MS&L Procedure

PRO-4.5-0001-1-10
Leaded Tank Entry Procedure

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To review changes, refer to the 'Version Summary' at the end of this document.

Contents

List of Tables, Diagrams and Figures

1. Purpose

This Procedure advises on the special and additional requirements on entry to Leaded and Previously Leaded Tanks and assumes that all other Control of Work requirements have been satisfied.

This Procedure is based on the Energy Institute guidance on the declassification of tanks previously in leaded gasoline service and the Innospec Environmental (formerly Octel) Leaded Gasoline Tank Cleaning Booklet. Both documents are available in the Published Documents Area of Livelink.

This procedure relates to OMS sub element 4.5.

This procedure specifically details the requirements of the following documents:

- Innospec OIP5 Leaded Gasoline Tank Cleaning Booklet
- Energy Institute guidance on the declassification of tanks STAND-G-053-009

2. Scope

This Procedure specifies requirements relating to organic lead hazards and entry into Leaded Tanks and Previously Leaded Bulk Tanks, not for assets that are painted with leaded paint.

PRO-4.5-0001-1-04 Confined Space Entry shall be met in addition to the requirements of this Procedure prior to any tank entry or work.

The requirement specified in this procedure applies equally to BP employees, contractors and visitors engaged in the ANZ MS&L business.

Specific sites, areas and activities may have more detailed OMS requirements and where these exist the requirements will be specified in local procedures, safe work instructions, manuals, handbooks or specific standards.

3. Terms, Definitions and Abbreviations

Table 1: Terms, Definitions and Abbreviations

ANZ MS&L	Australia and New Zealand (ANZ) Marketing, Supply & Logistics (MS&L) business.
BP Representative	Person accountable for execution of entry into a Leaded Tank
Breathing Apparatus	A form of respiratory protection that provides compressed breathing quality air to the wearer. The air may be supplied by airline or may be carried in bottles. The air may be supplied to the user through a full face mask or a helmet.
Fume or dust generating work	Work that is capable of generating lead dust or fume from tank surfaces or scale.
Leaded Tank	Any tank that cannot be proven (using tank history or valid declassification records) to be Non Leaded or Previously Leaded (Typically Slops and AVGAS tanks).
Leaded Fuel	A fuel that contains more than 0.05% Leaded Product as specified on the Safety Data Sheet (SDS).
Leaded Product	An organic lead compound, usually tetramethyl lead or tetraethyl lead, added to some fuels to improve the octane rating.
Non Leaded Tank	A Leaded Tank that has been declassified in accordance with PRO 4.5-0001-1-11; or Never contained Leaded Product as verified with the tank history.
PPE	Personal Protective Equipment
Previously Leaded Tank	A Tank that has not held Leaded Fuel for 10 years and has been cleaned and not reintroduced with Leaded Fuel post cleaning
Resting ECG	An interpretation of the electrical activity of the heart over a period of time, as detected by electrodes attached to the outer surface of the skin and recorded by a device external to the body.
Spirometry	A measurement of lung function, specifically the measurement of the amount (volume) and / or speed (flow) of air that can be inhaled and exhaled.
Visual Inspection	Entering a tank to perform a visual inspection and without conducting any additional physical work.
Worker	Any person entering a tank

4. Roles and Responsibilities

The roles and responsibilities associated with this procedure are listed in the following table.

Table 2: Roles and Responsibilities

BP Representative	Where Leaded Tank entry is required, the BP Representative shall: • Appoint a supervisor accountable for the implementation of this procedure; • Ensure that the party conducting leaded work has identified a means of disposing of lead contaminated waste and residue in accordance with local regulations; • Ensure the party conducting leaded work implements and verifies a process to: a) Ensure workers who do not pass the Breathing Apparatus (BA) medical do not undertake BA related work inside a Leaded Tank; b) Ensure urine and, where applicable, blood samples are taken and assessed for lead contamination before, periodically during and following lead work in accordance with this procedure. c) Exclude Workers who return an elevated urine or blood from commencing or continuing work inside a Leaded Tank; d) Notify the worker and BP of any elevation of levels of lead in urine or blood that may have arisen from work inside the leaded tank.

5. Methodology

5.1. Medical Requirements for Wearing a Breathing Apparatus

5.1.1. Breathing Apparatus Medical

Workers that are required to wear BA inside a Leaded and Previously Leaded Tank shall have completed a BA Medical Assessment within two years prior to entering a tank.
The medical assessment shall address the risks to the cardiac, respiratory and musculoskeletal systems associated with BA use, and by signed by a Registered Medical Practitioner. Tests should include:

- Review of medical history;
- Physical examination (including respiratory and cardiovascular assessments);
- Resting ECG; and
- Spirometry.

5.1.2. Medical Confirmation

Medical confirmation that the worker is fit to wear BA within 2 years shall be provided to the BP Representative (FRM-4.5-0001-1-10 can be used for this purpose). A copy shall also be provided to the Worker.

Without this confirmation the BP Representative shall not allow the Worker to enter the confined space.

Where the worker is a BP employee, they shall utilise the services of BP's preferred medical provider - refer to the Health & Wellbeing Medical Services intranet page.

5.2. Medical Requirements for Entering a Leaded Tank

The requirements of this section are not required for entry into Previously Leaded Tanks.
The requirements of this section are not required for Visual Inspection of Leaded Tanks post cleaning.

5.2.1. Urine and Blood Samples

A urine sample shall be collected for all Workers required to enter a Leaded Tank.
A blood sample shall be collected for all Workers required to engage or assist directly in fume or dust generating work.
Urine and/or blood samples shall be collected by a Registered Medical Practitioner.

Samples shall be collected:

- As close as possible prior to commencing work within the Leaded Tank, but after other potential lead exposure has ceased;
- Within two days of completing Leaded Tank Entry work; and
- At the end of every working week for Leaded Tank Entry work that lasts longer than one week.

5.2.2. Sample Results

If results of pre / mid / post job test are elevated, as per Table 3, the Worker shall not enter the tank until the results have returned to normal readings.
Verification that the worker's levels are below those indicated in Table 3 signed by a registered medical practitioner should be provided to the BP representative at each testing stage.

At each stage the worker shall be informed of their test results.

Table 3: Blood and Urine Limits

Lead Limits	Fume or dust generating work	Non fume or dust generating work only
Lead / Creatinine Ratio in Urine	20 µg/g or 10.9 nmol/µmol creatinine (females) 40 µg/g or 21.8 nmol/µmol creatinine (males)	20 µg/g or 10.9 nmol/µmol creatinine (females) 40 µg/g or 21.8 nmol/µmol creatinine (males)
Blood Lead	10 µg/dL or 0.48 µmol/L (females) 30 µg/dL or 1.45 µmol/L (males)	Not Applicable

5.3. Medical Record Keeping

Information provided to the BP representative should reflect capacity to safely perform their role only (i.e. 'fit for work'; 'fit with restrictions' or 'not fit'). Specific medical information (test results etc.) shall be maintained by the worker's direct employer in accordance with privacy legislation. For BP employees this will be retained in BP's confidential Medical database.

The BP Representative shall securely store and retain:

- Evidence that the worker was fit to use BA

- Evidence that the worker had urine, and if required blood, levels at or below the required standard prior to, during and following completion of lead work
- Evidence that, where urine or blood samples were elevated, the worker was not permitted to resume lead work until the levels had returned to a satisfactory level.

The Health Team shall retain all copies of BA and biological monitoring Forms, medical history examinations and tests and pathology results for BP employees entering Leaded Tanks received as per WIN-3.4-0004-0-02 Management of Medical Records.

The Health team may be contacted to determine if a Worker has passed a BA medical within the last two years.

5.4. Leaded Tank Entry

The requirements of this section are not required for entry into Previously Leaded Tanks.

5.4.1. Exclusion Zone

An exclusion zone shall be clearly marked and controlled. The location of the exclusion zone should be the bund or otherwise be determined by a risk assessment.

Table 4 outlines the minimum PPE requirements when entering the exclusion zone.

Table 4: Exclusion Zone PPE Requirements

Task	Minimum PPE Requirements
Removal of Gas from Tank	Half face respirator with organic (A1) cartridge
All other times	Determined by task risk assessment

5.5. Health and Safety Requirements

5.5.1. Hygiene

Workers shall wash face and hands prior to eating, drinking or smoking.

Prior to leaving site at the end of the day, Workers shall ensure all contaminated or potentially contaminated areas of the skin are thoroughly washed.

5.5.2. Training

All people entering the tank shall be aware of the content of Organic Lead Essentials (Annex A -).
A signed copy shall be contained in the permit set.

5.5.3. Equipment

The following equipment shall be in place in place in advance of lead tank entry:

- Basin / mechanism to decontaminate tools, equipment and Personal Protective Equipment (PPE);
- Tray for washing down suits (if applicable) and boots;
- Equipment to mark exclusion zone around the tank;
- Mechanical ventilation equipment (including ducting);
- Waste bins or drums with lids for lead contaminated waste;
- Air supply hose reinforced typically PVC with terylene or nylon, nominal internal diameter 10 mm, external 17 mm;
- Specific PPE – rubber boots, fire retardant light disposable coveralls (if low splash potential) or fire retardant chemical protective coveralls (high splash potential or high pressure spraying), fire retardant overalls (i.e. Nomex) and balaclava (for cleaning only), PVC gauntlets;
- Breathing air supply system complying with AS / NZS 1715; and
- Respirators and cartridges able to meet requirements of this Technical Note. Respirators and cartridges shall comply with AS / NZS 1716. Models compliant include:

a) Half face and full face negative pressure respirators used with A1P2 (or A1P3) cartridges; and

b) P2 disposable mask shall not be used during Leaded Tank entry as it does not protect against organic lead vapours.

- Change or wash room; and
- Wind indicator.

5.5.4. Gas Freeing and Cleaning Requirements

The Leaded Tanks shall be gas free and cleaned.

The following objectives shall be completed wherever possible:

- Remove all loose adherent material that has been in direct contact with residue (normally tank bottom, internal piping and side walls of the first shell strake) as well as areas around the roof trusses when reasonably practicable;
- Remove and thoroughly clean any materials, linings, insulation, wooden supports or concrete bottoms with the potential to absorb liquids and release organic lead vapours; and
- Remove residue as early as practical and before drying out as this creates elevated dust levels. Small quantities of water may assist to wash residue and liquid into a sump for removal.

Ventilation and PPE requirements for the Gas Freeing and cleaning process are outlined in Table 5.

Table 5: Ventilation and PPE Requirements for cleaning and entry

Work Type	Ventilation	Minimum PPE Requirements
Gas Freeing	Contaminated vapour should be extracted or displaced from a low level inside the tank (organic lead vapour is heavier than air); Contaminated vapour should be expelled at a high level on the downwind site (to minimise risk to personal at ground level); and Ducting may be used to achieve these aims.	Opening manholes, fitting ventilation equipment and sampling (tasks that involve no entry) is: • Half face respirator with organic cartridge (A1); • PVC or Nitrile Gloves. Entering the tank: • BA; • Rubber boots;

Tank Cleaning	Mechanical dilution ventilation shall be running at all times.	• Fire retardant Light disposable coveralls (low splash potential) or Fire retardant chemical protective coveralls (high splash potential); and • PVC gloves. • Nomex overalls and balaclava until tank is gas freed. The splash potential of the tank shall be determined by risk assessment.

5.5.5. Decontamination and Inspection

The cleaning of tools, equipment and PPE shall be completed after leaving the tank. The method to decontaminate is to wash with soapy water and remove all visible contamination.

Air hoses shall be inspected at the completion of each day, for physical deterioration and removed from service if necessary.

5.5.6. Work after Completion of Gas Freeing and Cleaning

Table 6 outlines the ventilation and minimum PPE requirements for fume or dust and non-fume or dust generating work.

Abrasive blasting is considered fume and dust generating work however ventilation is not required due to the nature of the task.

Upon review of Lead in Air monitoring results post gas freeing and cleaning, the PPE requirements in Table 6 may be relaxed by the Health Team if justified.

Table 6: Ventilation and PPE Requirements for Post Cleaning and Gas Freeing

Work Type	Task	Ventilation	Minimum PPE Requirements
Non-Fume or Dust Generating Work	All	Mechanical dilution ventilation shall be running at all times	Half face respirator with organic cartridge (A1); PVC or Nitrile Gloves.
Fume or Dust Generating Work	Abrasive or Water Blasting	None	BA with hood or helmet. Protective suit or clothing, protective gloves and footwear.
	Tasks other than Abrasive Blasting	Mechanical dilution ventilation shall be running at all times	BA with hood or helmet; or Supplied air welding headpiece.

5.6. Previously Leaded Tank Entry

Previously leaded tanks present a much lower lead exposure risk to workers. However, previously leaded tanks may still contain some inorganic lead in scale.

Although the requirements of Section 8 do not apply to previously leaded tank entry, they may be adopted as best practice control measures.

Requirements for all previously leaded tanks are listed in Table 7.

Table 7: Ventilation and PPE Requirements for Previously Leaded Tank Entry

Work Type	Task	Ventilation	Minimum PPE Requirements
Gas Freeing	All	Determined by task risk assessment	Determined by task risk assessment
Tank Cleaning	All	Determined by task risk assessment	
Non-Fume or Dust Generating Work	All	Determined by task risk assessment	Determined by task risk assessment

Fume or Dust Generating Work	Abrasive or water Blasting	Determined by task risk assessment	BA with hood or helmet. Protective suit or clothing, protective gloves and footwear.
	Tasks other than Abrasive Blasting	Determined by task risk assessment	Half face respirator with P2/P3 filter or PAPR with P2/P3 filter Gloves

5.7. Lead Contaminated Waste Disposal

The BP Representative shall determine the appropriate means of disposing of lead contaminated waste and residue in accordance with local regulations.

6. Verification

Self-Verification of OMS sub-element 4.5 should be included in a Self-Verification Programme. Refer to PRO-8.2-0001-0-01 MS&L Self Verification Procedure for further details to developing self-verification protocols.

7. Associated Documents

The following associated documents:

- Have been referenced in this procedure.
- Should be considered in understanding and applying the instructions provided in this procedure.

Table 8: Required References

Document Name	Document No	Document Location
Breathing Apparatus Medical Confirmation Form	FRM-4.5-0001-1-10	Controlled Document Register
Guidance on the Declassification of Tanks Previously in Leaded Gasoline Service	STAND-G-053-009	LiveLink
Requirements for Safe Entry and Cleaning Petroleum Storage Tanks	API 2015 Ed.8	SAI Global Standards On-line
Innospec Environmental Leaded Gasoline Tank Cleaning Booklet	InnospecOIP5	LiveLink
Leaded Gasoline Tank Cleaning and the Disposal of Sludge		Associated Octel Company
Leaded Tank Biological Monitoring (Fume or Dust generating Work)	FRM-4.5-0001-1-12	Controlled Document Register
Leaded Tank Biological Monitoring (Non Fume or Dust generating Work)	FRM-4.5-0001-1-11	Controlled Document Register
MS&L Self Verification Procedure	PRO-8.2-0001-0-01	Controlled Document Register
Permit to Work Procedure	PRO-4.5-0001-1-01	Controlled Document Register
Previously leaded tank declassification	PRO-4.5-0001-1-11	Controlled Document Register
Project Health and Safety Environmental Management Plan (PHSEMP)	FRM ANZ 01-09 01	Standards Library (LiveLink)
Respiratory protective devices	AS/NZS 1716-2012	Standards Australia
Selection, use and maintenance of respiratory protective equipment	AS/NZS 1715-2009	Standards Australia
Management of Medical Records	WIN-3.4-0004-0-02	Controlled Documents Register

8. External References

This procedure was prepared with reference to relevant legislation/regulations including but not limited to, relevant Acts, Regulations, Australian Standards and industry codes and practices.

Details of current legislation/regulations can be provided by the HSSE Team on request.

9. Version Summary

The table below provides a summary of version history of this procedure.

Table 9: Document Version Summary

Version	Prepared by	Description of Change	Date	MoC
1	Andrew Bennett	Supersedes TN ANZ 01-02 02. Changed from Technical Note to OMS Procedure. Created new section (5.6) on management of previously leaded tanks – these were previously managed as leaded tanks as per Section 5.5. Other small wording changes, additions or deletions.	11 Nov 14	10266
2	David Venour	Changes in management of medical information to reflect privacy requirements and be less prescriptive on how contractors should adhere to health monitoring requirements.	15 May 18	11434

End of Document

Annex A - Organic Lead Essentials

WHAT IS ORGANIC LEAD?

- Organic lead in the petroleum industry refers to tetraethyl lead (TEL) and tetramethyl lead (TML).
- It was used as an octane-boosting additive for petrol and is still used in Avgas up to concentrations of 0.2%.
- Organic lead may be found in sludge, residue or scale in Avgas or previously leaded tanks
- Organic lead may convert into inorganic lead over time.

HOW WILL IT AFFECT MY HEALTH?

- Effects of high levels of organic lead exposure include mania, convulsions and brain damage.
- Effects of moderate organic lead exposure above the exposure standard include metallic taste in the mouth, nervous irritability, tinnitus, insomnia, fatigue, muscle pain, disturbed vision, gastrointestinal distress and tremors.

HOW CAN I BE EXPOSED?

- Organic lead exerts its effects after being breathed in or absorbed through the skin.
- Inorganic lead may be released into the air when hot work is conducted on surfaces exposed to organic lead.

WHAT ARE THE ORGANIC LEAD HEALTH GUIDELINES?

- The Safe Work Australia National Exposure Standards for organic lead are:

	TEL	TML	Inorganic Lead
8-hr Time Weighted Average Exposure Standard	0.1 mg/m^3	0.15 mg/m^3	0.15 mg/m^3
Short Term (15 minute) Time Weighted Avg. Exposure Standard	NA	NA	NA

- Air monitoring is not usually carried out since results take >2 days and don't take into account skin exposure

HOW CAN I CONTROL MY EXPOSURE?

- For entry into leaded tanks, the following controls shall be carried out:

a) Medical assurance that Workers are fit to wear BA
b) Mechanical Dilution Ventilation to be running at all times while Workers are inside the tank
c) Cleaning PPE to include BA, Fire Retardant Coveralls, Gumboots and PVC or nitrile gloves
d) Inspection PPE to include half face respirator with organic cartridge + PVC or nitrile gloves
e) Fume or dust generating work PPE to include BA or supplied air welding hood (Trades Assistant included)
f) Disposable PPE and soiled clothing to be disposed of as lead contaminated waste
g) Reusable PPE to be washed with soapy water immediately after exiting Tank
h) Workers to wash face and hands prior to eating, drinking or smoking and all potentially contaminated areas of skin before leaving site at end of day (cleaning contractor only)

- For entry into leaded tanks, regular biological monitoring will be carried out to make sure the above controls are working.

WHAT ELSE CAN I DO?

- Consult your Supervisor or Terminal Management if you have any concerns

SIGN AND ATTACH TO PERMIT SET

Name …….. Sign……..

Date……..