7.0 Waste Management

7.1 Introduction

This section:

- Describes current waste management practices at Alcan Gove operations; and
- Includes management commitments (controls) to minimize any current and potential future environmental impacts directly or indirectly related to waste generation at Alcan Gove operations.

Alcan Gove operates under an environmental management system that is certified to the ISO 14001 standard. This, in addition to internal Alcan requirements, commits Alcan Gove to continuous improvement in waste management. The management commitments made in this section of the report are summarised in the commitments listed in Section 25 (Environmental Management Plan).

The main solid wastes currently generated at Alcan Gove include:

- Scale;
- Spilled and lost product;
- Tyres from plant services, mine and refinery workshops;
- Batteries;
- Scrap metals;
- General packaging and containers;
- Fluorescent tubes;
- Waste paper;
- General process waste; and
- Electrical equipment.

The main liquid wastes include:

- Waste oils and fuels;
- Waste grease;
- Engine coolants; and
- Relatively small quantities of general chemical wastes.

The following waste streams are covered elsewhere in this EIS:

- Bauxite residue (discussed in Section 3.6);
- Waste water from the Residue Disposal Area (Section 11.3.2);
- Stormwater runoff and cooling water discharge from the refinery (Section 11.3.1); and
- Air emissions (Section 8.5).

In addition to the wastes from the Alcan Gove operations, there is also a range of community wastes generated at Nhulunbuy and nearby communities. These have been deposited at a landfill to the west of the town (with separate areas for putrescible wastes and light industrial wastes). Alcan Gove cleaning contractors also used this site for disposal of office waste. The landfill is the responsibility of the Nhulunbuy Corporation and operated by Yirrkala Business Enterprises (YBE). It has limited capacity and hence a new landfill to be located to the east of Nhulunbuy is planned to be developed and ready for use in 2004. Closure of the current landfill and development of the new site for waste disposal is the responsibility of the Nhulunbuy Corporation.

7.2 Waste Management Standards

The Alcan EHS Policy commits all Alcan facilities to excellence in EHS through continual improvement. The guiding principles behind this policy require adverse environmental impact to be minimised and also require compliance with legal requirements and Alcan's internal standards.

Alcan's environmental directives require that the primary objective of waste disposal is to prevent the generation of wastes, maximise re-use and recycling, and ensure safe management of non-reusable and non-recyclable wastes. Alcan Gove's environmental performance criteria state that "wastes are to be minimised by minimising packaging to site and maximising recycling and return of waste to suppliers through "Cradle-to-Grave" contracts".

In complying with these requirements, Alcan Gove is committed to separating potentially hazardous materials and managing them in accordance with relevant NT Government and Commonwealth Government requirements. A waste management program based on ISO 14001 continual improvement principles, addressing waste minimisation, classification, control, re-use, recycling, and disposal is being developed and will be progressively implemented prior to the construction phase of the expansion project.

Alcan Gove will comply with the NT *Waste Management and Pollution Control Act 1998* and the *Waste Management and Pollution Control (Administration) Regulations 2001* which cover waste such as tyres, containers that are contaminated with residues of a listed waste, and waste mixtures, or waste emulsions, of hydrocarbon and water.

7.3 Current Waste Management Practices

A waste assessment audit was conducted of the Alcan Gove operations in June 2003 (Wastemaster, 2003). Some of the waste materials were quantified and recommendations made for improved waste management procedures. These recommendations have been reviewed by Alcan Gove as part of the development of a long-term waste management strategy, and have been taken into account in the preparation of this section of the EIS.

7.3.1 Solid Wastes

7.3.1.1 Scale

Scale accumulates in process vessels and other equipment during the refinery process, including thickeners associated with the mud separation process. Scale is removed from these tanks and loaded onto trucks for disposal at the RDA. Scale is also removed during maintenance shutdowns of other process areas. Scale from the precipitation tanks is stored in skip bins on-site and disposed at the RDA.

Alcan Gove's Strategic Plan for the next five years includes an initiative to eliminate all significant sources of caustic to ground (eg instances where caustic contaminated material is temporarily placed on bare ground). In response to that, a project to design a Thickener Scale Handling Unit, otherwise known as the "scale muncher" project, was initiated in 2000. It involves developing a crushing device that can be neatly fitted to ports on the outside of the thickener tanks. This enables scale to be crushed and pumped back into the refinery process where it can become part of the productive inventory again rather than disposing it to the RDA. A trial of this project proved it to be technically adequate, although there have been concerns about some safety aspects of the operation and the efficiency of the unit compared to other cleaning methods. An engineering design review has been undertaken to address these issues. Three thickeners are now equipped with the mechanism to attach the unit and, on the completion of the engineering design review, it is anticipated that all thickeners and all washers will be progressively converted to accept the scale handling unit.

Recent actions taken to reduce the disposal of caustic to ground include the direct loading of scale and mud into low loaders, which directly transfer the waste into trucks, which in turn, transport the material to the RDA. This is now the practice for most thickeners. In addition, the existing thickeners have been modified and operational practices improved to reduce the total number of tank descaling operations undertaken each year.

7.3.1.2 Spilled and Lost Product

Spilled and lost product includes bauxite, hydrate and alumina. The sources of spilled product include loss from conveyors and ship loading operations, and temporary storage of hydrate on the ground that occurs when there is disruption in the process. Several initiatives for returning spilled material to appropriate locations within the process have been implemented. Conveyor spills have been reduced in high priority areas over the last three years. For example, modifications to one conveyor reduced hydrate spillage by an estimated 2,500 tonnes per annum.

Since 2000, there have been several improvements to minimise loss of product through airborne dust, including the following:

- Improved bag house efficiency;
- Installation of removable skirts on the export conveyor; and
- Transfer station improvements

7.3.1.3 Tyres

Waste tyres are generated at the mine and refinery workshops. Earthmoving equipment tyres from the mine are either buried in a controlled manner during rehabilitation works at the mine or are provided to local community organizations for use as barriers and borders. Approximately 50 to 60 vehicle tyres from the heavy vehicle workshop at the mine are used and disposed of each year (Wastemaster, 2003). Used tyres from other parts of the operation are back-freighted to Darwin for retreading a maximum of three times, prior to disposal at the RDA.

Alcan Gove has been actively searching for alternative management strategies for used tyres. These include shredding and transportation off site. Further investigations will be undertaken to determine the most suitable management strategy for waste tyres.

7.3.1.4 Batteries

Used batteries are collected from both the mine and refinery.

Some lead acid batteries from the refinery are disposed of by the battery supplier in Darwin in accordance with the supply contract. By 2004, Alcan Gove will increase the scope of this initiative to include lead acid batteries from the mine as well as large haul batteries.

A Darwin-based metal recycling company is contracted to arrange for recycling of nickel-cadmium batteries.

7.3.1.5 Scrap Metals

Scrap metals are generated from a variety of sources including workshops and maintenance and construction work at the mine and refinery. Bins specifically for separation of scrap metal are sited at specific locations throughout operational areas. When full, the bins are collected and shipped to metal recyclers in Darwin.

The crushed metal cases of oil filters from workshops are stored in special hazardous material bins and skips, and are collected for scrap steel feed. Oil filters from the steam power station are currently disposed with general waste.

7.3.1.6 General Packaging and Containers

The reduction in the packaging of supplied materials has been adopted as one of Alcan Gove's Environment, Health and Safety (EHS) strategic objectives. This has resulted in an increased amount of packaging being returned to the supplier and reducing the quantity requiring disposal at Gove.

Attempts have been made to minimise waste from light fuel deliveries by using re-usable 1,000 L pods (bulki-boxes) rather than 205 L drums. This has been successful for lubricants in particular, where any material not able to be recovered from the bulki-box is returned to the supplier in the container.

A concrete bunded drum cleaning and crushing facility for waste oil and grease drums is planned to be completed in 2004. The waste grease drums will then be barged to Darwin where they will be shredded and sold as scrap metal.

Non-re-usable plastic drums are triple-rinsed and deposited at the RDA landfill.

7.3.1.7 Waste Paper

Waste paper is sent to the Nhulunbuy landfill. A recently purchased paper compactor and bailer will be used by the waste management contractor proposed to be appointed during 2004. It is planned that the paper bales will be barged to Darwin for recycling.

7.3.1.8 General Waste

General refinery wastes including plastics, oil sludge, oily rags, gloves, mixed metal fragments, filter cloths, fluorescent tubes, and broken timber pallets are deposited at a dedicated landfill location at the RDA.

7.3.1.9 Electrical Equipment

Electrical equipment, such as computers, air conditioners, refrigerators and microwave ovens, are deposited in recycling bins located at the electrical workshops. The metal recycling contractor recovers useful metals from these items. Freon gas and other ozone depleting substances are recovered prior to the disposal of refrigerators and air conditioners.

7.3.2 Liquid Wastes

7.3.2.1 Waste Hydrocarbons

Waste hydrocarbons are recovered from sources such as vehicle maintenance, mechanical plant and hydraulic equipment. Degreaser, waste oil, waste fuel and Class 3 dangerous goods go to the waste oil reuse tank, which is burnt in the lime kiln.

Waste grease is produced from a variety of sources including vehicles and large mechanical gear drives, and is stored temporarily in the drum yard until it is shipped to Darwin. It is then transported to a licensed facility in Port Hedland where it is used as a fuel source for incineration of other wastes.

7.3.2.2 Engine Coolants

Engine coolants are used in cooling circuits for heavy and light vehicles. The main sources of engine coolants are at the refinery and mine workshops. Waste engine coolant is shipped to Darwin for recycling.

7.3.2.3 Hazardous Wastes

A licensed hazardous waste management contractor collects and disposes of obsolete laboratory chemicals and electric light ballasts. The contractor also collects mercury for re-use from a controlled storage area on site. Asbestos is removed in accordance with asbestos handling requirements and deposited in dedicated deep disposal pits at the RDA.

Historically, waste polychlorinated biphenyls (PCBs) were generated on site. However, since 1995/1996, Alcan Gove has had a purchasing policy not to buy transformers containing PCBs. All equipment originally containing PCBs were drained and rinsed with the PCB safely recovered by a qualified waste contractor. To ensure that no PCBs were present in transformers after draining and rinsing, samples of the transformer oils were periodically sent for analysis to an independent laboratory.

7.4 Effects of Proposed Expansion on Waste Impacts

The proposed expansion has potential to generate additional wastes associated with construction, increased throughput and new refinery processes. This will require modifications to current waste management practices, which will be coordinated as part of a comprehensive waste management strategy. The elements to be incorporated into this strategy are outlined below.

7.4.1 Operational Wastes from Expanded Refinery

7.4.1.1 Scale

As discussed in Section 4.3.4, new high-rate decanters will be used for residue separation in the expanded refinery. As part of the expansion project, the existing multi-stage thickeners that are currently used for residue separation will be converted to additional washers. The new thickeners will require descaling very infrequently (every few years) compared to the existing thickeners (every few months). This will significantly reduce the amount of scale produced and hence the volume of scale waste requiring disposal. All washers, including the converted thickeners, will be modified to enable descaling using the proposed new descaling unit (Section 7.3.1.1). Scale from the remainder of the current operating areas of the refinery will continue to be managed as at present, except for

ongoing continuous improvement initiatives to reduce scaling rates and reduced potential for scale spillage outside bunded areas. For all new operating areas of the refinery, scaling rates will be minimized through design and all recovery of scale will be done within concrete bunded areas. All scale, other than that which can be returned to the process via the proposed new descaling unit, will continue to be deposited at the RDA.

7.4.1.2 Waste Hydrocarbons

It is estimated that approximately 700 kL of waste oil would be generated once the gas supply has been secured for the expanded refinery (around 600 kL was collected in 2003). This waste oil will be blended with fuel oil to fire the lime kiln. Emissions from the lime kiln are addressed in Section 8.5. Continuous improvement over the next five years will ensure significant reduction in the potential for spillage and soil contamination from the storage and handling of waste hydrocarbons.

7.4.1.3 Other Wastes

A study of projected waste streams (such as packaging, scrap metals, tyres, batteries, paper, waste hydrocarbons etc.) generated by the expanded refinery will be part of the process for developing the site-wide waste management strategy currently in development. This will include an estimate of the increased quantities of the various waste streams.

7.4.2 Construction Waste

7.4.2.1 Construction and Commissioning Sources

As discussed in Section 4.9.2, to construct the expanded refinery it is proposed to maximise the use of pre-assemblies and modules constructed off-site. This process will significantly reduce the amount of construction activity to be undertaken at Gove. As many of the major components will be constructed off-site, the wastes generated during this process will remain at the off-site location where there are likely to be greater opportunities for waste management and disposal than there are at Gove. This will significantly reduce the need to either dispose of the wastes at Gove or to ship them out of Gove for management and/or disposal.

Even with a pre-assembly approach to construction, there will still be a range of wastes generated at Gove. The major solid waste streams likely to be generated are listed below.

- Limited tree and other vegetation waste from the small amount of clearing required;
- Soil and fill from excavation works for foundations;
- Timber from concrete formwork, boarding and associated waste;
- Scrap steel and offcuts, including weldmesh, conduit, pipework, nuts, bolts, concrete reinforcing rods, etc.;
- Concrete, plaster board and cement sheeting;
- Insulation materials;
- Plastics from conduit and pipework; and
- Miscellaneous wastes from a range of construction activities including:

  General office refuse, paper, food scraps, food containers and wrappings;

  Packaging materials from equipment, material, stores and spare parts;

Residues from painting, lubricating fluids and fuels for machinery.

Where possible, these wastes will be segregated so that they can be shipped off-site to maximise potential re-use and recycling opportunities. A significant portion of construction materials can be recycled.

The following are examples of how materials, identified as construction wastes, have potential for reuse or recycling:

- Clean soil from excavation work will be stripped in layers, stockpiled and reused for contouring, landscaping and rehabilitation; and
- Recyclable building wastes will be collected separately and re-used or recycled, for example:
  - Timber from concrete formwork will be recovered and reused;
  - Scrap steel and offcuts will be recycled;
  - Plastics will be recycled where practicable; and
  - Oils will be collected and blended with the fuel oil for combustion in the lime kiln.

A number of hazardous wastes may also be generated during the construction phase. These could include waste solvents, some insulation materials, paints, waste hydrocarbons and water treatment chemicals. These will be managed in accordance with the EPCM Contractor's construction waste management plan. This plan will also provide quantitative estimates of the expected waste streams and emissions. Alcan Gove's annual NPI reporting requirements will take account of the construction phase of the expansion project.

7.4.2.2 Construction Village Waste

The construction workforce accommodation facilities will be prefabricated structures. This will have the benefit of decreasing the amount of waste materials generated during the establishment of the village. Demountable buildings will be transported to site by barge from Darwin or elsewhere and there will be minimal waste generated in their placement on site. At completion of the construction phase, the facilities will either be retained on site for use by local community-based organisations or removed from site.

Waste generated during the occupation of the construction village will include the following:

- Putrescible wastes; and
- Sewage.

Putrescible wastes will be disposed of at the new Gove landfill (Section 7.1) which is to be managed by the Nhulunbuy Corporation. There will be excess capacity available for disposal of the wastes generated from the construction workforce during the 30-month construction phase.

Sewage from the construction village will be pumped to the Nhulunbuy sewerage system for treatment and disposal (Section 5.4).

The contractor managing the construction village canteen will be subject to similar contractual conditions as apply to the existing catering contractor. This will include preparation of an environmental management plan that outlines environmental standards and procedures which will include the following:

- Committing to continually review the types of packaging materials for food supplies in order to find more environmentally "friendly" materials or reduce the volume of packaging;
- Recycling or disposing of packaging materials;

- Committing to disposing of solid wastes (kitchen food scraps, accommodation quarters waste, ablution block waste, laundry waste and maintenance operation wastes in a manner approved by Alcan Gove and the Nhulunbuy Corporation;
- Recycling of waste materials (including waste oil); and
- Contingency plans for spillages of hazardous materials.

7.5 Waste Management Strategy

Alcan Gove will manage solid and liquid wastes during construction and in the future operation of the expanded refinery in accordance with the preferential hierarchy of minimisation, reuse, recycling and finally disposal. This includes adopting waste conscious design principles and planning prior to commencement of construction activities, incorporating waste management requirements in equipment specifications, reusing/recycling excess and waste materials, storing and disposing of waste materials in an appropriate manner, and instituting management controls for these programs.

Alcan Gove will ensure that the construction contractor's environmental standards with respect to waste minimisation and management are aligned with those of Alcan Gove. This will be assured through measures including waste management requirements as a component of the contract between Alcan Gove and the contractor, and by conducting audits of the contractor's performance.

Alcan Gove has committed to implementing a waste management strategy which will address current opportunities and those associated with the proposed expansion. This strategy will be in accordance with relevant regulatory requirements, guidelines and Alcan's internal standards.