ನವ ಮಂಗಳೂರು ಬಂದರು ಪ್ರಾಧಿಕಾರ
नव मंगलूर पत्तन प्राधिकरण
NEW MANGALORE PORT AUTHORITY
(Fully Solar Powered)
भारत सरकार (पत्तन, पोत परिवहन और जलमार्ग मंत्रालय)
Govt of India (Ministry of Ports, Shipping and Waterways)
ಪಣಂಬೂರು पणम्बूर Panambur / ಮಂಗಳೂರು मंगलूर Mangalore - 575010

Azadi Ka Amrit Mahotsav

SAGARMALA
PORT-LED PROSPERITY

3/11/EMP/CE(C)/2012-13/TS 24-05-2022

To

The DDG/ Regional Officer
Ministry of Environment, Forest& Climate Change
Integrated Regional Office , 4th Floor, E&F Wings,
KendriyaSadan, 17th Main Road,
II Block, Koramangala,
BANGALORE – 560 034.

Kind Attn: K.P. SINGH

Sir,

Sub: Submission of half yearly Compliance report from October – 2021 to March 2022 -Environmental Clearance issued by the Ministry of Environment, Forests & Climate-intimation regarding-reg

Ref: Your letter No.E.P/12.1/574/KAR/57 Dated: 18-05-2022

****

With reference to the subject cited above, please find enclosed here with the half yearly Compliance report for the period of October 2021 to March 2022 on stipulated environmental clearance terms and conditions along with Radio active study report, Disaster Management Plan , Rain water harvesting , Green Belt and STP photographs are enclosed here with for information for the **E.C No. 10-54/2007.1A-III dt.29/07/2008, Expansion of Construction of Liquid Cargo Jetty**, the same information has been sent to through mail to rosz.bng-mef@nic.in and roszmon@yahoo.in also . The half yearly Compliance report from October-2021 to March 2022 is uploaded in Port website www.newmangaloreport.gov.in

Thanking you,

Encl: As above

Yours faithfully,
Chief Engineer (Civil)

CC to: Environmental officer, KSPCB, Parisara Bhavan, Baikampady. Mangalore
CPCB, Zonal office, Bangalore through Email cpcbzo@yahoo.com

E.C No. 10-54/2007.1A-III dt.29/0/2008, Expansion of Construction of Liquid Cargo Jetty **Berth No.13- Environmental Conditions**		
Sl.No	**Specific Conditions**	**Remarks**
1	All measures indicated in the letter dated 10.6.2008 of NMPT shall be strictly complied with	Complied
2	Radio active study for determining the dispersion of dredged dump material shall be carried out and the report submitted within 6 months from the date of receipt of this letter.	Complied (Annexure-I is enclosed)
3	Necessary clearances from the Karnataka State Pollution Control Board shall be obtained before initiating the project.	Necessary clearances obtained from the KSPCB
4	Quarantine condition shall be provided for keeping the hazardous containers if they are accidentally received.	No major hazardous/inflammable /explosive containers received.
5	Green belt area shall be developed along the project and budget earmarked	Proper green belt has been designed with peripheral shelter belt. A separate budget is allotted for plantation. Photos enclosed-Annexure-II
6	A disaster management plan covering emergency evacuation mechanisms etc., to deal with natural disaster events shall be prepared and furnished to the Ministry.	Port Disaster Management Plan covers Berth No. 13 also. (Annexure-III)
7	The Relocation of the fisherman and local communities, if any, in the area shall be done strictly in accordance with the norms prescribed by the State Government. The relocated communities shall be provided with all facilities including health care education, sanitation and livelihood.	There is no displacement of Fisherman and local communities as the project is constructed inside the Custom Bond area, which is in Port custody since 1965
8	The project proponent shall not undertake any destruction of mangroves during construction and operation of the project.	No Mangrove vegetation found in the Project area

Dy. Manager Environment

9	Sewage arising in the Port area shall be disposed off through septic tank- soak pit system or shall be treated along with the industrial effluents to conform to the standards stipulated by Karnataka Pollution Control Board and shall be utilized/re-cycled for gardening, plantation and irritation.	Complied
10	Project proponent shall prepare and regularly update the Disaster Management Plan from time to time.	The Disaster Management plan is updated for once in 5 years regularly as per the template of NDRF.
11	There shall be no withdrawal of ground water in CRZ area, for this project. The proponent shall ensure that as a result of the proposed constructions, ingress of saline water into ground water does not take place. Piezometers shall be installed for regular monitoring for this purpose at appropriate locations on the project site.	The latest DMP update in 2017. Ground water withdrawal is not done in the CRZ area . Water arrangements has been done in the project area through tankers.
12	The project shall not be commissioned till the requisite water supply and electricity to the project are provided by the PWD/Electricity Department.	Complied
13	Specific arrangements for rainwater harvesting shall be made in the project design and the rain water so harvested shall be optimally utilized. Details in this regard shall be furnished to this Ministry's Regional Office at Bangalore within 3 months.	Rain water harvesting is adopted by the Port. Hence the Port is self sufficient in water consumption. Photos enclosed(Annexure-IV)
14	The facilities to be constructed in the CRZ area as part of this project shall be strictly in conformity with the provisions of the CRZ Notification, 1991 as amended subsequently.	Complied
15	No product other than permissible in the Coastal Regulation Zone Notification, 1991 shall be stored in the Coastal Regulation Zone Area.	Complied

General Conditions		
Sl.No	**Conditions**	**Remarks**
1	Construction of the proposed structures shall be undertaken meticulously conforming to the existing Central/local rules and regulations including Coastal Regulation Zone Notification 1991 & its amendments. All the construction designs/drawings relating to the proposed construction activities must have approvals of the concerned State Government Departments/Agencies.	Complied
2	Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees/mangroves and pollution of water and the surroundings.	Complied
3	The project authorities must make necessary arrangements for disposal of solid wastes and for the treatment of effluents, solid wastes and noise level etc. must conform to the standards laid down by the Competent authorities including the Central/State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act,1986, whichever are more stringent.	Solid wastes regularly collected and disposed at MCC designated dumping area and Port does not generate any effluents. Only Domestic effluent is treated in the 1.2 MLD Sewage Treatment Plant Annexure-V
4	The proponents shall provide for a regular monitoring mechanism so as to ensure that the treated effluents conform to the prescribed standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned State/Central officials during their visits.	Complied

5	In order to carry out the environmental monitoring during the operational phase of the project, the project authorities shall provide an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.	NABL accredited laboratory conducted the Environmental Monitoring regularly.
6	The sand dunes and mangroves, if any, on the site shall not be disturbed in any way.	Not Applicable
7	A copy of the clearance letter will be marked to the concerned Panchayat/local NGO, if any, from whom any suggestion/ representation has been received while processing the proposal.	Complied
8	The Karnataka Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tahalshidar's Office for 30 days	Complied
9	The funds earmarked for environmental protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards shall be reported to this Ministry's Regional Office at Bangalore and the State Pollution Control Board	A separate Environmental Funding is allocated for Environmental issues. Rs. 232 Lakhs is spent every year 1. Nursery Maintenance -75 lakhs 2. Maintenance of Garden-86.00lakhs 3. Dust suppression sprinklers- 41.0 Lakhs 4. STP – 30 Lakhs

Dy. Manager Environment

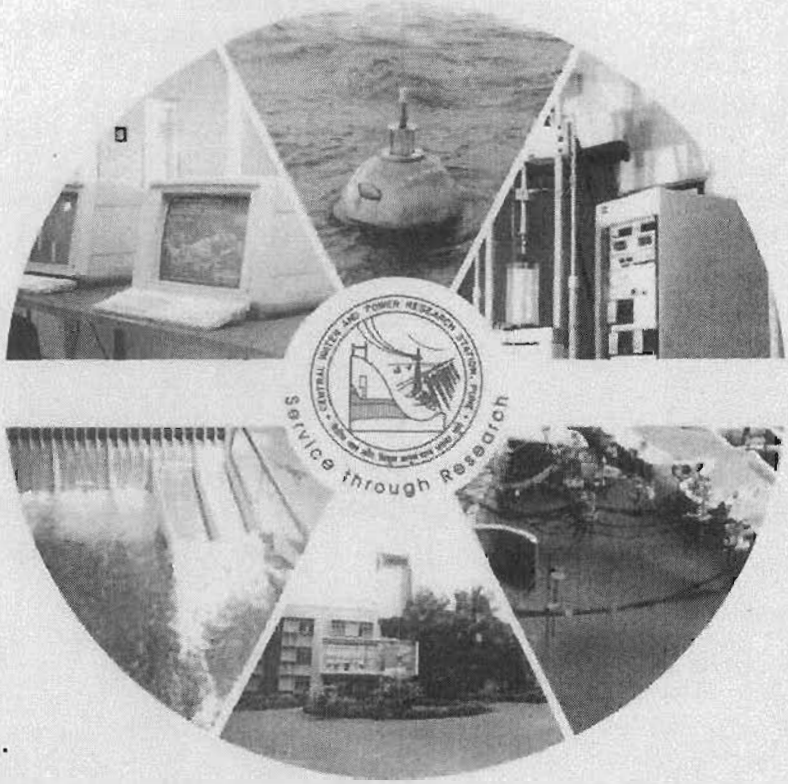
Superintendent Engineer Civil -I

ANNEXURE - I

Government of India
Ministry of Water Resources

भारत सरकार
जल संसाधन मंत्रालय

सत्यमेव जयते



केन्द्रीय जल और विद्युत अनुसंधान शाला

CENTRAL WATER AND POWER RESEARCH STATION

TECHNICAL REPORT NO. 4648
AUGUST 2009

RADIO ACTIVE TRACER STUDIES AT NEW MANGALORE PORT, MANGALORE DURING OCTOBER 2007-JANUARY 2008 AND JANUARY 2009-APRIL 2009

Dr. I.D. GUPTA
DIRECTOR I/c

II copy

Phones : 24103440/24103414
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Website : www.cwprs.gov.in
E-mail : wapis@cwprs.gov.in

GOVERNMENT OF INDIA
Ministry of Water Resources
Central Water & Power Research Station
PO: Khadakwasla Research Station, Pune 411 024

No.101/76/99-PH-II

Dated :

Chief Engineer (Civil)
New Mangalore Port Trust
Panambur, New Mangalore 575 010.

Sub : Report on Radio Active Tracer Studies at New Mangalore Port, Mangalore .-Reg.

Sir,

Enclosed herewith please find two copies of Technical Report No.4648 of August 2009 entitled **"Radio Active Tracer Studies at New Mangalore Port, Mangalore (Oct- 07 to Jan-08 & Jan-09 to Apr-09)"**. The receipt of the same may kindly be acknowledged.

Thanking you,

Yours faithfully,

CNKamethar 17/8/09

(C.N. Kanetkar)
Joint Director

Encl : a/a

CC : Dr. Gursharan Singh
Head, Isotope Applications Division
Outstanding Scientist
Bhabha Atomic Research Centre,
Trombay, Mumbai 400 085.

CC : Director, CWPRS, for kind information
CNK, JD / CRO (PH) / CRO (TC) / Lib. & Info. Officer Gr.I / SRO (PH-II)

FOR OFFICIAL USE ONLY

REPORT DOCUMENTATION SHEET

	Month & Year
Technical Report No.4648	August 2009

Title	Type of Report
	Final
RADIO ACTIVE TRACER STUDIES AT NEW MANGALORE PORT, MANGALORE DURING OCTOBER 2007-JANUARY 2008 AND JANUARY 2009-APRIL 2009	No. of Pages 13

Ports & Harbours Group
Coastal and Offshore Engineering Laboratory
CENTRAL WATER AND POWER RESEARCH STATION
PUNE - 411 024, INDIA.

Sponsoring Authority
Chief Engineer (Civil), New Mangalore Port Trust, Panambur, Mangalore – 575 010.

Key Words
Radio Active Tracer, Dredging, disposal ground, approach channel, break water, littoral drift, siltation, injection apparatus, global positioning system, tracking, half life period, grain size distribution.

Synopsis

This report describes the Radio active tracer studies conducted at New Mangalore Port Mangalore during the period October 2007 to January 2008 and January 2009 to April 2009.These studies were conducted to asses the efficacy of the disposal ground for the dredged material from the approach channel and the harbour basin areas. Earlier no studies were available for this pertinent period. Presently southern side is being used for the disposing the dredged material.

The annual maintenance dredging is generally carried between October to January every year hence the selected period of study has been chosen for deciding about the location of the disposal ground for this material. Two separate studies were conducted to cover a period of about six months by injecting Scandium-46(half -life 84 days). A site on the Northern side of the existing approach channel was selected for the injection of the tracer material.

The tracking of the tracer indicated that the movement of the bed material is predominantly towards North-West from October to January. Hence this location is suitable for disposing the maintenance dredging material during this period. It is suggested to carry out maintenance dredging from October and complete within a period of about 2 months which will ensure the movement of dumped material away from port approach channel and harbour basin. The tracking results during February and April indicated the spread of material along northwest and southeast directions. It is also suggested to spread the material over a larger area while dumping which will avoid progressive shallowing of the contours in the vicinity and the same can be ensured by carrying out periodical sounding in this area. In the absence of the current data near the port area, it is also suggested to collect current data at suitable locations.

PREFACE

New Mangalore Port authorities have proposals to expand the port facilities for accommodating deeper draft vessels to cater to the increasing traffic. The widening and deepening of approach channel to cater to bigger vessels is anticipated to enhance the annual maintenance dredging quantity which is a recurring cost to the port exchequer In the absence of Radio Active Tracer studies for the period October to April, which is the pertinent period during which maintenance and capital dredging generally carried out, CWPRS have suggested Radio Active Tracer studies to identify the efficacy of the disposal ground for the dredged material during this period. Accordingly two radio active tracer studies were conducted from October 2007 to January 2008 and January 2009 to April 2009 using Scandium 46 as the tracer material with a half life period of 84 days. The studies were undertaken under the guidance of Shri U.V. Purandare, then Additional Director. Shri C.N. Kanetkar is the Joint Director during these studies. V.B. Joshi was the Chief Research Officer during first study and Shri T. Nagendra was Chief Research Officer during second study and they were responsible for the studies. Shri H.B. Jagadeesh, Senior Research Officer carried out the studies with the assistance of Shri A.S. Chalawadi, Research Assistant and Shri B.K. Girish, Research Assistant during the studies. Shri M. Phani Kumar, Research Officer was also associated with the studies. Staff members of Ports and Harbours Group assisted in the studies and preparation of the report. Shri V.K. Tripathi, Senior Research Officer and Executive Engineer (Mechanical) and his technical staff have carried out fabrication of injection apparatus and participated in the studies during the injection tracer to the sea bed.

These studies were conducted in collaboration with Bhabha Atomic Research Centre (BARC), Mumbai. The logistic supports were provided by New Mangalore Port Trust under the guidance of Shri M.R. Headoo, Chief Engineer (Civil).

Smt. V.M. Bendre was the Director of CWPRS during the course of studies and Dr I.D. Gupta is the Director-in-charge at the time of preparation of the report.

RADIO ACTIVE TRACER STUDIES AT NEW MANGALORE PORT, MANGALORE DURING OCTOBER 2007-JANUARY 2008 AND JANUARY 2009-APRIL 2009

TECHNICAL REPORT NO.4648 AUGUST 2009

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TECHNICAL REPORT NO.4648 AUGUST 2009

SUMMARY

New Mangalore Port, one of the major ports, is an artificially developed lagoon type of port located on the West Coast of India in Karnataka State. The port facilities have been developed over last four decades or more in stages to cater to increased traffic and to accommodate larger size of vessels.

At present the depth of the approach channel is 15.4 MCD and bottom width is 245m. The port has proposals to further deepen and widen the approach channel and lagoon. It is observed that with the increase in depth and width of approach channel, the quantity of maintenance dredging will also increase. Maintenance dredging being a recurring expense for the port exchequer, any further developments of the port will have an important bearing on the port's financial feasibility.

In order to specify suitable disposal site during the period of maintenance dredging (October to January), CWPRS has suggested for Radio Active Tracer (RAT) studies for this period and as well for period from January to April since most of capital dredging also takes place during these periods. Therefore, two RAT studies were conducted one from October 2007 to January 2008 and second from January 2009 to April 2009 to investigate the movement of the bed material at the proposed dumping ground for the port developments. The injection point selected was about 6 km northern side of the approach channel at a depth of about 24 to 25m. The study from October to January indicated that the movement of the bed material is predominantly towards North West for all the four trackings during the above period and the average velocity of transport was 2.7m/day.

The study from January to April indicated that the movement of the bed material is predominantly north during first tracking i.e. during January 2009, during second tracking (February 2009) the bed material did not appreciably move

northwards, whereas some traces of spread was noticed on the southeastern side but the extent of spread was less. During the third tracking (April 2009) as well, no appreciable spread was noticed on northwestern or southeastern side of the injection point.

The tracking of the tracer indicted that the movement of the bed material is predominantly towards North-West during October to January. Hence, this location is suggested for disposing the maintenance dredging material during this period. It is desirable to carry out maintenance dredging from October and complete within a period of about 2 months which will ensure the movement of dumped material away from port approach channel and harbour basin. The tracking results during February and April indicated the spread of material along northwest and southeast directions. It is also suggested to spread the material over a larger area while dumping which will avoid progressive shallowing of the contours in the vicinity and the same can be ensured by carrying out periodical sounding in this area. In the absence of data on currents near the port area, it is also suggested to collect this data at suitable locations.

RADIO ACTIVE TRACER STUDIES AT NEW MANGALORE PORT, MANGALORE DURING OCTOBER 2007 – JANUARY 2008 AND JANUARY 2009-APRIL 2009

TECHNICAL REPORT NO.4648 AUGUST 2009

1.0 INTRODUCTION

New Mangalore Port, located on the west coast of India in Karnataka State is an artificially developed lagoon type of port (Fig 1). It is one of the major all weather ports of India. The port facilities have been developed over last four decades in stages to cater to increased traffic and to accommodate progressively larger size of vessels. The port layout comprises two breakwaters flanking the entrance, of length 770m each which was extended in three stages. The port approach channel is aligned along 259° N almost parallel to sea bed contours to optimize its length. Even though the approach channel is open to the most critical wave direction off the Mangalore coast during the southwest monsoon season, the harbour basin remains tranquil throughout the year. This has been possible due to natural wave attenuation in the approach channel due to the transmission of wave energy laterally across the side slopes of the channel due to refraction and internal diffraction.

The present length of the approach channel is about 7.5km from the port lagoon entrance and the channel is dredged to depth -15.4m below CD while the lagoon is dredged to -15.1m. Due to large siltation during SW monsoon every year at entrance of the port, the length of channel was required to be extended significantly for each stage of development to reach the natural contours corresponding to the desired depths. During the stage I (-9.5m draft) the length of approach channel was required to be extended upto 3200m in 1975 though it was identified as 2870m in 1968. For stage II (-13.5m) the length was extended to upto 6250m against initially identified lengths of 4800m in 1976. Even for the present stage approach channel (-15.4m), the length is varying around 7500m with an increasing trend year after year.

Even though the port basin was developed on sandy beach, the major portion of channel is located on silty bed. Though the littoral drift from adjacent beaches is minimal, considerable siltation takes place in the approach channel and the port basin

during SW monsoon season due to deposition of suspended sediments with the coastal and tidal currents crossing the channel. It is noticed that the average depth of siltation in the approach channel is proportional to the depth of channel. For first stage, it was about 1.0 – 1.5m (approach channel 10.7m CD) and it has increased to about 2.5m during third stage (approach channel 15.4m depth). Thus due to increased depth of siltation in approach channel and increased length of approach channel with stagewise developments the quantity of maintenance dredging has also increased considerably. Since the cost of recurring maintenance dredging is also increasing, particularly for deep draft requirements, this will be a major factor for the feasibility of future developments.

In the past during I stage to III stage developments of the port, when the approach channel was deepened and lengthened the disposal ground was also shifted in the offshore direction. The disposal of the dredged material on the south side of the approach channel was always resorted to, based on the Radio Active Tracer (RAT) studies conducted during 1991-92. Shifting of the disposal ground further west for the now proposed developments is likely to enhance haulage distance for both capital and maintenance dredging operations. Earlier RAT studies were carried out at this port in April 1967 and October 1971 to identify suitable dumping ground for capital dredging material. The dumping ground evolved was located at 9 km from shore on the southern side of the approach channel (Fig.2). Further, to assess the suitability of dumping ground for different developments RAT studies were conducted during 1991 and 1992. During April 1991, considering the very fine nature of the dredging material (D_{50} = 13 microns) activated Scandium Chloride in liquid form was used to prepare injection material. However, due to a number of reasons, the tracer material could not be tracked and data were not available to obtain any valid conclusions. It was, therefore, decided to repeat the same studies during May 1992 by injecting a solid tracer material activated Scandium 46, as an artificially crushed glass particles simulated to the size distribution curve of dredged sample, deleting the finer portion below 40 microns and a tracer with D_{50} of 60 microns was used. After the injection of tracer in May 92, the immediate subsequent trackings gave useful results giving an indication of the dispersion of dredged material. However, during subsequent tracking in September 92, no useful data were available. The results of May 92 tracking indicated a tendency for movement of bed material south direction.

However, it was concluded that no definite indication of the movement was possible in the absence of further tracking data. After these studies, it was indicated to the project authorities that since the tracking results did not yield any conclusive trend regarding the actual movement of materials alternative methods such as analysis of sounding surveys around dumping areas in post monsoon and pre monsoon etc. may be useful to conclude the suitability of the dumping area on the southern side of the approach channel.

For the further developments viz., deep draft berth, western dock arm etc it is required to carry out capital dredging and it is anticipated that the quantity of maintenance dredging will further enhance with further widening and deepening of the channel to cater to the deeper drafts. For optimising the cost of capital and maintenance dredging CWPRS suggested RAT studies to identify the disposal ground for the dredged materials (Tech. Report No.4076, February 2004). The present report describes the RAT studies conducted at New Mangalore Port by CWPRS in collaboration with Bhabha Atomic Research Centre (BARC), Mumbai, for the period October 2007 to January 2008 and January 2009 to April 2009.

2.0 STUDY METHODOLOGY

The study method mainly comprises the following activities:

1. Preliminary off field preparations
2. Field studies
3. Plotting and analysis of tracking data

2.1 Preliminary off field preparation comprises:

1. Selection of grain size distribution
2. Selection and preparation of radio active tracer material

2.1.1 Selection of grain size distribution

From the results of analysis of sea bed samples from New Mangalore Port region and by considering the experience of the previous tracer studies conducted at New Mangalore Port during 1991-92, it was decided to use a coarser material ranging between 60 μ and 100 μ for the present studies. The finer part was deleted since

using of such finer material will keep the tracer material in suspension and will not settle on the sea bed and hence the tracking of bed material is not possible during the course of the experiment.

From the analysis of various soil samples received from the New Mangalore Port authority, a sample in the region near the lee side of north breakwater (about 1 km from shoreline) indicated about 96% of fine sand. Since this sample is in the region of approach channel and is a part of dredged material to be disposed off, it was decided to adopt the grain size distribution curve of this sample for preparing the tracer material. The selected grain size was passing through 100 μ and retained on 60μ.

2.1.2 Selection and preparation of radio active tracer material

The tracer material should have the same transport characteristics as the sediment insitu, the specific gravity, grain size distribution and nature of surface of the tracer particles should be similar to the corresponding properties of the sediments. Other considerations governing the choice of tracer material were

a) It should have half life long enough the remain traceable for a considerable duration, and
b) It should emit sufficiently hard gamma rays.

Scandium 46 with a half life of 84 days, emitting two kinds of gamma energies 0.887 Mev, 1.12 Mev in the form of Scandium glass powder was selected as the tracer for the present studies.

The details of preparation of tracer in the glass matrix form are given by BARC in their report dated July 2009.

2.2 Field studies

It comprises of mainly:

1. Background survey (pre injection tracking)
2. Injection of the tracer to the sea bed
3. Post injection trackings

2.2.1 Background survey (pre injection tracking)

In order to know the natural background radiation in the study area extensive background survey was carried out using a water proof Scintillation Detector. The detector mounted on an iron sledge, connected to a rate meter was dragged on the sea bed at a speed of about 1.0 knots. Sufficient care need to be exercised to maintain the speed of the vessel. At higher speed the sledge gets lifted up from sea bed thus radiation cannot be detected. At lower speed it is difficult to manoeuvr on the required grid line. Radiation intensity was recorded at discrete locations by fixing the location of detector by global positioning system available in the Varati tug, which was made available for the studies all the time. The natural background observed during the present studies ranged from 1500 – 2000 cpm (counts / minute)

2.2.2 Injection of the tracer material to the sea bed

The tracer material transported in a lead container was mixed with dry sand about 5 kg of grain size passing 100 μ and retained on 60μ. An injection apparatus fabricated at CWPRS was used for this purpose. Mock tests were also conducted before actual injection. Staff members from BARC took all necessary precautions to avoid any untoward incidence and also to minimize the chances of unnecessary exposure to radiation.

The injection apparatus used for releasing the radio tracer were disposed off by dumping at a place about 3 to 4 km from injection spit towards sea side at deeper contours.

2.2.3. Post injection tracking

After the injection of tracer material to the sea bed, tracking were carried out at suitable frequent intervals of time to know the extent and direction of the spread of the tracer material. Generally, the first post injection tracking is carried out immediately on the next day after injection of the tracer material. Second tracking was done after about one month and subsequent tracking frequency were decided based on the result of the previous tracking. During the process of tracking the sledge connected with water proof detector is lowered on to the sea bed from the tug near the injection point and dragged on the seabed carefully at a speed of about 1.0-1.5 knots.

The readings in the rate meter, the position of detector by G.P.S. are noted down simultaneously. This process is continued on pre-determined grid lines at suitable intervals and readings are noted for discrete locations. The recording of readings will be continued along a grid lines till the time the rate meter starts showing background radiation values. Similarly, the recordings of radiation are done around the injection point. Sufficient care need to be taken to cover all the area around the injection point and also care need to be exercised for smooth manoeuvring of the vessel at the required speed of 1.0-1.5 knots. At greater speed the chances that the sledge lifts above sea bed resulting in non detection of the tracer exists.

2.3 Plotting and analysis of tracking data

The tracer radiations were recorded at discrete locations during each tracking and corrected for the natural background radiation level obtained during the background survey. Using the corrected data, the radiation decay and isocount contours are plotted. From these data transport velocity, thickness and rate can be calculated. Based on these results suitability of the site for dumping the dredged material at the given period is decided.

3.0 CURRENT MEASUREMENT

In the absence of data on currents in the vicinity of New Mangalore Port area, an attempt was made to measure the sea currents at two locations. Valeport current meter was used for this purpose and measurements were made for two days on 23rd and 24th of October 2007 during the injection of tracer for the first study.

Current measurements were taken near the injection point on 23.10.2007 over three depths from the Varati tug viz. 10m, 15m and 20m. At 10m depth, the current magnitude was ranging from 0.35 to 0.40 m/s, direction around 210° N. At 15m depth it was 0.25 m/s and 150° N, and at 20m depth it was about 0.55 m/s and 200° N. These values are only approximate since it was very difficult to anchor the tug at the desired point during the course of measurements.

At point C-1 (Fig.2) current measurements were taken by deploying Valeport current meter from a survey vessel. Measurements were taken on 23rd October 2007 and 24th October 2007. Magnitude and directions of current was observed over the

vertical at an interval of 2m starting from 2m upto 10m. Details of the current measurements are as below:

Date of measurement : 24.10.2007 (08-57 Hrs.) **H.W. + 1.50m**
24.10.2007 (15-19 Hrs.) **L.W. + 0.25m**

Depth in m	Average Current m/s	Mean Direction	Average Salinity ppm
2.0	0.1	350° N	32.30
4.0	0.14	350° N	32.90
6.0	0.12	300° N	33.20
8.0	0.20	295° N	33.55
10.0	0.28	290° N	33.95

During the course of measurement, the anchoring of the survey vessel was found to be difficult and the vessel continuously drifted from the point of initial measurements. Hence, these values are only representative in nature. Since proper data on currents is not available in the vicinity of the port, it is suggested to measure the currents by anchoring the currentmeters at suitable locations. It is also suggested to carry out drogue observations over different depths (with drogue vanes at mid depth and 1m above sea bed) at some suitable selected locations. These observations will be very useful in identifying the prevailing direction and magnitude of the currents at these locations.

The ocean surface circulation on the west coast of India near Mangalore region indicates that the currents are towards northerly direction from October to January (Fig.3).

4.0 FIRST STUDY (OCTOBER 2007 TO JANUARY 2008)

Following Table shows the details of various activities during the first study:

TABLE – I (a)

DATE	ACTIVITY CONDUCTED
23/10/2007	Background survey
24/10/2007	Tracer injection to sea bed
25/10/2007	First post injection tracking
14/11/2007	Second post injection tracking
18/11/2007	Third post injection tracking
23/01/2008	Fourth post injection tracking

TABLE – I (b)

First study

Tracking No.	Days after Injection	Location of C.G (m)	Activity Spread N ($cpm.m^2$)	% Activity recovered	V (m/d)	E (cm)	Q (T/d/m)
1	1	182	2.92×10^{10}	91% (7.3 Ci)	182	1.2	3.27
2	20	665	2.8×10^{10}	87% (7.0 Ci)	25	1.7	0.63
3	53	611	2.8×10^{10}	87% (7.0 Ci)	8.2	1.7	0.21
4	90	802	2.6×10^{10}	81% (6.5 Ci)	6.8	2.5	0.26

** Source : BARC Report*

The background survey conducted on 23.10.2007 at the study area indicated a natural background radiation in the range 1500-2000 cpm. On 24.10.2007 the radio active tracer Scandium 46, 8 Ci was injected at injection point (Lat. 15^0 57.567^0 N and Long. 74^0 41.685^0 E).

The isocount contours and transport diagram for the first post injection tracking conducted on 25.10.2007 is as shown in Fig.4 and Table I (b). The percentage of activity recovered was 91% (7.3Ci), velocity of movement was 182 m/d. The general direction of movement of tracer was predominantly towards west.

During the second post injection tracking, the general movement of the tracer was towards northwest direction (Fig.5). The percentage of activity recovered was about 87% (7.0 Ci). Velocity of movement was 25m/day, transport thickness of 1.7cm and transport rate was 0.63 tonnes / day / m.

In the third post injection tracking, the predominant movement of the tracer was north northwest (Fig.6). The activity recovered was about 87% (7.0 Ci). Velocity of transport was 8.2 m/day, transport thickness was 1.7cm and rate of sediment transport works out to above 0.21 tonnes day/m.

The fourth post injection tracking also showed that the movement of tracer was predominantly towards north northwest direction (Fig.7). The quantity of activity recovered was about 81% (6.5 Ci), velocity of transport was 6.8 m/day transport thickness was 2.5cm and quantity was 0.26 T/d/m.

Overall, the tracking results indicated that during the period October to January, the bed sediment movement is predominantly towards North northwest with an average velocity of about 7.5m/day. The activity recovery percentage varied from 91% during first tracking, 87% during second and third tracking, 81% during the fourth tracking which is an indication of successful extensive tracking of the activity spread. The transport diagram for all these trackings is shown in Fig 8.

5.0 SECOND STUDY (JANUARY 2009 TO APRIL 2009)

The list of study activities are given in the Table below:

TABLE – II (a)

SL.NO.	DATE	ACTIVITY CONDUCTED
1	20/01/2009	Background survey and injection of the tracer material
2	21/01/2009	First post injection tracking
3	24-25/02/2009	Second post injection tracking
4	15-16/04/2009	Third post injection tracking

TABLE – II (b)

Second study

Tracking No.	Days after Injection	Location of C.G (m)	Activity Spread N (cpm.m^2)	% Activity recovered	V (m/d)	E (cm)	Q (T/d/m)
1	1	170	1.80×10^{10}	99% (4.5 Ci)	170	1.35	3.39
2	33	495	1.38×10^{10}	72% (3.6 Ci)	10	4.2	0.63
3	84	487	1.36×10^{10}	52% (2.59 Ci)	3.8	6.4	0.36

** Source : BARC Report*

The background survey indicated natural background radiation of about 1500-2000 cpm. On 20.01.2009 the radio active tracer, Scandium 46 5 Ci was successfully injected at the injection point (Lat. 15^0 57.567^0 N and Long. 74^0 41.685^0 E).

First post injection tracking was conducted on 21-22 January 2009. The isocount contours for this tracking is shown in Fig 9. The direction of the movement of tracer was predominantly towards northwest direction. About 90% of activity was recovered during first tracking and loss of small fraction of radio tracer may be due to saturation limit of radiation detector.

During the second post injection tracking it was noticed that the tracer predominantly moves towards northwest and southeast direction (Fig 10). The spread in northwest direction was about 900m and in southeast direction it was about 600m from injection point. About 72% (3.6 Ci) of the radio tracer was recovered during this tracking the loss of activity may be attributed to the burial of the tracer. Velocity of movement was about 10m/day, transport thickness 6.4 cm and rate of transport was 0.63 T/d/m.

During the third post injection tracking it was the isocount contour (Fig.11) indicates that the movement of the activity is towards northwest and southeast directions. About 52% (2.59 Ci) of activity was recovered during this tracking. The reason for low recovery of activity during this tracking may be attributed to significant burial of radiotracer and inadequate tracking due to bad weather conditions. Velocity of movement was 3.8 m/day, transport thickness was 6.4 cm and rate of transport was 0.36 T/d/m. The transport diagram for all these trackings is shown in Fig.12.

6.0 DISCUSSIONS

The radio active tracer studies conducted during the periods October – January and January – April were successful. In the absence of RAT studies for these periods earlier, this study results will be very helpful in deciding about the dumping of dredged material during these period. At New Mangalore Port region the sea bed contours are parallel to the coastline. Since the proposed dumping ground is at a sufficient depth (24-25m), it is anticipated that at these regions the bed movement

direction is same either on southern or on the northern side of the port approach channel. The ocean surface circulation on the Indian coast shows a northerly current for the period October to January. Hence an injection point on the northern side of the existing port approach channel at a depth of about -24m was selected for these studies. Also at present, southern region is being used for dumping the maintenance dredging material and this will lead to burial of the tracer material during the course of studies which in-turn will adversely affect the post injection trackings.

While choosing the particle size for the tracer material fine fractions were deleted purposely based on the earlier experience of tracer studies at this site. Use of fine material makes the material to remain in suspension hence much of the activity will be lost which will lead to low recovery of activity during the course of post injection trackings. Since the selected particle size distribution is courser it is anticipated that the movement of the material dumped at this location will be faster than the actual measured velocity during the course of these studies.

The studies indicated that the seabed sediment movement is towards northwesterly direction from October to January. Hence the region on the northern side of approach channel is suitable for the dumping of maintenance dredging material which is generally carried out during this period. It is suggested to dump the dredged material over a wide area so that this will avoid local shallowing due to the material dumped. It is also necessary to carry out periodical sounding of the dumping ground to ascertain that the material dumped disperses away from the port approach channel and there is no progressive shallowing of the contours in the vicinity. From the periodical surveys of the approach channel it is observed that most of the siltation takes place during monsoon season viz., from June to September. It is suggested that the annual maintenance dredging may be undertaken from October and completed within a period of two months. This will ensure that the material dumped during this period clearly moves north westerly region i.e. away from the approach channel as seen from the RAT study results.

The dredged material dumped will be in a loose state as compared to natural sea bed material. Thus the dumped material has a tendency to move and spread. Thus the material dumped on the southern side of the approach channel may enter the approach channel region during monsoon season since the waves are predominant

from southwest and west directions during this period. Hence, the disposal of dredged material on the northern side of approach channel will be more advantageous. During the monsoon season, any movement of this dumped material will be away from the approach channel and harbour basin hence the chances of dredged material re-entering the channel and basin are remote. This may reduce the annual maintenance dredging quantity of the port in the years to come.

Since the movement of the sea bed material is observed to be north and northwesterly direction from October-January, the disposal ground need not be shifted westwards for the future developments like deepening of approach channel. Before resorting to northern dumping ground, it is suggested to carryout detailed hydrographic survey of the region around the suggested disposal area covering about 3 km x 3 km and suitable marker buoys may be installed for the disposal ground. In the absence of the availability of the data on currents in the port vicinity, it is suggested to measure currents by anchoring currentmeters at suitable locations and also by making few drogue observations.

7.0 CONCLUSIONS

1. The RAT studies conducted at New Mangalore Port region for the period covering October – April was successful.

2. Since no RAT studies were conducted earlier for this period, the results of the present studies will be helpful in deciding about the dumping of dredged material during these periods.

3. From results of the studies, it is suggested to dump the dredged material from October – January on the northern side of the port approach channel.

4. Since the annual maintenance dredging in the port takes place from October, it is suggested to dump maintenance dredged material on the northern region.

5. To ensure northerly dispersal of the dumped material away from port approach channel during maintenance dredging it is suggested to undertake the maintenance dredging from October and complete within a period of about two months.

6. For future developments of port like deepening of approach channel, there is no need to shift the dumping ground seawards.

7. Before resorting to northern dumping ground, it is suggested to carry out detailed hydrographic survey of the proposed dumping ground, monitoring of the dumping ground by periodical survey is also suggested to ensure no progressive shallowing of the region around this region.

8. It is also suggested to collect current data near the port vicinity since no current data is available at present.

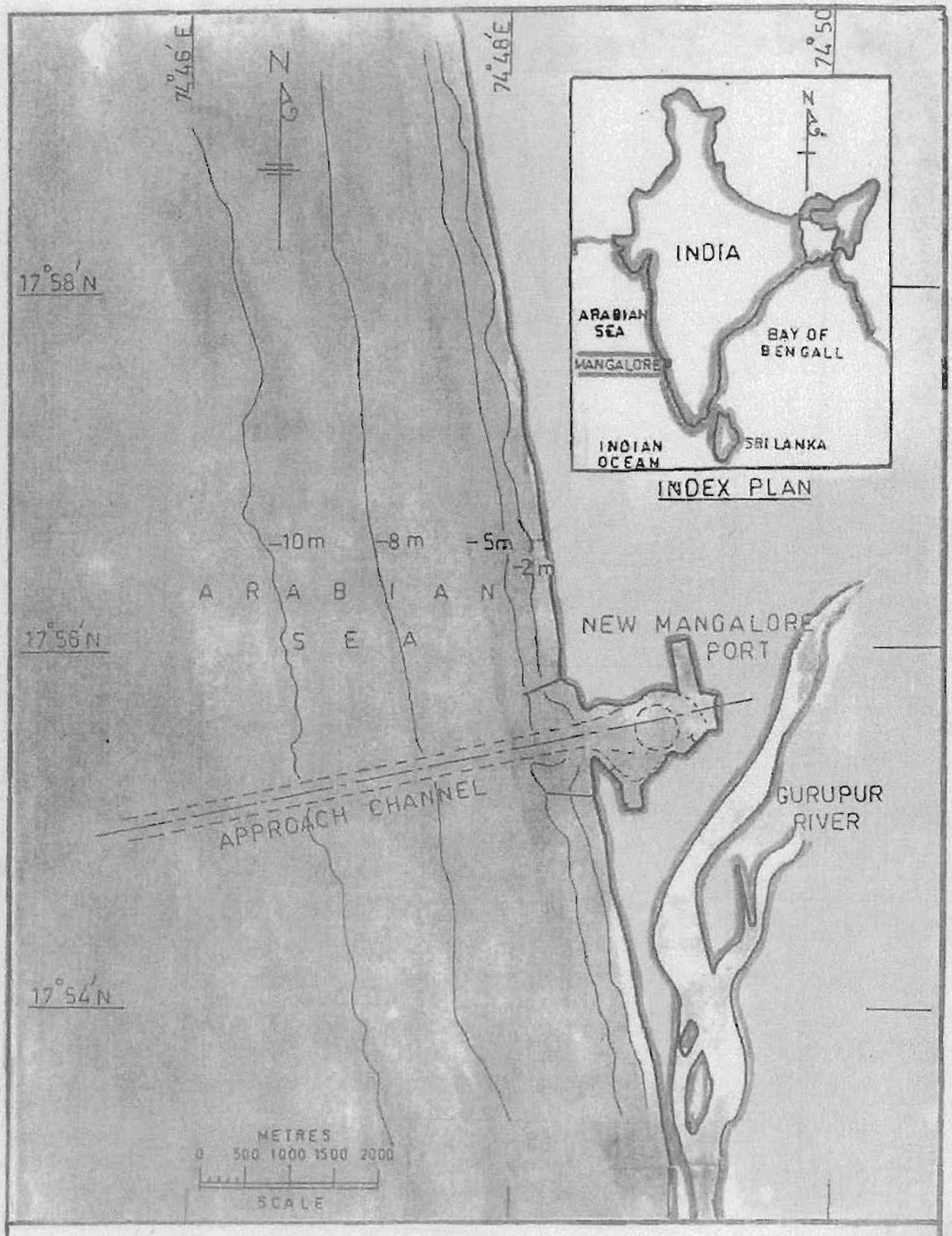


FIG: 1 LOCATION PLAN FOR NEW MANGALORE PORT

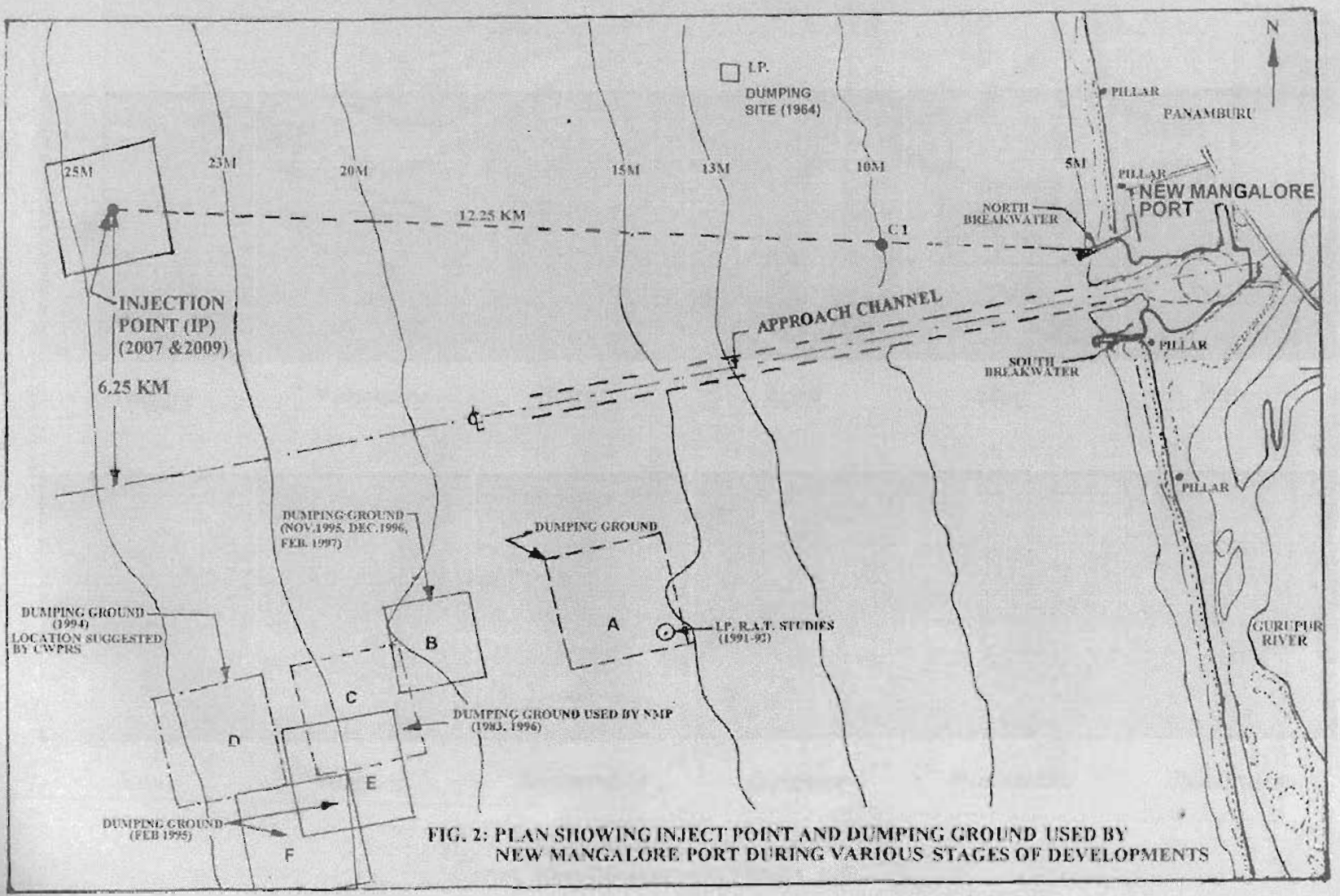


FIG. 2: PLAN SHOWING INJECT POINT AND DUMPING GROUND USED BY NEW MANGALORE PORT DURING VARIOUS STAGES OF DEVELOPMENTS

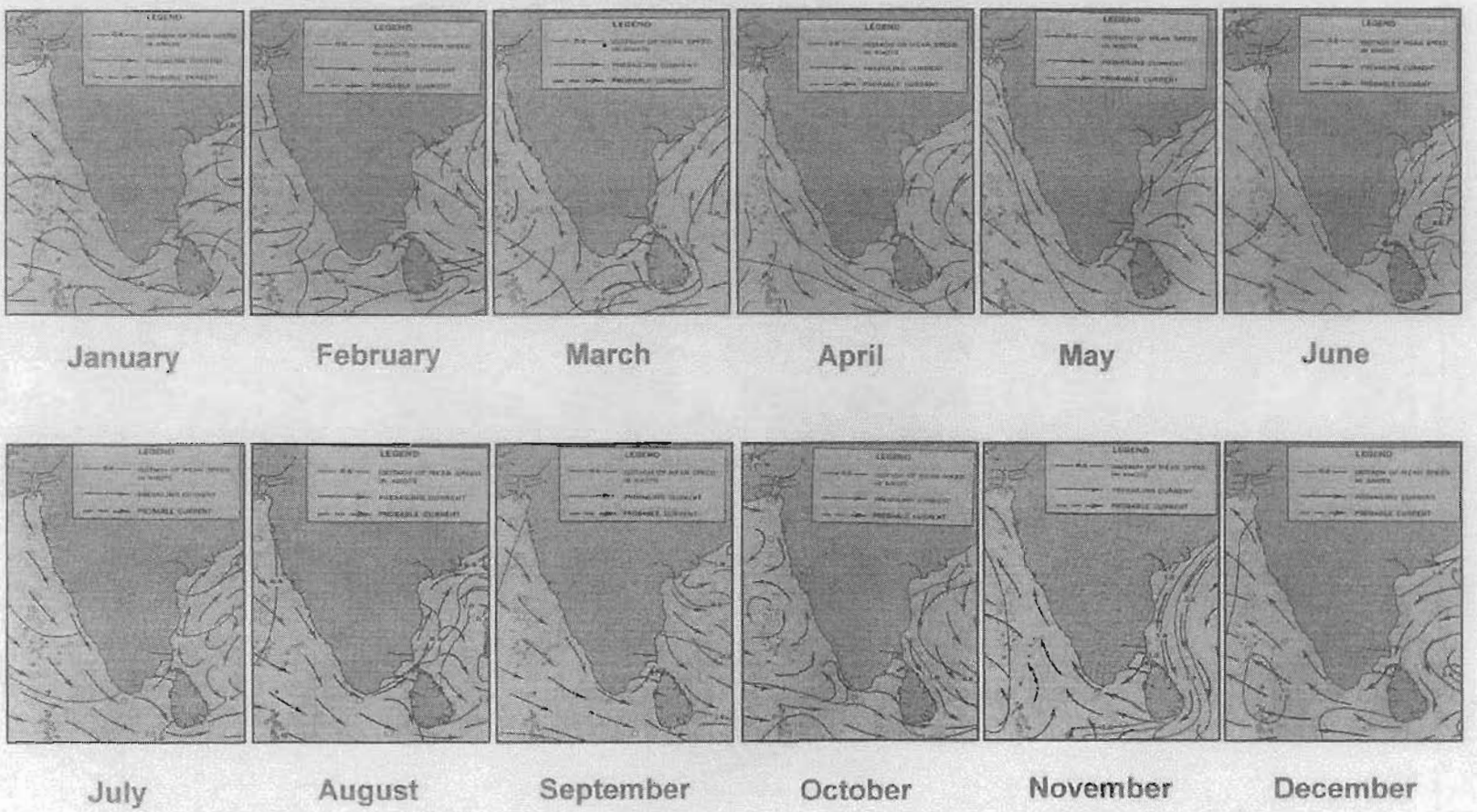


Fig. 3 Ocean surface circulation on Indian coast
(Ref. West Coast of India Pilot Ed. 1967)

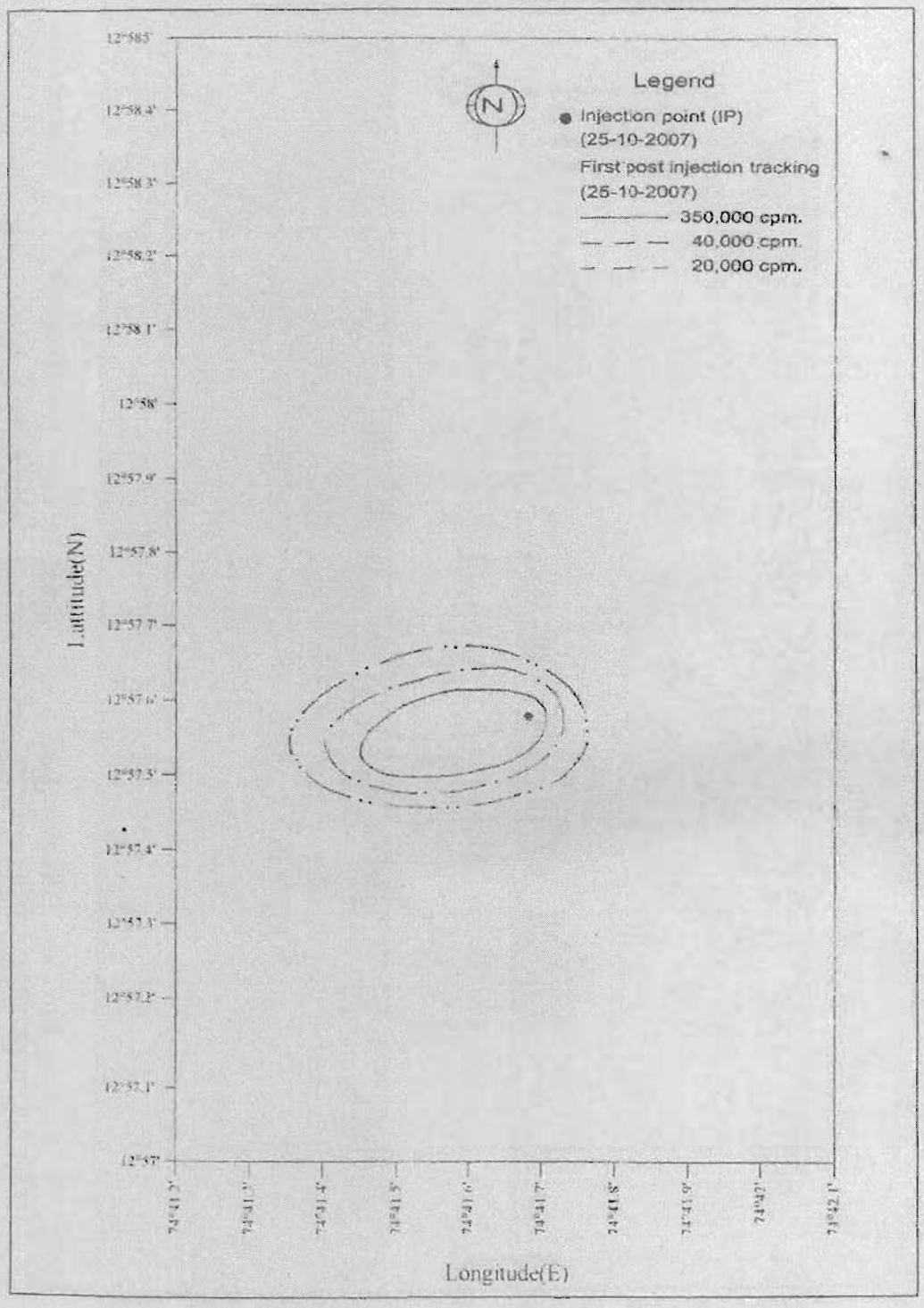


Fig. 4. Isocount contours of first post injection tracking (Investigation 1)

(Source: BARC Report)

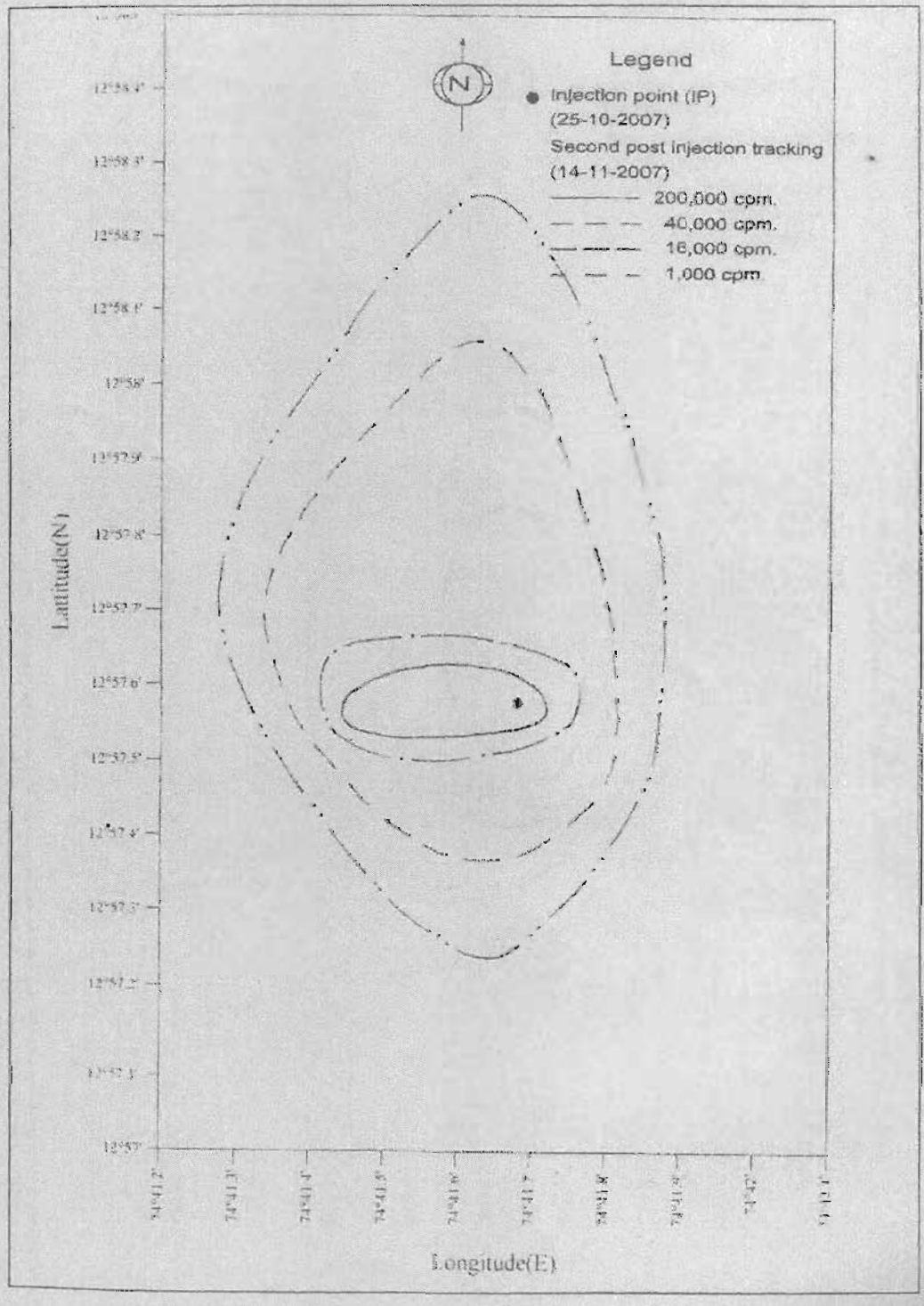


Fig. 5. Isocount contours of second post injection tracking (Investigation 1)
(Source: BARC Report)

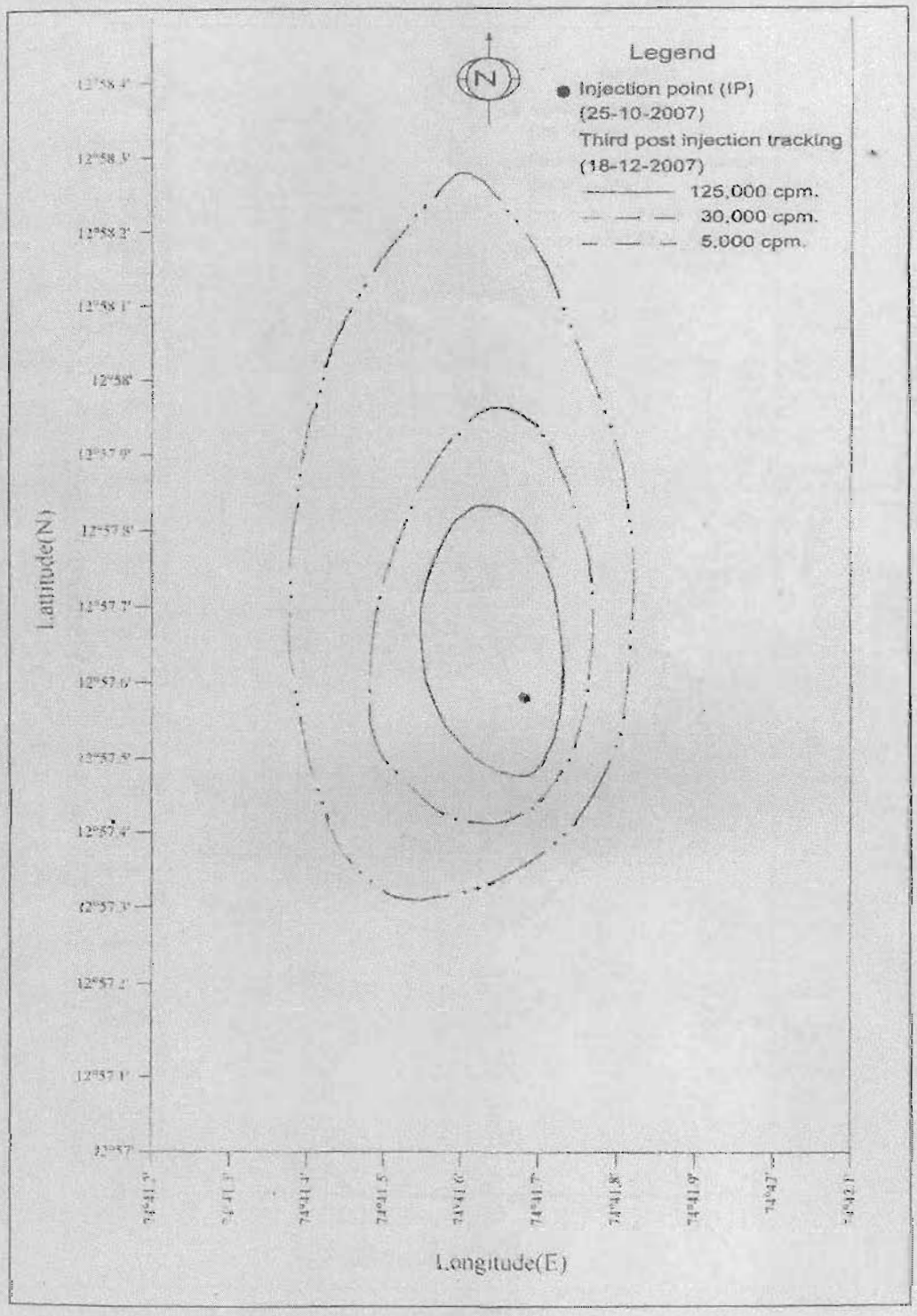


Fig. 6 : Isocount contours of Third post injection tracking (Investigation 1)

(Source: BARC Report)

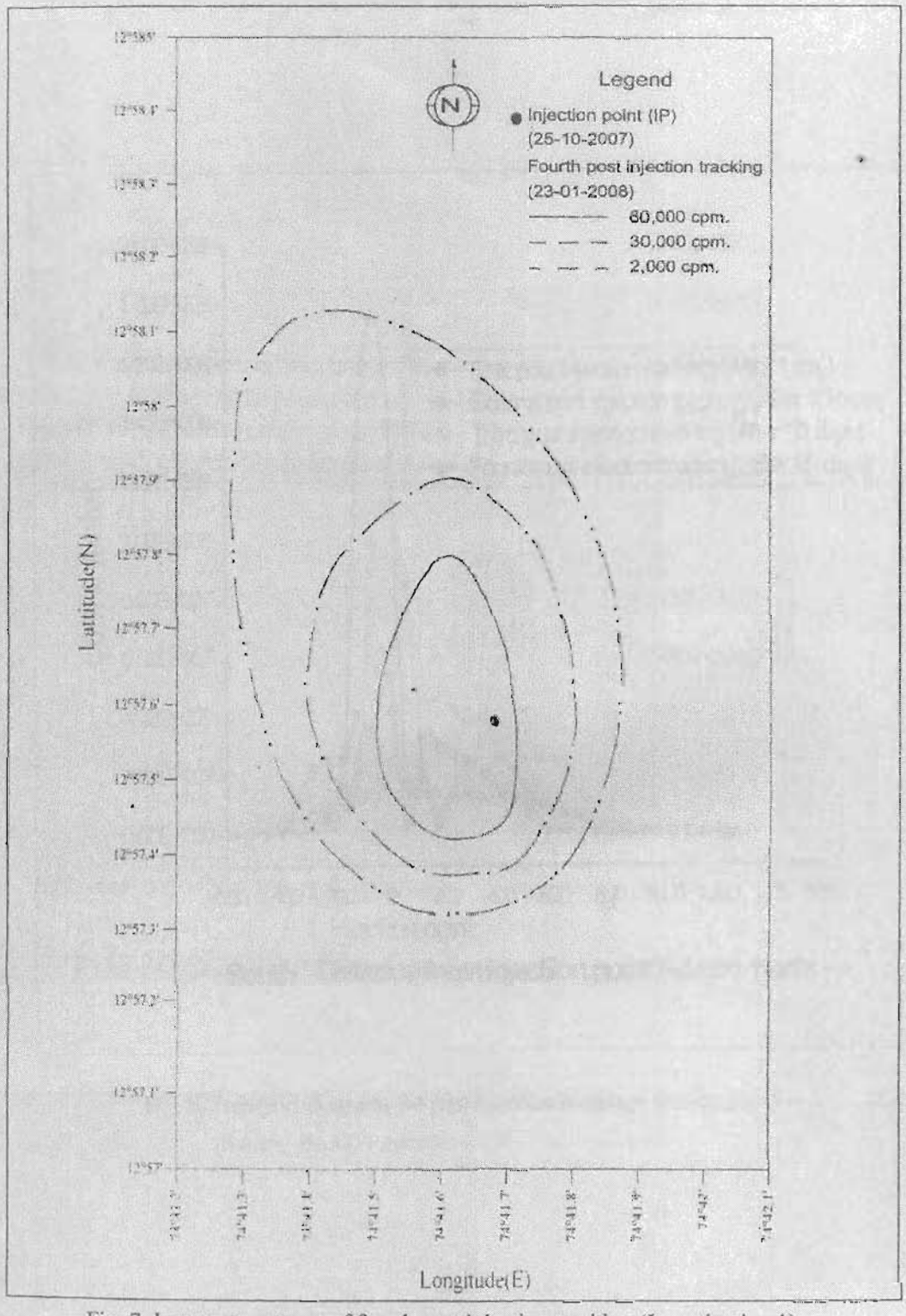


Fig. 7. Isocount contours of fourth post injection tracking (Investigation 1)
(Source: BARC Report)

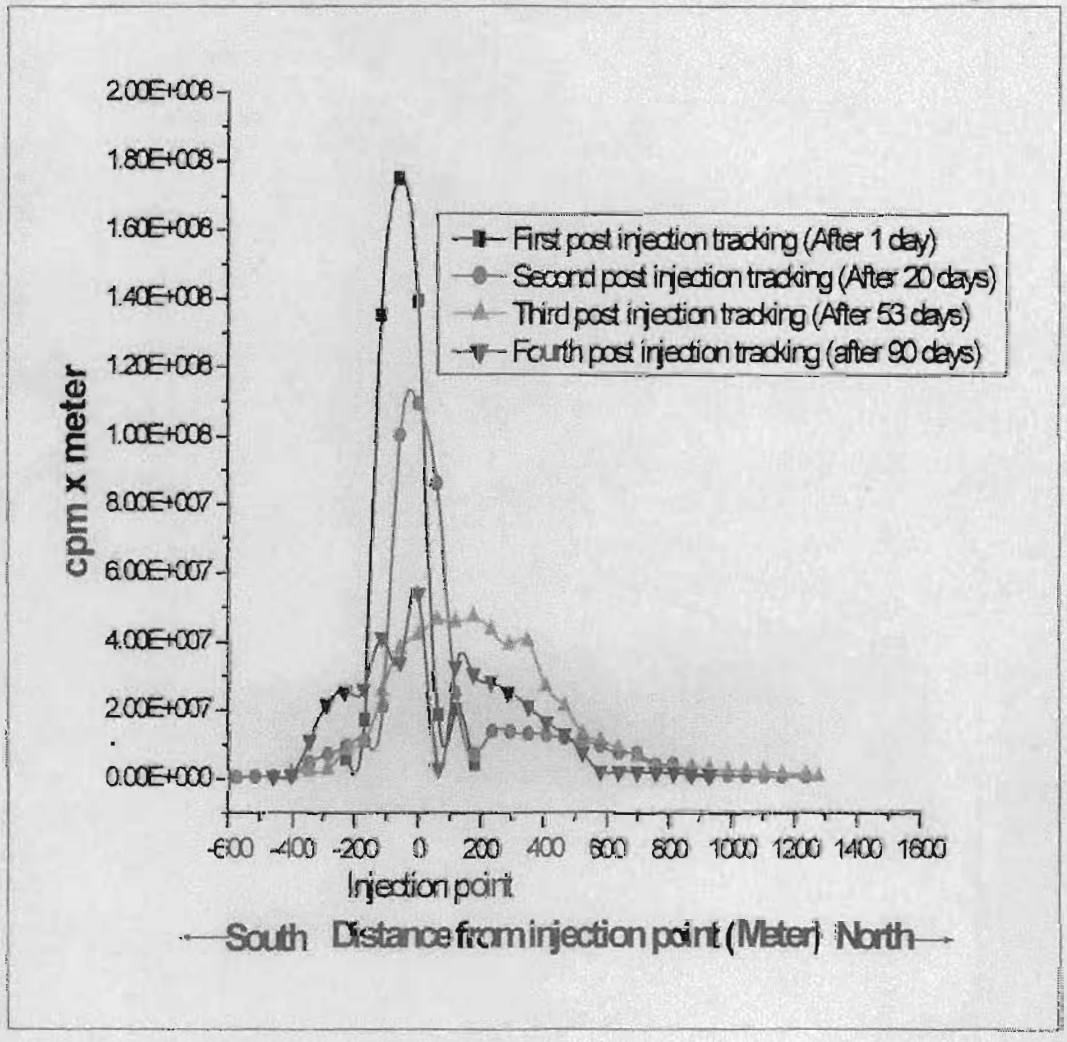


Fig. 8. Transport diagrams for post injection trackings (Investigation 1)

(Source: BARC Report)

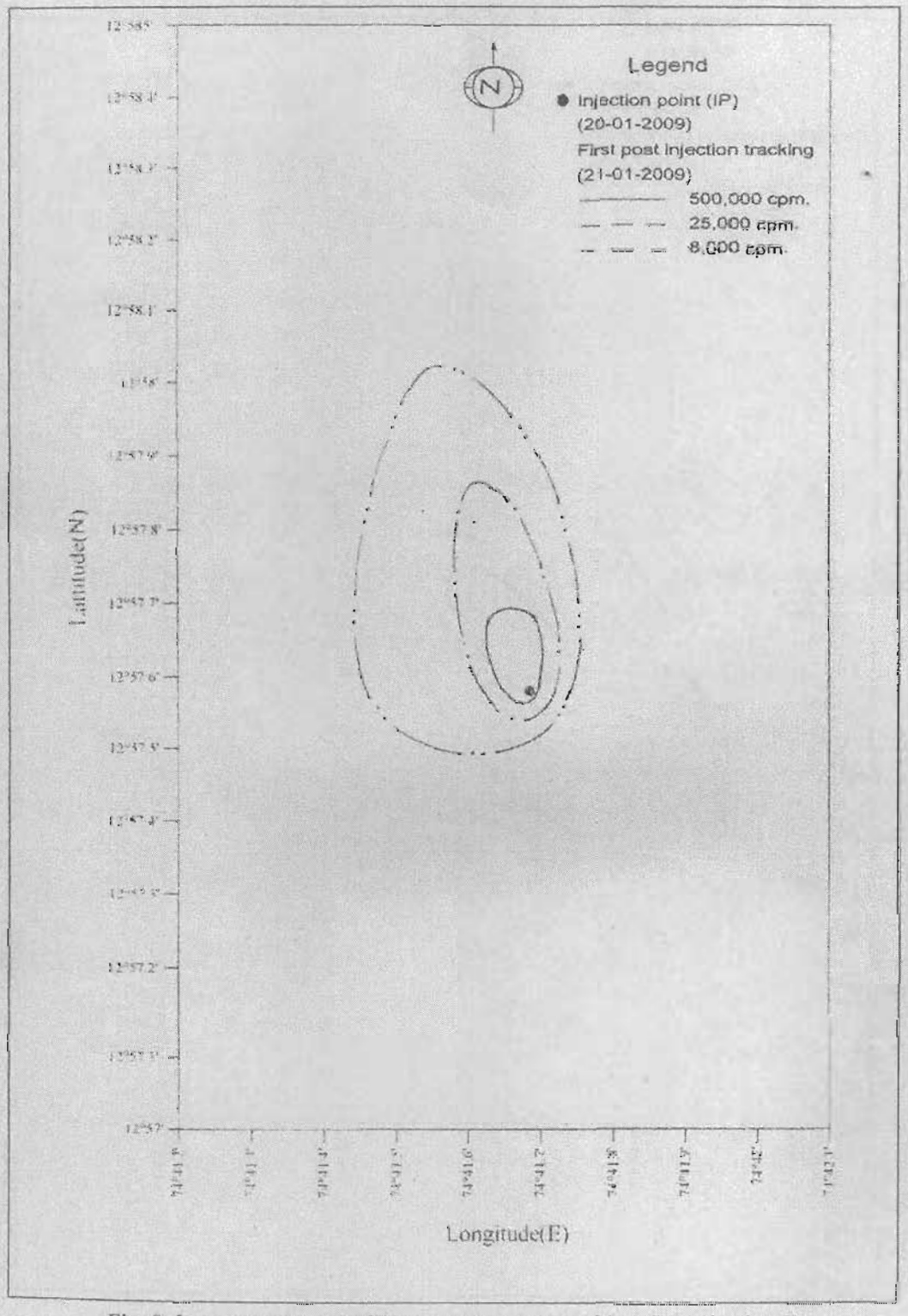


Fig. 9. Isocount contours of First post injection tracking (Investigation 2)
(Source: BARC Report)

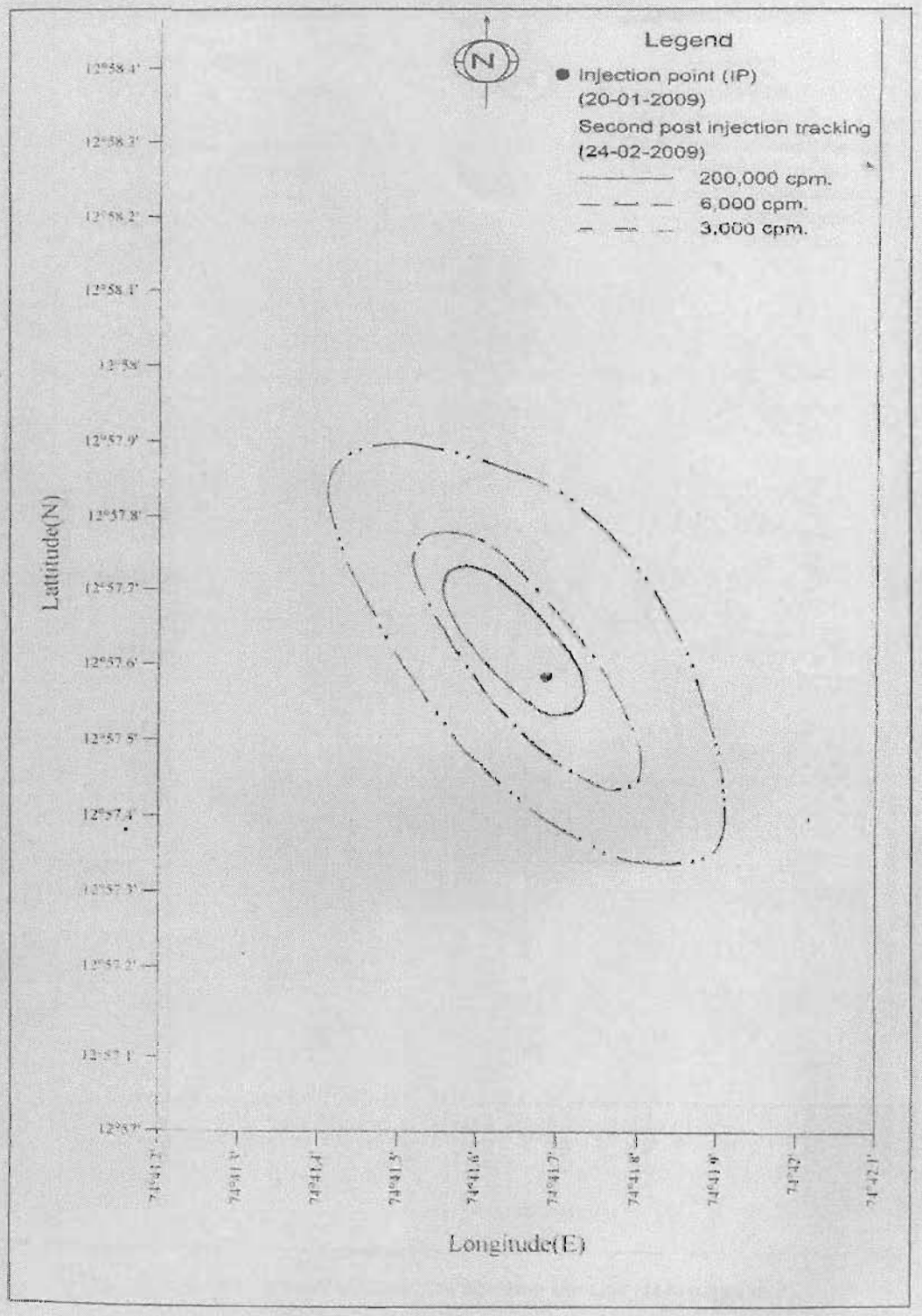


Fig. 10. Isocount contours of second post injection tracking (Investigation 2)

(Source: BARC Report)

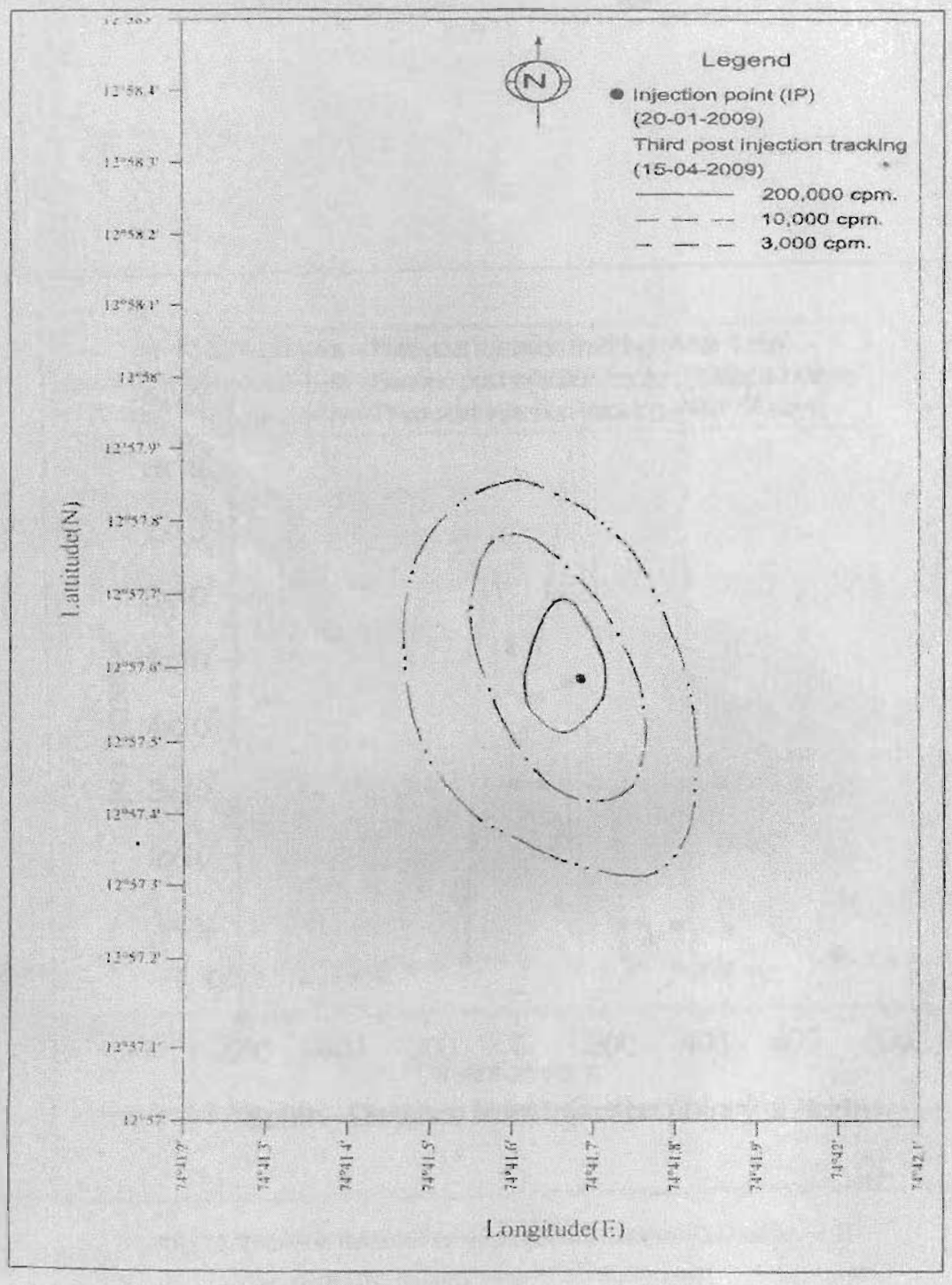


Fig. 11. Isocount contours of third post injection tracking (Investigation 2)

(Source: BARC Report)

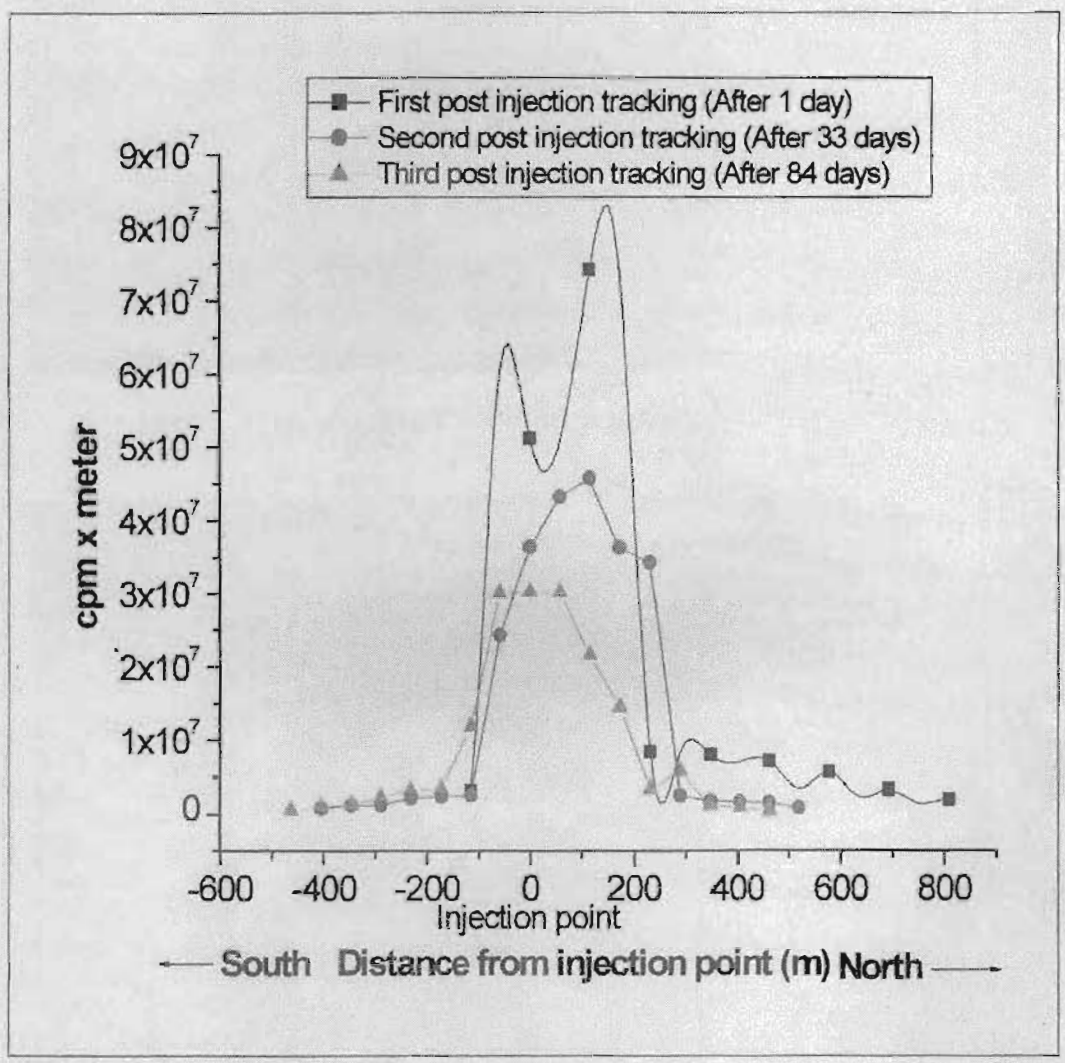
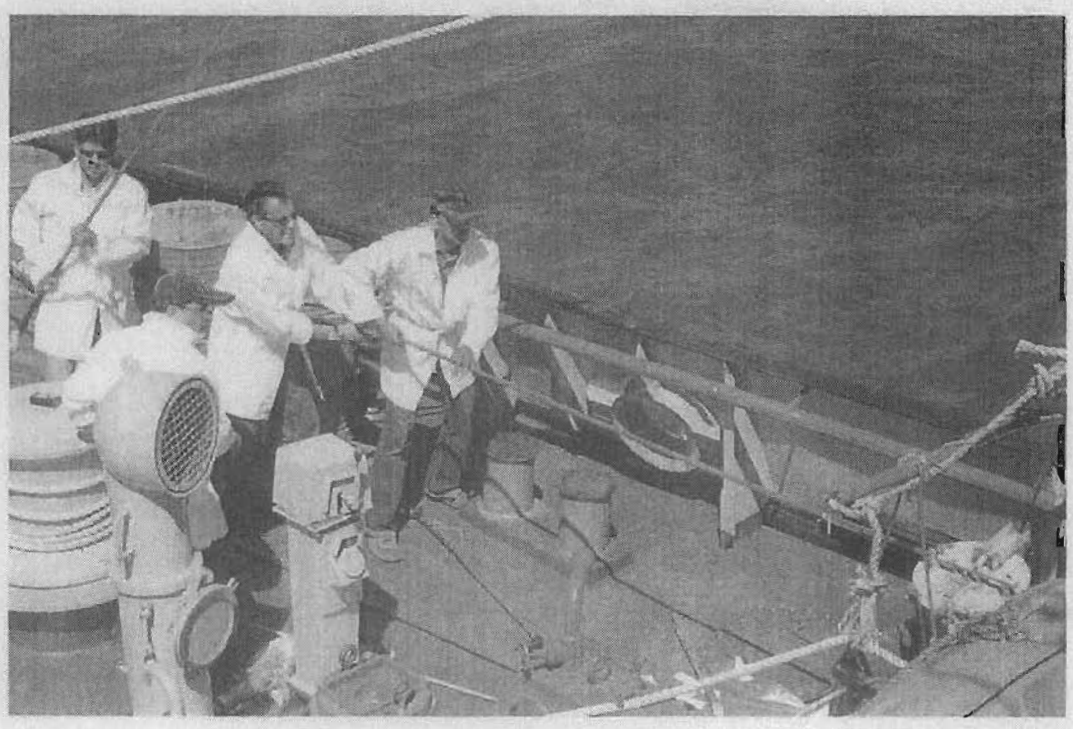


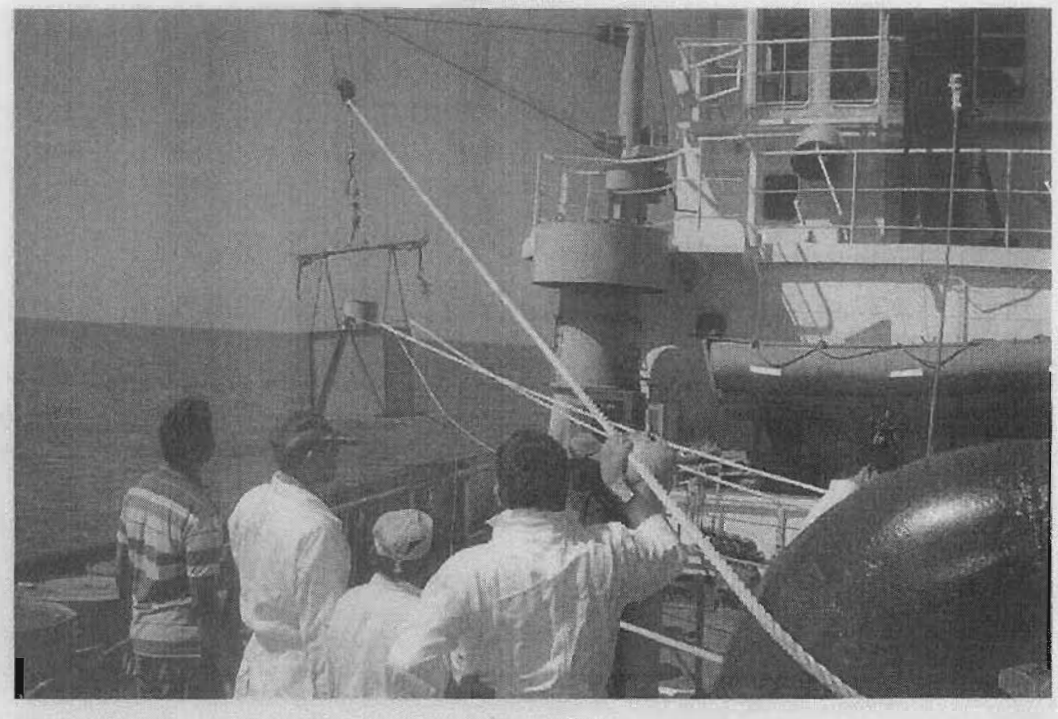
Fig. 12. Transport diagrams for post injection trackings (Investigation 2)

(Source: BARC Report)

1. CWPRS, BARC and NMPT team with injection apparatus on tug 'Varahi'

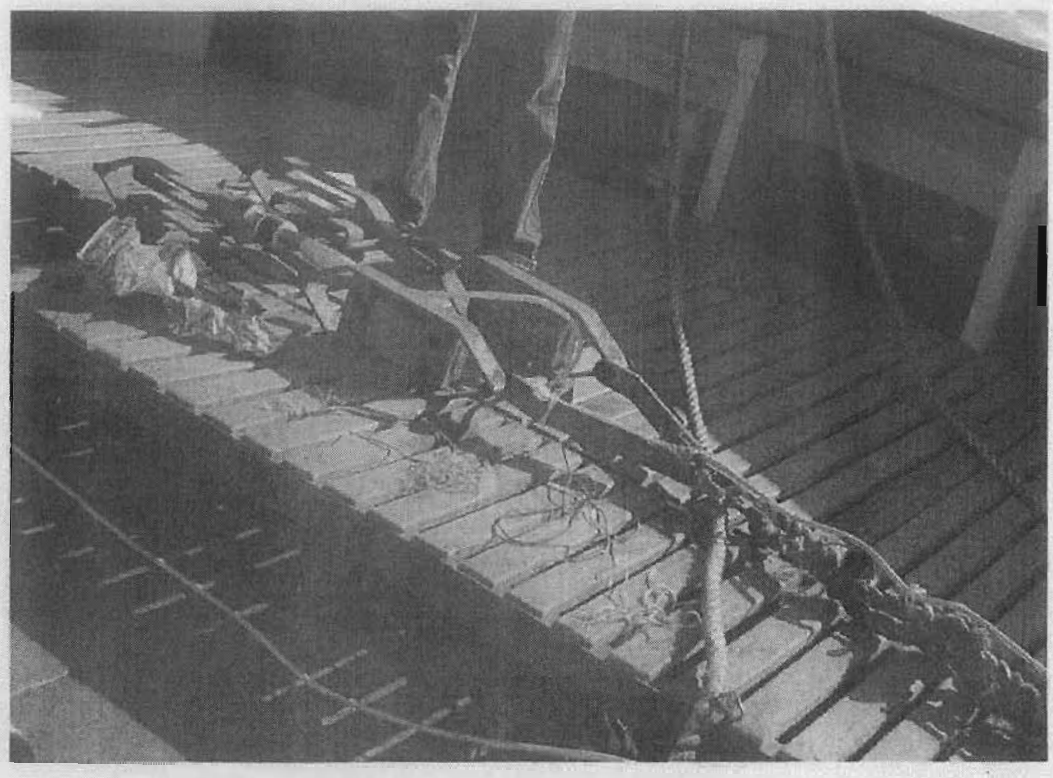


2. Tracer placement and mixing under progress

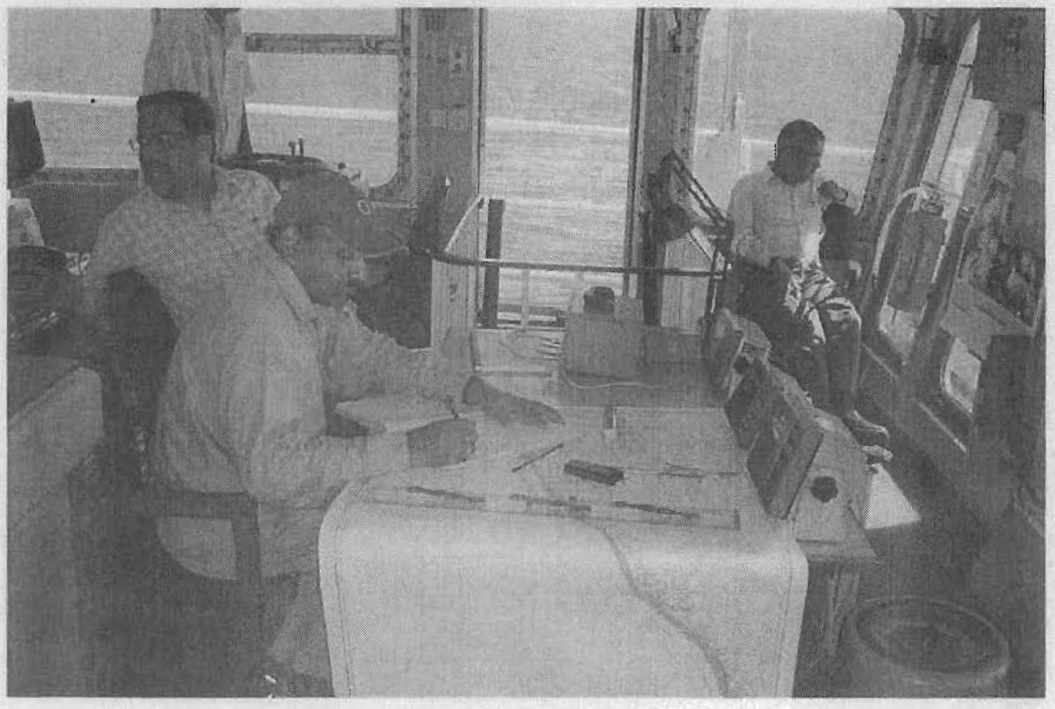


3. Deployment of tracer on to sea bed under progress

4. Application of pressure through nitrogen cylinder for injection of tracer material



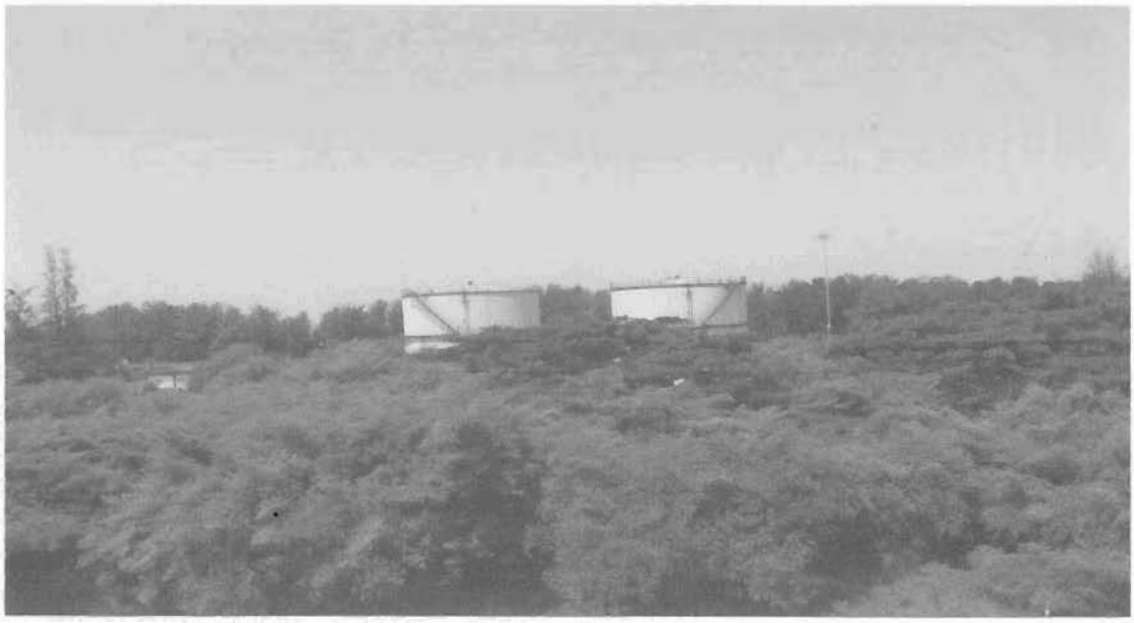
5. A view of sledge apparatus fixed with radiation detector for tracking



6. Recording of tracking results under progress

ANNEXURE - II

Green Belt Development near Oil Jetty – B.No. 13



ANNEXURE-II

Green Belt Development At Oil Dock Arm

ANNEXURE III

DOCK MASTER
Marine Department
New Mangalore Port Trust

NEW MANGALORE PORT TRUST

PANAMBUR
MANGALORE – 575010
KARNATAKA

UPDATION OF DISASTER MANAGEMENT PLAN

MARCH – 2017

Environmental Technical Services Pvt. Ltd.
C-14-D, Gangotri Enclave, Alaknanda,
New Delhi – 110019

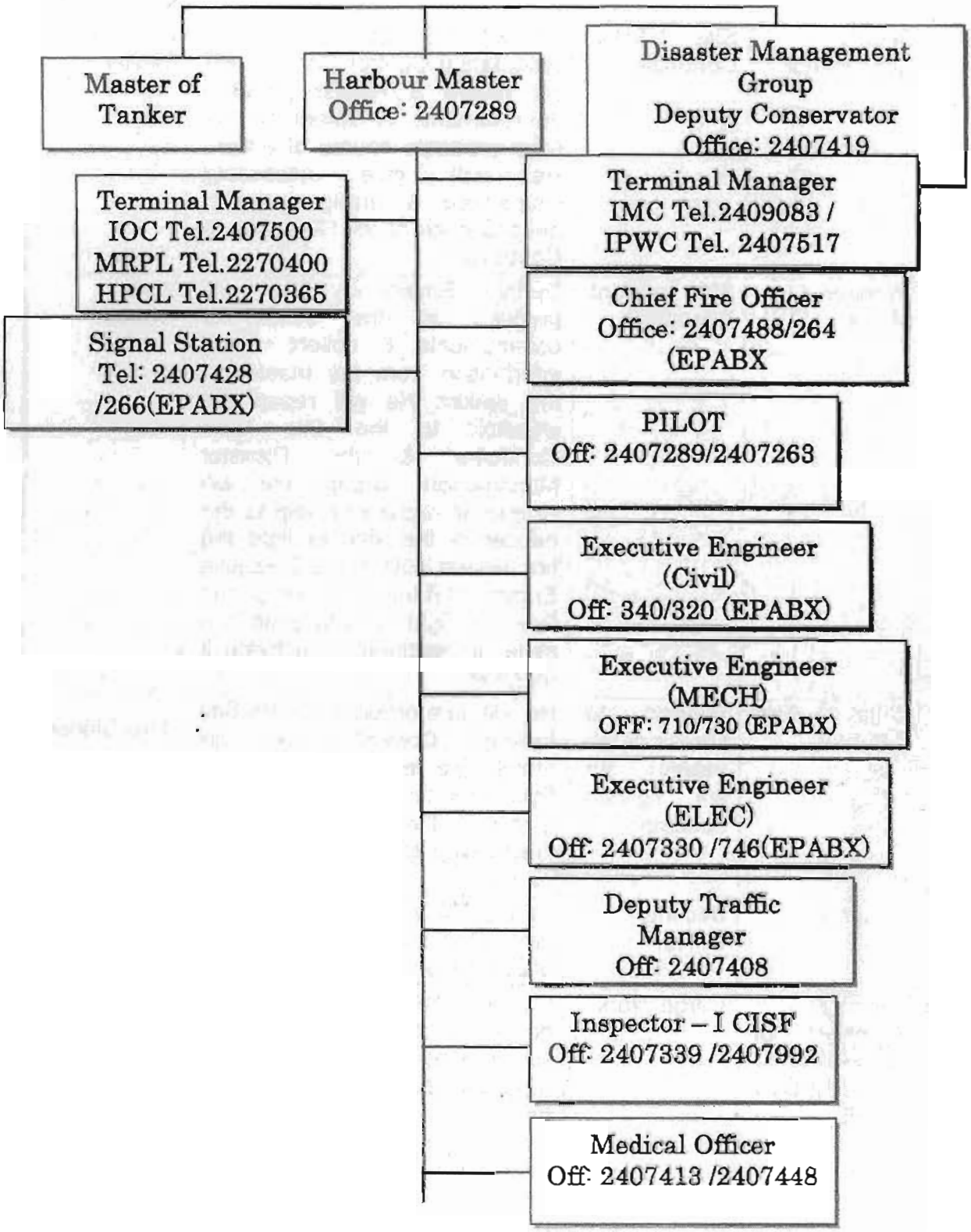
Mobile : 0-9810830190, 0-9873552267
E-Mail - JPSHRI@GMAIL.COM, SS@ETSINFRA.COM

7.4.2 Duties & Responsibilities of Action Group

Designated Officer	Role	Duties	Alternate Officer
Deputy Conservator	Site Main Controller	He will be stationed at the Emergency Control Centre. He will review & Assess possible developments to determine the most probable course of action. He will give necessary instructions & arrange external necessary aid to the Site Incident Controller.	Harbour Master
Harbour Master	Site Incident Controller	During Emergency he will proceed to the scene & communicate & collect all information from the master of the tanker. He will report the situation to the Site Main Controller & the Disaster Management Group. He will extend all necessary help to the master of the ship to fight the fire. He will instruct the Executive Engineer (Mech) to keep the fixed fire fighting installation in a state of readiness & activate if required.	Dock Master
Chief Fire Officer	Support to Master of the vessel for fire fighting operation.	He will take orders from the Site Incident Controller. He will mobile fire tenders, men & fire fighting equipments to the scene & extend all necessary support & fire fighting to the master of the vessel.	Fire Officer.
Inspector - I CISF	Security Officer	Controls & Directs traffic in the area shall supervise evacuation of personnel from the scene.	Inspector -II CISF
Terminal Manager of IOC / IPWC / IMC / HPCL / MRPL	Cargo Work	He will be responsible of shutting down of cargo operation & coordinating with the organization. He renders necessary assistance to the site incident controller by providing additional fire fighting & emergency equipments as required.	Assistant Terminal Manager
Executive Engineer	Fixed Fire Fighting	He will keep the fixed fire fighting installations in a state of	Asst. Exe. Engr.

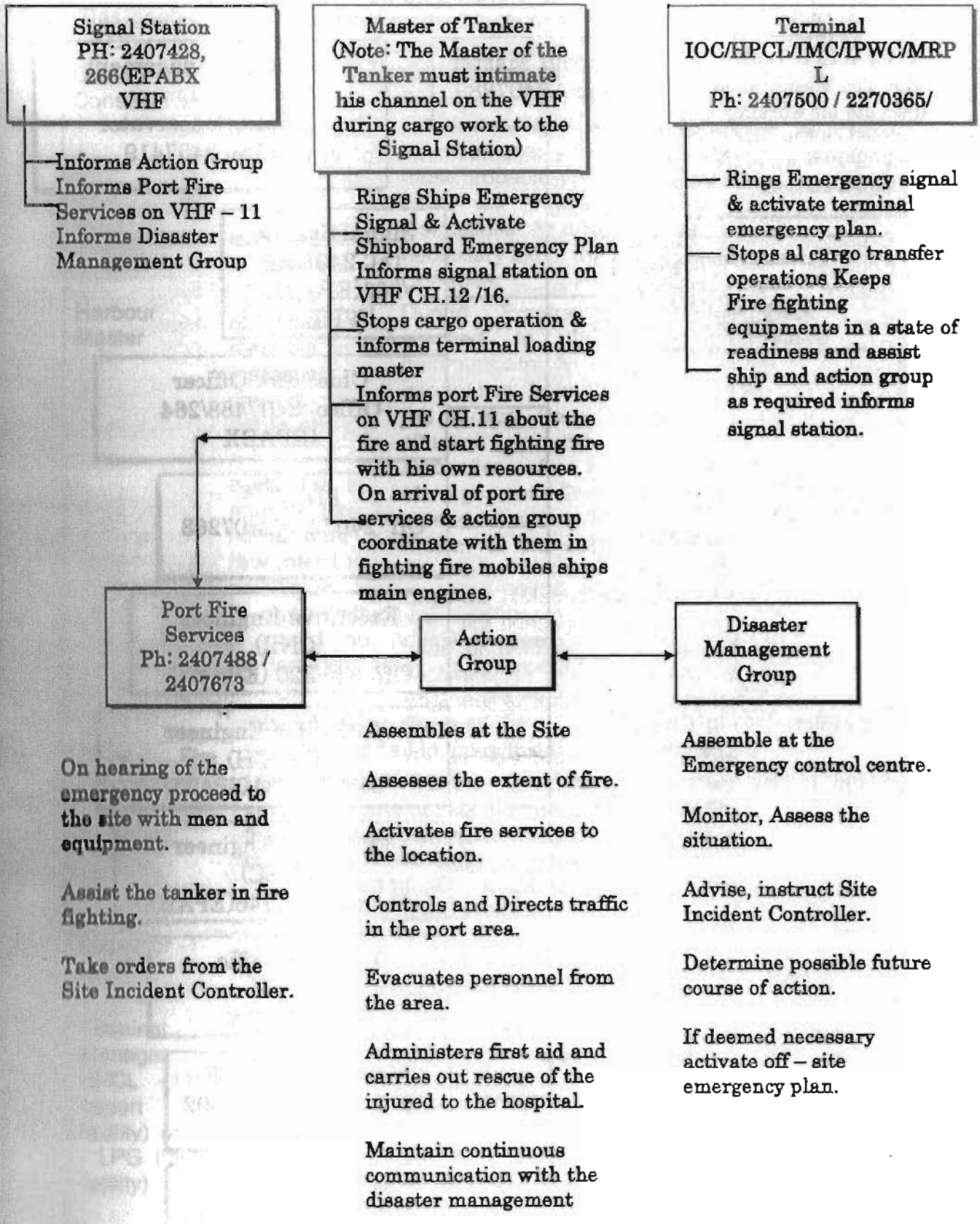
7.4 Action Plan – Scenarios at NMPT

7.4.1 Action Plan – Fire on Board Tanker at Tanker Jetties

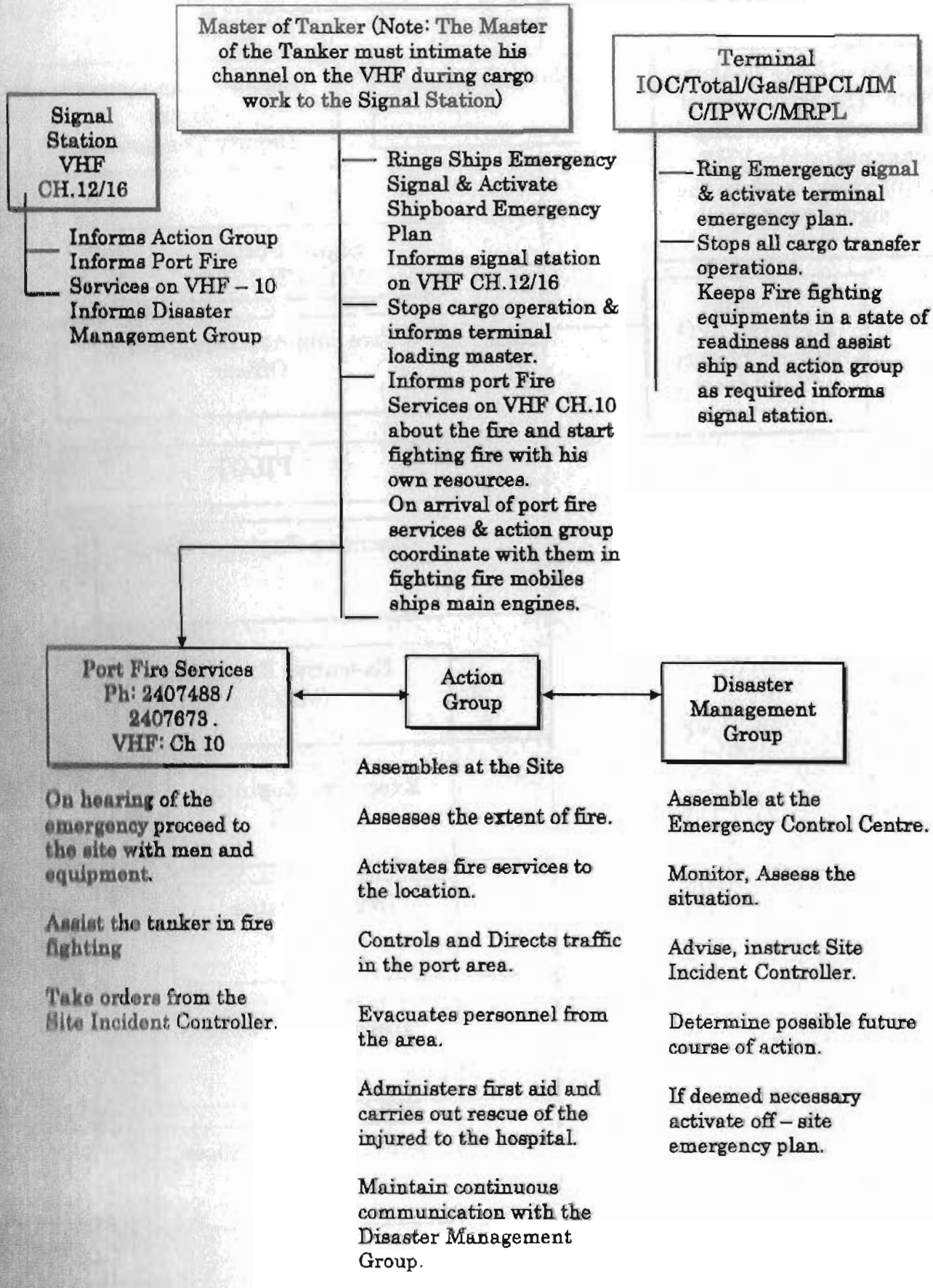


(Mech)	Installation	readiness. He will ensure sufficient pressure on the lines and start them on receiving instructions from site main or site incident controller.	(Mech)
Executive Engineer (Mech)	In charge of Vehicles standby	He will mobiles and dispatch sufficient number of vehicles to the site of emergency.	Assistant Executive Engineer (Mech)
Executive Engineer (Elec.)	In charge of Electrical Installation	He will responsible for Electrical supply to vital installations at Berth	Asst Exe Engineer (Elec)
Res – Cum Senior Medical Officer	First Aid to Injured	He will be responsible to organize and keep first aid team with ambulance & necessary medicines to attend to any injured person at the site of the accident.	Medical Officer
Master of the tanker	In Charge of fire fighting operation on board vessel	He will fight the fire with ships own resources as well as from the help available from action group. He will coordinate with action group leader. He will be responsible for shutting down all cargo operation on board in coordination with terminal In Charge.	Chief Officer of Tanker
Duty Pilot	In Charge of Pilotage	He will be ready on site for taking the ship out of berth.	Stand By Pilot
Stand By Pilot	Signal Station In Charge	He will monitor the communication on VHF & convey and relay messages on the advice from sire main and site Incident Controller. He will maintain LOG of events.	Signal Station Superintendent.

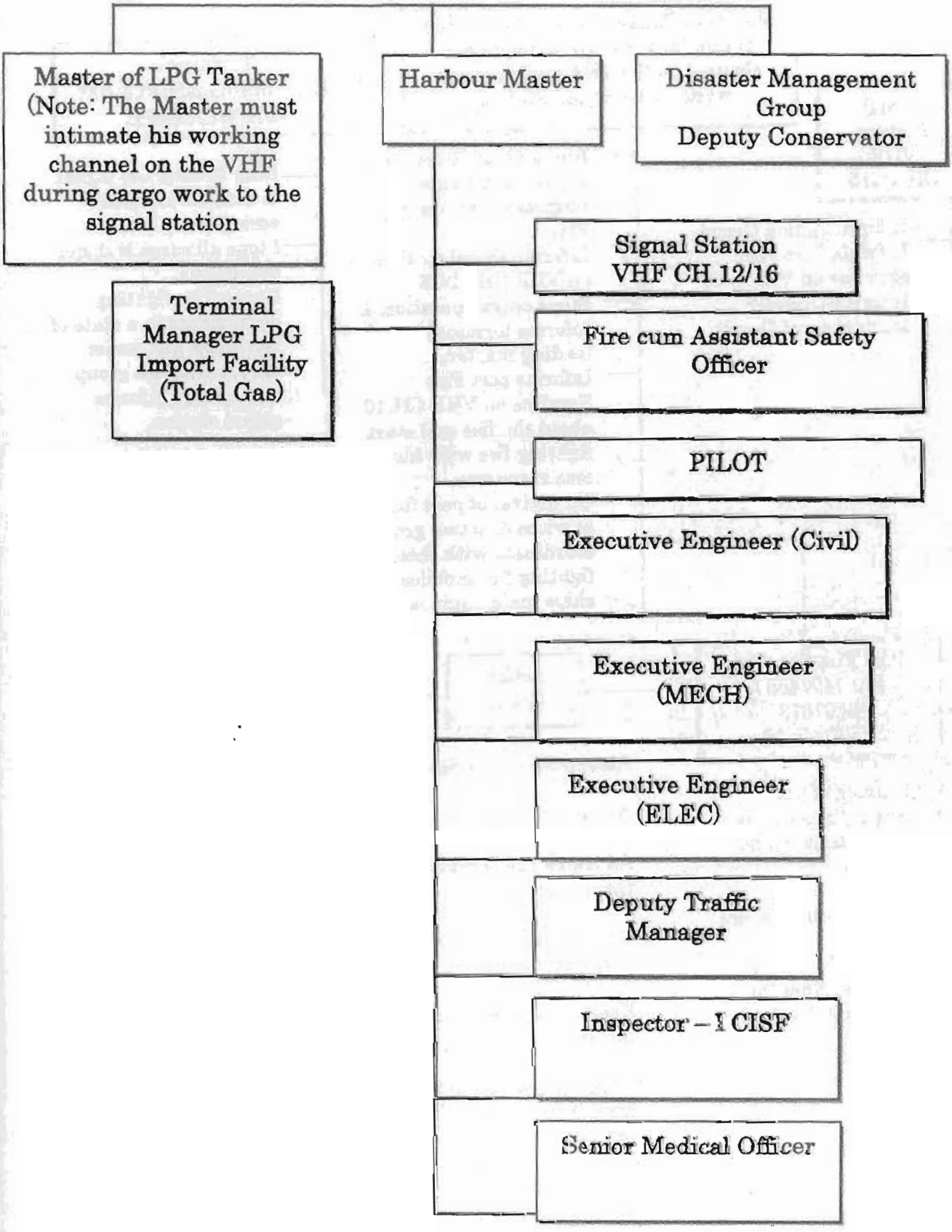
7.4.3 Action Plan – Tanker on Fire at Tanker Jetty



Action Flow Chart for LPG Tanker Fire at Berth No. 12



Action group at NMPT Fire On-Board LPG Vessels at Berth No. 12



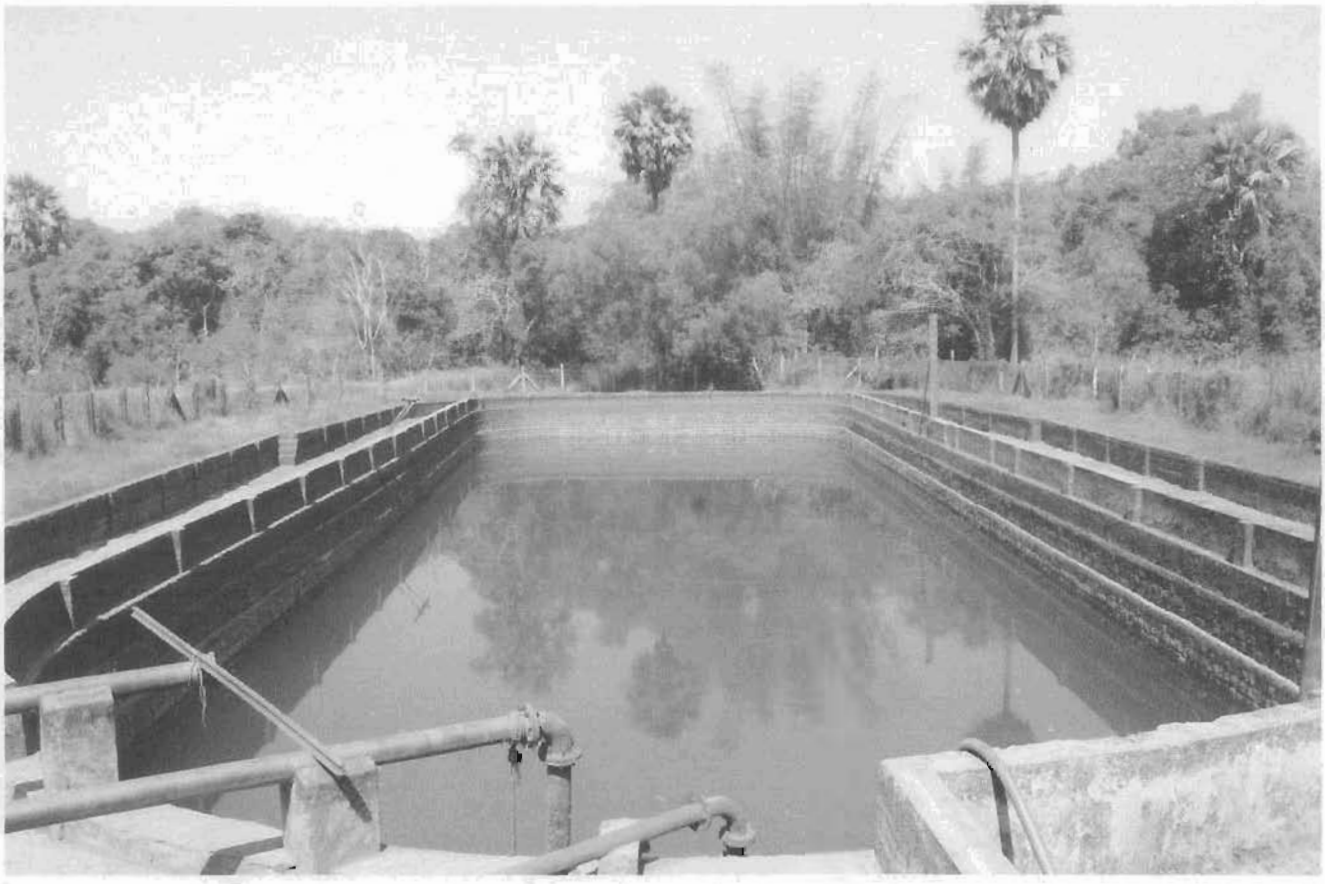
Action Group for LPG berth no. 12 Duties and Responsibilities:

Designated Officer	Role	Duties	Alternate Officer
Deputy Conservator	Site Main Controller	Will be stationed at the Emergency Control Centre to review & assess possible developments to determine the most probable course of action. He will give necessary instructions & arrange for external aid to the Site Incident Controller as necessary.	Harbour Master
Harbour Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the master of the tanker. He will report the situation to the Site Main Controller & the Disaster Management Group. He will extend all necessary help to the master of the ship to fight the fire. He will instruct the Executive Engineer (Mech) to keep the fixed fire fighting installation in a state of readiness & activate if required. He will instruct Marine Engineer(s) to keep tugs ready for fire fighting.	Dock Master
Fire Cum Asst Safety Officer I	Support to Master of the vessel for fire fighting operation.	Shall take orders from the Site Incident Controller. He will mobilise fire tenders, men & fire fighting equipments to the scene & extend all necessary support to the master of the vessel for fire fighting.	Fire Cum Asst Safety Officer II.

Inspector – I CISF	Security Officer	Controls & Directs traffic in the area. Shall supervise evacuation of personnel from the scene at the time of emergency.	Inspector –II CISF
Terminal Manager - Total Gas (LPG Import facility)	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with NMPT and rendering necessary assistance to the site incident controller by providing additional fire fighting & emergency equipment as required.	Assistant Terminal Manager
Executive Engineer (Mech)	In charge of Vehicles standby	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	Assistant Executive Engineer (Mech.)
Executive Engineer (Elec.)	In charge of Electrical Installation	Shall be responsible for Electrical supply to vital equipment and systems at the berth	Asst Exe Engineer (Elec.)
Dy Chief Medical Officer	First Aid to Injured	Shall be responsible to organize and keep first aid team with ambulance & necessary medicines to attend to any injured person at the site of the accident.	Sr. Medical Officer
Master of the tanker	In Charge of fire fighting operation on board vessel	Shall be responsible for fighting the fire with ships own resources as well as from the help available from action group. He will coordinate with action group leader and will be responsible for shutting down all cargo operation on board in coordination with terminal In Charge.	Chief Officer of Tanker
Duty Pilot	In Charge of Pilotage	Shall be ready on site for taking the ship out of berth.	Stand By Pilot

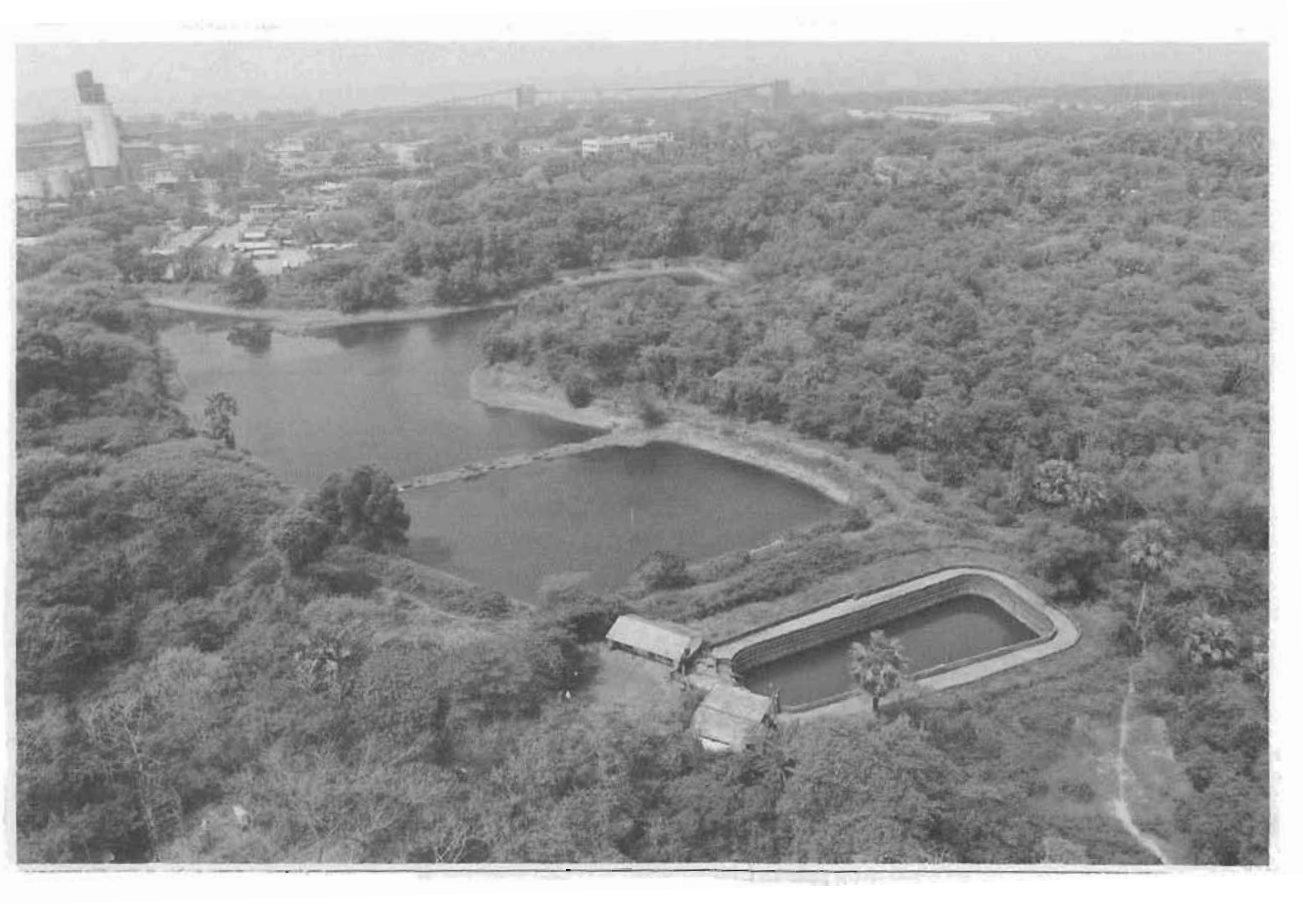
Stand By Pilot	Signal Station In Charge (Port Control)	Shall monitor the communication on VHF & convey and relay messages on the advice from Site Main and Site Incident Controller. He will maintain LOG of events.	Signal Station Superintende nt

ANNEXURE-IV



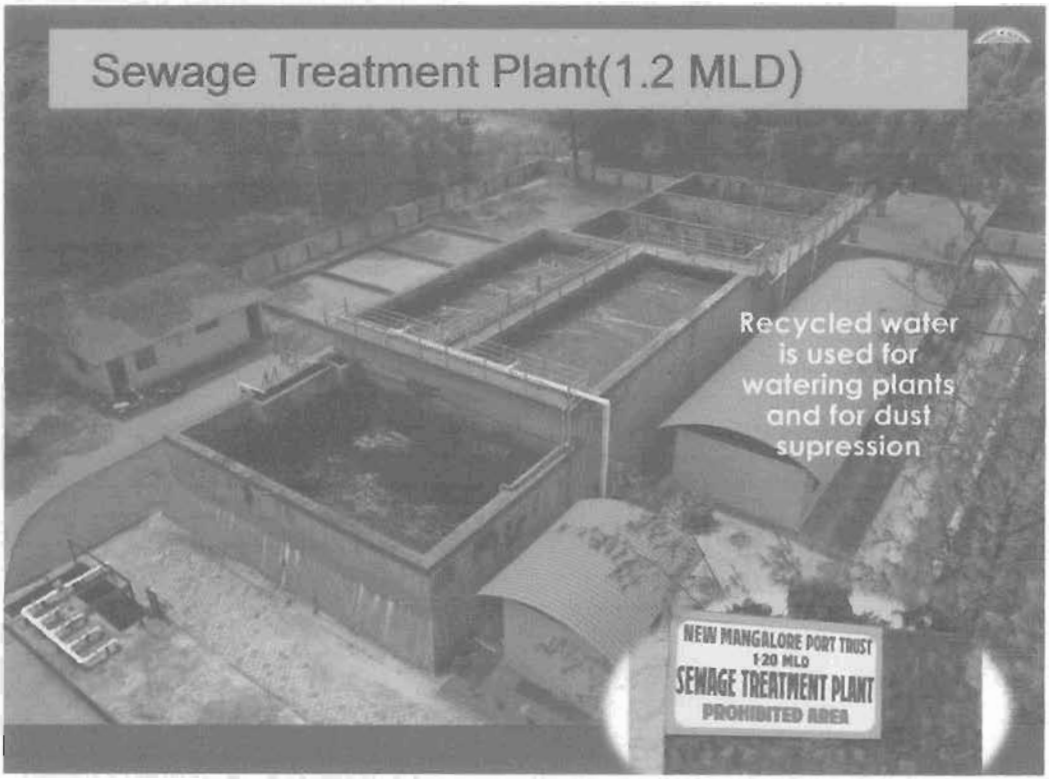
Thimmappayya well- the main source of water for the Port

Rain water harvesting at Railway Marshalling Yard



Rain Water Harvesting At Port Estate

ANNEXURE-V


Sewage Treatment Plant(1.2 MLD)
Recycled water is used for watering plants and for dust supression
NEW MANGALORE PORT TRUST
1·20 MLD
SEWAGE TREATMENT PLANT
PROHIBITED AREA