

**BUREAU OF SUGAR EXPERIMENT STATIONS
QUEENSLAND, AUSTRALIA**

**FINAL REPORT - SRDC PROJECT BS174S
DEVELOPING A FRAMEWORK FOR ADVANCING
ROAD TRANSPORTATION OF SUGARCANE**

by

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SD98013

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**This Project was funded by the Sugar Research and Development Corporation
and by the BSES during the 1996/97 financial year.**

CONTENTS

Page No

SUMMARY

1.0	OBJECTIVES.....	1
2.0	BACKGROUND.....	1
3.0	PROJECT PLANNING MEETING.....	2
4.0	DRAFT PROPOSAL TO UPDATE CURRENT LEGISLATION	3
5.0	QUEENSLAND TRANSPORT DRAFT POLICY	4
6.0	CANE TRANSPORT SURVEY	5
7.0	CONCLUSIONS AND BENEFITS TO THE INDUSTRY	5
8.0	ACKNOWLEDGMENTS.....	6
9.0	REFERENCE	7
APPENDIX A	– CANE TRANSPORT SURVEY FORMAT.....	8
APPENDIX B	– SURVEY RESULTS	12
APPENDIX C	– DRAFT PROPOSAL TO QUEENSLAND TRANSPORT.....	16
APPENDIX D	– DRAFT POLICY FROM QUEENSLAND TRANSPORT.....	19
APPENDIX E	– PUBLICATIONS ARISING FROM THIS PROJECT.....	21

SUMMARY

Every year approximately 38 million tonnes of sugarcane are carried from the field to the sugar mills in Queensland. All of this cane is carried by some form of in-field cane haulout vehicle for part of its journey.

This project used a consultative process to determine critical issues affecting road and in-field haulage of sugarcane. A survey of canegrowers and harvesting contractors has given the researchers additional data to complement the results of discussions with stakeholders. The sugar industry is unique in that the definition of a cane bin trailer is defined by legislation and the operation and performance standards described in a Queensland Transport publication, Information Bulletin Cane Bin Trailers VSS .02.6/94. The mail-out survey and subsequent discussions at grower and contractor meetings indicated that many stakeholders did not fully understand the implications of this publication. As the carrying capacity of sugarcane haulage equipment has increased, non-compliance to this information bulletin has also become greater.

Key issues identified included:

- the specifications of many large capacity sugarcane haulout vehicles are outside the current legislative requirements for cane bin trailers. The current information bulletin refers only to cane bin trailers. Self-propelled haulout units, both rigid and articulated, are not adequately classified.
- allowable mass loadings and the desired distribution of mass between the tractor and the haulout are not well understood by the industry.
- increased allowable axle loadings of some low pressure, high flotation agriculture tyres are permitted when these tyres are used for sugarcane transportation. New tyre sizes and types are becoming available from overseas and their suitability as haulout tyres is not clearly defined.
- the maximum allowable speed for a cane bin trailer is 40 km/h. Some current vehicles have the potential to exceed the limit and many new tractors suitable for cane haulage can exceed this speed.

The non-conformity of the large sugarcane haulout vehicles identified by this project was considered an issue requiring immediate attention. This project deviated slightly from its initial objectives and the researchers developed a draft proposal to assist in resolving non-conformity problems. This draft proposal was the product of consultation with all stakeholders and was the catalyst for solving the non-conformity problem. A draft policy was developed by Queensland Transport and, after minor alteration by the industry, has been accepted by all stakeholders. The policy shall:

- retain without change all Axle Mass Concessions and Performance Standards, as detailed in VSS .02.1/94.
- allow the maximum allowable road speed to be increased from a maximum of 40 km/h to less than 50 km/h for current haulout vehicles. Vehicles that conform to additional ADRs (Australian Design Rules) may operate at road speeds greater than 50 km/h.

- create vehicle categories for current and future in-field rigid and articulated haulage vehicles. Rigid trucks used to haul sugarcane are also described.

At the time of publishing this report, the policy had not been ratified by State Parliament but there appears to be no impediments to this occurring.

Approval of the new policy must be accompanied by an education campaign to ensure all stakeholders understand the benefits of this policy to the sugar industry and its effects on their operations. Researchers from the Bureau of Sugar Experiment Stations intend to undertake additional research to further improve the operation efficiency, safety and ensure a better understanding of sugarcane haulage. Assistance from the Sugar Research and Development Corporation will be requested for this work.

1.0 OBJECTIVES

An objective of this project was to initiate a research program for the road transportation of sugarcane. Future research projects will be undertaken with the knowledge and cooperation of key parties and therefore have realistic and achievable goals.

This project has encouraged communication between road regulators, manufacturers of haulout equipment, suppliers of tyres and suspension systems, users of haulout equipment, researchers and cane growers and thus created a cooperative environment for future research in this area. In addition to the initially specified objectives, this project has addressed the current issue of legislation not adequately covering the newer types of haulouts and the non-conformity of many haulouts to current regulations.

2.0 BACKGROUND

The Queensland Government, through the Queensland Transport (also known as Queensland Department of Transport), determines legislation that controls road transportation of sugarcane. Manufacturers of sugarcane haulout equipment have previously approached officers of Queensland Transport on an individual basis requesting changes or exemptions to current regulations. This fragmented approach was not very successful as Queensland Transport personnel often receive conflicting messages as to the needs and priorities of the Queensland sugar industry. BSES, together with organisations such as CANEGROWERS and Queensland Caneharvesters, believe that the cooperative framework must be set in place before significant research projects commence.

Sugarcane haulage has changed significantly since the days when the farm tractor could adequately perform farm duties and haul the cane crop. Most cane haulouts are now dedicated solely to this one task and vehicles carrying 12 tonnes or more of sugarcane are common. The cane harvesting sector has indicated a desire for more information on the regulations governing their operations to ensure they conform to all regulations. As new haulout vehicles are sophisticated and expensive, it is essential that the operation of these machines be economically viable. Without the appropriate legislative changes and active support from all those involved in cane transport, use of this new equipment will be restricted and innovative development stifled. The Australian sugar industry must rely on innovation to stay ahead of its competitors.

This one-year duration project was an essential first step towards a coordinated approach to improve the efficiency of the road and in-field cane trailer transport system. An environment was created which will greatly enhance the success of future projects on the road transportation of sugarcane.

3.0 PROJECT PLANNING MEETING

The project commenced with a meeting that determined content and format guidelines for a survey of the present haulout fleet. To ensure all facets of in-field cane haulage were considered, a group comprising of the researchers, growers, representatives from cane harvesters, haulout manufacturers, Queensland Transport and a person with previous experience in cane transport research was assembled. This group met on 16 August 1996 at BSES head office in Brisbane and comprised of:

Brian Robotham, BSES, Bundaberg
 Chris Norris, BSES, Bundaberg
 Peter Twine, BSES, Brisbane
 Tony Matta, Queensland Transport, Brisbane
 Trevor Fuelling, Tully Sugar Limited, Tully
 John Powell, Queensland Caneharvesters, Mackay
 Milton Rogers, Rogers & Sons Pty Ltd, Brisbane
 Ian Jones, SRDC.

This meeting aimed to identify the critical issues affecting the sugarcane haulout industry that required additional information. These subjects would form the basis of the survey and the researchers would develop the survey format after this meeting. The group discussed the historical aspects relating to the development of high flotation cane haulouts. Although haulout equipment had changed significantly, there had been a lack of research of in-field cane transport since the development of tractor and trailer tipper combinations. Industry representatives highlighted how cane haulout equipment had evolved to the point where current regulations were no longer applicable to developments within the industry. Tony Matta agreed but highlighted the fact that many large sugarcane haulouts, presently in use, were operating outside the current regulations for cane bin trailers. The main areas of non-conformity involved the legislation, which defined a cane bin trailer as a trailer:

- *with an Aggregate Trailer Mass (ATM) of up to 20 tonnes; and*
- *towed by agricultural tractors with a maximum speed of 40 km/h;*

(Source: Queensland Transport Information Bulletin CANE BIN TRAILERS VSS .02.6/94)

Many of the newer cane haulout vehicles have trailers with ATM exceeding 20 tonnes. These units are mainly tractor and trailer combinations and self-propelled articulated units. Several of the haulouts currently in use have the potential to exceed the maximum speed of 40 km/h and many tractors being imported from Europe and the United States have road speeds greater than 40 km/h. These tractors feature high-speed transmissions, front axle and rear axle suspension systems and hence are well suited to the task of in-field cane haulage. The Information Bulletin VSS .02.1.94 is the primary publication that defines sugarcane haulage vehicles. This document was the result of negotiations conducted more than ten years previous and only describes cane bin trailers. Modern rigid and articulated self-propelled cane haulage vehicles are not agricultural tractors and hence not defined by current regulations. Problems caused by the lack of clearly defined categories for cane haulage vehicles have escalated to cases where Queensland Transport staff in one

canegrowing region will register a particular type of vehicle for use on public roads while staff in a different region are refusing to register an identical vehicle. The current and future effects of these areas of poor definition and non-conformity were considered enormous and hence resolution of this issue was considered of highest priority. The lack of appropriate legislation for the sugar industry would also stifle future development and innovation of sugarcane haulout equipment.

Key issues identified at this meeting were:

- the specifications of many large capacity cane haulout vehicles are outside the current legislative requirements for cane bin trailers. The limit of a 20 tonne maximum ATM was applicable to roll-on/roll-off cane trailers and the smaller bins, but larger capacity haulout units have now evolved.
- allowable mass loadings and the desired distribution of mass between the tractor and the haulout are not well understood by the industry.
- increased allowable axle loadings of some low pressure, high flotation agriculture tyres are permitted when these tyres are used for sugarcane transportation. This increased loading is in the form of loading concessions granted by Queensland Transport due to the reduced pavement damage of these tyres. The benefits and definition of the load concessions are not well understood by tyre suppliers, equipment manufacturers and equipment users. New tyre sizes and types are becoming available from overseas and their suitability as haulout tyres is not clearly defined.
- the maximum allowable speed for a cane bin trailer is 40 km/h. Some current vehicles have the potential to exceed the limit and many new tractors suitable for cane haulage will exceed this speed.

The meeting resolved to conduct the survey of the sugarcane haulout sector as planned but of higher priority was the resolution of the non-conformity of the newer large haulouts to current legislation.

4.0 DRAFT PROPOSAL TO UPDATE CURRENT LEGISLATION

Based on the decision at the project planning meeting to address the issue on non-conformity of newer haulouts, additional discussions were held with Queensland Transport, CANEGROWERS, Queensland Caneharvesters, haulout manufacturers, harvesting contractors and growers. The best solution was for the industry to be proactive and put a proposal to Queensland Transport detailing the resolution from an industry perspective. Officers from Queensland Transport were aware of the problems and hence offered constructive comment towards the drafting of the proposal to update current legislation.

A draft proposal was then developed by the researchers and exhaustive consultation undertaken with all stakeholders. The key features of the proposal were:

- concessional tyre loading and braking performance requirements remain for vehicles currently covered by this bulletin.

- a vehicle category be created for cane haulout vehicles and includes tractor/trailer combinations, articulated units and self-propelled rigid units that either have an ATM exceeding 20 t, can operate at speeds greater than 40 km/h or both of these.

Allowances would be given for the use of approved 'road friendly' suspensions. Maximum allowable operating speeds would be specified by the equipment manufacturer with due regard to the specifications of the various components (brakes, tyres, etc) used in the haulout. The use of high flotation agricultural tyres (at a maximum inflation pressure of 2.5 bar) would enable appropriately designed vehicles to operate within a special sub-category of cane haulout vehicles. Under this proposal, the axle loadings and allowable speeds of haulouts with high flotation tyres would be self-limiting. Allowing a maximum tyre inflation pressure of high flotation tyres to be 2.5 bar would effectively limit tyre operating loads and speeds permitted by tyre manufacturers. This would free Queensland Transport staff from the time consuming task of having to review all sizes of high flotation tyres and publish data specifying allowable axle loads for each tyre.

As CANEGROWERS already had an efficient communication pathway to Queensland Transport, the draft proposal was submitted by this organisation on behalf of the Queensland sugar industry. The proposal was submitted to Queensland Transport on 11 February 1997.

5.0 QUEENSLAND TRANSPORT DRAFT POLICY

Receipt of the draft proposal indicated to Queensland Transport staff the strong desire of the Queensland sugar industry to resolve the vehicle compliance issue. The draft proposal developed within this project was not totally acceptable but proved to be the catalyst for altering the current legislation. A Draft Policy for Sugar Cane In-field Hauling Equipment (see Appendix D) was received from Mr P R Blake, Executive Director (Land Transport and Safety), Queensland Transport on 3 July 1997. The document was quickly circulated to the researchers and interested parties for comment. This draft policy was in a significantly different format to the proposal sent to Queensland Transport but it effectively produced all desired reforms. Features of the draft policy were:

- Axle Mass Concessions and Performance Standards, as detailed in VSS .02.1/94, are retained without change.
- maximum allowable road speed was increased from a maximum of 40 km/h to less than 50 km/h for current haulout vehicles. Vehicles conforming to additional ADRs (Australian Design Rules) may be operated at speeds greater than 50 km/h.
- categories have been created for in-field rigid and articulated haulage vehicles. Rigid trucks were also described in this policy.

However, ATM (Aggregate Trailer Mass) of cane bin trailers remained at 20 tonnes and this was not acceptable. Subsequent discussions with Queensland Transport officers resolved to alter ATM in the draft policy to GTM (Gross Trailer Mass). The GTM is the weight on the trailer axles and does not include the mass transferred to the towing vehicle (tractor). ATM is the weight on the rear axles plus the mass transferred to the towing

vehicle. The GTM is easier to measure in the field than the ATM and allows the trailer to carry a greater load while still conforming to the 20 tonne limit. This alteration was considered acceptable to all parties. Queensland Transport proposed that the policy would be introduced in time for the 1998 harvest.

6.0 CANE TRANSPORT SURVEY

The survey questionnaire was developed by the project researchers and reviewed by industry representatives. A small sample survey was trialed to identify potential shortcomings in the survey design. The sample responses were analysed and the result considered acceptable. Respondents were asked to describe their role within the sugarcane industry eg grower, haulout driver, contractor, etc and their mill area but were not asked to identify themselves. Survey forms were submitted to both the CANEGROWERS and Queensland Cane Harvesters for distribution to their members. The CANEGROWERS distributed the survey questionnaire via their regional offices while the Queensland Caneharvesters chose to distribute the survey questionnaire with their monthly newsletter. The researchers used industry meetings such as the Queensland Cane Harvesters post-harvest Industry Forums to explain the purpose of the survey. As with all information seeking surveys, some harvester operators and growers were unsure of how the data could be used and hence openly expressed a desire not to participate. This unease of growers and harvesting contractors with relation to transport matters was noticed at several meetings and was thought to be due to a poor understanding of the legislation governing cane transportation.

The survey form, see Appendix A.1, was designed to be folded after completion, stapled and mailed, postage paid, to BSES Bundaberg. Response to the survey was voluntary and there was no follow up of survey recipients to ensure forms were returned. However, over 5% of the forms were returned which exceeded the standard return rate of 2% for this type of survey. The number of responses was quite uniform on a regional basis with 28 from the northern region, 30 from the Burdekin region, 39 from the central region and 39 from the southern region. An analysis of the survey data is given in Appendix E.

7.0 CONCLUSIONS AND BENEFITS TO THE INDUSTRY

This project has successfully identified the key issues affecting road and in-field transportation of sugarcane. A survey of canegrowers and cane harvesters has enabled the researchers to confirm their assessment of the current and future needs of road and in-field cane haulage. Discussions with all stakeholders have resulted in a better understanding of the current and future problems facing sugarcane haulage. An important result from this project is the improved communication between legislators, researchers, industry bodies, haulout manufacturers, component suppliers and the users of sugarcane haulage equipment. The issue of highest priority identified was the inability of current legislation to adequately cover the types of haulout used to transport sugarcane in Queensland.

This project has greatly exceeded its initial objectives as not only has it created an environment for understanding and cooperation, but it has also initiated proposals that will

resolve one of the major impediments to the future development of sugarcane haulage. Using a consultative process, the researchers developed a draft proposal to amend the operating loads and speeds for cane haulage equipment. This draft proposal was forwarded to Queensland Transport on behalf of the sugar industry.

As a result of this action, a draft policy was developed by Queensland Transport and, after minor amendment, approved by all stakeholders. The draft policy effectively produced the desired reforms although the format was significantly different to that proposed by the industry. The policy will:

- retain without change all Axle Mass Concessions and Performance Standards, as detailed in VSS .02.1/94.
- allow the maximum allowable road speed to be increased from a maximum of 40 km/h to less than 50 km/h for current haulout vehicles. Vehicles that conform to additional ADRs (Australian Design Rules) may operate at road speeds greater than 50 km/h.
- create vehicle categories for current and future in-field rigid and articulated haulage vehicles. Rigid trucks used to haul sugarcane are also described.

This policy ensures that all current vehicles built to satisfy Queensland Transport Information Bulletin Cane Bin Trailers will remain conforming. It gives the sugar industry clear guidelines for the future development of efficient sugarcane haulage vehicles which conform to all specifications of government and component suppliers. At the time of publishing this report, the policy had not been ratified by State Parliament but there appears to be no impediments to this occurrence.

This project has given researchers a better understanding of the needs of the sugarcane transport sector. This project report and an additional joint BSES and SRDC project will continue to stimulate research on in-field sugarcane haulage.

8.0 ACKNOWLEDGMENTS

The researchers sincerely thank Mr John Powell for his assistance and enthusiasm during this project. Mr Win Chappell collated and analysed all survey data. His assistance and constructive comment were greatly appreciated. The time and effort given by Dr Peter Twine, Messrs Tony Matta, Trevor Fuelling, Milton Rogers and Ian Jones was appreciated. Messrs Ross Berry and Ross Rieschieck of Queensland Transport completed the work initiated by Tony Matta. The researchers also thank Rohan Geddes for his assistance in the preparation of this report.

This research was funded in partnership by the Sugar Research and Development Corporation and the Bureau of Sugar Experiments Stations.

9.0 REFERENCE

Anon. (1994) Information Bulletin. Cane Bin Trailers. Queensland Transport,
VSS .02.6/94.

MOST COMMON

..... km



HAULOUT SPEED:	COMMONLY USED:	MAXIMUM POSSIBLE:
PUBLIC ROADS .....	..... km/h	..... km/h
FARM ROADS .....	..... km/h	..... km/h

WHAT RESTRICTS THE COMMONLY USED SPEED OF YOUR HAULOUTS?

.....
...
.....

WHAT LIMITS THE MAXIMUM SPEED OF YOUR HAULOUTS?

.....
...
.....

SUSPENSION SYSTEMS

DOES YOUR CURRENT EQUIPMENT UTILISE A SUSPENSION?

PRIME MOVER <input type="checkbox"/> YES	TRAILER <input type="checkbox"/> YES
<input type="checkbox"/> NO	<input type="checkbox"/> NO

TYPE TYPE

IS/WOULD A SUSPENSION SYSTEM (BE) USEFUL IN YOUR HAUL SITUATION?

YES NO

WHY?

.....
.....
.....

BRAKING SYSTEMS

**WHAT TYPE(S) OF BRAKES ARE CURRENTLY USED ON YOUR HAULOUTS?
(OTHER THAN TRUCKS)**

- AIR SYSTEM (TRUCK TYPE)
- DRUM OR DISC / HYDRAULIC
- OTHER (DESCRIBE)

WOULD IMPROVED BRAKES CHANGE HOW YOU OPERATE?

YES NO

WHY?

.....

.....
.....

TYRES



WHAT TYRES ARE USED ON YOUR HAULOUT?

		TYRE SIZE	PRESSURE
PRIME MOVER	(FRONT)	.....	.....
	(REAR)	.....	.....
TRAILER	(AXLE 1)	.....	.....
	(AXLE 2)	.....	.....

HOW DO YOU RATE THE WET WEATHER ABILITY OF YOUR CURRENT HAULOUT EQUIPMENT?

ADEOUATE

INADEOUATE

WHY?

.....

WHAT IS THE MAJOR REASON WHY YOU CHOSE YOUR CURRENT HAULOUT EQUIPMENT?

.....

WHAT IS THE MAJOR DEFICIENCY WITH YOUR CURRENT HAULOUT EQUIPMENT? (MAYBE SEVERAL)

.....

THE FUTURE CANE HAULOUT SYSTEM (10 YEARS TIME) SHOULD HAVE

CAPACITY	.....	TONNES
SPEED	.....	km/h
OTHER FEATURES (Wet weather performance etc)	.....
	
	

COULD THE SAFETY FEATURES OF YOUR CURRENT EQUIPMENT BE IMPROVED? (eg visibility, on-road stability)

YES

NO

IF YES, STATE HOW

.....

.....

...



ADDITIONAL COMMENTS

.....
.....
.....
.....

**SHOULD YOU WISH TO DISCUSS ANY ITEM ON THIS SURVEY, PLEASE CONTACT:
BRIAN ROBOTHAM PHONE (071) 59 3228 OR CHRIS NORRIS PHONE (070) 91 4525.**

**PLEASE FOLD, STAPLE AND RETURN BY MAIL. YOU MAY PLACE SURVEY FORM IN
AN ENVELOPE AND SEND TO THE BELOW ADDRESS.**

THANK YOU

FOLD HERE

FOLD HERE

No postage stamp required
if posted in Australia



STAPLE

**REPLY PAID RP 144
CANE TRANSPORT SURVEY
PO BOX 651
BUNDABERG 4670**

STAPLE

FOLD HERE

FOLD HERE

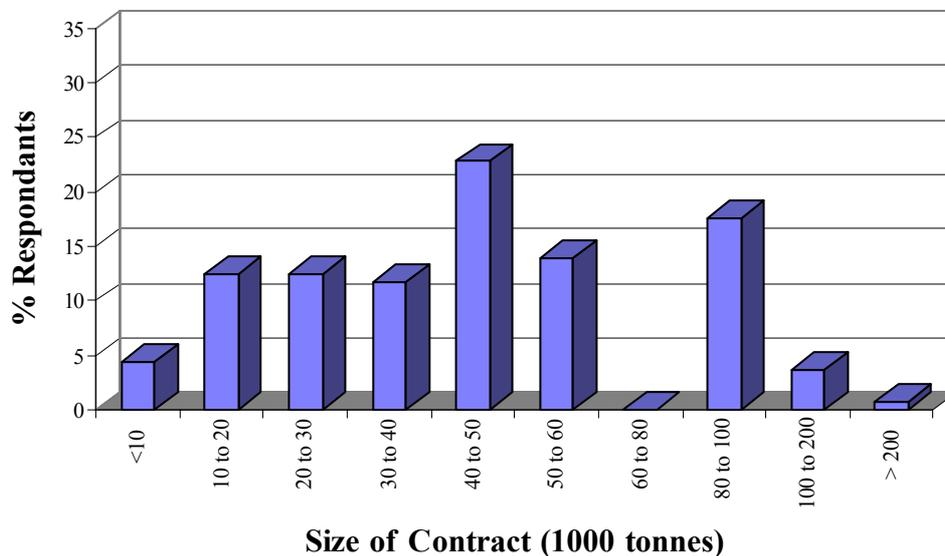
APPENDIX B

Survey Results

The researchers chose a voluntary return by mail method for the survey forms. There was no follow up to ensure forms were returned. It was interesting to note that although respondents were not asked to identify themselves, several names and addresses were placed on the survey form, in case additional information was required.

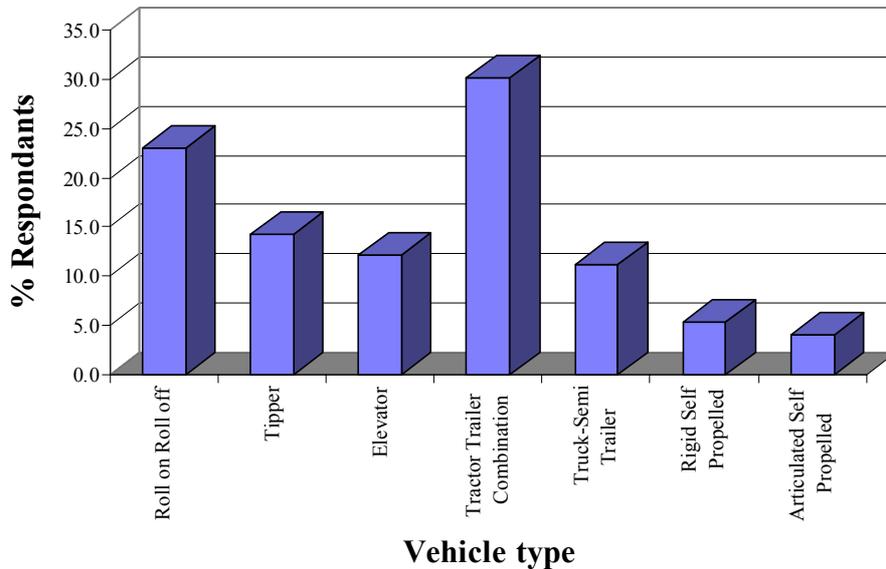
The two industry organisations, CANEGROWER and Queensland Caneharvesters, used different methods to distribute survey forms but as all responses were pooled, the effectiveness of the distribution methods cannot be determined. All sugarcane growing regions had similar representation with 28 responses from the Northern region, 30 responses from the Burdekin, 39 responses from the Central region and 39 from the Southern region. This survey produces a broad view of in-field sugarcane transportation as perceived by growers, haulout equipment operators and harvesting contractors. Within this group, views on issues such as operating speed, safety may have differed and no attempt has been made to separate the opinions of different stakeholders.

Graph 1 - Harvest group contract sizes of the survey respondents



The survey covered a range of harvesting group sizes as shown in Graph 1. The smaller groups typically used roll-on/roll-off and small (6-8 tonne) tipping bins while the larger groups had mainly elevating and tipping bins of 10-12 tonnes capacities.

Graph 2 - Types of haulout vehicle used by survey respondents



The older style roll-on/roll-off units were the second largest group recorded in the survey. Tractor trailer combinations included the older style units typified by the open cab two wheel drive tractor and the newer units with modern four wheel drive tractors with cane capacities of 12 tonnes and greater.

**Table 1
Haulout and mill bin sizes - present and future**

Present bin size			Future bin size	
size (tonnes)	haulout % response	mill % response	size (tonnes)	% response
<5	17	35	<10	7
5 – 7	30	42	10 – 13	53
7 – 9	22	2	12 – 16	21
9 – 11	17	11	15 – 21	16
11 – 15	11	0	20 – 31	3
15 – 27	3	10		

In the survey, the sizes of present in-field haulage bins and mill transport bin were recorded. As expected, most mill bins were in the 4 to 6 tonne size range although some larger bins and multi-lift bins are present.

The most popular bin size for the future (10 years hence) was a 12 tonne capacity bin. This bin size was seen as a good compromise between load capacity and in-field mobility. A significant number of respondents (40%) indicated that a bin capacity greater than 12 tonne was required. If in-field haulout bins of greater than 12 tonne capacities are to be developed, good communication must occur between designers, regulators, users and crop production researchers to ensure the resultant equipment is appropriate to the sugarcane production industry.

Table 2
Haulout operating speeds – current and future

On public roads		Speed in 10 years (no trucks/semi-trailers)	
speed km/h	% response	speed km/h	% response
<15	0	<20	7
15 - 20	5	21 – 40	28
20 - 25	13	41 – 60	23
25 - 30	9	61 – 80	13
30 - 40	30	81 – 101	5
40 - 50	26		
50 - 101	33		

Current haulout speeds used on public roads often exceeded the allowable limit of 40 km/h. The majority of farm travel of haulouts (68%) is at speeds of 40 km/h or less. Survey results were only just in favour (54%) of increasing the allowable speed limit. Subsequent discussions with several harvesting contractors indicated that uncertainty as to whether additional regulations would accompany increased operating speeds was the reason for caution in requesting a higher speed limit.

When asked what limited the operating speed of the haulout vehicle, the most common reason (68%) was rough headlands in the field. While machine design may reduce the effects of rough headlands, it is interesting to note that the greatest single factor limiting haulout speed is not directly machine related. Other factors limiting haulout speed given in the survey were the use of an under-powered prime mover (tractor) and the presence of other vehicular traffic (safety related).

Many of the newer haulout units are using air-braking systems but there are still a large number of units with hydraulic brakes (63% of responses). Respondents strongly believed that braking systems currently used on sugarcane haulouts were adequate. Subsequent haulout braking tests conducted by Queensland Transport and BSES officers supported this view. Officers from Queensland Transport favour the more efficient air braking systems and an increase in usage of this system is considered desirable. The use of air braking systems on haulout vehicles will satisfy ADR requirements of the proposed Queensland Transport draft policy.

The vehicle suspension systems are becoming more common on cane haulage vehicles but there are still a large number of older style tractors and trailers in use. Suspension systems were used on 32% of prime movers (primarily tractors) and 37% of trailers surveyed. As there was no way of determining age of the haulout, an increasing use of suspension on cane haulouts could not be quantified. The researchers were surprised that only 55% of respondents felt a suspension system was useful as many haulout operators cite poor vehicle ride as an undesirable machine attribute. The survey included large number of smaller haulout units that operated on short haul distances. The researchers believe efficient suspension systems are more desirable as haulout speeds and loads increases.

Two thirds of the respondents stated the safety of their haulout equipment could not be improved. It is not possible to draw any conclusions from a single survey question but observations by the researchers indicate haulout safety ie lighting, couplings, safety chains, etc is of a high standard.

The majority of respondents (75%) believed their wet weather harvesting equipment was adequate. Should more data be collected on this subject, it would be useful to partition the responses of growers from those of the harvesting contractors. Haulout equipment may have the capability to remove the crop from the field under wet conditions but damage to the subsequent ratoon may still be unacceptable. This survey was conducted during the 1996 sugarcane harvest which had average to dry field conditions during this period. The survey responses with respect to wet weather harvesting equipment may have been significantly different during a wet harvesting period.

APPENDIX C

The researchers developed this draft proposal after consultation with all stakeholders. Submission of the draft proposal was via the CANEGROWERS organisation. The draft proposal was submitted to Queensland Transport on 11 February 1997.

DRAFT PROPOSAL TO QUEENSLAND TRANSPORT FROM CANEGROWERS

RE: OPERATING LOADS AND SPEEDS FOR CANE HAULAGE EQUIPMENT

Recommendation

That the legislation be amended to remove the stipulation that all vehicles carrying cane must satisfy the specifications of Department of Transport, Bulletin VSS .02.6/94 (ie must have an ATM less than 20 t and speed is limited to 40 km/h), with due consideration to the proposals that:

1. concessional tyre loading and braking performance requirements remain for vehicles currently covered by this bulletin. It is anticipated this class will be gradually phased out as the haul fleet is upgraded.
- 2a. a vehicle category be created for cane haulout vehicles and includes tractor/trailer combinations, articulated units and self propelled rigid units that either have a ATM exceeding 20 t, can operate at speeds greater than 40 km/h or both of these.

This category would cover cane haul equipment which utilise:

- * axle loadings which conform with heavy vehicle specifications (with current concessions for 'road friendly' suspensions where applicable)
 - * manufacturers certification that braking performance satisfies appropriate ADR specifications
 - * approved suspension system
 - * maximum allowable speed will be specified by the manufacturer with due regard to the specifications of the tyre manufacturer and other components.
- 2b. a sub-category of the above be developed to suit vehicles fitted with high flotation agricultural tyres (maximum operation pressure 2.5 bar). The maximum load and speed ratings shall be those specified by the tyre manufacturer or the suppliers of other components.

Background

Cane Bin Bulletin VSS .02.6/94 defines criteria of a cane bin trailer and details operational concessions which were developed in conjunction with the cane industry. The concessions for these vehicles include relaxation of braking equipment requirements and an increase in load limits of tyres. The braking concession is a result of speed limitation of 40 km/hr for these vehicles and the load concessions recognise the lower road damage potential of low pressure agricultural tyres (Potter Metcalf *et al*, 1993).

Significant changes have occurred in cane transport since the original negotiations, as most recently detailed in Department of Transport Bulletin VSS .02.6/94 were negotiated. This has resulted from the industry adopting new technology and the move to larger harvesting groups to reduce costs. The newer equipment typically incorporate high flotation tyres, resulting in improved in-field trafficability due to lower ground pressures. This trend towards these specialised, high flotation vehicles is predicted to continue. Unfortunately, many new cane haul machines currently in use fall outside the specifications of the legislation as noted in VSS .02.6/94.

Discussion

The vast majority of the current cane haulout fleet fits within the specifications as defined by Department of Transport, Bulletin VSS .02.6/94, and the concessions defined within this bulletin are currently very important for the industry.

Commercial reality dictates that to maintain or further reduce cane transportation costs, future equipment must increase in operating speed (during all components of the operating cycle), increase the payload capacity and further improve performance in wet field conditions. The evolutionary developments within the industry mean that the specifications as defined by VSS .02.6/94 become less relevant to the industry, as equipment currently falling within its boundaries is upgraded and replaced.

To allow better in-field performance and higher operating speeds on rough farm roads, many new transporters are incorporating 'road friendly' (eg airbag) suspension systems. Similarly, axles and braking systems which meet all ADR requirements for on-road vehicles are being incorporated in the designs.

Due primarily to misinterpretation of the limitations (particularly the 20 t ATM and axle load concessions), and a desire to manufacture equipment to better meet the needs of the industry, many of the newer haulout units do not comply with the legislation.

It is proposed that the legislation be changed to reflect the positive changes, which are occurring within the cane transport industry. Such changes would:

1. allow for the continued use of vehicles which fully comply with VSS .02.6/94, with all concessions being retained.

- 2a. remove the requirement that all vehicles (except trucks) used for the transport of sugarcane be required to comply with VSS .02.6/94. This will then allow the continued development of specialist cane haulout equipment with better road safety. These vehicles may be considered to integrate on-road and field abilities, and are distinct from the vehicles defined in Bulletin VSS .02.6/94 which are field vehicles with concessions to allow for on-road usage.

Specifications of this would include:

- * an approved suspension system.
 - * axle loadings which conform with heavy vehicle specifications (with current concessions for 'road friendly' suspensions where applicable), or the maximum rating of the tyre, whichever is the lesser.
 - * manufacturers certification that braking performance satisfies appropriate ADR specifications at the maximum allowable vehicle speed. This may involve physical testing of the loaded vehicle.
 - * maximum allowable speed will be specified by the manufacturer with due regard to the specifications of the tyre manufacturer and other components eg brakes.
- 2b. a sub-category of the above be developed to suit vehicles fitted with high flotation agricultural tyres (maximum operation pressure 2.5 bar). The maximum load and speed ratings shall be those specified by the tyre manufacturer or the suppliers of other components. This is in line with the recommendations of Potter *et al*: *'Hence, in determining an appropriate load for this tyre (23.1*26, and similar agricultural flotation tyres), it appears that the major constraint is the manufacturers safe load for a specific tyre in the particular operating conditions'*.

Summary

Analysis of the cane haulout sector has shown significant gains can be made through the use of increased operating speeds and/or increased loadings. The sugar industry will evolve towards the use of fewer haulout vehicles capable of higher speeds and able to carry greater loads. The use of modern dedicated haulage vehicles will result in safer roads during the sugarcane harvest period, and improved efficiencies for the industry.

Some legislative changes are required. It is proposed these changes will recognise the road safety advances incorporated into the designs of these machines. It is also proposed the legislation will recognise the dramatic reductions in average pavement surface stresses afforded by the use of low pressure agricultural tyres.

References

Anon (1994), *Information Bulletin*. Queensland Transport VSS .02.6/94.

APPENDIX D

This draft policy was received from Mr P R Blake, Executive Director (Land Transport and Safety), Queensland Transport on 3 July 1997.

DRAFT POLICY FOR
SUGAR CANE IN-FIELD HAULING EQUIPMENT

Vehicle Type	Less than 50 km/h	Greater than or equal to 50 km/h
Tractor	<p>Construction – Performance Standards.</p> <p>GVM/GCM - Manufacturers Rating</p> <p>Axle Mass Concession - as per current “Cane Bin Trailer” Bulletin.</p>	<p>Construction - Limited Safety related ADRs</p> <ul style="list-style-type: none"> - Suspension - Brakes - Lights <p>GVM/GCM - Manufacturers Rating</p> <p>Axle Mass Concession - as per current “Cane Bin Trailer” Bulletin (Only granted for operation from harvester to long distance transport system.)</p>
Trailer	<p><i>Operation from harvester to long distance transport system only.</i></p> <p>Construction - Performance Standards as per current “Cane Bin Trailer” Bulletin.</p> <p>ATM - 20 tonnes</p> <p>Axles - Maximum 2 Axles</p>	<p><i>Operation from harvester to long distance transport system only.</i></p> <p>Construction - ADRs</p> <p>ATM - 20 tonnes</p> <p>Axles - Maximum 2 Axles</p> <p>Axle Mass Concession - as</p>

<p>Infield Hauling Unit Rigid and Articulated</p>	<p>Axle Mass Concession - as per current "Cane Bin Trailer" Bulletin.</p> <p><i>Operation from harvester to long distance transport system only.</i></p> <p>Construction - Performance Standards</p> <p>GVM - 30 Tonne</p> <p>Axles - Maximum 3</p> <p>Axle Mass Concession - as per "Cane Bin Trailer" Bulletin</p>	<p>per current "Cane Bin Trailer" Bulletin.</p> <p><i>*Long haul trailers - No Concession permitted</i></p> <p>Operation from harvester to long distance transport system only.</p> <p>Construction - limited Safety related ADRs</p> <ul style="list-style-type: none"> - Suspension - Brakes - Lights <p>GVM - 30 Tonne</p> <p>Axles – Maximum 3</p> <p>Axle Mass Concession - as per "Cane Bin Trailer" Bulletin</p>
<p>Rigid Trucks (Conforming Vehicle)</p>	<p>N/A</p>	<p>Axle Mass concession could be permitted.</p>

- Tandem axle groups are limited to 20 Tonnes for the group.
- Single axle trailers only are concession mass up to 11 Tonnes with suitable tyres.
- The extreme axle spacing must meet the requirements and as outlined in Mass Limits for Heavy Vehicles in Queensland.

ADR - Australian Design Rules

GVM - Gross Vehicle Mass

GCM - Gross Combination Mass

GTM - Gross Trailer Mass

APPENDIX E

Publications Arising from the Cane Haulout Survey

E1. Caneharvesters Magazine Publications

- | | |
|-------------------------------------|-------------------------|
| E1.1. December 1996 Edition: | Cane Transport Research |
| E1.2. February 1997 Edition: | Transport Update |
| E1.3. April 1997 Edition: | Haulout Survey Results |

E2. CANEGROWERS Magazine Publications

- | | |
|---------------------------------------|------------------------------------|
| E2.1. 9 December 1996 Edition: | Standard transport rules on way |
| E2.2. 30 June 1997 Edition: | Qld transport confirms farm policy |
| E2.3. 14 July 1997 Edition: | Cane haulout policy is reviewed |