

Transporting Oil Products to Disaster Areas

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Rail Transport of Oil Products

Generally, railways worldwide play a key role in carrying oil products using tank wagons over long distances between refineries, which are often in port areas, and inland oil depots. As an island nation, Japan imports nearly every barrel of oil it consumes because the country has almost no

domestic oil reserves, so rail and road oil transport are key logistical operations.

The following table shows the shares of transport volume in fiscal 2009 to the six prefectures in the Kanto and Tohoku regions of Japan where transport distances are 100 km or greater. It clearly demonstrates how oil transport by rail plays a major role in supporting the livelihoods of people in these regions.



Double-headed DD51 diesel locomotives running on Ban'etsu West line

(JR Freight)

Transport Immediately after Great East Japan Earthquake and Tsunami

The huge Magnitude 9 Great East Japan Earthquake struck northern Japan mid-morning on Friday 11 March 2011. The massive damage to the region's power and transport infrastructure, first from the earthquake and then from the tsunami, immediately knocked out supply of oil products (petrol, kerosene, diesel, and fuel oil). Road and rail links were cut and power-supply disruptions even prevented pumping of petrol at stations that had survived the disaster unscathed. Although the rail network around greater Tokyo returned to operation gradually during the weekend, rolling blackouts from Monday 14 March coupled with damage to refineries in the area meant

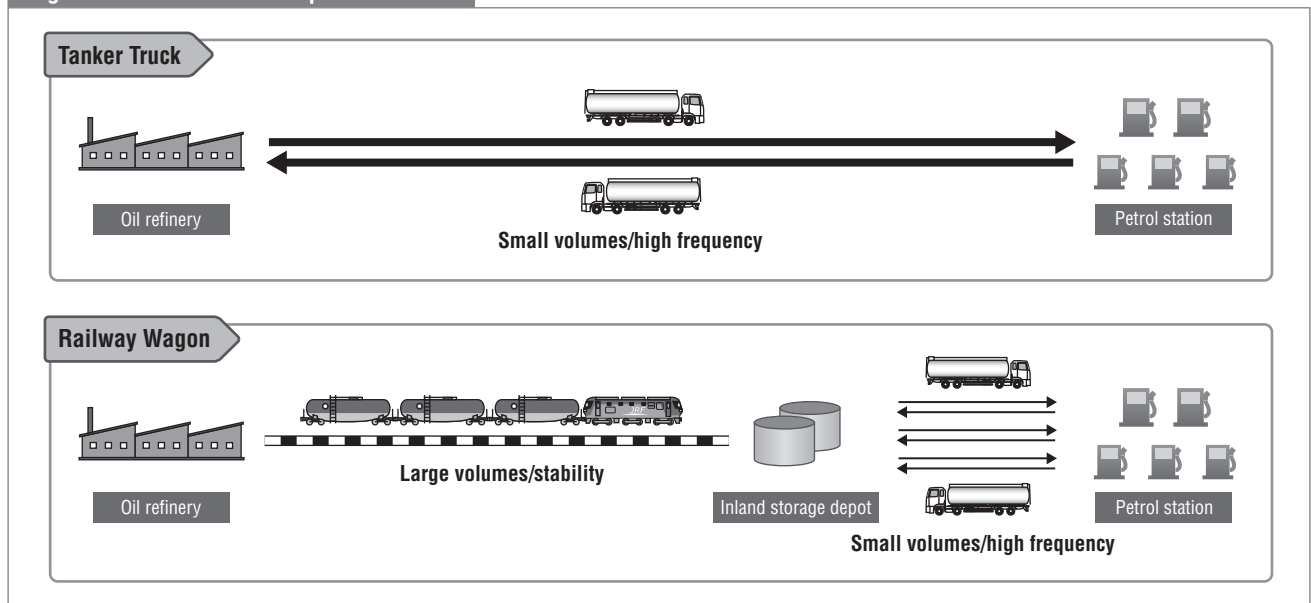
Table 1 Shares of Transport Volume in FY 2009

(1000 kiloliter)

	Nagano	Gunma	Tochigi	Yamanashi	4 Prefectures total	Iwate	Fukushima	2 Prefectures total	Grand total (6 Prefectures)
Oil Sales Volume	2595	2410	2430	847	8282	1798	3362	5160	13,442
Rail Transport Volume	2161	1823	1647	356	5987	413	766	1179	7166
Rail Transport Share	83.3%	75.6%	67.8%	42.0%	72.3%	23.0%	22.8%	22.8%	53.3%

Figures for oil sales volume: Petroleum Association of Japan

Figure 1 Oil Product Transport Methods



that oil shipments to inland parts of the Kanto region soon backed up. Even in Tokyo, long lines formed at petrol stations as supplies ran short and unofficial rationing started.

In light of this dire situation, on 14 March, JR Freight approached the Ministry of Land, Infrastructure, Transport and Tourism (MLITT) and JR East, which manages train operations in the affected areas, to gain their full support in assuring rail transport of oil. As a result, JR Freight managed to avoid the effects of rolling blackouts from 15 March and restarted oil transport in stages as refineries came back online.

Transport to Stricken Areas

The 24-hour TV news coverage was soon showing scenes of refugees shivering in the freezing winter cold at evacuation centres, because there was no kerosene for heaters. Increasingly longer queues of people and cars were forming at petrol stations. Before the disaster, oil freight trains to the Tohoku region mainly used the Tohoku Line (from Sendai Rinkai Railway to Morioka Freight Terminal or Koriyama and from the Keihin/Keiyo industrial regions to Koriyama). These lines had been cut and damaged at many locations and restoration work between Utsunomiya Freight Terminal and Morioka Freight Terminal was expected to require a long time to complete. Worse, the only oil refinery in the Tohoku region at Sendai as well as the JR Freight Sendai Rinkai Railway had both suffered major damage from the tsunami.

Detour to Morioka Freight Terminal

The cuts in the transport links forced planning of a 1030 km detour to Morioka Freight Terminal running from the Keihin

area (Negishi Station) via the Joetsu Line, Nihonkai Jukan Line, Aoimori Railway Line, and Iwate Galaxy Railway Line. On 16 March, planners hoped to get the detour operational on 19 March, but due to the strenuous efforts of all the companies involved, transport started a day earlier on 18 March.

Although the Negishi Refinery of JX Nippon Oil & Energy Corporation had been affected by the earthquake, it managed to start shipping on the day the detour opened.

The only tank wagons that Japan Oil Transportation could run over the full detour were thirty-six old *Taki* 38000 Series wagons built in the Japanese National Railways (JNR) era. They were spread all across Japan at the time and the company rushed to marshal them together as soon as possible. Normally, the Japan Oil Terminal oil depot only operated in the day, but the company immediately switched to night operations to match freight schedules.

It was soon clear that running an 18-wagon train each day to the region would require three trains for a total of 54 wagons, meaning we would run out of wagons in 2 days using the 36 available. We frantically started working to find out if the new *Taki* 1000 Series, of which there were about 900 available, could run the full detour route. With JR East's cooperation, operations could start in a few days. Thanks to the everyone's dedication, the initial detour trains managed to run every day and a second daily run was added from 21 March.

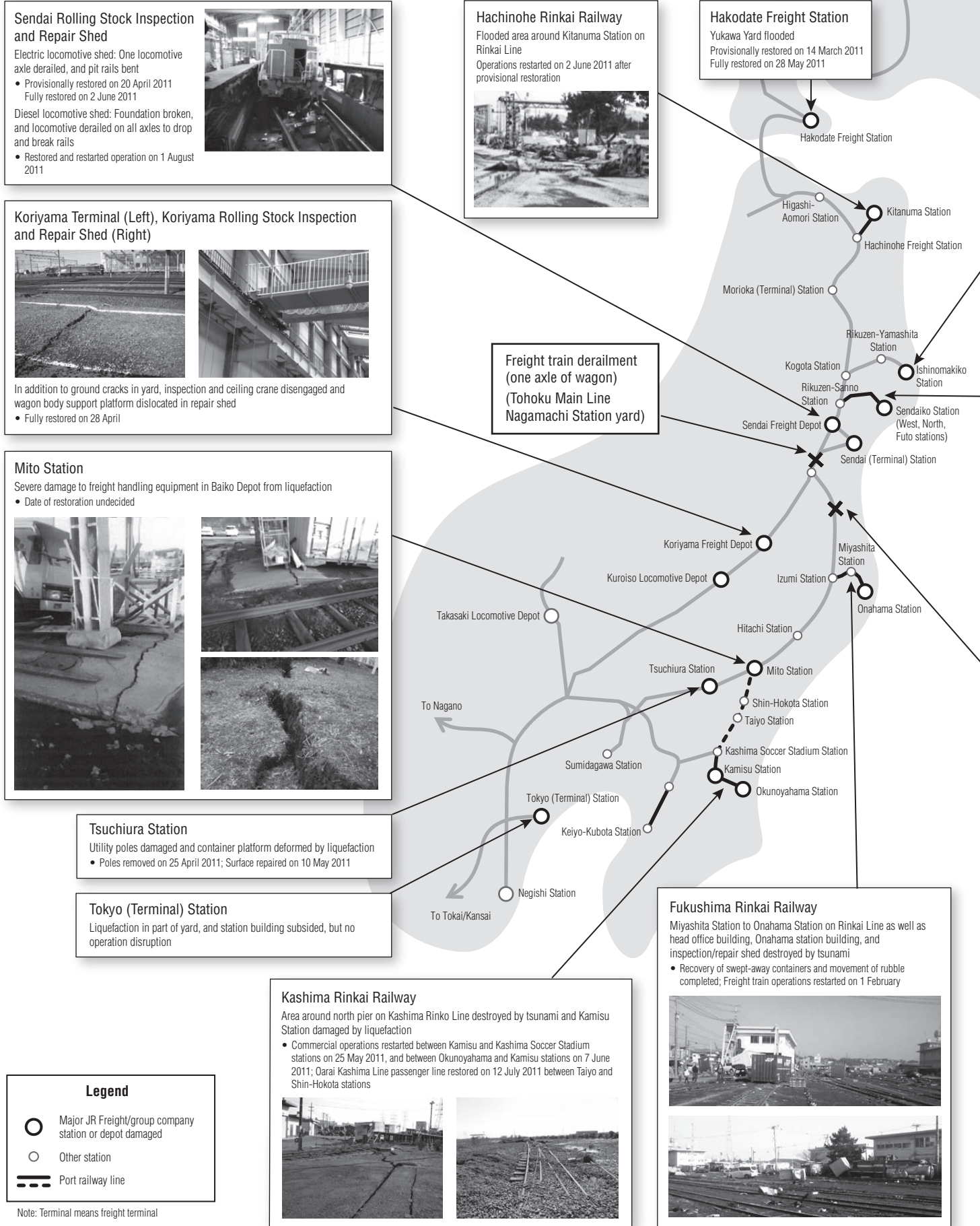
Detour to Koriyama

Like Iwate Prefecture, Fukushima Prefecture was suffering a shortage of oil products too, so a 570-km detour was planned from Negishi Station to Koriyama Station via a route

Figure 2 Damage to JR Freight and JR Group Companies from Great East Japan Earthquake

Number of damaged rolling stock (registered to JR Freight) and containers

4 locomotives, 172 container wagons, 46 privately owned freight wagons, 1095 containers, approximately 130 privately owned containers





Ishionomaki Station

Entire station yard as well as shipper's dedicated line and JR Freight owned and operated Senseki Freight Branch Line destroyed by tsunami

- Containers swept away on land recovered, disassembly of destroyed locomotives and wagons and removal of line equipment completed



Sendai Rinkai Railway

Entire length of Rinkai Line from underpass No. 10 to end of line as well as head office building, station building, and inspection/repair shed destroyed by tsunami

- Recovery of swept-away containers, movement of rubble offsite, disassembly of destroyed wagons, and removal of destroyed line equipment completed
Sendainishiko Station reopened on 25 November 2011; Sendaihuto Station reopened on 16 March 2012; Sendaiko Station reopened on 19 March 2012; and Sendaikitako Station to reopen in September 2012



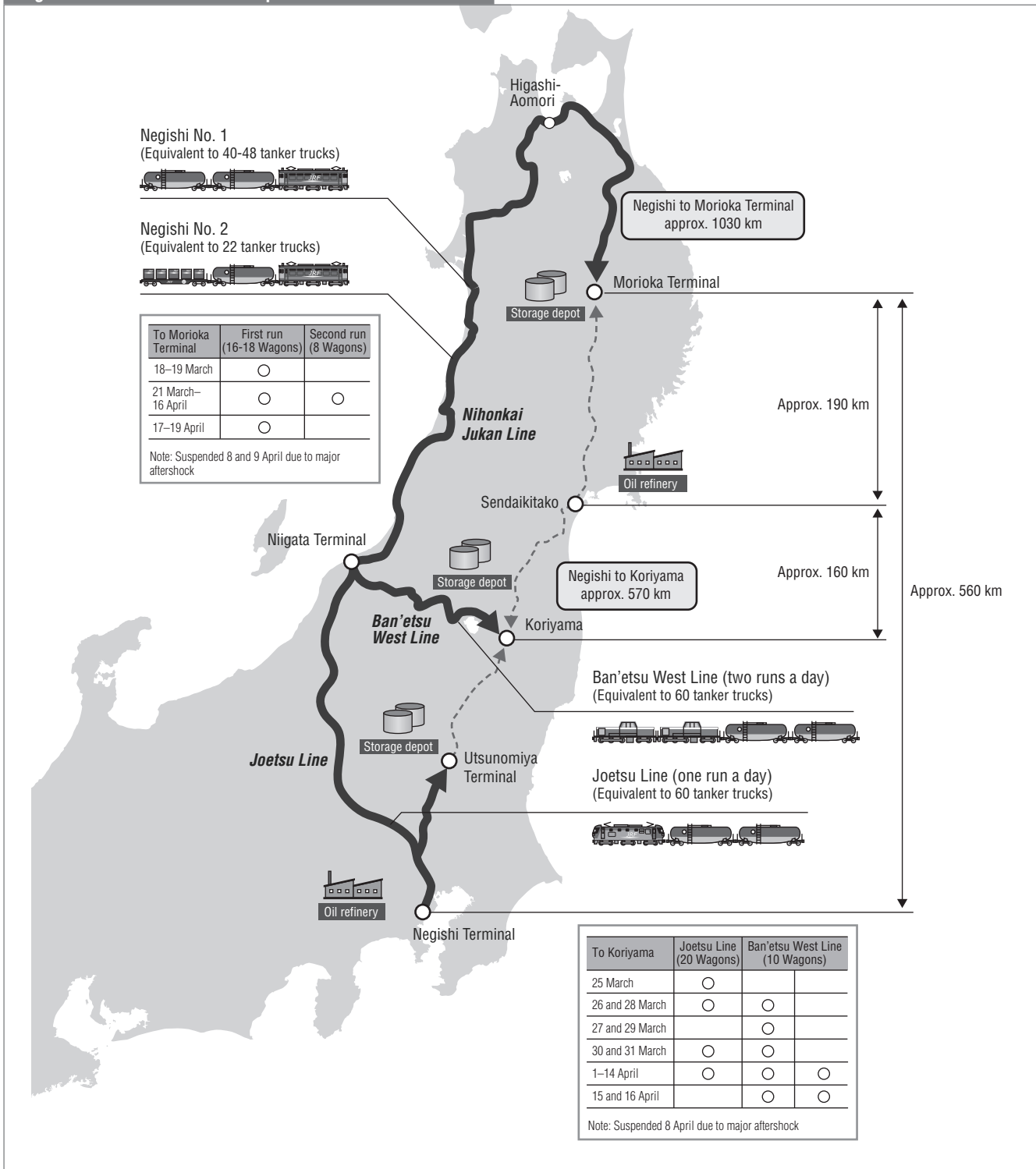
Freight train derailment (Joban Line between Yamashita and Hamayoshida stations)

Locomotive hit by tsunami with driver still onboard (about 15:50); 20 freight wagons and 75 containers swept away, but locomotive not derailed and driver unhurt

- Freight wagon and container disassembly and removal completed; Locomotive disassembly and removal completed in mid-November 2011



Figure 3 Alternative Oil Transport Routes and Volumes



including the Joetsu and Ban'etsu West lines. A major hurdle was the fact that no freight had run on the Ban'etsu West Line since 2007, so a lot of the work involved securing sufficient locomotives and drivers to meet the transport capacity.

DD51 diesel locomotives were needed, because part of the route was not electrified. Eight locomotives were brought from as far as Hokkaido, Nagoya, Osaka, and Kyushu. Normally, drivers undergo a month of training before driving on lines that they do not normally work on. However, since

there was no time, with JR East's cooperation we conducted intensive training of JR Freight drivers on 25 March when the Ban'etsu West Line was restored.

The transport capacity of the Joetsu Line is 20 wagons, but the steep grade on the Ban'etsu West Line only allowed haulage of 10 wagons even with double-headed DD51 locomotives. Consequently, a 20-wagon train was run every other day on the Joetsu Line from the start of operations on 25 March and it was divided at Niigata Freight Terminal into



Class EF81 freight locomotive hauling tanker wagons

(JR Freight)

two 10-wagon trains to run daily on the Ban'etsu West Line. When enough drivers were ready on 30 March, a 20-wagon train was run every day on the Joetsu Line, with two 10-wagon trains running every day on the Ban'etsu West Line.

Transport Results for Detour Trains

As shown in the following table, between 18 March and 19 April, detour trains to Morioka Freight Terminal hauled the equivalent of 1850 oil tanker trucks. From 25 March to 14 April detour trains to Koriyama hauled the equivalent of 1000 oil tanker trucks.

Terminus	Transport Volume (10,000 kiloliters)	Oil Tanker Truck Equivalent
Morioka Freight Terminal	37	1850
Koriyama	20	1000
Total	57	2850

Note: Conversion to tanker truck loads = Transport volume (kl)/20 kl (capacity of one tanker truck)

Oil Transport after Tohoku Line Reopening

Although it has been more than a year since the disaster, Sendaikitako Station has still not recovered even after the full reopening of the Tohoku Line on 21 April 2011, so oil transport to Morioka Freight Terminal is using two oil freight trains a day from Negishi Station via the Tohoku Line. Oil

transport to Koriyama Station is by one train a day from Negishi Station via the Tohoku Line plus the two trains a day running as in the pre-quake days from refineries in the Keihin/Keiyo area, for a total of three trains a day.

Emergency oil transport was achieved after the earthquake by the cooperation of the companies involved. We are sure that, through these efforts, the importance of logistics as part of the social infrastructure has come to be recognized by more people than ever before. ■



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