



ODOUR MANAGEMENT PLAN ELF FARM SUPPLIES SUBSTRATE FACILITY

Prepared for: Elf Farm Supplies Pty Ltd

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Prepared by

Todoroski Air Sciences Pty Ltd

Suite 2B, 14 Glen Street

Eastwood, NSW 2122

Phone: (02) 9874 2123

Fax: (02) 9874 2125

Email: info@airsciences.com.au

Odour Management Plan

Elf Farm Supplies Substrate Facility

Author(s): Aleks Todoroski

Position: Director

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TABLE OF CONTENTS

1	INTRODUCTION.....	1
1.1	Preamble.....	2
2	PROJECT DESCRIPTION	3
3	ODOUR GOALS	5
4	ODOUR MANAGEMENT	6
4.1	Potential Sources of Odour.....	6
4.2	Odour Control	6
4.3	Odour Management Procedure	7
4.3.1	MOD1 - Odour Control Measures for Operation of the Ammonia Scrubbers.....	7
4.3.2	MOD1 - Additional Odour Control Measures for the Biofilter Operation	8
4.3.3	MOD1 - Additional Odour Control Measures	9
4.3.4	MOD1 - Odour Performance parameters	9
4.4	Monitoring to Manage Odour.....	9
4.5	Complaints Management	10
5	ODOUR CONTINGENCY MEASURES	13
6	MOD1 ODOUR MONITORING	14
6.1	Odour surveys	14
6.2	Odour complaints	14
6.3	Example of survey methodology	14
7	CONTINUOUS IMPROVEMENT.....	14

LIST OF TABLES

Table 3-1:	NSW Odour Policy - Odour Assessment Criteria	5
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LIST OF FIGURES

Figure 2-1:	Completed MOD1 Project	4
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1 INTRODUCTION

This report has been prepared by Todoroski Air Sciences (TAS) on behalf of Elf Farm Supplies Pty Ltd (hereafter referred to as the Proponent). The report presents an Odour Management Plan (OMP) and has been prepared in accordance with the conditions set in the Project Approval 08_0255 (MOD3, 16/03/2020), for the Elf Substrate Plant at Mulgrave, NSW (the Project).

The Elf Substrate Plant produces mushroom substrate which is a nutrient-rich growing medium used by mushroom farms for growing mushrooms. Mushroom substrate is produced from natural materials, primarily straw and water, with added ingredients of poultry manure, dry stable bedding, gypsum and agricultural meals and by-products. These materials are recycled leftover agricultural products which are used to produce the growing medium (substrate). After harvesting the mushrooms, the spent substrate is then recycled into the landscaping industry.

The OMP has been prepared specifically for application to the updated facility, which features a large new biofilter and ammonia scrubbers to manage odour. The previous bio-scrubber and associated chimney were decommissioned on 30 June 2018. The plan has been updated from the previous plan by reference to the Modified Conditions of Approval (MOD3, 16/03/2020), as follows:

Modified Conditions of Approval	Where addressed in this OMP
<p>4A. The Proponent must update the Odour Management Plan for the Substrate Plant site, in consultation with the EPA, to the satisfaction of the Secretary. This plan is to update the plan approved under Condition 4 of Schedule 3 and must:</p> <ul style="list-style-type: none"> (a) be prepared by a suitably independent, qualified and experience expert whose appointment has been endorsed by the Secretary; (b) be submitted to the Secretary for approval within one month of the date of endorsement by the Secretary of the odour emissions plant design as required under Condition 3(a) of the approval; (c) identify all major sources of odour (d) included management measures to ensure no offensive odours from the Substrate Plant site; (e) include procedures for the monitoring of odour emissions, in accordance with the requirements if the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales and any requirements of the EPA. The odour monitoring program must include, but not be limited to: <ul style="list-style-type: none"> i. results of the complaints handling system; and ii. system and performance review for continuous improvement; (f) include odour management performance parameters that are consistent with the manufacturers' performance guarantees provided for the biofilter and scrubbers; (g) include measures to prevent and/or mitigate fugitive emissions (h) include triggers for remedial and contingency action; and (i) include contingency measures in the event of failure of any component of the odour emissions plant and biofilter system or identification of fugitive emissions from the facility. Contingency measures must include enclosing the West Water Recycle pit and treating the post 36 hour emissions from the Phase 2/3 building via the ammonium scrubbers and biofilter. <p>4B. The approved updated Plan (as revised and approved by the Secretary from time to time), must be implemented for the life of the Project as soon as written endorsement by the Secretary is received.</p>	<ul style="list-style-type: none"> (a) Section 1. (b) – (c) Section 4.1 and 4.4 (d) Section 4 and 5 (e) Section 4.5, 4.6 and 4.7 (f) Section 4.3.1 to 4.3.4 (g) Section 4.2, to 4.6. (h) Section 4.3.1 to 4.3.3, 4.4 and 4.6 (i) Section 5

1.1 Preamble

This Odour Management Plan is designed to describe the measures that will be implemented to minimise the odour impacts of the Project. The OMP includes operational and control measures for normal and abnormal conditions which can generate odour. Note that there is a separate 'Complaints Procedure' for odour complaints management.

The OMP is intended to be used as a reference document for operational staff on a day-to-day basis and shows what actions will be taken to minimise potential odour impacts and who is responsible for authorising or undertaking the action.

The OMP details the operational control measures appropriate for management and control of odour. The OMP also aims to document the possibility of unanticipated events, such as equipment failure. Preventative and contingency actions in the event of equipment failure include appropriate maintenance work to be undertaken to reduce the likelihood of failures, and where possible keeping spare equipment to replace key odour control related equipment in the event of a failure.

The Odour Management Plan is made available on the company website and can be made available in hard-copy or reference to any regulator and all site personnel.

The OMP addresses the following:

- ✦ Identify the activities which have potential to produce odour and the sources of odour emissions;
- ✦ Include management measures to minimise odour generation and ensure no offensive odours;
- ✦ Outline an odour monitoring program;
- ✦ Include triggers for possible measures to manage potential operational process or control failures or abnormal situations; and
- ✦ Record keeping of complaints and other operational aspects related to odour generation.



2 PROJECT DESCRIPTION

The Elf Substrate Plant is located at Mulgrave approximately 2km southeast of Windsor, NSW (see **Figure 2-1**). The site is surrounded by isolated semi-rural properties to the southeast, an industrial area to the east and northeast. Immediately to the west of the facility is a floodplain area and adjoining this is a suburban residential area.

The substrate plant will progressively expand by upgrading its operations in stages designed to ensure the production rate of substrate material matches increasing demand. The expansion includes significant new controls at the Plant to reduce odour emissions and increase the capacity of the facility to reach a maximum of 3,200 tonnes of Phase 1 substrate per week.

The scope of the current modified expansion is outlined below.

- ✦ Enclosure of the raw materials storage and handling area;
- ✦ The bio-scrubber and chimney has been decommissioned;
- ✦ The pre-wet building is used for bale wetting, thus enclosing this activity;
- ✦ A straw bale breaking line in the current pre-wet shed;
- ✦ Construction and utilisation of tunnels for the phase I substrate production;
- ✦ Ammonia scrubbers and biofilter in operation and tested on an annual basis for performance; and
- ✦ Extraction ductwork to extract air from various operating areas of the plant.



Figure 2-1: Completed MOD1 Project

3 ODOUR GOALS

Odour assessment criteria are defined in the NSW Office of Environment and Heritage (NSW OEH) document "*Technical Framework: Assessment and management of odours from stationary sources in NSW*" (2006), to guide decisions about effective odour management and the potential to cause harm or unreasonably interfere with a community's quality of life. **Table 3-1** summarises the NSW odour policy assessment criteria.

The criteria refer to odour dilutions, or odour units (OU). The odour assessment criteria allow for population size, range in sensitivities to odours within the community, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectations of amenity.

Table 3-1: NSW Odour Policy - Odour Assessment Criteria

Population of affected community	Odour assessment criteria (OU)
Rural single residence (≤ 2)	7.0
~10	6.0
~30	5.0
~125	4.0
~500	3.0
Urban area (≥ 2000) and/or schools and hospitals	2.0

The odour goals relevant to the existing operation of the substrate plant were applied to the odour impact assessment, and were derived per the NSW odour policy on the basis of the population density of the receiving area, as follows:

- ✦ For the surrounding urban areas of McGraths Hill, Windsor and South Windsor, where the population of the affected community is 2000 or more, the appropriate goal is for odour at the receptors not to exceed **2 odour units** for 99 per cent of the time in any year; and,
- ✦ For the rural village of Mulgrave, where the residential population is substantially smaller and a population of approximately 10 is assumed, the appropriate goal is for odour at the receptors not to exceed **6 odour units** for 99 per cent of the time in any year.

For MOD1 modelling a single 2 OU criterion was applied for all receptor locations.

It is important to note that the NSW EPA odour criteria only apply to modelled odour levels, whereas an approved, actual operating facility is assessed on the basis of its actual odour, in terms of offensiveness of the odour.

Offensive odour is defined per Section 129 of the POEO Act as an odour that by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstance is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or response of a person who is outside the premises from which it is emitted, or that is of a strength, nature, duration, character or quality prescribed by the regulations or that is emitted at a time, or in other circumstances, prescribed by the regulations.

4 ODOUR MANAGEMENT

4.1 Potential Sources of Odour

The sources of odour at the Elf Substrate Plant that include the major sources identified per Approval Condition 4A(c) include the following:

- ✦ Bale wetting hall
- ✦ Water recycle pit;
- ✦ Phase 2 filling and pasteurisation operations (ducted to biofilter); and
- ✦ Biofilter.
- ✦ Dam
- ✦ Raw materials storage area
- ✦ Working Hall(s)

4.2 Odour Control

The current operational features to further control, maintain and manage odour emissions include:

- ✦ Fully enclosed processing and raw materials areas, for all major odour-generating processes and products, maintaining a slight negative pressure
- ✦ Undertaking Phase I production in tunnels;
- ✦ Undertaking pre-wetting indoors;
- ✦ Air-under system in the Pre-Wet and Phase 1 tunnels to improve aeration during composting process;
- ✦ Computer controlled fans to maintain optimum air supply and extraction in tunnels;
- ✦ Instrumentation to monitor compost processing variables;
- ✦ Enclosed conveyor transport system for material transfer from Phase 1 to Phase 2 tunnels;
- ✦ Extraction ductwork to extract air from various operating areas of the plant and deliver it to the emissions treatment plant;
- ✦ Ammonia scrubbers to remove ammonia from exhaust air from the plant prior to exhausting through the biofilter;
- ✦ A biofilter to accept air from all buildings, after treatment through the ammonia scrubbers;
- ✦ Site monitoring network consisting of trigger alarms on operational processes; and,
- ✦ Maintaining storage of critical spares for machinery equipment where possible.



4.3 Odour Management Procedure

Odour control is achieved with a combination of plant design and process management. The following process management actions are currently in place to minimise the generation of odour emissions:

- (i) Clean up any spillage in front of the ingredients store or elsewhere on a daily basis;
- (ii) Remove solid material from the collection pit screen regularly;
- (iii) De-sludge the collection pit (if sludge is present) at regular intervals (at least fortnightly/monthly);
- (iv) Enclosed processing areas for all potentially odour-generating activities;
- (v) Keep external doors closed when not in use;
- (vi) Regular visual integrity checks of enclosures (buildings, conveyors ductwork) to identify potential leaks;
- (vii) Maintain appropriate conditions of temperature and oxygen content during composting, consistent with the needs of the process, to minimise odour generation;
- (viii) Air-under system in the pre-wet building and in all Phase 1 tunnels to improve aeration of composting material;
- (ix) Automatic control system for fans to maintain optimum air supply and extraction;
- (x) Enclosed conveyor transport for tunnel loading, dispatch loading and transfer to Phase 2 tunnels;
- (xi) Operate the ammonia scrubbers and biofilter in a manner to maximise their efficiency at removing odorous substances and odour causing substances from the air stream;
- (xii) Minimise as far as practicable the duration of any bypassing of the ammonia scrubbers and biofilter for maintenance; and,
- (xiii) Schedule any necessary bypassing of the ammonia scrubber or biofilter to periods when hot substrate is not being turned and when weather conditions will assist dispersion.
- (xiv) Monitoring system to detect any faults or operational anomalies and send alarms to the Duty Manager 24/7; and
- (xv) Potential dam odour is managed by complying with Condition 17B of Schedule 3 of the Project Approval and the water management plan.

All fugitive sources will be enclosed and the exhaust air from these sources will be treated in the ammonia scrubbers and the biofilter before being released to the atmosphere.

To ensure these controls remain effective, the following additional measures would be applied to these measures.

4.3.1 MOD1 - Odour Control Measures for Operation of the Ammonia Scrubbers

The following management and maintenance functions will be undertaken for the ammonia scrubbers.



Maintain the scrubber per the manufacturer's specifications. The initial indicative settings are set out below, and will be updated from time to time as necessary to ensure adequate odour management and plant operation.

- (i) Acid scrubber;
 - Maintaining the pressure difference between the supply air to the scrubbers and the supply air to the biofilter.
 - pH value-at set point at 4.0 – 4.5pH.
 - EC value(conductivity) set point at 200mS/cm, max225mS/cm.
 - Monthly inspection of
 - Flow detection sensor and conductivity sensor.
 - Connection of the sulfuric acid supply line.
- (ii) Water make-up system – Monthly Visual inspection
- (iii) Mist eliminator / fan of the supply air duct – six monthly visual inspection
- (iv) Ammonium sulfate pump - Monthly Visual inspection
- (v) Recirculation pumps - Monthly Visual inspection
- (vi) Sulfuric acid pump cabinet - Monthly Visual inspection
- (vii) Sulfuric acid storage tank - Monthly Visual inspection
- (viii) Sulfuric acid filling station - Monthly Visual inspection
- (ix) Ammonium sulfate storage tank - Monthly Visual inspection
- (x) Ammonium sulfate drain station - Monthly Visual inspection
- (xi) Control cabinet - Monthly Visual inspection

4.3.2 MOD1 - Additional Odour Control Measures for the Biofilter Operation

The following management and maintenance functions will be conducted for the biofilter:

- (i) Monthly inspection of the biofilter to ensure the following:
 - a. Pressure drop across Biofilter/scrubber system as per specifications, under steady state operation;
 - b. Temperature of incoming air is below manufacturer's set point, and cooling coil operating as required
 - c. Biofilter bed media at the required moisture level;
 - d. Check that water intakes and nozzles are not blocked;
 - e. Check for any gaps and leaks, or impermeable areas; and,
- (ii) Every six months check bed depth is within manufacture's specifications, and evaluate whether bed media is functioning correctly or may be spent. Repair or renew as appropriate.



4.3.3 MOD1 - Additional Odour Control Measures

The following additional mitigation measure is proposed for consideration to further minimise the odour emissions from MOD1 operation. This might be reasonable in the longer term, subject to the need for any further control as production increases:

- (i) If extra emissions volume treatment is required in the future, approval for construction of a second biofilter will be sought

4.3.4 MOD1 - Odour Performance parameters

To ensure the odour management system is functioning at optimised capacity, the following performance parameters will be reviewed in line with system performances to achieve peak results. Thus the initial indicative settings that are set out below will be updated from time to time as necessary to ensure adequate odour management and plant operation.

- ✦ Pressure difference packing material scrubber 1.
- ✦ pH value Set point 4.0 pH
- ✦ EC value (conductivity):- Set point 200 mS/cm, max 225 mS/cm.
- ✦ Pressure (in front of the bio filter): Monitored for compaction of biofilter media and to maintain power efficiency.
- ✦ NH₃ measurement (in front of the bio filter: - Max 20 ppm)
- ✦ Maintaining the pressure difference between the supply air to the scrubbers and the supply air to the biofilter

4.4 Monitoring to Manage Odour

With the ammonia scrubbers and biofilter in place, and noting that the operational building will be equipped with air pressure monitors to ensure negative pressure is maintained, provided that all plant and operations function normally, there is a low risk of offensive odours arising, and thus the direct odour monitoring of plant emissions is not warranted.

As part of the normal operational management of the systems and plant, the following checks will be conducted on a monthly basis or in the event of any legitimate complaint:

- ✦ Visual integrity checks on key building seals and the ducting connecting the process buildings, scrubbers and biofilter. The aim is to ensure there are no leaks reducing the effectiveness of the system in maintaining a slight negative pressure in buildings and ductwork. Suggested methods include:
- ✦ Regular monitoring and maintenance of the air pressure monitoring systems within the building.
- ✦ Visual integrity checking of the biofilter. Two key observations are needed – no significant dry patches, and no significant gaps. Either condition, if significant can render a biofilter less effective. It is thus important to maintain moisture throughout the biofilter bed at a level sufficient for the microorganisms to thrive. Poor operation can be indicated by significant dry



patches (beyond the very immediate surface which may become temporarily dry on a hot windy day). Similarly, it is important to maintain a uniform structure and consistency throughout the material bed to prevent exhaust air by-passing the biofilter bed through any gaps. Suggested methods include:

- ✦ Visual, and potentially physical examination of the biofilter bed for dry patches greater than 1m in diameter, and any visible cracks, or venting emissions (e.g. as a plume of condensing air from a gap that may be visible in the cool of the morning, or a large area of the biofilter without any visible discharge in the cool of the morning);
- ✦ Annual testing of biofilter, checking trends. This is done because it can be difficult to detect any slow degradation of performance over time by only examining the current data.

Complaints received are to be considered as set out in **Section 4.5**.

4.5 Complaints Management

The most current "Complaints Procedure" as can be found on the company website, is to be followed. (if the complaints management is updated, this section will need to be updated). The current complaints management is reproduced below;

Overview

This complaints management system contains the following elements:

- *advertised telephone number for complaints;*
- *system for logging and investigating complaints;*
- *process for recording the outcome of investigations and action taken; and*
- *feedback to complainants following investigation, as required.*

Introduction

Complaints will be received via the complaints telephone line (1800 155 079) or via the Elf Farm Supplies website (once operational). On receipt, complaints will be forwarded immediately to the relevant officer for investigation, and will be responded to within five business days, should the complainant request a response. This response will be provided back to complainant through their nominated choice of:

- *Follow up phone call with reference number*
- *Email with reference number*
- *Letter with reference number.*

Step One: Receive and Record the Complaint

All complaints received by the complaints telephone line (and via the complaints email portal) will be recorded and the following information will be sought from the complainant:

- *Personal information of the complainant – ideally their name and contact details (complaints made without personal information will still be recorded and investigated)*
- *Nature of complaint*
- *Time of complaint*
- *Location of complaint (to the nearest cross street, if complainant prefers not to give their exact location)*



- o *Description of odour (character and strength), if odour complaint*
- o *How long the odour has been present, if odour complaint*
- o *Wind direction and other pertinent meteorological information (e.g. raining, fog, hot, wind strength), if odour complaint.*

Once the complaint has been recorded the complainant will be provided with a reference number and advised of the response timeframe. In circumstances where complaints can be resolved at the point of contact, a record will be taken and the complainant will be provided with the reference number of their complaint.

Step Two: Investigate, Assess, and Determine Action

Once a complaint has been received and the details recorded, the complaint will be investigated and an assessment made:

- o *Complaint information is forwarded to the appointed officer at the time of complaint for the matter to be investigated*
- o *For odour complaints, attendance at reported site of complaint in order to confirm the nature of odour and its source:*
 - *Confirmation of character and strength of odour*
 - *Identification of direction of odour*
 - *If not possible to attend (i.e. no location given, WHS requirements) the complaint is still to be investigated as per the following steps of this procedure*
- o *Cross-reference complaint against production schedule and activities at the Elf Farm Supplies at the time of complaint and one hour preceding the complaint.*
- o *For noise, odour and dust complaints, cross-reference complaint against meteorological conditions, including wind direction and strength at time of complaint and one hour preceding the complaint*
- o *On the basis of the data gathered during the preceding stages, make an assessment of cause of the complaint*
- o *Determine if corrective action is required and any contingency measures pending implementation.*
- o *Implement contingency measures and corrective action, where required.*

Step Three: Respond to The Complaint

Once the complaint has been assessed, a formal response will be provided to the complainant, if they requested one. The EPA will also be advised of the formal response.

This response will be provided within five business days of the complaint being made and will include:

- o *Time and date of the complaint*
- o *If an odour complaint, the location of the complaint*
- o *If an odour complaint, the wind strength and direction one hour prior to complaint lodgement*
- o *Overview of activities at Elf Farm Supplies one hour prior to complaint lodgement*
- o *Outcomes of the assessment of the complaint.*



Should the complainant be dissatisfied with the outcome of the complaint, details of other complaint options will be provided and their dissatisfaction with the outcome will be recorded.

Step Four: Report the Complaint

Complaint data will be compiled in a complaints' register to record the quantity and nature of complaints. The complaints register will be published on the Elf Farm Supplies website, and updates will be posted on the site each month.

- *The register will detail:*
- *Number of complaints received*
- *Number of unique complainants where possible to identify*
- *Nature of complaints*
- *Outcomes of complaints*
- *If complaint was resolved in compliance with this procedure.*

Reports and complaint records will be held for a period of four years after the complaint is made, as per EPA licence requirements.

Promotion of Complaints Telephone Line

The complaints telephone line will be advertised through:

- *Signage at the entry to Elf Farm Supplies Pty Ltd site (108 Mulgrave Road, Mulgrave NSW 2756)*
- *Telephone directory listing for Elf Farm Supplies*
- *Elf Farm Supplies website*
- *Newsletters, whilst provided*
- *Public information sessions, whilst conducted*
- *Periodic advertisements in the local print media, whilst provided.*



5 ODOUR CONTINGENCY MEASURES

This section details the contingency measures in place to identify the source of elevated odour levels and bring odour levels back under control and minimise their impact. Elevated levels of odour may be identified either by:

- receipt of an odour complaint suggesting that there is an odour
- detection of odour beyond site boundary as a result of the monitoring procedures
- malfunction of the odour abatement system

Elevated Odour Levels

Any elevated levels of odour identified by monitoring or complaints will be mitigated as follows:

Checks at the identified source of the elevated levels will be carried out to ensure the plant is being operated to the manufacturer's specification and/or the most current updated parameters and to ensure that any improvements required to minimise the odour levels are made.

Close liaison will be undertaken with authorities throughout all stages of this process as required by licences and conditions of consent.

- ✦ The design of the biofilter cells enables the complete isolation of one cell. This can enable complete removal and replacement of Biofilter medium or to investigate and repair any fault.
- ✦ In the event of failure of a scrubber fan, spare parts will be available to rectify as soon as practically possible.
- ✦ Enclosing the west water recycle pit and treating the post 36 hour emissions from the Phase2/3 building can be implemented if investigations show these are the source of odours.
- ✦ Backup power generators are available in the event of mains power fault.

6 MOD1 ODOUR MONITORING

The following odour monitoring will be carried out by a competent third party:

6.1 Odour surveys

Surveys were undertaken for detection of offensive odours per the normal methodology used by the third party (refer 6.3), at the nominated receptors every three months of operation after commissioning for a total of 4 surveys (1 year of operation).

Odour monitoring ceased after the 4 surveys (1 year). The odour surveys and complaints investigations determine that EFS is not a source of an offensive odour, described in *POEO Act and Technical framework - Assessment and management of odour from stationary sources in NSW November 2006*.

6.2 Odour complaints

Odour complaints will be monitored and if a pattern of valid complaints have been received further surveys will be conducted.

6.3 Example of survey methodology

Odour intensity rankings

An assessor or group of assessors remain in a fixed location and sniff odour every 10 seconds, for 10 minutes without interruption, thus gathering 60 odour intensity measurements over the 10-minute period. The assessor must be exposed to the prevailing winds that may carry odour.

The intensity of the odour smelt (including nil odour) is ranked per an odour intensity scale. The scale ranges from no odour to extremely strong. A code is to be used to describe the nature of the odour, e.g. G – garbage, S – Sewage, BF – bushfire etc. as appropriate.

The recorded data is to be analysed to determine the significance of the odour.

7 CONTINUOUS IMPROVEMENT

To ensure this plan and the operational management on the site is kept current, this plan and its structure and requirements will undergo review as follows:

- ✦ Regular annual review to check for relevance and opportunities for improvement;
- ✦ Whenever any major change to the design or operations of the plant occurs;
- ✦ Whenever any opportunity to make improvements arises, for example if such opportunities are discovered during complaints investigations, maintenance work or from any major incident, failure, success and the like; and,
- ✦ In response to any useful public or others' suggestions.

The review may range from a simple correction, through to a detailed formal review of each element of the plan. Any review must be documented and controlled by ascribing a revised document version number and date.