4. Summary

We verified that accidents caused by snow, etc., have the following characteristics, which are shown below together with points to prevent accidents:

○ Trends in accidents

- Among accidents caused by natural phenomena such as weather, those attributed to snow and snowmelt are the most common, which occur not only in heavy snowfall areas, etc., but also in low-snowfall areas.
- About 90% of accidents caused by snow, etc., are train derailment accidents, and of those, about 90% occurred because of flange climbing. The objects most frequently climbed up were caught snow and compacted snow at level crossings.
- As for the cases where trains climbed up onto compacted snow at level crossings, they involved compaction of snow by vehicles passing over the crossing, and in many cases there were snowfall of 20 cm or more from the previous day and intervals of 10 hours or more after the previous train.

○ Human factors and organizational factors

- There were accident cases in which human and/or organizational factors were involved, and as for accidents caused by climbing up onto snow, etc., human and/or organizational factors related to snow removal were involved in about 40% of them.
- These accidents involved either or both of errors in situational judgment by individuals or organizations or deficiencies in rules. Specifically, they include cases, for example, where snow removal was not carried out appropriately because of insufficient checks of snow conditions, erroneous judgments based on empirical practice, etc., and where no objective standards and conditions were given for determining the necessity of snow removal and the possibility of operations in internal regulations.

Points to prevent accidents

Implement the following in advance:

- Understand the nature of accidents in heavy snowfall areas, etc., and past accidents caused by snow, etc.
- Establish arrangements, for example, for snow removal and operation controls for routes, level crossings, etc., during snowfall and snow accumulation, and define objective decision criteria, etc., for implementing them.

Implement the following during snowfall and snow accumulation:

- Properly ascertain snow conditions on routes, level crossings, etc.
- Pay attention to the reduction in braking force caused by snow, ice, etc., entered between brake shoes and wheels and take appropriate measures.

As we are approaching the winter season, we hope you will refer to the characteristics and cases of accidents introduced in this digest, review measures to prevent accidents caused by snow once more, and advance their implementation.

Comment from the Director of the Analysis, Recommendation and Opinion Office

Heavy snowfall, snow accumulation, and even snowfall are rare in some areas, and railway operators and routes in low-snowfall areas may have little or no experience in snow disaster countermeasures. With limited management resources, it may be difficult and burdensome to establish concrete systems to respond to events such as snow disaster. However, once an accident, etc., occurs, it can have a significant social impact. Therefore, we expect you will refer to the analyses and specific cases of railway accidents introduced in this digest, further advance the development of systems including planned cancellations, and ensure the safe and stable railway transportation.

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We welcome your comments on "JTSB Digests" and requests for outreach lecturers.