

**Charles Ife Pty Ltd and Industry Research and  
Development Board [1995] AATA 224; (1995) 95 ATC  
2149 (11 August 1995)**

**ADMINISTRATIVE APPEALS TRIBUNAL**

**CHARLES IFE PTY LTD v. INDUSTRY RESEARCH AND  
DEVELOPMENT  
BOARD**

No. V94/164

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Research and Development  
(1995) 95 ATC 2149

**COURT**

ADMINISTRATIVE APPEALS TRIBUNAL

GENERAL ADMINISTRATIVE DIVISION

G.L. McDONALD (Deputy President), D.L. ELSUM (Member) AND R.C.

GILLHAM

(Member)

**CATCHWORDS**

Research and Development - processing of effluent from piggery - use of by-products - whether total waste management system developed by the applicant qualifies as "research and development"

**Industry Research and Development Act 1986** ss.22(1), (1A), 39L

Income Tax Assessment Act 1936 s.73B(1), (2)

**HEARING**

MELBOURNE, 18-21 and 26 April and 2 May 1995

11:8:1995

Counsel for the applicant: Mr T. Murphy

Solicitor for the applicant: Mr A. Blogg, Aitken Walker Strahan

Counsel for the respondent: Mr C. Gunst

Solicitor for the respondent: Ms L. Haigh, Australian Government  
Solicitor

## **ORDER**

The Tribunal varies the decision taken on 3 February 1994, affirmed on review of 4 August 1993, and remits the matter to the respondent with a direction that Area 2, Area 3 (excluding the gas scrubbing tower and the co-generation system) and Area 4 meet the definition of research and development for the purposes of sub-section 73B(1) of the Income Tax Assessment Act 1936 and otherwise affirms the decision under review.

## **DECISION**

G.L. McDONALD, D.L. ELSUM AND R.C. GILLHAM The respondent, the **Industry** Research and Development Board ("the IRDB"), has the power under section 39L of the **Industry Research and Development Act 1986** ("the IR and D Act") to make determinations as to the eligibility of research and development ("R and D") activities as defined in sub-section 73B(1) of the Income Tax Assessment Act 1936 ("the ITA Act") and to issue certificates to the Commissioner of Taxation in respect of those activities.

2. The Tax Concession Committee of the IRDB ("the TCC") is a committee established pursuant to section 22(1) of the IR and D Act and exercises a delegation from the respondent pursuant to section 22(1A) to determine tax concession eligibility issues on behalf of the respondent.

3. The applicant, **Charles IFE Pty Ltd**, seeks review of a decision taken on 3 February 1994, by the TCC as delegate of the respondent affirming its decision of 4 August 1993 that, whereas the activities known as Area 1 - front end collection system and grit removal ("Area 1") met the definition of R and D in the ITA Act, those known as Area 2 - European designed anaerobic digester system with design adaptations to suit Australian conditions ("Area 2"), Area 3 - development of gas purification methods using gas scrubber ("Area 3") and Area 4 - evaluation of the by-products of the digester for suitability as fertiliser ("Area 4") did not. The reasons given for the decision were that:

- " a) the projects demonstrate insufficient innovation, systematic experimental activity or generation of new product or process to satisfy the definition of research and development in Section 73B(1) of the Income Tax Assessment Act 1936.
- b) contractual arrangements that have been witnessed by the Committee indicate that the dominant purpose of the project was to purchase and install an item of plant for commercial purposes."

Sub-section 73B(1) and sub-section 73B(2) of the ITA Act relevantly read:

" 73B (1) In this section, unless the contrary intention appears-  
'research and development activities' means -  
(a) systematic, investigative or experimental activities that -  
(i) are carried on in Australia or in an external Territory;  
(ii) involve innovation or technical risk; and  
(iii) are carried on for the purpose -  
(A) of acquiring new knowledge (whether or not that knowledge  
will have a specific practical application); or  
(B) creating new or improved materials, products, devices,  
processes or services; or  
(b) other activities that -  
(i) are carried on in Australia or in an external Territory; and  
(ii) are carried on for a purpose directly related to the  
carrying on of activities of the kind referred to in paragraph  
(a); . . . ."

" 73B (2) For the purposes of the definition of 'research and  
development activities' in subsection (1), activities that are  
carried on by way of -  
(a) market research, market testing or market development, or sales  
promotion (including consumer surveys);  
(b) quality control;  
. . .  
(d) the making of cosmetic modifications or stylistic changes to  
products, processes or production methods;  
shall be taken not to be systematic, investigative or experimental  
activities."

4. At the hearing, the applicant was represented by Mr T. Murphy, of counsel, with Ms M. Barker, of counsel. The following witnesses gave oral evidence on behalf of the applicant:

Mr M.J. Charles, the managing director of the applicant company, who has had an interest and worked in the pig farming industry since the 1950s. He commenced operating **Charles IFE Pty Ltd** at Berrybank Farm in 1967. "IFE" stands for "Integrated Farm Enterprises". He is, and has been throughout his career, an active member in a number of bodies connected with the Australian pig industry. He has lectured and given presentations in Australia and Taiwan on a variety of pig farming topics. In paragraph 15 of his witness statement, he describes Berrybank as "a model farm" which attracts up to 500 visitors, who have an interest in pig farming, to view its operations annually.

Mr S.M.W. Charles is Mr M.J. Charles's son and is a building and waste management consultant. He holds degrees in planning and design as well as building from The University of Melbourne.

Both Mr M.J. and Mr S.M.W. Charles have been deeply involved with all stages of the project the subject of these proceedings.

Mr H.R. Mendelsohn has a background in chemical engineering and has been practising as a project management and energy consultant.

Dr P. Andreoli is an agricultural scientist with a doctorate in agricultural science from Perugia University, Italy. In his witness statement (exh F, p.1) Dr Andreoli sets out the following areas of specialisation:

- (a) agronomy and land use planning;
- (b) agricultural engineering;
- (c) natural resources development (which includes the development of organic fertilisers);
- (d) anaerobic digestion technologies;
- (e) soil rehabilitation; and
- (f) irrigation systems.

Since February 1992, he has been a director of his family company, Bio-Resources Australia Pty. Ltd. He has been involved in R and D of alternative energy systems, waste management and recycling since the late 1960s, and in the development of anaerobic digesters since the late 1970s. He has worked in Italy, Papua New Guinea, China and Australia.

Mr I.G. Farran is an agricultural engineer with extensive experience in the poultry and piggery industries, including working for the Victorian Department of Agriculture (in piggery research), as a director of the Pig Research and Development Corporation, as well as in private enterprise both as a manager and a consultant to pig and poultry farms.

Dr M.J. Ginnivan is an agricultural scientist who is currently the general manager of Bunge Meat Industries ("Bunge"). Dr Ginnivan holds a doctorate of philosophy from the University of Newcastle upon Tyne (UK) on the topic of waste treatment piggery effluent. Bunge, with which Dr Ginnivan has been associated since 1982, operates the largest piggery in Australia.

Dr M.A. Connor is a senior lecturer in chemical engineering at the Chemical Engineering Department of The University of Melbourne.

His principal area of study has been in the environmental engineering area including the biological treatment of liquid wastes, the treatment and disposal of solid waste and the design of air pollution control equipment.

Dr E. Vincenti, who gave evidence by telephone from Italy and through an interpreter, is a civil engineer and is president of Societa Politecnica Italiana SrL ("SPI"), a company which operates the business of supplying agricultural and engineering services, including in the area of anaerobic digesters, in Italy.

Dr E.J. Fish holds a Doctorate of Philosophy from The University of Melbourne in fluid mechanics and has carried out a post doctoral studies at the University of Grenoble, France. He is the principal in a consulting engineering practice, which, among other areas, emphasises potable and waste water treatment.

The respondent was represented by Mr C. Gunst, of counsel. Oral evidence was given on behalf of the respondent by Dr K. Singhe.

Dr Singhe is the assistant director of the registration and assessment section of the research and development tax concession branch of the Department of Industry, Science and Technology. He holds a Doctorate in Philosophy in micro-biology, a graduate diploma in public administration and has been a graduate student at the Australian National University in the School of Biology. He has completed research on micro-biology in the food industry and has lectured at Charles Sturt University in micro-biology. Between 1990 and 1991 he was a patents examiner and subsequently worked for a short time with the Environmental Protection Agency.

In addition to the documents lodged pursuant to section 37 of the Administrative Appeals Tribunal Act 1975 (exh A, pp 1-640 inclusive) witness statements were tendered by all the witnesses who gave oral evidence. A number of other documents were also tendered in evidence, including a useful chart detailing the processes involved in the operation of the applicant's anaerobic digester plant (attachment SC2 to Mr S.M.W. Charles's statement, exh B).

## BACKGROUND

5. Anaerobic digestion has been described as a versatile process for waste management and energy production, capable of utilising a wide range of organic materials, including livestock manures, sewerage sludges, municipal garbage, food processing wastes and energy crops (A.G. Lane, CSIRO, 1984). The products of a properly-conducted digestion process can be an inoffensive aqueous slurry and biogas, the latter being a mixture of methane and carbon dioxide. The methane can be used to provide fuel energy.

6. The applicant owns a property of 860 ha at Windermere, near Ballarat, Victoria. The main enterprise there, at the time of the claim, was a 1200 sow piggery, marketing over 25,000 heavy pigs annually. The traditional method, applied internationally and followed in Australia, of disposing of piggery waste, consisting of urine, faeces, pig hair and undigested (spilt) feed, is to separate the solids and dispose of them to land, and to dispose of the liquids to land directly or via lagoons which provide anaerobic and aerobic treatment.

7. The applicant proposed to run a R and D project, incorporating a digester, in parallel with the traditional method of waste disposal. The applicant claimed that there is no anaerobic digester operating on a continuous basis in a commercial Australian intensive piggery. The applicant proposed to establish a "total waste management system", whereby all of the by-products would be utilised. The biogas produced would be used in a co-generation system (co-production of electricity and heat) with surplus electricity being disposed of to the State electricity distribution grid (240/410v), the non-gaseous product of digestion would be used as a fertiliser and the water recycled.

#### THE HISTORY OF THE APPLICATION

8. On 10 November 1989 the applicant sought an Advance Ruling from the respondent as to whether a project for treating animal effluent from a piggery that would enable the products to be recycled or sold would be likely to meet the definition of R and D in the ITA Act. On 8 March 1990 the TCC formed the opinion that it would (exh A, T8), the applicant was informed of the in-principle ruling by letter dated 14 March 1990 (exh A, T9). The applicant applied for the tax concession for the years 1989/1990, 1990/1991 and 1991/1992. On 21 October 1992 the Australian Taxation Office ("ATO") requested the respondent to provide a certificate for those years.

9. In February 1993 the ATO forwarded to the respondent two agreements dated 5 April 1990 essentially between the applicant and SPI for

- (a) constructing the biodigester system; and
- (b) marketing it.

The respondent claimed not to have seen them before.

10. On 4 August 1993, based on an assessment by Dr Singhe, the respondent determined (exh A, T31) that that part of the project entitled "Development of a front end feeding system to the digester" (Area 1) met the definition of R and D but that the following activities did not, on the grounds that they contained no evidence of innovation or technical risk and (in respect of some of the activities) that they were not "systematic, investigative or experimental":

" Area 2 - build a European-designed anaerobic digester system and adapt the design to Australian conditions, materials and technology.

Area 3 - develop gas purification methods and generate electricity from this purified gas.

Area 4 - uses for the by-products, either as saleable products or recycled into integrated farming system."

The respondent also determined that the contractual arrangements indicated that the "dominant purpose" of each of the projects was to purchase and install an item of plant for commercial purposes and not for the "dominant purpose" of R and D.

11. The applicant was advised of the decision and that it may lodge a request for the IRDB to reconsider its decision under section 39S of the IR and D Act (exh A, T32), and further that in such circumstances it was the IRDB's policy to have an appeal report prepared by an assessor who has had no previous involvement in the case.

12. Following a request from the applicant for such an internal review (exh A, T35) a departmental officer (Mr Voylay) recommended in December 1993 that Area 2, 3 and 4 activities be accepted as satisfying the requirements for R and D (exh A, T50). The TCC deferred its decision for two months and during this time it requested the original assessor, Dr Singhe, to find supporting evidence for his unfavourable assessment. It requested "additional information to determine whether (the) advance ruling differs from what is currently available or whether there was any lack of disclosure any time during assessment".

13. The applicant was advised by letter dated 8 February 1994 (exh A, T62) that the IRDB had considered the applicant's appeal and had affirmed its original decision.

#### THE ISSUES

14. Mr Murphy submitted that the applicant's system was conceived as a "total waste management system for the Australian pig industry using anaerobic digestion" and not as a mere waste disposal system. He submitted that the development of the system is more than the application of scientific principles to the problems arising from the digestion of pig effluent; it is a system which was designed to achieve (and did achieve) something not achieved anywhere else in the world, namely the total utilisation of the entire effluent stream and the complete digestion of the solid portion produced by a piggery as well as the generation of sufficient electric power, not only to meet the requirements of the system, but also to provide for most of the power requirements of the whole farm and provide excess power to the State electricity distribution grid.

15. Mr Murphy contended that the features of the system which distinguish it from waste disposal systems operating in Australia are that it is both environment-friendly and neighbour-friendly, in particular, the system does not require pre-

treatment storage; it utilises all of the effluent; it digests all the solids and it generates power in excess of its own needs. He submitted that the features of the system that distinguish it from anaerobic digesters used overseas include the fact that it operates solely on pig effluent; it is shock-loaded and intermittent-loaded (that is, it can be loaded each day over 8 hours rather than continuously over the whole 24 hours, representing a significant labour cost saving), the effluent is not pre-heated; the system loads and processes all the fibre; it generates energy in excess of its own requirements; it uses significantly fewer chemicals; it may be operated at a single piggery and by piggery employees (i.e. without engineering or other professional or specialist qualifications).

16. Mr Murphy submitted that the development of the system is to be considered as a single project, all of which constitutes R and D as defined in section 73B(1)(a) of the ITA Act. Alternatively, if the development of the system is to be divided into four areas, each area constitutes R and D as defined in section 73B(1)(a) of the ITA Act. Any area, or areas, which are not found by the Tribunal to constitute R and D under the provisions of section 73B(1)(a) of the ITA Act would fall within the ambit of section 73B(1)(b), being activities carried on for a purpose directly related to the carrying on of activities which themselves constitute R and D.

17. Mr Gunst submitted that the expression "total waste management system" is unhelpful; it is relied on by the applicant to mount a suggestion that, because there has never before been such a system in Australia, the whole plant is "R and D". Mr Gunst submitted that this is fallacious. He said that, for the purpose of constituting "innovation" or "technical risk", it is not sufficient for a product to be the first of its type built by an applicant, or even the first of its type in Australia. He submitted that the contractual arrangement evidenced by the construction agreement indicates that the dominant purpose of the project was to construct an item of plant for commercial purposes, and not for the dominant purpose (or indeed any purpose) of R and D.

18. Insofar as Area 1 is concerned, Mr Gunst submitted that, despite the decision already reached by the respondent, it was open to the Tribunal in this application to say that some or all of the three parts of it are not R and D. He said that insofar as Area 2 was concerned the respondent had assessed the design adaptations claimed by the applicant in two areas, those relating to the construction of the digester and those relating to its operation. Insofar as the former is concerned, he submitted that the activities concerned are excluded from the definition of R and D by section 73B(2)(d) of the ITA Act which refers to "the making of cosmetic modifications or stylistic changes to products, processes or production methods". In the case of the latter, the claims related to: digestion of pig manure; two stage digester; fibre digestion; loading rate (i.e. "shock loading") and the use of swivel nozzles to achieve mixing in the digester. He submitted that these changes are not innovative being predictable or came with the imported technology or were developments not unique to the applicant's digester. Mr Gunst submitted that the applicant faced no

technical risk when it embarked on the project, the construction agreement guaranteeing that the biodigester would be brought to a stable gas generating state, with SPI and Dr Andreoli being required to correct any deficiencies at their own expense.

19. In the case of Area 3 Mr Gunst submitted that the applicant had said in evidence that co-generation is no longer part of the claim, having been funded by a grant from another body. The process used by the applicant is well known. The elimination of hydrogen sulphide from the biogas and its conversion to electricity is not novel and involves no technical risk. In the case of Area 4, Mr Gunst said that the nutritive value of sludge is widely accepted. There is no innovation or technical risk in determining this. The "trials" conducted by the applicant showed no evidence of scientific method and were not experimental or systematic. The determination of the economic value of the slurry for commercial exploitation is not R and D. Statements in a newspaper article attributed to Mr Melville Charles regarding the threats to the piggery as the result of environmental considerations and the difficulty of expansion confirmed that the substantial or dominant purpose was that of purchasing and installing the biodigester for use, not research. The plant was built as a full scale, operational plant, without any pilot plant or experimental plant being constructed first to gauge the likely success of a full size plant operating successfully. It had significant excess capacity, indicative of an intention to expand the piggery (which has since in fact taken place). He contended that the claimed activities were:

- . (to a certain extent) not carried on in Australia,
- . neither systematic, investigative nor experimental,
- . not carried on for the purpose of acquiring new knowledge or creating new or improved materials,
- . not supporting activities directly related to other R and D activities, and
- . in any event mere "sales promotion, quality control or cosmetic or stylistic changes to products processes or production methods".

#### THE EVIDENCE

20. The Tribunal has considered the evidence as it relates to each of the four Areas. This was not only the way in which the applicant originally submitted the claim but also provided the most convenient method for the Tribunal to approach its assessment. However, we have also considered the question of the extent by which the combination of Areas and the combination of activities constitutes R and D, and evidence on that point has also been taken into account. The Tribunal notes the submission by the applicant that "the development of the System is to be considered as a single project all of which constitutes research and development . . ." (applicant's submission of the facts, issues and contentions, para 7.1). We note

further that the applicant submits that the term "activities":

" . . . is sufficiently broad to include a whole project as well as its components and, given the purpose of the legislation should be so interpreted. Otherwise, by the application of a mosaic approach a project which, taken as a whole would meet the requirements of the section might be artificially excluded by dividing it into a large number of arbitrary projects constructed solely for the purpose of contending that each viewed separately does not qualify as research and development." (para 9)

In view of matters raised in the submissions and in evidence the Tribunal feels that it is appropriate to say at the outset that it views quality control, the commissioning of plant, and the activities which may comply with the definition of R and D as quite separate functions.

21. Mr Gunst in his submission said that:

" a large amount of the work that was done in ensuring the plant operated to its maximum efficiency, as it now does, was in my submission work in the nature of quality control . . . ."

(trans, p.582)

and

" Quality control, that is, ensuring that your system works better rather than worse, is specifically excluded . . . ." (trans, p.582)

22. Mr Murphy in a submission which appears to have been incorrectly attributed to Mr Gunst in the transcript of proceedings said:

" My learned friend raised the point of quality control. That is not something which I have addressed in my submission. We say that it is quite clearly not a case of quality control. This case is the creation of a brand new process, not the operation of an existing process, and that is different to the quality control."

(trans, pp.594-595)

23. With respect to the commissioning of the plant, at its meeting in February 1994 the TCC disagreed with the favourable recommendation of Mr Voylay. It commented that:

" (T)he activities were primarily commissioning of plant; further development was responsibility of consultant who carried financial risk." (exh A, T61, p.637)

The Tribunal is of the view that, in the present context, the above issues should be approached on the general basis that:

- (a) quality control refers to the control of the input variables of a process such that the output meets the quality specification;
- (b) commissioning refers to the bringing on-stream of a developed plant or process;
- (c) R and D refers to systematic, investigative or experimental activities involving innovation or technical risk as set out in section 73B(1)(a) or (b).

24. R and D is concerned with the development of a plant or process; subsequent to this development the plant or process is commissioned and when fully operational is subjected to quality control on a continuing basis. It is generally in the development stage that evidence of R and D necessary to satisfy the requirements of the ITA Act would be demonstrated.

25. The Tribunal has some difficulty with the implication in the TCC's decision, set out at T61, p.637 of the T documents, that the TCC had determined the relevant development to occur post-commissioning in the present case and had disqualified it on the basis that the financial risk lay with the consultant than with the applicant. Moreover, this appears not to be consistent with the approach of Dr Singhe who appears to assess the adequacy of compliance with the technical risk criterion of activities which fall, chronologically, in the development stage, although appearing to dismiss it if the risk is financial rather than technical regardless of which party bears the risk. For example, in exhibit 2 at page 5, he criticises a reference by Mr Mendelsohn to risk because it "appears to be 'financial risk' rather than 'technical risk' as required by the Act".

26. For the purpose of examining the evidence to determine whether or not the activities comply with the definition in the ITA Act, the Tribunal has used the relevant definitions of "systematic", "investigative" and "experimental" which are to be found in the New Shorter Oxford Dictionary and which are as follows:

" Systematic - arranged or conducted according to a system, plan or organized method.

Investigative - characterised by or inclined to investigation.

Experimental - based on, or derived from, or making use of experiment".

"Experiment" is defined, relevantly, as "an action or procedure undertaken to make a discovery, test a hypothesis or demonstrate a known fact".

27. Each of "systematic", "investigative" and "experimental" as used in section 73B(1) of the ITA Act are to be considered as alternatives and there is no warrant when assessing applications to require the alternatives to be combined (e.g. as suggested at one point in Dr Singhe's evidence, trans, pp.561-562).

## 1 - AREA 1 PROJECT

28. The eligibility of this part of the total project was accepted by the respondent. Mr Gunst, in his submission, said that:

"Area 1 has been accepted. There are three parts to that. It would be open to the Tribunal - because this is the hearing de novo of the decision, the decision being the one of 3 February '94, which confirmed the decision of 4 August '93 in relation to all four of these parts - it would be open to this Tribunal, as a matter of law, to say that some or all of those parts of area 1 were not research and development." (trans, pp.587-588).

Having heard the evidence the Tribunal takes no exception to the respondent's finding for the reasons it stated that Area 1 project activities were R and D in their own right.

29. Moreover, the Tribunal finds that these activities qualify as R and D for two other reasons, namely that they are an integral part of a system comprising the Area 1 project activities and the Area 2 project activities, and also that the Area 1 project activities qualify under section 73B(1)(b), being carried on for a purpose directly related to the carrying on of activities of the kind referred to in section 73B(1)(a), that is, Area 2 activities.

## 2. - AREA 2 PROJECT AND AREA 3 PROJECT

30. Two of the features claimed by the applicant as part of Area 3 (the development of gas purification methods), namely the use of stirrers to remove hydrogen sulphide (para 37.2 of the outline of applicant's submission) and the maintenance of the pH at a level which inhibits the production of hydrogen sulphide (para 37.3 supra) are physically parts of the plant or process encompassed by Area 2 (the biodigester). In paragraph 37.1 Mr Murphy lists another feature - "the addition of ferric chloride to the influent (rather than to the scrubber)". This latter activity qualifies as eligible R and D by virtue of being part of Area 1 which has been accepted.

31. In paragraph 224 of Mr Scott Charles's witness statement he states:

" The Applicant's system for scrubbing gas consists of:-

(a) The foam separator above the primary digester which scrubs hydrogen sulphide and some carbon dioxide. As the water vapour condenses it tends to fall back into the digester, counter-current to the gas which is moving upwards.

(b) The condensation traps and pipes laid on slopes to remove water.

(c) A water scrubber using counter-current flow of recycled water and the gas through a media with a large surface area which removes

hydrogen sulphide and some carbon dioxide.

(d) A dehumidifier or dryer which also removes water vapour."

The foam separator, referred to in sub-paragraph (a), is an activity which, since it deals with the biogas prior to its entering into the secondary digester, is physically part of Area 2 which the Tribunal finds, *infra*, qualifies as eligible R and D.

## 2A - AREA 2 PROJECT

32. This stage of the project consists of the primary and secondary biodigesters and ancillary equipment. The primary digester is a closed, flat-bottomed tank with a capacity of 2300m<sup>3</sup>. It receives thickened effluent with a solids content of five per cent. It is thermally insulated, and heated by hot water circulating in circumferential jackets. The contents are maintained at a temperature of 35-37 degrees C. The digester incorporates a stirring system which consists of six vertical lances arranged in a circle and projecting downwards through nozzles in the roof of the tank. They discharge compressed biogas into the contents of the digester. The stirring system also incorporates a gas lift which consists of a vertical tube running from just above the floor of the tank to just below the surface of the liquid. Gas is blown into the bottom of the tube creating large bubbles which, as they rise, assist in the extraction from the system of the minute bubbles of newly formed gas which tend to remain in suspension and in creating a motion for the purpose of mixing the contents of the digester.

33. The smaller, secondary digester is for the purpose of separating digested material from undigested material, recirculating undigested material to the primary digester, discharging the digested material and for storage of gas which is accommodated in a gas holder. The lower, tank section (which is not heated or insulated) has a capacity of 450m<sup>3</sup> and the upper gas holder section has a capacity of 350m<sup>3</sup>.

34. A vertical pipe (referred to by the applicant as a "venturi") located in the centre of the tank receives the flow of liquid from the primary digester containing digested and undigested material. The incoming flow is discharged from pipes at the top of the tube so as to impart to the stream a circular motion. Because of the lower temperature of the contents of the secondary digester a separation occurs, the digested material falling rapidly to the bottom and to the periphery of the tank, the lighter undigested material falling more slowly and being collected from the centre of the base of the tank and pumped back to the top of the primary digester for further digestion.

35. The gas generated in the primary digester is discharged into the gas holder of the secondary digester from which it is withdrawn for treatment and use.

36. The digested material is extracted as a slurry from the periphery of the secondary digester tank by means of a series of pipes with inlets at different

locations around the tank. The pipes connect to a manifold external to the tank, and the manifold is connected to the suction of a positive displacement pump.

37. In the original assessment which was the basis for the rejection of the applicant's claim the assessor, Dr Singhe, held that the activities described under the heading "design adaptations to suit Australian conditions" cannot be classed as "systematic, innovative or experimental", the object being "not to generate new knowledge but to construct the digester using locally available material". It was held that the activities do not involve "innovation or technical risk", they are activities "likely to be successfully carried out by most workmen and the outcome of the substitutions could have been predicted with a high degree of certainty". It was held that no new knowledge had been generated in the activities involved in Area 2. Mr Gunst's submissions in this regard have already been referred to.

38. The Tribunal has considered the project Area by Area and has examined the activities carried on in each Area. The Tribunal has also considered the extent to which the combination of Areas and the combination of activities constitutes to R and D. It is the applicant's contention that the whole project consisting of Areas 1, 2, 3 and 4 should be considered together. The applicant is concerned that the term "activities" can be given too narrow an interpretation. Mr Murphy said:

" Now, in the light of the proper principles of statutory interpretation, we say, first, that the term is sufficiently broad to include, as in this case, the whole project as well as to include individual components of that project. Now, if that was not the case, one could have the problem with - well, I think the technical phrase is the 'mosaicing approach'. What you do is you break down a given project into various smaller and smaller elements and, at the end of the day, you look at each of those smaller elements, and then you say - you apply the various tests and you find, well, it has all been done before in each of those smaller cases."

Mr Elsum gave the sample (example) of the computer, and I think Dr Singhe conceded that you could have research and development in the context of putting together in a novel way various items of plant, or various items of equipment or inventions or whatever else, had existed earlier." (trans, p.567)

Mr Gunst said in his submission:

" As has been pointed out in another context by the Tribunal:  
' . . . the use of existing technology to operate what is essentially an information system of the same type as that installed in a number of other industrial environments is not innovative simply because it is installed in a new environment. There must

be some development of the technology or a new use of existing technology for an activity to involve innovation.'" North Broken Hill Ltd v IRDB [1993] AATA 254; (1993) 18 AAR 177, at 191.

For the reasons set out elsewhere in this Decision, the Tribunal is satisfied that the applicant's project is not of the same type as that installed in other industrial environments.

39. It is the Tribunal's view that a project that meets the requirements of the legislation can be composed of a number of activities, any one of which may not itself meet the requirements, i.e. the project can be a mixture of activities, some of which do and some of which do not meet the legislative requirements.

40. It was contended by Mr Gunst that to a certain extent the project fails the requirement that the activities take place in Australia or in an external Territory on the basis that the applicant's consultant engineer, Dr Andreoli, went to Italy and used SPI's computer software to carry out some design calculations. It appears that this was for the purpose of the mechanical design of the basic tanks constituting the primary and secondary digester and for calculating the volume of methane that would be produced. The data used was generally available material; indeed the evidence was that a local project engineering firm had quoted to do this work in Australia. The fact that this mechanical design information was acquired overseas and not in Australia does not disqualify the project, in the Tribunal's view.

41. It was contended by the respondent that the construction contract between the applicant and SPI and the associated specification which was tendered during the hearing (exh D) demonstrated that the design of the project was being provided by SPI, and its performance guaranteed.

42. Evidence given by Mr Melville Charles, Dr Vincenti and Dr Andreoli was to the effect that the differences between an SPI biodigester and the applicant's development were so great that the parties mutually agreed to terminate their agreement. In any event, the terms of the contract, contrary to the respondent's assertion, did not provide a warranty that SPI would make the process work; it provided for some assistance to be provided and for the duration of the contract to be extended but then for the contract to be terminated. So far as the specification was concerned the applicant said that it was a composite document that had been prepared by Mr Melville Charles, Mr Ian Farran and Dr Andreoli, largely as what the Tribunal takes to be a set of draft process design objectives and not a set of commitments binding the parties. Mr Melville Charles said in evidence that the specification did not describe what the applicant was promised, but what the applicant wanted for the project. The Tribunal accepts this explanation.

43. The Tribunal took into account the language difficulty in relation to the evidence of both Dr Vincenti (who gave his evidence through an interpreter) and Dr Andreoli. We accept that the payments made by Dr Andreoli, amounting to

about \$50,000, which, according to Dr Vincenti were not received by SPI, were probably spent as indicated by Dr Andreoli, and probably, also, in defraying travel costs associated with the visit of SPI personnel to Australia. The Tribunal has no difficulty in accepting Dr Vincenti's evidence and rejects Mr Gunst's assertion that Dr Vincenti was not an honest witness.

44. The Tribunal has considered the contention by the respondent that the applicant constructed the plant, not for the purposes claimed, but because it was required to install a treatment system by the Environment Protection Authority. There is no evidence to support this as being the case. Indeed, the respondent's own assessor, Mr Voylay, made this clear in his referees' comments (exh A, T50, p.527).

45. The respondent also suggested that the failure to build a pilot plant prior to building a full scale plant was indicative that the plant was to be used for production purposes and that this was confirmed by the extra capacity which has been incorporated into the design to accommodate an expansion of the piggery. It is the Tribunal's view that the use of a plant for production purposes does not erase the R and D activities that resulted in its creation. It is common practice in designing a plant not to make the design too tight a fit for expected production levels.

46. Insofar as the question of a pilot plant is concerned if, as the applicant indicated, the purpose is to benefit the Australian piggery industry by making available a waste disposal system then it would be appropriate to develop one that did not have any latent scale-up problems; in other words, the applicant accepted additional technical risk in order to ensure a more robust, innovative product. No evidence was offered by the respondent to the effect that a smaller plant would have been feasible.

47. The respondent said in its submission that it "had assessed those design adaptations claimed by the applicant in two areas, those relating to materials used in construction of the digester and those relating to the operation of the digester . . ." . In relation to the former the respondent said in submission:

" (T)hese changes were cosmetic . . . The activities are excluded from the definition of R and D by section 73B(2)(d) of the ITA Act: '. . . the making of cosmetic modifications or stylistic changes to products, processes or production methods.'

Those claims relating to the operation of the digester were:

- . digestion of pig manure
- . two stage digester
- . fibre digestion
- . loading rate (i.e. "shock loading of the primary digester P192)

. use of swivel nozzles to achieve mixing in the digester."  
(respondent's outline of final address, p.7)

48. The respondent submitted that the changes made that related to the operation of the digester ". . . were not innovative . . ." and "The applicant, when it embarked on the project, intended that it face no technical risk . . ." by virtue of the warranty in the construction agreement. The Tribunal has already dealt with the matter of the warranty.

49. In the course of his evidence Mr Scott Charles stated that Australian pig feed contains up to 30 per cent more crude fibre than pig feeds around the world and tendered as exhibits communications from the Western Australian Department of Agriculture (exh. 36) and The Bishop Burton College, UK (exh 37). He said that, apart from the level of fibre in the pig feeds, complete digestion of the biodigester influent is not achieved in other systems as it is in the Charles system because of the time factor, the Charles system's superiority in this respect being due to its recycle system based on the so-called "venturi" heat exchanger/separator.

50. Mr Scott Charles said that other systems encounter blockages as a result of heating the incoming raw slurry by means of a conventional external heat exchanger. The applicant developed a circumferential external hot water jacket, thus avoiding this problem and also scale build-up on the heat-exchange surfaces which is a problem experienced when internal heating coils are used. Mr Scott Charles said that the problem of blocked pipes following the inclusion of fibre in the influent is not solved by using larger diameter pipes as contended by the respondent; it is solved by devising an effective stirring system.

51. He also said that there is no evidence that shock loading as practised by the applicant is used elsewhere in the world. During his evidence, he said that what the applicant was aiming at was the development of a plant that could be useful to the Australian pig industry.

52. Mr Melville Charles said in the course of giving his evidence that the design objectives of the total system included that it should require low maintenance, be economically viable, be energy positive, achieve complete digestion, add to the value of the soil, be environmentally friendly and ensure that all pig waste is disposed of within 8-10 hours, thus resulting in a clean farm.

53. He outlined the differences between the applicant's design and the SPI design, the latter's operation depending on the simultaneous loading of various effluents; not loading fibre but screening it off for separate composting; using non time-sequenced gas injection, and at the bottom of the tank, compared with programmed operation of gas injection through lances from the roof of the tank; the loading of slurry at a high solids content of five per cent continuously, compared with the applicant's shock loading procedure. He said that the programmed gas recirculation

system is a particularly important feature of the applicant's system, allowing fibre to be loaded.

54. Mr Mendlesohn in giving his evidence said that other than the plant in question, there was no successful animal waste treatment plants (and none producing energy) in Australia. He said the objective of Energy Victoria was to support a working plant, one that could be demonstrated to industry as a commercially operating entity. He said the reason Energy Victoria supported the project was because of the potential it offered for replicating the technology around Australia, piggeries having significant problems with their effluent. He said that Energy Victoria supported the entire project but had intimated that it would like to see the financial support used to develop the interface with the electricity grid.

55. In the course of giving his evidence Dr Andreoli stated that 2-stage digesters in Italy processed mixed effluents; blends of effluents being easier to digest. It is more difficult to deal with effluent from pigs only. He said that in Australia the phosphorus:nitrogen ratio is a problem; a high phosphorus content encourages the activity of the acid-forming bacteria thus lowering the pH of the digester contents.

56. He said the gas lift and the "venturi" systems were the applicant's designs, not SPI's. The SPI jets would not work on the applicant's system due to the higher viscosity of the slurry. He said that the incorporation of fibre increases the biogas production by 30 per cent and that the hydrogen sulphide content is low because the low pH (7.4) maintained helps to reduce the activity of the hydrogen sulphide-producing bacteria.

57. Dr Andreoli said that the Charles system was the cheapest and most suitable for a single farm. Internationally there is no operating plant as advanced; a Danish producer has sought to be the applicant's representative in Europe.

58. Mr Farran included in the course of giving his evidence the opinion that no-one had been able to establish an anaerobic digester for pig effluent and to keep it operating for a number of years. He said that the Charles system was not a copy; the waste feed is different, the front end is different and the insulation and thermic designs, all carried out in Australia, are different.

59. During his evidence Dr Ginnivan, general manager of the Meat Industries sector of Bunge referred to a report on the operation of a single-stage pilot digester with a volumetric capacity of 15-18 cubic metres which he had written in 1985. He said:

" . . . it was my view at the time that a 15 cubic metre plant wasn't representative of a large commercial plant and therefore, the questions of mixing, gas usage, and heat exchange, and gas recovery weren't addressed as part of our brief, and it was not accurate to

pretend that you could extrapolate the data or the system that we had at that level to a large scale commercial digester. On top of that, the day to day technical problems we had with blockages, losses of gas, etcetera, meant that we had some reservations about whether the existing system could, in fact, be scaled up exactly was (sic) it was." (trans, p.354)

He said he was not aware of any large scale digesters but "had not gone looking for them over the last six or seven years".

60. He was asked "Would there be any point in you building a huge anaerobic digester to process all your waste?" He said:

" My examination of it says no. However, I will admit the fact that Melville Charles has one worries me because he's usually fairly well attuned to what's going on, and if he thinks it's a good idea there must be something in it in terms of - proximity to feed sources would be - would be one. Sorry, that's a roundabout way of saying that. There could be, in special circumstances, justification for going to the expense of an anaerobic digester. If, for instance, you could locate your piggery next to a dairy plant that was associated with a small town, then the cost of the anaerobic digester may be offset by the fact that you could access some cheap feed. So again it's a commercial decision that needs to be made." (trans, p.363)

61. During his evidence Dr Connor expressed the view that the applicant's work was relevant to the pig industry at large. Insofar as technical risk is concerned he also said that "technical risk is the risk that whatever system you put in place is not going to perform as desired . . . anything that will result in your plant or system not performing to specification" (trans, p.369).

62. Dr Connor said that in a laboratory where careful control can be exercised over conditions, far better performance results can often be achieved than those which can be achieved on a large scale plant. Thus, it is easier to categorise the performance of a laboratory digester than a full scale digester. In going from the small scale to the large scale there is an enhanced risk of not detecting the failure until some time later.

63. Dr Fish, who has studied the literature and has visited companies which market anaerobic digester technology in Germany and France, told the Tribunal that Europe was the most advanced in the use of anaerobic digestion technology, followed by the USA, which in turn was more advanced than Australia. He regarded the applicant's system as incorporating a number of ". . . unique innovations which could not be considered a mere adaptation of existing

technology" (clause 3 of his statement, exh F). He listed the following matters, which he regarded as being of particular importance:

- . the ability to load fibre into the digester rather than screening it off
- . utilising a method of agitation of the materials so as to cope with the digestion of the fibre
- . shock loading, that is the ability to load over an 8 hour period (as distinct from 24 hour or continuous loading) without preheating and without substantial effect on gas production in a climate subject to wide variation in temperatures.

64. With respect to the establishment of a pilot plant, Dr Fish deposed in his statement (exh K) as follows:

" 2. Whilst it is possible to establish certain things in a pilot plant it is not always possible to create a successful system by simply scaling up that plant. Therefore, such scaling up always carries with it technical risk.

...

4. It is often a matter of compromise when determining whether to build a pilot plant before a full scale plant. If the plant is too small, it may not be possible to simulate the conditions of a full scale plant. Alternatively, the scale required to accurately simulate a full scale plant may be so large that it would be a waste of money to built (sic) a pilot plant before the full scale plant."

65. In the course of his evidence Dr Fish said that the applicant's gas agitation system is innovative because of the introduction of lances and timing valves, preventing formation of scum. He said that the type of gas agitation used in German plants does not break the scum. He said that he would regard technical risk "as a situation where you're making an investment in doing something and you are not certain that the outcome will satisfy that requirement . . ." and ". . . all of these designs in fact involved substantial risk on the part of the owner of this plant, that it might or might not work" (trans, p.395).

66. Dr Vincenti said in the course of his evidence which was given through an interpreter that the digester built in Australia contains essential differences from SPI designed systems. European pig feed contains a lot less fibre which, in any case, is separated and composted. When fibre is included in the raw slurry, mixing becomes very difficult. The Charles digester manages to perform a process not yet developed in Italy. The mixing system in the Charles biodigester has been brought to a level of efficiency, Dr Vincenti said, that SPI did not think was possible. The recycle system was practically invented in Australia. SPI technology was not adequate and therefore SPI cancelled the contract. The Charles system is an

integration of technologies that can be considered as new, and SPI is putting into practice some of the innovations introduced in Australia.

67. Dr Ginnivan had been involved in an experiment with a small scale (15-18 cubic metre) single stage anaerobic digester in 1985. He said that the plant achieved the aims of the experiment (to determine if anti-bacterials and anti-microbial agents given to pigs in combination with detergents adversely affected the anaerobic digestion process). While the aim of that particular experiment was very limited and did not address issues which would arise in a large commercial plant (such as questions of mixing, gas usage, heat exchange and gas recovery) it does, in the Tribunal's view, highlight limitations in cases such as the present which would attach to the building of a pilot plant.

68. The Tribunal also heard evidence regarding the disposal of piggery effluent in the United States and evidence regarding the state of development of effective operating digesters in Europe.

69. The respondent called no expert witnesses; the only witness called was Dr K. Singhe who was the original assessor and who, after the favourable assessment was made by Mr Voylay on appeal, was asked by the respondent to find supporting evidence for his unfavourable assessment.

70. While giving evidence, in answer to Mr Gunst, Dr Singhe indicated that, in his view, there was no feature, apart from the front-end system, that fits within the definition of the ITA Act, and that there is nothing that "is systematic, investigative, experimental, involving either innovation or technical risk".

71. Dr Singhe's evidence amounted to rebuttal of the evidence of the applicant and its expert witnesses, the assessment he had made and the results of a literature survey which he had performed. The Tribunal noted that a number of the applicant's witnesses also claimed to have carried out extensive literature surveys. Dr Singhe was asked whether in all the articles he had looked at he had found an article which actually dealt with a piggery of the same size as the applicant's. His answer was that he had not, because the information found in the literature is limited to research enterprises. Dr Singhe admitted that he knew of no plant in Australia similar to the applicant's.

72. The Tribunal has been more assisted by the evidence of the applicant and the expert evidence of the experienced professionals in related fields who appeared as witnesses than by the evidence of Dr Singhe.

73. Having considered all the evidence, the Tribunal finds that the activities carried on in respect of Area 2 and referred to by the respondent as relating to the operation of the digester were systematic or investigative or experimental (in this regard the Tribunal noted in particular the evidence of Mr Scott Charles and Dr

Andreoli) and involved innovation or technical risk. This finding also extends to the use of gas jets to achieve mixing in the digester, although the gas jets did not consist of swivel nozzles as asserted by the respondent, but removable lances (which could be removed easily for clearing if they became blocked) with an automatic valve sequencing system to optimise the mixing effect. In addition, the development of the system of pH adjustment by recycling liquid from the secondary digester to the primary digester, the development of the "venturi" in the secondary digester for separating the digested material from the undigested material and recycling the latter, and the hydrogen sulphide control and removal techniques also qualify as being activities which are systematic, investigative and experimental involving innovation and technical risk. Moreover, the combination of the individual activities into the whole system constituting Area 2 involved innovation and technical risk.

74. The Tribunal finds that all the activities carried on by the applicant in Area 2, exclusive of those which the respondent has termed "construction activities", either individually or in combination, were systematic, investigative or experimental activities that were carried on in Australia, involved innovation and technical risk and were carried on for the purpose of creating new or improved materials, products, devices, processes or services in accordance with section 73B(1)(a)(iii)(b) of the ITA Act and therefore qualify as R and D. The Tribunal finds that a supply of hot water to heat the primary digester and maintain the temperature of its contents at 35-37 degrees centigrade is necessary for its operation. At paragraph 83 (infra) the Tribunal finds, in its consideration of Area 3 activities, that in the absence of co-generation the unscrubbed biogas could be used as a fuel for other purposes such as steam generation including the supply of hot water to heat the primary digester. However, while the Tribunal finds that the activities involved in the development and construction of the source of the hot water required by the primary biodigester do not constitute R and D, we find that the system for conveying the hot water from its source to the heating jackets of the primary digester, including the flow and return pipelines from and to the source (for present purposes the co-generation shed), is an integral part of Area 2. Similarly, the Tribunal finds that the pressure relief system, the pipeline to the gas flare and the flare itself are integral parts of Area 2. As a consequence, the activities involved in the development and construction of these features qualify as R and D. Those activities which the respondent has termed "construction activities" qualify as R and D by virtue of being "other activities" in accordance with section 73B(1)(b)(ii) of the ITA Act.

## 2B- AREA 3 PROJECT

75. The gas scrubber (referred to by Mr Scott Charles as a water scrubber) is said to remove hydrogen sulphide and some carbon dioxide from the biogas by contacting it with recycled water.

76. Paragraph 243 of the Mr Scott Charles's witness statement indicates that the specification for the scrubbed gas calls for a concentration of carbon dioxide of less than 30 per cent (presumably by volume) and a concentration of hydrogen sulphide of less than 0.02 per cent (presumably by volume). No evidence was given as to the levels of carbon dioxide and hydrogen sulphide in the raw gas, so that no assessment of the efficiency of the gas scrubbing tower can be made.

77. In the original assessment by the respondent it was determined that biogas scrubbing and the elimination of hydrogen sulphide are well-known processes, are not innovative and involve no technical risk. In the assessment which took place on appeal the assessor held that the gas purification method does not involve innovation or technical risk.

78. The cleaning of gas by means of a water spray with the gas flowing counter-current to the water in a packed tower is a common piece of equipment. It can be designed to meet specified needs. In determining whether there are features involving innovation which would meet the definition of R and D the Tribunal finds that, given the circumstances under which the gas is collected, involving intimate contact between the gas and the liquid in the biodigester, it is likely that essential equilibrium is achieved in the distribution of hydrogen sulphide and carbon dioxide between the gas phase and the aqueous phase at the particular temperature, pressure and pH level prevailing in the system. The solubility in water of carbon dioxide is 0.14 per cent by weight at 20°C and that of hydrogen sulphide is 2.9 per cent by weight at 20°C. However, there would be some reduction in the concentration of these gases in the methane stream as a consequence of contacting it with water in the gas scrubber at a lower temperature than the 35-37°C at which the biogas is generated in the primary digester (from which, the applicant says, the largest proportion of the gas is evolved). No reduction is likely to occur as a consequence of the scrubber water being less alkaline than the contents of the digester.

79. The Tribunal's attention was not directed by the applicant to any quantitative information indicating the effectiveness of its gas scrubbing tower. In the Tribunal's view, the fact that elemental sulphur is found in the scrubber water after contacting the gas is indicative of the fact that some hydrogen sulphide is removed there, elemental sulphur being precipitated slowly from an aqueous solution of hydrogen sulphide in the presence of air. This removal of some hydrogen sulphide from the biogas is to be expected given the solubility of hydrogen sulphide in water and the lower temperature of the scrubber water compared with that of the digester.

80. Dr Andreoli said in evidence that the applicant had obtained an indication of the cost of a biogas scrubber from a Swedish organisation:

" . . . the cost was in order of \$100,000. The plant we designed - probably - I haven't got - but probably would have cost 15, maybe \$20,000 . . . ."

" Well, can we just take that Swedish system for the scrubbing of the biogas? Did that use plain water or did it use water with chemicals in it?---No. There are special sensors that analyse the characteristics for the gas instant by instant, and then introduce special chemicals at the correct condition - a solution which is used to . . . . . the gases." (trans, p.322)

81. The Tribunal finds that this reference is not relevant. There is no point in designing a fully instrumented system using chemical absorbents, with the associated high capital and operating costs, when a simple system using water is all that is necessary given the rate of flow of raw biogas to be treated, the concentration of contained hydrogen sulphide and the maximum acceptable concentration in the treated biogas having regard to its projected use. Accordingly, in the Tribunal's view no technical risk is involved in the case of the scrubbing tower.

82. Mr Scott Charles scoped various methods for the removal of hydrogen sulphide in paragraphs 216-219 of his witness statement, including the use of water. In paragraph 225 it is stated that "the Applicant's gas scrubbing system is novel because of its simplicity". In paragraph 209 Mr Charles states that "for many uses and in most small scale situations, carbon dioxide scrubbing may not be necessary". In paragraph 204 it is stated that:

" Because we are using bio-gas in engines, it is necessary to remove the hydrogen sulphide as the presence of that substance will acidify the oil and corrode the internal parts of the engines. About one-tenth of 1% by volume of hydrogen sulphide is acceptable."

Whereas the Tribunal finds that, in addition to the individual activities which themselves constitute R and D the concept of a successful total waste management system, as developed by the applicant and consisting of Area 1 and Area 2, of itself also constitutes R and D, that does not extend to include the use of biogas as a fuel for internal combustion engines, in this case driving electric generators. Moreover, it does not involve innovation, nor does it involve technical risk.

83. In the absence of co-generation the unscrubbed gas could be used as a fuel for other purposes such as steam generation including the supply of hot water to heat the primary digester. In that circumstance the removal of hydrogen sulphide would not be necessary and, as a consequence, the gas scrubbing tower would not be necessary. The Tribunal finds that the acceptance of Area 1 and Area 2 does not extend, therefore, to the gas scrubbing tower and its associated water circulation

system. The Tribunal finds that the activities involved in the construction of the gas scrubbing tower do not constitute R and D.

84. Insofar as the development of an interface system for feeding low voltage synchronous power to the State electricity distribution grid is concerned this is not now part of the claim. The Tribunal asked Mr Melville Charles:

" And the other issue, you mentioned that Energy Australia gave you a grant towards the electricity generation area; was that a grant in the sense of money or was it a grant in the sense of some technical assistance or how did it operate?---A grant in the sense of money, but we have to raise - or mention to Energy Victoria what we - we suggested an area that would be appropriate to what they were doing. It was Energy Victoria that introduced us - introduced me to Dr Andreoli and they always wanted to be part of the project. But they wanted to be part of the project that was significant to the area they're in, which is co-generation.

So their grant was given for what purpose?---For the development of the sinquiness (sic) low voltage so we could put low voltage power into the grid. And we've never claimed that, but it's certainly an R and B (sic) project.

Yes, so that is not part of this claim?---No.

No, all right. Because it does make a difference to the deductibility, that is why I was asking?---Yes, all right." (trans, p.199).

85. Recognising that the temperature of biogas leaving the primary biodigester (which operates at 35-37(C) will be above ambient much of the time it is likely that removal of condensate from the pipeline taking the gas a safe distance from the biodigester to a point of use (for present purposes the co-generation shed) would be necessary. The Tribunal finds that the condensate traps and the gas dryer should be included in the qualifying system.

86. The applicant claimed that if any activities failed to qualify as R and D they would still fall within the ambit of section 73B(1)(b) of the definition, being activities carried on for a purpose directly related to the carrying on of activities which themselves constitute R and D.

87. It is the Tribunal's view that that provision would be appropriate for activities which were in some way inputs to, or of assistance to, accepted R and D activities, in this case the activities involved in Areas 1 and 2. Since the claim associated with co-generation fails, and that associated with feeding power to the grid has been

withdrawn, the associated scrubbing system cannot be described or interpreted in this way.

88. The Tribunal finds that those aspects listed by the applicant as parts of the gas purification system and referred to as "the use of stirrers to remove hydrogen sulphide" and "the maintenance of the pH at a level to inhibit the production of hydrogen sulphide" have been considered as part of Area 2 which as a whole has been found to meet the requirements for being described as R and D.

89. Similarly, that aspect referred to as "the addition of ferric chloride to the influent (rather than to the scrubber)" has been considered as part of Area 1 which has also been found to meet the requirements for being described as R and D.

90. To avoid confusion, those three activities will be taken to constitute those aspects of Area 3 which are eligible, together with components (a), (b), (c), (d), (f) and (g) listed in paragraph 229 of Mr Scott Charles's witness statement, that is, the equipment and pipework upstream of the co-generation shed excluding the gas scrubbing tower and its associated water circulating system.

### 3 - AREA 4 PROJECT

91. According to Mr Scott Charles's witness statement, the stabilised solids extracted from the digester are in the form of a slurry produced at a rate of 25,000 litres per day. Upon analysis the slurry was found to possess fertiliser value in the form of nitrogen, phosphorus and potassium. The solids content of the slurry was found to be capable of being increased to 40 per cent by passing it through a centrifuge, although the sludge produced was difficult to handle. The efficiency of the centrifuging process was found to be improved by the addition of polyelectrolyte. Handling was found to be improved by mixing the sludge with fibrous materials such as sawdust and pine bark; coal, rock phosphate and lime could be used to absorb excess moisture.

92. Trials were conducted on the liquid slurry and on various mixtures of the centrifuged solids. Trials with cereal crops and a legume were conducted on 50 plots each measuring 1 metre by 1 metre. Small scale trials (in plastic tubs) were conducted on vegetables - radishes, spinach, carrots and tomatoes. Work was carried out in relation to pasture and lawns. One trial involved treating strips of grass 10 metres by 1 metre with various rates of application of digester slurry, centrifuged solids and centrifuged liquid. A similar test compared centrifuged sludge mixed with blood and bone and superphosphate. A larger scale trial compared pasture growth when using liquid slurry at 20,000 litres per ha with untreated areas. A further trial was conducted by the Ballarat Regional Board on the effect of a mixture of centrifuged slurry, coal, potash lime and manferra mulch on certain native plants. Mr Charles said that the trialing of the sludge as a fertiliser is continuing. In oral evidence Mr Charles agreed that the trials had not been

performed "in a greenhouse controlled environment" (trans, p.96) and that no form of statistical analysis was applied to the results (trans, p.103).

93. The applicant contended that the Area 4 activities were systematic, investigative or experimental; they were innovative because this was the first example of the large scale use of slurry and fertiliser made from fully digested pig effluent; they involved technical risks because there was uncertainty as to what the properties of the slurry and the fertiliser would be and whether it could be processed and sold commercially as a fertiliser. The purpose of the activities was the development of a new product made from totally digested pig effluent.

94. The respondent's position has been described at paragraph 18 (supra).

95. In the Tribunal's view there is no doubt that the liquid slurry product of the system comprising Area 1 and Area 2 would of necessity be disposed of to land. This fact is obvious; the nutritive value of the liquid slurry and its derivatives in relation to various crops would, if it existed, provide enhancement to the total system which the applicant envisaged creating. The Tribunal finds that the activities involved in the chemical analysis of the liquid slurry, the development of dewatered sludge and admixtures with fertilisers and neutral extenders and in the conduct of growth trials for commercial exploitation of the liquid slurry produced by the biodigester constitute R and D. The Tribunal does not accept the respondent's contention that there is a lack of sophistication in the conduct of the growth trials such as should lead to the Tribunal rejecting Area 4 as qualifying. It finds that the Area 4 activities were systematic, investigative or experimental. It accepts the applicant's contention that they involved innovation and technical risk for the reasons given in paragraph 93 (supra) and that they were carried on for the purpose of developing a new product made from totally digested pig effluent, and that this provides enhancement to the total system.

## CONCLUSION

96. The Tribunal finds that the activities involved in Area 1, Area 2, Area 4 and those parts of Area 3 which are integral parts of the process or plant of Area 1 or Area 2, that is, exclusive of the gas scrubbing tower and the co-generation system, meet the requirements for being described as R and D set out in sub-section 73B(1) of the ITA Act.

97. The Tribunal varies the decision taken on 3 February 1994 affirming the decision of 4 August 1993 and remits the matter to the respondent with a direction that Area 2, Area 3 (excluding the gas scrubbing tower and the co-generation system) and Area 4 meet the definition of R and D for the purposes of sub-section 73B(1) of the ITA Act 1936 and otherwise affirms the decision under review.