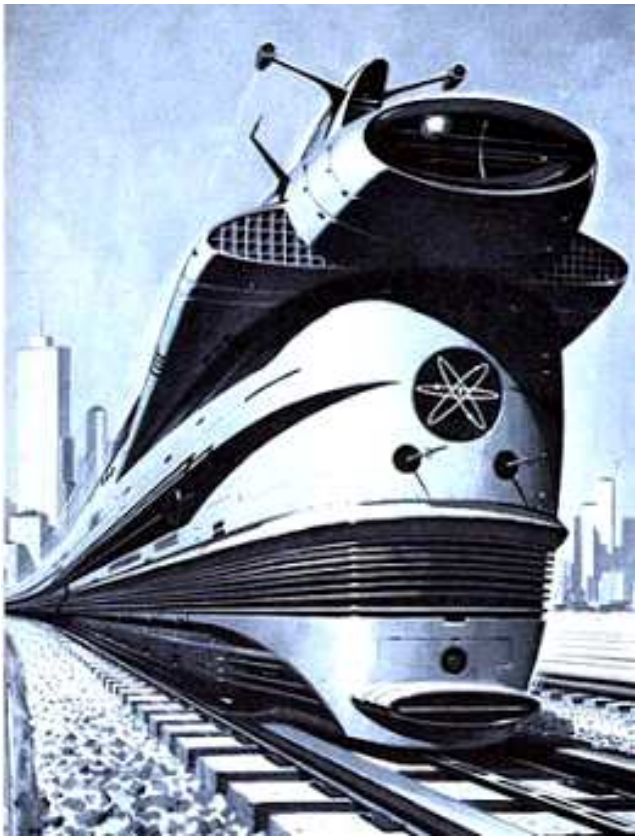


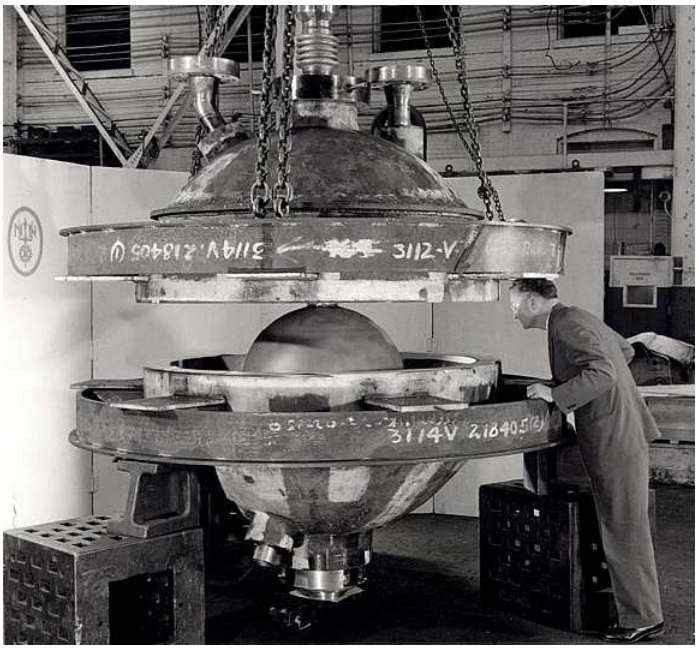
NUCLEAR POWERED LOCOMOTIVES

A Fifties' Fantasy That Never Gained Much Traction

A few years after the end of World War II, the commercialization of nuclear power lead to a variety of potential applications for mobile reactors. In 1954, a professor at the University of Utah began to study the idea of creating a nuclear powered locomotive. He was supported in this effort by Babcock & Wilcox (B&W), an early participant in nuclear power work.

Together they created a conceptual design, which they dubbed Project X-12. The significance of that designation has been lost in time. The heart of their creation was a homogeneous nuclear reactor filled with liquid uranium oxide.

Similar reactors had been built for the Atomic Energy Commission; including this one, which was manufactured by the Newport News Shipbuilding & Dry Dock Co. in 1955 and sent to the Oak Ridge National Laboratory for operation and evaluation.



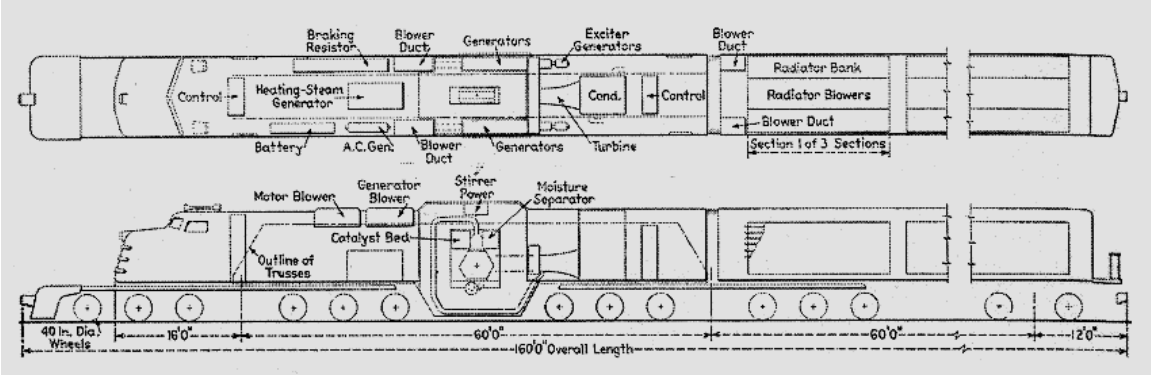
The idea of creating nuclear powered locomotives drew the attention of five American railroad companies, nine manufacturers and the media. But using nuclear power as a motive force for railroads had its drawbacks.

Skeptics pointed out the number of train wrecks that were being experienced, and worried about the result of a nuclear-powered locomotive being involved in an operational accident of any magnitude. The X-12's designers addressed this concern...at least from a theoretical standpoint.

The small reactor core, which measured only 36 inches in diameter and with a height of 10 inches was to be encased in an eight inch-thick vessel, surrounded by another eight inch-thick shield as part of an elaborate 'defense in depth' approach. The space in between the vessel and the shield was to be filled with a 'high viscosity hydrocarbon fluid' to absorb and internal dislocation on accidental impact. Automatic scramming was included in the design, along with removal of decay heat generated following an emergency shutdown.

And then there were some pretty weighty (pun intended) issues. The X-12 power plant was to consist of the nuclear reactor, a main steam turbine for power generation as well as steam condensers and chillers. A heavy duty gear box was to be provided, to couple the turbine shaft to four electric generators, which would produce, combined, 7,000 horsepower.

The locomotive would have weighed 360 tons; twice the weight of a conventional steam engine suitable for the same service. Just the shielding for the X-12's reactor would have been 200 tons. This kind of concentrated weight would have required upgrading of most of America's rail lines.

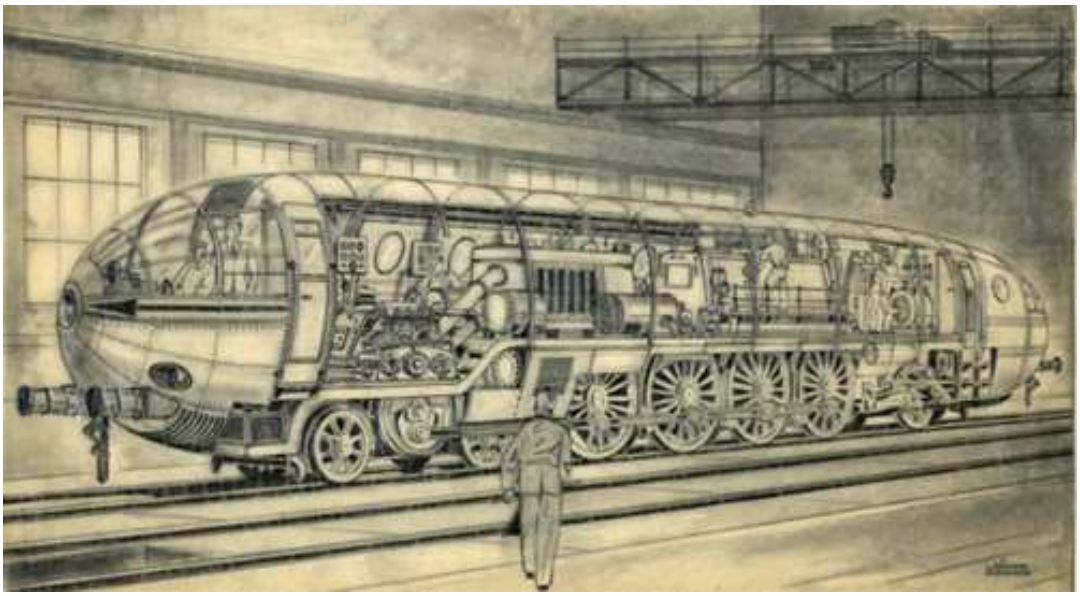


The engine section and its tender, which would have carried huge radiators for cooling the turbine steam, would have measured 160 feet in length; raising further questions about its ability to maneuver curved or steep sections of existing track.

Cost of a X-12 nuclear powered locomotive was estimated to be $1.2 million (in 1954 dollars), which was double the cost of four contemporary diesel units; which, when coupled together, would produce the same horsepower as the X-12. As one wag put it: "The cost weighed as heavily on the minds of railroad executives as the X-12 would have weighed on their tracks".

In spite of the obvious drawbacks, the creators of X-12 applied for a patent in 1955. Their application was eventually approved in 1964; by which time other nuclear programs had moved forward and experienced problems. Additional negatives associated with refueling, remote maintenance and waste disposal made it clear that a nuclear powered locomotive was not such a good idea, after all. And so, X-12 became but a footnote in the history of nuclear power.

But every now and then, someone still tries to reinvent this wheel. This in spite of today's heightened concerns about the safety and potential environmental impact of such designs, and their resistance to terrorists' ambitions.



The latest such scheme has been put forth by the Russians, who envision making it more difficult to pinpoint some of their Intercontinental missiles' locations by using trains as mobile launching platforms. But such trains would require several conventional locomotives to haul such massive loads. Their combined heat and exhaust signatures would be a dead giveaway.

So, the Russians are reportedly currently considering designing and building nuclear-powered locomotives to do that job.

Would it work? Yes...if rail lines were made strong enough to bear the concentrated loads.

Would it be undetectable? Probably not...nuclear reactors have heat signatures too.

Would it be safe? Well...this is an idea from the nation that gave us Chernobyl...

Bill Lee
November 2013