Logistics of Container Deposits in Remote Communities in the Northern Territory

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Logistics of container deposits in remote communities in the Northern Territory
Acknowledgments

This report recognises the support and participation of the communities involved in the case studies. We would particularly like to credit community members, Council staff and store managers from: Lajamanu, Angurugu, Atijere and Umbakumba whom provided valuable feedback and advice throughout the project. It is the voice of individuals within these communities that has helped to shape this report. Additionally, others who were contacted within project timeframe (including recycling, resource recovery, and mining and freight companies) were most helpful in providing information.

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1.0 Introduction

Anecdotally, it is well recognised that soft drinks and other beverages are popular store items in remote communities. Palmer and Brady (1991; 1988) in two distinct food and nutrition studies found (respectively) that the per capita consumption of soft drinks was 5.35 times the Australian national average and that in remote settlements that 291.70 mL per person of soft drinks were consumed daily by Indigenous people. These examples provide evidence that in some areas, people living in remote communities have a high consumption of soft drinks which suggests there are potentially many containers in remote communities contributing to the general litter stream or remote landfills.

The report provides an assessment of logistics for organising and arranging local container deposit schemes in remote communities of Indigenous people within the NT. For the purpose of this report, a container deposit refers to the collection and return of beverage containers for an incentive or deposit. There are a small number of remote communities in NT (Maningrida, Goulburn Island, Titjikala, Santa Teresa, and Alyangula) who have installed voluntary or deposit driven beverage container collections. This provides some evidence that schemes may be logistically applicable for other communities. Moreover, container deposit schemes are recognised for contribution to improving resource recovery, litter reductions (Angel 2006) and improving long term sustainability outcomes. In the NT, outside of the major service centres there are very little initiatives in place for resource recovery or recycling opportunities (NT Government 2002). Container Deposit Schemes may provide a starting initiative for improving resource recovery processes in remote areas. This report investigates the feasibility of container deposit schemes through studies in three remote communities: Atitjere, Lajamanu and Angurugu. The communities provide interesting comparisons on logistical issues because they represent communities with different population sizes, different transportation options and are varying distances from the nearest service centres.

1.1 Terms of reference

The report was undertaken for the NT Government and focuses on providing the detail specific to the Terms of Reference set out in the project tender. This TOR includes:

- Identify communities interested in adopting a voluntary local container deposit system and select case studies.
- Estimate the number of containers currently entering the selected communities identifying proportion sold locally and itemised into categories as per South Australia container refund scheme.
- Estimate the current post sale destination of containers sold locally within the selected communities and identify relative proportions entering landfill, litter stream or being removed from community.
- Identify viable options for resource recovery or energy production.
- Identify willingness and issues/barriers for store managers if they increase prices of drinks and offer refunds.
• Query store managers as to what refund amounts would be lucrative for community residents and whether different containers should have different deposit amounts
• Determine workable local labelling schemes for containers to stop inflow of containers from non-refund towns or neighbouring communities
• Identify all parties (existing or new) in communities who could accept returned containers provide refunds, sort/decontaminate containers and arrange transport from community
• Identify existing options, logistics and costs to transport containers from communities to nearest recycling merchants including community – owned transport, existing delivery contractors and barges.
• Determine handling fees required per container to cover all additional costs imposed by four models being:
  - target local litter and dispose of returned container to local landfill;
  - transport and sale of returned containers where viable (e.g. aluminium cans) through existing regional recycling operations and disposal of remainder to landfill;
  - transport and sale of returned aluminium cans through existing regional recycling operations and processing of remainder in appropriate waste-to-energy facility;
  - transport all returned containers to the Darwin City Council Regional Recycling Facility.
• Document procedures to ensure materials collected are able to meet the minimum requirements of transport operators (e.g. containment, handling and discharge/pollution) and recycling receivers (i.e. delivery condition and levels of contamination)
• Determine appropriate handling and storage infrastructure for stores and other return points, keeping infrastructure as simple as possible. Take account of existing secure storage space; storage required over extended Wet seasons; space around stores. Include option of common storage facilities for multiple sales outlets.
• Determine establishment and maintenance costs for this infrastructure. Include identification of infrastructure that can be manufactured locally using existing workshops and labour. Identify workshop tools required to produce such infrastructure.
• Develop appropriate administration and accounting options for stores and other sales outlets to track sales vs. refunds of containers.
• Identify options to manage and distribute unredeemed deposits.

The TOR are reported throughout the report within the methodology, the results and analysis section. In addition, the report provides some other recommendations that add to the analysis and sets out potential viable pathways for implementing container deposits schemes within each case study communities.
1.2 Report structure

As suggested previously, the report is guided by the TOR within the project guidelines. Following on from this introduction, the report is broken into four sections:

- Methodology which describes the methods used to identify case studies, engage communities and analyse data
- Case study results which are presented against the TOR and provide a cross comparison of the communities within the study
- Analysis follows this and provides an interpretation of results, as well as individual assessments of the three case studies
- Conclusion and recommendations provide some further analysis beyond the TOR and sets out some future recommendations

The report is grounded by experiences within the fieldwork period and by views and responses from stakeholders working within remote communities or engaged in the resource recovery industry.
2.0 Methodology

The methodology reports the selection of case study communities and provides the detail of how the investigation was undertaken within the case study communities. The project work included a mix of quantitative and qualitative analysis. The data analysis on the number of containers and estimated handling costs provide quantitative assessments on logistics. Interviews provide a contextual understanding of the workable options for the communities involved in the study. The project was subject to a three month completion timeframe and was completed from June to August 2006.

2.1 Case study communities

The project team approached a number of remote communities within the Northern Territory to identify suitable case studies. The selection criteria for the selected community case study included:

- Population of greater than or equal to 200 people
- Community located in remote area of the NT
- Whether Community Government Councils were supportive of the field work taking place in July – August 2006
- Representation within case studies of the diversity in transportation options, degree of remoteness (i.e. from major service centres) and population

The case study communities for this project were Lajamanu, Angurugu and Atitjere communities (Figure 1). Table 1 presents a summary of background information on these communities. It should be noted that while contacting communities, a large number of communities (outside of the case study communities) were interested in the study and findings.

Table 1: Background information for case study communities

<table>
<thead>
<tr>
<th></th>
<th>Lajamanu</th>
<th>Angurugu</th>
<th>Atitjere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>750*</td>
<td>850*</td>
<td>250*</td>
</tr>
<tr>
<td>Regional</td>
<td>Katherine</td>
<td>Darwin</td>
<td>East Arnhem</td>
</tr>
<tr>
<td>Sub Regional</td>
<td>Victoria River</td>
<td>South Miwatj</td>
<td>Plenty</td>
</tr>
<tr>
<td>Transportation</td>
<td>Road Freight</td>
<td>Barge</td>
<td>Road Freight</td>
</tr>
<tr>
<td></td>
<td>Air (mail and passenger)</td>
<td>Air (mail and passenger)</td>
<td>Air (mail and passenger)</td>
</tr>
</tbody>
</table>

*(Australian Bureau of Statistics 2001)
Figure 1: Map of case studies communities and distance from service centres
2.2 Survey and interviews

Surveys (see appendix A) and interviews were used within the case study communities, to gather data from a range of stakeholders, including:

- Community Councils
- Schools
- CDEP groups and participants
- Women’s Centres
- Community store

The project questions used in the survey and interviews targeted specific data and perceptions of different groups to delivering a container deposit scheme within the community. The questions also investigated what involvement stakeholders could provide if a scheme was installed at their community. Interviews and surveys were semi-formal and used a combination of questioning and pictorial prompts to engage those involved.

2.3 Quantitative and economic analysis

Table 2 identifies the structure in which the SA container deposit scheme\(^1\) itemises containers. This report uses this typology for identifying containers to include within the estimates of the amount of containers in case study communities. All case studies have restrictions on sale and availability of alcohol beverages within the community and hence, these have been deleted from the data collection. The study would benefit from including communities where alcohol is available for purchase in future.

Table 2: Typology of containers (based on SA scheme)

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Container type</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonated soft (non-alcoholic) drinks</td>
<td>All</td>
<td>Up to and including 3 litres</td>
</tr>
<tr>
<td>Water (plain, still or carbonated—spring water, mineral water and any other water intended for human consumption)</td>
<td>All</td>
<td>Up to and including 3 litres</td>
</tr>
<tr>
<td>Beers/ales/stout</td>
<td>All</td>
<td>Up to and including 3 litres</td>
</tr>
<tr>
<td>Wine based beverages (wine cooler and similar beverages)</td>
<td>All</td>
<td>Up to and including</td>
</tr>
</tbody>
</table>

\(^1\) In South Australia container deposit schemes have been under legislation since 1975. Sections 65-73 of the Environment Protection Act assert that a range of beverage containers sold in South Australia are required to carry both a refundable deposit and approved refund markings.
### Logistics of Container Deposits in Remote Communities in Northern Territory

<table>
<thead>
<tr>
<th>Beverage Type</th>
<th>Volume Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirit based beverages</td>
<td>All: Up to and including 3 litres</td>
</tr>
<tr>
<td>Alcoholic beverages—derived from the fermentation of fruit (cider, alcoholic lemonade etc.)</td>
<td>All: Up to and including 3 litres</td>
</tr>
<tr>
<td>Non-carbonated, soft (non-alcoholic) drinks such as (but not limited to): fruit juice drinks, fruit drinks, ‘sports’ drinks, ‘vitamin’ drinks, ‘energy’ drinks, ready-to-drink cordials</td>
<td>All: Up to and including 3 litres</td>
</tr>
<tr>
<td>Pure fruit juice (means a liquid at least 90% of which is fruit juice or vegetable juice or a mixture of fruit and vegetable juices)</td>
<td>All: Less than 1 litre</td>
</tr>
<tr>
<td>Flavoured milk (cow’s milk or the milk of any other animal, soy milk, ultra heat-treated milk, low fat milk etc.)</td>
<td>All: Less than 1 litre</td>
</tr>
</tbody>
</table>

As per the TOR, the results section provides estimated costs of the handling of containers to:

- target local litter and dispose of returned container to local landfill;
- transport and sale of returned containers where viable (e.g. aluminium cans) through existing regional recycling operations and disposal of remainder to landfill;
- transport all returned containers to the Darwin City Council Regional Recycling Facility.

The analysis of cost of handling was conducted using the most cost effective transportation options, using a base rate of $1.5 per kilometre when community vehicles are chosen, averaging the labour costs (in comparison with other schemes already operating) and estimation of the required infrastructure. The total costs were divided by the amount of containers present at the community, to provide a cost per container estimate. Since there are no wastes to energy facilities available in or close to the case study communities this was removed from the analysis.

### 2.3 Framework

The analysis within this report uses a conceptual model (see figure 2) to represent the workings of container deposits set up at the local community level. This framework has been developed from the findings of work at Titjikala and other container collection schemes within Australia (including Fitzroy Crossing, WA). The framework was used during community consultations to explore logistics of container deposits, to determine the potential roles for community stakeholders and to understand the pathways/options available to the case study communities. The framework is analysed within section...
4 of the report and the most viable (considering long term sustainability, community capacity and economic costs) pathway for each community to undertake container deposit is also presented.

**Figure 2: Container Deposits at local context:** The arrows in this model represent the flow of beverage containers. The boxes represent options for the people, transportation and final locations of containers within a container deposit scheme that is run locally.

- Consumers
- Collectors
- Community stores
- Outside transport
- Recycling or transfer station
- Another community institution e.g. Community Council, CDEP office, women’s centre, school
- Community transport
- Stockpile
- Local re-use or recycling
- Local landfill
3.0 Case study results

The information within this section presents findings of data required to report on the project’s Terms of Reference (TOR). That is, that the results of each community is presented against the other communities, rather detailing each case study individually. The evaluation in following sections of this report will draw on this data.

3.1 Estimated amount of containers at each community

Store Managers were asked about the sales of cans over the last year. For Lajamanu, the exact figures were presented (see appendix B). In other cases, data tracking of sales was not available; store managers and other takeaway outlet managers were asked to estimate the sale of products (which in most cases was measured in pallets per week or fortnight). Table 3 presents a break down of containers as per the SA container typology presented in previous section of this report. This information is then used in Table 4 to provide estimated amount of containers (by materials) at each community.

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Size</th>
<th>Lajamanu</th>
<th>Angurugu</th>
<th>Atitjere</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>store</td>
<td>store</td>
<td>store</td>
</tr>
<tr>
<td></td>
<td></td>
<td>t/a</td>
<td>t/a</td>
<td>c/h</td>
</tr>
<tr>
<td>Carbonated soft (non-alcoholic) drinks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.25 L</td>
<td>32835</td>
<td>14676</td>
<td>26288</td>
<td></td>
</tr>
<tr>
<td>600 mL</td>
<td>19476</td>
<td>20160</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>390 mL (bottles)</td>
<td>n/a</td>
<td>33544</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>375mL (cans)</td>
<td>29713</td>
<td>36960</td>
<td>15096</td>
<td></td>
</tr>
<tr>
<td>Water (plain, still or carbonated—spring water, mineral water and any other water intended for human consumption)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600mL</td>
<td>143</td>
<td>56</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>1 L</td>
<td>32</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>1.25L</td>
<td>143</td>
<td>124</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Non-carbonated drinks e.g. fruit drinks, 'sports' drinks, 'energy' drinks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600mL</td>
<td>12,144</td>
<td>13156</td>
<td>3562</td>
<td></td>
</tr>
<tr>
<td>Pure fruit juice</td>
<td>600mL</td>
<td>n/a</td>
<td>n/a</td>
<td>358</td>
</tr>
<tr>
<td></td>
<td>150mL</td>
<td>n/a</td>
<td>n/a</td>
<td>4800</td>
</tr>
<tr>
<td>Flavoured milk</td>
<td>600mL (plastic)</td>
<td>1199</td>
<td>2010</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*NOTE: t/a – takeaway, c/h – cook house, n/a – not available, estimated amounts determined through weekly pallet numbers.*
Table 4: Total containers by material

<table>
<thead>
<tr>
<th></th>
<th>Lajamanu</th>
<th>Angurugu</th>
<th>Atitjere</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td>65972</td>
<td>37026</td>
<td>53702</td>
</tr>
<tr>
<td>Aluminium</td>
<td>29713</td>
<td>70504</td>
<td>28246</td>
</tr>
<tr>
<td>TOTAL</td>
<td>95685</td>
<td>107530</td>
<td>81948</td>
</tr>
</tbody>
</table>

Through observations during the fieldwork period, the project team attempted to provide an estimate of the percentage of beverage containers currently going to landfill and entering the litter stream (see Table 5). The short project timeframe meant the estimates could not accurately be determined because of the changes throughout the year in total litter to landfill. To improve the estimates this was matched with estimates from community stakeholders (averaged in this report). The project team and community estimates for containers going to landfill, litter or outside the community present similar or close results.

Table 5: Percentage of beverage containers entering landfill, litter stream and outside community streams: The table presents both estimates of the project team and those from the community.

<table>
<thead>
<tr>
<th></th>
<th>Landfill</th>
<th>Litter</th>
<th>Outside Community</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project team</td>
<td>Community</td>
<td>Project team</td>
</tr>
<tr>
<td>Lajamanu</td>
<td>40</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Atitjere</td>
<td>70</td>
<td>73</td>
<td>5</td>
</tr>
<tr>
<td>Angurugu</td>
<td>90</td>
<td>90</td>
<td>5</td>
</tr>
</tbody>
</table>

Local labelling schemes are particularly important in Angurugu and Atitjere communities, whereas Lajamanu store and community (in general) were less concerned about labelling. The possible techniques that could be used for labelling containers include:

1. Price tags with store specific branding
2. Stamping of containers
3. Receipts detailing purchase supplied on return of containers
4. Provision of slip detailing items purchased

The last of these suggestions may be easiest to implement, but it may also contribute to the litter within the community and may create some confusion unless properly presented to consumers. Additionally, slips or receipts could be easily lost or misplace by the consumer depending on the deposit value. It should be noted that labelling would not generally be an issue, if container deposit was legislated throughout the NT.

3.2 Resource recovery options for communities

To analyse resource recovery options, the project team recorded the recycling options within the nearest service centre for the communities (see Table 6) and discussed the requirements of the
recyclers for the products. Glass was not included in the analysis, because none of the communities within the study sold glass beverage products.

Table 6: Possible resource recovery facilities

<table>
<thead>
<tr>
<th>Community</th>
<th>Service Centre</th>
<th>Aluminium depot or recyclers</th>
<th>Plastic depot or recyclers</th>
<th>Paper (i.e. tetra, LPB) recyclers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lajamanu</td>
<td>Katherine</td>
<td>Katherine Waste Depot</td>
<td>Katherine Waste Depot (note: not recycled)</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CMA Metals</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MT Bins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atitjere</td>
<td>Alice Springs</td>
<td>Bowerbird Tip</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Russ Driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CMA Metals</td>
<td>Wastemaster</td>
<td>Wastemaster</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMS metal</td>
<td>Collex</td>
<td>NT Recycling Solutions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste Master</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*LBP – liquid paper board

Resource recovery managers and freight companies (operating in the case study area) were contacted to provide details on the minimum requirements for accepting materials. The findings of this are presented in Table 7.

3.3 Stakeholder responses

The following presents the major points in the interviews held with various stakeholders within the community. Table 8 concentrates on the store manager’s responses since their role is critical in administrating the deposit scheme. Store managers were interviewed on range of topics including: lucrative and feasible incentives, willingness to participate, the governance structure within the store and store’s role within the schemes. Table 9 presents major points from the feedback of various stakeholders within the community.
### Table 7: Requirements of transporters and resource recovery facilities

<table>
<thead>
<tr>
<th>Area</th>
<th>Freight/Resource Recovery Facility</th>
<th>Requirements</th>
</tr>
</thead>
</table>
| **Darwin**    | Perkins Shipping                           | Materials must be on a pallet or baled.  
Containers do not need be crushed.  
Provide free transport from communities, but not to individuals.  
Store at Darwin port for pick-up by resource recovery agent. |
|               | CMA Metals                                  | Purchase all metals (crushed or uncrushed) and will provide bales or bins.  
Will pick-up recyclable material from Darwin port.  
Can drop of other materials at other locations (e.g. DCC regional recycling facility). |
|               | NT Recycling Systems                        | Accept paper and plastics in any form.  
Will pick-up from Darwin port, at cost. |
|               | Wastemaster                                 | Accept metals, paper and plastics.  
Will pick-up for Darwin port. |
|               | DCC Regional Recycling Facility             | Accepts all recyclable materials when dropped off. |
|               | Sims Metal                                  | Accepts all metals when dropped off. |
| **Katherine** | Pandion Haulage                             | Backload - $50 per pallet for drop off at Katherine from Lajamanu  
$100 per pallet for drop off at Darwin from Lajamanu  
Items must be on a pallet or bales.  
Prefer the material to be crushed. |
|               | MT Bins                                     | Purchase all metals.  
Items can be crushed or uncrushed. Prefer if items are not individually crushed.  
Will provide bales for collection.  
Are currently investigating opportunities glass and plastic recycling. |
| **Alice Springs** | Tooby Transports                          | Backload $60.00 per pallet to Alice Springs |
Material must on pallets or baled.

<table>
<thead>
<tr>
<th>Store Name</th>
<th>Acceptance Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russ Driver</td>
<td>Accept all metals. Pay 5c per can. Material does not have to be crushed. Will provide bales.</td>
</tr>
<tr>
<td>Alice Springs Metal Recyclers</td>
<td>Purchase all metals (crushed or uncrushed). Will provide bins for collection.</td>
</tr>
</tbody>
</table>

Table 8: Store Managers responses

<table>
<thead>
<tr>
<th></th>
<th>Lajamanu</th>
<th>Atitjere</th>
<th>Angurugu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incentives</td>
<td>Feasible – 5c-10c</td>
<td>Feasible – 5c</td>
<td>Feasible – 5c-10c</td>
</tr>
<tr>
<td></td>
<td>Lucrative – 25c</td>
<td>Lucrative – 20c</td>
<td>Lucrative – 50c</td>
</tr>
<tr>
<td>Willingness of the store to participate in scheme</td>
<td>The store is willing if the Council is the one who implements the program.</td>
<td>The store could support it, but containers in the litter stream are not really an issue in this community.</td>
<td>The store would be happier to support a voluntary return scheme rather than a deposit scheme because of the administrative work involved.</td>
</tr>
<tr>
<td>Willingness of store to raise cost</td>
<td>Would be happy to raise cost 5c-10c, but not any higher.</td>
<td>The incentives that are lucrative, will impact on sales of the product.</td>
<td>Raising cost may be detrimental to business and store is focussed on keeping costs down. This is because the people paying the additional costs may not be the one's returning the items for reimbursement.</td>
</tr>
<tr>
<td>Stores role</td>
<td>- Provide day storage for containers</td>
<td>- Storage at back of store (short-</td>
<td>Take backloads to Alyangula</td>
</tr>
</tbody>
</table>
| Labelling                                                                 | - Could support return of deposits  
   | - Supportive to work with a community group (e.g. Women’s Centre) for bulk payments  
   | - Provide community transport, e.g. van  
   | - Could manage the administration of deposits  
   | - Supportive of keeping records, i.e. cans sold vs. returned  
   | - Help to arrange transport, e.g. backload  
   | - Would provide returns on certain day of week  
   | - Not sure if there is enough staff to manage administration  
   | Labelling would be important to do, but it would add to administration of the scheme.  
   | Would need labelling, or the alternative is to get the whole island onto the scheme.  
| Labelling                                                                 | Waste Depot monthly (i.e. same run as pallets).  
   | Supportive of novelty based approached (e.g. basketball hoop bins).  
| Labelling                                                                 | Not an issue, because they aren’t many outside containers coming into the community.  
| Labelling                                                                 | Labelling would be important to do, but it would add to administration of the scheme.  
| Labelling                                                                 | Would need labelling, or the alternative is to get the whole island onto the scheme.  

<table>
<thead>
<tr>
<th>Table 9: Community stakeholder’s responses to the container deposit scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lajamanu</strong></td>
</tr>
<tr>
<td>Community Council</td>
</tr>
<tr>
<td>CDEP program</td>
</tr>
<tr>
<td>School</td>
</tr>
<tr>
<td>Women’s Centre</td>
</tr>
</tbody>
</table>
3.4 Handling costs

The following tables (Table 10-12) break down the estimated costs associated with different options available to the community in handling and transporting the containers and are based on experience for similar schemes operating in NT. These estimates assume:

- CDEP is main labour used in handling containers at community level (i.e. collect, sort, crush and deliver containers to landfill or collection). CDEP rate is $15.96 per hour.
- Other labour used to run the scheme is voluntary (e.g. store, women’s centre) but may play a role in handling.
- The most cost effective transport options have been used for calculations in freight.
- Current location of landfill at field work time from community, Lajamanu 5 km, Angurugu 12 km (wet tip), Atitjere 2 km.
- Travel in community vehicle is calculated at $1.50 per kilometre (which covers fuel, driver, routine maintenance) and one visit per week to landfill/collection point.
- Freight companies transport out of the community is calculated per pallet with average of containers when crushed by machine (15,000 cans per pallet and no machinery available for crushing plastics) and hand crushed (800 cans and 400 plastic bottles). Infrastructure required for crushing is costed at $13,000. It should be noted that grant funding available may be able to cover the initial set-up costs.
- Infrastructure used in transport is costed free because pallets are available from each store.
- Infrastructure used locally to store containers is an estimated per site and is costed as one-off purchase
  - Lajamanu – wire crates (most material and tools on site) - $100.00, Bales free from MT Bins
  - Angurugu – 4 bales - free, wire crates (most materials and tools on site) - $100.00
  - Atitjere – 2 bales - free, wire crates (tools on site) - $160.00

The estimated cost for CDEP participants is based on an assessment of time allocated by similar container deposit schemes and the number of containers within each community (Titjikala and Maningrida). The estimated time in calculations below does not vary under different circumstances (i.e. travel outside or inside community), whilst this may be case such estimates requires more field based experience. Furthermore, the estimates assume that CDEP participants take on all handling responsibility in the scheme whereas other voluntary stakeholders may contribute to the scheme (e.g. community store). Whilst, it is quite difficult to estimate the voluntary effort that previous schemes have utilised, voluntary stakeholders play an important role and may mean the estimates within this study are conservative.
### Table 10: Target local litter and dispose of returned container to local landfill

<table>
<thead>
<tr>
<th></th>
<th>Lajamanu</th>
<th>Atitjere</th>
<th>Angurugu</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDEP hours</td>
<td>14300.16</td>
<td>12517.64</td>
<td>17875.20</td>
</tr>
<tr>
<td>Transport to landfill</td>
<td>840.00</td>
<td>336.00</td>
<td>2016.00</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>100.00</td>
<td>280.00</td>
<td>340.00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15240.16</td>
<td>13133.64</td>
<td>20231.20</td>
</tr>
<tr>
<td>TOTAL per container per annum</td>
<td>0.16c</td>
<td>0.16c</td>
<td>0.19c</td>
</tr>
</tbody>
</table>

### Table 11: Transport and sale of returned containers where viable (e.g. aluminium cans) through existing regional recycling operations and disposal of remainder to landfill

<table>
<thead>
<tr>
<th></th>
<th>Lajamanu</th>
<th>Atitjere</th>
<th>Angurugu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushed by machine</td>
<td>Crushed by machine</td>
<td>Crushed by machine</td>
<td>Crushed by machine</td>
</tr>
<tr>
<td>Hand crushed</td>
<td>Hand crushed</td>
<td>Hand crushed</td>
<td>Hand crushed</td>
</tr>
<tr>
<td>CDEP hours</td>
<td>14300.16</td>
<td>12517.64</td>
<td>17875.20</td>
</tr>
<tr>
<td>Transport within the community/landfill</td>
<td>840</td>
<td>336</td>
<td>0</td>
</tr>
<tr>
<td>Transport out of community</td>
<td>0</td>
<td>0</td>
<td>2688</td>
</tr>
<tr>
<td>Transport by freight to regional recyclers</td>
<td>110</td>
<td>2218.45</td>
<td>FREE</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>13000</td>
<td>13160</td>
<td>340</td>
</tr>
<tr>
<td>TOTAL</td>
<td>28250.16</td>
<td>26123.64</td>
<td>20903.2</td>
</tr>
<tr>
<td>minus sale of aluminium</td>
<td>452.6432432</td>
<td>305.3621622</td>
<td>Not available</td>
</tr>
<tr>
<td>TOTAL</td>
<td>27797.5168</td>
<td>25818.2778</td>
<td>13479.79</td>
</tr>
<tr>
<td>TOTAL per container per annum</td>
<td>0.2905107</td>
<td>0.31505683</td>
<td>0.19c</td>
</tr>
</tbody>
</table>

### Table 12: Transport all returned containers to the Darwin City Council Regional Recycling Facility

<table>
<thead>
<tr>
<th></th>
<th>Lajamanu</th>
<th>Atitjere</th>
<th>Angurugu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushed by machine</td>
<td>Crushed by machine</td>
<td>Crushed by machine</td>
<td>Not required</td>
</tr>
<tr>
<td>Hand crushed</td>
<td>Hand crushed</td>
<td>Hand crushed</td>
<td>Hand crushed</td>
</tr>
<tr>
<td>CDEP hours</td>
<td>14300.16</td>
<td>12517.64</td>
<td>17875.20</td>
</tr>
<tr>
<td>Transport to collection point</td>
<td>420.00</td>
<td>168.00</td>
<td>2688.00</td>
</tr>
</tbody>
</table>
The numbers presented in these calculations are sensitive to five factors: changes in freight prices, classification of CDEP as “in-kind” hours, changes in fuel prices, technological developments or different infrastructure used and variances in sale records. Whilst it is outside the scope of this study, it would be useful to conduct a sensitivity analysis of these results.

3.5 Infrastructure

**Handling infrastructure**

There are a number of products commercially available for crushing of large quantities of aluminium cans and plastics. Many of the commercial units are not appropriate because of costs, maintenance requirements and availability of service agents to undertake maintenance. Across a range of factors Auto Baler units (such as Tretheway Auto Bale, HydraPac balers) used by recycling merchants, are not appropriate for small remote communities because these units generally costs around $50,000 - $70,000, require specialised maintenance activities and often require high amperage/3 phase power sources. Table 13 provides information on two units that are likely to be the most appropriate for remote areas (although one unit is currently not available). In deciding application of machinery factors, it is important to consider include cost, power requirements, reduction in volume from crushing/density compaction and availability of grant funding for capital costs. Additionally, individual can crushing units have been excluded because recycling merchants generally do not prefer cans individually crushed.

**Table 13: Crushing Machinery**

<table>
<thead>
<tr>
<th>Accepted materials</th>
<th>Costs</th>
<th>Amount per pallet</th>
<th>Power requirements</th>
<th>Reduction in volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>RamCan Aluminium cans</td>
<td>$13000.00</td>
<td>~15,000</td>
<td>11 hp motor</td>
<td>90%</td>
</tr>
<tr>
<td>Ian Muir’s Crusher* Aluminium cans/plastics</td>
<td>$6000.00</td>
<td>Unknown</td>
<td>11 hp motor</td>
<td>unknown</td>
</tr>
</tbody>
</table>

* - currently not available
The cost of purchasing crushing machinery needs to be weighed up against the number of cans being collected within the community. It may be worthwhile purchasing a can crusher for a regional scheme, so the machinery is used and allocated across a number of communities.

Storage infrastructure

Each of the communities visited had available storage areas within or around workshop facilities. The project team recommends that storage within the community stores or takeaway outlets be considered as day storage only because of the lack of space in most cases, potential growth of stores and risk associated with storage in communal areas. Options for short term storage could include lockable wheelie bins, skips or wire mesh cages.

Most stakeholders suggested that storage facilities would need to be lockable if a deposit scheme was running or returned material could be crushed daily; otherwise collectors may try to collect additional earnings from one container. It is likely that the most effective long term collection facilities are lockable wire mesh containers which could be made with locally available tools (i.e. welder, angle grinder) and wire mesh (available in two of three communities). Metal merchants will also supply communities with bales for collection, which could be used for day storage.

3.6 Administration and accounting options for stores

There are a number of elements to administrating container deposits within stores. There are several steps that store can undertake in order to track sales versus refunds. The store would need to decide to what detail they undertake the tracking of sales.

Tracking number of sales

Many stores can work out the amount of beverages sold because they operate the business through electronically point of sales. However, for those stores who do not operate an electronic point of sales, the only way to track sales is manually, by noting when purchases are made. Stores can cross-reference the number with stock take figures or alternatively, for those stores not operating an electronic point of sales, they could choose to use current inventory or stock control systems to account for deposited items.

Tracking the number of sales allows stores to calculate the amount of deposits that have been taken, through the simple equation below. This could be done on daily, weekly, monthly basis depending on the levels of return and sales of containers.

Equation: Number of sales x deposit amount = total deposits collected

System for refunds

The collected deposits should be kept separate from sales figures. Stores could choose to operate in a similar way to a petty cash system (with small amount of funds kept on the premises for returns) or
stores may want to set up a separate account to track the amount of deposits coming in. Stores might also consider giving people credit within the store.

The return of deposits does not necessarily have to operate through the store. It may be that the store provides bulk payments to another community organisation (e.g. Council) who then distributes the deposits on return of containers. Such arrangements may be suitable where stores do not want to stockpile containers within the store environment. In such cases, the tracking of the refunds would also be conducted outside of the store.

**Tracking refunds**

There are two ways to calculate the amount of containers coming back for collection deposits:

- By manually counting all the containers returned
- By scanning bar codes or having unique labelling systems
- By sorting the containers (by size and material) and weighing them, then dividing them by the amount that one container weighs

The amount of containers returned and time involved with each method, will determine the most efficient solution. The store or those returning the funds will need to record the amount of return to cross reference with the amount of sales.

### 3.7 Identify options to manage and distribute unredeemed deposits

The best way to manage and distribute unredeemed deposits should be determined by the communities individually. However, during the field work time we sought to identify a number of options for communities. Unredeemed funds could be used in the following ways:

- Support a community developed project. Many stores already work within this policy with available profits.
- To support the development of the container deposit scheme, e.g. transport, travel, infrastructure, education programs, to add a “novelty factor” to collection.
- To improve other waste management practises in the community, e.g. more or better bins.

Those managing the deposits, the store (Store Manager and store committee) and/or the scheme’s co-ordinator are best placed to make decisions on the management of unredeemed deposits.

Unredeemed deposits could get easily misplaced in general store revenue, unless properly managed. It is therefore useful for stores could avoid this by using separate accounts for deposits, tracking the sales of deposit items or separating deposit out of the total figures on routine basis (daily, weekly or fortnightly depending on total returned container amounts).
4.0 Lessons on the logistics of container deposits in remote communities

There are some broad findings about container deposits that require some review. However, the diversity in results across the case study communities is also worth exploring and suggests the importance of considering local container deposit schemes on a case by case basis. It is for these reasons that this analysis attempts to make some broad statements about the findings in the sections 4.1 to 4.3 and then it focuses individually on each case study community.

4.1 Economics of container deposit schemes

If we solely consider the economic costing involved with container deposits, the feasibility of operating the schemes in all case study communities is questionable. It may be more worthwhile looking at the cost and benefit more broadly within the scheme to consider:
- Benefits in reducing waste going into landfill space
- Improved waste management regimes
- Shifting responsibilities of litter management control back onto consumers
- Increased recycling efforts
- Impact of resource recovery on the community
- Increased economy of scale by going NT wide

Moreover, the economic analysis presented within this report has some considerable limitations. Most importantly, the economic analysis identified the relatively high handling fees involved in terms of labour, sorting and transporting containers. A community council may choose to incorporate the scheme into a CDEP work plan and hence, the operational and labour costs would be significantly reduced. With this in mind, the local co-ordination of the project would also need to be considered within the Community Council’s responsibility; otherwise operational costs would make the scheme a relatively unattractive option.

Resource recovery schemes in remote areas have often received criticism for the high cost of transporting materials out side of the community. To an extent this is clarified in the case studies within this report, particularly when there is are no options for crushing the material. When communities can draw on cost effective or free back-loading services, the resource recovery options become more cost effective. This study has also costed out all community travel as additional travel, but many communities may have opportunities to incorporate travel in routine runs to land fill or service centres (e.g. store manager at Angurugu does a regular run to collect barge materials from Alyangula barge).

Table 13 presents costs of these arrangements for each of the case study communities. The figures presented are estimated costs of container deposit schemes that have factored in no labour costs and free transport. When crushing is not used, the cost per container is significantly reduced and moreover, may result in small amounts of income through sale of aluminium.
It is also worthwhile calculating the cost, if the capital costs were provided through grant funding. Such opportunities exist through NT Government and other communities (including Maningrida, Nyrippi and others) have made use of the funds to purchase crushing facilities. If transports cost were free, CDEP labour was used and capital costs were grant funded, the costs for the schemes (according to the above calculations) would be nil. However, this assumes there are no on-going maintenance costs and no educational programs. These costs are difficult to measure within this research report but could be substantiated through field trials of container deposit schemes.

4.2 Co-ordinating the scheme regionally

It would be worthwhile in all remote communities to look at the options for co-ordinating the scheme regionally. Such an initiative is probably relatively easy to achieve in Angurugu because much of the infrastructure for transferring the waste for resource recovery is available in Alyangula. For the other case study communities, regional co-ordination would need to be investigated further but would be particularly beneficial when dividing the cost of purchasing crushing equipment. Co-ordinating the collection of containers across a number of communities may mean that communities can reach a high level of stockpile that is attractive to outside markets and resource recovery agents.

4.3 Making the incentive worthwhile

In most cases, the refunds offered for return of containers is determined at 5 cents per container. All of the store managers and take away outlets within this study suggested that altering the prices for different size beverage would be challenging to administer and moreover, would be confusing for consumers and sorting processes. Table 5 (pg 12) suggests that all store managers were caught between the concepts of feasible incentives and lucrative incentives. That is, 5-10 cents would be expensive.
feasible to increase the price on consumers but collectors would want a more lucrative offer of 20-50 cents. This was also confirmed through discussions with community members. Such as one community said, “5 cans at 20 cent would be a dollar and kids would be interested in collecting containers for that kind of money”.

In similar incentive scheme, Lajamanu community introduced the additional $2 deposit on fuel cards so residents would return the fuel cards. The store manager suggested this had little impact on return of cards:

At the start of the fuel scheme we had 1000 cards. In the end 11 of the 1000 cards were returned for $2 payment. We then offered children a popsicle for return of cards and this helped to increase the amount that was returned.

This example and other discussions during field work provide some important learning for any incentive scheme. This includes:

1. Incentives need to be clearly articulated and communicated to consumers and community members appropriately. The co-ordinator and those working in stores offering the scheme may need to work out appropriate channels for ensuring the communication of incentives and a co-ordinated educational delivery of the scheme.
2. Incentives may need to be targeted at certain stakeholders within the community, e.g. children.
3. 5 cent incentives are more lucrative for group of people or community groups, who can collect enough containers for the scheme to be lucrative.
4. In small communities, incentives could also be linked with ideas of “community benefit” which may be more encouraging for people. That is, reducing visual litter and improving community amenity would add value to the scheme.

4.4 Analysing the framework case by case

The field work relied heavily on identifying workable options for the community by using the framework described in the methodology section of this report. The first finding when the framework was applied to all case studies communities was that a local co-ordinator is needed to develop and co-ordinate the container deposit scheme (see Figure 3).
The concept of local co-ordinator can be applied to most recycling initiatives. That is where recycling efforts have been placed in remote communities; they have been undertaken at the communal level with an individual co-ordinating the scheme. For example, a group of outstations close to Alice Springs wanted to dispose of their stockpiles of used batteries. By combining all the batteries together the outstation residents had enough of stockpile for it to be of interest to a recycling agent who paid for rail freight from Alice Springs to Adelaide (Byrne, personal communication, 2004). Whilst all outstations members were interested in getting rid of the batteries, it was an individual Resource Agency staff member who took responsibility to get the batteries to Alice Springs and arrange with the Adelaide recycling recipient.

For a container deposit scheme, the local co-ordinator would be best placed within a Community Council because they have responsibility for managing waste on the community. A local co-ordinator's role is crucial during the initial stages of planning within the communities, although their on-going role may be minimal if the scheme is set up and co-ordinated efficiently by a range of community stakeholders.

With these ideas in mind, the following presents the most appropriate proposal for container deposit collections for the three case study communities. The framework described in methodology section is used to highlight workable solutions that consider costs, local capacity and available transportation options. It should be noted that the following proposals are influenced by individuals working and living within the community and could be affected by changes in the employment of staff at community level.
**Lajamanu community**

Of the three case studies, Lajamanu community stands out from the other case studies because the majority of containers in Lajamanu community are not making it to landfill sites. The Community Council and other community stakeholders are concerned with the amount of containers within the litter stream which provides an incentive to improve waste management practices. Moreover, many community members who were interviewed in this project wanted to improve current practices in waste management and were supportive of container deposit schemes. The most appropriate pathway for a container deposit scheme at Lajamanu is shown in Figure 4.

In short, consumers or community groups (i.e. school groups) could be responsible for collection. The store would provide the administration of the deposit scheme, increasing prices to a level deemed appropriate by the store committee, and providing day storage of containers. The CDEP (either through woman’s centre or another work crew) would be responsible for collecting containers from the store, sorting, baling items and disposing of the plastic products to landfill. The store is supportive of offering a van for collection of containers. Aluminium products could be sent back into town via Pandion Haulage at a cost ($2043 per year not crushed).

There is an opportunity to obtain support from Newmont Mining (owners of Granites and Tanami mines). Although, understanding this relationship is outside the scope of this exercise, it is worth noting as there may be opportunities for obtaining discounted back loading rates or obtaining funding to set up infrastructure for the scheme.

**Figure 4: Container Deposit Scheme at Lajamanu community – (red highlights workable pathways)**
**Angurugu community**

Out of the three case studies, the most workable in terms of logistics for resource recovery was found at Angurugu. This is because the community are able to utilise existing recycling initiatives in place at Gemco Mine and Alyangula. Gemco have developed a partnership with Perkins Shipping and NT Metals which allows the free transport of recyclable (including metals, plastics) materials from Alyangula port. However, Angurugu also poses the greatest challenge in setting up independent container deposit scheme because of the number of outlets on the island selling beverage products. For a container deposit scheme to work in Angurugu, it would need to be taken on by all communities across the island. During our field work, we investigated the interest of this scheme with other stakeholders (including Umbakumba community, Gemco and Annidilywaka Land Council) and found that there is interest. Stakeholders recommended that best way to achieve island wide initiative with all stores, takeaway outlets etc, should be through Annidilywaka Land Council recommending the scheme to retail outlets. It is worthwhile noting that many stakeholders at Angurugu considered that it might be worthwhile introducing a voluntary container scheme without the administration burden associated with container deposits.

Figure 5 presents the most viable pathway for achieving container deposits at this level. Similarly to Lajamanu, consumers or community groups (e.g. art centre) would be responsible for collecting containers. The community store would administer the return system and CDEP would be responsible for transporting the containers to Alyangula/Gemco transfer station.

**Figure 5: Container Deposit Scheme at Angurugu community – (red highlights workable pathways)**

**Atitjere community**

Atitjere community has the smallest population of three case study communities, but despite the small population size the level of containers entering the communities is high. This is likely to be because many small outstations within region use the store. This poses a question on the community support for the project. As community stakeholders and representatives suggested many people who do not
reside at community will have to pay additional fees for drinks which they may not recuperate because many of the outstations residents have limited transportations options to return the cans. One outstation resident commented, “Kids could collect the cans at outstations, but they might not be able to get them into town”. It may be that if enough cans are collected over time, it will become economic to pick these up from the outstation. In addition, the community store considers it particular important to have labelling scheme because of the variety of resident within the community who purchase products from Alice Springs.

Figure 6 presents the most viable option for the community. The pathway presents similar findings to Lajamanu with plastic containers going to landfill and aluminium cans be taken to town. The limited amount of containers entering the litter stream (i.e. most waste making it to landfill) may also make this scheme less attractive for the Council to adopt because it will have limited impact on improving waste management practises within the community.

**Figure 6: Container Deposit Scheme at Atitjere community – (red highlights workable pathways)**

4.4 Developing workable options

The analysis of the framework needs to be considered in the context of a range of other factors. Aside from the factors presented throughout this report, the co-ordination and sustainability of container deposits would be determined by:

- Offering an incentive that is meaningful to consumers
- Consumers need to be informed of the scheme in appropriate manner, through posters, workshops and active involvement
- Local coordination of the project needs to rest with an individual within Community Council
- Community members need to be supportive of the scheme
- Small communities should consider leveraging support regionally (within other community or regional organisations, such as land councils) for the collection/deposit schemes to improve cost effectiveness, sustainability and labelling issues
- The scheme would need to be supported through CDEP work plan
- Regional collection centres that co-ordinate and maximise return on materials
5.0 Conclusions

The co-ordination of stakeholders within communities to deliver container deposit schemes locally is perhaps one of the most challenging tasks of all in working out logistics of these schemes. The working arrangements of the schemes, stakeholders involved, transport options, resource recovery options, incentives and impact on waste management practices will vary for each community. Models of practice from other communities who have implemented container deposit schemes provide useful experience, but the results are not directly transferable to other communities. Each community needs to be considered on an individual basis.

Container deposit schemes need to be considered in a broader context than simply obtaining resource recovery options in some Indigenous communities. Communities where containers amount for a large percentage of waste entering the litter stream (as opposed to landfill) would see advantages in developing schemes as a means to reduce litter in their communities. However, for communities with only small percentage of containers in the litter stream, the value in developing container deposit schemes would only be realised if the end results were resource recovery, regional transfer or recycling options.

Contrary to way container deposit schemes are implemented in mainstream communities, container deposit schemes are unlikely to earn revenue for remote communities. The most likely scenario is that, Community Councils could implement a container scheme which is cost effective in the long term. This report recommends that communities will have minimal costs implementing container deposit schemes through:

- Using local transportation with existing routine runs
- Devising strategic long term waste management plans and strategies locally that fit in with regional and territory wide investments and initiatives
- Including the labour and handling components within a CDEP work plan
- Implementing local co-ordination of the container deposit scheme as Community Council responsibility
- Stores voluntarily introducing and administering the returns and deposits
- Obtaining free or cost effective back loading services from freight companies
- Regional approaches with other interested communities along the same transport corridor or routes
- Utilising available grant funding for initial set up costs (including infrastructure)

Introducing a scheme that has minimal costs provides the opportunity to explore the scheme outside of the realms of economic benefits. This study suggests that container deposits schemes can contribute to cleaner communities, a meaningful CDEP activity, material for resource recovery options and reductions in waste going to landfill.
This initial study has documented the complexity around implementation of container deposit schemes within the local context. To further progress this work, it would be appropriate to develop a number of models/options (such as the ones discussed in the summaries within the analysis) that are specific to individual communities. The factors involved in developing workable options (see section 4.4) could be resolved within each community context. The developed models for implementation of container schemes (which may include voluntary schemes) should then be presented to each individual community for more investigative discussion and consultation. The community are then in the best position to ascertain willingness to implement the container deposit scheme. Arguably though, the most important part to this work is to develop an evidence base from results of trials of local level container deposit schemes in remote communities.
References


