Safety & Legal Issues in Operating a Heritage Train

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SUMMARY: The “not for profit” Company, 3801 Limited, was established in 1985 to maintain and operate Australia’s iconic heritage steam locomotive 3801 and associated rollingstock in a safe, efficient and economically sustainable manner for the ongoing benefit, cultural understanding and enjoyment of the general community and the volunteers and staff of the Company.

The Duty of Care under Common Law and Statutes together with relevant legislation on corporate governance, rail safety, environment, heritage, occupational health and safety constitute the legal framework for heritage rail operations today. Legal agreements for accreditation to operate on the rail system and for access to the rail network set the safety culture for the Company and the consequent operational safety actions.

The Risk and Safety Committee of the 3801 Limited Board reviews and assesses the risks and safety issues involved in the operations of the Company through wide consultation and feedback. Training of staff and volunteers and certification of competency are key safety requirements together with the development of management plans. OH&S, fatigue, drug and alcohol policies are central to safety operations. The maintenance and operation of heritage rollingstock that is outside current rail operating practice raise difficult safety issues requiring specialist skills and knowledge.

Regular internal auditing by directors and senior management ensure that staff and volunteers understand and practice safety.

1. INTRODUCTION

The restoration of Australia’s iconic heritage steam locomotive, 3801 to full working order was undertaken by the State Rail Authority of NSW in conjunction with the Hunter Valley Training Company over the period 1983 to 1986.

The “not for profit” Company, 3801 Limited, was established in 1985 “to promote and undertake the restoration to operating condition and the operation, maintenance, care, custody and control of locomotive 3801” and associated heritage rollingstock.

The Company’s aim has been to operate the heritage rolling stock in its care in a safe, efficient and economically sustainable manner as the premier heritage train operator in New South Wales for the ongoing benefit, cultural understanding and enjoyment of the general community and the volunteers and staff of the Company.

Its operations have been based in a portion of the former Locomotive Workshops complex at Eveleigh, Redfern.

Since its restoration, 3801 has operated a regular program of tour & charter trains to a variety of destinations in N.S.W. & interstate. In 1988, it operated very popular tours to Canberra, Adelaide, Perth, Melbourne and Brisbane as the ”Bicentennial Train” for Railways of Australia. Since that time, 3801 has hauled tours to Alice Springs, Melbourne & Brisbane.

Undoubtedly, 3801 is Australia’s best known & most widely travelled locomotive having made the journey to Perth & return twice. Alice Springs also has been visited twice by 3801 on special tour trains.

As a result of the N.S.W. Department of Transport seeking Expressions of Interest to take over the weekend’s only passenger service on the Unanderra – Moss Vale line as a tourist operation, 3801 Limited commenced the Cockatoo Run heritage tourist train on 19th August 1995. This service now operates as a scheduled service from Sydney via Wollongong and Robertson every Wednesday and Sunday with heritage diesel locomotives.

On 16th September 1994, the Director General, Department of Transport approved 3801 Limited. becoming an accredited railway operator in NSW under the Rail Safety Act of 1993.

3801 Limited is unusual in two key aspects. Firstly, it is not a rail enthusiast organization but rather an organization whose purpose is to preserve and operate an important piece of the NSW railway’s heritage for the enjoyment of the people of this State through having it operate tour trains. Secondly, all its operations are on today’s commercial rail network requiring compatibility with a modern heavily trafficked electrified system.

This demands high levels of reliability and performance. 3801 and its cars are permitted to operate up to 115kph. By operating 3801 and its associated heritage cars in this manner, the Company is promoting significant
regional tourism through giving people the experience of heritage rail travel as it was in the immediate post war years.

2. THE 3801 RESTORATION; CONCEPT AND POLICY.

In 1983, State Rail determined that it wished 3801 to be returned to full operating condition and for it to operate heritage tour trains for the ongoing benefit, cultural understanding and enjoyment of the general community.

This policy decision recognised the iconic status of 3801 as the class leader of the ultimate development of express steam locomotives in this State.

3801 is the most widely travelled heritage locomotive in Australia and has earned a high level of recognition and appreciation by the general community.

In 1994, the Institution of Engineers Australia recognised this special heritage status of 3801 by attaching a Historic Engineering Marker plaque to the locomotive.

The decision to operate 3801 and its associated heritage rollingstock on the contemporary rail system has raised many complex heritage and safety questions requiring compromises and the search for acceptable alternative solutions.

The two key guiding principles have been:
- Whenever it was necessary to make a change to heritage equipment, it should be done in a manner that is reversible if possible so that at any time in the future, it can be returned to its pre restoration condition.
- Safety of the travelling public and staff has to be of paramount importance. In meeting a safety requirement, ways of doing so that may be different from the contemporary railway practice but more sympathetic to heritage values needed to be explored and shown to be acceptable if possible.

3. THE LEGAL AND SAFETY FRAMEWORK FOR THE OPERATION OF HERITAGE RAIL.

(Note: This is a description of a framework and not a definitive statement of all the issues involved.)

The Rail Safety Act (1993) and amendments was introduced to regulate the NSW rail system as it moved to an open access regime. This Act requires any rail operation of a gauge of not less than 600mm to be accredited by the Rail Safety Regulator(s).

In addition to rail operators, track owners, track managers and maintainers must be accredited.

The formal requirements for accreditation have increased dramatically as the rail system has become privatised and are managed by the seven State and Territory Rail Safety Regulators.

The Rail Safety Regulators Panel has issued a new National Rail Safety Accreditation Guideline that will become mandatory in coming months. This Guideline is to be implemented in conjunction with the Australian Standard AS 4292, Railway Safety Management.

The principal requirements of this Guideline are:

a) Risk Management
   Demonstration of risk management processes suitable and sufficient for the nature of the operations that are subject to regular audit.

   Demonstration that all reasonably foreseeable safety risks have been identified and how these risks are managed effectively through the implementation of an effective safety management system using the “As Low As Reasonably Practicable” (ALARP) approach to the assessment and control of risks in conjunction with the Australian Standard AS 4360, Risk Management.

b) Human Factors
   Demonstration of an understanding that human error is normal and that systems should be designed to complement human error.

   Demonstration of effective processes for the integration of human factors principles into all aspects of rail safety.

c) Safety Management System (SMS)
   - Safety policy.
   - Governance, internal controls, accountabilities, authorities.
   - Safety performance levels and key performance indicators
   - Regulatory compliance, change management and annual reporting.
   - Document control and information management.
   - Safety audits.
   - Passenger security including terrorism response.
   - Incident management and investigation.
Training, assessment and certification of competency including the maintenance and operation of steam locomotives and associated heritage rolling stock.

Engineering and operational systems for rolling stock and the certification of fitness for use.

Safety Interface Coordination with other track owners and operators.

The Rail Safety Regulators Panel is now requiring that the Safety Management System be fully integrated with Occupational Health and Safety requirements, financial management, drug and alcohol management and fatigue management.

The ongoing restructuring of the Australian rail industry has highlighted the need for national rail safety legislation and steps to harmonise the various State regulations. The National Transport Commission is currently drafting new uniform legislation on rail safety and accreditation.

In addition the Australasian Railway Association through its code management company is developing codes of practice for the guidance of the industry. Standards Australia is currently reviewing the Australian Standard AS 4292, Rail Safety Management to bring it into line with new requirements.

These initiatives are certain to result in many additional legal and safety requirements for the whole rail industry including heritage rail.

Other legal requirements are insurances including public risk insurance, EPA and heritage requirements as well as recognising obligations under the Corporations Act and the legal Duty of Care.

4. BALANCING THE HERITAGE, LEGAL AND SAFETY ISSUES.

While heritage rollingstock does not comply in many respects with current codes and standards, the approach has been to demonstrate that what is proposed is demonstrably safe. The Rail Safety Regulators have accepted the adoption of existing railway practices provided that a thorough risk assessment together with appropriate controls has been implemented.

An example of this is in the current safety requirement for central locking of doors on passenger rollingstock. This requirement is incompatible with 1930s rollingstock and such cars do not have the power source and cabling to support it. The acceptable alternative is to have a passenger attendant in each car responsible for controlling the external doors as well as caring for passengers and their needs.

The recent Waterfall accident inquiry emphasised the need for dead man controls in locomotives and multiple unit rollingstock. The fitting of such controls to a steam locomotive would be both complex and costly.

As a steam locomotive always has a fireman who is fully qualified in locomotive handling as a member of the crew, the fireman is accepted as a human dead man control meeting the safety requirement.

Both of these examples demonstrate the need to accept the safety principle being sought by the regulations but to look for alternative ways of meeting the requirement that are compatible with heritage rollingstock and demonstrating an acceptable and safe outcome.

Prior to restoration in 1983, all asbestos lagging was removed from 3801. Many worn or rusted components on the locomotive were restored or replaced at this time. All the bodywork of the tender was badly rusted so a replacement tender body was constructed.

Welding rather than riveting was adopted as a realistic compromise. The inner riveted firebox of the boiler was life expired so a new welded inner firebox was designed to replace it as the engineering equipment and skills were no longer available for riveted construction on that scale.

This resulted in the mismatch of the new welded inner firebox and the riveted outer firebox when boiler stays were fitted.

This mismatch resulted in the working pressure of the boiler being reduced from the original design figure of 1,690 kN/ m² to 1,482 kN/ m². This reduction has not resulted in any material change in the operational use of 3801.

Large superheated steam locomotives were designed to spend the bulk of their time hot and in steam. With the current intermittent operation of 3801, it is allowed to go cold between trips. A partial vacuum forms in the boiler as it cools and this results in air (oxygen) being drawn in through the cylinders and valves in the front end. When this oxygen meets pools of condensate in the mild steel superheater elements, pinhole corrosion can occur in a matter of weeks.

This has required the development of a completely new corrosion control regime whereby the boiler is dosed with a filming amine anticorrosion agent before shutdown. Minor internal alterations have been made to facilitate this practice.

To meet current safety and operational requirements of the rail network, 3801 has been fitted with a Hasler speed recorder, sand removal equipment, tender headlight and radio.

In the near future, 3801 will be fitted with GPS and satellite radio equipment now being required for Train...
Order working in rural NSW. In all of these examples, the changes are reversible in that this equipment can be removed easily at some future date if required.

Modern track management safety equipment sometimes is not compatible with heritage operations. The commercial rail network has many hotbox detectors installed at regular intervals to detect remotely any overheated axle boxes on long freight trains. Being infrared detectors, these frequently register steam from an operating injector on 3801 resulting in an alarm being registered in the train control centre and the train being stopped for examination.

In the days of regular steam locomotive operation, State Rail track maintenance staff carried out regular programs of vegetation reduction along the trackside to reduce the likelihood of grass fires caused by locomotive cinders. As track owners no longer conduct these hazard reduction programs, steam locomotives no longer operate on days of total fire ban. The spark arrestor equipment is inspected regularly and maintained at a high standard.

During periods of heightened bushfire risk, the Company seeks the advice of the Rural Fire Service in the days leading up to a trip and if necessary, a diesel locomotive replaces steam on the day.

All maintenance work undertaken on safety critical components such as brakes, wheel sets, bogies and couplers must be signed off as fit for service by the 3801 Limited Maintenance Manager and records retained for audit if required. Before a train enters service, a trip examination and certification is required.

Current Environmental Protection legislation imposes standards that are markedly different for those existing in the days of steam.

Locomotive ash is now an industrial waste that must be handled through a licensed disposal system. Like other heritage steam locomotives, 3801 does not comply with the current EPA noise and emission standards for locomotives. However the Act allows for heritage locomotives to be granted exemption.

Another example of changing standards is toilets. Until relatively recently, open toilets discharging on to the track was standard railway practice in NSW. Occupational Health and Safety requirements are pressing now for the fitting of retention toilets. For heritage rollingstock, this requires considerable change. Existing toilets need to be removed, new toilets, holding tanks and decanting facilities need to be provided.

Whilst these modifications could be reversed with difficulty at some future date if necessary, very significant expenditure is required to install this equipment or remove it later. To date Government has shown little willingness to fund these needs of heritage rail operations.

Under current accreditation requirements, 3801 Limited is responsible for training and certification of competence for all locomotive crews, on-train staff and volunteers and maintenance staff and volunteers.

As heritage locomotive driving and maintenance are no longer current skills in the commercial rail system, the transfer of this knowledge is a crucial function for the Company. To achieve this some key staff is being given “train the trainer” qualifications.

All train-operating crews are paid professionally. Many of the train operating crews are regular staff from other parts of the rail industry and are employed by 3801 Limited on a casual basis when not required by their prime employer whilst a few are in full time employment of 3801 Limited. Rostering to meet fatigue management obligations is increasing in complexity.

All training in steam operation is undertaken within the Company. Trainees generally commence as part of the support maintenance team on steam operations and gain experience firing. After reaching competence in firing and locomotive handling, they can become certified firemen when the have passed the required safe working courses.

Following years of firing where they gain driving experience under the tuition of senior drivers, they become qualified drivers. In addition, drivers must learn the various routes and know the location of signals, points, stations etc. before they can be permitted to drive over those routes.

All volunteers and staff undertaking on-train duties must have “Track Awareness” certification that has to be organised by the Company. Each passenger service has to have at least one qualified first aid person on board and 3801 Limited has to arrange this training.

By working as volunteers with a previous generation of steam operators, the Company’s present relatively young maintenance staff has gained a sound skill base and is rapidly becoming multi skilled.

Several of the maintenance staff have gained safe working and locomotive driving qualifications and are now regularly rostered as the fireman on 3801.

With the disappearance of steam from State Rail, present operating and maintenance procedures have to be supported by manuals and standards dating from the 1950s. However there are specialised requirements under OH&S legislation that require formal training and qualifications such as working in confined spaces such as boiler and tender tanks and the operation of cranes.
Formal induction programs are required for staff and volunteers undertaking maintenance work and training is required before metal and woodworking workshop equipment can be used. Much of this equipment must be fitted with protective guards and safety switches now. The Large Erecting Shop, Eveleigh, a part of the former State Rail Locomotive Workshops, has been the operating and maintenance base for the Company’s activities for the past 18 years. As it is a heritage-listed building still owned by State Rail, carrying out restoration and maintenance activities has posed its own set of issues.

Under track inspection pits, a regular feature of past railway practice, must now be treated as a confined space and chained off when not in use.

Certification of locomotive boilers and pressure vessels has become an increasingly difficult and onerous responsibility. Previously State Rail has its own internal inspecting staff and following the demise of steam in State Rail, 3801 Limited used WorkCover certified boiler inspectors.

Several years ago, WorkCover ceased this service and now it is the responsibility of the Board of 3801 Limited to appoint a person of competence to certify boilers and pressure vessels as being fit for use. This has placed a heavy responsibility on the Company. Regrettably the removal of licensed boiler inspectors has diminished the exchange of information and good practice in the heritage rail sector.

3801 Limited has developed a very substantial expertise and body of knowledge in the maintenance and operation of large steam locomotives on the current commercial rail network.

During the financial year 2004/5, 3801 Limited carried over 20,000 passengers on its services and the average journey length was 140km reflecting the many long distance trips undertaken. (See Appendix)

Company tours are advertised on our website and through a regular newsletter. All passengers on 3801 Limited trains are given booked seats and most services provide a buffet service that is staffed by volunteers.

Passengers expect that in addition to the experience of a heritage rail journey, they will have the opportunity to enjoy an interesting event at the destination. Successful marketing requires a visit to vineyard, a whale watch, a jazz concert or a local country fair in addition to the trip behind 3801.

Current community expectations require an acceptable ambiance on a heritage rail journey as they are being invited to pay to spend several hours on a rail journey. This means that the interior décor and comfort in restored cars has to be of a high and acceptable standard. Sometimes this comes in to conflict with the retention of interior furnishing heritage values.

It is argued on some occasions that heritage conservation requires the retention of rather basic 1950s vinyl seating or worn linoleum floor covering that has claimed heritage significance. When appropriate, this can be resolved by fitting seat covers over the original seating or placing a carpet runner over early flooring material. It is only when heritage conservationists object to covering the earlier material that real difficulties arise.

This brings to a head the differing objectives of conservation in the strict sense and the selective operation of heritage equipment. An alternative approach in this situation is to carefully remove the original material for safe storage in order that it can be reinstated at some later date when the item of rollingstock is returned to “original” condition.

The majority of cars operated by 3801 Limited were originally constructed in the 1920s and 1930s. During their operating life State Rail heavily modified and in some cases rebuilt these cars. In some instances, cars that eventually came to 3801 Limited had been withdrawn from service and left on the scrap siding where they were vandalised further.

Heritage conservation plans need to recognise the history of rollingstock before discussions about “original” condition lose sight of the practical objectives.

To protect the interests of passengers, staff and volunteers, substantial insurances are necessary. Like all approved heritage rail operators in NSW, 3801 Limited has its own $10 million public risk policy while the NSW Treasury provides a further $240 million indemnity extension.

In addition to public risk insurance, the Company has Personal Accident Voluntary Workers and Directors and Officers Liability Policies. Workers Compensation cover is also required. The annual insurances for 3801 Limited are in excess of $100, 000.

The Risk and Safety Committee is the committee of the Board of 3801 Limited responsible for setting policy in these areas and monitoring results. It comprises some board members, senior management, train operating, maintenance and volunteer representatives.

Directors undertake regular monthly safety audits of train operations to check on the understanding of staff and volunteers of the Company’s safety policies and procedures. These audits are very useful in gather comments and suggestions from staff for improvements in operating practices.
Accidents and incidents are reviewed by this Committee to ensure that established procedures are safe.

As 3801 Limited is incorporated as a “not for profit” company limited by guarantee, all directors act in an honorary capacity.

The Company has 10 full time staff and some 96 volunteers. The fixed costs in operating a heritage train are high due to the substantial charges associated with insurance, staff, and equipment. Sound financial management of the income and expenditure of the Company is crucial to continued success.

The General manager is responsible for marketing and operations planning and a steady month-by-month program of tours and charters is crucial.

In the 2004/5 financial year, 3801 Limited had a gross income of $2m earned from its operations. From this, the Company expended $390,000 in the maintenance and restoration of rollingstock in its care and retained a surplus $35,000 at the end of the year. Clearly the ability to earn and invest funds of this magnitude in the ongoing maintenance and development of 3801 & its associated train through commercial activities has been to the enhancement of this heritage.

An inherent feature of heritage train operations is the long list of desired improvements to rollingstock and equipment that would assist business goals. Hence staff and volunteers are always seeking approval for expenditure in their respective areas. However, safety related expenditure always has priority but in all cases funds have to be earned from operations before expenditure can be approved.

Balancing competing demands for expenditure is a constant and difficulty task for management especially when the widely differing needs and motivating influences of paid staff and volunteers are added to the mix.

However all concerned gain their ultimate reward in witnessing the pleasure and enjoyment of the general community generated by our heritage train operations.

5. CONCLUSIONS.
The policy decision to return a significant heritage item to full operation requires that complex on-going issues of finance, safety and heritage will require management throughout the whole life of the operation.

In the case of the 3801 Limited operations, targeted marketing has enabled the restored train to earn its ongoing upkeep through the Company being financially viable.

The rapid changes in national rail safety regulation and accreditation place difficult demands on heritage operations due to the mismatch of new technology with heritage equipment.

However a careful analysis of the safety objective can often lead to an alternative approach that is acceptable regarding safety but more compatible with the heritage values.

In returning a major heritage item to operations, a balance between heritage conservation objectives and practical considerations has to be struck.

Some of the practical issues are compatibility with contemporary infrastructure, meeting current community expectations for comfort and amenity and sometimes restoration expenditure justification.

In many instances, acceptable alterations can be made that are easily reversible at a future date if a return to original condition is required.

When an object is judged to have a high value in its original condition, consideration should be given to putting it in storage and replacing it with item of acceptable amenity.

Given good will on all sides, acceptable outcomes can be achieved.

6. ACKNOWLEDGMENT
The author acknowledges the generous support and advice given in the development of this paper by the staff and volunteer members of the 3801 Limited Risk and Safety Committee.

7. REFERENCES.
Australian Standard AS 4292, Rail Safety Management
Australian Standard AS 4360, Risk Management

8. APPENDICES

3801 Ltd Performance Statistics: (04/05 Financial Year)
www.3801limited.com.au

Financial.
Total Income $1,995m
Rollingstock Maintenance $389,750
Surplus $ 35,000

Operations.
Passengers
Mainline Tours 9675
Cockatoo Run 3091
Charters 2771
Maitland Steamfest 5071
Total 20,608
In the above, 5,450 country region passengers were carried on shuttles in Dubbo, Narrabri & Griffith. Average length of journey by passengers in 04/05 was 139.6km.

**Locomotives**

Locomotive km travelled in 04/05

<table>
<thead>
<tr>
<th>Locomotive</th>
<th>Steam</th>
<th>Diesel &amp; electric</th>
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<tbody>
<tr>
<td>3801</td>
<td>14,088</td>
<td>17,675</td>
</tr>
<tr>
<td>3830</td>
<td>2,185</td>
<td>2,185</td>
</tr>
<tr>
<td>3112</td>
<td>1,402</td>
<td>1,402</td>
</tr>
<tr>
<td>Total Steam</td>
<td>17,675</td>
<td></td>
</tr>
<tr>
<td>Total Diesel &amp; Electric</td>
<td>38,719</td>
<td>68.6%</td>
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Total locomotives 56,396 km.

Locomotives accredited with 3801 Ltd: -

Steam 4 3801, 3830, 3112, SMR 18
Diesel 7 4401, 7344, 4908, 4918, 4486, 4473, 4833

**Staff & Volunteers**

Full Time.
Management & Office 3
Maintenance 7
Total 10

Casual.
Accredited drivers, firemen & guards. 71
Volunteers 96

All volunteers have passed “Track Awareness” course and 7 have first aid qualifications.