Is the SCMagLev Safe?

By: Dan Woomer January 11, 2021
Edited by: Susan McCutchen

The Baltimore-Washington Rapid Rail (BWRR) (the project developer) and the Northeast MagLev (TNEM) (the promotional entity) have the short-term goal of obtaining Federal Railroad Administration (FRA) approval to build a magnetic levitation (maglev) train between Baltimore and Washington, DC, with the long-term goal of extending the train operation to New York City by way of Philadelphia. Japan's Superconducting Magnetic Levitation (SCMagLev) train is the high-speed, ground-based transportation system TNEM is promoting to build in the northeast corridor of the United States.

Information about the SCMagLev and BWRR's plans to build and operate the system have raised many questions and concerns. This is one of a series of articles that identifies and discusses some the many questions and concerns citizens and communities have identified with moving forward in building and operating the SCMagLev.

Abstract

This article identifies and discusses questions and concerns about the structural safety standards being used to assure passenger crash survivability and the impact of the SCMagLev operation on the residents living near the guideways. The trial operation of the SCMagLev on the present 26-mile test track in rural Japan, mostly in tunnels, does not fully validate its ability to function safely and reliably in day-to-day, high-frequency service in the urban and suburban environment of the Baltimore-Washington metropolitan area. The German Maglev accident of September 22, 2006, which killed 23 people after the safety of the system had been certified by the German government, should be a cautionary note as this project is considered.

Lathen - German Maglev crash. Photo DPA. 23 May 2008.

Questions & Concerns

(1) How do the structural standards of the SCMagLev compare with US Railcar construction and safety standards?

- The longitudinal strength of the vehicles is an important safety consideration. No reduction should be allowed, compared with what would be required for a wheeled rail vehicle, and perhaps the strength requirements for the SCMagLev should be stricter.
    - The SCMagLev vehicle will be confined within the sidewalls of the guideway. In any collision with another train, objects in the guideway (including maintenance or inspection vehicles), devices at the end of the line, or a damaged guideway, there is no alternative but for the SCMagLev train itself to absorb energy. Steel-wheeled trains can absorb the energy of the collision by jackknifing sideways. For the SCMagLev, the walls of the guideway would prevent jackknifing.

- The entire impact of the incident would either be absorbed by the SCMagLev train being crushed and/or by it buckling in a vertical direction. Buckling in a vertical direction has implications of the vehicle going airborne, possibly leaving the guideway.

- Potential accidents involving guideway switches are another reason vehicle strength should not be lowered from those of wheel-rail vehicles.

(2) What is the risk of the SCMagLev becoming airborne?

- According to the material provided at the scoping and informational meetings, there are no physical barriers in the guideway design to keep the magnetically-levitated vehicle from rising out of the guideway. With the guideway sidewalls restricting air flow, hitting an object that would wedge under the front end of the SCMagLev at high speed and lift it higher into the air could subject the underside of the vehicle to tremendous air pressure that could lift the vehicle out of the guideway, especially if the vehicle is designed with much less weight than a steel-wheeled rail vehicle.

- Are there research and safety reports on the risks of the front end of the SCMagLev accidentally being raised slightly and catching air due to malfunctions in the maglev suspension hardware?

(3) The cross-section of the guideway brings up several issues.

This issue includes:

- Snow accumulation is an issue because it cannot simply be shoved to the sides. The sides may trap objects in the guideway such as wind-blown debris. Debris larger than the space between the vehicle and the guideway would be a serious endangerment to the SCMagLev and the passengers.

- What size object can be tolerated in the guideway?

- What if a fence-jumping deer were to get trapped in the guideway just ahead of a train, with the angle of impact causing the animal to be wedged between the side of the vehicle and the guideway?

- What about a suicidal person?

- Another category of hazard is debris thrown onto the guideway, either from an overhead bridge or simply thrown in from the side of the guideway. What damage would a shopping cart cause? Or a bowling ball or an old lawn mower? Experience by both AMTRAK and MARC in the Baltimore-Washington region has shown these are not just theoretical possibilities.

- How are melting snow and stormwater mitigated as to not further pollute the adjacent community streams and waterways?

(4) Where is the research to show the SCMagLev will not cause human health issues resulting from exposure to the intense electromagnetic radiation?

- The intensity of the electromagnetic radiation emitting from the passage of the SCMagLev varies in complicated patterns not previously tested on humans over the long term. As compared with the German MagLev, the SCMagLev generates a higher level of electromagnetic radiation. BWRR indicated in its November 2018 *Final Alternatives Report* that radiation is so severe that people will not be allowed to be closer than 20 feet from the guideway when underneath it. [4]

(5) How limited is the forward view from the SCMagLev?

- It appears from the scoping meetings showing the design and operation of the SCMagLev that an employee will be unable to have a clear view of what is in front of the train. The safety of maintenance workers along the guideway, when handling the train in maintenance and staging yards, or in special situations (such as slow orders), would seem to be hampered without a forward view.

(6) The Federal Railroad Administration (FRA) should provide guideway safety standards for this project, including the following.

- Design tolerances for SCMagLev guideways, including speeds allowed in curves and through turnouts (based in part on the lateral forces able to be resisted), as well as safety parameters for the turnout components, including the alignment tolerances of the moving parts.

- Standards regarding the fixation of hardware on the inner vertical surfaces of the SCMagLev guideway. If such fixtures become loose, they could jam between the vehicle and the side of the guideway, with consequences that would likely compromise the integrity of the passenger compartment at high speed, or bring the train to a high G-force stop, with high-heat or even fire generated by the friction involved between the contacting components. The fixation standard issue would also involve the components of the vehicle that interact with the guideway.

(7) Is the SCMagLev leading face designed to deflect debris?

- The lower part of the front-end shape of the SCMagLev shown in the material provided at the scoping and subsequent informational meetings is not designed to deflect material. Further, its tapered, rounded design would make it more likely that debris would become wedged under or on the sides of the vehicle. As noted previously, such debris could result in a dangerous situation for the SCMagLev and its passengers.

(8) How will routine maintenance be coordinated to avoid a collision with maintenance equipment or personnel?

- Guideway maintenance activities will need to take place during operating periods. For example, what if piece of debris is reported and someone goes out to remove it? That person will need to be inside the guideway and unable to quickly step to the side.

- With larger repairs/maintenance, large equipment will be needed. Again, such equipment and operating personnel will be inside the guideway without the ability to move aside.

(9) How will the SCMagLev steer in an emergency slow-down and stop?

- At speeds of 93 miles-per-hour (150 kilometers-per-hour) or less, the SCMagLev moves along the guideway on rubber wheels. These wheels retract as speed builds [(5)]. During an emergency slow-down and stop at any point on the guideway, what is the ability of the steering (sidewall) components of the SCMagLev to keep the vehicle from contacting the sidewall if the wheels on one side accidentally come down at high speed, causing a turning moment in the vehicle?

Findings/Conclusion

There are many serious issues, questions, and concerns about the safety of the SCMagLev operation, both for the passengers and the residents living near and alongside the guideways. This article identifies and explores some of them.

Want to Help?
(1) Share this information with your family, friends, neighbors, and community.
(2) Join our Facebook page: www.facebook.com/groups/CitizensAgainstSCMaglev.
(3) Contact your elected officials to express your opposition to building the SCMagLev, go to: myreps.datamade.us.
(4) Submit multiple public comments often at www.bwmaglev.info/index.php/contact-us. State your objection(s), and always end by saying you support the "No Build Alternative."
(4) Learn more about the concerns and impacts the SCMagLev will have on our communities, see: www.stopthistrain.org/.
(5) Make a contribution to support Citizens Against the SCMagLev (CATS) and Maryland Coalition for Responsible Transit (MCRT) at mcrt-action.org. Your donation, in any amount, is appreciated. Thanks for your support!

About the Author
Daniel E. Woomer is a community activist and technical expert. He retired after a long career that included positions with Westinghouse Defense Center, Johns Hopkins University's Applied Physics Laboratory, and the U.S. Department of Energy (DOE). During his career with the DOE, he worked in various positions with the Energy Information Administration and the Office of Congressional and Intergovernmental Affairs, and he helped set up the Office of Technology Transitions. He also served for several years as an adjunct faculty member with the University of Maryland University College, where he developed and taught mathematics, supervisory and leadership classes.

Sources
The principal source of information for this article are responses by Louis T Cerny, PE, to FRA notices, including his November 25, 2016, response to a notice in the *Federal Register*. Mr. Cerny has been involved with maglev proposals since the late 1980s, when he served as the executive director of the American Railway Engineering Association. He has continued to study maglev technology as a private consultant and has commented on many maglev proposals. Mr. Cerny was a voting member of FRA committees that developed safety standards for high-speed rail.

(1) Cerny, Louis. "Comments on Final Alternatives Report November 2018." Gmail dated December 14, 2018.
(2) Cerny, Louis. "Response to November 25, 2016 Federal Register Notice regarding Baltimore-Washington Maglev Proposal (SCMAGLEV)" December 10, 2016.
(3) Discussion with Louis Cerny on October 14, 2020.
(4) Baltimore-Washington Rapid Rail. "Interface with Other Infrastructure (Roads/Bridges/Rail Systems/Structures)." *Final Alternatives Report*, p. 42. https://www.bwmaglev.info/images/document_library/reports/alternatives_report/SCMAGLEV_Alts_Report_Body-Append-A-B-C_Nov2018.pdf. November 2018.
(5) Technology. https://en.wikipedia.org/wiki/SCMagLev.
(6) Lathen German Maglev crash photo credit: news@thelocal.de. May 23, 2008. https://www.thelocal.de/20080523/12045.

- - - - - - - - - - - - -

Citizens Against the SCMagLev (CATS) is a confederation of scientists, engineers, experts, community organizations and citizens in support of transportation infrastructure improvements that benefit our communities, state, and nation. CATS opposes the construction of an expensive transportation system serving a small minority of the wealthy at the cost of taxpayer funds far better used to maintain and improve the transportation infrastructure needed and used daily by all citizens, businesses, and commerce. For up-to-date information on the SCMagLev opposition, see our Facebook page at: https://www.facebook.com/groups/CitizensAgainstSCMaglev.