



# Decontamination of Process Equipment



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<b>Owner:</b>	<b>Cameron Hunter</b>
<b>Authoriser:</b>	<b>Simon Guy</b>
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# Decontamination of Process Equipment



## 1. INTRODUCTION

The purpose of this document is to describe the process for decontaminating any item of equipment that has been in contact with hazardous materials prior to repairs or leaving site. This includes, but not limited to, items taken out of service for repair and for the return of hire equipment.

Many items of equipment such as pipes, valves and pumps, while in service, may come into contact with hazardous materials. To ensure that all persons involved in the handling, repair and transportation are not exposed to any hazardous material, the items of equipment must be decontaminated. The decontamination process must take place prior to work being conducted on the equipment, the equipment being relocated from plant areas or being sent to offsite destinations.

The decontamination process described in this document shall be applied to all equipment that has been in contact with any hazardous material including hire equipment. Hire equipment must be free from contamination before being returned.

A decontamination tag system is used to ensure that contaminated items are decontaminated prior to removal from the plant area for handling, repair and transportation.

The system also ensures that readily accessible records of decontamination are available.

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**Note:** For decontamination of plant and equipment within the Ammonia Ammonium Nitrate Manufacturing Facility refer to [AmmoniaAN Decontamination Procedure \(CSBP-GM-11-037-07\)](#)

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**Note:** For decontamination of plant and equipment within the Sodium Cyanide Manufacturing Facility refer to [Sodium Cyanide Decontamination Procedure CSBP-GM-KC-000-07](#)

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# Decontamination of Process Equipment



## 2. DEFINITIONS

### 2.1 HAZARDOUS SUBSTANCES

Hazardous substances are those that, following worker exposure, can have an adverse effect on health.

### 2.2 NON-HAZARDOUS SUBSTANCE

A substance that does not meet the hazardous substances classification criteria and does not have a hazardous classification on its accompanying safety data sheet.

### 2.3 DECONTAMINATE

The process of rendering (an area, building, object, etc.) harmless by the removal or neutralization of harmful substances.

### 2.4 DECONTAMINATION TAG SYSTEM

A process used to communicate, control and authorise the management of equipment decontamination.

### 2.5 TRAINED AND COMPETENT PERSON

A competent person is one who has; through a combination of training, education and experience, acquired knowledge and skills enabling that person to perform a specified task.

### 2.6 DECONTAMINATION PERSON

Any person who can competently follow and perform designated decontamination instructions.

## 3. RESPONSIBILITIES

### 3.1 BUSINESS UNIT MANAGER

The Manager is responsible for:

- a. Providing a safe system of work where persons are not exposed to hazardous substances.
- b. Ensuring that information, instruction, training and supervision of all personnel is provided to enable them to safely perform work involving hazardous substances.
- c. Ensuring that this procedure is followed by all parties involved in decontaminating equipment.

### 3.2 TEAM LEADER / RESPONSIBLE OFFICER (FOR CONTRACTORS)

Team Leaders / Responsible Officers are responsible for:

- a. Ensuring all personnel know and follow established procedures for decontamination.
- b. Ensuring JSA's are developed and approved prior to the commencement of work and checking that required controls are in place when work is being undertaken.
- c. Reviewing and signing completed JSA's.

### **3.3 TRAINED AND COMPETENT PERSON**

Trained and competent person are responsible for:

- a. Determining the method of decontamination.
- b. Completing the relevant sections of the decontamination tag and book.
- c. Inspecting the equipment to ensure that it has been decontaminated effectively.
- d. Authorises the movement of decontaminated equipment from the site.

### **3.4 DECONTAMINATION PERSON**

The decontamination person is responsible for:

- a. Decontaminating the item according to the instructions on the tag.
- b. Signing and dating each step of the decontamination process indicated on the tag.
- c. Informing the trained and competent person that the item is ready for testing and/or inspection

### **3.5 THE WORK PERMIT AUTHORISER**

- a. The Work Permit Authoriser is to adhere to procedural guidelines contained in this guide manual when organising and controlling work involving the decontamination of hazardous substances when undertaken within a Permit to Work.

### **3.6 EMPLOYEES**

- a. All employees, are responsible for ensuring they:
  - a. Participate in the development of the Job Safety Analysis (JSA) and comply fully with its requirements.
  - b. Inspect all equipment intended to be used.
  - c. Do not commence work unless all control measures identified on the JSA are in place.
  - d. Review and re-sign the JSA if the scope of work or conditions change.

## 4. PROCEDURE

### 4.1 CLASSIFICATION OF HAZARDS SUBSTANCES

The classification of a substance is determined through either:

- The Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004) (Approved Criteria) or
- Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

The classification of any material can be obtained from safety data sheets located on Chem Alert. Section 2 of the safety data sheet (Hazard Identification) specifies the substances hazardous classification as per the below categories:

<b>C</b>	Corrosive
<b>E</b>	Explosive
<b>F+</b>	Extremely Flammable
<b>F</b>	Flammable
<b>N</b>	Dangerous for the Environment
<b>O</b>	Oxidizing
<b>T+</b>	Very Toxic
<b>T</b>	Toxic
<b>Xn</b>	Harmful
<b>Xi</b>	Irritant
<b>Muta.</b>	Mutagen
<b>Repr.</b>	Toxic to Reproduction
<b>Carc.</b>	Carcinogen

## 4.2 EXAMPLES OF HAZARDOUS SUBSTANCES

Hazardous substances include but are not limited to:

- Sodium cyanide
- Ammonium nitrate
- Acids
- Hydrogen peroxide
- Chlorine
- Sodium hypochlorite
- Ammonia
- Strong alkalis
- Flammable liquids and gases, for example sulphur dioxide and sulphur trioxide
- Some trace elements: molybdenum, copper, selenium and manganese
- Concentrate scrubber liquors
- Fungicide

## 4.3 NON-HAZARDOUS SUBSTANCES

Equipment and hired machinery used in our processes come into contact with other materials which are not necessarily of a hazardous nature but could be construed as being hazardous. These materials are classified as being non-hazardous, however it is considered good practice to ensure equipment or hired machinery has been thoroughly cleaned before being sent off site for repair or return.

## 4.4 DECONTAMINATION TAGGING SYSTEM

The purpose of the decontamination tag is to:

- Identify the area from which the equipment was removed and the actual equipment details
- Document the method of decontamination and test results
- Authorise movement of the equipment
- Communicate to the receiver that the equipment has been decontaminated along with any special precautions to be observed.

**See appendix 2 - Decontamination Tag**

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**Note:** Decontamination Tag is Form PF 941 (see attached)

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**For a material that is classified as hazardous, the trained and competent person and person decontaminating the equipment shall not be the same person.**

**For a material that is classified as non hazardous, the trained and competent person and the person decontaminating the equipment can be the same person.**

## 4.5 INITIATION OF DECONTAMINATION

Prior to commencing any decontamination work the JSA must be reviewed to ensure that all hazards and controls have been captured and that the JSA is still relevant to the task.

Once the equipment requiring decontamination has been identified the trained and competent person must:

- Determine the method of decontamination relevant to the hazardous substances present.
- Identify the appropriate decontamination area to be used.
- Complete the identification and procedure sections of the tag and sign it.
- Give and explain the tag to the person decontaminating the equipment.
- Inform the decontamination person of any specific areas where contamination may not be visible but will likely be present.

**See appendix 1 - Decontamination Flowchart**

## 4.6 DECONTAMINATION OF EQUIPMENT

The decontamination person must follow the procedure for decontamination as specified on decontamination tag. There are a number of decontamination processes that are available.

### 4.6.1 Dismantling

Many items such as pumps and blowers will require complete dismantling and washing prior to being overhauled. Prior to the dismantling stage a complete drain and wash of the equipment will be required.

All control valves must be stroked to the open position where practicable.

### 4.6.2 Water Wash

Equipment may be required to undergo a wash process. For water flushes the decontamination person must ensure that all surfaces and internal spaces are flushed. The flushing process should commence from the lowest point, through to the highest point. (Initially reverse flushing flow to remove solids). Once the flushing process has been completed the remaining liquid should be drained from the lowest point.

### 4.6.3 Neutralisation

If neutralisation is required the agent documented on the decontamination tag must be used. Some standard neutralisations include:

- Weak sodium hypochlorite (1% available Cl) can be used for cyanides.
- Acids and alkalis may not require neutralisation, depending on pH.

- Sodium carbonate can be used for chlorine.
- Steam purging can be used to remove residual hydrocarbons or chemical fluids.

These are only guidelines and the agent specified on the decontamination tag must be used. Once neutralisation has occurred the equipment must be washed as per the above water wash method.

#### 4.6.4 Sampling and Analysis of Wash Water

The wash water must be analysed to ensure that the decontamination process has been effective. Either the decontamination person or the trained and competent person must sample and analyse:

- The last water running out of the item of equipment or
- The contents of any wash bath after the last wash has been completed.

The allowable concentrations in wash water are:

- 1 ppm for cyanides
- pH 6 to 8 for acids and bases.

#### 4.6.5 Gas testing

If there is a possibility of the equipment containing flammable or toxic contaminants, gas testing will be required.

The allowable gas concentrations contained with equipment must be:

- For flammable contaminants - below 5% of its lower explosive limit.
- For toxic gases - zero.

#### 4.6.6 Cover Openings

In some cases openings may have to be blanked to prevent ingress of water and dust which may be mistaken for contaminant. Generally, manholes and nozzles should be blanked to prevent:

- Ingress of water and dust
- Escape of residue water

#### 4.6.7 Degreasing

All process equipment 'externals' shall be free from oil and grease. Oil galleries, drains and breather ports shall be sealed to prevent loss of oil during transport.

#### 4.6.8 Completion

As each of the decontamination steps are completed the decontamination person must sign and date each in the space provided on the decontamination tag.





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Once all of the steps have been completed the decontamination person must inform the trained and competent person that the item is ready for a post decontamination inspection.

### 4.7 INSPECTION OF DECONTAMINATED EQUIPMENT

Once the decontamination process has been completed and sign off by the decontamination person the nominated trained & competent person must inspect the equipment to ensure that the decontamination has been effective.

The trained & competent person must fill out the completed decontamination section of the decontamination tag or ensure that the person who tested the equipment has completed this section. They must also complete the cleared for work/transit section of the decontamination tag along with any special work precautions required.

The decontamination tag must then be attached to the equipment and the decontamination book must also be completed and retained.

## 5. REFERENCES

Occupational Safety & Health Act 1984

Occupational Safety & Health Regulations 1996

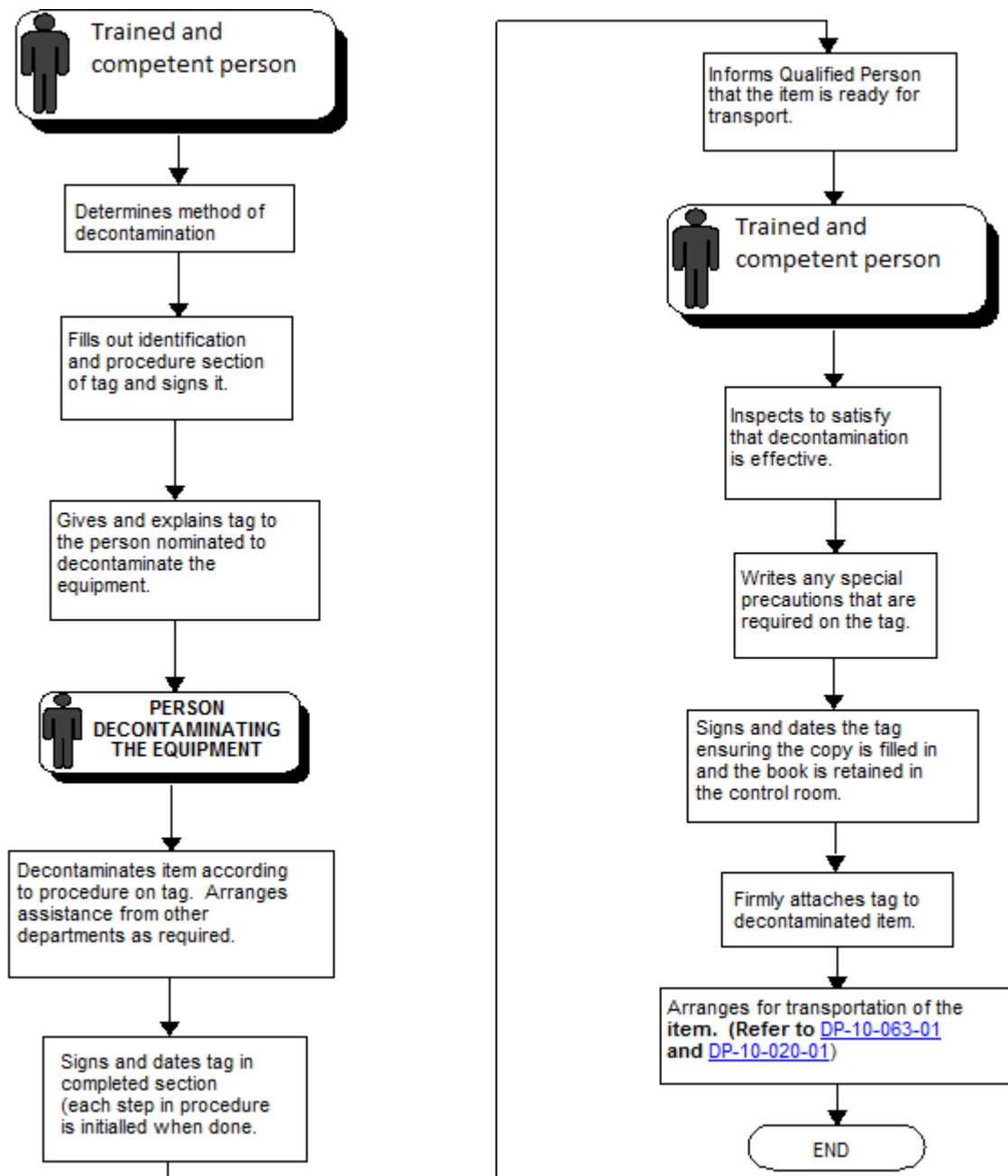
Safe Work Australia – Hazardous Chemicals

Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008 (2004)]

Decontamination Tag Form PF 941

Material Data Sheet Sodium Cyanide Solid

## 6. APPENDIX 1 – DECONTAMINATION FLOWCHART





# Decontamination of Process Equipment



## 7. APPENDIX 2 – DECONTAMINATION TAG

CSBP		DECONTAMINATION TAG No. 25367	
IDENTIFICATION			
Area _____	Plant _____		
Equipment Name _____	Serial No _____		
Service _____			
Contaminant _____			
PROCEDURE FOR DECONTAMINATION/GAS FREEING			
Procedure defined by (print): _____			
Signed: _____		Date: ___/___/___	
	Circle the Requirement		Initial When Done
1. Dismantle	Y	N	
2. Steam Purge	Y	N	
3. Water Wash	Y	N	
4. Neutralise	Y	N	
	With _____		%
5. Water Wash & Drain	Y	N	
6. Test Wash Water for:	Y	N	
7. Allowable Concentration _____			
8. Gas Test	Y	N	
9. Gas Test Type _____			
10. Allowable Concentration _____			
11. Cover Openings	Y	N	
12. Other _____			
COMPLETED DECONTAMINATION/GAS FREEING			
Wash Water Result: _____			
Gas Test Result: _____			
Date: ___/___/___		Time: _____	
Signed: _____		Print Name: _____	
CLEARED FOR WORK/TRANSIT			
Special Work Precautions: _____			
_____			
Date: ___/___/___		Time: _____	
Signed: _____		Print Name: _____	
File copy at: _____			