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CENTRAL INTELLIGENCE AGENCY

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COUNTRY USSR

REPORT

SUBJECT 1. Refrigerator Trains in the USSR
2. Miscellaneous Information on Soviet Railroads (*description of network; electrification*)

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[Redacted]

a nine-page [redacted] report on refrigerator trains in the USSR and miscellaneous information on Soviet railroads.

[Redacted]

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[Redacted]

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[Redacted]

RAILROADS OF THE USSR

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REFRIGERATOR TRAINS IN THE USSR

[Redacted]

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The make-up of a refrigerator train

[Redacted]

The train is composed of a locomotive, diesel-electric or steam, a car [Redacted] call the power plant, in which are installed the diesel motors which produce the electric power; another car, the refrigerating plant, in which are mounted the compressors, condensers, brine pumps, and all the refrigerating apparatus; and finally, a third car, occupied by the personnel who tend the equipment and by all the gauges and remote control instruments. The train proper consists of 20 cars refrigerated by calcium chloride brine, which circulates through coils located in the car roofs.

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These trains carry a total of 600 tons of refrigerated cargo, chiefly frozen products.

The cars are four-axle, with roller bearings, air brakes, and automatic coupling.

They are metal cars, thermically insulated, of course. The refrigerating surface of the coils is about 120 square meters.

The power-plant car has three diesel motors, connected directly to their alternating-current generators, with a total capacity of 260 horsepower, [Redacted]

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[Redacted]

The temperature inside the car can be maintained down to -10° Centigrade, with a temperature outside of more than 30°C.

The brine, driven by a pump, circulates at a temperature between minus 15 and minus 17 degrees Centigrade.

[Redacted]

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The car couplings of the brine tubes are flexible metal tubing.

Temperature regulation in each car is completely automatic, controlled by solenoid valves. The temperature in the cars can vary, because the thermostats operate absolutely independently.

The operation of the power plant and the refrigerating plant is also completely automatic, controlled by start and stop mechanisms through electrothermal relays.

Consequently, no personnel of any kind ride in these cars.

The refrigerator cars are equipped with electric fans which circulate the air inside the cars to maintain the desired temperature more easily and avoid fluctuations of temperature as far as possible.

The refrigerating agent used is ammonia.

In view of the special climatic conditions and the great variations in temperature in the regions through which the train travels, an electric heating system is also provided, which, like the cooling system, also operates automatically when the outside temperature is too low.

The personnel car is equipped with living quarters for the seven-man train crew.

These are specialists in diesel engines and refrigeration machinery, as well as specialized electricians.

This car also has a panel with thermometers and all kinds of indicators, operating by remote control, by means of which it is possible to follow the operation of the equipment and observe at any time whether the train is functioning properly.

There is radiotelegraphic communication with the locomotive, and consequently with the general network.

These trains are coupled to the locomotives which run on the routes which the trains travel; but they are completely independent of the traction system.

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[redacted]

These trains are used to haul refrigerated products, and especially frozen products, for great distances. They call a distance of 10,000 to 12,000 kilometers "great". The average period of time which they take to cover those great distances is about 2 weeks.

The operational cycle of these trains is calculated at 4 months, at the end of which they go to bases for repair, overhaul, cleaning, and preparation [for a new run].

They have four big bases with mechanics and shops for all these repairs, the whole length of the railway from the Ukraine and Moscow to Vladivostok.

Since the work of the personnel is very hard, they are relieved frequently.

The cars are insulated with a spongy plastic product called IPORCA [sic].

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[redacted] the cost per ton-kilometer for merchandise hauled on these trains is about equal to the cost for hauling it in refrigerator cars using natural ice. The cost is calculated to be 10 kopeks per ton-kilometer (one ruble equals 100 kopeks).

These cars are 15 meters in length. "Iporca" plastic insulation is of a uniform thickness of 15 centimeters.

The over-all "K" coefficient for these cars, [redacted] is 0.32.

[redacted] these trains, [redacted] 75 in operation, are perfected and [redacted] their performance is satisfactory.

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There are also some groups of two cars, with a refrigerating plant connected as shown in the following figure:

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The refrigerating-plant compartment has a diesel motor coupled to a generator, which supplies the power to run the compressor, fans, etc. The other compartment in the other car, in which the personnel ride, has a control and instrument panel also.

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Two men constitute the crew of [one of] these groups; they work in shifts.

They also have a kind of car with a compartment for the diesel-electric unit and compressor and refrigeration machinery.

The two-car groups described above are also used for long hauls, coupled to passenger trains, or forming special trains.

The cars with independent units are used for shorter distances and are coupled to fast passenger trains.

[redacted] these last two types of cars are in an experimental stage.

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In addition, they have 60,000 ice-cooled refrigerator cars. The ice is placed in tanks in the sides and in the roof. The cars are being modified so that all the tanks will be in the roof, for they prefer to carry the ice in roof tanks.

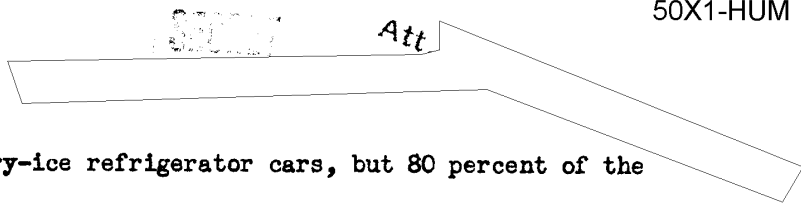
The load of ice per car is about 6.5 tons. The cars are four-axle, 13.5 meters in length.

The modern metal cars are 17 meters long and have roller bearings, which enable them run at a speed of 100 kilometers an hour.

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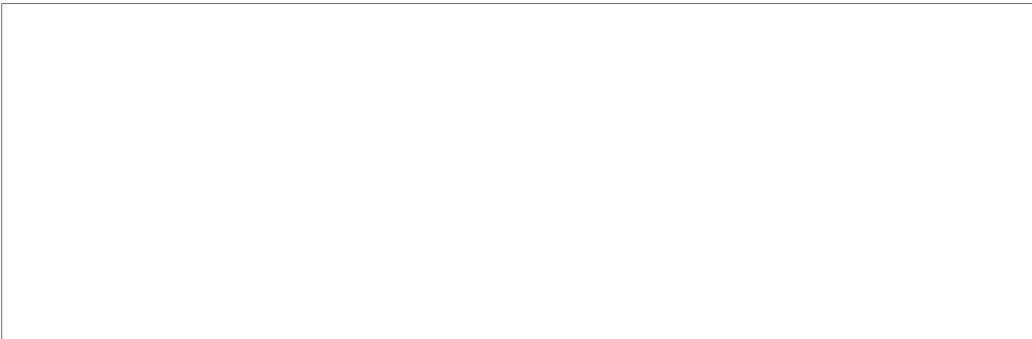


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There are also dry-ice refrigerator cars, but 80 percent of the cars are refrigerated with natural ice.

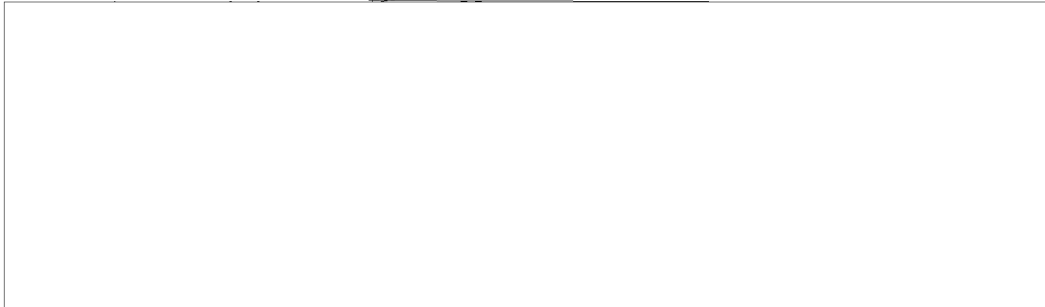
They form and collect this natural ice by a clever method, utilizing the temperature of the atmosphere. The consumption of natural ice is 18 million tons, compared with 2.75 million tons of artificial ice.



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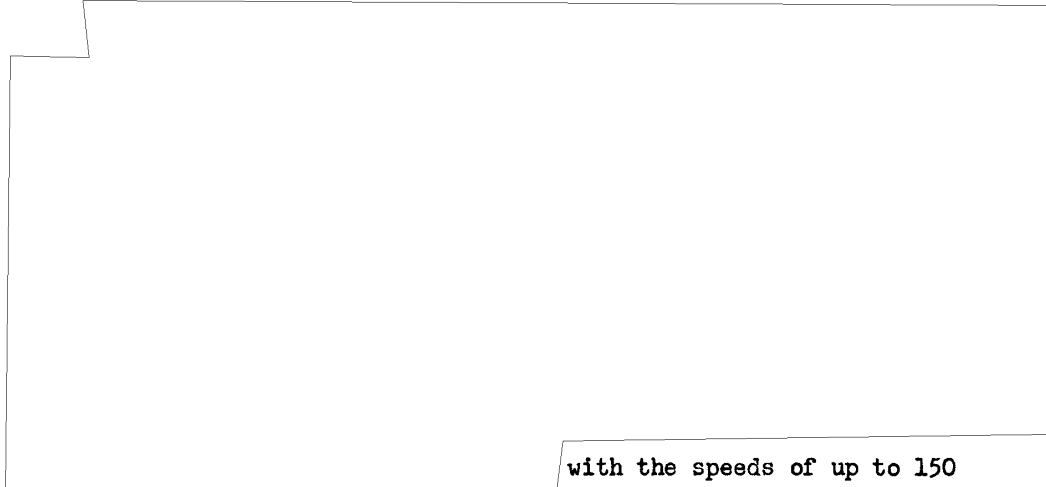


They prefer diesel-electric locomotives and use them almost exclusively, using only a few mechanical ones for switching locomotives.

Most of the locomotives have a small number of axles. 50X1-HUM

have locomotives of up to 6,000 horsepower, with a weight per axle of 20 tons. 50X1-HUM

They have one of the most modern diesel-electric locomotives, with a radio, a device for limiting speed, and cab signaling.



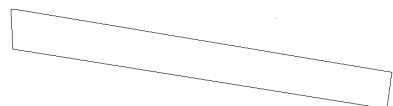
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with the speeds of up to 150 kilometers per hour which the trains traveled, it was essential that the track be in the best condition.

They have rails 25 meters in length, 65 kilograms to the meter.

They use welded stretches of track, varying in length from 800 to 1500 meters, depending on the profile of the line and on the climate of the region in which it is located. The ties are of wood,

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although they are beginning to use prestressed concrete. The ties are
50 centimeters apart (from center-to-center, of course) except on curves,
where they are 44 centimeters apart.

The joints of the rails never rest on ties [redacted]

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[redacted]
They have all the usual equipment in the way of jacks, mechanical
tools, gauge testers, etc.

[redacted] a powerful jack [redacted] places the length
of track at the exact distance [from the next length] calculated for that
site on the basis of the temperatures, so that expansion will not cause
trouble.

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When they replace track or lay a new stretch, once the ground has
been tamped, they have a special train for laying prefabricated track,
with gantry cranes and a system which [redacted] enables them to lay
15 kilometers per hour.

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[redacted]

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THE TECHNICAL OFFICE OF THE RAILWAYS

They have about 200,000 kilometers of broad-gauge lines besides 80,000 kilometers of the same gauge in factories, mines, and enterprises (they cannot be called private lines, for they all belong to the state, but they operate independently of the national network).

Forty percent of the length of lines is double-track, but these figures of 200,000 and 80,000 kilometers do not count the double track where there is such.

They have multiple tracks almost nowhere.

They have electric, diesel-electric, and steam traction. They use coal for steam traction

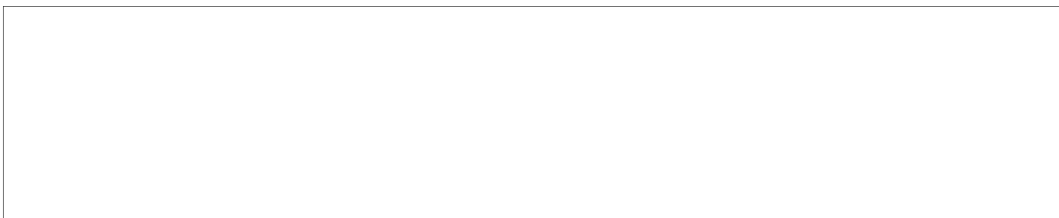
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The electric power network is almost all 1,500-volt, although they have some 3,000-volt. They are experimenting with supplying alternating current at 22,000 volts, with good results.



They use electric traction in places where working conditions and climate are especially difficult.

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They have a plan for the electrification of major lines, and in comparison with the 5,000 kilometers which is electrified now they expect:

In 1950, a total of 13,000 kilometers, as far as Lake Baykal.

In 1970, a total of 30,000 as far as Vladivostok.

In 1975, a total of 55,000 kilometers.

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[redacted] in 1970 steam traction will have practically disappeared, with electric and diesel-electric traction substituted. They are using this latter especially in the south of Asia [sic] and in the west.

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[redacted]

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They have 20-ton freight cars, with roller bearings, which run in trains at 100 kilometers an hour.

They also have special cars of all kinds, besides the well-known ones. The only special car [redacted] was for the transport of live fish. [redacted] live fish are also hauled for consumption, [redacted] such cars are used only for pisci culture and for transporting fish for stocking lakes, ponds, and rivers.

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[redacted]

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At the present time, passenger cars are all made of metal, and they are insulated with the same material as the refrigerator cars;

[redacted]

They use automatic coupling, [redacted]

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[redacted] This coupling, of course, reduces the shock, and it has an uncoupling device controlled from the sides of the cars, [redacted]

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[redacted]

they inspect the axles of all rolling stock once a year.

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[redacted]