



MP/CONF/8/17
2 August 1973

Original: ENGLISH

IMCO

INTERNATIONAL CONFERENCE ON
MARINE POLLUTION, 1973
Agenda item 7

CONSIDERATION OF A DRAFT INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973

Comments and proposals on a draft text of the Convention

Submitted by the Government of Japan

Attached hereto are the comments of the Government of Japan regarding the draft text of the International Convention for the Prevention of Pollution from Ships, 1973.

ARTICLESArticle 3 (Application)

The ships to which the present Convention shall not apply should be confined only to warships.

Article 4 (Penalties) and Article 6 (Detection of Offences Against and Enforcement of the Convention)

Redraft Articles 4 and 6 as follows:

Article 4Penalties

(1) Any discharge, wherever it occurs, by a ship of harmful substances or effluent containing these substances in contravention of the provisions of the Regulations:

(a) shall be an offence punishable under the law of the Administration of that ship; and

(b) may be an offence punishable under the law of any other Contracting State.

(2) The penalties provided under the law of a Contracting State in respect of the unlawful discharge of harmful substances or effluent containing these substances shall be adequate in severity to discourage any such unlawful discharge. The penalties provided for in respect of unlawful discharge outside the territorial seas of a Contracting State shall be no less severe than the penalties provided for under its law in respect of the same infringement within its territorial seas.

3) Whenever a Contracting State has commenced proceedings in accordance with this Article, no other proceedings in respect of the same alleged contravention may be commenced by any other Contracting State except for the Administration of the ship and any State within whose territorial seas the contravention occurred. However, the penalty which was imposed by one Contracting State shall be taken into account by the Contracting State within whose territorial seas the contravention occurred, when it takes proceedings in respect of the same contravention.

Article 6

Detection of Offences Against
and Enforcement of the Convention

- 1) Contracting States shall co-operate in the detection of offences and the enforcement of the provisions of the Convention using all appropriate and practicable measures of detection and environmental monitoring, adequate reporting procedures and accumulation of evidence.
- 2) Any Contracting State shall furnish to the Administration of Contracting States whose ports or off-shore terminals the ship enters, evidence, if any, that the ship entitled to fly the flag of or under the authority of another Contracting State has discharged harmful substances or effluent containing these substances in contravention of the provisions of the Regulations.
- 3) Upon receiving such evidence, the Administration so informed shall investigate the matter, and may request the other State to

furnish further or better evidence of the alleged contravention. If the Administration so informed is satisfied that sufficient evidence is available in the form required by its law to enable proceedings against the owner, master of the ship or any other persons including the crew-members of the ship who caused the alleged contravention, it shall cause such proceedings to be taken as soon as possible. The Administration shall promptly inform the State which has reported the alleged contravention, as well as the Organization, of the action taken.

(4) A Contracting State may investigate a ship entitled to fly the flag of or under the authority of another Contracting State when it enters the ports or off-shore terminals under its jurisdiction, if it has or receives evidence that the ship has discharged harmful substances or effluent containing these substances in contravention of the provisions of the Regulations. The Contracting State may request the State which has reported the evidence of unlawful discharge to furnish further or better evidence of the alleged contravention. When the Contracting State is satisfied that sufficient evidence is available in the form required by its law to enable proceedings against the owner, master of the ship or any other persons including the crew-members of the ship who caused the alleged contravention, it may cause such proceedings to be taken, informing immediately in writing the Administration of the report of such investigation with all the necessary circumstances thereof and the proceedings to be taken

under its law. In this case, if the Contracting State is satisfied that effective measures adequate in severity to discourage any unlawful discharge will be taken by the Administration, it may refrain from taking further proceedings. The Contracting State shall promptly inform the Administration and the State which has reported the alleged contravention, as well as the organization, of the action taken.

(5) All possible effort shall be made to avoid the ship being unduly delayed through action under this Article.

Article 7 (Reports on Incidents Involving Harmful Substances)

The word "incident" should be qualified so as to cover only "significant discharges of harmful substances".

Article 10 (Settlement of Disputes)

Japan is in favour of Alternative II.

Annex to Article 10 (Arbitration)

Add the following as the first sentence of sub-paragraph (1) of Article 10 of the Annex.

"The tribunal shall render its award within a period of five months from the time it is established unless it decides, in case of necessity, to extend the time limit for a period not exceeding three months."

Article 17 (Amendments)

Paragraph (2) of this Article should be deleted.

ANNEX IRegulation 1 (Definitions)1. Definition of "oil"

It might be appropriate to apply to the non-persistent oil the criteria different from those applied to the persistent oil. Japan has an intention to study poisonous or diffusive characters etc. of the non-persistent oil in order to make sufficient data available at the Conference in October.

2. Definition of "new ship"

Japan is in favour of "3 years" in the square brackets.

Regulation 9 (Control of Discharge of Oil)

1. Change (1) (a) (iv) into the following:

(iv) the instantaneous rate of discharge of oil content does not exceed:

(1) for the new tanker 30 litres per nautical mile;

and

(2) for the existing tanker 60 litres per nautical mile.

2. Change (1) (a) (v) (1) and (2) into the following:

(1) for the new tanker $\frac{1}{100,000}$ of the total quantity of the cargo of which the residue formed a part; and

- (2) for the existing tanker $\frac{1}{15,000}$ of the total quantity of the cargo of which the residue formed a part.
3. Change (1) (b) (iv) into the following:
- (iv) the discharge from the ship of 400 tons gross tonnage or above is made as far as practicable from the land, but in no case less than 12 nautical miles from the nearest land;
4. Add the following as paragraph (6):
- (6) The provisions of sub-paragraph (1) (b) of this Regulation shall not apply to the discharge of bilge water equivalent to clean ballast.

Regulation 11 (Methods to Effect the Control
of Discharge of Oil from Oil Tankers)

1. The study on Improved R.O.B. System which was reported at the Preparatory Meeting for the International Conference on Marine Pollution, 1973, has been progressing as shown in Annex 1 of this paper and there is a fair prospect of completion of this system. As this system when completed is effective for the prevention of marine pollution, Japan proposes the redraft of paragraph (2) of this Regulation as given below, so that either the method of Segregated Ballast Tank System or Improved R.O.B. System may be adopted at the option of the Contracting States.

(2) Every oil tanker (excluding combination carriers) of 150,000 tons deadweight and above and every combination carrier of 100,000 tons deadweight and above, for which the building contract is placed on or after 1 January 1978 or in the absence of a building contract the keel of which is laid or which is at a similar stage of construction on or after 1 January 1979 or the delivery of which is on or after 1 January 1980, shall be designed, constructed and equipped in compliance with the requirements of Regulation 13 or 15 of this Annex.

2. Change the words of "both the methods specified in subparagraph (1) (b) and (1) (c)" in paragraph (3) into the following.

"either method specified in sub-paragraph (1) (b) or (1) (c)"

Regulation 13 (Segregated Ballast Oil Tankers)

Japan has considered the capacity of the segregated ballast tank and the data as a result of this consideration is attached as Annex 2 of this paper. On the basis of this data Japan proposes the redraft of certain provisions of this Regulation as follows.

1. Delete sub-paragraph (3) (a) and (b) and change the words of "and on after ... provided that" in paragraph (3) into the following:

"and the depth of the centre of propeller under the water is not less than 55% of propeller diameter. In this case, however, ships' condition shall not be trim by the head".

2. Delete the words of "or the following: ... full load displacement" in paragraph (4).

Note: We interpret that paragraph (5) of this Regulation permits in-port disposal to the shore-reception facilities.

Regulation 15 (Retention of Oil on Board)

Delete the square brackets around "automatic" and "The meter shall be ... of the discharge." in sub-paragraph (3) (d), and add a new sub-paragraph between sub-paragraphs (3) (e) and (f) reading as follows:

"Every oil tanker (excluding combination carriers) of 150,000 tons deadweight and above and every combination carrier of 100,000 tons deadweight and above, for which the building contract is placed on or after 1 January 1978 or in the absence of a building contract the keel of which is laid or which is at a similar stage of construction on or after 1 January 1979, or the delivery of which is on or after 1 January 1980, in addition to the requirements of the above-mentioned sub-paragraphs,

shall be fitted with an automatic oil discharge control device which can maintain the discharged oil content level below 30 parts per million, an oily water separating device and an automatic recording device to provide a permanent record of the oil content of the discharge which cannot be altered."

ANNEX II

Regulation 9 (Cargo Record Book)

Change the words of "The written entries ... French." in paragraph (4) into the following in conformity with the provisions regarding the Oil Record Book.

"The written entries in the Cargo Record Book shall be in an official language of the State the flag of which the ship is entitled to fly and in English or French."

Appendix I of Annex II

Teratogenic substances, carcinogenic substances and mutagenic substances should be included in Category A.

Appendix II of Annex II

The list of noxious liquid substances carried in bulk should be revised or adjusted as follows:

1. "Caustic potash" on page 113 is revised to "Potassium hydroxide (solution)" and transferred to page 115.
2. "m-Chlorobenzene" on page 113 is revised to "Chlorobenzene".
3. "Creosote, Cresols and Cresylic acid" on page 113 are unified to "Cresols".
4. Delete "o-Dichlorobenzene" on page 113.
5. "Isopropylamine" on page 114 is revised to "iso-Propylamine" and transferred to page 115.
6. "Monoisopropanolamine, Monomethyl ethanolamine, Mononitrobenzene and Mono-iso-propylamine" on page 115 are revised to "iso-Propanolamine, Methyl ethanolamine, Nitrobenzene and iso-Propylamine".
7. "Sodium dichromate" on page 115 is revised to "Sodium bichromate".
8. "p-Xylene and Xylene (mixed isomers)" on page 116 are unified to "Xylenes".

Appendix III of Annex II

The list of other liquid substances carried in bulk should be revised or adjusted as follows:

1. "Isopentane, Isopropyl acetate and Isopropyl alcohol" on page 118 are revised to "iso-Pentane, iso-Propyl acetate and iso-Propyl alcohol" and transferred to page 119.
2. "Liquid sulphur" on page 118 is revised to "Sulphur (molten)" and transferred to page 119.
3. "Monoethylene glycolmonoethylene ether" on page 119 is revised to "Ethylene glycol monoethylene ether" and transferred to page 119.
4. Delete "Monopropylene glycol" on page 119.

ANNEX IV

Regulation 3 (Certificate and Survey)

Change paragraph (1) into the following:

(1) An International Sewage Pollution Prevention Certificate (1973) shall be issued to a ship engaged on international voyages and shall be of a form which corresponds to that of the model given in the Appendix to this Annex.

ANNEX V

Regulation 1 (Definitions)

Delete the words of "excluding fresh fish and part thereof" in paragraph (1).

Regulation 3 (Discharge of Garbage)

Change sub-paragraph (1) (b) into the following:

(b) the discharge into the sea of food wastes and fresh fish and part thereof is prohibited within a distance of 3 nautical miles from the nearest land;

RESOLUTION

Japan proposes the adoption of the draft Resolution attached hereto.

DRAFT RESOLUTION

METHOD TO IDENTIFY
THE SOURCE OF DISCHARGED OIL

The conference,

Having in mind Regulation 9 of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, whereby the discharge of oil or oily mixtures from ships shall be prohibited except when such discharge satisfies specified conditions,

Recognizing the necessity of ensuring that any ship which has discharged oil or oily mixtures in contravention of the said Regulation shall be identified promptly and punished,

Recommends that Contracting States should promote the development and practical use of any possible method whereby the discharged oil be promptly identified as the oil loaded on board a certain ship,

Invites the Organization to do, at the time when any such method be successfully developed, preparatory work to amend the Convention in order to place in it the provisions concerning such method.

ANNEX IImproved R.O.B. SystemIts oil pollution Prevention Effects and Development1. Introduction

This report is intended to give further explanation to the Japanese proposal contained in the IMCO document PCMP/2/8 of 12 February 1973 on the segregated ballast system and R.O.B. system referred to in Regulation 11, paragraph (2), Annex 1 of the draft convention.

According to the draft convention, every new oil tankers of 150,000 tons deadweight and above and every combination carriers of 100,000 tons deadweight and above are required to have segregated ballast tanks. It is, however, more desirable for the purpose of the prevention of marine pollution that new large tankers and combination carriers are required, as proposed by Japan, to have either segregated ballast tanks or an improved R.O.B. system which will be adopted optionally according to the particular operational conditions, navigational routes, loading and unloading ports, etc.

An interim report on the progress of the development of the improved R.O.B. system is attached hereto.

It should be noted that the system which is being developed in Japan and discussed in this paper represents an

attempt to improve the R.O.B. method by means of a coordinated assembly of relatively simple mechanical devices which are less subject to human judgement and errors. The system is only one of the various arrangements possible for improving the R.O.B. method, and in no way claims to exclude the development of any other arrangement which will achieve the same objective.

2. Oil Pollution Prevention Effects of Improved R.O.B. System

This system is designed to treat dirty ballast water and tank washings by means of slop tanks and separators so as to limit to 30 ppm or less the oil content of final effluent into the sea.

This system also incorporates oil-content monitoring and controlling devices, which record the quantity and rate of oil discharged, and automatically stop pumping when oil discharged exceeds the predetermined standard.

The system has the following three main features:

(1) Total oil discharge is considerably reduced.

Let us assume that tanker displacement during a ballast voyage is 30-45% of full load displacement, and that dirty ballast water and tank washings generated amount to 25-30% and 3% respectively of deadweight (W).

If these are treated by this system, oily water of effluent is limited to 30 ppm, while most effluent during the R.O.B. operation is clean and well below this figure. Even if the whole effluent has the oil content of 30 ppm, total oil discharged will not exceed approx. $\frac{1}{100,000}$ ($\pm (0.33 \text{ to } 0.28) \times W \times 30 \times 10^{-6}$), which is far lower than $\frac{1}{15,000}$ specified in the present convention. One of the major advantages of this system is its ability to extract clean sea water from oily water on tankers and discharge it, so that the remaining oil-rich water may be retained on board for discharge to the shore reception facilities.

(2) As it keeps the oil content of effluent to 30 ppm or less and retain on board highly concentrated oily water, oil particles in effluent are usually very fine in size. Thus, the oil discharged into the sea is made susceptible to natural degradation and rendered harmless to the marine environment.

(3) By means of the oil-content monitoring and controlling devices, the system ensures the R.O.B. operation in compliance with the specified standard and eliminates the need to depend on human judgment by the personnel on board a ship, and by transforming the recording device into a "black box" it indicates without fail whether unlawful discharge has or has not been made.

3. Feasibility of the Development of the Improved R.O.B. System

Prospect:

We are quite optimistic regarding the development of this system by the end of this year. The complete system will be commercially available in 1975 and it will be applicable to all tankers with slop tanks.

Basic specifications:

The basic design of this system is illustrated diagrammatically on the last page of this paper. The system is not complete yet, and the diagramme shows only the outline of the system.

Note: *1. The settling behavior of oily ballast water and tank washings has been observed both on board actual ships during operation and at the experimental model plant.

As a result, it has been ascertained that about 30 hours' settling is sufficient for decanting clean ballast (less than 30 ppm) from dirty ballast water (please refer to the IMCO document PCMP/2/8/Add.2 of 19 February 1973).

*2. It was found that the slop tank has so remarkable separating ability to deal with a large quantity

of dirty ballast due to its tower shape and heating effect that its improvement will considerably contribute in this respect. The sludge in slop tanks, however, should be removed to enable effective working of oil-water separators. In this connection, some methods of sludge removal are being developed.

- *3. Effective use of an oil-water interface detector is essential to keep the oil-water separator in good working condition.

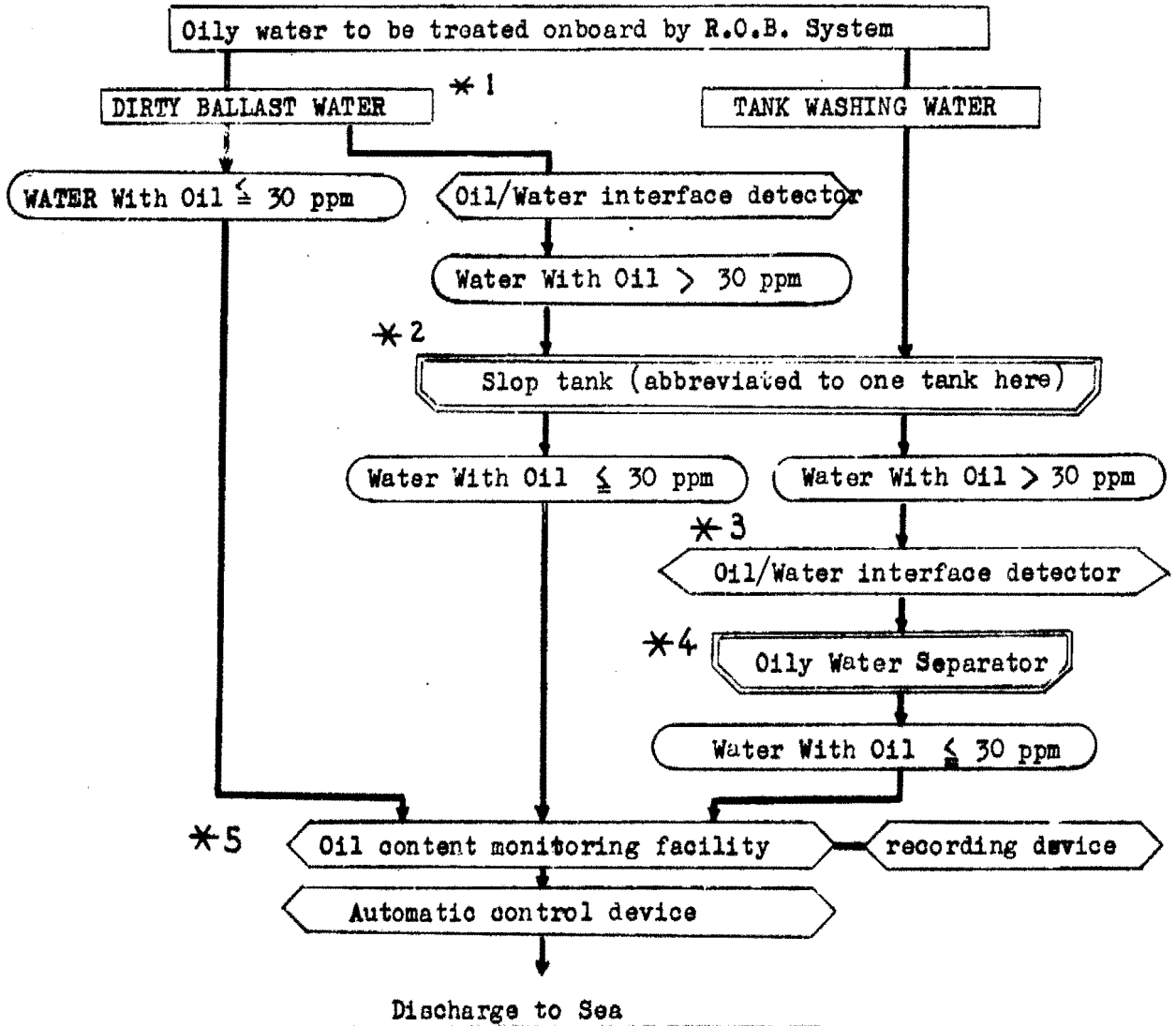
The detector used for the test showed good results, but it must be further improved.

- *4. The separator used for the test (Slanted plate/Sand filtration type) showed a result as expected. Another type of separator will be tested within this year.

- *5. The oil content monitoring device is the most important element of this system, and it is sufficient if the device is required to measure only the range below 30 ppm, since the development of this device is easier than that of a wider-range device mentioned in the draft Convention. The laboratory test has already been completed, while the prototype device is now being manufactured.

[*1 - *5 correspond to those numbers on the attached diagram]

The improved R.O.B. System



APPENDIX

Improved R.O.B. System

1. Confirmation of Rough Separation Effect by The Slop Tank
2. Efficiency Test of The Oil-Water Separator Manufactured for Trial

**Experimental Result by Using Crude Petroleum
(Interim Report)**

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1. Introduction

The development of the improved R.O.B. system is advanced as a preventive countermeasure to prevent oil discharge from ocean-going tankers.

In the method the tanker is equipped with a large capacity oil-water separator system. In this system the dirty ballast water and tank cleaning water are directed to a "slop tank" and oil-water separator where the oil content is removed prior to overboard discharge. (Desired oil content of the discharged water is something less than 30 ppm.)

The ultimate goal of this trial project is full development of an effective oil-separator system. To be specific, the primary goal is development of the slop tank to increase oil-water separation, and development of an increased capacity on-board separator; together with the equipment required to measure and record oil content of the discharge system and a positive control system to prevent discharge when the oil concentration exceeds the permissible amount. Toward this end an oil content monitoring device and an oil-water interface detector are part of the overall system.

Investigation of the properties contained in the tank cleaning water and efficiency tests of the trial manufactured oil-water separator and oil-water interface detector are presently being conducted by the R.O.B. system. Crude petroleum is being used in the trial so that close approximation of actual shipboard operations can be evaluated. An experiment with heavy oil

(grade B) has been completed. The crude oil experiment has been partially completed.

Results are partially reported in this paper.

2. Equipment

Test equipment is the same as that reported on in the previous paper. (PCMP/2/8 12, Feb., 1973). The situation and number of sampling cocks used in the distribution of oil concentration investigation for the slop tanks are shown in Fig. 1.

3. Test

The operational procedures for tank cleaning, slop tank settling, overboard discharge and compilation of data and oil concentration measurement methods remain the same as those reported on in the previous paper in 1973.

(1) Testing conditions

1 Tests of slop tank model

Tests of No. 1 and No. 3 of Table 1 were conducted under conditions of changing main factors which affected the oil content properties of the tank cleaning water.

Table 1 Test Conditions

Test Number	Test No. 1	Test No. 2	Test No. 3
Temperature of cleaning water	Room temp.	Room temp.	Room temp.
Suction pump	Eductor	Eductor	Recipro. pump
Tank cleaning time	30 min. 8 times	30 min. 4 times	30 min. 8 times
Flow rate of cleaning water	16.3 t/H	16.3 t/H	16.3 t/H
Heating of slop	Do not	Do not	Do not
Slop tank used	2 sets	1 set	2 sets
Cleaning process	Closed cycle	Closed cycle	Closed cycle
Sludge	Exist	Exist	Exist
Detergent	Do not use	Do not use	Do not use
Slop settling time	There is	None	There is
Discharge pump	Recipro. pump	(Centr. pump + Eductor) or partly Recipro. pump	Recipro. pump

2 Tests of the oil-water separator

The prepared oily water for the test conditions in Table 1 was drained from the slop tank and passed through the oil-water separator. Oil concentration was measured at both the entrance and exit of the separator. In Test No. 2, as shown in Table 1 the oily water was sent directly to the separator with no settling time in the slop tank. This test was carried out in order to investigate the efficiency of the separator against comparatively

heavy oily cleaning water. For the drainage in this test, a centrifugal pump and an eductor were used together. Occasionally a reciprocating pump was used. In another experiment, the efficiency of the oil-water separator to water of high oil concentration was tested. The heavy oily water was prepared by mixing crude petroleum and sea water by means of an eductor. The heavy oily water was sent directly to the separator where it was measured at both the entrance and exit of the separator. In this test it may be desirable that the tank cleaning water go to the oil-water separator. However, concentration of oil in the tank cleaning water changes to a large degree with the passage of cleaning time. Therefore, oily water was ejected by the eductor in order to correctly evaluate the efficiency of the separator.

The oil-water separators (slanted plate/sand filtration type) were tested.

3 The oil-water interface detector

When the oily water was drained from the slop tank, the oil-water interface detector was activated and its operation checked. (Results displayed by recorder and showed in Fig. 15)

(2) Determination

Oil concentration was measured by the colorimetric determination method.

(3) Properties of crude petroleum and sludge

Crude petroleum: Received from Mitsubishi Oil Co., Ltd.

MIZUSHIMA Petroleum Depot.

Composition properties are shown in Table 2.

Sludge: Sludge collected from an ocean-going tanker, N. MARU during cleaning of the tank before docking. Sludge was collected from the tank in areas missed during the initial cleaning operation.

(4) Amount of sludge deposited

Sludge was deposited in the cleaning tank before cleaning was started. Amount of sludge used is as follows:

Test No.1	170 kg
Test No. 2	0
Test No. 3	43 kg

4. Results

(1) Test with slop tank model

1 The change of oil concentration of the tank cleaning water for the washing nozzle and the eductor driving, and the foul water from tank cleaning, which was sampled at the discharge side of the eductor, in Test No. 1 is shown in Fig. 2.

2 The distribution of oil concentration in slop tank No. 1 and No. 2 in Test No. 1 was determined by the direction of the depth shown in Fig. 3 and 4.

3 The change of oil concentration with time (that is, separation

effect) in slop tank No. 1 and No. 2 in Test No. 1 is shown in Figs. 5 and 6.

4 The change in oil concentration of the tank cleaning water for the washing nozzle and the foul water from tank cleaning which was sampled at the discharge side of eductor, in Test No. 3 is shown in Fig. 2.

5 The distribution of oil concentration in slop tank No. 1 and No. 2 was determined by the direction of the depth in Test No. 3 and is shown in Figs. 7 and 8.

6 The change in oil concentration with time in slop tank No. 1 and No. 2 in Test No. 3 is shown in Fig. 9 and 10.

(2) Efficiency tests of the oil-water separator (Operating condition shown in Table 3)

1 Measured results of the concentration of cleaning water at the entrance and exit of the oil-water separator in Test No. 1 is shown in Fig. 11. The cleaning water settled in the slop tank for 63 hours and was then sent to the oil-water separator.

2 Measured results of the oil concentration at the entrance and exit of the oil-water separator in Test No. 2 is shown in Fig. 12. The cleaning water was not settled in the slop tank before being directed to the separator. In this figure, the two points (the final two points) at 2 hours and 50 minutes after and at 3 hours and 20 minutes after are the results of supplying with a reciprocating pump. The other points are the results of supplying

with a centrifugal pump (JSS pump) and eductor (closed cycle) to the oil-water separator.

3 The experimental results with heavy oily cleaning water are shown in Fig. 13. These are the results when crude petroleum and sea water were mixed by the eductor and sent to the oil-water separator.

4 The results of Test No. 3 at the drainage of oily water is shown in Fig. 14.

(3) Results of operational check of the oil-water interface detector

An example of the operating state, when the oil-water interface detector was located in the position where the detector is installed is shown in Fig. 15.

(4) Comparison of the results with crude petroleum and with heavy oil (Grade B)

The water separation effects of the slop tank with crude petroleum and heavy oil under the same conditions of tank cleaning were determined. Comparative data are shown in Fig. 16.

5. Conclusion

From these results the following areas of discussion about tank cleaning water when using MURBAN crude petroleum can be clarified.

- (1) The emulsified layer of crude petroleum under the oil surface layer in the slop tank was very thin as well as that of heavy oil (grade B).

- (2) The crude petroleum concentration of tank cleaning water is lower than that of heavy oil (B) and the separation effect in the slop tank is very good.
- (3) When a reciprocating pump is used as the suction pump there is no great difference in the oil concentration in slop tank No. 1, whereas in slop tank No.2 the oil concentration is lower by comparison when the eductor is used as a suction pump.
- (4) When the oil concentration of the oily water is high when the eductor is used the concentration can be reduced under several ppm by the slanted plate and sand filtration system.
- (5) The oil-water interface detector was reliable in indicating the proper oil-water interface.
- (6) Affection of the sludge deposits could not be seen from the results of this test.
- (7) Consequently it has proved that the purity of ballast water and tank cleaning water becomes under 30 ppm. at this test plant and believe firmly that the same effect will be attainable case of actual tanker.

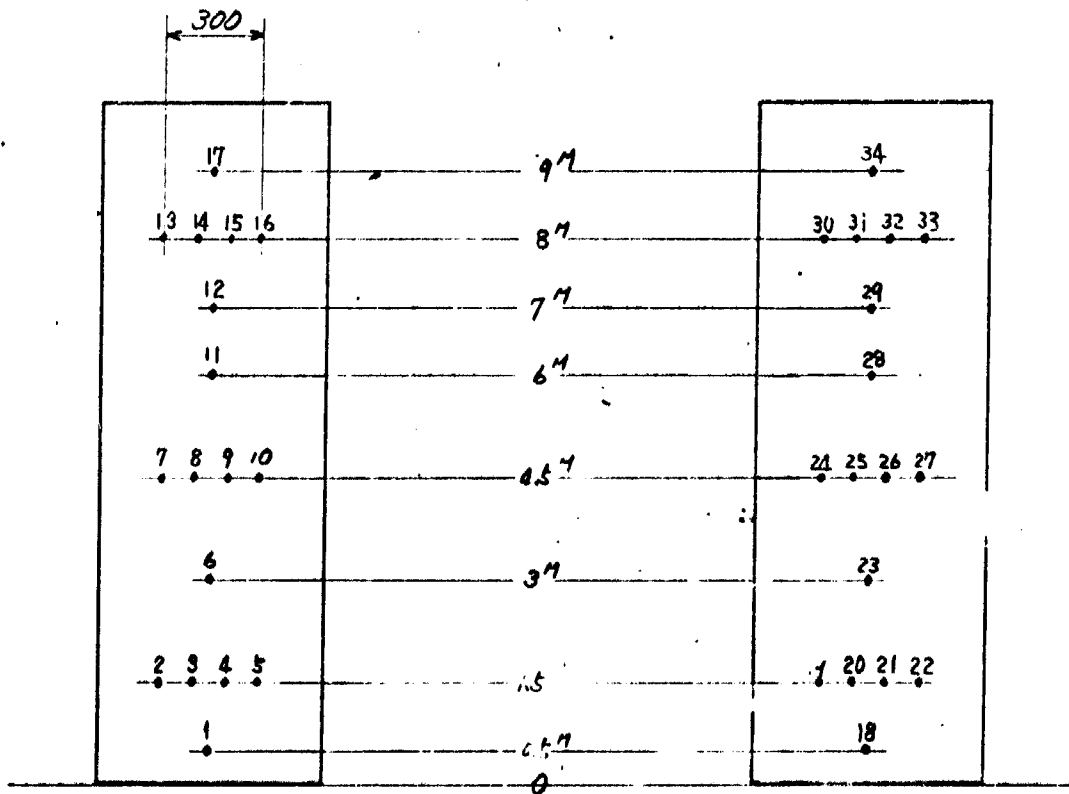
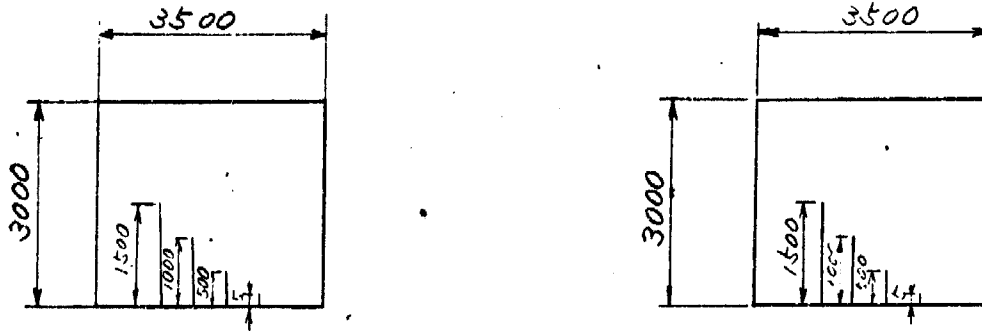
Table 2. Properties of crude petroleum

Kind of oil	MURBAN crude petroleum
Specific gravity 15/4°C	0.833
Viscosity cSt @ 50°C	2.639
RW @ 50°C	32.4
Pour point °C	-25.0
Carbon residue wt. %	0.15
Water content %	0.5
Ash content wt. %	0.00
Sulphur content wt. %	0.69
Calorific value Cal/g	10,950
Delivered date	73. 5. 23

Table 3. Operating conditions of oilwater separator

Slanted plate ^x type oil-water separator			
	Duration	Amount of Water Supply	Amount of pressurized water
Fig. 11	Min 30	6 T/H	25% (1.5 T/H)
	Hr Min 2 : 30	10 T/H	" (2.5 T/H)
	4 : 30	"	"
	6 : 30	"	"
Fig. 12	: 30	6	" (1.5 T/H)
	: 50	"	"
	1 : 30	10	" (2.5 T/H)
	1 : 50	"	"
	2 : 30	"	"
	2 : 50	"	"
	3 : 20	"	"
Fig. 13	: 30	"	"
	: 40	"	"
	1 : 15	"	"
	1 : 25	"	"

Fig.1 Situation & Number of Sampling cocks



Sampling situation of the slop tank
 No. 1

Sampling situation of the slop tank
 No. 2

Fig. 2 Change of Oil Concentration of tank cleaning water and foul water during tank washing.

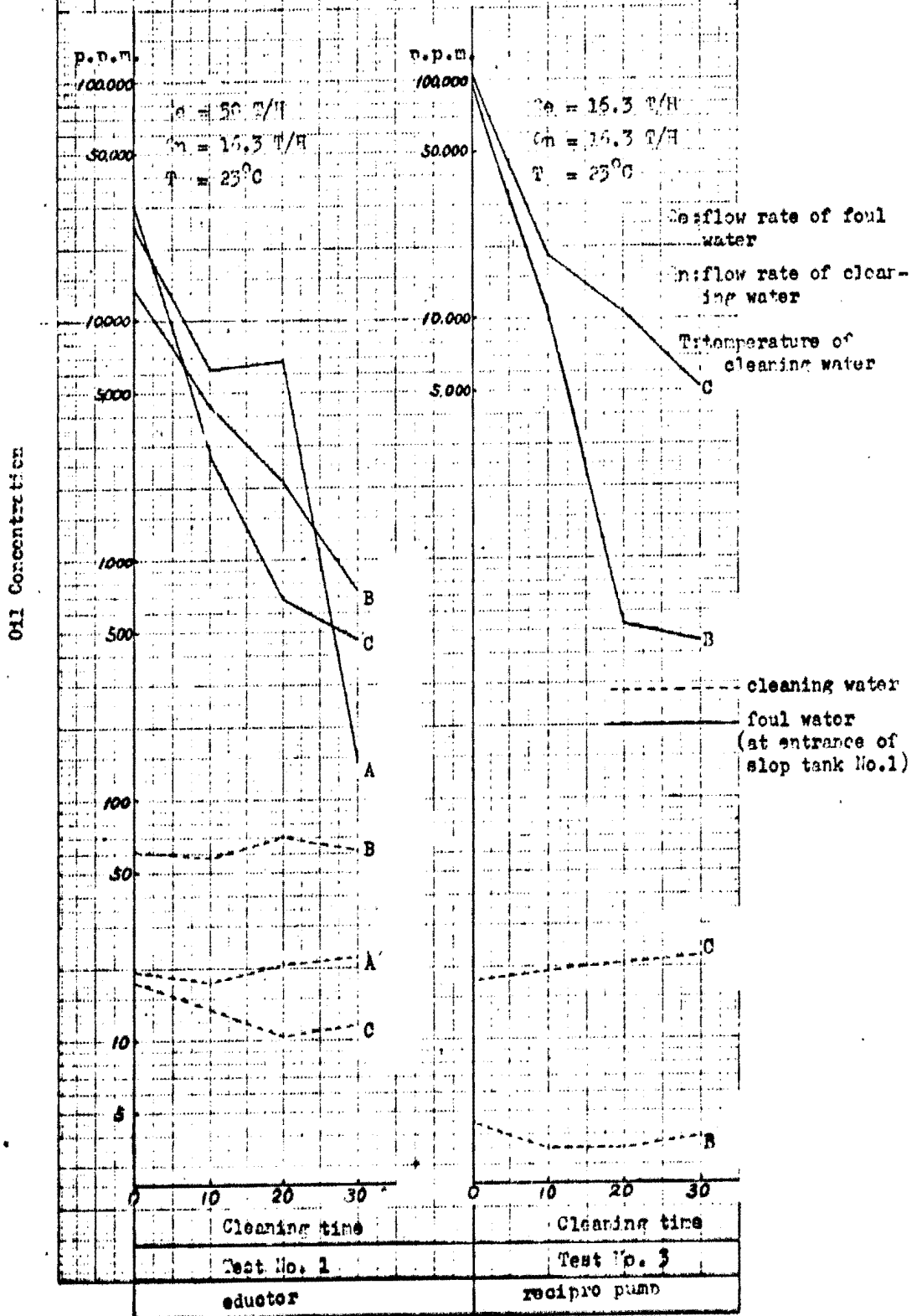
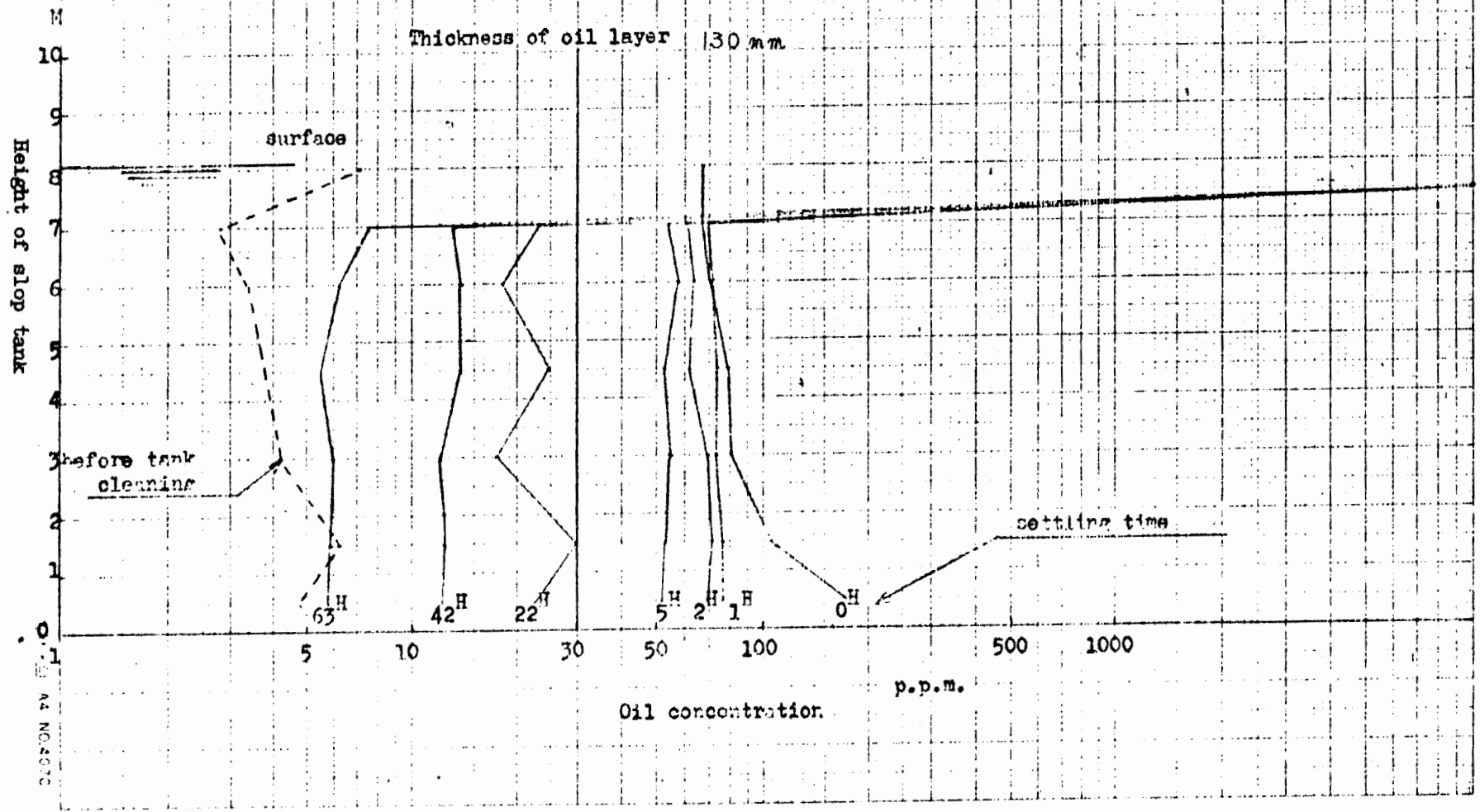


Fig.3 Distribution of oil concentration in slop tank test with crude petroleum ①
slop tank No. 1
sampling situations: 5mm apart from wall



0.1 1 2 3 4 5 6 7 8 9 10

0.1 1 2 3 4 5 6 7 8 9 10

Fig.4 Distribution of oil concentration in sloop tank

Test No. 1

Test with crude petroleum
Slop tank No. 2
sampling situation: 5mm apart
from wall.

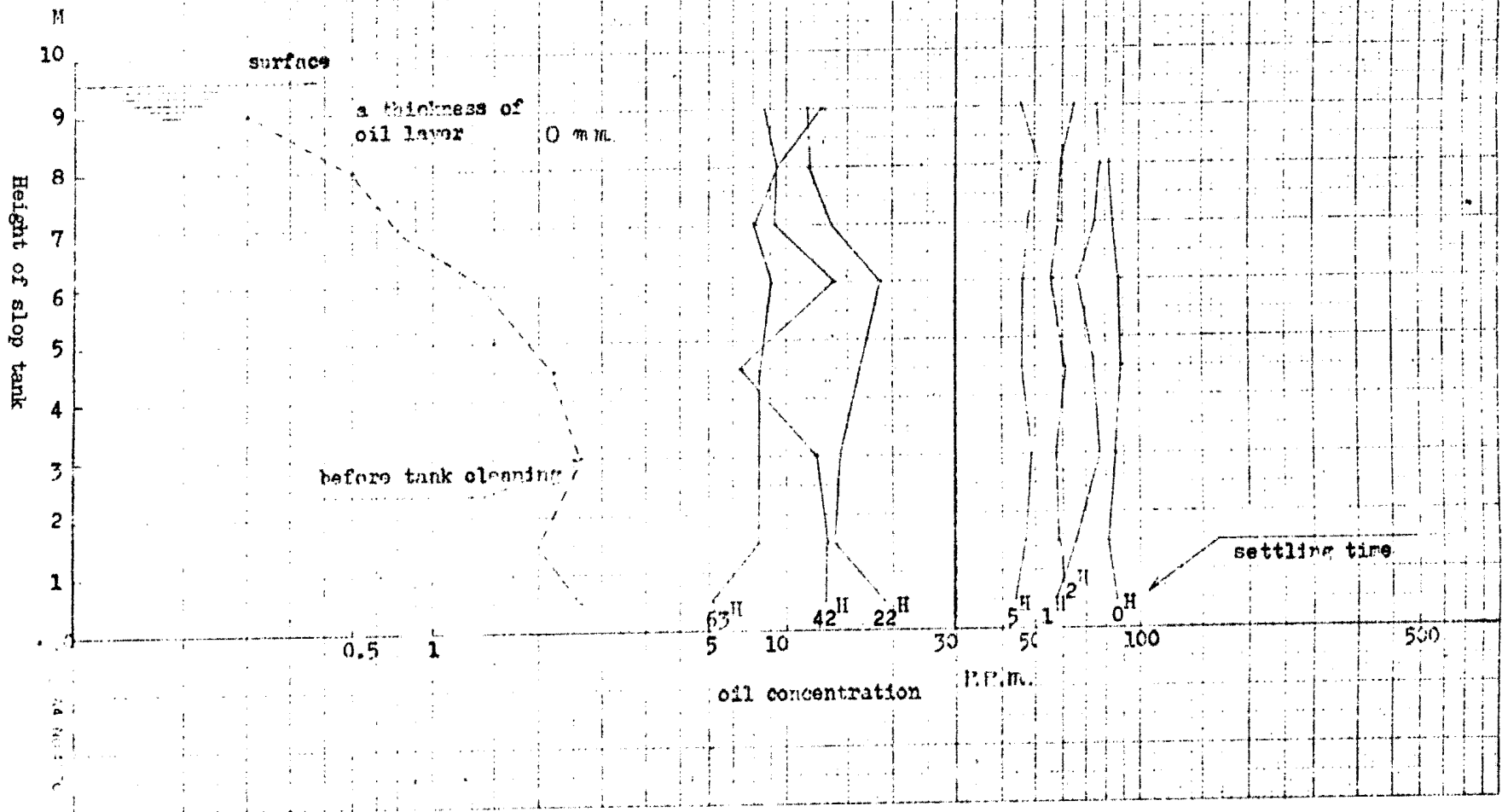


Fig. 5 Oil-water separation effect in slop tank Test No.1

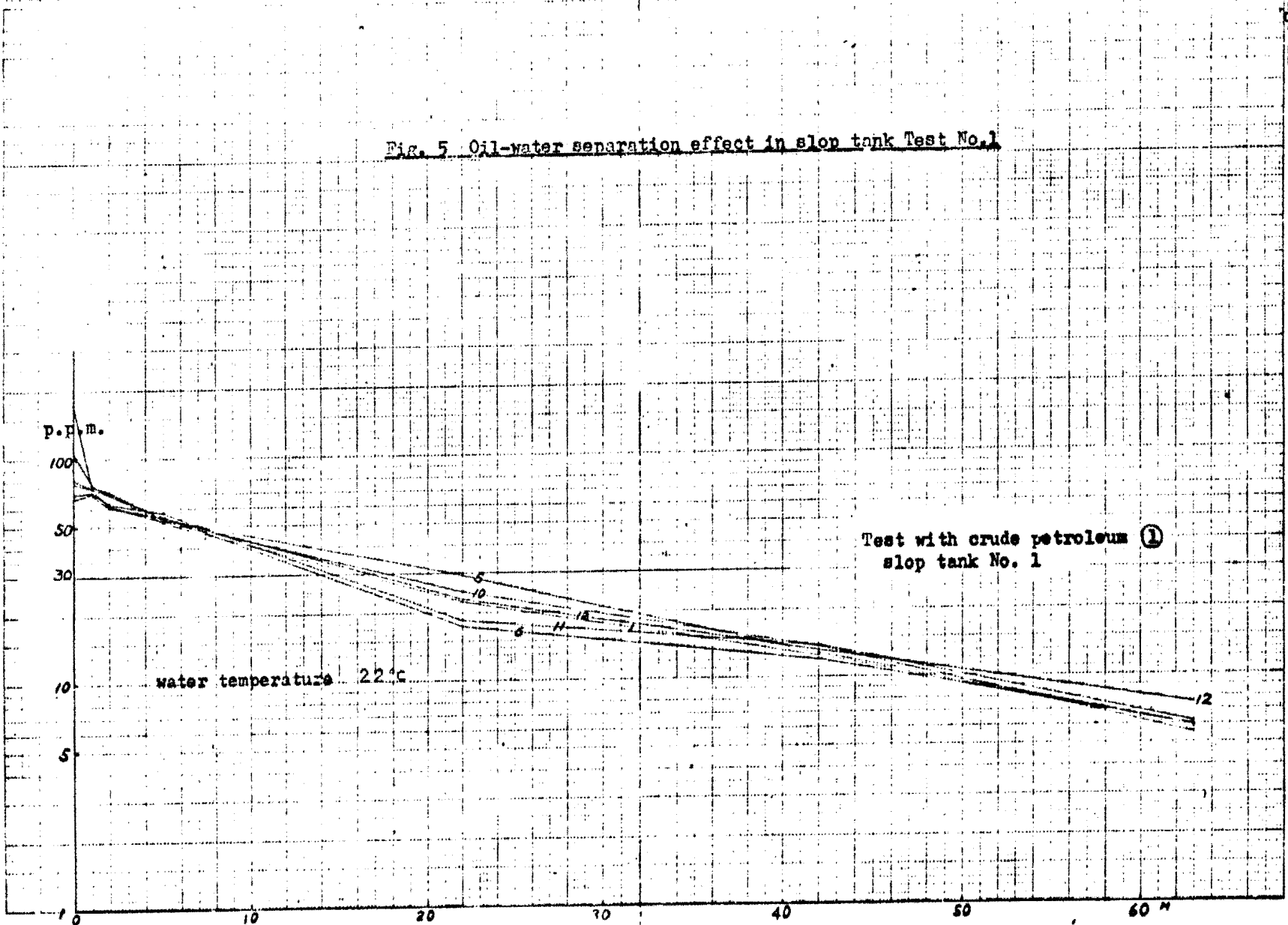
Oil concentration

p.p.m.

Test with crude petroleum ①
slop tank No. 1

water temperature 22°C

Settling time



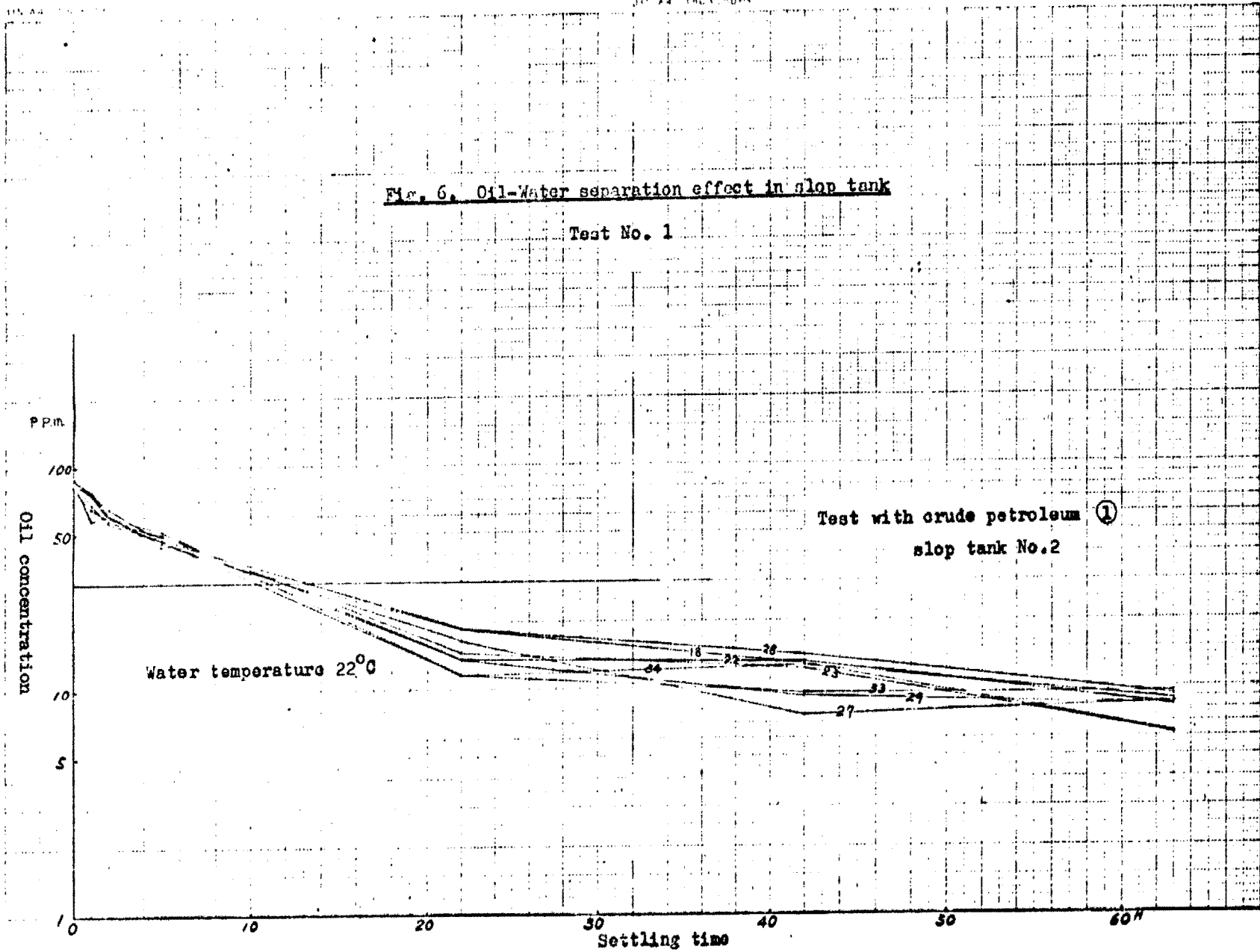


Fig. 7 Distribution of oil concentration in slop tank

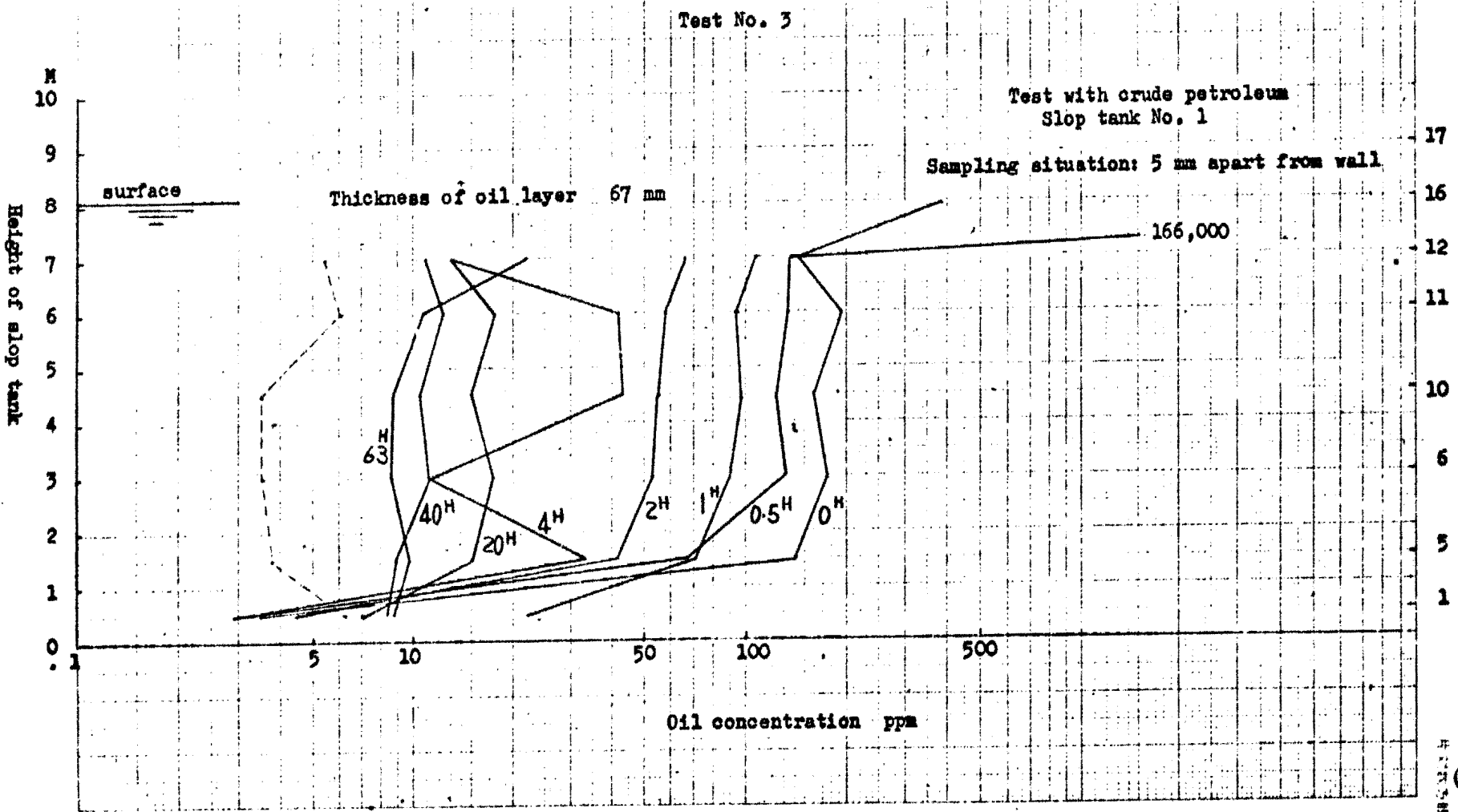
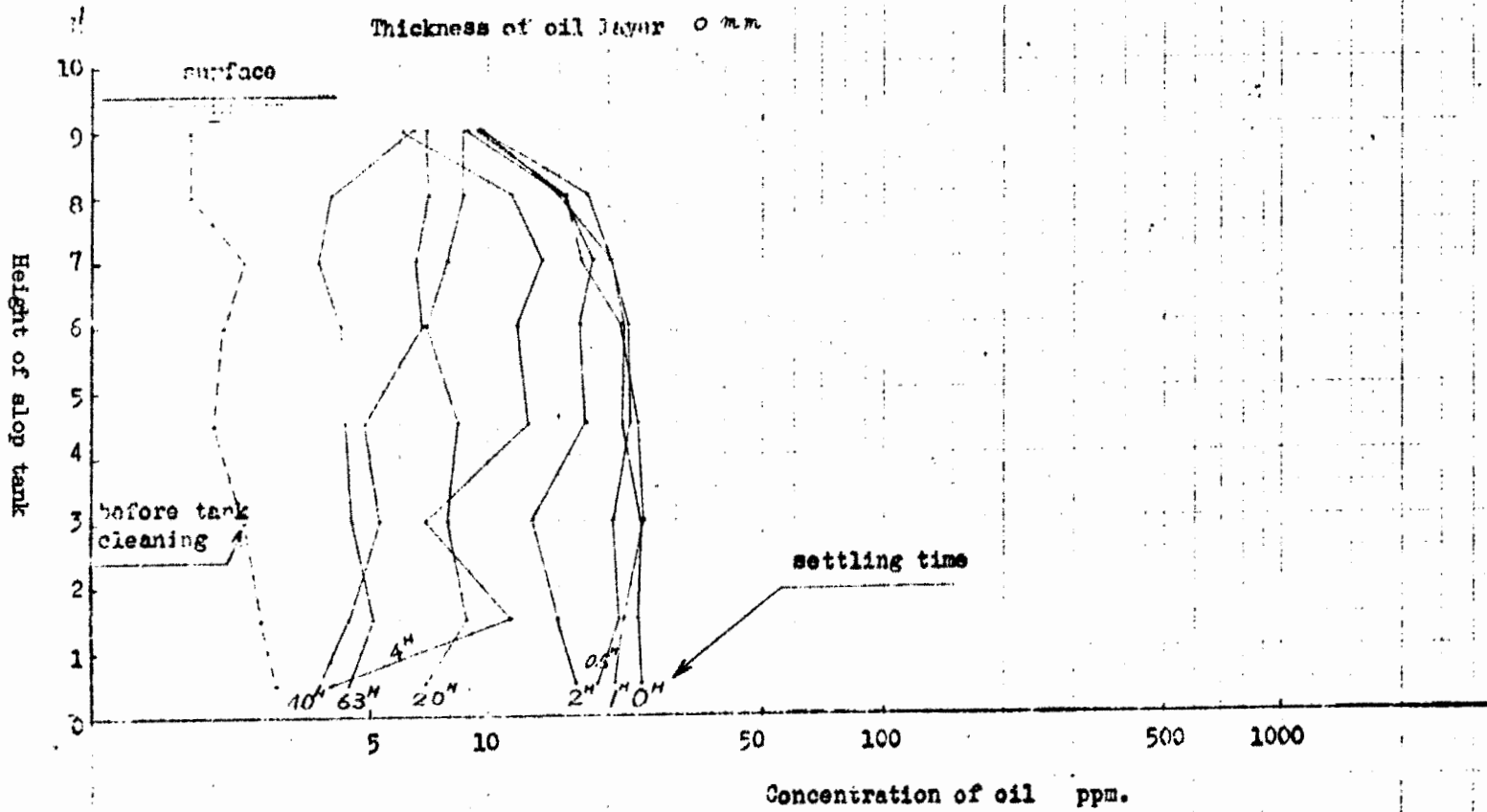


Fig.8 Distribution of oil concentration in slop tank

Test with crude petroleum
slop tank No.2

Test No. 3

Sampling situation: 5mm apart from wall

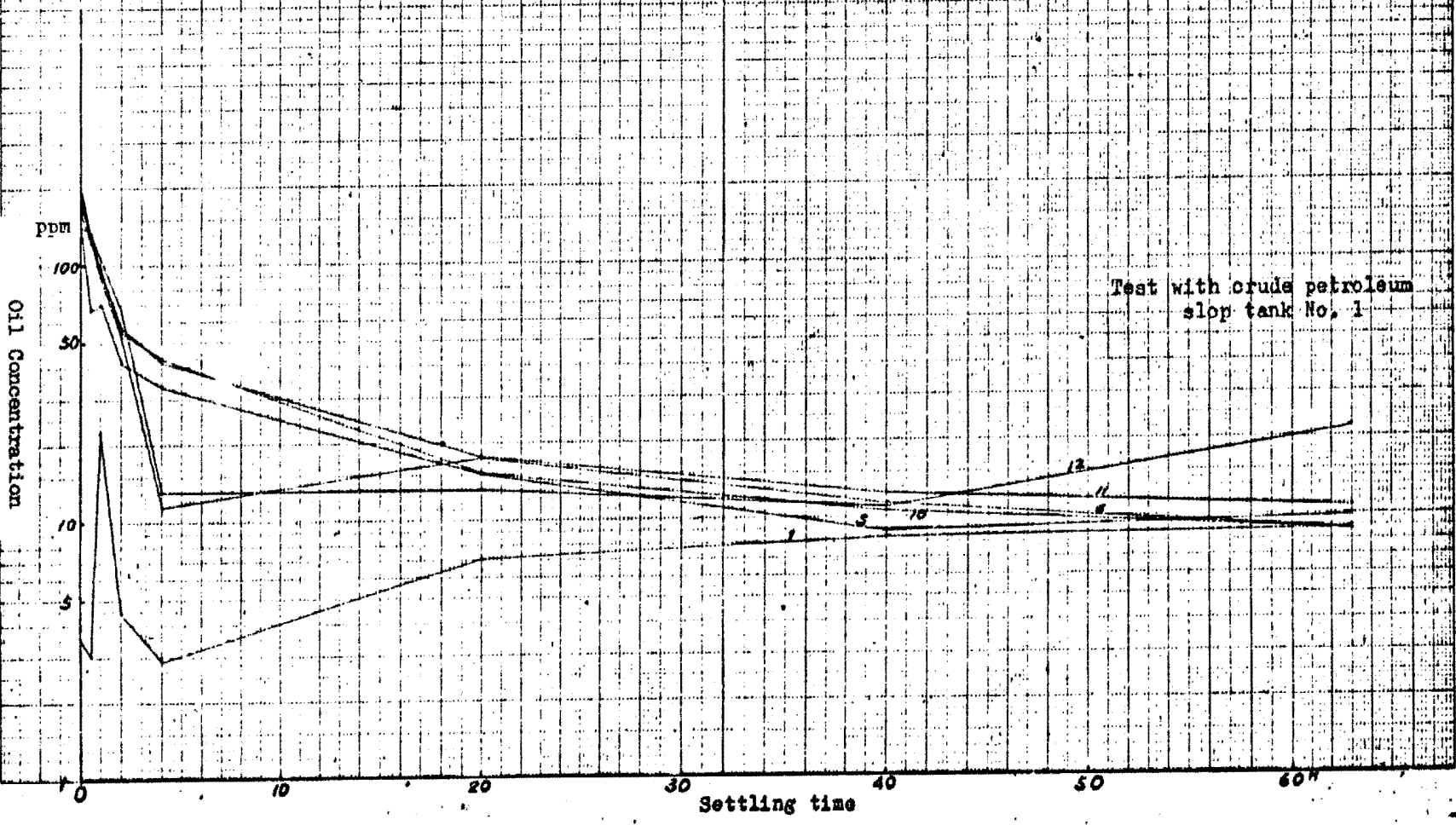


115 A4 180 x 240 mm

115 A4 180 x 240 mm

Fig. 9 Oil-water separation effect in sloop tank

Test No. 3

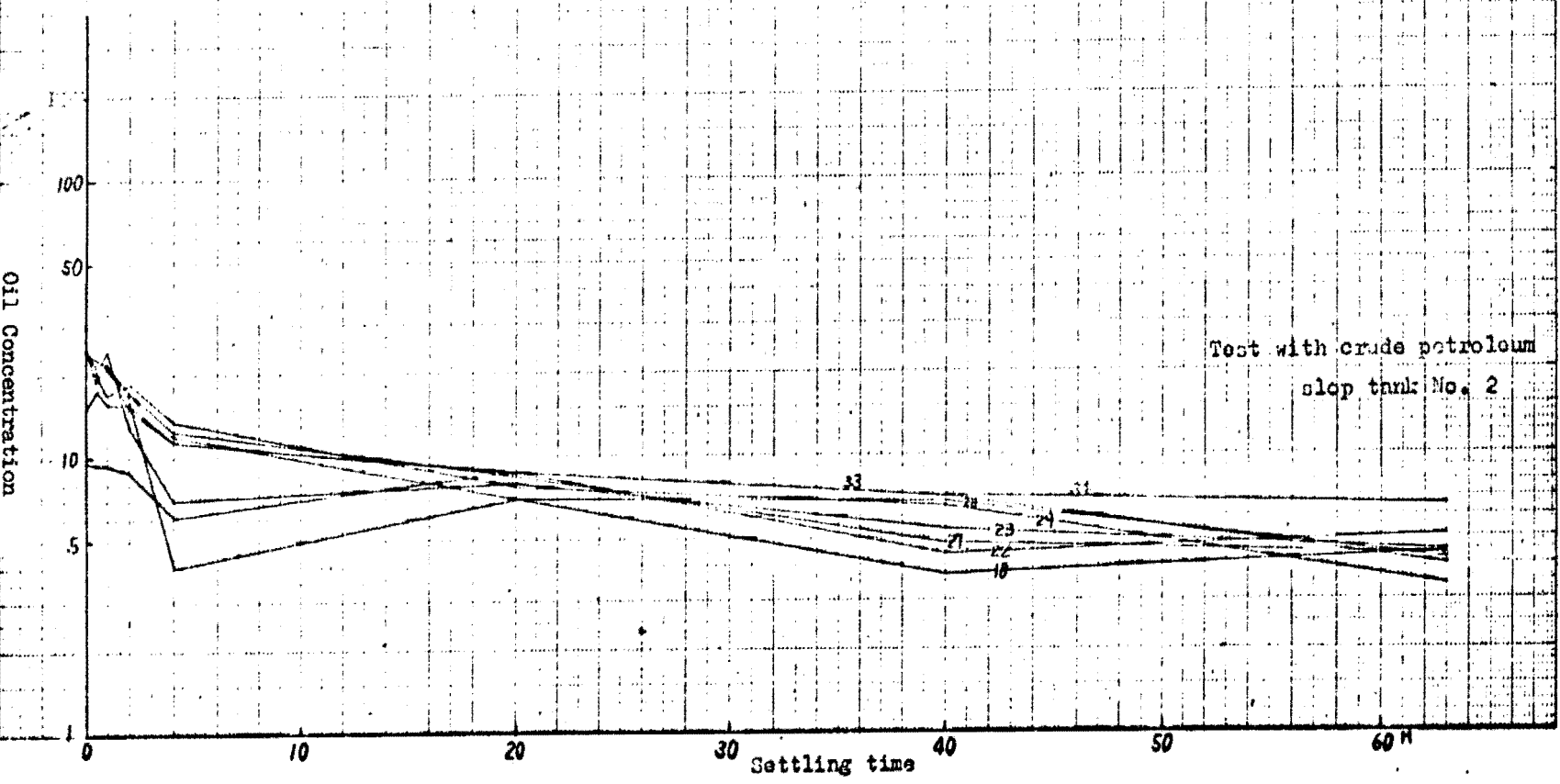


Oil Concentration

Fig. 10 Oil-water separation effect in slop tank

Test No. 3

Test with crude petroleum
slop tank No. 2



Efficiency tests of the oil-water separator

Fig. 11 Result of test No.1

(Cleaning water was settled for 63 H in sloop tank)

Sampling situation:

- A : Entrance of slanted plate type oil-water, separator
- B : Exit of do (Entrance of Sand filter)
- C : Exit of sand filtration type oil-water separator

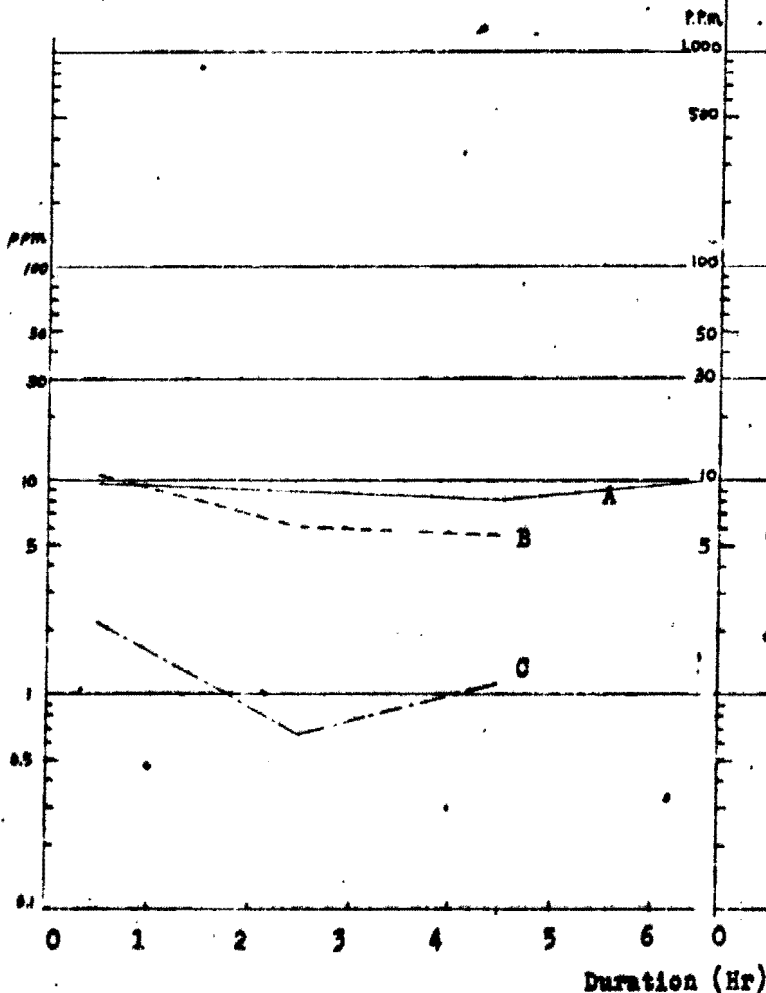


Fig. 12 Result of Test No. 2

(Cleaning water was not settled in sloop tank)

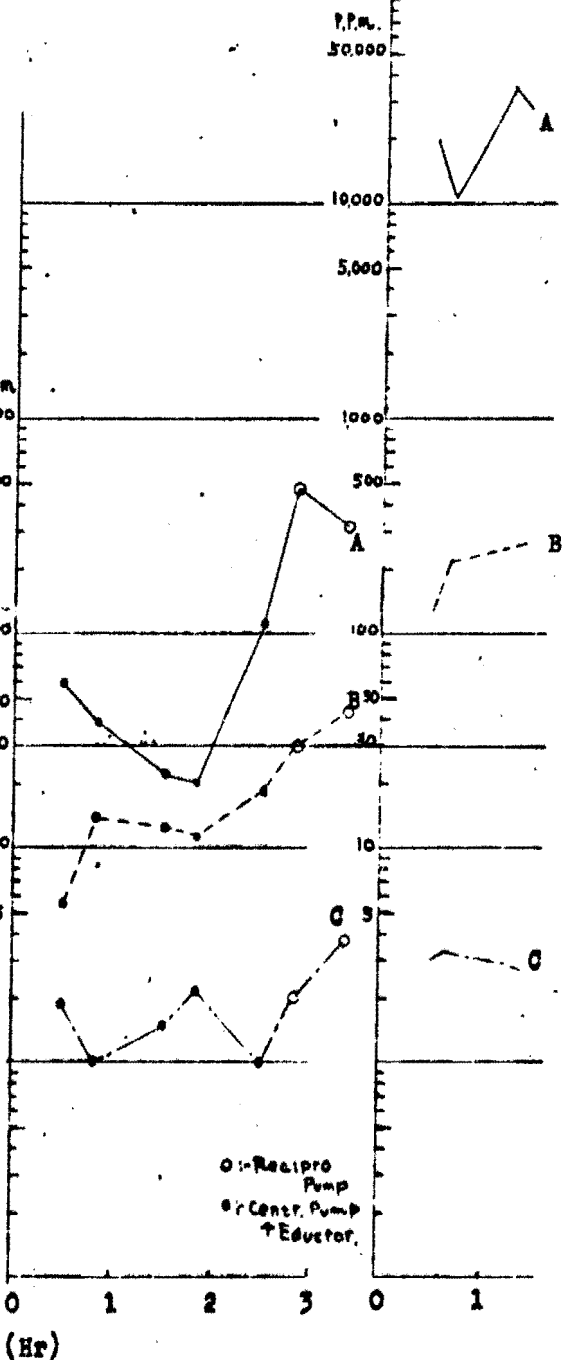
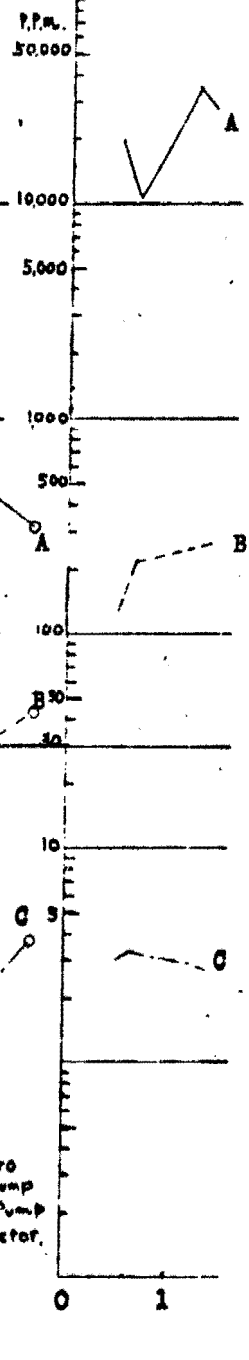


Fig. 13 Result of heavy oily cleaning water

(mixed by eductor)



○ - Recipro Pump
 ● - Cent. Pump
 † - Eductor

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Fig. 14 Efficiency tests of the oil-water separator

Test No. 3

Sampling situation:

A : Entrance of slanted plate type oil-water separator

B : Exit of " " " "
(Entrance of sand filter)

C : Exit of sand filtration type oil-water separator

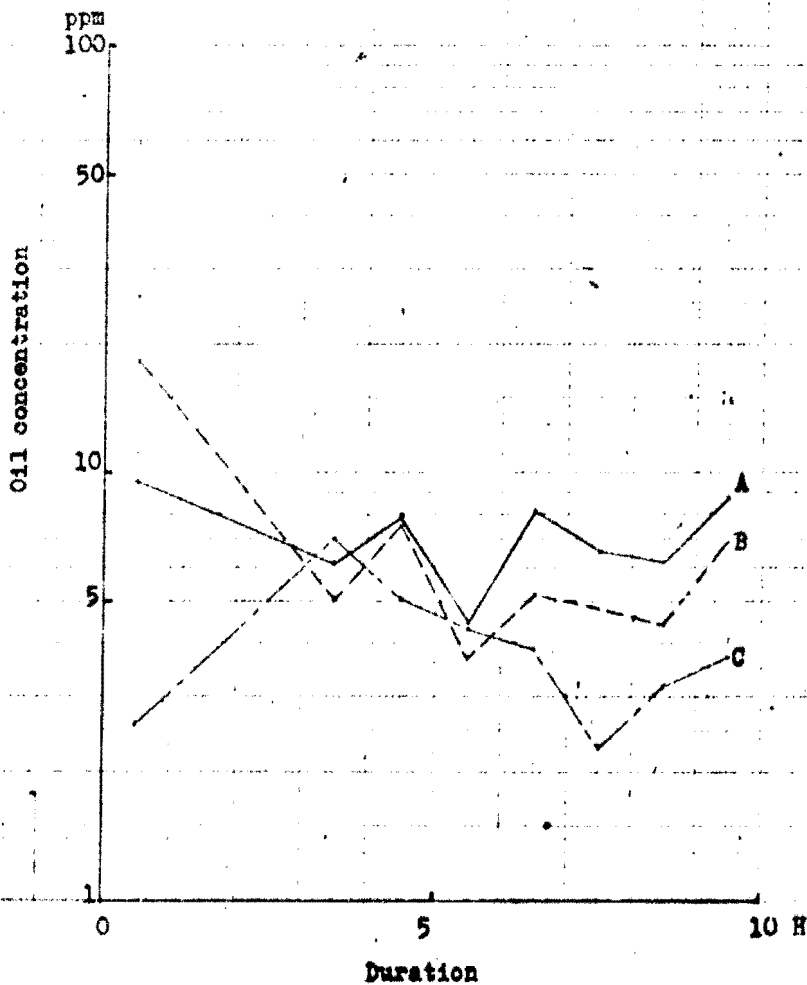


Fig. 15 Results of test of oil-water interface detector

(Test No.3 Slop tank No.2 used)

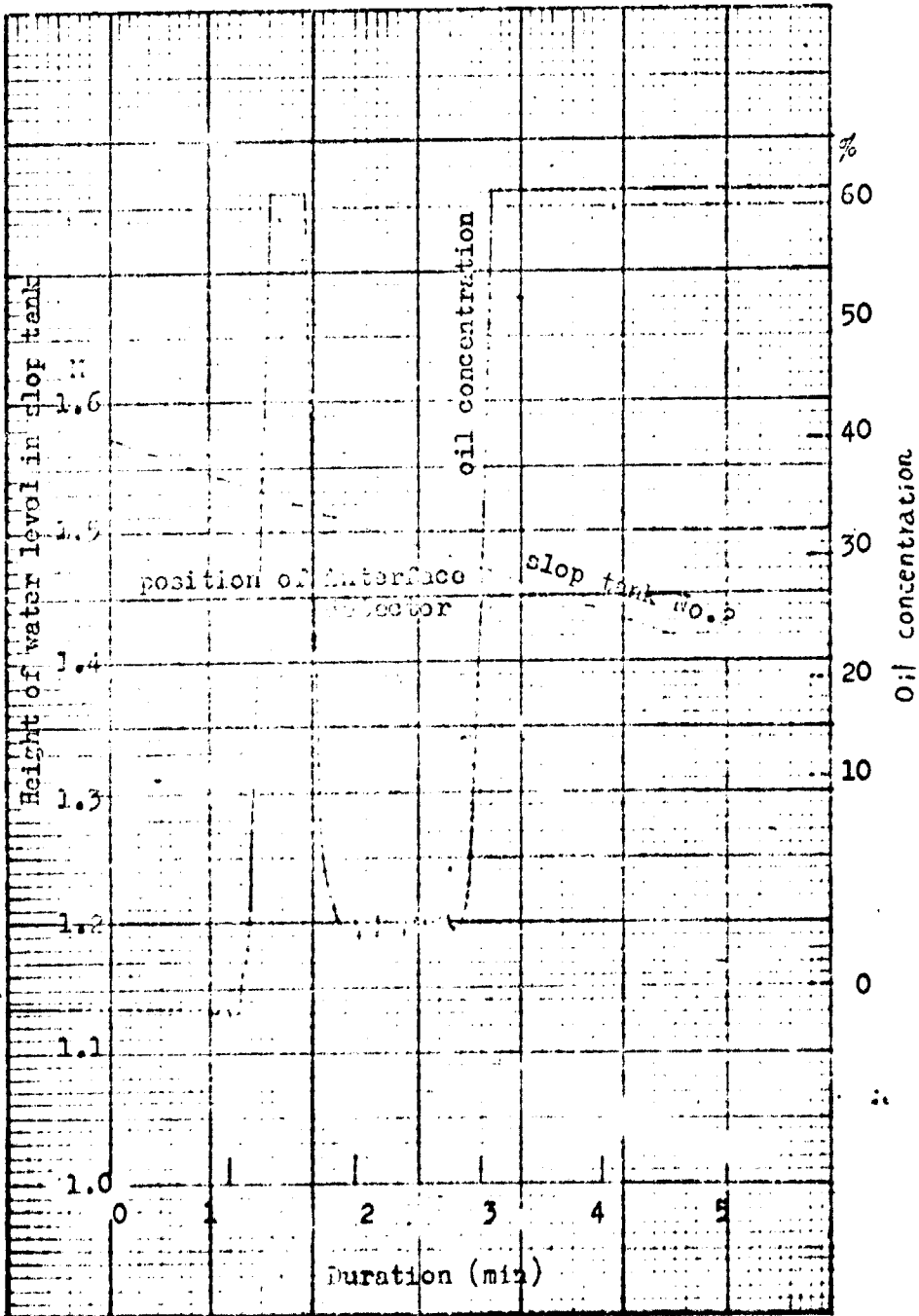
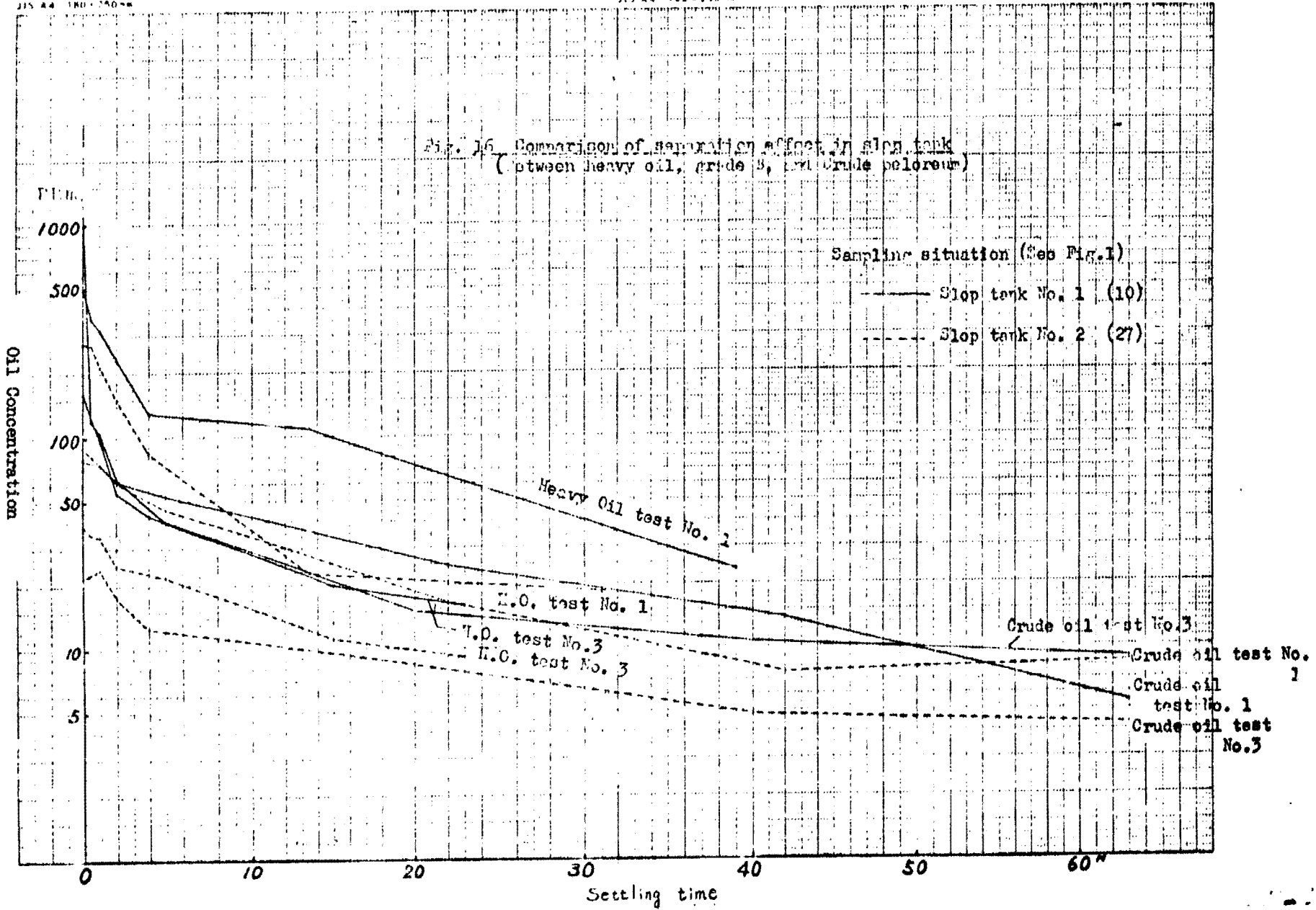


Fig. 16 Comparison of separation effect in slop tank
(between heavy oil, grade 3, and crude petroleum)



ANNEX II

Explanatory Note on the Proposal to

Regulation 13 of Annex 1

1. According to the present draft text, the capability of the segregated ballast tanks depends on two parameters, i.e. draft and displacement. For the enforcement of the provision, however, it is desirable to determine the capacity by only one parameter which indicates directly the safety of navigation.

2. The factors that should be considered for the safe operation on ballast voyages are as follows:

- (1) stability
- (2) manouverability
- (3) avoidance of slamming

3. As for the stability, present oil tankers hold excessive and sufficient stability, and it will not happen that the considerable decrease of stability takes place when the segregated ballast tank system is adopted. It is, therefore, not necessary to consider the stability.

4. The manouverability is composed of the following three factors,

- (1) turning ability
- (2) response to steering
- (3) course stability

The factors (2) and (3) are affected primarily by the ship type, rudder area and rudder angle. Consequently, the effect caused by increase of the segregated ballast capacity is very little.

It thus appears that, in respect of the manouverability, only the turning ability may be necessary to consider. This is represented by the radius of turning, and the radius of turning D_T is shown as the following formula:

$$D_T = C.L.d$$

C: coefficient which depends on the ship type, rudder area and rudder angle, etc.

L: length of ship

d: draft of ship

Therefore, the radius of turning, i.e. manouverability depends primarily on L and d.

5. On the other hand it is certain that slamming depends on Froude number and d/L .

6. From the foregoing it can be said that the safe operation on ballast voyages of an oil tanker depends primarily on L and d, and it is considered reasonable to determine the ballast capacity by keeping a minimum draft in ballast condition.

Furthermore, determining the ballast capacity by keeping the fore and aft draft is equal to obtaining the optimum arrangement of the segregated ballast tanks.

Therefore, the Government of Japan proposes to determine the capacity of the segregated ballast tanks only by keeping the fore and aft draft in ballast condition.

7. As regards the minimum value of the fore draft, the Government of Japan agrees, in the light of experiences, to the value shown in the present draft text, i.e. the fore draft $df = 0.025 L$.

On the other hand, as the expression of "to ensure adequate propeller and rudder immersion" has a vague meaning, the Government of Japan proposes the value of the aft draft as mentioned in the proposal, i.e. "the depth of the centre of propeller under the water is not less than 55% of propeller diameter."

This proposal is made because of the following reasons:

- (1) The propeller should be considered to be submerged for the safe manouvering on ballast voyages, and 10% of the propeller radius should be estimated as a margin.
- (2) Trim by the head should not be caused in the light of common sense in manouvering.
- (3) The proposed provision may be effective for preventing the development of unusual proportions.

8. In accordance with the Japanese proposal the segregated ballast capacity of tankers which have been designed as

segregated ballast tankers and comply with IMCO tank size limitation have been estimated and the result is shown in the attached figure.

REGULATION 13 SEGREGATED BALLAST OIL TANKER

DESIGN CONDITION		2. NORMAL BALLAST CONDITION (ARRIVAL)	3. TANK ARRANGEMENT
1. DEAD WEIGHT AND DRAFT		FORE DRAFT: 2.5% L	a. TO FULFILL LIMITATION OF SIZE OF OIL TANK BY IMO.
TYPE	FULL DRAFT	AFT : 2.5% (DEPTH OF CENTRE OF PROPELLER UNDER WATER / PROPELLER DIAMETER)	b. TO SE 0.82 OF CARGO COWTY.
130000DWT	16.5		
230000DWT	19.5 (MALACCA PASSABLE)		
350000-365000 DWT.	22.0 (LIMITED DRAFT FOR ARRIVING EUROPORT)		4. CONSUMED BUNKER OIL CALLING ROUTE: PANAMA BOTH WAY BUNKER AT PANAMA
500000DWT	28.0		

NOTE: Δ_B : DISPLACEMENT OF BALLAST CONDITION
 Δ_F : DE. OF FULL LOAD COND.
 MARKED O DIESEL • TURBINE x O.B.O CARRIER

