

SCIENCE & TECHNOLOGY

Stalin's Collision Course With 20th-Century Technology

By Simson L. Garfinkel

AFTER gaining absolute control of the Soviet Union at the end of the 1920s, Joseph Stalin embarked on a breakneck plan to industrialize the USSR's largely agricultural society.

But Stalin was a politician, not an engineer. In his mind, there was but one way to measure the desirability or success of a large civil project: by its size. Big projects were good; bigger ones were better still.

Engineers who used their training to show the flaws in Stalin's reasoning were called "wreckers," suspected of collusion with Western capitalist states. As enemies of the Soviet people and the Communist Party, they were arrested, jailed, and frequently put to death.

Peter Palchinsky was one such engineer. Educated in pre-Revolutionary czarist Russia and a respected industrial consultant to the capitalist seaports of Amsterdam, London, and Hamburg, Palchinsky could not help but be viewed with suspicion by the early Communists. This was particularly ironic, considering that Palchinsky had been a foe of the czarist regime since his exile in 1905 for supporting that year's attempted revolution.

In 1917, he quickly joined Russia's Provisional Government — only to be jailed when the Bolsheviks seized power. Palchinsky escaped death after a friend wrote a letter to Lenin saying that his engineering talents and ideas could be of use to the Soviets. And so they were, until those same talents forced Stalin to order his execution.

Now, for the first time, Palchinsky's life, philosophy, and their collision course with the Soviets are revealed in a new book, "The Ghost of the Executed Engineer: Technology and the Fall of the Soviet Union," by Lauren Graham, a professor at the Massachusetts Institute of Technology in Cambridge, Mass.

What were the ideas that Stalin considered so dangerous? Palchinsky's obsession with the "human element." Palchinsky said that it was impossible to evaluate an engineering project without considering the people involved. The training of the workers, the motivation of the managers, and even the happiness and the living conditions of the worker's families all played a role in determin-

ing the failure or success of a project. Graham writes that Palchinsky believed these human factors were just as real and as important as other, purely "technical," concerns.

Sent to the Ukraine by the czarist government in 1901 to study the decline in coal production, Palchinsky sent back neat tables and drawings depicting the nightmarish conditions of the miners: four families to a house, earthen floors, and poor sanitary facilities. Though he refrained from political comment, the reports were nevertheless political dynamite. When he tried to publish his findings in the Mining Journal, Palchinsky was sent to Siberia in a kind of administrative exile.

the winters. Their high death rate from exposure and disease was for Stalin an acceptable cost, but for Palchinsky it was a sign of irrationality, inefficiency, and injustice."

Much of Graham's book is devoted to describing three such projects: the construction of the world's largest steel mill at Magnitogorsk (in a region inaccessible by water and lacking coal); the building of the world's largest hydroelectric dam on the Dnieper River (in a sparsely populated area that was rich in coal); and the digging of a canal from Leningrad to the White Sea that was so shallow as to be unusable by ocean-going vessels.

In each case, Graham shows how Palchinsky's condemnations and predictions of collapse would come back to haunt the USSR throughout its lifetime.

Arrested in 1928 as the alleged head of the Industrial Party, Palchinsky was secretly executed on May 24, 1929, accused of trying to overthrow the government and restore capitalism.

Palchinsky's execution — and the Industrial Party trials that followed — cast a shadow over the new country's entire engineering profession. To keep their work from overstepping into the realm of public policy, Soviet engineers specialized to a degree unimaginable to their Western counterparts. It was no fluke that on one of his innumerable visits to the Soviet Union, Graham met a woman who had an engineering degree in "ball-bearings for paper mills."

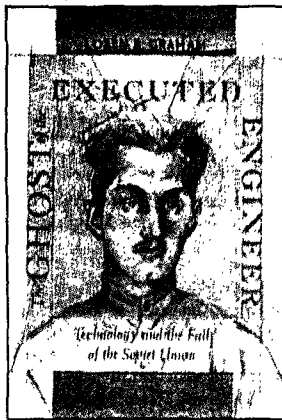
Graham shows how Soviet overspecialization, like most of the distinctive features of engineering in the former Soviet Union, can be traced back to the time of Palchinsky's death.

In this outstanding account, Graham shows how the later-day Soviet failures with the Chernobyl nuclear power plant in 1986, the Siberian Baikal-Amur Railway in the 1970s and '80s, and the 1989 miner's revolt at the Don Basin mines were inevitable results of Soviet-style central planning and an unwillingness to consider economic realities.

"The Ghost of the Executed Engineer" is mandatory reading for anyone trying to understand how the nation with the world's richest deposits of mineral wealth and most technically trained work force failed to become an economic giant in the 20th century.

■ *Simson L. Garfinkel is a freelance writer who specializes in science and technology.*

BOOKS



THE GHOST OF THE EXECUTED ENGINEER: TECHNOLOGY AND THE FALL OF THE SOVIET UNION
By Lauren R. Graham
Harvard University Press
128 pp., \$22.95

Things were no better after the Russian Revolution. In a series of megaprojects, "Stalin was quite willing to force poorly educated peasants from the countryside to perform tasks in new industries for which they were not qualified," Graham writes.

Graham tells how communities were destroyed, peasants impressed into slave labor, and corners cut in the interest of meeting unrealistic schedules.

"The results were high accident rates and shoddy production, graphically described in memoirs of the period," he writes. "The relocated workers lacked adequate housing, especially for

How Moon and Helped Make a At Boston's Tea

ON Dec. 16, a thin crescent moon will grace an early evening sky. If you see it, you thought to the Boston Tea Party. Reel threw a shipment of tea into the harbor rather than a 220-year-old tariff on that same December date.

You will see in the sky what the colonial raid will show the same phase and be in the same location to the computer power now available, we can know about this moon that surprised the colonists. It produces a far lower tide than they expected.

Physicists Donald W. Olson and Russell L. D. West Texas State University in San Marcos have a lunar story. They used calculating methods developed by meteorologist Jean Meeus that work even without a "palmtop" computer on which I wrote this column. Astronomical sleuths explain in the December issue of that, not only was the young moon nearly in line with the sun, but it also was at perigee (closest approach). This substantially enhanced its tidal power.

It works this way. When the moon is new or full, Earth and sun. Astronomers call this line up: lunar tide-raising forces then add together. The largest ordinary low-high tidal ranges — the so-called spring tides — occur when the moon also is at perigee — that is, when it is closest to Earth — its tide-raising force is even greater. The combination of perigee and syzygy can bring the highest and lowest low tides known.

That's essentially what happened when the tea-carrying cargo ships *Beaver*, *Dartmouth*, and *Griffin* were at Boston's Griffin's Wharf. Drs. Olson and Doescher's calculations show that lunar perigee occurred about 3 a.m. Dec. 13, 1773, in terms of modern Eastern Standard Time. New moon occurred 14 hours later. The influence of this near coincidence of lunar perigee and syzygy was still strong Dec. 16. It was a range from an average of about 11 feet for ordinary low tides to more than 14 feet.

The Tea Party lasted from 6 to 9 p.m. The ebb tide came right in the middle of it. The raiders dumped 90,000 pounds of tea leaves, and after them. With little water at the docks, they expected a mess on the mud flats.

Commenting on this research in a telephone interview, Olson explained that the tidal story was a byproduct of his research. He was originally interested in why the British looked like on historic occasions. Old picture books of historic events may get the lunar phase wrong.

Olson and Doescher had earlier checked out the night of Paul Revere's famous ride. Accounts at the time implied a nearly full moon. They wondered if a nearly full moon might have revealed Revere's crossing of Boston Harbor under the nose of a British ship. Calculations showed that the moon was indeed nearly full. But it rose too far to the south to give Revere a clear view.

In checking out the Tea Party moon, Olson found that some accounts and pictures had it wrong. The moon was bright, but it was a thin crescent.

The analogy to 1773 isn't exact. This time it was a new moon. The tides will be ordinary. The reason may have been political. The colonists would seize the tea at midnight Dec. 16 if the British waited for high tide would have run over the tea.

The raiders had to move fast to make their point. Even if they had known how bad low tide would be, they couldn't risk delay. It would have been another day of colonial wisdom outweighing scientific knowledge.