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Support to the  
National Cleaner Production Centre  
in the Republic of Zimbabwe

4<sup>th</sup> International Mission  
(18 - 31 August, 1996)

**Back to Office Report**

ENVIRONMENTAL



RESEARCH

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(18 - 31 August, 1996)

Back to Office Report

IVAM Environmental Research  
University of Amsterdam

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## 1. Introduction

This report covers the results of activities during the fourth international mission in August 1996, as part of the contract IVAM Environmental Research has with United Nations Industrial Development Organisation (UNIDO) in co-operation with the United Nations Environmental Programme (UNEP) to act as counterpart institution for the Cleaner Production Centre of Zimbabwe (CPCZ). The general aims of this counterpart institution arrangement is to act as a advisor of the CPCZ. Objectives of this arrangements during the first years are to deliver training and guidance for representatives of CPCZ in order to conduct demonstration projects, to advise and assist in institutional networking and assist in local capacity building, thereby contribute to the establishment of a firm Cleaner Production Centre in Zimbabwe.

This fourth mission was organised in order to:

- monitoring and reviewing the progress of the demonstration projects and where necessary assisting in solving problems and removing barriers (partially by site visits to the participating companies);
- evaluating all existing company level assessment reports and assisting in preparing final CP-assessment reports for all demonstration projects, suitable for publication (at least the 1995 projects: case studies in breweries, sugar refineries and joineries , and if already finalised also the 1996 projects: case studies in food processing industry, breweries and foundries);
- strategy development for information dissemination of the results of the demonstration projects, e.g. starting initial discussion on the preparation of a case study booklet of CP-experiences in Zimbabwe and discussion on the necessity for developing a customised Zimbabwe CP-manual;
- elaborating ideas for future demonstration projects;
- advising in strategic (long term) planning.

In Annexe 1 a short overview is given of the activities during this mission.

This Back to Office report describes the following:

In chapter 2 the overall impressions are presented of this mission, concerning (i) the demonstration projects, (ii) information dissemination and (iii) organisational issues at the CPCZ. In chapter 3 the outcome of discussions concerning future plans is presented. And finally chapter 4 summarises the conclusions of the current situation at the CPCZ and give some recommendations.

## 2. Overall impressions

### 2.1 Demonstration projects

Since the erection of the CPCZ 11 CP-demonstration projects have been initiated:

- 4 breweries (National Breweries in Harare and Bulawayo, and City Council Breweries in Gweru and Mutare)
- 2 sugar refineries (Zimbabwe Sugar Refineries in Harare and Bulawayo)
- 2 joineries (ZimBoard and Border Timbers, both in Mutare)
- 1 foundry shop (National Railways Zimbabwe in Bulawayo)
- 2 food processing companies (Cairns Food in Harare and Mutare)

A short overview of the status of progress of these projects is presented in table 1. The progress and results of the 1995-projects (NatBrew, Z.S.R. and the joineries) have been discussed already in extensive detail during earlier missions, and the progress is reported in Back to Office reports on those missions. The projects in the local breweries, the foundry workshop and the 2 food processing plants started earlier in 1996, and are still under execution. In Annexe 2 an overview is given of the comments on the progress, based on reviewing the intermediate draft reports and discussions with the staff members of CPCZ, responsible for the CP-assessments.

Company	Progress status	Comments
National Breweries, Harare	Project finished, final report ready	implementation status is unclear
National Breweries, Bulawayo	Project finished, final report ready	implementation status is unclear
Z.S.R., Harare	Project finished, final report ready	implementation status is unclear
Z.S.R., Bulawayo	Project finished, final report ready	implementation status is unclear
Border Timbers, Mutare	Project cancelled	still point of attention if a sector-specific project, more oriented on waste management can be initiated
ZimBoard, Mutare	Pre-assessment finished	unclear if project will be continued, due to lack of commitment of the company
National Railways Zimbabwe, Bulawayo	Pre-Assessment finished, results laid down in intermediate report	not clear what will be the next step. For short comments see Annexe 2.5
Cairns Food (coffee department and pet food department), Harare	Feasibility studies under execution. Draft report ready	See Annexe 2.1 and 2.2
Cairns Food (vegetables canning), Mutare	Assessment phase in progress, option generation. Intermediate report ready	See Annexe 2.3
City Council Brewery, Gweru	Assessment phase in progress, option generation almost finished. Intermediate report ready	See Annexe 2.4
City Council Brewery, Mutare	Assessment phase in progress, problems with data gathering. Intermediate report (almost) ready	No reviewing comments because intermediate report was not available yet

Table 1 Status of progress of the demonstration projects

*Observations:*

- As mentioned in the Back to Office (March 1996) the 4 completed demonstration projects (NatBrew and Z.S.R.) were, taken into consideration the non-ideal circumstances, reasonably successfully and the results of the projects need to be disseminated. That required the completion/revision of the reports, suitable for the companies and for publication. During the mission in March 1996, as also described in the Back to Office report (March 1996) detailed comments were given how to improve the reports. However till now nothing happened. CPCZ did not revised the reports (yet), and is still waiting for a reaction of the companies. Since finalising the projects (January 1996) the CPCZ did not had any contact with the company. Therefore also no information is available on (i) if (part of) the options have been implemented and (ii) if implementation has resulted in the estimated (environmental and economical) effects.
- Since March 1996 nothing happened at ZimBoard; CPCZ is still waiting for additional data in order to revise the pre-assessment report and to make a decision (with the company management) if and how an in-depth CP-assessment should be executed.
- Also the foundry project at NZR, Bulawayo is 'stopped', it is not clear if or when the company decides to continue the project.

- The new projects at Cairns and the City Council breweries are running reasonably smoothly; especially due to the fact that the commitment of the company (at all levels; senior, middle and even shop floor) is considerable higher than in the first demo-projects (NatBrew and ZSR), most probably due to better starting point (outcome from a tailor-made sector specific or in-company workshop with sufficient representatives from the company). In the Cairns projects the results and draft reports are received by the company with great enthusiasm; already investments have been made (e.g. investments up to 1,000,000 Zim\$) even before finalising proper feasibility studies.

*Problems:*

- scale of operation: the City Council Breweries are very small companies (up to 10 employees) resulting in impossibility for the company to dedicate a lot of time for the project.
- data collection for the material balance: problems related with (i) inappropriate monitoring systems in the companies, (ii) lack of monitoring (water, electricity) devices inside the company and (iii) slow and/or expensive analysis of waste water samples (presently done by governmental lab).
- feasibility studies: problems to collect data concerning required investments for new technology and problems with executing a proper 'before-and-after'-analysis. The 'before analysis' is hindered by insufficient data from the material balance and in the 'after-analysis' it is found difficult to make reliable estimations of the possible outcome. At the same time misunderstandings appear how to conduct a feasibility study; in some cases the feasibility calculation were methodologically made wrongly (see the example in Annexe 2.4).
- time investment from company representatives: despite acceptable level of commitment (resulting in active participation of the company representatives at project meetings) the company representatives do not take the expected responsibility for several duties, e.g. data collection and analysis in most cases still fully prepared by consultants.
- reporting: unclear how to draft report for the company and for publication. CPCZ is still experimenting with a proper format for reporting, that can be used efficiently by all staff members.

*Conclusions / lessons learnt:*

- tailor made CP-assessments: the CP-assessment methodology should be applied flexible, each time depending on characteristics of the company (organisational structure, complexity and scale of operations, commitment of the company, ...) a customised approach have to be chosen, without loosing touch with the systematic approach of the methodology. E.g. the way how many and which company representatives should participate in the project has to be considered each time again. Data collection should not be treated as a too fixed exercise of filling up data sheets. Well-considered data gathering is essential to avoid asking too much (and thereby endangering the commitment), at the same time also proper explanation why those data are required and (if necessary) a joint effort to gather those data if not available. It is envisioned that firstly CPCZ shall make an overview of their experiences and lessons learnt from the first group of demonstration projects and secondly CPCZ and IVAM Environmental Research sees what type of CP-assessment manual, customised to the Zimbabwean situation should be developed (in the first half of 1997). At the moment CPCZ is thinking of developing a manual that can partially be used by companies itself, without consultants support.
- data collection: problems can be partially overcome by running a temporarily monitoring scheme during the CP-assessment (as have been done at Cairns, Mutare). In order to do that there is a (strong) need for measuring equipment, either owned by CPCZ or in collaboration with other Zimbabwean institutes (e.g. Zesa is offering commercial assistance, and maybe a link can be made with SIEMP, for using energy measuring equipment). At the same time it is recommendable to pay attention in all companies in setting up a customised monitoring system.
- feasibility studies: active participation of company representatives, and thereby using their expertise, and contacts with suppliers of technology is necessary for gathering or estimating the required data. At the same time an explanation is given how to execute a proper feasibility study, referring to the (UNEP)CP-manual.



- reporting: reports of a CP-assessments are in the first place meant for the company management, to show which improvements are possible (founded with a proper, not to extended not to limited, description and analysis of the present operating practices) and what environmental and economical effects can be reached. Secondly the reports, sometimes partially screened for confidential data, should be used for dissemination of CP. Based on the guidelines presented in the (UNEP) CP-assessment manual concerning report writing all reports written so far have been discussed in order to illustrate the present imperfections.
- follow-up: a CP-assessment does not end after drafting a report what improvements are possible. The last phase (implementation and continuation) is of the same importance as the other phases. In principle the company itself bears the responsibility to execute this activity. Experiences however have shown that external incentives and sometimes actual support are still desirable. The CPCZ should at least contact the company a couple of times after finalising the report, in order to (i) see if actual implementation is taken place and (ii) receive hopefully successful results from that implementation, that can be used for convincing other companies of the benefits of CP.

## 2.2 Information dissemination

Information dissemination is still not yet properly designed at the CPCZ. At the moment only very general publicity is given by the CPCZ what their activities are, via their periodical newsletter and seminar. No specific success-stories have been publicised. It is discussed with dissemination channels can be used. Besides more attention to proper report writing for the companies, and in the (near) future also use these (screened) company-reports for PR, the CPCZ is planning to draft a CP-case study booklet with short description of the results of all their demonstration projects. Several formats have been discussed how to make such a booklet (what information should be included, which presentation is the most attractive, etc.), and plans are made to develop the booklet before the end of 1996. In that case it could be presented at the reception for Zimbabwean industries at the planned annual NCPC-meeting in December 1996 in Harare. At the same time that booklet can be used as PR-material for attracting companies in new demonstration projects.

## 2.3 Organisational aspects at the CPCZ

### *The structure of CPCZ:*

The personnel composition, namely the consultants who execute the demonstration projects, is still not steady, thereby endangering the quality of the CP-assessments. Each time partially trained/experienced leave the Centre and newcomers are coming. At the moment Romeo Gurajena (past deputy-director) is finally formal excluded from the CPCZ, Sam Katsaruware left also the group and Daisy Nyazenga is only seldom involved. Idah Chitopo and Abigail Mpaya are still employed by the Centre and can be considered as reasonable experienced, but they expressed their doubts for how long they will stay at the Centre. The CPCZ just started with two new trainees, ms. Shupi Sithole and Mr. Eliphias Makombe and with a freelance involvement of an experienced electro-engineer (Joshua Nyarugwe, stationed in Mutare). All people expressed their need for job security, at least expressed by (long)term contracts. The CPCZ however has problems to fulfil these requests, due to their uncertain financial situation.

### *Advisory Board:*

The Advisory Board is still functioning ineffectively. At the Advisory Board Meeting (28 August), scheduled to discuss the initial draft of a business plan for 1997/99, related to the topic of sustainability, the discussion revealed surprisingly that the members of the Board had considerable misunderstandings concerning the basic objectives and obligations of the CPCZ (as described in the Modality of Operations). This observation explained why the Advisory Board was not functioning the way CPCZ would have liked (in a supportive way). In order to clarify the misunderstanding already during this meeting a short

overview was given of all objectives and it was decided that CPCZ and the UNIDO-office in Zimbabwe will prepare an explanatory note for all Advisory Board members, including a description of the objectives, the structure of the CPCZ and links with executed and planned activities. A new meeting is scheduled on 19 November. The most basic lesson that can be drawn from this 'accident' is that proper communication and information exchange is crucial for the CPCZ. The concept of Cleaner Production and what activities are essential in the framework of CP is for most organisations in Zimbabwe still brand new and therefore continuous, repeatedly explanation is essential.

*Institutional networking:*

During the mission a meeting was arranged with SIEMP (SADC Industrial Energy Management Project). This programme is initiated (with Canadian funds) in 1989 for the entire SADC-region with a focus on energy. In the past years several energy audits are conducted in different sectors (food & beverages, textiles), also in Zimbabwe. Recently SIEMP started with a regional approach, at the moment a program is running in Zimbabwe, with several companies (e.g. NatBrew and Cairns, Harare) and some local consultants (e.g. Southern Centre, University of Zimbabwe and Harare Polytechnic) participating. SIEMP is seeking for participation of local consultants, research institutes and training institutes in order to establish local capacity. The discussion revealed that the SIEMP-activities show large similarities with CPCZ-activities. Surprisingly till now both CPCZ and SIEMP did not know from each others activities and even more surprising in the case of Cairns, Harare the company itself did not mention towards the organisation that they run a similar activity at the same time, so no synergetic effects. As an outcome of these first meetings both CPCZ and SIEMP see possibilities for co-operation and at least strengthening of each others activities and they agreed that they will seek in what form a collaboration could take place: co-operation, exchange information, equipment, office, manuals.

### 3. Future plans

The following plans for the near future have been discussed:

*(1) New demonstration projects:*

- Breweries: Chibuku breweries (production of opaque beer), with 16 breweries in Zimbabwe, showed their interest for a CP-project and the CPCZ is asked to present proposal for senior staff of Chibuku (all GM's of the respective breweries). The initial idea will be to organise workshop(s) for representatives of all breweries and execute a in-depth CP-assessment in 1 (or 2) breweries as a pilot project. This project offers the opportunity to use and disseminate the experience built up so far in breweries (NatBrew and City Council breweries), despite the differences in type of bear (respectively opaque and clear beer).
- Hotels: Delta Corporations showed initial interest in a possible project in their hotel chain. Hotels are no industrial activity, but all around the world it has been shown that CP is also applicable for these type of organisations. A project in such an organisation offers interesting opportunities, e.g. ease of implementation due to importance of tourism for Zimbabwe.
- Textile industries: Spinners and Weavers (Kadoma) is still on the list of possible candidates. CPCZ will take initiative to re-open the discussion with the company.
- Foundries: After the one-day workshop for foundries in March 1996 and the pre-assessment at National Railways of Zimbabwe no follow up activity has been initiated. CPCZ is planned to seek more foundries for a demonstration project, and at the same time think from the start to streamline the dissemination of the results to the entire sector.
- Tanneries: A tannery workshop in Marondera has shown interest for a project, and also because of the existence of a large number of tanneries in Zimbabwe, a demonstration project in this sector is worthwhile to consider.

- Regional project: As an outcome of discussions how to select demonstration project, and what way to disseminate results of demo-projects, it appeared that for Zimbabwe a more regional approach (instead of a sector approach) could be advisable, because of the relative small number of companies pro industry sector in Zimbabwe. This idea will be developed more in detail in the beginning of 1997.

*(2) Information dissemination:*

As mentioned in paragraph 2.2 it is important for the reputation of the CPCZ to publicise the results reached so far in the demonstration projects. Therefore it is planned to draft a case-study booklet.

*(3) Policy development:*

We discussed the outcome of the (national and local) policy workshops; at the moment it is envisioned that initiatives will start in Harare and Bulawayo. At the same time it is concluded that in new policy activities in the near future also town clerks, chancellors and politicians have to be included in the target group, because of the influential position. In Gweru most probably a co-operative relation has been established, and links will be laid with the Swedish activities. On national level interesting new developments are taking place, that can strengthen the role of CPCZ, e.g. in the framework of the "White Paper", the national Environmental Policy Plan, responsibility is assigned for CPCZ as advisor, and also a key position in the development of an Environment Fund. CPCZ recognises the importance to stay in close contact with those developments in order to seize this opportunity to upgrade the attention for Cleaner Production.

*(4) Financial organisations:*

Financial organisations and financial departments in companies could play a key role as driving force for CP, because of the dominant focus of companies on financial issues. Therefore concrete plans have already been made to organise activities towards finance people (organised in Chartered Accountants and Institute of Cost Management): a seminar for introducing the concept of CP (19 September) and a 2-day workshop on Total Cost Management (2-3 December).

*(5) Related CP-activities in Zimbabwe:*

- Norway: already funds allocated by NORAD for CP-activities, via the UNDP-office in Zimbabwe. However, till now no appropriate proposals. CPCZ is trying, in co-operation with the UNIDO-office in Zimbabwe, to interfere in a strategic way, in order to release the money.
- Denmark: a fact finding mission was organised by Danish consultants, as an assignment for DANIDA, in order to identify and prioritise possible projects. Cleaner Production is prioritised as one of the essential activities and CPCZ is nominated as key actor for CP-activities. This offers also an excellent opportunity for CPCZ to extend their activities.
- Netherlands: (1) A second CP-workshop has been organised by the Dutch organisation of retired engineers, NMCP, in co-operation with Zimbabwean Institute of Engineers. The first one was in 1995 (without involvement of CPCZ. This time CPCZ was properly informed (via UNEP), and Lewin Mombemuriwo participated as a speaker. However, the overall impression was negative; the workshop in Harare had only 8 participants and the workshop in Bulawayo cancelled because of too low interest. NMCP has an assignment from UNIDO and UNEP to support the NCPC's in respective countries, but so far the communication and co-operation with the CPCZ seems far from effective. IVAM shall contact NMCP in the Netherlands in order to streamline the communication.  
(2) There is a city link between Mutare and Haarlem (Netherlands), at the moment focusing on Waste Management, but with opportunities to move towards more CP-like activities. CPCZ will contact the representatives in Mutare and IVAM shall arrange follow up in the Netherlands.

#### 4. Concluding remarks

As an outcome of this mission in the framework of the counterpart institution arrangement the following remarks seems to be essential, in order to improve the performance of the Cleaner Production Centre in Zimbabwe.

##### *CP-demonstration projects:*

Based on the lessons learnt from the first series of projects it can be concluded that the execution of the second series is improved considerable, but still external supervision seems to be necessary, related with still existing need for training and explanation of basic CP-methodology and the tendency that imperfections creep in the assessments. The personnel developments in the Centre, mobility of the personnel due to lack of job security, intensifies this need for continued attention of building local capacity and supervising the CP-demonstration projects.

##### *Organisation of the Centre:*

The financial situation of the CPCZ, especially related with the contribution of EFZ, is still far from optimal. At the same time relational channels have to be improved; the co-operation with SIRDC, envisioned to be a partner if CPCZ (e.g. providing the deputy-director) is not what it should be and also the Advisory Board is not functioning the way it planned. This issue has to be covered urgently in order to give CPCZ the opportunity to work in a co-operative surrounding.

Besides the already mentioned endangering situation of fast job-rotation the Centre is also still struggling with some basic needs, which hamper proper functioning:

- At the moment office space is far from optimal and it is foreseen, due to internal circumstances at Delta Corporation (the present host of the CPCZ), that CPCZ has to seek for a new office, with the problem how to finance that.
- The centre lacks sufficient materials (computers and CP-literature) for efficient functioning.
- And, specifically related with the demonstration projects, there is a need for measuring equipment in order to overcome the problem of lacking of required data and the missing in the companies of a proper monitoring system and/or monitoring devices. A possible co-operation with local institutes, e.g. Universities, Polytechnic or a organisation like SIEMP, can hopefully partially cover this need.

##### *Sustainability of the Centre:*

As part of the upcoming attention for a y to self-sustainability for the CPCZ, CPCZ calculated, as part of the first concept of the Business plan for 1997/199 (prepared for the Advisory Board) what the revenues could be by executing 10 company projects annually, under the assumption that CPCZ can ask normal (local) consultancy fees. In that case even the basic costs cannot be covered (taken into account: office rent, etc. and personnel: 1 director, 2 deputy directors and 1 secretarial member). And besides this no activities taken into consideration that do not generate-revenues, in spite of the recognition by CPCZ that those activities are also important. It can be concluded that at least for the next year(s) outside support is still necessary. The possibilities offered by bilateral funds hopefully offer this support, additional to UNIDO/UNEP-funding, in order to secure and strengthen the position of CPCZ by extension of their activities.



## Annexe 1 : Programme of the 4d International Mission, 18 - 31 August, 1996

- |           |   |
|-----------|---|
| 18 August | <ul style="list-style-type: none"> <li>• Arrival</li> </ul>   |
| 19 August | <ul style="list-style-type: none"> <li>• Initial discussion with Lewin Mombemuriwo, practical (detailed) arrangements</li> </ul>  |
| 20 August | <ul style="list-style-type: none"> <li>• Meeting with Southern African Industrial Energy Management Project (SIEMP)</li> <li>• Review discussion with CPCZ concerning reports finalised demo-projects at NatBrew and ZSR</li> </ul>               |
| 21 August | <ul style="list-style-type: none"> <li>• Review discussion with CPCZ concerning progress demo-projects at Cairns Food, Harare and Mutare</li> </ul>   |
| 22 August | <ul style="list-style-type: none"> <li>• Visit of Cairns Food Industry, Mutare site</li> </ul>  |
| 23 August | <ul style="list-style-type: none"> <li>• General meeting with all CPCZ-associates</li> </ul>  |
| 26 August | <ul style="list-style-type: none"> <li>• General meeting with all CPCZ-associates</li> </ul>  |
| 27 August | <ul style="list-style-type: none"> <li>• Review discussion with CPCZ concerning progress demo-projects at City Council Breweries in Gweru and Mutare</li> <li>• Meeting with SIEMP</li> </ul>   |
| 28 August | <ul style="list-style-type: none"> <li>• Attendance at CPCZ-Advisory Board Meeting</li> </ul>   |
| 29 August | <ul style="list-style-type: none"> <li>• Wrap up meeting with CPCZ-staff</li> <li>• Discussion on the preparation of a CPCZ-case study booklet</li> </ul>   |
| 30 August | <ul style="list-style-type: none"> <li>• Discussion with Lewin Mombemuriwo on progress 1996 and planning 1997</li> <li>• Meeting with Roland Deschamps (UNIDO-representative)</li> <li>• Meeting with Petra Lenz (UNDP-representative)</li> </ul> |
| 31 August | <ul style="list-style-type: none"> <li>• Departure</li> </ul>   |

Annexe 2: Review of the CPCZ-demonstration projects <sup>(1)</sup>

## 2.1 Cairns - Harare (coffee department):

*General comments:*

- structure of the draft report is all right;
- reference to figures and tables sometimes incorrect;
- it is not clear if all the presented data are calculated in an uniform way (e.g. are they all dry matter based ?);
- data collection not complete, why no test runs made (similar to Cairns, Mutare) to collect more data ?

*Specific comments:*

- page 2: why different type of roasters ?
- page 4 (table 1.1): estimated 18 - 20 % loss; this is total loss, its is important to estimate the actual dry losses, excluding moisture losses.
- page 3: efficiency of roasting is 80%, why is that called the standard ? Does that reflect an internal (company) standard or an (inter)national sector standard ?
- page 5: after roasting the coffee is cooled; in what temperature range, and is there any heat recovery ?
- page 5: estimations or measurements concerning consumption of paraffin and gas are missing.
- page 7: concerning the ground coffee production (grinding - blending - packaging) no CP-options mentioned. Does that imply that the operations are perfect and/or no or minor losses ? E.g. what about the energy (electricity) consumption, and why no packaging problems (similar to the problems at the instant coffee department) ?
- page 8: concerning the instant coffee production: figure for the water consumption in the extraction unit is missing.
- page 8: text is not clear if output is solid waste and/or waste water (slurry).
- page 8: cleaning operations are not described properly; how often, with what input (water, cleaning materials) and what output (slurry, including coffee losses) ?
- page 9: what about heat and water losses during cooling step ?
- page 9: lumps are added in the process; is that only for reworking, or also to reach a specific solid content (35-36%), and thereby limiting the amount that can be reworked ? And if no lumps are available, how do they adjust the solid content ?
- page 9 - 10: the process of filtration is only described, material balance is missing.
- page 10: better to dedicate a separate section to spray drying unit, especially because of the importance of the unit for the lump problem.
- page 13 - 16: the difference between "observation" and "cause" is not clear, sometimes too much overlap.
- page 13 - 14: additional observations/problems for the roasting section: (i) roasting efficiency and (ii) cooling procedure after roasting.
- page 14 (extraction unit): observations concerning (i) cleaning operations between different blends and (ii) fines removing due to sieving process are missing.
- page 15: no information included from the filtration section; possible problems are the foam rubber sheets and the cartridge filters.
- page 16: nothing mentioned concerning (i) the packaging unit and (ii) the cleaning operations in the department.
- Related to the above mentioned extra problems more options could be generated.

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<sup>(1)</sup> These comments are expressed already during the review discussions with the CPCZ-members during this mission.

- Summarising: cause assessment and option generation are in general appropriate, but can be extended, and in relation to the feasibility studies the description of environmental (reduction of waste, etc.) and economic effects (investment required and cost/benefit calculation) is missing. And based on those figures an analysis can be made if the original targets have been reached; reduction of water and energy consumption (difficult to say due to unquantifiable data) and increase of extraction (from 40-50% to 60%).

## 2.2 Cairns, Harare (pet food department)

### *General comments:*

- the (draft) report is difficult (almost impossible) to review for an outsider because it gives no description of the technology, equipment and operation practices (e.g. manually or not).
- it is worthwhile to consider if presentation of the cause assessment immediately after the process description and material balance will improve the readability.

### *Specific comments:*

- target setting: is only solid waste a problem in this production unit ?; no water problems (high water consumption) and/or energy consumption that needs attention ?
- page 1 (table 10 - general inputs and outputs): in the list of inputs reworking of scrap waste (90,272 kg) is missing (see also page 7).
- page 3: "manual handling results in product spillage during weighing". Is that because of (i) remainings in the bags, (ii) spillage by emptying, (iii) dust generation by emptying, etc. ? And do they (try to) rework the spills ?
- page 5 (and page 8): "the company has started to record the losses". Can this be seen as a result of the CP-assessment ? And what is the outcome of the monitoring, after 3 months recording ?
- page 6 (table 12 - material balance): the table only lists the inputs/outputs without any quantitative data. Are there no data available at all, also no estimations, and what about the possibility to make test runs ?
- page 7 (mixing): in the option generation it is only mentioned that there is a problem with down time. A proper description is missing how often, why and what the consequences of the down time (e.g. product loss, spills, waste, etc.) are.
- page 11: the recommendation that proper cost and material balancing are advisable is a smart recommendation, in order to see if the 'strategy' of the company, not to worry about losses because everything is reworked in the pet food department. The recommendation will even be stronger if an example is given of such a cost estimation.
- cause assessment and option generation:
  - is labelling of the raw materials essential or necessary for product formulation ?
  - could it be advisable to do the weighing / recording at the other departments (part of the raw materials are waste streams from other Cairns departments) ?
  - what will be the consequence of introducing silo's, what extra equipment is necessary (pipelines, pumps), and what kind of possible problems ?
  - an automatic weighing system can be very accurate, but what sort of system you propose ?
  - are there no losses at the mixing operations ?
  - mixing operations are batch wise and not continuous !
  - what kind of incentives has the department already introduced to reduce losses ?
  - down time problems need more explanation (see earlier remarks)
  - baking/drying operations are wrongly described: cause assessment should focus on (i) burning problems during baking and (ii) overdrying final product drying stage. Both problems causes considerable amounts or rejects (see page 9 of the report).



### 2.3 Cairns, Mutare (fruit and vegetable processing/canning)

A review is given of the draft report of the assessment report, describing the processes, including a material balance. The results of the cause assessment were only available as a short list and during the mission a site visit took place in order to organise a brainstorm session for option generation. The results of that meeting were (very) positive, 19 representatives of the company (different levels, from senior management up to work floor) participated and many CP-options taken into consideration.

*General comments:*

- proper data gathering, partially by using actual measurements during a test run;
- presentation of data (in tables, graphs, text) however not always conveniently arranged;
- 2 production lines presented (tomato line and fruit canning/pulping), but only the first line is properly described.

*Specific comments:*

- Section 2 (process flow description of the tomato line): By adding a description of at least (i) the technology used, (ii) the maximum production capacity, (iii) the actual production (with explanation of seasonal fluctuations) and (iv) the apparently appearing break downs (which specific units, and what causes), more insight will be gained in the way operations and its problems.
- Figure 2 (tomato line flow chart): More appropriate to list the intermediate products not as input/output but in line with the process units. Thereby it can be seen immediately what the actual inputs (raw materials) and outputs (final product and waste streams) are.
- Page 5: It is recommended that Cairns, ideally, should monitor the production process for a longer period. This recommendation will be more practical for Cairns if it will be elaborated in a monitoring scheme (what streams need periodical monitoring, what requirements for monitoring devices, what barriers in such a scheme, etc.). That would support the company in setting up such a system, and thereby tries to guarantee continuous attention for improvements.
- Pages 6 and 7 (conveyor systems): It is concluded (and was also one of the topics in the discussion with the company during the site visit) that the performance at line 1 and 2 is considerable different. Description of what the actual differences are, in technology and/or operation practices, is missing. This analysis could lead to possible improvements.
- Pages 11 and 12 (concentrators): The description of water and steam inputs and discharges is not clear, and perhaps incorrect (as discussed during the site visit). And missing is the description of the vacuum pumps, with a possible cause for problems (due to improper operation practice the pressure is too high thereby requiring that the temperature has to be ~70 °C in stead of 55 °C).
- Page 12 (retorts): Missing is the description of the temperature range and the cycle time.
- Page 12: It would be advisable to include as a summary of section 3 an overview of all the losses, in order to give an indication where the biggest losses are.
- Page 13 (general comments): The statement "no measurement means no control" is correct but can be strengthened by "no control means no possibility for feed-back and thereby possibility for optimisation".
- Page 14 - 20 (fruit canning and pulp making): The description of this production unit is far less extensive than the previous section (tomato line) and therefore less useful for proper cause assessment/option generation. If possible, try also to follow the same approach and format.
- Page 20 (conclusions): The report ends in a 'negative' way, by first stressing on active participation and then ending with "it will be worth the effort". In order to gain (more) commitment, rephrasing this conclusion would be advisable.

### 2.4 City Council Brewery, Gweru (brewery)

*General comments:*

- proper description of process, operating practices, etc.

- interesting analysis of correlation's between actual thruput, coal consumption, water consumption and electricity consumption. One extra, important, conclusion can be drawn from these analysis: there is no correlation between the efficiency and the thruput ! This indicates that the process conditions are not under control.
- section on cause assessment and option generation is described very staccato, more explanation in order to convince the company of the value of the recommendations will be needed.
- feasibility study is incorrect (see specific comments).

*Specific comments:*

- Material flow analysis (table 3):  
what means spillage; solid and/or liquid spills (drained), what percentage of beer in the spills, and how are those spills priced ?  
the amount of waste water is missing, the related costs are not mentioned and also quality of the waste water (BOD, TSS) is not described?  
the spent grains are priced, but does the brewery have to pay for disposal or are they selling it ?
- An extra analysis step can be made analysing graphs 1-6, namely the correlation between actual thruput and efficiency figures (e.g. water consumption pro litre beer versus thruput) ?
- In table 3.2 it is mentioned that they collect sweepings at the milling section and sell it. This can be seen as profit, but also as loss, because it is sold at a lower price than the actual (original) value !
- Process description of the steeping tank: How do they produce the hot water; is it heated by heat exchange mechanism in order to reuse waste heat (from the conversion stage) ?
- Process description of the cooking vessel: unclear description of the boiling process; is it life steam injection ? And how appropriate is the isolation of the cooking vessel; are there opportunities for improvement ?
- Process description of the conversion stage: Is the waste heat from the cooling process re-used ?
- Process description of the straining stage: Again an heating process; how does it takes place ? And is the straining done by centrifuging and/or screening ?
- Spent grains: it is mentioned that the average solid percentage is 0.059%. Most probably it is meant to be 5.9%, and do you mean 6% solid in the spent grain or reverse way 6% moisture ?!
- In the description of the respective units each time different terminology is used: steeping tank - cooking vessel - cooling in ? vessel - straining in ? vessel - pasteurisation vessel - ... This is confusing because sometimes the process takes place in the same vessel.
- Process description of the pasteurisation and 2d conversion: again a cooling process, with no clarification if heat exchangers are in place.
- Process description of the packaging department: It is better to divide in 2 processes units, first bottle washing and second bottle filling. The process of bottle washing is described inappropriate, e.g. no description of washing with hot and/or cold water, how many stages and what cleaning agencies (also missing in the material balance) ?
- Missing in the report are the washing operations (CIP-unit and floor washing); in the CP-assessments of NatBrew these activities were the key focus and most probably also in these breweries improvements will be possible of these operations (water consumption and way of discharging).
- In relation with those comments most probably also the cause assessment and the option generation can be extended, e.g. heat/cooling operations and washing operations can be improved.
- Feasibility studies: The calculations are incorrect !  
*In the report the investment costs of a bottle washer are mentioned (I), and secondly it is mentioned what the present water consumption is, how much the company wants to reduce the water consumption and to what savings such an reduction would amount (S). Then it is mentioned that the payback time is I/S. However the pay back time should be calculated as investment / estimated savings. And estimated savings should be calculated as the difference between the present bottle washer and the modified bottle washer. The applied calculation method presume that improving the bottle washer can cope for the total reduction of water consumption in the company what seems to be very unrealistic (considering the relative water consumption of each of the department) and the*

reduction of water is not based on technology information but based on what the company wants to reach.

## 2.5 National Railways of Zimbabwe, Bulawayo (foundry section)

The report is only in a draft stage and only covering the pre-assessment phase. Therefore is not reasonable to review it in detail. At the moment the report contains only a rough qualitative description of the different processes (foundry, surface treatment, electroplating and painting). At some stages a more thorough description could be useful in order to make a proper evaluation of the key bottle necks in the company. And secondly at least some quantitative description, rough estimations of the environmental impact (and/or related costs), would be advisable, in order to make a conscious choice for an audit focus.



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