Waste Management Procedure
Queensland Operations

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Position	Name	(tick one column only)		Signature	Date
		Approve	Review		
Environment Manager	Trina Jensen	☒	☐		19/03/2019

Table of Contents

REVISION HISTORY

Revision	Revision Date	Document Status	Revision Comments	Author	Approved By
0	15/01/2018	Issued for Use	Document updates	Brendan Cowie	Trina Jensen
1	19/03/2019	Revised	Annual revision		Trina Jensen

1. PURPOSE

The Waste Management Procedure (WMP) establishes the minimum environmental standards for waste management and provides guidance for employees and contractors on the management and disposal options for waste generated as a result of Senex's operations in Queensland.

This WMP has been prepared to address the requirements of Senex's Environmental Authority (EA) conditions, *Waste Reduction and Recycling Act 2011* and relevant Queensland waste management legislation.

The objective of this procedure is to:

- Minimise waste related impacts;
- Protect the environment, and the health and safety or personnel and the community; and
- Meet the compliance obligations and licensing conditions.

These objectives will be achieved through effective and responsible handling and disposal of waste generated during construction and operational activities.

2. SCOPE

This WMP applies to all Senex personnel and contractors across all Senex controlled workplaces in Queensland.

3. RESPONSIBILITIES

Senex is responsible for the ongoing management of activities on its tenure. Senex requires its employees and contractors to undertake work in an environmentally sound manner in accordance with regulatory requirements, EA conditions, and Senex procedures and policies including this WMP. Roles and responsibilities of Senex personnel and contractors as regards this WMP are summarised in the table below.

Role	Responsibilities
Senex Environmental Representative	• Identify, classify, monitor and quantify the wastes generated • Ensure that licensed waste disposal contractors and treatment facilities are used • Conduct audits of waste contractors to assess compliance with this procedures requirements • Regularly inspect and audit site waste management practices and ensure environmental records are kept • Ensure statutory reporting data, including annual reporting requirements, is collected • Coordinate the implementation of any corrective and preventative action and incident response.
Senex Site Supervisors	• Ensure the requirements of this procedure are implemented

Role	Responsibilities
(Drilling, Completions, Civil Construction, Operations)	• Ensure waste is appropriately stored on site and adequate bins and equipment • Approve the movement of wastes from site • Ensure relevant waste tracking paperwork is completed before transport and retain copies and records of paperwork • Ensure field and contracting personnel are aware of their obligations under this procedure • Report any activity that has or may result in an environmental incident
Senex Environment Manager	• Ensure the waste management principles and the requirements of this procedure are implemented during all stages of the project lifecycle. • Ensure adequate resources are provided to achieve the requirements of this procedure. • Ensure environmental auditing of third-party waste contractors is periodically carried out. • Approve this procedure and review periodically.
Contractor Site Supervisor	• Ensure the requirements of this procedure are implemented for all contractor operations • Ensure adequate waste management equipment (bins, skips, etc.) and services are provided as required for contractor operations • Implement waste minimisation strategies as outlined in this procedure • Ensure that waste transportation and tracking is carried out in accordance with this procedure • Ensure that all) waste transport certificates are submitted to the administering authority (i.e., Dept. of Environment and Science) within statutory timeframes • Ensure that any incidents or observations that may occur during waste storage and handling are reported • Ensure waste inspections are carried out on a weekly basis and inventories are maintained
All Personnel	• Comply with the requirements of this procedure • Keep sites tidy, free from litter and put waste in the correct bins • Report all incidents and observations relevant to waste
Contracts and Procurement	• Ensure that the Contractor selection process considers the Contractors ability to meet the requirements of this procedure. • Ensure that the contracting process for the provision of goods includes options for chemical re-stocking and returning unwanted or excess chemicals.

4. PRINCIPLES FOR WASTE MANAGEMENT

Wastes must be appropriately managed to avoid or minimise the potential for:

- Release of hazardous waste to land or waters either through inappropriate waste disposal or accidental release;
- Inadequate waste management leading to inappropriate disposal or inadequate re-use and recycling; or
- Impacts to the environment, land use or well-being of people resulting from inappropriate storage, handling and disposal of waste.

Waste management at Senex operated sites will incorporate the waste management hierarchy (most preferred to least preferred):

1. **Source Reduction** – By eliminating, changing or reducing practices that generate wastes;
2. **Reuse** – Reusing waste materials;
3. **Recycling** – Converting waste into other useable materials;
4. **Treatment and Disposal** – The rendering of wastes safe by neutralisation of other treatment methods and finally deposing of the waste products which can no longer be reused or recycled.

5. WASTE MANAGEMENT STRATEGY

Process	Actions
Identify Waste Types	A variety of wastes are generated in association with the following daily activities at Senex Energy workplaces: • Drilling, operation and plugging of wells; • Separation and treatment of produced fluids; • Equipment operations and maintenance; • Operation of camp, office and processing facilities. Waste generated from the above activities can generally be categorised as non-hazardous Waste or hazardous waste[1]. The Safety Data Sheet (SDS) for materials should be referenced to assist with the appropriate identification for handling and disposal of waste material. A table listing typical waste types generated from oil and gas activities is provided in Attachment A.
Source Reduction	Source reduction is an important step in the waste hierarchy as it stops wastes before they are generated. It can be achieved through: • Substituting toxic/hazardous chemicals with less toxic alternatives; • Modifications of production processes; and • An effective preventative maintenance program. Examples of source reduction include: • The installation of drip trays and other spill containment devices for chemical / oil storage or loading areas to minimise the likelihood of spills resulting in large volumes of contaminated soil and material; • Pre-planning well treatment operations so that only the required volume of chemicals for the operation are brought to site; • Purchasing chemicals in bulk form e.g. IBC's to reduce packaging wastes; • Working with suppliers to reduce the amount of packaging.
Reuse	Reuse generally means that a discarded item is used again. Some examples include: • Returning chemicals that are in excess or no longer required to the supplier; • Reusing chemical containers to store wastes;

[1] Note the handling of chemicals and hazardous materials is covered under the Senex *Hazardous Substances and Dangerous Goods Procedure* (SENEX-CORP-HS-PRC-010)

	• Returning cleaned containers, packaging materials or wooden pallets to the vendor for reuse.
Recycling	Recycling is the process where used materials are converted into new products which otherwise would be disposed into landfill. Typically, the material is sent to a licensed recycling facility.
Treatment and Disposal	Wastes which cannot be reused and recycled may need to be neutralised and stabilised before final disposal. Although this is the least preferred option some materials generated during Senex activities will require treatment (e.g. NORM or sludge containing heavy metals). An overview of some common treatment technologies include: **Neutralisation** – combining acidic and caustic materials to produce a less corrosive product. **Biological Treatment** – carried out using naturally occurring or introduced organisms to degrade the organic compounds. Can be used for solids or sludges through land farming or composting. Liquids such as sewage can be treated in septic tanks or packaged treatment units. **Solidification/stabilisation** – This process uses cement or a similar binding agent to fix or immobilise the contaminants to prevent their mobility into the soil or groundwater. This is usually a pre-treatment step before disposal to landfill. **Thermal destruction** – includes various technologies such as incineration, desorption and drying. Wastes containing high organic content are suitable for incineration. Note specifically designed incineration facilities are required. **Landfilling** – wastes which cannot be salvaged for reuse or recycling are put into landfill as the final disposal option. Hazardous wastes are required to be disposed into secured landfill where the runoff such as leachate is collected for treatment.
Segregation and Storage	Non-hazardous wastes must be segregated at the source into recyclables and non-recyclables. Depending on the quantities generated, it may be possible to again separate the recyclables into individual streams for example paper, glass, scrap metal and wood. The segregated wastes must be stored in dedicated bins or skips ready for removal from site. Wastes must be covered to prevent scavenging by animals. The storage and disposal of hazardous /regulated wastes is further outlined in Section 6.
Onsite Landfill Disposal	Operation of an onsite landfill for disposal of wastes must be authorised (i.e. relevant permits and licenses have been obtained) and only non-hazardous wastes are permitted to be disposed of. Design, construction and operation of the landfill must meet regulatory requirements. Refer to the Senex Environment Team for further information and advice.
Transport and Disposal Off-site	All loads of waste are to be covered during transport. Non-hazardous waste may be removed from site by Senex personnel or contractor, or contracted waste collector. Wastes and recycling should be kept segregated during transport and disposed of at the appropriate facility. Hazardous and / or regulated wastes must be removed by a licensed / certified contractor to undertake the removal of that particular waste. Senex personnel and contractors must check the currency of the waste contractor's certification before allowing waste to leave site. When transporting hazardous or regulated waste offsite a record must be kept of the waste being transported. In Queensland a Waste Tracking Certificate must be completed and a copy retained by Senex. Senex's Waste Tracking

	Procedure (SENEX-QLDS -EN-PRC-006) provides detailed information on waste tracking requirements. Wastes must only be processed or disposed of to a facility that has been specifically licensed to accept that waste.
Monitoring	The Senex Environmental Representative will conduct regular inspections to ensure that Senex's operational sites are well maintained including that: • No litter is present; • All spills, including minor spills, are cleaned up immediately; • Wastes are segregated and stored according to classification; • Putrescible wastes are stored in covered waste containers; • Waste storage facilities are not located within 50m of waterways; • Wastes are not incinerated or buried on site without regulatory approval; • All wastes are disposed of by licensed waste contractors; and • Waste tracking forms are correctly completed, signed off and filed for all hazardous or regulated wastes moved off site.
Training	Senex personnel who handle wastes on a regular basis should be provided with the appropriate training (i.e. suited to their role and responsibilities) in segregation, storage and handling procedures. Regular toolbox meetings are also to be held to reinforce key waste management principles, to increase awareness of any waste related issues and identify solutions.
Records	The Senex Environmental representative or Site Supervisor must retain the waste consignment notes for both non-hazardous and hazardous wastes disposal. In addition, records on waste generation data must be collated and retained on file.
Evaluation	The implementation and effectiveness of this management plan and associated documents will be regularly assessed to ensure: • Senex is demonstrating compliance with legal and landholder obligations; • The strategy remains up-to-date and relevant; and • The procedures adequately cover and manage environmental issues.

6. WASTE MANAGEMENT MEASURES

The table below details the specific measures for the major waste streams generated during Senex's operations. The Senex QLD Waste Tracking Procedure (SENEX-QLDS-EN-PRC-006) also provides detailed information on waste disposal options and waste receiving facilities available for specific waste streams.

Waste Stream	Management Measures
Hazardous /Regulated Material	• Hazardous / regulated wastes must be stored according to its compatibility and in suitable containers. Chemical compatibility can be assessed from the SDS. • Hazardous wastes and non-hazardous waste should not be mixed or placed in other storage areas. • Hazardous and / or regulated wastes must be handled and stored in accordance with: AS 3780:2008 – *The storage and handling of corrosive substances*;

	AS 1940:2004 – *The storage and handling of flammable and combustible liquids*; and AS 3833:2007 – *Storage and handling of mixed classes of dangerous goods in packaged and intermediate bulk containers.* • The appropriate storage and disposal requirements for hazardous wastes are also outlined in the Senex Hazardous Substances and Dangerous Goods Procedure (SENEX-CORP-HS-PRC-010).
Drilling Material	• All drilling and exploration waste fluids and muds must be contained in an appropriately constructed containment structure for disposal, remediation or re-use where possible. • If sumps are to be used to store residual drilling material or drilling fluids, they must be decommissioned (no longer used) following the completion of drilling activities. • Adequate freeboard must be maintained on the sump at all times to prevent overflow during storage for the duration of drilling activities. • Where drilling muds are removed from site they must be disposed of to a licensed facility. • **Waste fluids**[2], (other than waste fluid from the flare stored in flare pits, or **residual drilling material** or drilling fluids stored in sumps) must be contained in either above ground containers or a dam.
Residual Drilling Material	• Residual drilling material must be stored in sumps for the duration of drilling, after which it must be removed from site for disposal. • The exception to this is where drilling material meets **approved quality criteria** and is approved by Senex Environment Team for disposal to land.
Produced Water	• **Produced water** must be stored in dams and re-used for drilling and wellhole activities or where approved, re-used under a Beneficial Use Approval (BUA). Any proposed re-use under a BUA must be confirmed with the Senex Environment Team.
Green waste	• Stockpiled on site or mulched to be spread for rehabilitation and erosion control or placed in surrounding area to provide fauna habitat.
Sewage from Mobile or Temporary Facilities	• Treated sewage effluent or greywater can be released to land provided all government approvals have been obtained. Any proposed release to land must be confirmed with the Senex Environment Team. • Treated sewage effluent or greywater can be released to land it meets or exceeds **secondary treated Class C standards** for a treatment systems <150 equivalent persons. • Release of treated sewage effluent of greywater must be: ○ to a designated (fenced and signed) area; ○ not result in pooling of run-off or aerosols or spray drift or vegetation die-off; and ○ the contaminated release area must be kept vegetated with groundcover (not weeds).
Contaminated Material	• Contaminated material must be tested and approved to be handled as a waste under this WMP by the Senex Environment Team prior to disposal.

[2] Definitions for all items in bold are provided in Appendix A of the Environmental Authority (EPPG00651513)

	• Contaminated material must at all times be managed in accordance with the Senex Spill Response Procedure (SENEX-CORP-ER-PLN-006).

ATTACHMENT A – WASTE GENERATED, CLASSIFICATION AND MANAGEMENT AND DISPOSAL OPTIONS

The table below details the typical waste streams, their classification and options for management or disposal.

Waste	Classification	Treatment/Disposal Method
Green waste	General	Re-used onsite
General waste (including food scraps)	General	Licensed landfill
Scrap Metal (steel, aluminium, brass, copper, lead, other non-ferrous metals, stainless steel and zinc)	General	Recycle (scrap metal recycler)
High density polyethylene (HDPE) waste	General	Recycle
Textiles and rags	General (unless contaminated with a regulated waste)	Re-use/Recycle
CSG Water (including drilling completion fluids, frac fluid, work over fluids, permeate and low point drain water)	General	Recycled
Concrete wastes (including drilling cement returns)	General	In order of preference: re-use as fill or road base, recycle, licensed landfill
Timber (packaging and off-cuts)	General	In order of preference: re-use or recycle or licensed landfill
Paper and cardboard	General	Recycle
Spent Chemicals	Regulated	Recycle
Oily waste	Regulated	Recycle
Used filters – Oily filters	Regulated	Recycle
Clinical/biological	Regulated	Treated at licensed facility
Septic untreated or treated (not meeting irrigation specification)	Regulated	Treated at licensed facility
Grease trap wastes	Regulated	Licensed facility
Contaminated steel drums	Regulated	Re-use, return to supplier or disposal licensed facility
Sewerage sludge and residues	Regulated	Treated at licensed facility
Hydrotest water	Pending analysis – regulated or general	Re-use or treated at licensed facility
Rubber	Regulated	Recycle
Tyres	Regulated	Licensed facility - recycle
Batteries	Regulated	Recycling facility
Other Solid regulated waste	Regulated	Regulated landfill
Biocides	Regulated	Treated at licensed facility
Cement - powdered	Regulated	Regulated landfill
Contaminated soil or material (refer to Section 6 above)	Pending analysis – regulated or general	Regulated - Treated or regulated landfill General – re-use

Completion fluid/frac fluid sands & well work over fluids	Not to be disposed of as waste	Re-use then disposal at Regulated landfill
Drilling mud/fluid (used during the drilling process)	Not to be disposed of as waste	Re-use then disposal at Regulated landfill
Drilling solids/cuttings	Non-regulated	Re-used then disposal at Regulated landfill
Mud additives left over, spills of mud products, broken bags	Regulated	Treated at licensed facility
Spill clean-up materials	Regulated	Regulated landfill
CSG Waters (including drilling completion fluids, frac fluids, work over fluids, permeate and low point drain fluid)	Pending analysis[1] - Regulated or General waste	Regulated - Treated or regulated General – re-use
Separator solids (sludge or dry cake)	Regulated	Recycled
Weed washdown water	Regulated	Recycled
Grey water trucked from site	Regulated	Recycled

[1] In order for CSG Waters not to be classed and managed as a regulated waste under Section 65(3) of the Environmental Protection Regulation 2008 the following triggers apply:

Groundwater or treated groundwater necessarily or unavoidably brought to the surface of the earth as part of an industrial process, if the groundwater –

a) Has a pH of at least 6 but no more that 10.5; and

b) Has an electrical conductivity of <15,000µS/cm

In the event that the CSG water exceeds these trigger limits the CSG water must be considered a regulated waste and managed accordingly. In the event that the CSG waste is less than these trigger limits is considered general waste.