

INFORMATION REGARDING ENVIRONMENTAL AUDIT REPORTS

August 2007

VICTORIA'S AUDIT SYSTEM

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An environmental audit is an assessment of the condition of the environment, or the nature and extent of harm (or risk of harm) posed by an industrial process or activity, waste, substance or noise. Environmental audit reports are prepared by EPA-appointed environmental auditors who are highly qualified and skilled individuals.

Under the Act, the function of an environmental auditor is to conduct environmental audits and prepare environmental audit reports. Where an environmental audit is conducted to determine the condition of a site or its suitability for certain uses, an environmental auditor may issue either a certificate or statement of environmental audit.

A certificate indicates that the auditor is of the opinion that the site is suitable for any beneficial use defined in the Act, whilst a statement indicates that there is some restriction on the use of the site.

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ENVIRONMENTAL AUDIT

NUPLEX SPECIAL WASTE PTY LTD

FINDINGS AND RECOMMENDATIONS

51994-3-A

ENVIRONMENTAL AUDIT

NUPLEX SPECIAL WASTE PTY LTD

Findings and Recommendations

EPA Victoria
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Victoria 3006 AUSTRALIA

EXECUTIVE SUMMARY

Nuplex Special Waste Pty Ltd trading as Nuplex Environmental (Nuplex) operates a bulk liquid waste storage and treatment facility located at 88-90 & 92-94 Ordish Road, Dandenong. In this capacity, Nuplex performs an important function in the management of industrial wastes produced in Victoria.

Dr Peter Nadebaum of GHD Pty Ltd was engaged by EPA Victoria in his capacity as an Environmental Auditor (appointed pursuant to the *Environment Protection Act* 1970 ("the Act")), to conduct a environmental audit of Nuplex's operations at the premises in accordance with Part IXD of the Act. EPA staff including Neil McKenzie, David Nelson and Georgie Wettenhall worked with the auditor in undertaking the audit and in preparation of the audit report. Nuplex staff also greatly assisted the audit team in providing detailed information regarding the facility operations and making the relevant operational staff available for consultation during the audit period.

The objectives of the audit were to:

- identify controls implemented by Nuplex;
- determine adequacy of controls and the effectiveness of their implementation;
- assess compliance with the Environment Protection Act 1970, subordinate legislation and EPA statutory tools;
- assess implementation of legislative requirements into statutory control mechanisms;
- provide EPA with a comprehensive understanding of activities at the premises;
- identify opportunities to improve management of particular waste streams and consequently reduce waste dispatched to landfill for disposal; and
- report audit findings and recommendations to Nuplex and EPA.

Findings

Nuplex has implemented a quality management system certified to ISO 9002, and this is effective in meeting the acceptance requirements for discharge of treated wastewater to sewer, and for disposal of treated wastes to landfill.

A large number of areas were identified in which the operations give rise to adverse environmental impacts, and are not in compliance with the requirements of the EPA Licence. This situation appears to have occurred because Nuplex's management and operations staff

are focussed on ensuring that the treated wastes will comply with the requirements for discharge to the sewer or acceptance at a landfill, and do not appear to have considered or included as operational objectives the requirements for compliance with the EPA licence.

Nuplex advises that it is developing an Environmental Management System. It can be expected that this system will provide the necessary focus on ensuring that operational practices comply with the Licence conditions and address the environmental issues that presently exist.

The most important issues identified in the audit that Nuplex should address are:

- Avoidance of wastes entering the stormwater system, which discharges to Dandenong Creek,
- Ensuring that wastes are properly stored and contained;
- Ensuring the safe operation of the caustic waste oxidation system, including the safe storage of hydrogen peroxide;
- Ensuring that fugitive emissions from the solidification operations do not exceed off-site or on-site regulatory limits.

Because of the multiplicity of issues requiring improvement, it is recommended that Nuplex prepare a risk reduction and licence compliance plan which considers the various requirements and develops a prioritised strategy for dealing with the issues. This could take the form of an Environmental Improvement Plan. Current operations appear to be adversely impacting on water, land and groundwater, and it would be possible for EPA to take immediate action. Because of this, it is considered that Nuplex should prepare the Plan, seek its endorsement by EPA, and address the issues as a matter of urgency.

As this audit report was being finalised, Nuplex wrote to the auditor to advise that it was actively addressing the various issues identified in the audit, and outlined a number of projects that had been initiated in this respect.

Peter Nadebaum

Dr Peter Nadebaum

Environmental Auditor (appointed pursuant to the Environment Protection Act 1970)

Dated 3 October 2003

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1. INTRODUCTION

Nuplex Special Waste Pty Ltd trading as Nuplex Environmental (Nuplex) operates a bulk liquid waste storage and treatment facility located at 88-90 & 92-94 Ordish Road, Dandenong.

Dr Peter Nadebaum of GHD Pty Ltd was engaged by EPA Victoria in his capacity as an Environmental Auditor (appointed pursuant to the *Environment Protection Act* 1970 ("the Act")), to conduct a environmental audit of Nuplex's operations at the premises in accordance with Part IXD of the Act.

The audit was conducted in accordance with the objectives, scope and methodology outlined below. This report contains the findings and recommendations of the audit.

The audit client was EPA's South Metro Region, and EPA staff including Neil McKenzie, David Nelson and Georgie Wettenhall worked with the auditor in undertaking the audit and in preparation of the audit report.

A site familiarisation visit was undertaken on 17 June 2003, and the audit of the site was undertaken on Tuesday 24 and Wednesday 25 June 2003.

2. OBJECTIVES

The objectives of this audit were to:

- identify controls implemented by Nuplex;
- determine adequacy of controls and the effectiveness of their implementation;
- assess compliance with the Environment Protection Act 1970, subordinate legislation and EPA statutory tools;
- assess implementation of legislative requirements into statutory control mechanisms;
- provide EPA with a comprehensive understanding of activities at the premises;
- identify opportunities to improve management of particular waste streams and consequently reduce waste dispatched to landfill for disposal; and
- report audit findings and recommendations to Nuplex and EPA.

3. SCOPE

The scope of the audit was determined by EPA. Stakeholders were not consulted in determining the audit scope.

The segment that was audited is the Nuplex facility at 88-90 & 92-94 Ordish Road, Dandenong. The boundaries of the premises are shown in Appendix 1.

The scope of the audit was to confirm compliance with EPA Licence EI23855 and to confirm that the operations of the facility would not adversely affect beneficial uses of

the environment. The audit considered both normal and abnormal operating conditions at the site. The audit did not consider transport of waste outside the boundary of the site (ie to and from the site), or compliance with work place occupational health and safety requirements.

The audit considered the following elements of the environment:

- surface water;
- groundwater;
- land; and
- air.

The audit considered the impact of the operations of the facility on the beneficial uses defined in the following policies:

- State environment protection policy (Waters of Victoria);
- State environment protection policy (Groundwaters of Victoria);
- State environment protection policy (Prevention and Management of contaminated Land); and
- State environment protection policy (Air Quality Management).

The audit criteria are those listed in section 5 of this report.

The scope of the audit did not include determining compliance with:

- Nuplex's quality assurance system with ISO 9000 series; and
- occupational health and safety requirements.

4. METHODOLOGY

The audit was carried out in accordance with *"Environmental Audits – Industrial Facilities", EPA Publication IB WM 91/08* and the principles of ISO 14010. The audit involved the following:

- assembly of the audit team and supporting specialists;
- review of EPA files and assembly of information pertaining to the facility[1];
- desktop review and analysis of waste movements from the premises using information extracted from EPA's Waste Transport Certificate database;
- site familiarisation visit to identify core activities at the premises and associated controls;
- identification of potential hazards caused by the core activities;
- a qualitative assessment of environmental hazards to determine

[1] Documents reviewed are listed in Appendix 2.

which core activities pose a high to extreme risk[2];

- on-site audit to determine legislative compliance and assess controls for core activities;
- communication with South East Water, WorkCover and SITA Australia Pty Ltd to advise that the audit was being undertaken and to seek information on recent interactions they may have had with Nuplex;
- assessment of compliance with legislative requirements with a focus on core activities assessed as posing a high to extreme risk of environmental hazard;
- assessment of likelihood and consequence of potential environmental hazards caused by core activities in the context of existing controls;
- assessment of the nature, characteristics, and quantity of waste streams accepted, reprocessed, treated and dispatched from the premises, with a view of decreasing waste to landfill and promoting cleaner production initiatives; and
- report preparation.

During the course of the audit Nuplex was advised of the preliminary findings and the basis for these findings to confirm that the information base and findings were factually correct.

5. COMPLIANCE CRITERIA

Specific documents audited against were:

(a) EPA licence – EI23855;

(b) *Environment Protection Act* 1970;

(c) *Environment Protection (Prescribed Waste) Regulations* 1998;

(d) *Environment Protection (Scheduled Premises and Exemptions) Regulations* 1996;

(e) Industrial Waste Management Policy (Prescribed Industrial Waste); and

(f) Notifiable Chemical Order (PCBs).

6. HAZARD IDENTIFICATION AND RISK ASSESSMENT

The following key activities were identified at the Nuplex Site. They are:

- Waste acceptance;
- Waste treatment;
- Waste storage;
- Waste disposal;

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[2] Risk assessment methodology is outlined in Appendix 3.

- Site management (land, groundwater and surface water);
- Maintenance of financial assurance; and
- Administration.

Appendix 4 shows tables of hazards, potential causes, potential impacts and risk assessment for each of these activities.

The risk assessment shows that all activities excepting Administration posed a high to extreme risk of an environmental hazard and hence were considered 'core activities'.

7. FINDINGS

7.1 Background

1. The premises audited are located at 88-90 and 92-94 Ordish Road, Dandenong South. These premises have been licensed by EPA for the treatment of wastes since June 1988. A copy of Nuplex's Waste Discharge Licence (EI 23855) is provided in Appendix 5.
2. From 1988 to 1994 the premises was occupied by Jennings Waste Pty Ltd. Nuplex Special Waste Pty Ltd trading as Nuplex Environmental have occupied the premises since 1998.
3. Nuplex Special Waste Pty Ltd is a division of Nuplex Limited, a public listed company that has its headquarters in New Zealand. Nuplex Limited's business includes construction materials, specialty chemicals and resins and waste management.
4. The premises are located in an Industrial 2 zone under the Greater Dandenong Planning Scheme. The area of the premises is approximately 7.5 ha. Premises sharing a boundary with Nuplex's premises include:
    - Waste oil treatment facility (Nationwide Oil Pty Ltd) to the southwest;
    - Solvent and other flammable waste treatment (Teris Australia Pty Ltd) to the south;
    - Sawmill to the south;
    - Metal surface treatment to the north; and
    - Dandenong Creek to the west.

Nuplex advises that a recent notice by Vic Roads will see the site reduced by approximately 1.5 ha due to the compulsory acquisition of the rear portion of the site for the proposed Frankston – Mitcham freeway.

A plan of premises and photographs of the premises are included as Appendices 1, 6 and 7. A schematic process flow diagram is provided in Appendix 8.

7.2 Plant mass balance

A desktop mass balance was performed across the Nuplex premises for the 2002 calendar year, using data from EPA Waste

transport certificates and data provided by Nuplex. A process flow scheme is shown in Appendix 8, and the summary mass balance is shown in Appendix 12.

7.3 Waste acceptance

5. The waste types that Nuplex is licensed to accept and the specified allowed treatments are listed in Table 1 of the licence. It was observed that a wider range of wastes were being accepted than were listed, for example, resins and oil sludge wastes are accepted for solidification. It is noted that the waste designations used in the licence are not consistent with EPA's current list of wastes in the *Environment Protection (Prescribed Waste) Regulations* 1998, and EPA can be expected to revise the waste list in the licence in due course.

    - Recommendation. Review the range of wastes desired to be accepted and are appropriate to accept and request EPA to amend the licence condition accordingly.

6. Nuplex has a procedure for the acceptance of waste at the premises. This procedure outlines the record keeping and sampling and analysis requirements for incoming wastes, and requires that capacity of the plant is taken into account when accepting wastes.

7. Nuplex advised that the plant capacity is sometimes exceeded and bunds within the treatment plant are used for storage and treatment of waste. This can give rise to a situation where release of waste to the environment may occur.

    - Recommendation. Determine the current capacity of the plant to accept, store and treat wastes, and restrict the receival of wastes so that this will not be exceeded. If this capacity differs from the current licensed capacity, a licence amendment for this revised capacity should be sought.

8. Understanding the composition of the wastes received at the facility and determining the requirements for storage and treatment is a critical aspect of the plant operation in ensuring that environmental responsibilities are met and incidents avoided. As the composition of the wastes are usually not well defined and as the wastes are often complex mixtures of chemicals, this can be a difficult undertaking.

9. The responsibility for this aspect of the facility operation lies with the Laboratory Manager. Discussions with the Laboratory Manager indicated that she is highly experienced and has an excellent knowledge of the composition and treatment requirements for the waste streams received at the premises.

10. Each delivery of wastes at the premises is accompanied with an EPA waste transport certificate. The transport certificate is photocopied by Nuplex office staff at the front gate office prior to a truck being allowed access to the site. The certificate is then taken to the laboratory where it is filed and the sample details are recorded.

11. A sample is taken of every load of waste accepted at the premises. The samples are labelled and stored in the laboratory for at least a month. Analyses of the samples are undertaken by the laboratory to identify contaminants of concern and determine treatment requirements. Decisions about which analyses need to be undertaken are made by laboratory staff based on knowledge and experience of the staff of the characteristics of previous waste loads from the waste producer and waste appearance and odour.

12. Nuplex has developed a draft protocol for identifying the required analyses. This protocol specifies the analyses that must be carried out for a specific waste type prior to acceptance. The protocol states that some of the analyses may not need to be carried out on waste streams that have been previously analysed and accepted.

13. The analyses carried out by Nuplex are mainly colorimetric tests (eg involving indicator strips). In the case of aqueous waste treatment (such as hexavalent chromium waste) the tests can involve mixing with reagents or other waste streams to confirm the treatment requirements and effectiveness of treatment. In the case of wastes where it appears that the waste may have flammable components based on origin or odour, the flash point of the waste will be measured. The laboratory also carries out more detailed analyses, for example quantitative GC analysis of treated effluent prior to discharge to sewer to confirm compliance with the sewer acceptance criteria.

14. Review of the Nuplex incident reports indicated that there had been 9 incidents recorded over the past 3 years related to inadequate characterisation of wastes. These included, for example:

- drums containing wastes which gave rise to gases and fumes;
- drums containing explosive items (artillery shells);
- drums containing flammables not recorded on the manifest;
- spent caustic waste delivered in a tanker containing unexpected hydrocarbons;
- waste delivered in a tanker containing unexpected cyanide; and
- volume of waste delivered greater than expected.

Although the inadequate characterisation of wastes has the potential to lead to hazardous incidents such as inadequate treatment or fire or explosion, or the various situations listed above, none resulted in a significant uncontrolled release to the environment, and all were adequately dealt with by Nuplex.

7.4 Waste storage

15. The Licence and the Operations Manual for the facility details the requirements for the storage of the various wastes received at the premises, and the Manual includes information and guidance on important operating aspects of the facility. The Manual is an important document and has been well prepared.

16. Flammable goods are stored in the flammable goods store in accordance with Licence condition 3.2. Inspection of the labels on drums did not indicate situations where flammable goods were being stored outside the store. With respect to the storage of drums of other wastes, it was observed that some of the requirements listed in the Manual were not correctly implemented. For example, the Manual states that drums of waste must be stored at the "Drum Segregation Area or unloading area"[3].

[3] Detailed in Operations Manual DH01

However, it was observed that large numbers of drums were stored outside the areas designated in the Manual and the licence (Appendix 6 Photographs 1 and 2). Some of these areas were poorly or inappropriately bunded. It was observed that drums were temporarily unloaded and stored on the roadway near the truck wash, and spillage in this area could enter the stormwater system. Drums with punctured tops were also observed to be stored on the roadway in this area, together with empty (but not washed) drums waiting for crushing in the truck wash (Appendix 6 Photograph 3, also refer paragraph 93). Spillage of residual liquids in these drums could enter the stormwater system. Examination of aerial photographs taken in the 1990's and 2001[4] consistently show drum storage along the western boundary, adjacent and to the rear of the current truck parking area, towards the rear of the premises. These practices have the potential to have caused land contamination (See Appendix 1). These practices breach licence condition 3.6.

- Recommendation. Remove drums of waste from inappropriate locations and only store them within approved drum

[4] Appendix 9 Example Aerial photograph 2001

store areas or apply to EPA to amend the EPA licence.

- Recommendation. Develop and implement a training program for staff on the operating requirements for the facility, including the location and storage of wastes.

- Recommendation. Assess areas where wastes have been improperly stored and clean up any areas of soil contamination identified.

17. It was observed that drums were stacked beside the edge of bunds, including one instance opposite the flammable good store where drums had fallen outside the bunded area. (Appendix 6 See Photograph 4). This is in contravention of the EPA Publication 347 Bunding Guidelines, breaches licence condition 3.6 and may result in the wastes released to land or stormwater.

- Recommendation. Only store drums in bunded areas in accordance with the requirements of the EPA Publication 347 Bunding Guidelines.

18. The bund of the western tank farm was of earthen construction with a bitumen lining, and was in a state of disrepair. The tanks in the bund were irregular and in poor condition, there was evidence of overflow (one tank was overflowing at the time of the audit (Appendix 6 Photographs 5, 6 and 19). There was evidence of substantial quantities of liquid waste having being recently present in the bund (Appendix 6 See Photograph 7). Nuplex advised that the bund was occasionally used for storage of effluent, which did not meet the requirements for discharge to the sewer, and the volumes of the tanks were inadequate for the current throughput of the facility. It was advised that such a situation had occu[illegible] few weeks prior to the audit, an[illegible] several times a year. There was approximately 100 mm of red sludge and oil present in the whole base of the bund (Appendix 6 See Photographs 7, 8 and 9). The presence of dirt and sludge in the bund made inspection difficult; however, a check of the base of the bund at some seven locations during the audit indicated that there were holes in the base of the bund and that the majority of the base appeared to be in poor condition and unlikely to provide an impervious seal. These findings breach condition 3.3 of the licence. Seepage of wastes to land and groundwater will have occurred in this area, breaching condition 1.2 of the Licence.

- Recommendation. Review the capacity and operational

requirements for the tank farm, reconstruct the tank farm with adequate storage and containment, and clean up the land and groundwater contamination in this area.

19. Waste oil is stored in a waste oil tank farm adjacent to the solidification building. The tanks are contained in a concrete bund, and the concrete and tanks appeared to be in good condition. The capacity of the bund appeared to have sufficient containment volume to contain spillage of oil. The design of the bund does not comply with the EPA Bunding Guidelines 347, and breaches licence condition 3.1 in that some tanks are located too close to the bund wall (ie the bund wall is closer that half the height of the tank) so in event of a tank failure the contents of the tank could fall outside of the bunded area. It was observed that the floor of the bund was covered with oil (this appeared to be in the order of 150 mm depth), which reduces capacity of the bund. Oil staining of the ground was seen outside and around the bunded area indicating that land contamination has occurred in this area. This may have been caused by overfilling the tanks, with the resultant oil spray leaving the bunded area (Appendix 6 See Photograph 10). The tanks do have a high level alarm however this must be manually switched to the tank being filled and switching appears either to not have happened or not worked.

    - Recommendation. Review and upgrade the containment systems of the oil tank farm. This should include: ensure that the tank high level alarm systems are operative and are used; maintain the bund in an oil free condition; remove the oil contaminated soil from around the oil tank farm; and provide for meeting the tank – bund wall separation distance requirements (eg consider provision of a screen wall).

20. The Operations Manual specifies the actions to be taken to control spills. However it was observed that most of the bunded areas used for storage of wastes contained spilt waste liquids and storm water. Where the bunds were accessed by trucks or mobile equipment, there was potential for waste to be tracked into unbunded areas and roadways, from where the waste could wash into the site stormwater systems which lead to the creek. Several examples of this were observed (Appendix 6 See Photographs 11, 12, 13 and 14). Allowing stormwater and wastes to remain in the bunded areas reduces their effective capacity and increases corrosion of the storage containers and tanks.

- Recommendation. A comprehensive review be carried out of the storage and containment of wastes, and of the practices by which spilled wastes are cleaned up and stormwater removed from bunded areas, to ensure that bunds are maintained clean and dry and that spilt wastes are not transferred to roadways and non-contained areas.

7.5 Waste treatment

The waste treatment process is shown in schematic form in the Process Flow Diagram in Appendix 8.

Aqueous waste treatment

21. Aqueous waste treatment involves receipt and storage of aqueous wastes, the blending of streams to reduce their concentration or to effect useful reactions between wastes (for example acid with alkali streams), and the addition of lime slurry to raise the pH and precipitate heavy metals. Where necessary, a flocculant is added. Where reduction of wastes is required (eg reduction of Cr(VI) to Cr(III)), this is effected through the use of pickle liquor or sodium sulphide. Hypochlorite may be added to oxidise cyanide, and this is carried out under alkaline conditions. It was confirmed with the laboratory manager that cyanides are treated at a pH of 9.0 or greater. Treatment of waste can involve an iterative process of additions and laboratory analysis until it has been confirmed that the treated waste will comply with the requirements for discharge to the sewer. After treatment, the waste is filtered in a filter press to remove suspended solids. The filter cake from the filter press is transported by truck to the solidification plant for stabilisation. The treated effluent is stored in batches in vessels in the western bunded area, and the composition of each batch verified prior to release of batches to the sewer.

22. Review of the quantities of reagents used by Nuplex indicated that there was a large amount of lime used, and only a small quantity of acid. This indicates that Nuplex receives a relatively large amount of acidic waste, and is consistent with that expected in Melbourne. The relatively small quantities of acid used supports the conclusion that Nuplex does utilise waste alkali to neutralise acidic wastes where practical.

23. With respect to waste receipt and unloading, after sampling and analysis of a liquid waste delivery, the laboratory advises the waste transport driver and the treatment plant operator into which tank(s) the liquid waste is to be unloaded. The laboratory also

determines the treatment requirements for each waste load received, and advises an operator in the treatment plant of the treatment requirements and the testing that is to be carried out. This process was carried out for all waste deliveries observed during the audit, and it was observed that a Nuplex operator was present at all deliveries to supervise the waste unloading. This complies with Licence conditions 9.5 to 9.8 which require a trained operator to be present during the unloading and treating operations.

24. Assessing wastes, determining their treatment requirements and ensuring that these are carried out properly is a key aspect of the operations. This is a complex undertaking, and there is potential for error or inadequate characterisation and treatment of wastes. Nuplex recorded examples of where errors had occurred as incidents. These included:

- waste discharged from the tanker to the wrong processing tank (acid waste discharged to an alkali tank);
- resin water discharged to the wrong tank (resulting in formaldehyde unexpectedly being present in the treated effluent);
- some batches not sampled/tested;
- some batches not treated properly.

These reported incidents occurred infrequently and comprised a small percentage of the total waste receipts. It was noted that each of these reported incidents had been identified through Nuplex's internal processes, and did not result in discharges of effluent that did not comply with the Trade Waste Agreement.

25. Nuplex's procedure states that the instructions to operators are to be given in writing; it was observed that for one of the deliveries a waste transport driver from an external company was instructed verbally. This practice has the potential for confusion and could cause an incident.

    - Recommendation. The process for providing advice to those involved in waste transfer from truck to vessel should be reviewed and revised to provide a high level of assurance that the transfer instructions are correctly understood and implemented.

26. Liquid wastes containing high levels of solids are discharged into three of the four truck receival bays, which have been reserved for this purpose. (Appendix 6 See Photograph 15). Solids settle in the bay and liquid is removed by portable pump and stored in vessels in the aqueous waste treatment plant. The solids and sludge which accumulate in these receival bays

are periodically removed from the bays by front-end loader and loaded into a truck for transport to the solidification plant.

27. This operation introduces the potential for wastes to be spilled on the site roadways from the truck used to transport the wastes, or tracked on the front-end loader wheels onto the site roadways. During rain wastes on roadways will wash into the stormwater drainage system and will discharge to the creek. It was observed that a truck used for transportation of the sludge to the solidification plant was not water tight and some spillage occurred (Appendix 6 See Photograph 14).

    - Recommendation. Review the procedures for receival and storage of wastes and sludge in the truck receival bays, and subsequent transport of the sludge, with the objective of avoiding the need for the front end loader to drive into the waste, and to ensure that there will be no spillage of wastes onto the site roads such as may occur through the sludge removal operation or leakage from the vehicles used to transport the sludge.

28. Due to the nature of the processes undertaken and the mixing, separation and then further mixing of waste streams, the final destination of a consignment of waste received at the premises will not be easily identifiable. This limits the potential for readily identifying cleaner production opportunities.

29. Bunds within the treatment plant are sometimes used for storage and treatment of waste. Storage or treatment of wastes in bunds utilises the containment capacity of the bund, and this capacity is then not available should there be a spillage of waste. This could result in an uncontrolled discharge of wastes to the environment.

    - Recommendation. Wastes be not accepted in quantities that could require storage of wastes in bunds. Storage or treatment of wastes in bunds should not occur.

30. Licence conditions 4.5 and 4.6 require devices to be fitted to batch tanks to continuously measure pH, oxidation-reduction potential (ORP) and temperature. Inspection of a selection of tanks within the aqueous plant found that these devices were not fitted and Nuplex advised they have not been fitted for some years. Treatment of waste in the plant is an iterative process of treatment followed by further analysis in the laboratory. This process is reliant on the Laboratory's advice.

    - Recommendation. Apply for amendment of licence to reflect

current aqueous waste treatment practices.

31. The northern filter press at the premises leaks liquid onto the floor of the liquid treatment plant building. It was observed that the liquid had flowed out the western door of the aqueous treatment plant building and had the potential to discharge to the stormwater system (Appendix 6 See Photograph 13). Liquid and sludge had also flowed offsite through the northern side wall of the building onto the adjacent Teris property (Appendix 6 see Photograph 16 and 17). This is in breach of licence condition 1.2

    - Recommendation. Review and improve the filter cake handling and containment systems to prevent liquid and sludge from entering the stormwater system and the adjacent Teris property. Advise Teris that sludge is present on their property.

32. Filter cake is transported by truck from the filter press to the solidification plant. The truck used for this process was not suitable for transportation of wet materials, and filter cake and liquids were observed to leak from the truck to the road (Appendix 6 See Photograph 14). This breaches licence condition 3.9. The vehicle was being used despite the leak being realised. The filter cake has a prominent oxide red colour and liquid of this colour was observed flowing off site at the southern stormwater discharge point.

    - Recommendation. Ensure the vehicles used to transport filter cake do not leak.

33. Treated and filtered effluent from the treatment plant is stored in tanks in the western tank farm prior to verification of quality and discharge to the sewer. Acid is used for final pH adjustment of waste prior to discharge to the sewer. The acid for this purpose is stored in a bulk container on top of the bund wall at the west of the premises (Appendix 6 See Photograph 18). The container is adjacent to a roadway which is used by large vehicles, and the position of the container makes it possible that, if a spill of acid were to occur, it could discharge to the stormwater system.

    - Recommendation. Properly contain the container used for storage of acid for adjustment of treated effluent prior to sewer disposal.

34. Tank S2 used for intermediate storage of treated effluent in the western tank farm was seen to be overflowing into the bund despite its filling nominally ceasing the previous day. Visible signs of overflow on this and other tanks suggest there are not high level alarms on these tanks. It is normal practice to have high level alarms fitted to such

tanks. This situation places unnecessary loading on the bund and increases the risk of land and groundwater contamination (Appendix 6 See photograph 5).

- Recommendation. Fit tanks in the western tank farm with high levels alarms.

Solidification Process

35. Solid wastes are treated in the solidification plant which consists of two pits (Appendix 6 See Photographs 20, 21 and 22) into which the waste and solidification medium (cement kiln dust) are added and mixed by excavator. The waste is then transferred from the pits to curing bays where it is stored prior to consignment to landfill.

36. Condition 4.9 of the licence states that the following wastes may be solidified at the premises:

    - Heavy Metal Sludges;
    - Incinerator Ash;
    - Heavy Metal Contaminated Soil;
    - Metal Finishing Residues;
    - Aqueous based paint waste containing inorganic pigments; and
    - Heavy Metal Salts.

    It was observed that wastes other than these types, including oil sludge wastes and resins were also treated in the solidification plant.

- Recommendation. The solidification of wastes should be restricted to the range of waste types permitted under the licence. The range of wastes which are desired to be solidified should be reviewed and the EPA should be requested to amend the Licence accordingly.

37. Filter cake from the liquid treatment plant is treated in the solidification plant. Condition 4.12 of the Licence requires that waste be tested prior to transfer to solidification from the liquids plant. This is not undertaken.

    - Recommendation. Filter cake from the liquid waste treatment plant be tested prior to transfer to the solidification plant in accordance with the Licence or, if this is considered to not be necessary, an amendment to the Licence be sought from EPA.

38. The wastes that are stabilised vary widely in terms of physical form. Nuplex advised that it is not practical to empty all packaged wastes (eg drums and cans) prior to treatment, and the smaller packaged wastes (such as paint tins) are added directly to the stabilisation pits, and are broken up by an excavator. Where wastes are solid and cannot be easily separated from the packaging (such as material which has solidified in a drum), these are similarly

treated (Appendix 6 See photograph 21).

39. The laboratory provides instructions for treatment of packaged wastes by means of a labelling system. An example is shown in Photograph 23. The labelling system includes a colour code for the intended treatment type and details of the waste type, contaminants of concern and OH&S requirements. The Laboratory Manager advised that operators should use the label information to determine which wastes could be added together in the solidification process to avoid undesired chemical reactions. Interviews with operators indicated that this information is not taken into account when adding waste to the stabilisation pits and that the colour code is the guide to treatment type.

    - Recommendation. Training of the operators of the solidification plant should be undertaken to ensure that the operators know how to interpret the waste label and the treatment requirements.

40. Waste is solidified in two pits, each of approximately $40m^3$. After mixing and based on operator judgement of the physical consistency of the waste, it is transferred to temporary holding bays (Bays 1 and 2). The waste is allowed to cure in Bays 1 and 2 and is then aggregated with other solidified waste in Bays 3 and 4 for final storage. Bays 3 and 4 can contain a total of $270m^3$ of waste. Nuplex takes a composite sample from these bays and an external laboratory (MGT) undertakes TCLP testing of the samples. After the TCLP test confirms compliance with the landfill acceptance criteria, the waste is disposed of to landfill.

41. Review of the total usage of cementitious reagents indicated that the quantities used were consistent with those expected to be required for stabilisation of the wastes.

42. Solidified material was observed to have spilled out of the solidification building's northern entrance on to the soil (ie an unsealed area Appendix 6 See photograph 24). This is likely to have given rise to contamination of the soil in this area.

    - Recommendation. Improve house keeping of the solidification building operations to avoid spillage of the material on uncontained and unsealed areas.

43. The solidification pits are in-ground, and are subject to attack by acidic substances and physical damage by the excavator used to mix wastes and break up materials. The condition of the base of the pits was unable to be determined and, if damaged, may pose a potential

source of soil and groundwater contamination.

- Recommendation. Conduct a survey to confirm the integrity of the bases of the solidification pits.

44. The solidified wastes are disposed of at a landfill at Taylors Road, Lyndhurst, operated by SITA Australia Pty Ltd. The landfill is licensed to accept prescribed wastes. The current licence conditions for the landfill operation specify that prescribed waste accepted at the premises must be tested to confirm that it meets specified elutriation levels determined by TCLP testing. The SITA licence does not specify a frequency of sampling, and it can be concluded that Nuplex's TCLP testing regime complies with the landfill's acceptance requirements.

45. Condition 4.11(a) of the licence specifies that a "representative sample of each batch of stabilised waste" be subjected to TCLP testing. The definition of a "batch" of waste is unclear, although it is noted that if "batch" refers to a 40 m^3 batch of waste treated in one of the solidification pits, then the current testing frequency employed by Nuplex is in breach of the licence condition.

46. Given the range of wastes being stabilised, it is likely that the waste constituents within Bays 3 and 4 will be highly variable. Assessment of the landfill's acceptance requirements was beyond the scope of the audit, however the auditor is not confident that the current sampling and TCLP testing regime allows Nuplex to adequately meet its responsibility as a waste producer to characterise its waste and manage any risks associated with disposal of that waste.

- Recommendation. Clarify the requirement for sampling and analysis of solidified waste, including QA/QC requirements, with SITA and EPA.

Proposed Drying of Wastes

47. Nuplex has recently installed a rotating drum type dryer under EPA works approval WA49392. Nuplex advised that the purpose of the dryer is to remove moisture from solidified waste and reduce the cost of landfill disposal. The dried waste may also be reused as a drying agent in the solidification process. The waste dryer is yet to be commissioned using waste and is not yet licensed for operation by EPA. Because the dryer has been subject to the works approval process and is yet to be commissioned, assessment of the drier was excluded from the scope of the audit.

- Recommendation. Ensure that the drying process is approved and the licence is appropriately

amended prior to operation of the dryer other than as may be allowed for under the Works Approval.

Waste Oil

48. Waste oil accepted at the premises is subject to limited treatment. Gross solids are removed by screening, and aqueous phase is separated by gravity settling. The aqueous phase is transferred by truck to the aqueous waste treatment plant or the solidification plant. Gross solids are transferred to the solidification plant.

49. The licence currently specifies the maximum allowable oil storage at the premises as 25,000 litres. The current storage capacity (all of which can be used) is 250,000 litres. The auditors found correspondence from Nuplex regarding this and other items in the licence that did not accurately reflect current practices or equipment at the premises. There was no evidence that EPA had responded to this correspondence.

- Recommendation. The acceptance of waste oil be restricted to comply with the Licence. If greater volumes of waste oil are desired to be accepted, then an amendment to the Licence should be sought from EPA.

7.6 Spent Caustic oxidation

50. Nuplex has a plant for the treatment of "spent caustic" from oil refining. This waste is a high concentration caustic solution containing highly odorous reduced sulphur species such as sulphides and mercaptans.

51. Hydrogen peroxide is used to oxidise the reduced sulphur compounds and decrease the waste's odour. 50% hydrogen peroxide is used in the process; this material is a strong oxidant and if used or released in an uncontrolled manner can result in explosion. The treatment of gaseous emissions from this process is discussed in Section 6.8.

52. The current plant was opened in 1995 after its predecessor was badly damaged by an explosion in the reactor. A fire in a carbon adsorption unit initiated the explosion.

53. 20,000 litres of 50% solution of hydrogen peroxide is stored in a modified isotainer in an external bund adjacent to the spent caustic plant. Caustic soda associated with the scrubber unit DP2 is stored in the same bunded area. The bund is shallow (approximately 150 mm walls *cf* minimum of 300 mm specified in the Licence for all bunds), but the volume of the bund is consistent with containment requirements.

- Recommendation. Increase bund wall height to comply with Licence or, if the bund complies with containment requirements, seek amendment of the Licence.

54. An audit of the plant which focussed on the associated storage and handling of hydrogen peroxide solution was conducted by W.E Ross in September 2002. This audit report made recommendations related to:

- separation of the storage of hydrogen peroxide and caustic soda used in the scrubber system;
- maintenance;
- training; and
- the piping and instrumentation diagram (which did not reflect the plant as built).

There was no evidence that these recommendations had been carried out by Nuplex (as at June 2003) and, in particular, it was observed that hydrogen peroxide and caustic soda were still stored in a common bund and the recommendation for separating their storage had not been addressed. Because of the potentially explosive nature of hydrogen peroxide, it is essential that the recommendations of this audit be addressed.

- Recommendation. Implement as a matter of urgency the recommendations of the hydrogen peroxide system audit undertaken in September 2002.

55. Nuplex advised that the philosophy of design and operation of the caustic oxidation plant was to rely on automated systems for the control of addition of hydrogen peroxide, so that there is minimal reliance on the plant operator. An interview with a plant operator confirmed this and indicated that the operators place a strong reliance on the plant's control system to ensure safe operation. It was observed that there were a number of automatic safety cut-offs that were linked to the supply of peroxide to the reactor.

56. The Operations Manual for the caustic oxidation plant specifies detailed actions to be taken in operating the plant and in the event of malfunction. An interview with an operator suggested that he was not familiar with the detailed procedures or what should be done in the event of an emergency, reflecting the philosophy of relying on the plant automatic control systems.

- Recommendation. Prepare and implement a training program for operators that covers the requirements for operation and required actions in the event of unusual or upset operating conditions.

57. It was beyond the scope of the audit to undertake a Hazard and Operability

(HAZOP) Study of the spent caustic plant, and the audit findings are limited to observations made during the site inspection. There was no evidence that there had been a review of the Hazard and Operability of the plant in the years since its design and commissioning, or that there was a program in place of regular control system testing or regular maintenance of the caustic plant control systems and equipment. It was observed that there was a substantial ingress of dust arising from the operation of adjacent solidification plant, and that this had potential to adversely affect the control systems of the caustic oxidation plant.

- Recommendation. Undertake a HAZOP study for the plant, and develop and implement a program of regular testing of control systems and maintenance of plant and equipment.
- Recommendation. Institute measures to avoid dust ingress to the caustic oxidation area and its control systems.

7.7 Waste disposal

Landfill

58. Nuplex consigned approximately 23,000 cubic metres of waste to landfill in the 2002 calendar year. All of this waste was consigned to the landfill facility at Lyndhurst operated by SITA Australia Pty Ltd (SITA). 94% of this waste was stabilised waste from the solidification plant, the remainder being used packaging.

59. Review of the Nuplex incident reports indicated that there had been cases in which packaged wastes did not comply with the landfill acceptance requirements. For example, complaints had been received from SITA regarding a drum of resin which had been received without perforation, and deliveries of a drum of hydrochloric acid waste and carboys of hydrochloric acid waste. In general, it appears that such incidents occur infrequently.

60. The landfill generally does not carry out confirmatory testing of wastes upon receipt, although some random samples have been taken. The latter results were not available for the audit; however, Nuplex records indicated that there had been only one case where the wastes had not complied (cyanide failed the acceptance requirement). Discussion with the compliance manager at SITA indicated issues experienced with wastes from Nuplex has included excess vapour generation including VOCs and ammonia from stabilised waste; and high moisture content.

    - Recommendation. Improve procedures for approving solidified waste for landfill disposal to ensure that wastes

will comply with landfill acceptance requirements.

Sewer

Nuplex discharged approximately 35 ML of waste to the sewer system in 2002. The discharge to sewer is subject to the requirements of a Trade Waste Agreement with South East Water. The Agreement contains comprehensive requirements to prevent and detect discharge of non-compliant waste to the sewer.

61. The Agreement requires a batch process for treated effluent storage, verification and discharge to the sewer. This provides a good approach to ensure that the discharge will comply with the Trade Waste Agreement. In particular, the Agreement requires:

- sampling and analysis and confirmation of compliance prior to discharge of every batch, for key parameters that could adversely affect the operation of the sewage treatment plant (such as the presence of a biocide) or the safety of the sewerage system;
- Duplicate samples be taken which are analysed subsequently for a wider range of parameters as a more comprehensive check for compliance; and
- Samples be taken and analysed for a comprehensive range of parameters quarterly (eg for chlorinated organics), half yearly (eg metals scan) and yearly (eg dioxins).

62. Review of the Nuplex incident reports indicates that there have been occasional situations in which monitoring of the treated effluent in storage has not met one of the parameters for discharge, but nearly all of these have been identified and corrected prior to discharge to the sewer.

63. Examples of contaminants which were detected at levels which exceeded the Agreement and were corrected prior to discharge included: formaldehyde (mainly as a result of difficulties in analysis), cyanide, sulphide, zinc, iron, and phenolics. No cases were identified in which there was a serious discharge that would have affected the integrity of the sewerage system or the operation of the SEWL sewage treatment process.

64. Discussion with SEWL confirmed that there had not been any instances involving serious non-compliance with the Trade Waste Agreement, and SEWL viewed the procedures as reliable.

65. An assessment of the possible impact of the discharges on the sewer system and the downstream environment is beyond the scope of the audit, and it is assumed that compliance with the Trade Waste Agreement will provide for

adequate protection of the receiving environment downstream of the sewage treatment plant.

66. It is possible that some unusual compounds might be present from time to time in the wastes that would pass through the Nuplex treatment process, and would not be detected in the sampling and analysis procedures. Examples of this are, for example, soluble chlorinated hydrocarbons which are only analysed on a quarterly basis. However, it is considered that the Nuplex processes combined with the sewage treatment process makes it unlikely that significant concentrations of such compounds would discharge to and adversely affect the receiving environment. It should be recognised in this regard that it is probable that such compounds will be in use in the community and industry and will enter the sewerage system in any event, and the contribution from Nuplex may not be significant and distinguishable from the contribution from other sources.

Disposal to other sites

67. Some wastes accepted by Nuplex, cannot be treated at the premises, but are stored and then consigned to other licensed premises for treatment. Such wastes include flammable liquids and waste oil. Nuplex produces transport certificates where necessary for the dispatch of these prescribed wastes.

7.8 Discharges to air

68. There are two licensed discharge points at the premises. DP1 serves the ammonia stripper and DP2 serves the caustic scrubber which is used to treat exhaust gases from the spent caustic oxidation process and the aqueous treatment plant. The height of these discharge points were not measured but appeared to be consistent with the licence requirement. The discharge points were marked in accordance with the licence

69. The ammonia stripper as shown in Photograph 25 consists of a series of plastic membranes over which the waste is circulated. An induction fan draws air over the waste and strips the ammonia. Ammonia is a Class 2 indicator under the State environment protection Policy (Air Quality Management) (SEPP(AQM))for which a design ground level concentration is specified on the basis of potential health effects. There is insufficient information to confirm that the design concentration will not be exceeded. However, ammonia is an odorous compound, and because no complaints have been received in relation to ammonia emissions from the premises it is likely

that the design ground level concentrations are not exceeded.

- Recommendation. Confirm that the maximum emission level of ammonia from the premises does not cause the SEPP design ground level requirement to be exceeded.

70. Air stripping of ammonia is contrary to Clause 16 of the IWMP (Prescribed Industrial Waste) (IWMP(PIW))which states that PIW must not be treated in such a way that contaminants are transferred to other environmental media unless this results in the best practicable environmental outcome. Nuplex advised that it had considered this, and the planned implementation of an alternative treatment technology was abandoned due to a reduction in the amount of waste containing high ammonia levels accepted at the premises (photographic wastes). A review of waste transport certificate records indicates that the quantity of T120 photographic waste accepted at the premises over the last four years has reduced by approximately one third.

- Recommendation. Re-examine feasibility of alternative treatment technologies to confirm that the requirements of SEPP (AQM) and the IWMP (PIW) are complied with.

71. Tank S2 in the western tank farm area is fitted with a blower unit. Nuplex's Operations Manual states that this blower is used to remove any remaining ammonia from the waste, in addition to the use of the ammonia stripper served by DP1. Condition 3.4 of the Licence specifically states that this type of treatment in an external tank is not permitted. The discharge could give rise to concentrations of ammonia which exceed the acceptable ground level concentration and could also give rise to offensive odours. This is an unlicensed air discharge point.

- Recommendation. Remove the blower from Tank S2 or apply to EPA to have the discharge included in the Licence.

72. Emissions from batch tanks in the aqueous waste treatment plant are collected by a dedicated vent system on each tank and are discharged via the caustic scrubber DP2. Nuplex advised that the caustic scrubber is maintained at a pH greater than 10. Emissions from the filter presses are not collected in accordance with the Licence.

- Recommendation. Review requirements for collection of emissions from filter presses, and install collection system or seek revision to licence.

73. Air emissions from the spent caustic treatment process are treated in a small

chlorine based scrubber, a number of activated carbon adsorption units in parallel, and are then discharged through the caustic scrubber DP2. Scrubber liquor pH is maintained by use of a caustic dosing system and an alarm is fitted if liquor recirculation fails.

74. A visible emission from DP2 was observed during the audit. The licence does not permit visible discharges of wastes; however, it is considered most likely that this will have been water vapour and would not constitute a licence breach.

75. The discharge point on the installed waste drier will require licensing once it has been commissioned. No discharge points likely to require licensing other than that at Tank S2 were detected during the audit.

76. Sources of fugitive emissions to air were observed during the audit associated with the solidification plant, the filter presses, oil storage, and cement kiln dust storage. The emissions detected from the solidification plant appeared to be the most significant.

77. It was observed during the audit that the solidification process produces significant quantities of dust. This was associated with the addition of the reagents to the solidification pit, and the dust is probably cement kiln dust. There is no provision for collection of this dust. Licence condition 4.10 requires that odorous or dusty waste be cured in Building B when the scrubber served by DP2 is operating. This condition does not appear to be relevant given the lack of emission collection equipment in Building B. Evidence of the dusty nature of solidification can be seen in Photograph 26. Dust was also observed within the adjacent spent caustic treatment plant building where dust penetrates the walls of the building and builds up within the operation area. There are significant openings in the solidification building, and under some atmospheric conditions it is likely that dust will be discharged beyond the boundary of the premises. EPA has not received any complaints regarding dust emissions from the premises.

78. It was observed during the audit that the solidification process can give rise to considerable emissions of ammonia. In one instance the odour from this was sufficiently strong that the audit team was not able to enter the building through the western door. It is possible that these emissions could give rise to concentrations of ammonia off site which exceed the SEPP design ground level concentration.

79. Although outside the scope of the audit, it was noted that the concentrations of dust and ammonia observed on site may exceed work place exposure standards and should be checked.

80. In addition to dust and ammonia, it is possible that volatile organic compounds (VOCs) could be emitted from the solidification process. These could result from direct volatilisation, or through elution by other gases. Relevant to this, it was noted that SITA reported to EPA that it had rejected a load of waste in April 2003 due to high VOCs. EPA contacted Nuplex regarding this matter at the time and was advised that the waste was returned to Nuplex where it was further turned and aerated to liberate VOCs. This practice is akin to "land farming" waste to reduce VOC in contaminated soils and is contrary to Clause 16 of the IWMP (Prescribed Industrial Waste).

- Recommendation. Examine practices which give rise to fugitive emissions particularly including dust and ammonia. Ensure that the emissions are minimised in accordance with the IWMP, do not give rise to unacceptable off-site discharges, and that on-site concentrations comply with requirements for protection of the health of workers at the site. Contact EPA to determine if dust should be collected from Building B

81. A pipe connection on the cement kiln dust silos broke during the audit producing a substantial spill of cement kiln dust and a dust cloud (Appendix 6 See Photograph 27).

- Recommendation. Identify equipment critical for preventing environmental impacts and implement a program of regular maintenance and testing of this equipment.

Monitoring

82. Nuplex is required by its licence to conduct monitoring of discharges from DP 1 and 2 in February and July each year. An external contractor undertakes this monitoring. A review of historical monitoring results on EPA's files indicated a number of non-compliances with licence discharge limits, however the majority of test results indicated compliance. Instances of non-compliance are highlighted in the Tables in Appendix 10.

83. While stack testing is undertaken, no record is maintained of plant operating conditions. Failure to record this information is a breach of a condition of the Licence. Not recording the operating conditions of the plant limits the value of the monitoring data, as there is no indication as to whether the emissions reflect a normal, worst-case or other scenario.

- Recommendation. Ensure that the operating conditions of the

plant are recorded during stack testing of emission points.

84. The six-monthly frequency of stack testing provides only a limited number of "snap-shots" of the plant's emission performance. Based on the range of wastes accepted at the premises and the absence of complaints (which suggests that the air pollution control systems have been maintained in operation) it is unlikely that hazardous substances (including for example substances prescribed as Class 3 indicators in SEPP(AQM)) will be discharged to the atmosphere in quantities that would exceed the off-site design ground level concentrations.

85. A review of stack testing reports did not note any issues regarding the location of stack sampling points or sampling planes. The audit did not further assess compliance with the requirements of EPA Publication 440.1 A Guide to the Sampling and Analysis of Air Emissions and Air Quality.

86. The Licence requires submission of annual reporting of the results of monitoring undertaken during the previous year. There is no requirement to report breaches of licence limits when identified and Nuplex has not provided such reports.

7.9 Discharges to surface waters

87. Stormwater at the site is collected via two stormwater drainage systems, one serving the northern part of the site and the other serving the southern part of the site. These discharge to Dandenong Creek on the western boundary of the site. Other than in bunded areas, potentially contaminated stormwater is not segregated and contained to allow its quality to be verified prior to discharge.

88. The general house keeping of the site was poor. It was observed that spillages of wastes in areas that freely drained to the stormwater drainage system were not removed despite the Operations Manual requiring clean up actions. Examples of this were: leaking drums stored on roadways, leaking truck used to transport filter cake and sludge; spillages from the lime area overflowing into the road side gutter; (Appendix 6 See Photograph 28) and filter cake residue passing out of the western door of the aqueous treatment plant and entering the southern stormwater system. Other examples are noted in this report of situations where there is potential for wastes to enter the stormwater system (Appendix 6 See photographs 13, 27 to 30).

- Recommendation. Carry out a comprehensive assessment to identify where there is potential

for wastes and other material to enter the stormwater system, and determine how these can be avoided. This should include the systematic assessment of all areas of waste storage, handling and transport to identify all possible ways in which wastes and other material (such as soil) might enter the drainage system. Stormwater flow paths and containment options should be evaluated to determine how effective containment can be achieved.

- Recommendation. Institute a program including training of operators and provision of adequate resources to ensure that leaks and spills are cleaned up immediately.

89. Conditions 6 and 12 of the licence require sampling of stormwater prior to discharge, and maintenance of the stormwater system. The Operations Manuals AS11.6.3 and LM10 includes sections on these requirements; however, the programs are inadequate and are not sufficient to avoid non-compliance with the Licence. Observations in this respect are outlined below.

    - Recommendation. Design stormwater sampling and maintenance regimes to comply with the licence and include in the Operations Manual.

90. The licence and Operations Manual requires the sampling of stormwater if a rainfall event exceeds 10 mm. The purpose of this is to capture the first flush from the premises. This sampling did not occur after the last 10 mm rain event, as the officer responsible was on annual leave. A rainfall of greater than 10 mm was recorded by the company, so the system was partially effective. The northern system was not sampled as it was not known to be a point of discharge. This breaches licence condition 12.7.

    - Recommendation. Carry out sampling in accordance with the Licence and the Operations Manual. Increase appropriately trained staff resources as necessary to ensure that sampling will be carried out when required.

91. The northern stormwater discharge has not been recognised by Nuplex as a point of discharge and hence has not been subject to the retention, maintenance and sampling and reporting requirements of the Licence or Management Plan. This breaches licence conditions 6.2, 12.2, 12.3, 12.6, and 12.7. The existing system includes a shallow pit fitted with a sluice gate. This system may have been designed to

provide a spill retention system; however, the operators did not recognise its use for this purpose and the gate was inoperable. (Appendix 6 See Photograph 31)

- Recommendation. Apply to EPA to amend the Licence to include the northern stormwater discharge point.
- Recommendation. Construct an appropriate retention system for potentially contaminated stormwater, and a sampling point, for the northern stormwater discharge point.
- Recommendation. Develop a testing and maintenance regime for the northern stormwater discharge point.

92. Inspection showed that the quality of the effluent in the northern offsite stormwater drain was oily. This breaches Licence condition 12.5. This drain runs under a bunded oil storage area which is in poor condition and where there is a high likelihood of oil having penetrated below the bund. It appears most likely that this is the source of the oil in the stormwater discharge, although it is possible that the drain has become coated with oil from prior spills and continues to shed oil to the drainage water. Nuplex is also not at the head of this drainage line and it is possible that contamination from operations upstream of Nuplex has occurred.

- Recommendation. Determine the source of oil contamination in the stormwater. This may involve pressure cleaning the drain and then inspecting clean flows for oil ingress.

93. The truck wash bay was being used as a drum crushing area and as drip tray for prescribed waste skips. Wastes were pooled in the truck wash bay (Appendix 6 See Photographs 11, 29, 30). This prevented the truck wash bay being used for its intended purpose and increased the risk of contamination of stormwater (and land) by the washing of trucks in other locations. The stormwater pit located on the south west corner of the truck wash bay was almost totally covered by mud. This pit would also serve as an overflow point for the truck wash. (Appendix 6 See Photograph 12).

- Recommendation. Assess the requirements and preferred location(s) for truck wash facilities, and construct these facilities. Restrict the use of these facilities to their designated purpose.
- Recommendation. Assess the need for the stormwater inlet located at the existing truck wash and, if it must be retained,

protect it from any potential overflow from the truck wash.

94. The southern stormwater area is designed to pass through a 30 kL settling tank system. This system was blocked with sludge and was inoperable. This breaches licence condition 12.4. Sludge was seen to be leaving the premises in the stormwater discharge. The latest sampling of the stormwater showed a level of suspended solids in breach of Licence condition 12.1 (150 mg/L *cf* licence limit 80 mg/L).

    - Recommendation. Carry out weekly inspection and maintenance works for the southern stormwater system in accordance with Licence conditions 12.3 and 12.4.

95. The site does not have a truck wheel wash facility. This is in breach of Licence condition 6.4. The audit inspection supported the need to have a wheel wash, noting that there were a number of areas where wheels of trucks entering and leaving the site could become contaminated (eg sludgy material in the drum receival area, spillage of filter cake residue, spillage and lack of containment of solidified material, and areas of the site which were not paved and became muddy with the passage of vehicles and mobile plant.

    - Recommendation. Install a truck wheel wash, and seal areas of the site subject to movement of vehicles and mobile plant.

7.10 Land and Groundwater

96. Licence Condition 1.2 requires that there be no discharge or seepage of waste to land or groundwater. There were a number of situations observed which did not comply with this requirement, and the systems and current practices do not protect land and groundwater from contamination. Examples of the current operations that have potential to give rise to soil and groundwater contamination are noted in preceding sections of this report, and include:

    - wastes covering the base of the western tank farm, and seepage through the bund floor (Appendix 6 See photographs 7, 8, 9, 25)(examination of the groundwater sampling results has shown hydrocarbon contamination of the groundwater adjacent to the tank farm);
    - oil staining outside the oil tank farm bund (Appendix 6 See photograph 10);
    - drum storage in unbunded areas and in some cases directly on soil (Appendix 6 See photographs 1 - 4, and Appendix 9) ;

- spillage in the vicinity of the truck wash bay (Appendix 6 See photographs 11 and 12);
- spillage of filter cake and sludges from truck transportation on site (Appendix 6 See photograph 14);
- spillage of solidified waste in the vicinity of the solidification building (Appendix 6 See photograph 24);
- spillage of wastes in other areas of the site, with tracking of these wastes onto unsealed areas and muddy areas of the site.

In assessing the significance of these areas of possible contamination, consideration needs to be given as to whether the contamination will: adversely the health of workers at the site, run off in stormwater and adversely affect the creek ecosystems, or give rise to groundwater contamination which would adversely affect the use of the groundwater or impact on the ecosystems of surface waters.

- Recommendation: If works are planned at the site, such as construction of new waste storage areas and paving, the soil contamination status should be determined prior to the works to ensure that any areas of significant contamination are cleaned up prior to the works.

97. In addition to potential soil and groundwater contamination arising through current operations, there is potential for past operations to have given rise to soil and groundwater contamination. For example, examination of aerial photographs taken in the 1990's and 2001[5] consistently show drum storage in areas that are not paved along the western boundary, adjacent and to the rear of the current truck parking area, towards the rear of the premises. These photographs also show other storage areas that had the potential to have caused land contamination.

- Recommendation. Carry out a review of soil contamination to identify where it may adversely affect the beneficial uses of the land, surface water or groundwater, with particular consideration to possible effects on surface water through run off in stormwater, and effects on the use of groundwater. Undertake progressive or staged clean up of the soil contamination where necessary, with a particular focus on eliminating sources of surface

[5] Appendix 9 Example Aerial photograph 2001

water and groundwater contamination.

98. The premises is required by licence condition 10 and Operations Manual LM 08, to have seven operable groundwater bores. There are only six bores operable. The lost bore was down aquifer gradient and hence is important when assessing the potential impacts of the premises operations.

    - Recommendation. Re-establish the seventh groundwater bore.

99. Condition 10.5 of the Licence requires the groundwater monitoring information to be assessed and provision of a proposed ongoing groundwater monitoring plan. In 1997, Nuplex submitted an assessment to EPA of past groundwater monitoring data. The assessment was conducted by Radian International Pty Ltd and concluded that the groundwater monitoring program in place at the premises was inadequate to make a definitive evaluation of water quality at the premises. A proposed program for groundwater monitoring has not been submitted.

    - Recommendation. Review the available groundwater results and prepare an investigation and action plan for submission to EPA.

7.11 Financial Assurance

100. Nuplex has provided EPA with a financial assurance of $139,163 in the form of a bank guarantee. This was provided in 1998. The amount of financial assurance assessed by EPA at that time was $278,326 and EPA accepted half of this amount in line with an agreement between EPA and the Victorian Waste Management Association on the condition that Nuplex implemented a voluntary Environment Improvement Plan. The financial assurance was to be reassessed on completion of the EIP. The EIP was completed; however, the assurance has not been reassessed.

101. The financial assurance was based on significantly less waste than the volume currently stored at the premises. The financial assurance should also include consideration of any land contamination at the premises and the status of physical and management measures to reduce the likelihood of further such contamination. In view of the number of improvements identified in this audit to be required, it can be expected that the financial assurance required will increase when reviewed.

    - Recommendation. Recalculate the financial assurance.

7.12 Plant management systems

102. Nuplex has a quality management system certified to ISO 9002. The quality system includes an Operations Manual and comprehensive procedures for most of the operations at the premises, and provides an excellent base for establishing the good operation of the facility. The Operations Manual includes the information required for the Waste Management Plan specified in the Licence.

103. Nuplex advises that it is developing an Environmental Management System that will be certified to ISO 14001. This is an excellent development, as it can be expected to identify the aspects of the facility operations that can give rise to environmental impacts, and to establish an appropriate environmental improvement plan.

104. The audit has identified many areas where environmental impact is occurring or has potential to occur, despite having a quality management system in place. This situation arises because the quality management system has focussed on complying with the quality requirements for the products (solidified waste and treated effluent), as is appropriate for a quality management system. The audit has found that these quality objectives have generally been met, and this supports the conclusion that the quality management system is in place and is being used by Nuplex. However, the quality management system has not focussed on complying with other requirements, such as environmental compliance requirements, and this is evident in the range of issues identified. As such, the Environmental Management System being developed can be expected to have this focus, and therefore should address the environmental compliance requirements.

105. In summary, the key reason that many environmental non-compliance issues have been identified in this audit is because Nuplex has been focussing on meeting product requirements, and has not understood or sought to address operational issues that could give rise to adverse environmental effects.

- Recommendation. Continue with development and implementation of an environmental management system which will satisfy the requirements of ISO 14001. The findings of this audit can provide a useful input to this process.

106. The audit identified some areas of the existing procedures that needed to be updated or better implemented. Most of these have been noted in the earlier findings of this report. It was also noted that the Operations Manual specifies an emergency procedure in SC07. This

procedure fails to capture incidents that may impact on the environment and focuses on incidents which pose a risk to workers at the site (refer Licence conditions 9.9 – 9.12). The Emergency procedures for the site require that the EPA be notified after an incident has occurred. It is not clear that the level of incident that requires notification has been properly defined.

- Recommendation. Carry out an environmental hazard aspects assessment and revise the Operations Manual emergency procedure to include incidents which could impact on the environment.
- Recommendation. Apply for a licence amendment to reflect an appropriate set of emergency procedures.
- Recommendation. Review the definition of the level of incident requiring notification to EPA and include this in the emergency procedures.

107. Nuplex has a good incident tracking system where all incidents are discussed at monthly management meetings[6] until all the corrective actions have been taken. However the definition of 'incident' does not include issues such as licence breaches and is more related to internal matters.

- Recommendation. Define "incident" to include all possible licence breaches.

7.13 Plant inspection and maintenance

108. Licence conditions require a weekly inspection and maintenance program to be carried out at the plant. Nuplex undertakes a monthly inspection of the plant for which records are kept. The inspection is no longer based on a set checklist as is specified in the licence and consists of visual inspection of equipment and recording of its condition.

109. It appears that most of the maintenance requirements at the plant are determined by failure of a piece of plant. For example, there was no periodic inspection or testing regime in place for tank integrity or instrument/ control operation.

- Recommendation. Develop an inspection, testing and maintenance program to ensure that adequate maintenance is carried out. This should comply with the Licence and ensure that critical items of plant are maintained so that they do not fail.

[6] Operations Manual procedure AMo5

7.14 Site Security

110. Vehicle access to the premises can occur through the main northern access road from Ordish Road, and through a southern access road from Ordish Road south of Teris. This road also provides access to Teris and Nationwide Oil. Pedestrian access is possible from the rear boundary adjacent to the Dandenong creek. The northern access road has a boom gate; however, vehicle access is not restricted on the southern access road, and pedestrian access is not restricted at the rear boundary. This breaches condition 9.8 of the licence.

- Recommendation. Improve the level of control on access to the site.

7.15 Operator training and awareness

111. Operator training records were sampled and whilst complete in respect to occupational health and safety the records did not contain reference to any environmental training. A view was also expressed by staff interviewed that operators do not require environmental nor licence awareness training.

- Recommendation. Carry out environmental training including licence awareness for staff .

7.16 Reporting

112. Nuplex has issued annual reports to EPA as required by Condition 13.1 of the licence. The contents of the reports have generally been in accordance with the licence requirements. The current reporting year used in the Nuplex licence is 1 May to 30 April. Since the Licence was issued, EPA has adopted as a standard licence condition for all premises accepting prescribed industrial waste, reporting on the activities of a financial year, with reports due on 1 September. It may assist Nuplex to seek an amendment of the reporting period to align with its financial year.

- Recommendation. Consider whether it may be preferred to amend the reporting period to align with Nuplex's financial reporting period.

113. Under the current reporting regime, reporting on environmental monitoring such as stack testing is completed up to 12 months after the monitoring is undertaken. Licence clause 13.2 requires reporting to EPA within 28 days those monitoring results which identify breaches of licence discharge limits. There was no evidence that breach reporting had been undertaken.

- Recommendation. Review and determine whether the requirement for reporting on

licence breaches is being captured and will be complied with.

8. CLEANER PRODUCTION

114. The waste hierarchy of avoid, reduce, reuse and recycle is being adopted by Nuplex, although there is potential for some further improvement. For example, both the aqueous and solidification plants use waste materials to react and stabilise other waste materials. Examples of this are Nuplex's use of alkaline wastes to neutralise acid wastes, and pickle liquor to reduce chromium (VI) to chromium (III). This reduces the volume of waste material produced, and minimises the use of non-waste materials (such as lime and cement, and sulphidic reagents).

115. Nuplex uses considerable quantities of town water in its processing and cleaning operations. A mass balance showed that of 35 ML wastewater discharged to the sewer, 13 ML (37%) was fresh water (Appendix 12). Nuplex advised that it had evaluated the potential for using treated effluent for this purpose; however, this has been practically limited by the increase in the concentration of dissolved salts leading to issues such as scaling and increased solubilisation of contaminants (such as metals) which could make it difficult to achieve the required limits for discharge. High salt content can also give rise to corrosion of equipment, in particular pumps. It is possible that a more careful analysis of the limitations of reuse of treated effluent could identify where it might be able to be used, and town water saved.

116. There is potential for recycling some of the wastes that are received. For example, the current operations include the following recycling operations:

- Used batteries are sent to an external metals recovery operation for recovery of the lead.
- Oil is settled and recovered from oil wastes, and forwarded to either Nationwide Oil, Teris or RRR for further processing and recycling, with the selection of the receival facility dependent on the facility's available capacity and the quality of the oil.
- Solvent wastes, after sampling, sorting and labelling, are forwarded to Teris for blending with other materials for use as a cement kiln fuel.
- Empty steel drums that can be cleaned to the requisite standard are crushed and collected by Menzies Metals for recycling.

117. The drier system that Nuplex is in the process of installing offers potential to reduce the requirements for cementitious reagents (cement kiln

dust) and to reduce the total mass and volume of waste requiring landfill disposal. It may also enable some of the wastes to be used for a higher use (such as daily cover at a landfill).

118. There is potential for waste avoidance if the waste generators (ie Nuplex's customers) reduce their generation of waste. Some waste treatment companies are offering a service to their clients to assist them in identifying and evaluating options for avoidance or minimisation of their waste stream. Nuplex could offer such a service to clients, and may find it to offer a commercial advantage to both Nuplex and clients although it may require a changed charging system.

119. It is concluded that Nuplex is already utilising opportunities for cleaner production and waste minimisation. There may be opportunities for further improvements which would offer savings to both Nuplex and its clients.

- Recommendation. Consider opportunities for offering a waste avoidance or waste minimisation service to clients; and further evaluate opportunities for substituting treated effluent for towns water, and the substitution of wastes for treatment reagents.

9. CONCLUSIONS

Nuplex performs an important function in the management of industrial wastes produced in Victoria. Nuplex has implemented a quality management system certified to ISO 9002, and this is effective in meeting the acceptance requirements for discharge of treated wastewater to sewer, and for disposal of treated wastes to landfill.

A large number of areas were identified in which the operations give rise to or could potentially give rise to adverse environmental impacts, and are not in compliance with the requirements of the EPA Licence. This situation appears to have occurred because Nuplex's management and operations staff are focussed on ensuring that the treated wastes will comply with the requirements for discharge to sewer or acceptance at a landfill, and do not appear to have considered or included as operational objectives the requirements for compliance with the EPA licence.

Nuplex advises that it is developing an Environmental Management System. It can be expected that this system will provide the necessary focus on ensuring that operational practices comply with the Licence conditions and address the environmental issues that presently exist.

The most important issues that Nuplex should address are:

- Avoidance of wastes entering the stormwater system, which discharges to Dandenong Creek,
- Ensuring that wastes are properly stored and contained;
- Ensuring the safe operation of the caustic waste oxidation system.
- Ensuring that fugitive emissions from the solidification operations do not exceed off-site or on-site regulatory limits.

A summary of compliance with licence conditions is shown in Appendix 11.

Because of the multiplicity of issues requiring improvement, it is recommended that Nuplex prepare a risk reduction and licence compliance plan that considers the various requirements and develops a prioritised strategy for dealing with the issues. This could take the form of an Environmental Improvement Plan. Current operations appear to be adversely impacting on water, land and groundwater, and it would be possible for EPA to take immediate. Because of this, it is considered that Nuplex should prepare the Plan, seek its endorsement by EPA, and address the issues as a matter of urgency.

As this audit report was being finalised, Nuplex wrote to the auditor to advise that it was actively addressing the various issues identified in the audit, and outlined a number of projects that had been initiated in this respect.

10. RECOMMENDATIONS

No.	Recommendation	Finding Reference Number
1.	Review the range of wastes desired to be accepted and are appropriate to accept and request EPA to amend the licence condition accordingly.	5
2.	Determine the current capacity of the plant to accept, store and treat wastes, and restrict the receival of wastes so that this will not be exceeded. If this capacity differs from the current licensed capacity, a licence amendment for this revised capacity should be sought.	7
3.	Remove drums of waste from inappropriate locations and only store in them approved drum store areas or apply to EPA to amend the EPA licence.	16
4.	Develop and implement a training program for staff on the operating requirements for the facility, including the location and storage of wastes.	16
5.	Assess areas where wastes have been improperly stored and clean up any areas of soil contamination identified.	16
6.	Only store drums in bunded areas in accordance with the requirements of the EPA Publication 347 Bunding Guidelines.	17

No.	Recommendation	Finding Reference Number
7.	Review the capacity and operational requirements for the tank farm, reconstruct the tank farm with adequate storage and containment, and clean up the land and groundwater contamination in this area.	18
8.	Review and upgrade the containment systems of the oil tank farm. This should include: ensure that the tank high level alarm systems are operative and are used; maintain the bund in an oil free condition; remove the oil contaminated soil from around the oil tank farm; and provide for meeting the tank – bund wall separation distance requirements (eg consider provision of a screen wall).	19
9.	A comprehensive review be carried out of the storage and containment of wastes, and the practices by which spilled wastes are cleaned up and stormwater removed from bunded areas, to ensure that bunds are maintained clean and dry and that spilt wastes do not transfer to roadways and non-contained areas.	20
10.	The process for providing advice to those involved in waste transfer from truck to vessel should be reviewed and revised to provide a high level of assurance that the transfer instructions are correctly understood and implemented.	25
11.	Review the procedures for receival and storage of wastes and sludge in the truck receival bays, and subsequent transport of the sludge, with the objective of avoiding the need for the front end loader to drive into the waste, and ensuring that there will be no spillage of wastes onto the site	27

No.	Recommendation	Finding Reference Number
	roads such as may occur through the sludge removal operation or leakage from the vehicles used to transport the sludge.	
12.	Wastes be not accepted in quantities that could require storage of wastes in bunds. Storage or treatment of wastes in bunds should not occur.	29
13.	Apply for amendment of licence to reflect current aqueous waste treatment practices.	30
14.	Review and improve the filter cake handling and containment systems to prevent liquid and sludge from entering the stormwater system or the adjacent Teris property. Advise Teris that sludge is present on their property.	31
15.	Ensure the vehicles used to transport filter cake do not leak.	32
16.	Properly contain the container used for storage of acid for adjustment of treated effluent prior to sewer disposal.	33
17.	Fit tanks in the western tank farm with high levels alarms.	34
18.	The solidification of wastes should be restricted to the range of waste types permitted under the licence. The range of wastes which are desired to be solidified should be reviewed and the EPA	36

No.	Recommendation	Finding Reference Number
	should be requested to amend the Licence accordingly.	
19.	Filter cake from the liquid waste treatment plant be tested prior to transfer to the solidification plant in accordance with the Licence or, if this is considered to not be necessary, an amendment to the Licence be sought from EPA.	37
20.	Training of the operators of the solidification plant should be undertaken to ensure that the operators know how to interpret the waste label and the treatment requirements.	39
21.	Improve house keeping of the solidification building operations to avoid spillage of the material on uncontained and unsealed areas.	42
22.	Conduct a survey to confirm the integrity of the bases of the solidification pits.	43
23.	Clarify the requirement for sampling and analysis of solidified waste, including QA/QC requirements, with SITA and EPA.	46
24.	Ensure that the drying process is approved and the licence is appropriately amended prior to operation of the dryer other than as may be allowed for under the Works Approval.	47
25.	The acceptance of waste oil be restricted to comply with the Licence. If greater volumes of waste oil are desired to be accepted, then an amendment to the Licence should be sought from	49

No.	Recommendation	Finding Reference Number
	EPA.	
26.	Increase bund wall height to comply with Licence or, if the bund complies with containment requirements, seek amendment of Licence.	53
27.	Implement as a matter of urgency the recommendations of the hydrogen peroxide system audit undertaken in September 2002.	54
28.	Prepare a training program for operators which covers the requirements for operation and required actions in the event of unusual or upset operating conditions.	56
29.	Undertake a HAZOP study for the plant, and develop and implement a program of regular testing of control systems and maintenance of plant and equipment.	57
30.	Institute measures to avoid dust ingress to the caustic oxidation area and its control systems.	57
31.	Improve procedures for approving solidified waste for landfill disposal to ensure that wastes will comply with landfill acceptance requirements.	60
32.	Confirm that the maximum emission level of ammonia from the premises does not exceed the SEPP design ground level requirement.	69

No.	Recommendation	Finding Reference Number
33.	Re-examine feasibility of alternative treatment technologies to confirm that the requirements of SEPP (AQM) and the IWMP (PIW) are complied with.	70
34.	Remove the blower from Tank S2 or apply to EPA to have the discharge included in the Licence.	71
35.	Review requirements for collection of emissions from filter presses, and install collection system or seek revision to licence.	72
36.	Examine practices which give rise to fugitive emissions particularly including dust and ammonia and ensure that the emissions are minimised in accordance with the IWMP, do not give rise to unacceptable off-site discharges, and that on-site concentrations comply with requirements for protection of the health of workers at the site. Contact EPA to determine if dust should be collected from Building B	80
37.	Identify equipment critical for preventing environmental impacts and implement a program of regular maintenance and testing of this equipment.	81
38.	Ensure that the operating conditions of the plant are recorded during stack testing of emission points.	83
39.	Carry out a comprehensive assessment to identify where there is potential for wastes and other material to enter the stormwater system, and determine how these can be avoided. This should	88

No.	Recommendation	Finding Reference Number
	include the systematic assessment of all areas of waste storage, handling and transport to identify all possible ways in which wastes and other material (such as soil) might enter the drainage system. Stormwater flow paths and containment options should be evaluated to determine how effective containment can be achieved.	
40.	Institute a program including training of operators and provision of adequate resources to ensure that leaks and spills are cleaned up immediately.	88
41.	Design stormwater sampling and maintenance regimes to comply with the licence and include in the Operations Manual.	89
42.	Carry out sampling in accordance with the Licence and the Operations Manual. Increase appropriately trained staff resources as necessary to ensure that sampling will be carried out when required.	90
43.	Apply to EPA to amend the Licence to include the northern stormwater discharge point.	91
44.	Construct an appropriate retention system for potentially contaminated stormwater, and a sampling point, for the northern stormwater discharge point.	91
45.	Develop a testing and maintenance regime for the northern stormwater discharge point.	91

No.	Recommendation	Finding Reference Number
46.	Determine the source of oil contamination in the stormwater. This may involve pressure cleaning the drain and then inspecting clean flows for oil ingress.	92
47.	Assess the requirements and preferred location(s) for truck wash facilities, and construct these facilities. Restrict the use of these facilities to their designated purpose.	93
48.	Assess the need for the stormwater inlet located at the existing truck wash and, if it should be retained, protect it from any potential overflow from the truck wash.	93
49.	Carry out weekly inspection and maintenance works for the southern stormwater system in accordance with Licence conditions 12.3 and 12.4.	94
50.	Install a truck wheel wash, and seal areas of the site subject to movement of vehicles and mobile plant.	95
51.	If works are planned at the site, such as construction of new waste storage areas and paving, the soil contamination status should be determined prior to the works to ensure that any areas of significant contamination are cleaned up prior to the works.	96
52.	Carry out a review of soil contamination to identify where it may adversely affect the beneficial uses of the land, surface water or groundwater, with particular consideration to possible effects on surface water through run off in stormwater, and effects on the use of groundwater. Undertake clean up of the soil contamination where necessary, with a particular focus on	97

No.	Recommendation	Finding Reference Number
	eliminating sources of surface water and groundwater contamination.	
53.	Re-establish the seventh groundwater bore.	98
54.	Review the available groundwater results and prepare an investigation and action plan for submission to EPA.	99
55.	Recalculate the financial assurance.	101
56.	Continue with development and implementation of an environmental management system which will satisfy the requirements of ISO 14001. The findings of this audit can provide a useful input to this process.	105
57.	Carry out an environmental hazard aspects assessment and revise the Operations Manual emergency procedure to include incidents which could impact on the environment.	106
58.	Apply for a licence amendment to reflect an appropriate set of emergency procedures.	106
59.	Review the definition of the level of incident requiring notification to EPA and include this in the emergency procedures.	106

No.	Recommendation	Finding Reference Number
60.	Define "incident" to include all possible licence breaches.	107
61.	Develop an inspection, testing and maintenance program to ensure that adequate maintenance is carried out. This should comply with the Licence and ensure that critical items of plant are maintained so that they do not fail.	109
62.	Improve the level of control on access to the site.	110
63.	Carry out environmental training including licence awareness for staff.	111
64.	Consider whether it may be preferred to amend the reporting period to align with Nuplex's financial reporting period.	112
65.	Review and determine whether the requirement for reporting on licence breaches is being captured and will be complied with.	113
66.	Consider opportunities for offering a waste avoidance or waste minimisation service to clients; and further evaluate opportunities for substituting treated effluent for towns water, and the substitution of wastes for treatment reagents.	119

11. GLOSSARY

Term	Definition
Solidification	A process whereby a waste is converted so that it is easily handled reducing hazards of volatilisation, leaching or spillage, this is essentially by means of reducing the available surface area of waste available to the environment
Stabilisation and solidification	A process whereby the solubility or chemical reactivity of a waste is reduced by chemical reaction (stabilisation) and/or physical entrapment in a solid matrix (solidification)
TCLP	Toxicity Characteristic Leaching Procedure – an analysis method for determining the elutriable fraction of a material
Spent caustic	A waste stream accepted by Nuplex which is produced by the caustic stripping of crude oil in oil refineries to remove odorous sulfur compounds.
Filter press	A piece of equipment for the separation of solids from a lid stream. Liquid is pushed through a series of filters under pressure provided by a positive displacement pump.
Flashpoint	The temperature at which a material will combust when exposed to an ignition source
Oxidation reduction potential (ORP)	Also called "redox potential" is a measure of the electrical potential and thus the potential for an oxidative or reductive chemical reaction to occur.
SEPP (AQM)	State environment protection policy (Air Quality Management)
IWMP (PIW)	Industrial waste management policy (Prescribed Industrial Waste)

12. LIMITATIONS

This report has been prepared by GHD and EPA for the objectives described in Section 2, and in accordance with the scope of work outlined in Section 3. Assessment of compliance has relied on observations at the site during the site inspection, sampling and analysis undertaken by Nuplex and its consultants, inspection of relevant documents and on responses provided by Nuplex personnel. The auditor did not carry out any sampling or analysis, or testing of equipment or emergency operation procedures. The audit did not determine compliance of Nuplex's quality assurance system with the requirements of ISO 9002, and did not consider transport of waste outside the boundary of the site (ie to and from the site), or compliance with work place occupational health and safety requirements.

This document does not purport to provide legal advice and any conclusions or recommendations herein must not be relied upon as a substitute for such advice.

APPENDIX 1 - AERIAL PHOTO SHOWING INDICATIVE SITE BOUNDARY



APPENDIX 2 – LIST OF DOCUMENTS REVIEWED

Document	Date
EPA Waste Discharge Licence EI 23855	11/5/98
Nuplex Annual Reports Regarding Licence No 23855	1996-2001
Nuplex Jennings Liquid Waste Environment Improvement Plan	30/4/97
Nuplex Jennings Site – Assessment of Groundwater Data	23/12/97
Land Title	2/2/00
Nuplex Environmental Operations Manual	1/4/03
Nuplex (Environmental) Emergency Management Manual	1/5/02
Draft Nuplex Environmental Safety, Health and Environmental Management Manual	1/4/03
Administration Manual	1/2/03
Nuplex (Environmental) Policy Manual	1/5/02
Nuplex (Dandenong) Forms File	1/11/02
Nuplex (Dandenong) Incident Reports	23/9/99-5/6/03
Nuplex (Dandenong) Quality Management Meetings Minutes	6/1/99-28/3/03
Job Specifications - Plant Manager - Laboratory Supervisor - Laboratory Technician - Plant Operator	 24/6/03 24/6/03 24/6/03 24/6/03
Example quotation Ferro Corporation Australia Pty Ltd for drum cleaning. MSDS attached.	23/4/02
Example quotation Pilkington for Waste Powder Material. MSDS attached.	14/5/03
Example Liquid Waste Information Sheet Sita/Armstrong. MSDS attached.	26/3/03
Example quotation Smorgon Steel for Refractory/Bag house dust. Liquid Waste Information Sheet and MSDS attached.	20/6/02
Response to EPA letter dated 15/11/02 re EPA Annual Report	28/2/03
Weekly Plant Productivity Report	14/6/03
Plant Status Report	14/6/03
Daily Task Sheet Reports (for morning and afternoon shift)	10/6/03-15/6/03
Review of Hydrogen Peroxide Bulk Storage Installation Nuplex Special Waste – Dandenong (Victoria). Prepared by W.E Ross. Audit against AS 4326-1995	26/11/02
Trade Waste Agreement Nuplex Special Waste Pty Ltd Trading as Nuplex Environmental and South East Water Limited	9/5/02-9/5/05
South East Water Limited and Nuplex Special Waste Proprietary Limited trading as Nuplex Environmental Trade Waste Agreement	15/10/99-15/10/00
Letter from City of Greater Dandenong to Nuplex containing a list of planning permits relating to 89-90 and 92-94 Ordish Road, Dandenong South	13/8/02
Correspondence between EPA and Nuplex regarding increased licence fees	24/6/02, 13/11/02
Letter from Nuplex to South East Water with Risk Profile Plan for Nuplex Environmental attached.	4/1/01

Permits to Transport Prescribed Waste Pursuant to Section 53F of the Environment Protection Act 1970. (Permit Numbers: EP001259 (ECT 069*) EP001850/0 (21455) EP41498 (211585) EP51609 (486195) EP001866/5 (202915) EP23691 (FOW879) EP50114 (RQM 323) EP29144 (NTP 638) EP46966 (RCH 035) EP39193 (NMT 524) EP29898 (NYX 576) EP42720 (QIE906) EP44878 (QMF 144) EP001528 (ENI 338)	 21/3/01 21/3/01 21/3/01 3/2/03 21/3/01 27/10/01 23/8/02 21/3/01 4/11/01 21/3/01 21/3/01 27/10/01 22/12/00 15/2/00