5/6B/96
31 May 2004

Australian Government

National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

Cancellation

Certificate of Approval No 5/6B/96

This is to certify that the approval for use for trade granted in Certificate No 5/6B/96 issued 30 December 1997 in respect of the

Shell Refining Model K2DFDO Bulk Flowmetering System

submitted by Shell Refining (Australia) Pty Ltd
Clyde Refinery
Durham Street
Rosehill NSW 2142

has been cancelled in respect of new instruments as from 1 July 2004.

Signed by a person authorised under Regulation 60 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

National Standards Commission

Instrument Certificate of Approval

No 5/6B/96

Issued under Regulation 9
of the
National Measurement (Patterns of Measuring Instruments) Regulations

This is to certify that an approval for use for trade has been granted in respect of the

Shell Refining Model K2DFDO Bulk Flowmetering System

submitted by Shell Refining (Australia) Pty Ltd
Clyde Refinery
Durham Street
Rosehill NSW 2142.

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

..../2

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 October 2002, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/96 and only by persons authorised by the submittor.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the Commission and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with the Commission's Document 106.

The Commission reserves the right to examine the instrument or component of the instrument purporting to comply with this approval.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0/A.

Special:

This approval is for two (2) instruments only, known respectively as the 'Silverwater Pipeline' and the 'JUHI Pipeline'.

DESCRIPTIVE ADVICE

Pattern: approved 22 September 1997

- A Shell Refining model K2DFDO bulk flowmetering system.

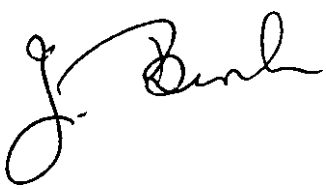
Technical Schedule No 5/6B/96 describes the pattern.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 5/6B/96 dated 30 December 1997
Technical Schedule No 5/6B/96 dated 30 December 1997 (incl. Test Procedure)
Figures 1 to 5 dated 30 December 1997

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.



TECHNICAL SCHEDULE No 5/6B/96

Pattern: Shell Refining Model K2DFDO Bulk Flowmetering System.

Submittor: Shell Refining Australia Pty Ltd
Clyde Refinery
Durham Street
Rosehill NSW 2142.

1. Description of Pattern

A Shell Refining model K2DFDO bulk flowmetering system which is approved for use for metering petrolum product having a kinematic viscosity between 0.5 and 10 mm^2/s.

1.1 Pipeline Flowmetering System

The approved systems start at the Shell Refinery Granville supply tanks. Figures 1 and 2 show the Silverwater pipeline and Figures 3 and 4 show the JUHI (Joint User Hydrant Installation) pipeline.

(i) Supply Tanks and Pumps

The supply tank incorporates an alarm system for low-liquid level condition. The level of liquid in each tank is continually monitored during a transfer and the transfer is manually shutdown when the low-liquid level alarm is activated.

Centrifugal pumps are installed such that the low level alarm is activated before the liquid level reaches the inlet of the centrifugal pumps.

Also, on the JUHI pipeline the pressure upstream of the pumps is monitored and controlled by a valve downstream of the pumps to ensure upstream pressure is maintained within the pre-determined levels.

(ii) Meter

A Smith model K2DFDO turbine flowmeter is used.

The flowmeter is installed in each pipeline in accordance with the manufacturers specifications and the system is approved for use at a minimum flow rate range of 140 to 330 m^3/hr for normal operation. The minimum quantity is 50 m^3.

(iii) Temperature Transmitter

A PT100 resistance thermometer fed via a safety barrier having a maximum permissible error not exceeding $\pm 0.25^0C$.

..../2

(iv) Pressure Transmitter

A Rosemount model 1151 pressure transmitter or any other compatible pressure transmitter having a certified maximum permissible error not exceeding ±50 kPa.

(v) System Controller

A Yokogawa model Centum CS Distributed Control System (DCS) as described in the documentation of NSC Approval No S331, is to process the signals from the flowmeter and the temperature and pressure transmitters to indicate volume at base conditions.

For each type of liquid to be metered, a pre-determined calibration factor (Meter Factor) is implemented via the Yokogawa system.

(vi) Indicating and Reporting System

An OMOSS computer system (Figure 5) that scans the measurements made and prints the information on which the transaction will be based. In addition, for monitoring purposes, it provides details of the tank liquid levels before and after the transfer.

(vii) Provision for Proving Device

Provision is made downstream of the flowmeter for connection of a proving device for the calibration and verification/certification of the system.

(viii) Transfer Device

A transfer device for each pipeline is located downstream of the meters with no intermediate outlet, as shown in Figures 1 and 3 for the respective pipelines.

The transfer point on the Silverwater line is defined by the motorised valve No 5116 located at the Shell refinery end of the pipeline.

The transfer point for the JUHI pipeline is defined by the valve No 00FC179 located at the Shell refinery end of the pipeline.

1.2 Sealing Provision

Provision is made for the calibration adjustments of the Yokogawa DCS to be sealed as described in the documentation of NSC Approval No S331

1.3 Verification/Certification Provision

Provision is made for the application of a verification/certification mark.

1.4 Markings

The instruments are marked with the following minimum data:

Manufacturer's mark, or name written in full	
Model number	
Serial number	
Year of manufacture	
Pattern approval mark for the instrument	NSC No 5/6B/96
Accuracy class	0.3
Maximum flow rate	..... m^3/hr
Minimum flow rate	..... m^3/hr
Minimum quantity	..... m^3
Liquid temperature range	0^oC to 50^oC
Liquid pressure range	200 kPa to 1400 kPa
Viscosity range or type of liquid for which the system is verified	

TEST PROCEDURE

The instruments should be tested in accordance with any relevant tests specified in the Inspector's Handbook.

Maximum Permissible Errors

The maximum permissible errors applicable at verification/certification and reverification are:

<u>One Stage Verification</u>	
of complete system:	±0.3%
<u>Two Stage Verification</u>	
of meter at metering conditions:	±0.2%
of conversion device:	±0.1%

Reference conditions for petroleum liquids are specified in AS 2649–1983, *Petroleum Liquids and Gases - Measurement - Standard Reference Conditions*.

Refer to Australian Standard AS4250.5-1995, *Liquid Hydrocarbons – Dynamic measurement – Proving systems for volumetric meters. Part 5: Dynamic measurement for calculation of meter factors.*

The meters should be tested against a proving device for unconverted volume.

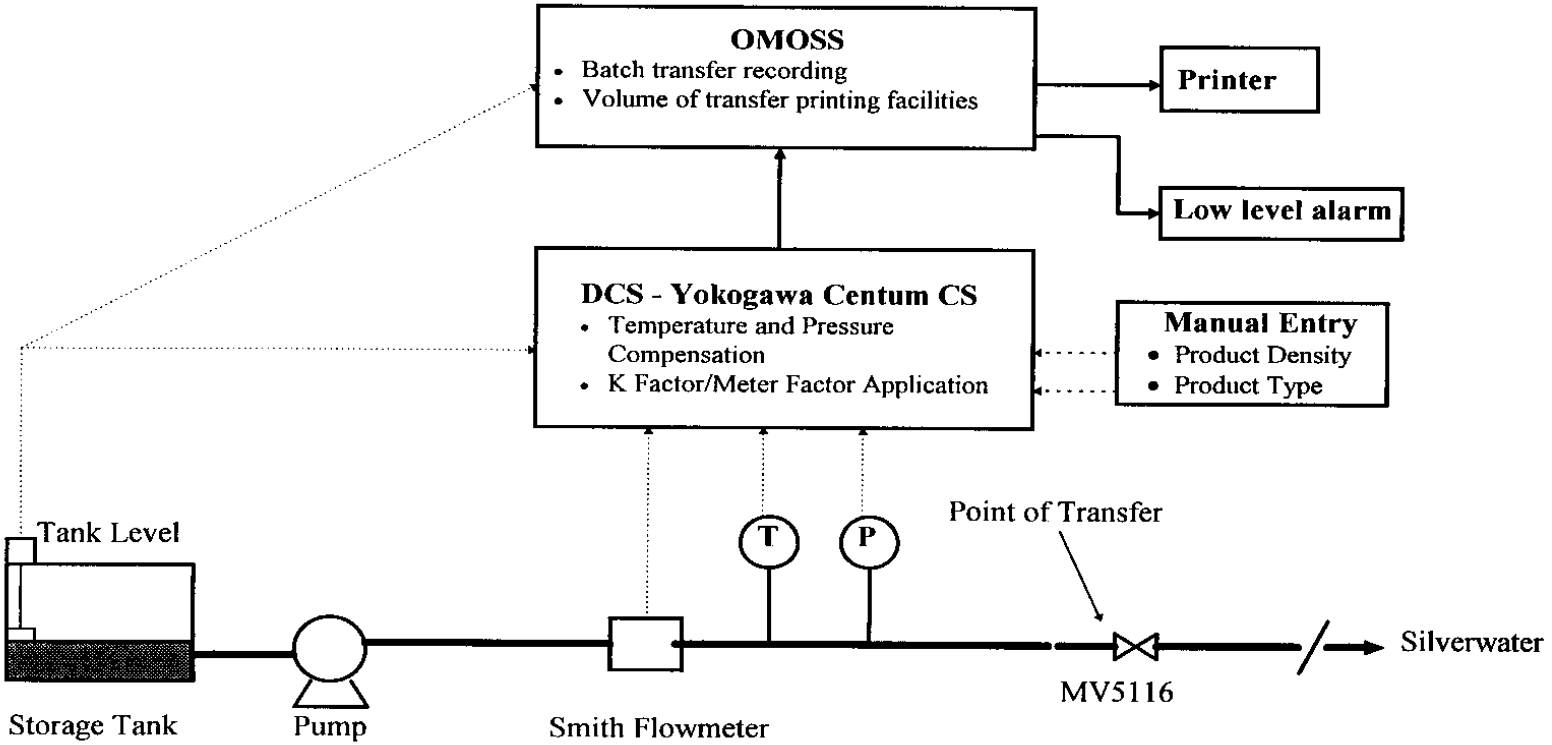
The flowmetering system may be verified as follows:

1. For the turbine flowmeter verify the meter-factor for the liquid being metered. Compare the metered volume from the flowmeter against the reference metered volume. The meter-factor (i.e. reference volume divided by flowmeter volume) may be calculated by converting both the reference volume and the flowmeter volume to base conditions (i.e. 15^0C and 101.325 kPa absolute pressure) and is compared with the value used by the Yokogawa control system. The MPE is ±0.2%.

2. The output pulses from the flowmeter are counted and are divided by the specified K-factor for the turbine flowmeter to give volume at operating temperature and pressure. Apply temperature and pressure conversion factors to the result to obtain volume at base conditions. The calculated temperature and pressure conversion factors may be checked against the values computed by the Yokogawa control system. Compare the calculated base volume with the base volume indicated by the Yokogawa control system. The MPE is ±0.1% (for volume throughput equal to or greater than the specified minimum delivery).

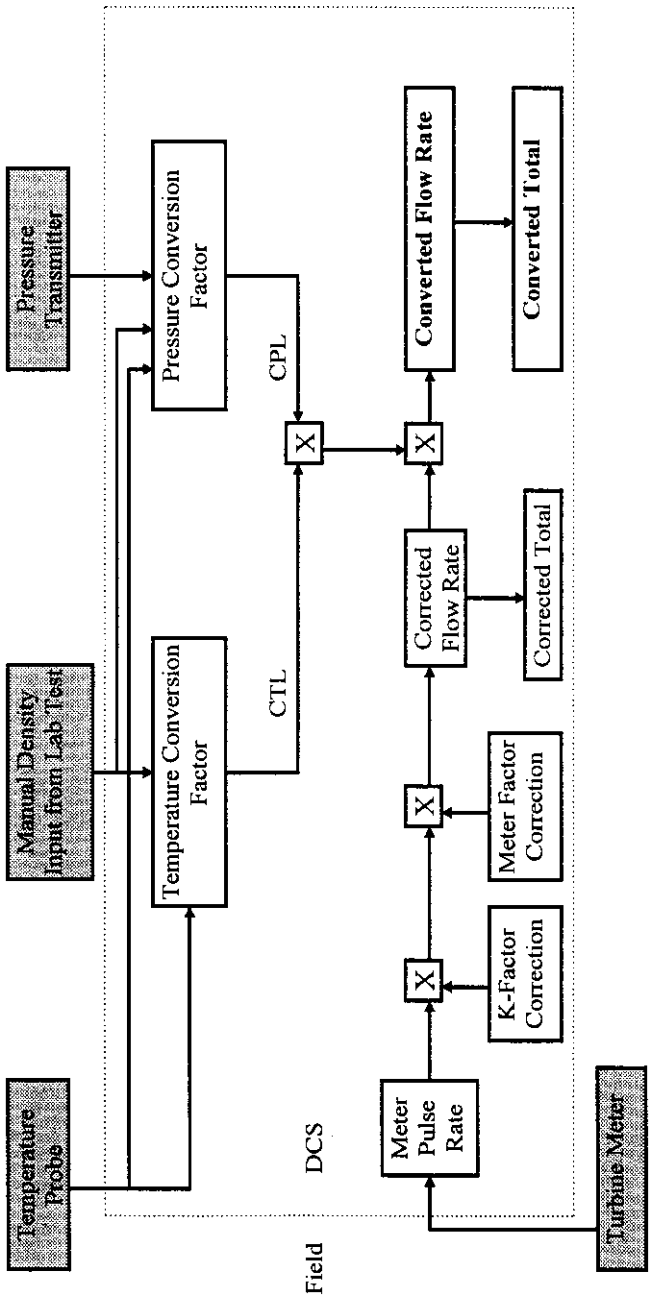
3. Check conversion using Table 54B (generalised products) of the ASTM-IP *Petroleum Measurement* Tables for temperature conversion, and Chapter 11.2.1M of the ASTM-IP-API *Manual of Petroleum Measurements Standards* for pressure conversion.

FIGURE 5/6B/96 - 1



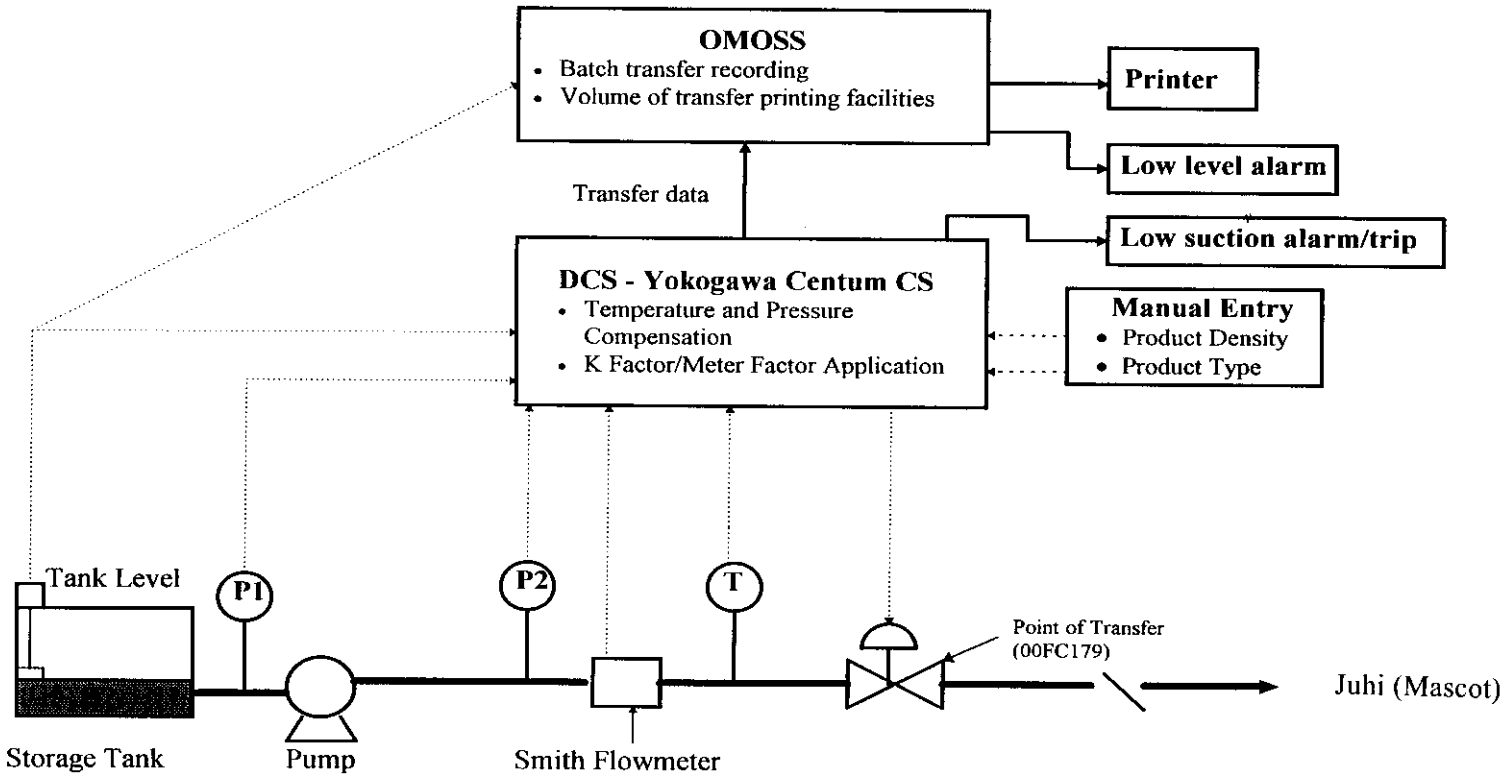
Silverwater Pipeline Flowmetering System

FIGURE 5/6B/96 - 2



Silverwater Pipeline Flow Compensation

FIGURE 5/6B/96 - 3



JUHI Pipeline Flowmetering System

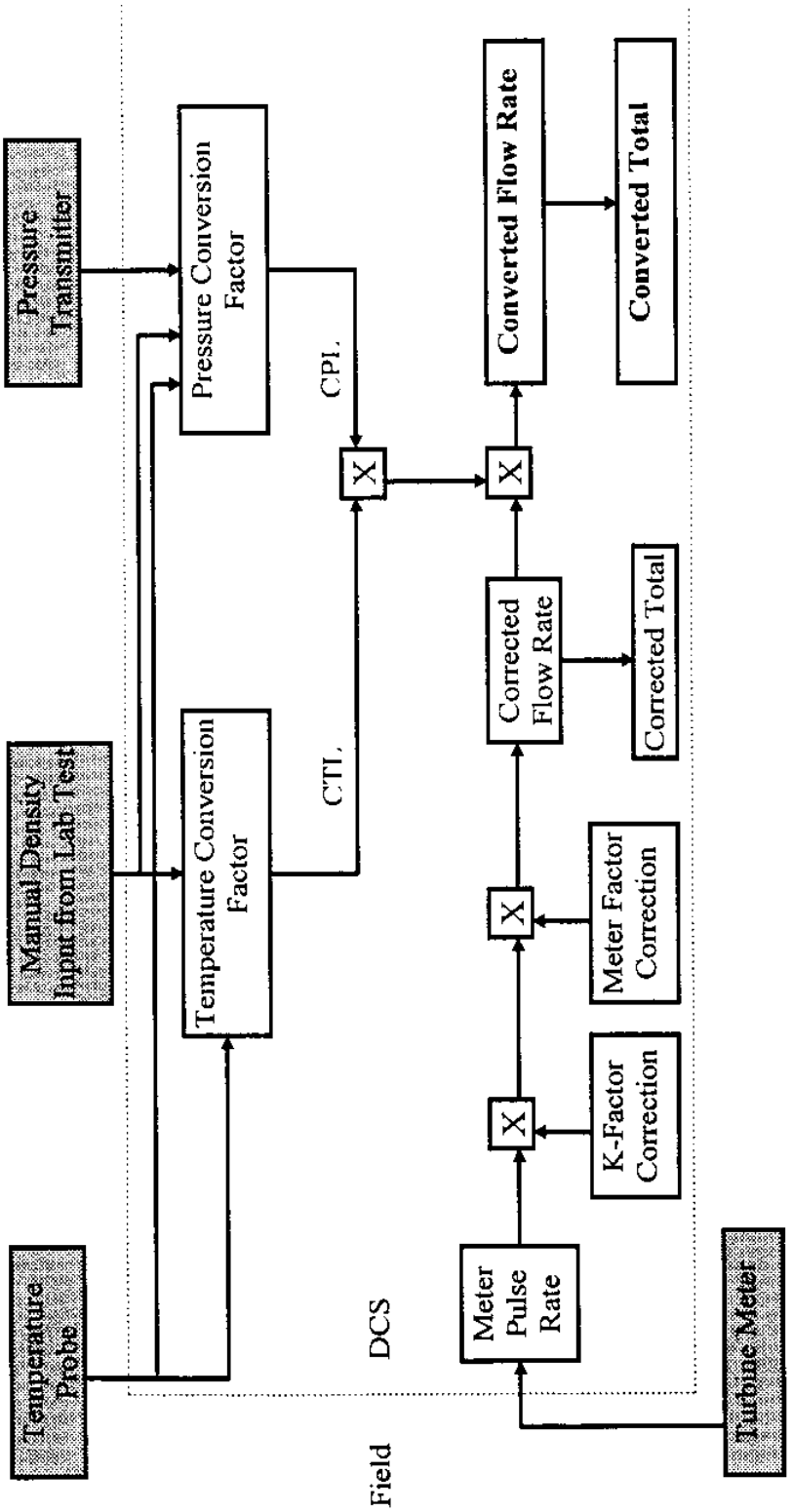
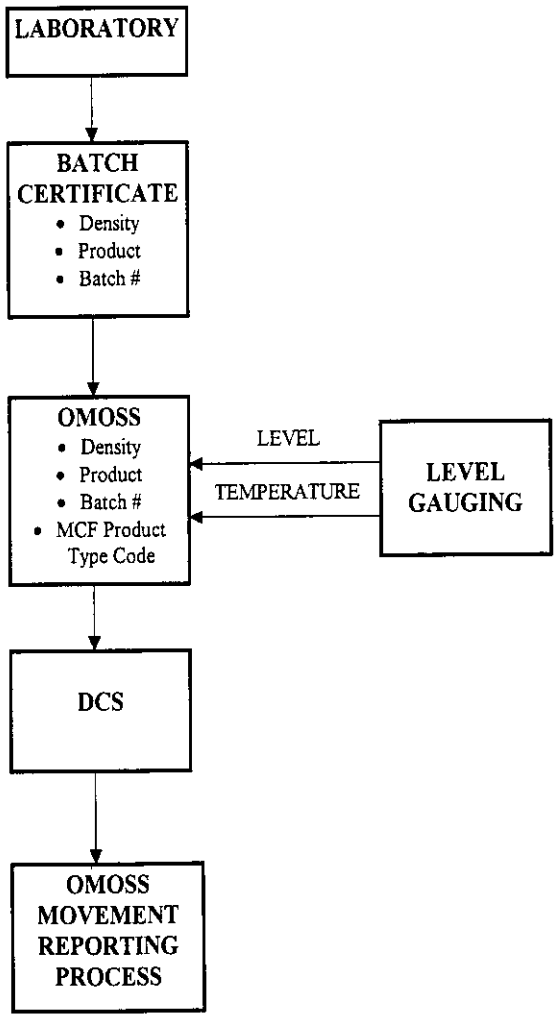


FIGURE 5/6B/96 - 4

JUHI Pipeline Flow Compensation

FIGURE 5/6B/96 - 5



OMOSS Movement Reporting