Best practice guide for the procurement and importing of bitumen

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Foreword

Bitumen is a vital component for cost effective construction and maintenance of the vast road networks in South Africa and neighbouring countries. Bitumen is produced and supplied in various grades at four refineries in the RSA with one refinery (in the Western Cape) supplying only one grade.

For various reasons, local refineries are not capable of assuring stable bitumen supplies to satisfy local demand (particularly during peak road construction periods) and supply of bitumen has been erratic for a number of years. Given the bitumen supply constraints at refineries this situation is not likely to improve in the immediate future.

Needless to say, the bitumen supply constraints at critical stages of road construction projects have a huge negative impact on the road construction companies (financial loss) as well as SANRAL's ability to manage its Strategic Tasks and Objectives.

This imbalance between supply and demand of bitumen has prompted leading road construction companies to resort to importing bitumen to meet the anticipated demands of major road construction projects. This measure is currently viewed as a temporary solution however as part of the industry's ongoing efforts to maintain supply reliability it is not unrealistic to predict that bitumen imports may become a permanent reality in the not too distant future.

The local bitumen supply situation is regularly reported on and highlighted in prominent local media and industry publications and it is therefore not surprising that numerous "entrepreneurs" (not necessarily directly involved in the Industry) are expressing an interest in sourcing bitumen on the "open market" and supplying to the local market.

Sourcing and importing bitumen of appropriate quality and consistency and at competitive prices is not as easy as it may sound or appear to the uninitiated. Imported bitumen comes with a substantial cost penalty and quality assurance from supply source to the asphalt producer and user is an aspect that demands procurement strategies and controls of the highest order.

Quality assurance of bitumen is of great concern for the major bitumen users (i.e. Asphalt producers, SANRAL and other government agencies responsible for building and maintaining paved road networks). The quality assurance process for locally produced bitumen is relatively straight forward but achieving the required level of control over the process could be a very challenging and costly exercise in the case of imported bitumen.

In addition to price and quality other important aspects associated with bitumen imports are compliance with enhanced Health, Safety and Environmental management practices (driven by strict International Safety Codes) and logistical challenges associated with off-loading (the bitumen Tanker) and storage and handling of the landed bitumen.

In response to these noted concerns it was decided to produce this best practice guide to provide information to potential bitumen importers. It is hoped that this publication will ensure a greater degree of informed decision making before embarking on what could be a very risky commercial venture.

1 Objective

The primary objectives of this guide are:

- To list the most prominent Health, Safety, Environmental and Quality Assurance standards and other regulatory requirements associated with the import of bitumen;
- To provide a broad overview of the processes and associated activities necessary to assure a reasonable likelihood of success with managing the potential risks associated with the import of bitumen;

2 Scope

This guide is primarily aimed at the activity of importing bitumen as bulk liquid cargo by sea in a bitumen Tanker. The import of bitumen in Bitutainers, drums or bags is not included in the scope of this guide.

The bitumen in scope is paving grade bitumen (previously known as penetration grade) i.e. straight run bitumen produced at a refinery and does not include modified bitumen's such as cut-back bitumen, polymer modified bitumen's or bitumen emulsions.

3 References

This publication is not intended to be a comprehensive guide on the requirements for importing bitumen and therefore it is recommended that the following referenced documents are read in conjunction with this guide:

3.1 Standards and specifications

- SANS 4001-BT1:2012, Edition 1.1 - Penetration grade bitumen. Covers product specifications of four penetration grades of bitumen suitable for road construction and similar purposes;
- SANS 10089-1:2008 Edition 4.3 - Storage and distribution of petroleum products in above-ground bulk installations;

3.2 Legislation

- Occupational Health and Safety Act (Act 85 of 1993 as amended) and applicable Regulations;
- International Trade Administration Act, (Act 71 of 2002): Import control regulations, Government Gazette No. 35007, 10 February 2012;
- National Ports Act (Act 12 of 2005);
- PORTS RULES, National Ports Act (Act 12 of 2005), 6 March 2009, Department of Transport;
- Guidelines for Agreements, Licences and Permits in terms of the National Ports Act (Act 12 of 2005), Transnet National Ports Authority 25 April 2008;
- Liquid Bulk Terminal Operator Licence, Transnet National Ports Authority, 1 December 2011;
- Harbour Master's Written Instructions, 2007 issued in terms of the National Ports Act (Act 12 of 2005)

3.3 Industry publications

- SABITA Manual 2: Bituminous products for road construction and maintenance, Fifth edition, September 2012;
- Industry Protocol for Responding to Bitumen Spills on Land and/or Adjacent Water Environments, SABITA, December 2012;

- SABITA Manual 8: Guidelines for the safe and responsible handling of bituminous products, Third edition, May 2011;
- International Safety Guide for Oil Tankers and Terminals, International Maritime Organization, Fifth edition, 2006;
- Marine Terminal Management and Self-Assessment, OCIMF, September 2012;
- Guidelines for the Handling, Storage, Inspection and Testing of Hoses in the Field, 2nd Edition, OCIMF, January 1995;

4 Definitions and abbreviations

For the purposes of this guide, the following definitions and abbreviations apply.

4.1 Definitions

Bitumen	Bitumen in the context of this guide means paving grade bitumen ***(previously known as penetration grade);*** i.e. normal "straight-run bitumen" derived from crude oil and produced at a refinery
Draught (Draft)	Depth of keel below waterline
Flammable (also referred to as 'Combustible')	Capable of being ignited and of burning. For the purposes of this Guide, the terms 'flammable' and 'combustible' are synonymous.
Flammable liquids Source: *(Harbour Master's Written Instructions in terms of the National Ports Act No 12 of 2005)* Corresponds to definition in the IMDG Code	Means a liquid, or mixture of liquids, or liquids containing solids in solution or suspension (except substances otherwise classified on account of their dangerous characteristics), which give off a flammable vapour at or below 61 degrees Celsius closed-cup test (corresponding to 65.6 degrees Celsius open-cup test), normally referred to as the "flashpoint". This includes liquids offered for transport at temperatures at or above their flashpoint, and, substances transported or offered for transport at elevated temperatures in a liquid state, which give off a flammable vapour at temperatures equal to or below the maximum transport temperature
Flammable liquid in bulk	Means any flammable liquid conveyed otherwise than in containers
Logistics	The planning, execution, and control of the movement / placement of goods and / or people, and the related, supporting activities, all within a system designed to achieve specific objectives.
Packaged cargo	Bitumen in drums, packages or other containers
Quality Assurance	Quality assurance is defined as planned and systematic actions necessary to provide adequate confidence that a product or service satisfies given requirements for quality. It is a proactive activity focused on providing confidence that quality requirements will be fulfilled.
Receiver	The consignee according to the contract for carriage. If the consignee designates a third party, this person shall be deemed to be the consignee. If the transport operation takes place without a contract for carriage, the enterprise which takes charge of the dangerous goods on arrival shall be deemed to be the consignee

Responsible Officer (ship)	A person appointed by the Master of the ship and empowered to take all decisions relating to a specific task, and having the necessary knowledge and experience for that purpose
Road tanker	A vehicle designed, manufactured and equipped in accordance with recognised and acceptable standards and specifications, and in this context specifically for the transport of Bitumen
Supplier	The enterprise which consigns dangerous goods either on its own behalf or for a third party. If the transport operation is carried out under a contract for carriage, consignor means the consignor according to the contract for carriage. In the case of a tank vessel, when the cargo tanks are empty or have just been unloaded, the master is considered to be the consignor for the purpose of the transport document
Tanker	A ship designed to carry liquid petroleum cargo in bulk, including a combination carrier when being used for this purpose
Terminal	A place where tankers are berthed or moored for the purpose of loading or discharging bitumen cargo
Terminal Representative	A person designated by the terminal to take responsibility for an operation or duty

4.2 Abbreviations

AASHTO	American Association of State Highway and Transportation Official Standards
EN	European Standards
HSE	Health, Safety and Environment
IMO	International Maritime Organisation
IMDG (Code)	International Maritime Dangerous Goods (IMDG) Code
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ITAC	The International Trade Administration Commission of South Africa
MARPOL	International Convention for the Prevention of Pollution from Ships
OCIMF	Oil Companies International Marine Forum
SABITA	Southern African Bitumen Association
SANRAL	South African National Roads Agency Limited
SOLAS	International Convention for the Safety of Life at Sea
TNPA	Transnet National Ports Authority

5 Sourcing and quality assurance of bitumen for import

5.1 Sourcing

The first challenge facing potential bitumen importers is to find bitumen of appropriate quality and consistency, and a reliable supplier. A quick search on the internet will reveal that there are literally "hundreds" of potential suppliers across the globe offering just about any type and grade of bitumen for sale. In many cases suppliers also offer comprehensive procurement and supply chain management services on behalf of potential buyers.

It is not within the terms of reference or scope of this guide to recommend any specific supplier for consideration. Potential importers will have to conduct their own due diligence investigations to ensure that ultimately they select a trustworthy supplier with a proven bitumen export track record. Some points to consider for selecting a supplier include but are not limited to the following:

- Is there any trade embargo in place that will prevent you from importing bitumen from a specific source;
- Is the supplier a manufacturer of bitumen (a refinery) and if not, where is the bitumen sourced from;
- If possible ascertain the source of the crude oil from which the bitumen is produced. Not all grades of crude oil are suitable for production of bitumen of appropriate quality and consistency for road paving purposes. Insist on traceable verification and certification of the source;
- What is the supply capacity of the supplier and how is this verified or guaranteed;
- Is the supplier capable of managing supply chain processes such as quality control and quality assurance, packing, transport logistics, handling at port of loading, etc. or will you have to engage third party agents to handle this on your behalf;
- Make every effort to check supplier affiliations and processes to verify compliance with internationally accepted standards in connection with Health Safety and Environmental management of marine operations and quality assurance systems.

5.2 Quality assurance

Quality standards and specifications

The quality of bitumen for road pavement purposes must conform to the specifications of asphalt producers, SANRAL and other government agencies responsible for building and maintaining paved road networks.

In different regions and countries around the world, different standards and grading systems are used for determining the quality of bitumen. The most recognized standards for petroleum bitumen are published by:

- European Committee for Standardization (CEN)
  - *Deutsche Industrie Norm (DIN EN)*
  - *Association Française de Normalisation (AFNOR – NF EN)*
  - *BSI Standards - the UK's National Standards Body (NSB - BS EN)*
- American Society for Testing and Materials (ASTM)
- American Association of State Highway and Transportation Officials (AASHTO)
- South African Standard Organization (SABS/SANS)
- Standards Australia (AS)

Quality assurance of locally produced bitumen is done in accordance with the requirements of SANS 4001-BT1:2012, Edition 1.1 - Penetration grade bitumen. This standard covers product specifications of four penetration grades of bitumen most commonly used in the Southern African region.

Bitumen importers must ensure that a robust assurance regime is in place to verify and certify the quality of imported bitumen along the entire supply chain.

The following should be considered as a point of departure for a quality assurance process:

- Enquire if the manufacturer/supplier has a quality control system and certification equivalent to the ISO 9000 family of quality management standards in place;
- Seek prior confirmation and acceptance of the requisite quality assurance process from your potential customers;
- Use a reputable inspection, verification, testing and certification institution to provide quality assurance and demonstration of conformance with SANS 4001-BT1:2012;

  (One such institution is SGS which is arguably the world's leading inspection, testing, verification, and certification company. Visit the SGS website at http://www.sgs.com for more information).

6 Bitumen import logistics

The bitumen importer is faced with a number of logistical challenges and some of these could be major and very expensive obstacles to overcome. Here follows a brief discussion of the main challenges and the minimum requirements for compliance with legal and industry standards as relevant.

6.1 Import control regulations

Petroleum products are subject to import/export control and therefore a company or an individual that intends importing bitumen into South Africa requires an import permit.

The issuing of bitumen import permits is subject to requirements administered by the International Trade Administration Commission of South Africa (ITAC). To be considered for authorisation, you must contact the Economic Development Department regarding the required procedure.

6.2 Shipping limitations

Due to specialised cargo handling requirements (heating, cargo pumps, tank and piping insulation, etc) bulk liquid bitumen is normally shipped in purpose built product Tankers that are dedicated to bitumen service.

The cargo capacity of a bitumen Tanker would be somewhere between 3500MT to 10000MT and on average around 5000MT. In Oil Tanker terms these are "very small" Tankers and the economies of scale makes these ships quite expensive to operate and are therefore not very attractive options for ship owners. Hence, there are a limited number of vessels available for charter and the optimum quantity, timing and execution of bitumen orders is a critical factor for ensuring the financial viability of the venture.

6.3 Ports cargo handling and storage infrastructure

Ideally a purpose designed terminal is required for importing bitumen. A terminal will typically comprise of the following port cargo handling and storage facilities:

- A berth with sufficient *Water Depth Alongside* to accommodate the anticipated draught requirements of bitumen Tankers;
- A fixed or mobile shore unloading gantry/manifold installed alongside the Tanker to connect flexible discharge hoses between the Tanker manifold and a fixed delivery line;
- A fixed pipeline installation to deliver bitumen to a storage facility;
- An intermediate storage facility (tank farm) of sufficient capacity (ideally between 10,000mt and 20,000mt) and situated as close as possible to the Tanker berth;
- A vehicle loading gantry for distribution of bitumen to consumers.

Currently there are no "bitumen specific" terminals available in South African ports. To establish such infrastructure (ideally at Durban, Port Elizabeth and Cape Town) would require major capital investment. Such investment could probably only be justified with some guarantee of a sustainable demand for imported bitumen.

Currently local bitumen importers make use of discharging systems/methods that are less cost effective due to multiple handling that increases labour and transport costs. Bad weather (rain in particular) can also delay off-loading of vessels and ad substantially to the turn-around time of bitumen shipments which further adds to the cost due to high demurrage fees.

Figures 1A and 1B below illustrates two temporary systems for discharging bitumen as an alternative to a permanent bitumen terminal.

Quayside Ship to Shore Bitumen Unloading Systems

Figure 1A – Ship to shore arrangement to discharge bitumen directly to road tankers

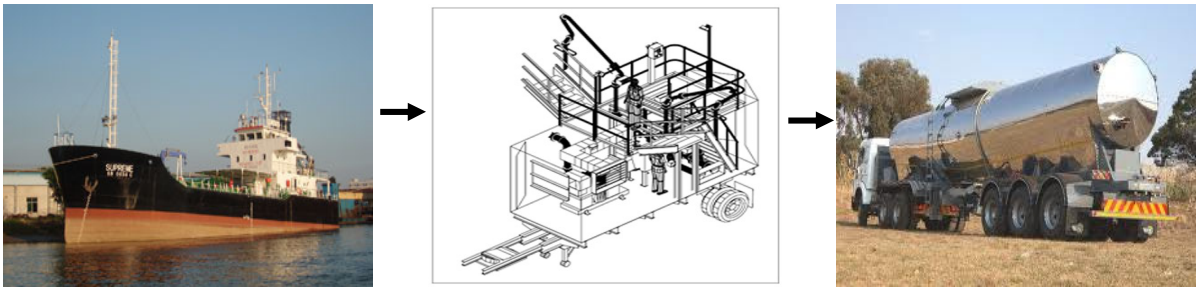

Figure 1B – Ship to shore discharge using a mobile discharge system positioned alongside the vessel. The mobile unit has a temporary holding tank and a manifold with loading arms that allows more than one road tanker (up to four) to be loaded simultaneously.

7 Bitumen import specific Health, Safety and Environmental management

Bitumen importers must understand that safety is critical to the tanker industry and that the associated activities are managed in accordance with a strict control framework within which shipping operates.

The framework embraces a number of regulatory requirements and industry safety management principles aimed at assuring enhanced HSE awareness and compliance with operational best practice.

Following below is a brief overview of the minimum HSE regulatory requirements and management expectations:

7.1 Tanker and terminal operations

The *International Safety Guide for Oil Tankers and Terminals* (ISGOTT) is the standard reference work on the safe operation of oil tankers and the terminals they serve. The Guide is divided into four sections:

- Part 1: General Information;
- Part 2: Tanker Information;
- Part 3: Terminal Information; and
- Part 4: Management of the Tanker and Terminal Interface.

Parts 1 & 2 of ISGOTT deal mainly with petroleum properties and hazards and with Tanker shipboard operations whilst Parts 3 & 4 is more relevant for purposes of this guide.

7.1.1 Export terminal and Tanker voyage operations

Operations in this particular context refer to the loading of bitumen at the port of export and the voyage to the in-bound port.

Whilst it is probably not possible to be directly involved in ensuring compliance with mandatory standards it is imperative that bitumen importers and terminal operators seek assurance that vessels chartered for transporting bitumen to our ports comply with applicable international, national and local marine regulations.

There are a myriad of certificates of fitness/compliance required in terms of MARPOL and SOLAS and many of these are specifically applicable to operation of Oil Tankers. Importers must ensure that their shipping agents or supplier representatives can provide written assurance of the vessel certification as applicable.

7.1.2 In-bound port cargo handling and terminal operations

The port authority (Harbour Master/Manager) requires terminal operators to compile HSE procedures for approval by the TNPA and also monitor terminal operations to ensure that they adhere to the procedures.
Besides procedures covering the Health and Safety aspects a major focus is on the prevention of spillages of cargo, especially cargo that would be a pollutant if it were to fall into the harbour. Procedures will also be required to prevent spilled cargo from entering the harbour water.

The ISGOTT is incorporated as a standard in the Port Rules in terms of the National Ports Act No. 12 of 2005. Bitumen importers must avail themselves of the contents of the ISGOTT as the following chapters are of particular relevance for port cargo handling and terminal operations:

PART 3: TERMINAL INFORMATION

- **Chapter 15, Terminal Management and Organisation** describes the risk based systems and processes that should be in place to ensure the safe and efficient operation of the terminal;
- **Chapter 16, Terminal Operations** provides information on a range of terminal operational procedures and activities that influence the safe receipt and handling of ships;
- **Chapter 17, Terminal Systems and Equipment** describes equipment that should be provided by the terminal at the ship/shore interface, including fendering, lifting, lighting and bonding and earthing equipment;
- **Chapter 18, Cargo Transfer Equipment** describes hard arms and flexible hoses used to make the ship/shore connection. The type of equipment is described, together with recommendations regarding its operation, maintenance, inspection and testing. If not properly engineered and maintained, this equipment will provide a weak link that may jeopardise the cargo system's integrity;
- **Chapter 19, Safety and Fire Protection** contains general guidance on safety management at marine terminals and specific recommendations on the design and operation of fire detection and protection systems;
- **Chapter 20, Emergency Preparedness** deals with the preparation of terminal emergency response plans and with the provision of resources and training necessary to support them;
- **Chapter 21, Emergency Evacuation** describes the elements that should be included within a terminal's evacuation plan and provides guidance on options to ensure that a safe and effective means of emergency escape is available;

PART 4: MANAGEMENT OF THE TANKER AND TERMINAL INTERFACE

- **Chapter 22, Communications** deals with communications required between the tanker and the shore, including pre-arrival communications between the tanker and local port authorities and between the tanker and the terminal;
- **Chapter 26, Safety Management** provides a summary of information for assisting the ship and the terminal jointly to manage personnel and operational safety. A Ship/Shore Safety Check-List is included in this Chapter, together with guidelines to assist its completion.

Bibliography

The author acknowledges that in compiling this guide the following publications were extensively consulted as appropriate technical and regulatory information sources:

1. International Safety Guide for Oil Tankers and Terminals, Fifth Edition, 2006 ISBN-10 1856092917
2. Harbour Master's Written Instructions, 2007 issued in terms of the National Ports Act (Act 12 of 2005)
3. Marine Terminal Particulars Questionnaire (MTPQ) Guidelines, published by OCIMF May 2011
4. Port Rules, issued in terms of the National Ports Act, No. 12 of 2005, 6 March 2009