Clean and maintain surface extraction sites and equipment

MITO Workbook

Name .....

MITO ID Number .....

Workplace Supervisor .....

Name of Business .....

Unit standard 8900

mito

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Contents

Introduction

This workbook has been developed to help you learn how to clean and maintain extraction plants and sites.

Imagine if surface extraction plants and sites were not regularly checked and cleaned. Equipment would constantly break down. Most of the time, it is only during cleaning that you can see the parts of plant and equipment that need maintenance and repair. Failing to regularly check and clean equipment could be costly for extraction companies. Additionally, undetected **hazards** on sites due to a lack of checking and cleaning could result in serious injury for both workers and visitors.

At all times, preventative checking and cleaning must be carried out within health and safety guidelines. Check to see that the company you are working for has these guidelines clearly in place.

Please send any feedback about this workbook to resourcecomments@mito.org.nz.

Objectives

After completing this workbook you will be able to:

- clean mobile surface extraction plants
- clean fixed surface extraction plants
- maintain and clean extraction site areas.

At the back of this workbook there is a **glossary**. A glossary is a list of words and their meanings. Most of the industry words in the workbook are in the glossary. This section will be useful to those who are not familiar with industry terms. Words that are in the glossary are in bold print the first time they appear in the workbook. You can then look the words up in the glossary.

Complete the activities as you work through the workbook. These activities will help you understand the information you are reading and relate it to your workplace.

Workbook layout

This workbook contains several types of study material as indicated by the following icons.

Summary/Key point
When you see this icon, there will be information to explain or summarise something in the workbook that you need to know. This may include interesting facts, questions and answers or where to find extra information.

Activity
When you see this icon, there will be an activity for you to do, which asks you questions about what you have just learnt. These activities will often ask you to record how you do things in your workplace.

Self assessment
When you see this icon, you can confirm your understanding of the section you have just covered. There will be questions to answer and then you can check you are on the right track by marking against the answers in the back of the workbook.

Fast forward
When you see this icon, you can fast forward to the next section of the workbook, if you have already covered this in previous training.

Hands-on activity
When you see this icon, you will be required to complete an activity that will involve you going away and looking for some information or completing a practical activity.

Definition
A definition is the meaning of a word. When you see this icon, it will explain a word or term in the workbook that you need to understand.

In focus
When you see this icon, you can read information about a trainee and the company they work for, or about a real situation that has happened on a worksite similar to yours.

Surface extraction plants

There are two types of surface extraction plants used at mining and quarrying sites. These are **mobile and fixed surface extraction plants**. Unlike fixed plants, mobile extraction plants can be moved from place to place.

Types of mobile surface extraction plants include:

- loaders
- diggers
- cranes
- dumpers
- graders
- transporters
- scrapers
- compactors
- runabouts.

Mobile and fixed

Mobile and **fixed** are words that have opposite meanings.

Mobile: Having the ability to move

Fixed: Remaining in one place.

Mobile surface extraction plant: An extraction plant that can be moved from place to place.

Fixed surface extraction plant: An extraction plant that remains in a specific location.

Types of fixed surface extraction plants include:

- jaw crushers
- cone crushers
- hammermills
- impact crushers (e.g. duopactors)
- conveyors
- sandscrews
- screens
- motor switchboards
- electrical appliances.

The word ‘extract’

Which of the following is an incorrect form of the word ‘extract’?

- Extraction
- Extracting
- Extracted
- Extractional

Fill in the blanks below with the correct form of the word ‘extract’.

1. The Caterpillar 797 mining truck is an example of a mobile _____ equipment.

2. Rock Face Quarries is well known for _____ high quality rock material.

3. Yesterday, Rock Face Quarries _____ a record total of 300,000 tonnes of blue rock material.

Health and safety

Before you start cleaning, you need to think about your safety and the safety of those around you. The health and safety of all workers is very important at any extraction site.

When cleaning mobile and fixed extraction plants, you will be using high pressure cleaning equipment and chemicals (see figure 1). Some of these include the following:

- **compressed air**
- steam
- high pressure water
- low pressure water
- chemicals such as detergents, disinfectants and solvents
- hand shovels
- mops, brushes, cloths and rags.

Using high pressure equipment

Do you know these words?

procedures
shortage
ventilated
cleansers
tagging
compressed air
debris

Check the meanings of these words in the glossary at the back of this workbook before you continue.

Be careful when handling high pressure equipment. Follow these safety **procedures**:

- Operate equipment according to manufacturer's instructions.
- Never direct steam or high pressure water at another person or yourself.
- Never place a compressed air hose against clothing or skin. Air can enter the bloodstream with fatal results.
- Do not direct high pressure water against the ground. Chips can be thrown up.
- Never use water on electrical components as this may cause **shortage** and fire.
- Make sure that the workplace has enough light and is well **ventilated**.
- Always make sure that there is no other person in or near your work area as they may be hit by high pressure water, steam or flying **debris** during cleaning.

Personal protective equipment

Always use suitable personal protective equipment (PPE) when cleaning with high pressure equipment and chemicals.

Always wear eye protection when operating high pressure water, steam or compressed air (see figure 1). Some **cleansers** cause eye irritation. Wear eye protection.
Some cleansers cause skin irritation. Wear gloves.

Figure 1 - Eye protection and hard hat

Other personal protective equipment that you may need to use includes:

- overalls
- gloves or barrier cream
- hard hat
- safety boots
- hearing protection.

Locking and tagging

Further health and safety procedures include locking and **tagging** machinery. All mobile and fixed machinery must be locked out and tagged (see figure 2).

These lockout procedures are as follows:

- Switch off the machinery.
- Place a padlock and signed tag on the switch which can only be removed by the person who signed it.

Figure 2 - Lock out tags

If the machinery cannot be locked out, make sure all guards are in place and that you keep clear of hazardous areas and nip points. An example of a nip point is where a conveyor belt goes over a return roller or under a belt cleaner.

Key point

Think about your safety and others before you start cleaning.

1. Have you got the right personal protective equipment?
2. Do you know how to safely use high pressure equipment?
3. Do you know how to isolate and lockout fixed and mobile machinery?

Cleaning mobile surface extraction plants

There are specific steps that you need to follow before, during and after cleaning.

Do you know these words?

visibility lodge soiled

Check the meanings of these words in the glossary at the back of this workbook before you continue.

Before cleaning

Before cleaning a mobile plant, do the following:

- Park the mobile plant on a level or near level surface.
- Switch off the engine.
- Apply the park brake.
- Drain all pressure systems e.g. compressed air for brakes.
- Lower attachments such as buckets to the ground.
- Securely pin or block any equipment e.g. a truck tray that has been raised for cleaning.
- Check to see that the machinery has been correctly locked out and tagged.

Figure 3 - Lower all attachments to the ground

Unsafe practice

In February 2008, the Department of Labour (NZ) reported an incident where a worker was seriously injured when he was cleaning the excavator boom of a loader.

The loader operator accidently knocked the bucket control, releasing the hand brake. This caused the loader to move forward and trap the worker between the bucket and boom. The worker fell heavily when the loader was reversed.

Source of information: Department of Labour (NZ) Worker Falls From Front End Bucket Loader. Incident Alert. Feb 2008. osh.dol.govt.nz

During cleaning

Clean the mobile plant as follows:

- Clean the outside of the mobile plant using high pressure water, compressed air or steam.
- Clean the windows, windscreens and mirrors, with a suitable cleanser to ensure good **visibility**.
- Remove solid material in truck trays and buckets using a hand shovel.
- Wipe the inside of the cab using a cleanser and cloth.
- Check that the cab is clear of debris and that there are no loose items e.g. grease gun, drink bottles, or stones that may roll or slide and **lodge** under the pedals.

During or after cleaning, it is also important that you inspect the plant for possible damage. Look for the following signs of wear and damage:

- tyre damage and wear
- incorrect track tension
- cracks
- leaks
- loose or missing nuts and bolts
- damaged or worn parts.

After cleaning

When you have finished cleaning, make sure that the following has been done:

- **Soiled** cleaning cloths and empty detergent (cleanser) containers are either cleaned or disposed of according to site rules.

Self assessment
Cleaning mobile surface extraction plants

Question 1

List three safety procedures you must follow before you start cleaning a mobile plant.

Question 2

Why are loose items such as empty bottles a danger in the cab?

Question 3

If a bucket, truck tray etc. cannot be lowered to the ground, what must you do to ensure industry best practice safety?

Self assessment
Cleaning mobile surface extraction plants

Question 4

Apart from high-pressure water, which other high-pressure systems can be used to clean the outside of plant?

Question 5

What should you do to air pressure braking systems before cleaning the equipment?

Question 6

Why should you never direct a high-pressure water system directly at the ground?

Self assessment
Cleaning mobile surface extraction plants

Question 7

Why is it very dangerous to aim a high-pressure air system at yourself or another person?

Question 8

List the six main items of personal protective equipment.

Cleaning fixed surface extraction plants

There are specific steps that you need to follow before, during and after cleaning a fixed extraction plant. Some of the procedures of cleaning a fixed plant are similar to the procedures of cleaning a mobile plant.

Before cleaning

Before cleaning a fixed plant, do the following:

- Check to see that the machinery has been correctly locked out and tagged.
- Make sure that the workplace has enough light and is well ventilated.

During cleaning

Clean the fixed plant as follows:

- Shovel or wash away spillage from machinery, conveyors and walkways.
- If dust suppression devices are in place, use these or water to suppress excessive dust.
- Clean machinery with water (high or low pressure), or compressed air after removing spillage.
- Clean electrical components with compressed air or by hand.
- Clean workshop benches with compressed air, as this is readily available and will not damage any workshop machinery or electrical components.
- Toilets and smoko rooms are cleaned by hand with mops etc. and suitable cleansers and disinfectants.

Key point

Do not use water to clean electrical components. Use compressed air instead.

During or after cleaning, it is also important that you inspect the plant for possible damage. Look for the following signs of wear and damage:

- leaks
- loose or missing nuts, bolts and rails
- cracks
- loose or cracked Vee belts
- damaged or worn parts.

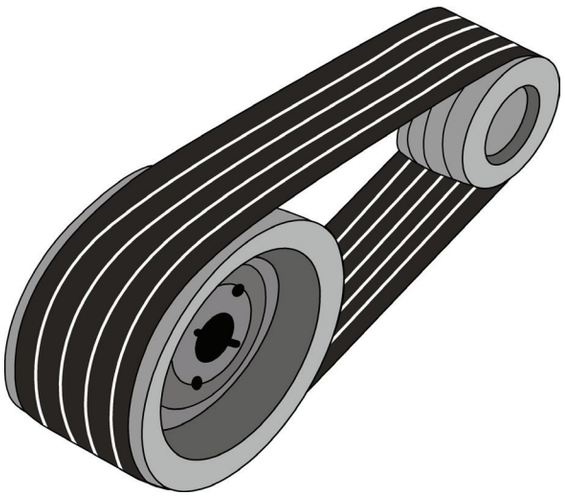

Figure 4 - Correctly tensioned Vee belt

Vee belt

A vee belt is a machine part made up of belt looped around two pulleys in a 'V' shape. Vee belts link an energy generator to a pulley.

After cleaning

When you have finished cleaning, make sure that the following has been done:

- Soiled cleaning cloths and empty detergent containers are either cleaned or disposed of according to site rules.

Self assessment
Cleaning fixed surface extraction plants

Question 1

In what direction should you sweep or shovel spillage around machinery?

Question 2

What method should you use to clean a workbench and why?

Question 3

What sorts of faults in Vee belts should you check for?

Self assessment
Cleaning fixed surface extraction plants

Question 4
Describe the 'lockout' procedure.

Question 5
When is it safe to use water to clean electrical components?

Question 6
If it is not possible to 'lockout' a piece of equipment, what method of protection must be in place?

Self assessment
Cleaning fixed surface extraction plants

Question 7

What is the normal way of cleaning buildings such as toilets, sheds, smoko rooms etc?

Question 8

What are the two main types of fixed plant found on a site?

The extraction site

The site must be regularly cleaned and maintained. Regular maintenance and cleaning is important for safety and reliability.

Health and safety

As you do with mobile and fixed plants, follow health and safety precautions when cleaning and maintaining a site:

- When using high pressure equipment to clean, follow the safety measures described in beginning of this workbook.
- Wear suitable personal protective equipment.
- Do not operate mobile earthmoving equipment unless you are trained and authorised to use it.
- Always notify other personnel, for example equipment operators, that you are working in the area.

Cleaning and maintaining the extraction site

Find out about the procedures that have been put in place for cleaning and maintaining the extraction site at your workplace.

Maintaining the site

Site areas must be maintained according to company rules. Areas that need maintaining are:

- access areas
- weighbridge areas
- subsoil drains
- silt traps
- surface drains
- haul roads
- **culverts**
- quarry benches
- stockpile areas.

Access areas and haul roads

All access and haul roads must be clear of spillage (see figure 5). A grader or loader is used to remove spilled rock and debris.

When you are maintaining and cleaning around the access areas and haul roads, you should check all areas to ensure there are adequate lines of sight for operators of mobile plant or customer vehicles particularly around the quarry entrance, weighbridge, office areas and the product stockyard.

If there is not enough line of sight in any area, then you should immediately let your supervisor know so that appropriate action can be taken.

Figure 5 - Haul roads must be clear of spillage.

Access area signage

Safety signs in access areas, especially gateways and around weighbridge and office areas must be clearly seen by both workers and visitors (see figure 6).

Check to ensure that all signs are able to be read clearly from required distances. Replace safety signs if needed.

Remove or clear away any objects such as trees and weeds that might prevent these signs from being seen.

Figure 6 - Access area signage

Access area signage

All haul roads must be clear of spillage. Access area signage must be clearly seen by workers and visitors.

The word ‘replace’

Fill in the following blanks using the correct form of the word ‘replace’

Scenario

This is a sign found in a mining site.

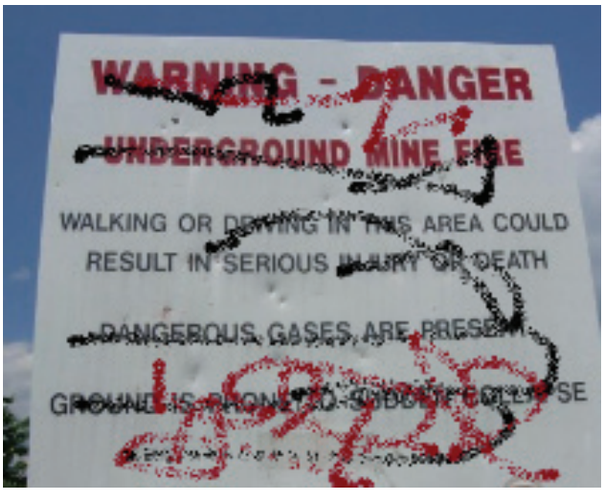

Figure 7 - Does this sign need maintaining?

1. It needs to be _____.
2. When _____ the sign, check to see that no information has been left out.

Surface drains and culverts

Surface drains and culverts often require the use of hand tools such as picks and shovels.

Subsoil drains (underground)

Subsoil drains may require flushing with water using high pressure hoses.

Cleaning the site

There are strict guidelines for waste removal and severe penalties for failing to comply. The rules around discharge consents such as dust and/or water, issued under the Resource Management Act 1991 (RMA) or in the Quarry Management Plan must be followed.

Specific site areas that need constant cleaning include walkways, workshops and stockpiles.

Walkways

Walkways in extraction sites must be cleared of all debris. For ground level walkways, use shovels, water hoses or earthmoving equipment to remove spillage and debris.

For raised walkways (see figure 8), use hand held tools (shovels and brooms) or high or low water pressure hoses. When cleaning elevated walkways, you will need to first secure the area beneath the walkway to prevent other persons from entering the area and being hit by falling materials.

Where there are underground walkways such as in reclaim tunnels, any spillage should either be shoveled back onto the reclaim conveyor (if it is safe to do so) or removed from the tunnel using a wheelbarrow.

Figure 8 - A clear raised walkway

Where there is evidence of spillage onto walkways, part of the cleaning process should involve identifying where the spillage has come from and either fixing the problem that is causing the spillage or at least reporting the problem to your supervisor.

Excessive dust caused when cleaning spillage around walkways must be dampened down with water.

Key point

An important part of cleaning spillage in walkways is finding out where the spillage has come from, i.e the source of the spillage.

Stockpiles

To maintain and clean stockpiles, the following are common cleaning procedures:

- Remove any **spillage** around stockpiles.
- Remove any rubbish or vegetation from around stockpiles.
- Control dust around stockpiles by dampening with water (see figure 9).

Figure 9 - Controlling dust at stockpiles

Workshop

To clean and tidy the workshop, make sure that:

- tools and equipment are stored correctly and not left lying around to create a tripping hazard
- scrap and offcuts of material are cleared away to prevent tripping hazards
- spillages of grease and oils are cleaned up using the correct company procedures, to prevent slipping hazards
- containers of flammable liquids are securely covered with tight fitting lids to prevent sparks causing a fire
- work benches are cleared and wiped clean regularly
- gas bottles are secured to prevent them from falling or being knocked over.

Key point

Store tools and equipment in workshops correctly and clear away scrap material to prevent tripping.

Rubbish bins with tight fitting lids should be provided, and used for the disposal of rags, oily materials or similar flammable materials. Separate bins for the collection of rubbish and scrap metal must be used.

Other areas on site that need constant cleaning and maintaining are the plant wash down bays and silt traps.

Plant wash down bays

At the plant wash down bays, waste water is usually first drained into an open silt trap, which is cleaned out periodically by a loader or excavator. After the primary silt trap, run-off goes into a grease trap or oil separator.

The oil separator is a below ground tank, with a discharge outlet below the level of water in the tank, so that oil and grease float on the surface and are not discharged.

The oil and grease are pumped out at regular intervals by a waste disposal contractor and disposed of off-site.

Silt traps

Most quarries will have a number of silt traps in various areas of the quarry. The common areas to have silt traps are places such as where surface run-off water leaves a bench, at the toe of overburden dumps, where water is discharged from a product washing plant and prior to surface run-off water entering the sediment ponds.

Silt traps should be cleaned out on regular basis before they become more than half full.

Cleaning of silt traps is normally carried out using either a front end loader or an excavator.

Self assessment
Cleaning and maintaining an extraction site

Question 1

Is there anyone you should tell when cleaning your worksite?

Question 2

Most site areas are to be kept clear of spilled rock. How is this usually done?

Question 3

If there is nobody else on the site, is it okay for you to use a grader or loader to clear spilled rock?

Self assessment
Cleaning and maintaining an extraction site

Question 4

Surface drains and culverts are usually cleaned with picks and shovels. What about subsoil drains?

Question 5

How can dust around the stockpiles be controlled?

Question 6

How should ground level walkways be cleaned?

Self assessment
Cleaning and maintaining an extraction site

Question 7

Why should tools and equipment in the workshop not be left lying around?

Question 8

Where does the run-off water from a vehicle/heavy equipment wash go to?

Question 9

Why is the discharge outlet in the oil-water separator always located below the level of water in the tank?

Glossary

C

cleansers	Chemicals that are used to clean surfaces.
compressed air	Air that has been squeezed into a small space.
culvert	Pipe that is used to drain water under a road or access track.

D

debris	Scattered pieces of a damaged object.

F

fixed extraction plant	Extraction equipment that cannot be moved.

G

glossary	A list of words and their meanings.

H

hazards	Things, actions, or events that can cause harm or damage.

L

lodge	To fit something firmly into place.

M

mobile extraction plant	Extraction equipment that can be moved from place to place.

P

procedures Steps or actions that need to be completed before something can be done.

S

shortage A short circuit that has occurred in an electrical equipment.

soiled The state of a cloth or similar material that has been made dirty.

spillage Earth, gravel or ore that has been shifted or lost from equipment during hauling and transportation.

T

tagging Placing a label on something in order to warn or identify.

V

ventilated Having enough air circulating in a room.

visibility Being able to see something clearly.

Answers

Self assessment on page 13
Cleaning mobile surface extraction plants

Question 1
Park the plant on level or near-level ground, switch off the engine and apply the parking brake.

Question 2
Loose items may roll under the driver's pedals.

Question 3
Such attachments must be securely pinned or blocked to ensure they do not fall.

Question 4
You can also use high-pressure steam or compressed air.

Question 5
Drain high-pressure braking systems before cleaning.

Question 6
The pressure may cause loose material to fly upwards causing injury.

Question 7
Compressed air can enter the bloodstream and cause death

Question 8
Six common items of personal protective equipment are:

- **eye protection**
- **overalls**
- **gloves or barrier cream**
- **hard hat**
- **safety boots**
- **hearing protection.**

Question 9

You should also visually check items for:

- **tyre damage and wear**
- **correct track tension**
- **cracks**
- **leaks**
- **loose or missing nuts and bolts**
- **damaged or worn parts.**

Self assessment on page 18
Cleaning fixed surface extraction plants

Question 1

Always sweep spillage away from the machinery.

Question 2

Compressed air is best to clean a workbench because it does not damage the equipment on the bench.

Question 3

Vee-belts should be check for splits and correct tension.

Question 4

The correct lockout procedure is to switch the plant off and place a padlock on the switch, together with a signed tag which can only be removed by the person who signed it.

Question 5

It is never safe to use water for cleaning electrical components of machinery.

Question 6

If the lockout procedure is not possible, ensure all safety guards are in place and that you keep clear of hazardous areas and nip points.

Question 7

Site buildings should be cleaned with brushes, mops and suitable cleaning agents such as disinfectant.

Question 8

The two main types of fixed plant are machines such as hammermills, cone crushers, buildings and containers.

Self assessment on page 28
Cleaning and maintaining an extractive site

Question 1
Always tell the others on site that you are cleaning.

Question 2
Usually a grader or loader is used to clear spilled rock from working areas.

Question 3
You may only use a grader or loader if you are licensed to operate such equipment.

Question 4
Subsoil drains are usually sluiced clean with high pressure hoses.

Question 5
Dust at stockpiles can be controlled by dampening with water.

Question 6
Use shovels, water hoses or earthmoving equipment to remove spillage and debris in ground level walkways.

Question 7
Tools and equipment that are not properly stored in their correct places are a tripping hazard. Tripping hazards can cause accidents.

Question 8
Water used for cleaning heavy machinery runs into a primary silt trap and then into a separator.

Question 9
This allows the water to be drained off, while keeping the oil and grease inside the separator tank. The oil and grease will be removed later.

Activity on page 5
The word ‘extract’

Extractional is incorrect. The correct forms of extract are extraction, extracting, extracted.

1. **Extraction**
2. **Extracting**
3. **Extracted**

Activity on page 24
The word ‘replace’

1. It needs to be **replaced.**
2. When **replacing** the sign, check to see that no information has been left out.

Notes

Notes

Notes

MITO New Zealand Inc.

Level 10, 79 Boulcott Street
PO Box 10803, The Terrace
Wellington 6143, New Zealand

T 04 494 0005 **F** 04 494 0006
0800 88 21 21
E info@mito.org.nz
mito.org.nz