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## *I INTRODUCTION*

The silence of a clear crisp Taupo morning is broken by the whine of a helicopter engine, and the sound of rotor blades slicing through the still air. Suspended on the cargo hook beneath the helicopter is a twelve-metre length of chain to which "The Rack" equipment is attached. After startup, the pilot hovers above so the Rack frame is about five feet from the ground. The Rack master attaches the eager rider to the stainless steel frame by two shoulder straps. A parachute harness is fitted to the rider, which is attached by the static line to the Rack frame.

After the rider is attached, the Rack master informs the pilot that he is disconnecting his intercom and connecting the rider. The rider flashes a look of intense anticipation to the Rack master before the pilot performs a short vertical lift, and then climbs to a cruising altitude of 1000 feet above ground level (agl). The rider's journey consists of an aerial viewing of some of the most scenic tourist attractions in the country – the Waikato River, Huka Falls and Craters of the Moon. After eight minutes, the exhilarated passenger is brought back to the point of takeoff, and is lowered to the ground. The Rack master unhooks the rider. The pilot lands the helicopter, laying out the Rack equipment in the process. The ecstatic rider moves off to retell the adventure to her travelling companions.

New Zealand has an international reputation for the provision of extreme adventure sports. This unrivaled reputation has been heralded by jet boat rides, white water rafting, and adventure aviation. AJ Hackett's Bungy Jumping initiative has reinforced New Zealand as a travel destination to challenge even the staunchest of thrill seekers.

There is a question of what people who embark on these adventure activities expect. It is probable that people estimate the risks of an activity, but it is questionable that they perceive the actual risks of the activity. Many do however expect that there has been some certification by a regulatory body to ensure that the risk of the activity is reduced to a minimum. Many expect that the activity will be exhilarating, but safe.

This paper discusses how risk is assessed and managed in the context of adventure aviation in New Zealand. It identifies the rationale for regulation, and the domestic and international processes for determining aviation safety standards. The concept of safety at reasonable cost is defined, as is various risk analysis models. The potential for conflict between the regulator and the regulated is discussed in the context of the Rack activity, as are the difficulties of objective risk quantification.

## II SAFETY & RISK

In the strict meaning of the word, "safety" is the freedom from danger or risks.<sup>1</sup> This means that an activity is either safe or unsafe. There are no degrees of safety. Flying can never be safe. The very nature of the activity means that there are a number of inherent risks that are not capable of elimination. "Safety" in aviation has been given a broader meaning, which encompasses "the avoidance of danger by the identification and control of risks according to *preconceived parameters*".<sup>2</sup> The preconceived parameters are appropriate limits against which inherent risk factors can be assessed in order to determine an acceptable level of safety. Preconceived parameters include Civil Aviation Rules, industry standards and aircraft manuals. In ordinary usage however, society uses the word "safety" synonymously with risk.

Risk is the chancing of a negative outcome.<sup>3</sup> It is variable and can be plotted on a continuum. The defining components of a risk equation are the chance of the event occurring, and the negativity of the consequence.<sup>4</sup> To quantify risk, both of the components need to be measured and multiplied together. The term "risk" however, is commonly used to describe either one of the components in isolation of the other. The risk of an accident for example is commonly estimated in terms of either the

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<sup>1</sup> Della Thompson (ed) *The Concise Oxford Dictionary* (9 ed, Clarendon, Oxford, 1995).

<sup>2</sup> Barry Payne *Rack Operations Seminar to The Civil Aviation Authority* (Aviation Network, Timaru, 31/12/1998) 3.

<sup>3</sup> N Resher *Risk- A Philosophical Introduction to the Theory of Risk Evaluation and Management*. (University Press, New York, 1983) 5.

<sup>4</sup> Above n 3, 5.

potential consequence, being injury or death, or the probability of the accident occurring, perhaps one chance in ten thousand.

The identification of the possible outcomes of certain courses of action or decisions is the subject of risk analysis, whereas risk assessment is the estimation of probabilities and the gravity of the consequences.<sup>5</sup> Risk management is an encompassing term, which involves the identification, assessment, and control of risk factors. The aim of risk management is to reduce the probability of a perceived event occurring, or in the event of an occurrence, to minimise the damage, harm or inconvenience to the entity concerned.

Although risk can be objectively calculated, the acceptance of risk is subjective. In the context of adventure activities, some may accept the risk because the act of it's self is rewarding. The thrill may be worth the risk. For others the activity may provoke fear and would not be worth the risk. Others may choose to accept a substantial risk because of the potential benefit of the outcome. This is evident in emergency situations when people jeopardise their own safety to rescue someone else.<sup>6</sup>

Although people tend to analyse and estimate the risks of a particular activity before they embark on it, there is a concern that without specialist knowledge, people are not accurately assessing the risk of aircraft transportation. Perceptions of risk are affected by the sensationalisation of aircraft accidents by the news media.<sup>7</sup> These adverse perceptions are factored into an individual's calculation of the potential risks and benefits of flying. The proper identification of risk in aviation requires specialist

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<sup>5</sup> N Resher *Risk- A Philosophical Introduction to the Theory of Risk Evaluation and Management* (University Press, New York, 1983) 5.

<sup>6</sup> James W Semanski *Rack Operations* Technical Opinion to the Civil Aviation Authority (20/8/1999) 2.

<sup>7</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 8.

expertise that many people do not possess.<sup>8</sup> Consequently, the decision to accept or reject risk may be based on unfounded assumptions.

### III RESPONSIBILITY FOR AVIATION SAFETY

Aviation is regulated for the primary purpose of protecting people that are carried by air, and those persons or property that are exposed to the dangers of aviation.<sup>9</sup> As the general public cannot accurately determine the risk in aviation activities, the responsibility to assess and manage risk in the public interest ultimately falls on the State.

A purpose of the Civil Aviation Act 1990 (the Act) is to establish "divisions of responsibility within the New Zealand civil aviation system in order to promote aviation safety."<sup>10</sup> Under the Act, the Ministry of Transport, headed by the Minister of Transport, has the primary authority for regulating civil aviation in New Zealand.<sup>11</sup> The Minister delegates functions and powers to the Civil Aviation Authority (CAA) established under the Act.<sup>12</sup> Management of the civil aviation system in New Zealand is principally carried out by the CAA. The responsibility for aviation safety is however shared by the aviation operators. The operator is responsible for the safe conduct of their operations, and to ensure compliance with the law.<sup>13</sup>

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<sup>8</sup> Barry Payne *Rack Operations Seminar to The Civil Aviation Authority* (Aviation Network, Timaru, 31/12/1998) 2.

<sup>9</sup> Barry Payne *Rack Operations Seminar to The Civil Aviation Authority* (Aviation Network, Timaru, 31/12/1998) 7.

<sup>10</sup> Civil Aviation Act 1990, s1.

<sup>11</sup> *The Laws of New Zealand* (Butterworths, Wellington, 1992) vol 1, Aviation, para 29.

<sup>12</sup> Above n 10, s5.

<sup>13</sup> Civil Aviation Act 1990, s12.

#### IV SAFETY STANDARDS

##### A International Regulation of Safety

Many of the safety requirements prescribed in New Zealand aviation legislation are determined in an international forum by the collective expertise of aircraft manufacturers, aviators, and safety administrators.

The International Civil Aviation Organisation (the ICAO) was established under article 43 of the Chicago Convention 1944 (the Convention). The purpose of the ICAO is to facilitate the safe and orderly operation of international civil aviation.<sup>14</sup> In performing this function the ICAO draft technical legislation, which is formally adopted by the Council of the ICAO as Annexes to the Convention. The contracting states are not bound to adopt the annexes to the Convention. Although the standards and recommended practices apply strictly to international civil aviation, most contracting states adopt the provisions for both domestic and international aviation.<sup>15</sup>

The annexes introduce international *standards* and *recommended practices* (SARPS). A standard is any specification, the uniform observance of which is seen as *necessary* to improve or promote some aspect of international aviation, and has been adopted by the ICAO Council. The non-compliance of standards by contracting states must be reported to the ICAO. A recommended practice is any specification adopted by the Council, the observance of which has been recognized as a *desirable* practice to improve or promote international aviation safety. Contracting states endeavour to conform to the recommended practices.<sup>16</sup>

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<sup>14</sup> Convention on International Civil Aviation (Chicago, 7 December 1944; 15 UNTS 295; Cmd 8742) preamble.

<sup>15</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 15.

<sup>16</sup> T Buergenthal *Law Making in the International Civil Aviation Organisation* (Syracuse University Press, New York, 1969) 61.



## **B Domestic Regulation of Safety**

As New Zealand is a signatory to the Convention, it is the role of the executive to adopt and incorporate appropriate annexes or amendments into aviation legislation. This is achieved by drafting compatible provisions into rules or regulations under the authority of the Act. The rule making powers under the Act fall on the Minister of Transport and the Director of the CAA.<sup>17</sup>

Section 33(1)(a) of the Act requires that rules shall not be inconsistent with the ICAO standards to the extent that they have been adopted by New Zealand. Section 33(2)(a) states that the recommended practices shall be given such weight as considered appropriate by the Minister, or by the Director when making emergency rules.

## **V JAMES REASON MODEL**

Over fifty years have passed since the introduction of the ICAO structure. Not surprisingly, further advances in risk assessment and analysis have started to erode the somewhat outdated approach to risk management. Traditionally, air safety experts have been strongly focused on the management of the active failures in aircraft accidents and incidents. The concern has been the sequence of events directly preceding the occurrence. There has been less emphasis and research conducted on the impact of organisational malfunctions in risk management.

James Reason has developed a conceptual and theoretical approach to the safety of large complex socio-technical systems such as aviation.<sup>18</sup> The model has been effected into corporate safety plans by Shell, British Rail, British Airways

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<sup>17</sup> Civil Aviation Act 1990, s32.

<sup>18</sup> Rob Lee *New Directions in Safety* update of *Transport Safety... at what cost?* Conference of the Chartered Institute of Transport (Brisbane, 8/1993) 6.

Engineering, and Singapore Airlines.<sup>19</sup> The ICAO has recommended that the model be adopted to aid compliance with Annex 13 of the Convention, which requires organisational and management information to be formally addressed in accident and incident reports.<sup>20</sup>

The Reason Model is multidimensional. It is based on the premise that a "total systems" approach to safety be adopted. Reason argues that modern aircraft have been developed to such a high standard of technical and procedural sophistication that the risks of single failures, either human or mechanical, are somewhat reduced. It is further asserted that aircraft accidents are more likely to result from *organisational* failures. Organisational accidents result from the combination of latent and active failures combined with local triggering events.<sup>21</sup>

*Active failures* are errors or violations which have an immediate adverse effect. These are usually attributed to the actions of front line operators such as pilots, cabin crew and air traffic controllers. *Latent failures* are distinguishable from active failures in that they are generally present before the onset of a recognisable accident sequence. They are "most likely to be generated by people whose activities are removed in both time and space from the direct human-machine interface: designers, high-level decision makers, regulators, line managers."<sup>22</sup> Latent failures are fallible decisions or actions, which may not be evident until they combine with active failures and triggering factors, such as technical faults or atypical environmental conditions, which breach the system's defences.<sup>23</sup>

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<sup>19</sup> Rob Lee *New Directions in Safety* update of *Transport Safety... at what cost?* Conference of the Chartered Institute of Transport (Brisbane, 8/1993) 7.

<sup>20</sup> Above n 19, 7.

<sup>21</sup> Above n 19, 8.

<sup>22</sup> Above n 19, 7.

<sup>23</sup> Rob Lee *New Directions in Safety* update of *Transport Safety... at what cost?* Conference of the Chartered Institute of Transport (Brisbane, 8/1993) 7.

*Defences* are measures, such as flight rules, navigation aids and equipment put in place to avoid adverse outcomes.<sup>24</sup> An *active defence failure* is an instance where an adequate defence is bypassed or defeated by the actions of a person or persons. A *latent defence failure* is a preexisting weakness in the defence mechanism. A *technical breakdown* is another category of defence failure, which may result from either or both active and latent failures. A *recovery measure* is a special type of defence, in that it is the last level of protection. The system has already become unsafe when a recovery measure is invoked. An accident or incident is not generally the result of the failure of one defence, but a combination of failed defences.

It is suggested by Reason that large socio-technical organisations contain *general failure types* (GFTs). Examples of GFTs include inadequate defences, poor training, and inadequate regulations. Active failures can be seen as *tokens* of general failure types. If for example an organisation has a number of seemingly unrelated accidents or incidents, the active failures may be a token, or an indicator, of an underlying general failure such as poor procedures within an organisation.

The Reason model identifies a number of stages of which may contribute to an adverse consequence. In the first stage, a fallible decision may be made by a decision maker. Secondly, there may be line management deficiencies, an example of which may be transpiring the fallible decision into policy. Thirdly, the preconditions are identified, which are the psychological precursors of unsafe acts. Preconditions constitute the organisational climate. The fourth stage is the unsafe act or acts, which are generally performed by people at the front line of the operation. The fifth stage is the failure of defences, or the inadequacy of defences. After the defences have been breached, a limited window of accident opportunity opens, and if combined with triggering circumstances leads to a system failure, which results in an accident or incident.<sup>25</sup>

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<sup>24</sup> Rob Lee *New Directions in Safety* update of *Transport Safety... at what cost?* Conference of the Chartered Institute of Transport (Brisbane, 8/1993) 7.

<sup>25</sup> Civil Aviation Authority *James Reason Model Seminar* (Wellington, 1998).

The following illustration demonstrates the stages of a system failure. A decision maker in a company may make the decision to under cut their competitors in the provision of passenger air transport services regardless of the financial implications. This may be translated into policy. Consequently, the organisational climate may develop to the extent where staff feel pressured to save money, and therefore cut corners. This transpires into unsafe acts, such as sub-standard maintenance procedures. When the final inspection of the maintenance is not carried out, a defence is breached, and the window of accident opportunity has opened.

Rob Lee states that the greatest variable in the safety of operations is not necessarily the equipment or category of the operation, but rather the nature of the safety systems and the dynamics within the organisation. Lee suggests that the real challenge in aviation safety is to monitor the organisational health of participants in the aviation industry in order to detect deficiencies, rather than identifying defects after an accident or incident occurs.<sup>26</sup> Latent failures should be addressed before an occurrence rather than after an accident, which has a potentially high social and economic cost.

#### A *Internal Quality Assurance*

New Zealand has followed an approach similar to that of James Reason. More emphasis is now placed on monitoring the organisational processes and management structure within aviation organizations. As a consequence of the Swedavia-McGregor report,<sup>27</sup> regulatory emphasis has shifted from an interventionist approach to a more passive monitoring approach. Previously the CAA provided an external quality control through the process of intervention and inspection. Inspections and audits often only provided a snap shot of an organisation's activities, which made it difficult to identify the underlying causal factors of failures.<sup>28</sup>

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<sup>26</sup> Rob Lee *New Directions in Safety* update of *Transport Safety... at what cost?* Conference of the Chartered Institute of Transport (Brisbane, 8/1993) 10.

<sup>27</sup> See Swedavia- McGregor Report (4/1988).

<sup>28</sup> Civil Aviation Authority *Internal Quality Assurance* Advisory Circular AC120-01A (30/9/96) 1.

Traditionally, little emphasis was placed on the *systems* put in place to produce the safety outcomes.

The Swedavia-McGregor report recommended that an internal quality assurance program be implemented.<sup>29</sup> Aviation safety would be further enhanced if the responsibility for safety were placed on operators. Safety is improved by the early identification and correction of deficiencies, rather than waiting for problems to be identified through the auditing process. The report indicated that it is more effective for the CAA to monitor the *systems* put in place to achieve the required safety standards rather than the safety outcomes.<sup>30</sup>

The Civil Aviation Rules require that aviation organisations seeking certification have in place a Quality Management System.<sup>31</sup> This involves the organisation developing a safety policy and plan that enables the monitoring and review of the organisation's safety performance.<sup>32</sup> It includes implementing operating controls and procedures, the purpose of which is to identify problems before they crystallise into accidents or incidents. There is an obligation on the operator to establish corrective action once an existing defect is identified.<sup>33</sup> Procedures for preventive action are mandatory to ensure that potential problems are identified and remedied.<sup>34</sup> There is a duty to ensure quality indicators, which for example include accident and incident reports. These are monitored to identify potential or existing problems.<sup>35</sup> An internal audit program is required to audit the applicant's organisation for conformity with the goals set in the safety policy.<sup>36</sup> The internal quality assurance

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<sup>29</sup> See Swedavia- McGregor Report (4/1988).

<sup>30</sup> Civil Aviation Authority *Internal Quality Assurance* Advisory Circular AC120-01A (30/9/96) 1.

<sup>31</sup> Civil Aviation Rules, pt 119.79.

<sup>32</sup> Above n 31, pt 119.79 (b)(1).

<sup>33</sup> Above n 31, pt 119.79 (b)(3).

<sup>34</sup> Above n 31, pt 119.79 (b)(4).

<sup>35</sup> Civil Aviation Rules, pt 119.79(b)(2).

<sup>36</sup> Civil Aviation Rules, pt 119.79(b)(5).

system includes management review procedures that assess the effectiveness of the system.<sup>37</sup>

The CAA continue to undertake audits on aviation organisations. Evidence is produced in the audit process, which evaluates the effectiveness of internal quality assurance procedures. The performance of the organisation determines the level of intervention necessary by the CAA. The frequency and intensity of the audits are reduced when the organisation performs well. The Quality Assessment system is a useful mechanism to enhance risk management, which provides a trigger for action by the Civil Aviation Authority to enable effective risk management.

## VI SAFETY AT REASONABLE COST

Although it is idealistic to minimise the risks in aviation as far as possible, acceptable levels of risk are not determined in a vacuum. The functions of the Minister include the promotion of safety in civil aviation at a reasonable cost.<sup>38</sup> Consequently, the Minister and the Director are required to consider the costs of implementing aviation safety measures when making any rule.<sup>39</sup> Reasonable cost is defined in the Act as "where the value of the cost to the nation is exceeded by the resulting benefit to the nation".<sup>40</sup> This philosophy comes from the Swedavia-McGregor recommendations that the aviation regulatory body should stop striving for improvement in safety when the cost of the safety measure outweighs the value.<sup>41</sup>

Reasonable cost can be determined by a cost benefit analysis. This involves the calculation of the potential costs and benefits to society as a result of the

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<sup>37</sup> Civil Aviation Rules pt 119.79(b)(6).

<sup>38</sup> Civil Aviation Act 1990, s 14(1).

<sup>39</sup> Above n 38, s 33(2)(f).

<sup>40</sup> Above n 38, s 14(3).

<sup>41</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 15.

implementation of safety measures. A cost benefit analysis requires consideration of the impact of a proposed rule. It provides the regulatory body with an objective basis for decision making, and enables transparency in the decision making process.<sup>42</sup>

For an evaluation of a complex rule, a cost benefit analysis can be time consuming and expensive. It can be an emotive process that requires a value being set on human life. Although the costs of the implementation of safety measures are quantifiable, safety benefits are more difficult to calculate. As many of the safety requirements in the Civil Aviation Rules have been determined by the ICAO standards and recommended practices, it is often unnecessary for the Civil Aviation Authority to undertake a detailed cost benefit analysis.<sup>43</sup>

## VII ADVENTURE AVIATION

### A Introduction

As commercial adventure aviation has become more prevalent and popular in New Zealand, many aviation operators have not only wanted the CAA to allow adventure activities, but to legitimise the activities through certification.<sup>44</sup> As many of the proposed adventure activities were unforeseen by regulators, some activities do not fit within the current regulatory framework because of two reasons. Firstly, the aircraft may not comply with the rules for air transport, and secondly, the aircraft may not be flown in strict accordance with the rules.<sup>45</sup>

An investigation was initiated by the CAA in 1996 to determine whether any regulatory change was needed. The investigation team consisted of aviation

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<sup>42</sup> Ministry of Transport *Civil Aviation Performance Review* (Wellington, 5/2001) 131, para 6.1.4.3.

<sup>43</sup> Above n 42, 131, para 6.1.4.7.

<sup>44</sup> "Adventure Aviation" CAA Review Magazine, Wellington, New Zealand, Issue 4, 1997, 7.

<sup>45</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 45.

consultants from both New Zealand and Australia. The investigation involved visiting a number of individuals and organisations involved in tourism, scenic flying, sports aviation and potential adventure aviation operators. Further analysis was conducted from information provided by the CAA, and the New Zealand Tourism Board.<sup>46</sup>

### **B Cost-Benefit Analysis**

An economic analysis aids in the determination of whether the benefits are produced as a result of the investment. A cost benefit analysis was conducted for adventure aviation to determine whether it was worthwhile to alter the regulatory framework to accommodate adventure aviation activities in New Zealand, and if so, to recommend the most cost effective form of intervention.

The costs that were analysed in the provision of adventure aviation were the physical resources that would be expended in the implementation of regulation. These costs include for example, regulatory and compliance costs, the costs of accidents, and air operator costs.<sup>47</sup> Regulation imposes a cost on air services providers. These costs of compliance may include further training and the provision of specialised equipment. The costs of compliance need to be weighed against the expected benefits.<sup>48</sup> The benefits of the regulation of adventure aviation include safety benefits in the reduction of accidents, increased income for operators, and national economic benefits.

There is however some difficulty in quantifying particular costs or benefits that have emotive or political elements. They have been described as intangible parameters. This is predominant when analysing safety benefits and the impact of fatal aircraft accidents. A cost benefit analysis requires a value to be placed on a human life. In the 1996 report, the statistical value of a human life or the economic

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<sup>46</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 2.

<sup>47</sup> Above n 46, 59.

<sup>48</sup> Above n 46, 59.



cost of a fatal injury was \$2.05million. The economic cost of a serious aviation accident was estimated at \$405,000.<sup>49</sup> Another example of a quantification difficulty is the impact of fatal accidents on tourist scenic flying. This difficulty has been discounted partly by a measure being placed on the loss of business to aviation operators. The political dimension arises when there are different opinions as to the commercial versus operational priorities of the CAA in regards to adventure aviation.<sup>50</sup>

Another difficulty in conducting a cost benefit analysis is the limited statistical information available for adventure aviation. There is an element of uncertainty when there is a prediction of the future impact of an activity, which is exacerbated by no history of the activity.

### C *Regulatory Options*

In developing rules for flight safety, contracting states to the Convention can adopt either an active or passive role.<sup>51</sup> An active role is one where the state will promulgate rules and regulations, which prescribe the safety standards that the operations have to attain. This regulatory framework cannot however provide the operator with a comprehensive set of instructions as to the conduct of the operation.

When the state adopts an active role, there is a high level of supervision and intervention. There is ongoing advice to ensure that the operators stay within the rules. By way of contrast, the passive role involves little intervention. The interpretation and implementation of the rules into an operation would be the operator's responsibility. With a passive role, the State relies on the threat of enforcement action to ensure operator compliance.<sup>52</sup>

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<sup>49</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 62. These costs have been determined after estimating hospitalisation and medical costs, legal costs, and air accident investigation and a loss of life quality penalty.

<sup>50</sup> Above n 49, 61.

<sup>51</sup> ICAO Document 8335.

There are differing opinions as to the role that the State should adopt in the regulation and supervision of the aviation industry. It is argued that an active approach stifles the development of civil aviation. Technical and operational development is slowed when the rules are too prescriptive.<sup>53</sup> Another objection is that too much intervention and supervision by the regulatory body may diminish an operator's safety responsibilities, and may not lead to a high level of safety.<sup>54</sup> A further opposing argument is that an active approach is too resource intensive for both the regulator and the regulated.

A passive role can be criticised in that there are limited means of detecting unsafe activities in the industry, and that these safety deficiencies are left undetected until after an accident has occurred. With the lack of functional supervision it is argued that the regulatory body would not be adequately informed of new technical and operational developments, and would have limited ability to assess regulatory compliance within the aviation industry. There is a further concern that some participants in the aviation industry do not have the capability to interpret and implement the regulatory provisions correctly, which may jeopardise safety. It is stated that good safety value is not obtained by expending time and resources on prosecutions for non-compliance, as is often a consequence of passive regulation.<sup>55</sup>

Whether the regulatory body adopts an active or passive approach depends on a number of variables, which were outlined in the 1996 report.<sup>56</sup> A main consideration is the allocation of responsibility between the state and the operator. If it is accepted that the State bears the main responsibility for aviation safety, then an active approach is more likely to be adopted. This often reflects the states

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<sup>52</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 18.

<sup>53</sup> Above n 52, 18.

<sup>54</sup> New Zealand Parachute Federation "Submission to NPRM Pt 115" [1996].

<sup>55</sup> Ministry of Transport *Civil Aviation Performance Review* (Wellington, 5/2001) 139, para 6.4.4.6.

<sup>56</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 19.

philosophical approach to public policy and management. The type of role that the regulator assumes also identifies the degree to which the state wants to promote, control, or restrict civil aviation.<sup>57</sup>

Another consideration as to the level of State intervention in civil aviation is the expectations of the operators. It was stated in the Civil Aviation Performance Review that there is a concern that some participants in the General Aviation Sector resist regulation.<sup>58</sup> Many in the general aviation industry see detailed regulation as financially onerous and unnecessarily restrictive.<sup>59</sup> The performance review has however illustrated that New Zealand's safety record is below that of other developed aviation nations such as Australia, the United States of America, and the United Kingdom.<sup>60</sup> Consequently, the relaxation of regulation or an increase of self-regulation is inconsistent with the current safety performance of the general sector of the civil aviation industry.

The opposing argument was however presented by operators, that too much adventure aviation was taking place in New Zealand, and that aviation accidents had a considerable adverse impact on general aviation operations. The argument follows that if adventure aviation continued to go unregulated, there would be an increase in accidents, which would lead to a fall in revenue for other general aviation operators.<sup>61</sup>

A major consideration in determining the role to be adopted by the regulatory body is the cost of the state involvement. Four levels of regulation were considered in order to determine the most cost-effective form of intervention for adventure aviation

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<sup>57</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 19.

<sup>58</sup> Ministry of Transport *Civil Aviation Performance Review* (Wellington, 5/2001) 123, para 5.6.1.1.

<sup>59</sup> See generally, Andrew Livingston, Waikato Hot Air Balloon Club – Alistair Malcolm, Aoraki Balloon Safaris *Submissions for NPRM pt115*, in Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) Appendix II, 2.

<sup>60</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 1.

<sup>61</sup> Above n 60, Appendix 2, 3.

activities. The status quo option was the benchmark for the analysis. This requires no additional regulation. There would be no improvement in the flight safety performance of adventure aviation.

The second option was active regulation. This would result in a significant increase in flight safety in the adventure aviation industry. It would require the appointment of three adventure flying inspectors. Their role would be to take an active approach to the entry control and functional supervision of the participants in the adventure aviation industry.<sup>62</sup>

The third option considered was passive regulation, resulting in some improvement of safety. It would involve the appointment of one adventure flying inspector. Their role would be to take a passive approach to the functional supervision of participants in the industry. The emphasis would be enforcement, which would result in minimal intervention in adventure aviation operations.

The fourth option considered was mixed regulation. Active regulation was proposed for activities involving helicopters and aeroplanes, which would significantly improve the safety in these two areas. For the other areas of adventure aviation, the status quo option was proposed. This would involve the appointment of two adventure flying inspectors.

The 1996 report compared the total costs and benefits, and the cost-benefit ratio for each type of regulation. It is assumed in the report that there would be a small net benefit to allow adventure aviation without further regulation.<sup>63</sup> It was hypothesised that active regulation would provide the greatest net benefits, and a cost benefit ratio of 1:133. Mixed regulation however had a lower total net benefit, but the highest cost benefit ratio of 1:180. It was proposed that the greatest benefit from every regulation dollar would be obtained by mixed regulation. The type of role to be adopted by the state is then determined by weighing the most cost-effective form of

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<sup>62</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 51.

<sup>63</sup> Above n 62, 64.

intervention against the option that yields the greatest benefit. Again factors such as State philosophy, public policy, and resource capabilities of the State and the regulated are considered in the decision making process.

#### *D Risk Analysis*

The Civil Aviation Rules acknowledge various levels of safety. Airworthiness standards are divided up into categories. Higher levels of risk for example are accepted in activities such as parachuting where there is a single participant. By contrast however, lower levels of risk are accepted in air transport operations and airline operations where there may be many fare paying passengers. Where there is carriage of fare paying passengers, the safety standard required is higher than that required for private or other commercial operations.<sup>64</sup>

As adventure aviation is not prevalent in other aviating nations, many of the safety requirements and standards relating to adventure aviation have been drafted from scratch in New Zealand. There have been no equivalent international safety provisions to utilise in the regulation of this unique class of aviation.

In determining an acceptable level of risk for adventure aviation, accident statistics were compared for various types of aviation activities. The 1996 report suggested that a reasonable safety standard for adventure aviation might fall somewhere between the aerial work accident rates and air taxi, commuter, and scenic operations' accident rates. It was however proposed that with stringent regulatory control, and additional operational requirements in the adventure aviation industry, a higher standard could be achieved close to the safety standard of domestic air transport. This was calculated to be an accident rate of 0.17 per 10,000 flights, and a fatal accident rate of 0.04 per 10,000 flights.

The risk in adventure aviation was assessed as accidents per 10,000 flights. The number of flights is however hard to determine, and so was supplemented where necessary with accidents per 100,000 flying hours. The primary aim of the risk

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<sup>64</sup> Peter Nalder *Risk Evaluation of the Rack* (Civil Aviation Authority, Wellington, 3/2/99) 2.

assessment was to calculate the probability of an accident occurring for an adventure flight. It has however been suggested that risk analysis in the prediction and prevention of transport accidents is inaccurate, as they often result from an unpredictable chain of events.<sup>65</sup>

Accident rates are used to determine the risks for certain types of activities. The New Zealand accident statistics provided by the Civil Aviation Authority were based on the period from 1985 to 1994 for helicopters and aeroplanes. Where there are insufficient New Zealand statistics to analyse, accident rates from other countries are utilised. An advantage of using statistics from other countries is obtaining a larger data pool, which improves the accuracy of inferences drawn from them. Statistics are often used from Australia, the United Kingdom and the United States, as the saturation of civil aviation is much greater in these countries. This is beneficial as the New Zealand statistical base is often too small draw accurate hypotheses. It is however difficult to utilise accident rates from other countries to determine these risks, as adventure aviation is not prevalent overseas, and safety performance differs somewhat between jurisdictions.

Comparisons were however made between activities which were seen to have a similar level of risk. The risk of adventure aviation in aeroplanes, may for example have a similar level of risk to agricultural flying.<sup>66</sup> Consequently, risk can be approximated by analysing accident statistics for similar activities, that are conducted in New Zealand or elsewhere.

In order to determine whether an activity could be adequately regulated, it was proposed in the 1996 report that each activity be assessed separately. Each activity should undergo an assessment of firstly, the nature of the activity. This enables a risk analysis of the specific activity. The second consideration evaluated was the quality of the vehicle. This is the airworthiness integrity and ongoing maintenance of the

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<sup>65</sup> Jake Ansell & Frank Wharton *Risk Analysis - Assessment and Management* (John Wiley & Sons, New York, 1983) 208.

<sup>66</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 12.

aircraft. The third consideration was the certification of the organisation and the pilot. Combinations of these three factors are conventionally used to provide an adequate balance in the safety equation.<sup>67</sup>

Pilot experience is considered an important factor in risk assessment.<sup>68</sup> The impact of pilot experience on accident rates was assessed. It was concluded that the more experience in terms of total flying hours, and or hours on type should generally lessen the probability of aeroplane accidents. This proposition was however inconsistent when applied to helicopter accidents.<sup>69</sup> It was recommended in the report that pilot knowledge and experience requirements be set high for adventure aviation activities to lower the probability of an accident occurring, and to lessen the severity of the consequences in the event of an accident.

The phase of flight was considered to contribute to the level of risk in an activity. The risks were calculated by determining the frequency of accidents in various flight stages. As there are limited adventure aviation statistics, again the various adventure activities were compared with similar general aviation activities.

Boeng Commercial Airplane group conducted a study from data collected from 1959 to 1994 on the accident rates in various phases of flight.<sup>70</sup> According to Boeng, 70 percent of all accidents, and 50 percent of fatal accidents occur in the take off, initial climb, final approach and landing phases of a flight.<sup>71</sup> Although some adventure flights only last a few minutes, most of the time is spent in phases of flight which have a higher risk than the in-flight stage. In addition to higher risks borne in

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<sup>67</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 55.

<sup>68</sup> Above n 67, 12.

<sup>69</sup> Above n 67, 48.

<sup>70</sup> Boeng Commercial Airplane Group *Statistical Summary of Commercial Jet Aircraft Worldwide* (1995) in Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 13.

<sup>71</sup> Boeng Commercial Airplane Group *Statistical Summary of Commercial Jet Aircraft Worldwide* (1995) in Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 13.

the take off and landing phases, the nature of some activities may further increase the risk in the in-flight phase of an adventure flight. It is however arguable, that as the Boeng study was conducted with data collected from a commercial jet fleet and based on a flight duration of 90 minutes, the conclusions drawn may have limited applicability to some adventure aviation activities which have a less than conventional flight envelope.

The levels of risk associated with specific aircrafts were analysed. This was achieved by categorising the aircrafts involved in accidents. The report concluded that helicopters generally had a higher level of risk than aeroplanes, which was reflected in the accident statistics.

The area of operation was considered for various adventure aviation activities when determining the risks. This includes assessing the risks associated with the terrain. The facilities used in the operation are considered, as is the availability of emergency services in the vicinity of the operation. The conditions of flight are analysed. This includes potential variables such as weather and night time operations.

### *E Principle of Equivalent Safety*

It was proposed in the 1996 report that an essential principle in adventure aviation safety is that conventional safety standards and recommended practices should only be relaxed in one facet of the operation. The second principle is that equivalent safety provisions should be implemented to ensure safety standards are maintained at an appropriate level. Where there is a reduction in the safety margins in any one factor of the safety equation, then an increase in the safety margin of another factor is needed to correct the balance. In determining the operational subparts for part 115 of the CARs, the CAA assessed the risks in each activity and then determined the measures that were necessary to counterbalance these risks. This is the principle of equivalent safety.<sup>72</sup>

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<sup>72</sup> Aviation Consulting Services & McGregor & Co *Regulation of Adventure Aviation - Investigation for the Civil Aviation Authority* (Auckland, 2/1996) 56.



### VIII UNNECESSARY DANGER

Acceptable levels of risk are not only defined in prescriptive provisions in the Act and the CARs. The dividing line between an acceptable level of risk and an unacceptable level of risk is further drawn in safety offences under the Act between necessary and unnecessary dangers. The Act provides two offences that reflect the concept of *unnecessary danger*.<sup>73</sup> These safety offences recognise that there are inherent dangers in aviation activities, which are not capable of elimination. The inherent dangers are not the subject of the penal provisions.<sup>74</sup> Other risks are however more susceptible to a greater degree of control or management. Dangers that are considered unnecessary and culpable are dangers that go beyond those inherent and necessary for the specific activity.<sup>75</sup> The term unnecessary danger will usually refer to avoidable harm that is unjustified.<sup>76</sup>

Section 43 makes it an offence for any holder of an aviation document to do, cause, or permit any act or omission to which the document relates, from causing unnecessary danger to persons or property. This offence targets participants in the aviation industry who are required to hold some form of aviation document.<sup>77</sup> Section 44 has a somewhat wider application. This offence targets an unlimited range of activities involving an aircraft, aeronautical product, or aviation related service, that causes unnecessary danger to people or property. These provisions specify a maximum fine of \$10,000 or imprisonment for a term not exceeding 12 months for a convicted individual, and a fine of no more than \$100,000 for a convicted body corporate. Hammond J stated that "[t]he practical consequence of the new sections [sections 43 and 44] is that pilots are statutorily enjoined to put risk avoidance squarely at the forefront of their operations."<sup>78</sup>

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<sup>73</sup> Civil Aviation Act 1990, ss43, 44.

<sup>74</sup> *The Laws of New Zealand* (Butterworths, Wellington, 1992) vol 1, Aviation, para 122.

<sup>75</sup> *Fowler v Police* [1983] NZLR 701 (CA) 703 per McMullin J.

<sup>76</sup> *Hollard v Police* (High Court Hamilton, AP 26/96, 17 April 1997, Hammond J).

<sup>77</sup> *The Laws of New Zealand* (Butterworths, Wellington, 1992) vol 1, Aviation, para 122.

<sup>78</sup> Above n 76, per Hammond J.

Generally the determination of necessary and unnecessary dangers will be a question of fact in each case. They are determined by the nature and purpose of the operation. Inherent dangers are not general to all operations, but are specific to individual flights.<sup>79</sup> The inherent dangers may for instance differ between flights undertaking the same activity, as variables such as weather and terrain may change from flight to flight. Generally an expert witness, such as an experienced pilot or aviation consultant, will testify at the trial as to whether the dangers were necessary or unnecessary to the operation.

Prosecutions pursuant to these sections usually arise out of accidents. These sections are however employed as a last resort in rare instances, in order to enforce operator compliance with statutory obligations.<sup>80</sup> Factors such as the likelihood of success, the resources necessary to undertake court proceedings, and the potential public gain from the successful prosecution are balanced in the exercise of the discretion to prosecute.<sup>81</sup> There is a consideration of whether the public interest would be best served by undertaking a prosecution.

## *IX RISK ASSESSMENT OF THE RACK*

The Rack is an adventure aviation activity that was established in Taupo in the early 90's by Bevin Thomas. At that time, there were no specific provisions in the Act or the CARs that regulated recreational external load operations. A commercial activity of this nature had not been envisaged by the regulators before this time.

Mr Thomas sought certification by the CAA to undertake the activity known as the Rack. The Minister declined this application, as the activity was determined to be unsafe. There were a number of grounds for this assumption. A major factor was not however the risk associated with the activity, but the lack of congruency with the

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<sup>79</sup> *The Laws of New Zealand* (Butterworths, Wellington, 1992) vol 1, Aviation, para 122.

<sup>80</sup> Peter Nalder Interview (The Author, Wellington, 5/3/2001).

<sup>81</sup> Above n 80.

current provisions in the Act and the CARs.<sup>82</sup> It was asserted that the Rack operation should have been classified as an air transport operation, but as the definition of passenger was not wide enough to include human loads carried external to the aircraft, the operation fell outside of the rules and therefore the standards and recommended practices.<sup>83</sup> The CARs intend passengers to be carried in a seat inside the aircraft.<sup>84</sup> The safety of the Rack operation was initially assessed against the background of the existing rules and accepted aviation standards rather than the actual risk of the activity.<sup>85</sup>

Where an operation is unable to meet a particular standard that is required for an air transport operation, the operator must be able to satisfy the CAA that increased risks specific to the activity are compensated in another way.<sup>86</sup> As the defences put in place by the Rack operator to reduce the risk exposure had not been formally evaluated by the CAA, the CAA could not be confident that the Rack offered an acceptable equivalent level of safety.<sup>87</sup>

In 1999, after continuing the Rack activity without certification, the CAA placed a condition on the airworthiness certificate of the helicopter operated by the Rack Adventures Company (Helistar Helicopters of Taupo). A restriction was placed on the commercial pilot license of the managing director of Helistar Helicopters. Furthermore, A prosecution was commenced against Mr Thomas pursuant to the unnecessary danger provision of section 44(a) of the Act.

During the dispute between the CAA and Mr Thomas, the CAA sought a number of professional opinions to analyse the actual risks of the Rack activity. One

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<sup>82</sup> Peter Nalder Interview (The Author, Wellington, 5/3/2001).

<sup>83</sup> Barry Payne *Rack Operation* Technical Opinion to the Civil Aviation Authority (Aviation Network, Timaru, 31/12/1998) 3.

<sup>84</sup> Above n 83, 3.

<sup>85</sup> See above n 83.

<sup>86</sup> Iain Kerr (Rules Manager) in "Adventure Aviation" CAA Review Magazine, Issue 4, Wellington, 1997, 7.

<sup>87</sup> Peter Nalder *Risk Evaluation of the Rack* (Civil Aviation Authority, Wellington, 3/2/99) 2.

opinion of which was received from James Szymanski.<sup>88</sup> In his letter he stated that determining risk was not an exact science. Consequently, the analysis provided a qualitative rather than quantitative assessment of the risks associated with the activity.

The risks that Mr Szymanski identified were firstly, the increased risk of harm for a passenger suspended on a 40ft length of chain underneath the helicopter. Secondly, the activity was conducted over unprepared and dangerous terrain. Thirdly, the static line parachute deployment method would be ineffective below 200 feet. It was hypothesised that below that height, there is an increased probability that the parachute would get tangled up with the aircraft in an emergency situation. The fourth major concern was the inability for a helicopter to perform a power off landing without injuring the passenger suspended below the aircraft. It was asserted that a successful forced landing of this nature was dependent on too many variables. Szymanski concluded that the activity had crossed the threshold of unacceptable risk.<sup>89</sup>

The CAA sought a professional opinion from Charles Bernard Lewis, an aviation consultant with considerable flying experience and technical knowledge of both aeroplanes and helicopters.<sup>90</sup> This opinion was somewhat more comprehensive. The opinion was produced as a statement of evidence in the trial. Although the risks were not quantified, a detailed analysis of the activity was however provided.

The specific risks associated with the aircraft were considered. The helicopter used in the activity was a MD500. This is a single engine aircraft. The New Zealand accident statistics for this model of aircraft were analysed. Although there was no dispute that the helicopter had been maintained to the standard required by the CAA, the aircraft remained unhangared on an unprepared surface. It was postulated that the risk of engine problems was increased due to the exposure of the aircraft to dust and

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<sup>88</sup> James W Semanski *Rack Operations* Technical Opinion to the Civil Aviation Authority (20/8/1999) 2.

<sup>89</sup> See above n 88.

<sup>90</sup> Charles Bernard Lewis *Statement of Evidence* (12/7/1999).

debris, and various weather conditions that would eventually lead to some deterioration of the engine.<sup>91</sup> It was further stated that the MD500 aircraft is susceptible to airframe failures.<sup>92</sup> It was concluded that a single engine MD500 aircraft had an insufficient quality guarantee to carry human sling loads for the Rack operation.

The risks were assessed in each phase of flight. During the takeoff phase, the helicopter hovered above the both the rider and the Rack master for 20-30 seconds. This enabled the rider to be attached to the Rack frame. A Federal Aviation Authority Height Velocity Diagram for the MD500 was produced which indicated that the aircraft was well within the shaded avoid area of the flight envelope during this time. This area should be avoided, as in the event of an engine failure the rotor rpm rapidly decrease, as does the aircraft's height. This is not only dangerous for the pilots within the aircraft, but the two people beneath it.

The rate of climb was acceptable in the circuit phase of flight. What was considered to increase the risk during the in-flight phase however, was the terrain flown over. Thermal areas, the Waikato River, forestry, and uneven ground constitute the scenic area, which increased the probability of an unsuccessful forced landing. The terrain posed a greater risk of injury for the rider in the instance of emergency parachute deployment. The rider received only minimal parachute training during the flight briefing, of which may have been inadequate to navigate the inhospitable hazards. During the descent and landing, the passenger was brought below the minimum safe deployment height of 200 feet. The aircraft was again within the avoid area for between 30-40 seconds.<sup>93</sup>

Like the other opinions received by the CAA, the major concern of Mr Lewis was the jettisoning of the rider during a forced landing close to the ground. It was asserted that a successful power off single autorotation is a difficult manoeuvre. If the

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<sup>91</sup> Charles Bernard Lewis *Statement of Evidence* (12/7/1999) 6, para 10.5.

<sup>92</sup> Above n 91, 5, para 9.3.

<sup>93</sup> Above n 91, 4, para 7.2.

rider is still beneath the helicopter, the pilot needs to auto rotate the aircraft to release the passenger, and then complete the engine off landing.<sup>94</sup> According to the expert opinions, this supposition was wrong, as there would be insufficient altitude to maintain airspeed for two power off auto rotations. The passenger would either be dropped from below safe deployment height, or would be dragged to where the aircraft is forced to land.<sup>95</sup> Mr Lewis was of the opinion that the Rack activity presented an unacceptable level of risk that was not adequately compensated by the defences put in place.

The CAA conducted an in house investigation of the risks associated with the Rack activity.<sup>96</sup> Questionnaires were completed by the CAA employees. This gauged the general collective opinion that the CAA held in relation to the risk of this operation. Questions were focussed on the helicopter experience of the employees and the perceived risks of the carriage of human sling loads. The answers provided alluded to the difficulty in substantiating and quantifying the assumptions of risk associated with the Rack activity. Very few indicated a method for the actual measurement and identification of the risks specific to the activity.

The in house questionnaires provided a subjective and unsubstantiated risk analysis of the Rack operation, the usefulness of which is questionable. This however was not the only method that the CAA employed in determining the Rack operation was unsafe. Furthermore, the general assertions put forward by many employees of the CAA were later supported by the more comprehensive technical opinions provided by aviation consultants.

The CAA however made a further in house attempt to analyse and assess the risks of the Rack.<sup>97</sup> Five helicopter specialists employed by the CAA were interviewed. Reports prepared by other CAA employees were reviewed. The opinion

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<sup>94</sup> Charles Bernard Lewis *Statement of Evidence* (12/7/1999) 4, para 12.10.

<sup>95</sup> See above n 94.

<sup>96</sup> Peter Nalder Interview (The Author, Wellington, 5/3/2001).

<sup>97</sup> See Peter Nalder *Risk Evaluation of the Rack* (Civil Aviation Authority, Wellington, 3/2/99) 2.

identified possible defences that would reduce the level of risk of the activity, which may have provided an equivalent level of safety. An example of which was the suggestion to use a twin engine helicopter rather than a single engine helicopter.

An attempt was made to quantitatively ascertain the increased consequence of harm in previous accidents, had a human sling load been attached to the aircraft. A safety analyst assessed each accident assuming there was a human sling load carried at the time, and recorded it as a potential injury if there was a high likelihood of injury to the human sling load. The findings were based on accident statistics from the period between January 1988, and January 1998. It was hypothesised that the percentage of potential risk of further injury would be significantly increased had a person been carried under the aircraft.<sup>98</sup> This statistical analysis was not however submitted in evidence at the trial.

The trial was heard in the District Court at Rotorua in September 2000.<sup>99</sup> Mr Thomas elected to have a trial by jury. The proceeding lasted 18 days, at the end of which Mr Thomas was discharged. It was held that in conducting the Rack activity, Mr Thomas did not cause unnecessary danger to persons or property.

It was put forward by a representative of the CAA that had there been a summary proceeding rather than a trial by jury, a different result may have been obtained. Again it was emphasised that as the general public do not accurately assess the risks involved with adventure aviation, it was overly optimistic to assume that a jury would have the technical knowledge, despite expert testimony, to understand the serious risks involved in the activity.<sup>100</sup> Despite the discharge however, the conditions imposed on the helicopter's certificate and on the pilot's commercial license to prevent the Rack operation remained.

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<sup>98</sup> See Peter Nalder *Risk Evaluation of the Rack* (Civil Aviation Authority, Wellington, 3/2/99).

<sup>99</sup> *Civil Aviation Authority v Thomas* (District Court Rotorua, 15/9/2000, Blackie J).

<sup>100</sup> Peter Nalder Interview (The Author, Wellington, 5/3/2001).

## X CONCLUSION

The drafting of the proposed adventure aviation rules has demonstrated the complications in assessing and defining appropriate levels of risk for aviation activities. This difficulty is accentuated by the unpredictable impact that new and unique operations will have on society.

More specifically, the Rack activity has illustrated the potential conflict between the regulator and the regulated, when an acceptable level of risk is determined. On the one hand, the regulated want to establish a commercially viable aviation activity. The Rack Adventure Company needed to keep expenditure to an absolute minimum if they were to compete for business with other non aviation adventure activities in the Taupo region, such as bungy jumping, white water rafting, and jet boating. There is no doubt that the operator wanted to provide a safe operation, but commercial viability could not be sustained if expensive safety requirements were imposed on the operation. A twin engine helicopter for example would have reduced the level of risk in the activity, but it was more economical to instead use a single engine helicopter. The regulator on the other hand, has a demanding obligation to achieve acceptable safety standards whilst balancing the often competing safety interests of the public, and the commercial imperatives of the aviation operators.

The irony of the Rack legend, which has spanned nearly an entire decade, is that the very people the CAA sought to protect, the public, acquitted Mr Thomas in the District Court of Rotorua. A jury of the public set an appropriate level of safety lower than that imposed by the CAA. Difficult as the regulators' balancing act may be, this arguably sounds the general aviators' cry that an overly paternalistic attitude is hidden under the guise of the public interest.



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