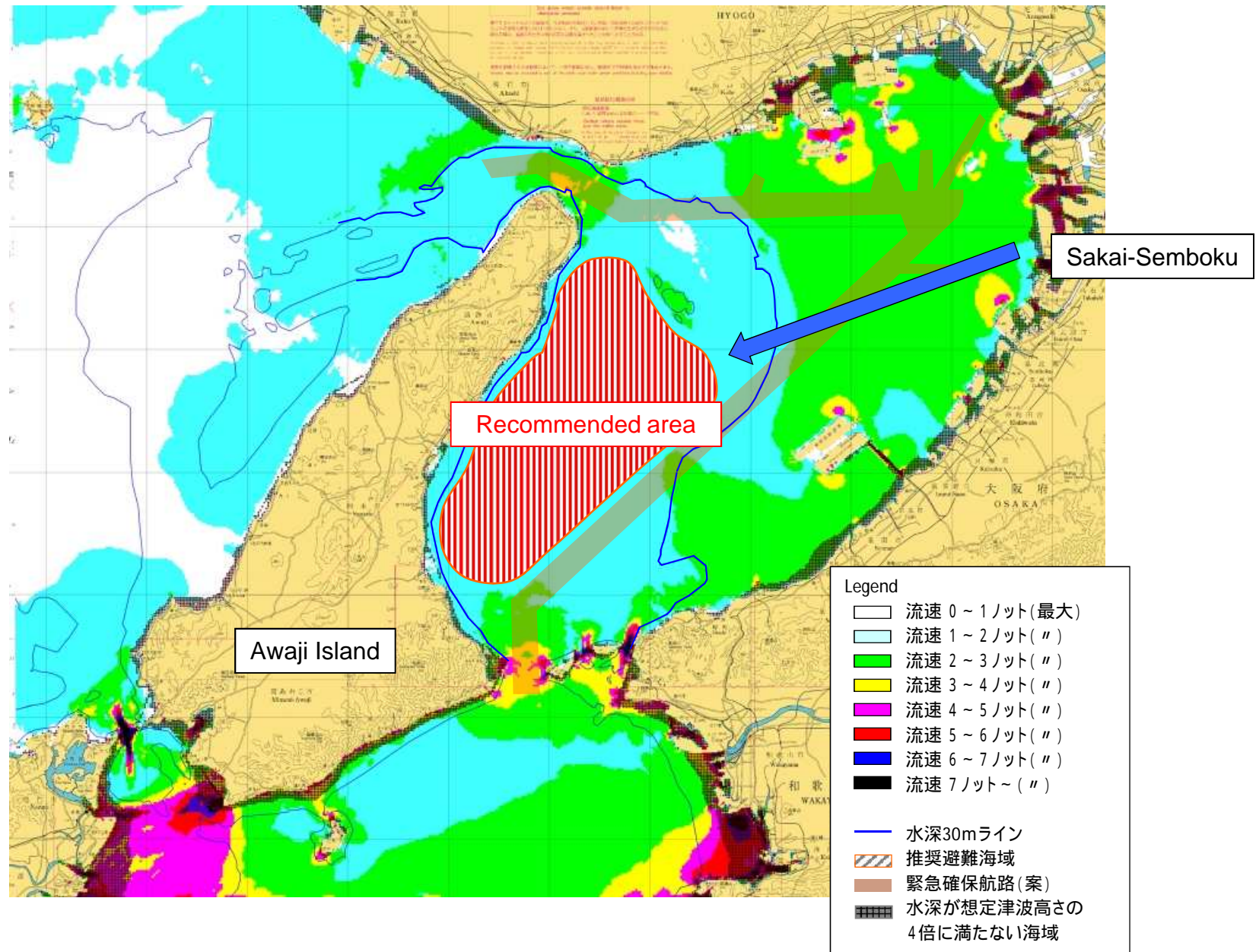
Development of a template of evacuation manual for vessels upon Tsunami strikes (which is then elaborated and finalized by each company)

Action flow of evacuation for Tsunami



for recommended areas ←

Recommended areas of sea for evacuation



Future Initiatives

1. Continuation training for emergency unberthing / LNG Carrier

Without pilot and with only one tugboat

【normally】

With pilot and four tugboats



Training for emergency unberthing

2. Communication drills

3. Development of an original evacuation manual for vessels by each company

Future Initiatives

4. Arrangement with tugboat companies

5. Installing emergency devices

QRH (Quick Release Hook)

ESDS (Emergency Shut Down System)

ERS (Emergency Release System)



QRH



ESDS



ERS