Nilgiri Railway (India)

No 944 bis

1. BASIC DATA

State Party: India

Name of property: Mountain Railways of India

Location: Nilgiri District, Tamil Nadu State

Date received: 29 January 2004

Category of property:

In terms of the categories of cultural property set out in Article 1 of the 1972 World Heritage Convention, this is a *site*. The Nilgiri Mountain Railway (NMR) is proposed as an extension to the existing World Heritage Site, Darjeeling Himalayan Railway (DHR), forming a serial nomination: Mountain Railways of India.

Brief description:

The Nilgiri Mountain Railway is a meter-gauge single-track railway in Tamil Nadu State, 46km long. Its construction was first proposed in 1854, but due to the difficulty of the mountainous location, the work only started in 1891 being completed in 1908. This railway represented the latest technology of the time, and it was highly significant facilitating population movement and the social-economic development in the British colonial era.

2. THE PROPERTY

Description

The Nilgiri Mountain Railway (NMR) consists of 45.88km of a meter-gauge single-track railway that connects Mettupalayiyam to Udagamandalam (earlier: Ootacamund or Ooty) in Tamil Nadu State. Mettupalaiyam is located at an elevation of 326m and Udagamandalam at 2203m. Rack rails consist of two toothed steel bars laid in a double row at 44mm apart and 64mm above the running rails so that the tooth of one rail is directly opposite to the gap of the other to ensure that the engine pinions do not work off the racks in curves. Rack bars of two standard lengths are in use: full bar (26 teeth per 3.12m) and half bar (13 teeth per 1.56m). The pitch of rack teeth is 120 mm. The entry to the rack is effected through specially designed entry tongues laid in special channel sleepers fitted with bow springs and connecting links connected finally to the rigid bars. The racks are laid at a constant distance of 455 mm. from the inner rails and are screwed by bolting to cast iron chairs fixed to the sleepers with fang bolts.

The railway can be divided into three sections:

1) The first section, ca 7 km, from Mettupalaiyam to Kallar (elevation 405m), is across the central plain of Tamil Nadu. The Railway runs through beetle-nut palm and other plantations. Maximum speed is 30km/h. Mettupalaiyam, was a small village in the 1850s and it gained importance as a railhead only after the British laid a Broad gauge line from Coimbatore to Mettupalaiyam in 1873. The Broad gauge train from Madras to Mettupalaiyam was called the Blue Mountain Express, the name of which was changed recently to the native Nilgiri Express. Mettupalaiyam has the carriage and Wagon Depot of the NMR and all the carriages and Wagons are maintained there.

2) The second is the rack section of the line, from Kallar to Coonoor (elevation 1712m), climbing 1330m in 19 km. On this rack section the average grade is 1 in 15 and the ruling grade is 1 in 12. There are 208 curves and 13 tunnels, as well as a half tunnel, where the Railway has been cut into the sheer cliff wall, enclosed by rock on three sides. There are 27 viaducts, built in steel and stone, featuring steel girder spans, typically of 60 feet (18.3m) supported on stone abutments and piers. The Kallar Bridge over the River Bhawani, the Adderley viaduct and the Burliar Bridge are examples of such composite bridges. Here, the Railway climbs through almost uninhabited, tropical jungle. The last five kilometres feature fine views over the escarpment, which the train has just ascended. Maximum speed is 13km/h. Coonoor town is built on one of the best geographical locations in the Nilgiri Mountains with a cool and equitable climate.

3) The third section is 18km long. The landscape is neat with dominant eucalyptus and acacia forest. The railway continues to climb across the Nilgiris till it reaches its summit just before the terminus of Udagamandalam at 2203m. Although the climb here is not as steep as the rack section, the ruling gradient between Coonoor and Udagamandalam is still very steep 1 in 23. There are three tunnels in this section including the longest on the line, some 282m. Maximum speed is 30km/h. The name of Udagamandalam refers to a collection of quaint huts of the aboriginal Todas, who believe they have always lived here. This place is popular for tourists.

The bogies were modified in 1992 to enable the passengers to get a good view on both sides. The coaches and wagons are provided with brakesmen who independently operate friction brakes and rack brakes on whistle codes from the driver. The railway is operating "X" class locomotives with pinion wheels on rack rail arrangement to negotiate the steep gradient of 1 in 12. Due to the steep gradient and adverse weather conditions, two different braking systems are used: i) adhesion braking between wheel and rail through friction, ii) brake application through the pinion and rack bar, connected to the track. The locomotive pinions are made to drive the pistons, which act as air compressors causing dynamic braking effort. The clasp brakes actuated by hand wheels on the brake drum, mounted on the pinions can also apply braking effort on the cogwheel.

History

Protected by wild, jungle-covered escarpments and located at an elevation of roughly 2000 meters, the Nilgiris hills were isolated until the 19th century with their tribal inhabitants, the Todas. The name of the hills means Blue Mountains in Sanskrit and reflects the perspective of a person looking at them from below. British settlement in the hills began in 1820. By 1830 there was military commandant, and British families from Madras began

building summerhouses, especially in Udagamandalam (Ootacamund). By 1870, the Madras government as a whole was moving there for the summer, in imitation of the annual migration of the viceroy's Government from Calcutta to Simla.

The history of NMR dates back to 1854 when proposals were first made by the British to build a railway up the hills. Work began on the Madras-Coimbatore line (5'6") in 1853, and the branch to Mettupalaiyam opened in 1873. The problem was how to replace the tedious ascent by bullock-cart or pony to Coonoor. In 1873, the district engineer of the Nilgiris, J.L.L. Morant, proposed building a rack railway, but the first offers were reclined. Sir Guildford Molesworth, the former engineer in chief of the Ceylon Government Railway, acting as consultant to the Government of India, advised a rack and adhesion line on the model of the Abt system built in the Harz Mountains in Germany. In 1882, M. Riggenbach, the Swiss inventor of Rigi rack railway, submitted a proposal for the construction of the railway line. This was accepted, and the *Nilgiri Rigi Railway Company Ltd* was formed in 1885. The work was inaugurated in 1891, and finally completed in 1908. Subsequently the railway was run by different companies, and was then incorporated into the Southern Railway in 1951.

Management regime

Legal provision:

The Ministry of Railways of the Government of India owns all the movable and immovable assets of the NMR.

The NMR has the legal protection available under the Indian constitution to Central Government property. The current protective measures are provided in the Railway act of 1989, dealing also with the pressures of unauthorised occupation of Government land and premises.

Management structure:

The management is guaranteed by the Ministry of Railways and the relevant branch offices.

There is a Property Management Plan, which deals with the management of the land, the buildings, the track, the bridges, and the tunnels.

Resources:

The resources are provided by the Indian Ministry of Railways.

Train services, station facilities, platforms and passenger amenities are provided for visitors and commuters. In addition, special tourist trains are promoted. Most stations have cafeteria; retiring rooms are available at Udagamandalam, Lovedale, Coonoor and Wellington. The total number of visitors to Nilgiri mountains in 2000was ca 1.5 million; ca 294,000 tickets were sold on NMR.

Justification by the State Party (summary)

The property is nominated on the basis of criteria ii and iv:

Criterion ii: NMR is an example of a colonial Railway, and part of that stage of globalisation, which was characterized by colonial rule, and the political and economic domination of the people of Asia, Africa and the Pacific by Europeans. Part of that process was technology transfer, and NMR is a spectacular example of such transfer. The Nilgiri plateau was transformed into a tea-growing area, a landscape made largely by human intervention with eucalyptus as the dominant tree, imported from Australia. Socially, the Nilgiris Mountains have been a location for interaction British and South Indian communities.

The technological and social interchange is also evident in the application of rack Railway technology as applied in the west to establish a rail link in a tropical location. The Swiss qualities of the NMR are strong. The steam locomotives which still work all traffic on the rack section and the tourist special on the adhesion section are the X class, designed in 1911 and built by the Swiss Locomotive and Machine Works in Winterthur between 1913 and 1952. The export of technology from Switzerland has contributed to the unusual if not quite unique features of the NMR.

Criterion iv: This Railway is a unique example of construction genius employed by Railway engineers in the later part of 19th century. Before the railway it took more than 10 days to reach Udagamandalam, braving insects and wild animals. With the introduction of the Railway, the 45 km journey took only 4 ½ hours. Various facets of the Railway line, viz. the rack & pinion mechanism to gain height, the steam engines, coaches, the station buildings preserved in their original shape all bear testimony to the technological skills of the bygone era are an outstanding demonstration of their function and illustrates a significant stage in human history. As an example of the transfer of rack railway technology to remote locations outside Europe, the NMR is certainly the outstanding remaining example in the world, in terms of its scale, authenticity, continuity and presentation. As an ensemble, with its impeccably maintained permanent way; its elegant, original stations and associated buildings, and its large proportion of old rolling stock and locomotives, it is genuinely outstanding, even unique.

3. ICOMOS EVALUATION

Actions by ICOMOS

An ICOMOS expert mission visited the property in September-October 2004.

Conservation

Conservation history:

The railway has been regularly maintained and used. The oldest rails on the line were laid in 1931-32 and the newest in 1999-2000. Most date from the 1940s and 1950s. Steel bridges are regularly painted and are in excellent condition. The date of its last painting is recorded on each steel span. Some inevitable damage has been caused in this high rainfall monsoon area. The worst damage was on 11 November 1993, when 333mm of rain in one day washed away 200 metres of track at km 20.4 (as well as causing considerable loss of life). Services on the section were

suspended for three months and rebuilding cost a total of 3,500,000 rupees.

State of conservation:

Protection is as good as can be expected for such a site. This is a working railway, which means it needs to be maintained and repaired as well as conserved on a regular basis.

Management:

The NMR is well managed, and there is a detailed management plan with the nomination. In addition, the railway's relative isolation and topography guarantee some protection already; forestry regulations and management provide protection on the most remarkable section from Kallar to Coonoor; and the buffer zone assures adequate measures in the urban areas.

The Southern Railway has a secure resources base and high-quality personnel who recognise the importance of heritage. They maintain the NMR to high standards and provide resources to do so, even though it is one of the most unprofitable sections of their railway.

The buffer zone is often only 8.5m. Nevertheless, considering that the most critical section on the escarpment between Kallar and Coonoor is through forest under the control of the Forestry Department, protection is considered to be adequately assured. The only section where development poses a potential threat is in the town of Coonoor. This is a relatively short section (about one kilometre long), and the railway is at that point in a narrow valley with rather steep sides. The reservation at this point is relatively wide, because it includes the station and its forecourt, the workshops, locomotive depot, the junction of the main line, and the line into the station. In fact, the topography provides a real protection to the railway extending far beyond its formal buffer zone.

Risk analysis:

The region where the railway is located is earthquake prone as well as being subject to abundant tropical rains. There is also the risk of landslides especially during rainy season. It is recognized, however, that the Indian Railways are committed to monitor and prevent damage as far as possible.

Authenticity and integrity

The railway has been remarkably little altered since it was built. It has three major stations, Mettupalaiyam, Coonoor and Udhagamandalam. The first two, which are also where the railway's workshops and depots are located, are in most essential respects exactly as they were when built in the 1890s. Coonoor is a particularly impressive station, with retiring rooms providing accommodation on the first floor. There have been, of course, some modifications (electric light, sewerage and signage), but they are fundamentally intact. The same applies to the carriage and wagon workshops at Mettupalaiyam and the locomotive workshops and depot at Coonoor. The station at Udhagamandalam is not as authentic. Its original building remains, but it had an extension added in the 1980s and the locomotive facilities have been removed. The minor stations are well conserved. While there have been some closures (notably Fernhill near Udhagamandalam, which has been converted into a resthouse), most remain as built. The interiors, fittings and furnishings are largely original and are used exactly as intended when built. This includes their ticket racks, cash boxes, and even their records. The original ticketing system, using Edmondson card tickets, continues in use. Signaling on the railway is totally original and contributes to both its authenticity and character.

The locomotives and rolling stock are strictly speaking moveable items. However, since there is nowhere else in India (and indeed very few railways anywhere in the world) they can be used, they are in effect irremovable from the NMR, other than by being scrapped or exhibited elsewhere. The locomotives are not those with which the line was opened, but were introduced in 1920 to a design developed by SLM, the Swiss Locomotive and Machine Works at Winterthur. Eight of these survive and all are still based at Coonoor. These eight SLM machines constitute the world's largest steam rack locomotive fleet and also its most original. The coaches, too, are significant. There is a total of 31 coaches on the NMR, all built during 1931 and 1932. They are the oldest passenger coaches in regular use on Indian Railways and some of the oldest used on regular trains anywhere in the world. They are also the only timber coaches still used in India.

Comparative evaluation

Taken as a whole, the railway is quite a large undertaking. According to the international comparative assessment provided in the nomination document and confirmed by TICCIH, it is easily the most original and one of the largest rack-and-pinion railways in the world. The NMR is an almost perfect example of the Abt rack system as it was at the height of its development, and it is supplemented with old-fashioned block working by Neale's tablet. Most stations, all signal boxes and workshops, and virtually the entire infrastructure are still in their original condition. Rack railways were never very common in British railway practice. They were more numerous in the Austro-Hungarian Empire and in Switzerland. On the World Heritage List, there is the 41km long Semmering Railway in Austria, which was built 1848-54.

The NMR railway is one of five surviving historic railways in India, including the Darjeeling Himalayan Railway (DHR) already inscribed on the World Heritage List. TICCIH has indicated that the DHR and the NMR are the two most innovative and outstanding of the five.

The DHR is basically a roadside tramway, 0.61m wide, with no notable structures, and built extremely economically. It was the first Indian mountain railway (1880-81), and experimental in nature. By contrast, the Nilgiri Mountain Railway, built nearly two decades later, is an altogether more substantial affair. Its gauge is broader, about 1m, and it is on its own reservation throughout its length. The NMR climbs far more quickly and on steeper grades, using the Abt rack system. This is which makes the Nilgiri Mountain Railway unusual. There are few other Abt rack railways in the world, and none so authentic throughout. It is also big for a rack railway, with relatively large steam locomotives and heavy trains.

Outstanding universal value

General statement:

The NMR has unusually high cultural values, reflecting successive waves of population movement into the Nilgiri Mountains. The movement from the plains into the Nilgiris began only during the later colonial period, after the British began to use the area as a resort. The railway was an essential part of that population movement, which transformed the Nilgiris from a remote area inhabited by tribal people with minimal connections with the rest of the country into an important region. The district is now thoroughly integrated into the mainstream of Indian social, cultural and political life.

The railway and the improved communication it brought was a critical part of this process. The railway brought the tribal people of the Nilgiris, like the district itself, into the mainstream of Indian life. They were converted to Hinduism and Christianity; and their traditional barter economy monetarised. A new population of Tamils (the most numerous), Kannadigas and Keralans from the plains, and of course British (now almost entirely departed) came to live in their land, which, thanks to the railway, was no longer a remote mountain fastness. A part of these changes was more intensive (and, in modern terms, more rational) use of the land, although the Nilgiris remain far from densely populated by Indian standards. The Toda people, one of the five main tribal groups, celebrated the coming of the railway in at least two songs dating from the early twentieth century.

Few railways have led to the creation of such works, which reflect its cultural significance. This significance is highly representative, and it is also unusually striking and well documented. As such the NRM has claims to universal significance on cultural grounds. The railway was a product of the colonial era, and it was built primarily to serve the colonial masters – their tea gardens, their summer capital, their cordite factory – but Indians, both the tribal peoples who had been there for centuries and the numerous migrants who came with the British from the plains, have made it their own, culturally as much as economically.

Thus, the cultural significance of the Nilgiri Mountain Railway extends beyond its significance as a built structure in a landscape, although it is notable in this regard alone. The landscape through which it passes is beautiful but challenging, and the technical solutions the railway's builders used to meet the landscape's challenges are a testimony to their creativity and ingenuity. But the NRM is also a railway which had a crucial role in causing changes in population, economic patterns and culture. It is a tangible expression of those changes which it occasioned.

Evaluation of criteria:

The present nomination is proposed as an extension to the existing World Heritage property, 'Darjeeling Himalayan Railway', of which the construction was completed by 1881. This property has been inscribed on the basis of criteria ii and iv as follows:

Criterion ii: Like the Darjeeling Himalayan Railway, the Nilgiri Mountain Railway is an outstanding example of the influence of an innovative transportation system on the social and economic development of a multicultural region, which was to serve as a model for similar developments in many parts of the world.

Criterion iv: The development of railways in the 19th century had a profound influence on social and economic developments in many parts of the world. This process is illustrated in an exceptional and seminal fashion by the two mountain railways in India, DHR and NMR. Of these, the NMR is distinguished representing a technically advanced phase, while the other mountain railways already inscribed, i.e. Semmering Railway in Austria and DHR in India, represent the beginnings of this development.

4. ICOMOS RECOMMENDATIONS

Recommendation with respect to inscription

ICOMOS recommends that the World Heritage Committee adopt the following draft decision:

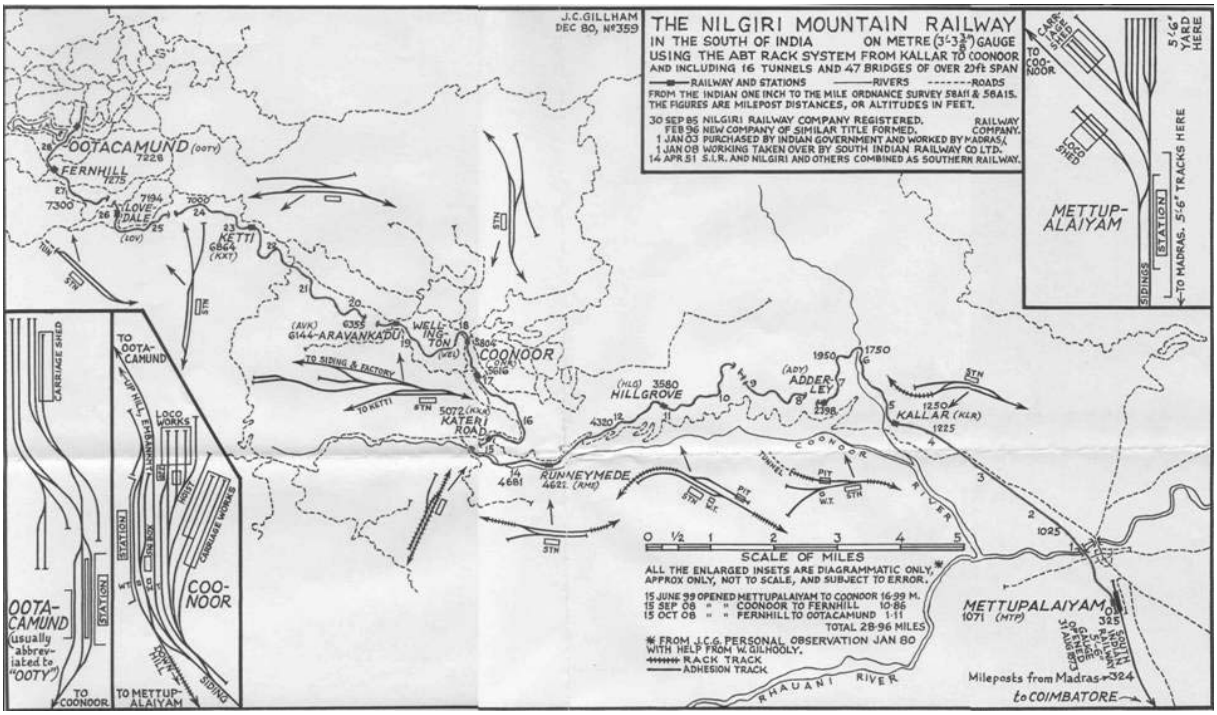
The World Heritage Committee,

1. Having examined Document WHC-05/29.COM/8B,

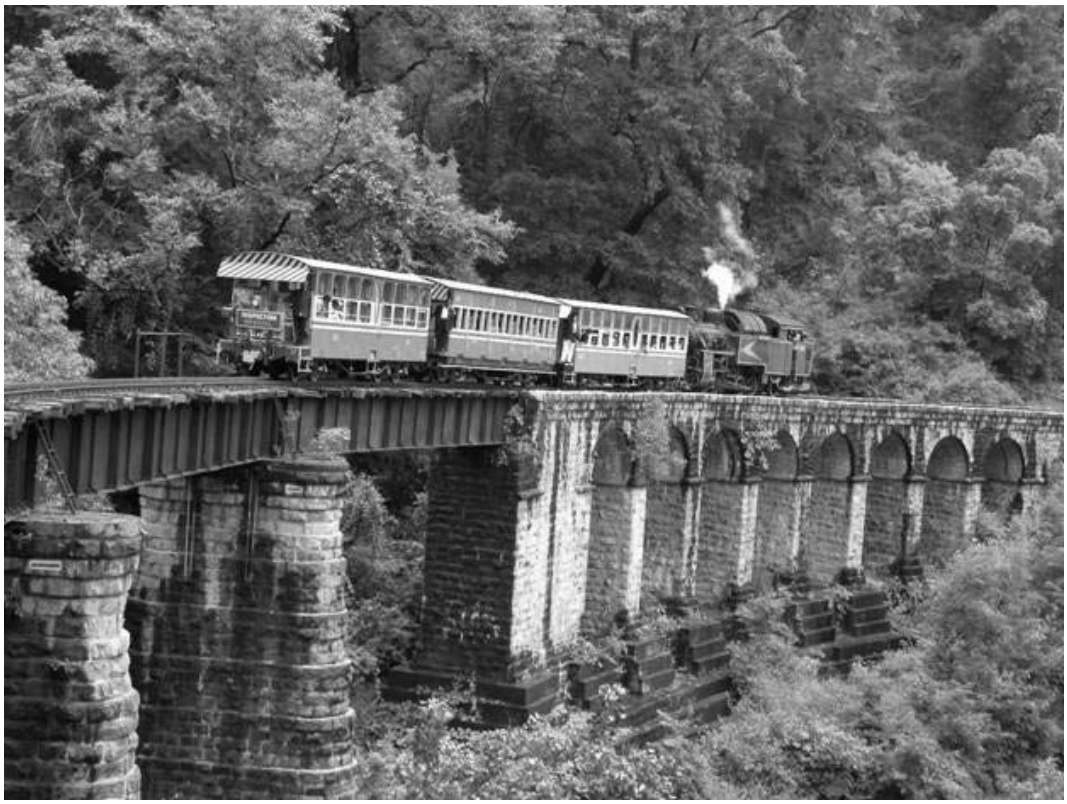
2. Approves the extension on the basis of the ***existing criteria ii and iv***:

> ***Criterion ii***: The mountain railways of India are outstanding examples of the interchange of values on developments in technology, and the impact of innovative transportation system on the social and economic development of a multicultural region, which was to serve as a model for similar developments in many parts of the world.
>
> ***Criterion iv***: The development of railways in the 19th century had a profound influence on social and economic developments in many parts of the world. The Mountain Railways of India are outstanding examples of a technological ensemble, representing different phases of the development in high mountain areas.

ICOMOS, April 2005



Map showing the route of Nilgiri Mountain Railway



Coaches of the Nilgiri Mountain Railway

View of second section through the jungle