

generate tumors; see "Niederschrift über die Sitzung des Wissenschaftlichen Ausschusses beim Reichsausschuss für Krebsbekämpfung," April 13, 1935, THW 1493, p. 27.

89. Arthur Brandt, "Bericht über die im Schneeberger Gebiet auf Veranlassung des Reichsausschusses für Krebsbekämpfung durchgeführten Untersuchungen," *Zeitschrift für Krebsforschung* 47 (1938): 108-11. Rajewsky continued animal experiments on radiogenic cancer into 1945; see his article with A. Schraub and G. Kahlau, "Experimentelle Geschwulsterzeugung durch Einatmung von Radiumemanation," *Naturwissenschaften* 31 (1943): 170-71. In 1942/43, Rajewsky's institute erected a three-million-volt X-ray apparatus for cancer therapy, the largest in the world at this time; see Hans Danzer, "Boris Rajewsky zum 60. Geburtstag," *Strahlentherapie* 94 (1954): 3-11.

90. Neitzel, "Berufsschädigungen," pp. 15-21. Neitzel in 1937 showed that one Schneeberg mine regarded as particularly dangerous contained some 35-44 ME, and that on Mondays, after ventilating fans had been off for the weekend, radiation could rise to 111 ME. See his "Bericht über die in den Monaten Oktober-November 1936 im Schneeberg-Neustädter Erzbergbau ausgeführten Untersuchungen zur Frage der Lungenschädigung der Bergarbeiter," *Arbeitsschutz* 3 (1937): 70-72. Boris Rajewski in 1935 began a project to determine the "tolerance dose" for radium stored in the human body; his 1936 *Toleranzmenge* was used as late as 1950 by the London-based International Congress of Radiologists. The value in question was apparently 3 to 30 ME, an extraordinarily high figure that seems to have considered radium poisoning but not cancer effects—see Kahlau and Schraub, "Krebserzeugung," p. 134.

91. Kahlau and Schraub, "Krebserzeugung," pp. 132-66.

92. Löwy, "Über die Joachimstaler Bergkrankheit."

93. Julius Löwy, "Die Wirkung der Joachimsthaler Pechblende im Tierversuch," *Medizinische Klinik* (Prague edition), no. 18 (1936): 619-20.

94. Neitzel, "Berufsschädigungen," p. 17; Brandt, "Bericht," pp. 108-9; and the more extensive report in Hans Rudolph Döhnert, "Experimentelle Untersuchungen zur Frage des Schneeberger Lungenkrebses," *Zeitschrift für Krebsforschung* 47 (1938): 209-39. Döhnert joined the Nazi party in May of 1933 (BDC).

95. Hermann Hebestreit, *Schutz und Erhaltung der Arbeitskraft* (Berlin: Otto Elsner, 1939), p. 204. Compare the similar assertions in Bauer, "Krebs und Vererbung," p. 475; and in Erwin A. Uehlinger and Otto Schürch, "Über experimentelle Erzeugung von Sarkomen mit Radium und Mesothorium," *Deutsche Zeitschrift für Chirurgie* 251 (1939): 12-33. Rajewsky about this time measured the radiation in homes of miners who had contracted cancer; see Brandt, "Bericht."

96. Franz Strnad, "Der Lungenkrebs," *Monatsschrift für Krebsbekämpfung* 6 (1938): 309-10.

97. See my *Cancer Wars*, pp. 186-92.

98. Wilhelm Engelmann, "The Present Position of Radium Emanation Therapy in Germany," *British Journal for Physical Medicine*, n.s., 1 (1938): 229-30 and 244.

99. Hans Krebs to Heinrich Himmler, November 19, 1938, and Himmler to

Krebs, December 15, 1938, T-175 #87, folder 193, Captured German Documents, National Archives.

100. See my *Cancer Wars*, pp. 192-95.

101. Wolfgang Zank, *Wirtschaft und Arbeit in Ostdeutschland 1945-1949* (Munich: R. Oldenbourg, 1987), pp. 65-66.

102. Forschungsinstitut der Friedrich-Ebert-Stiftung, *Wismut und die Folgen des Uranbergbaus* (Bonn: Friedrich-Ebert-Stiftung, 1992), p. 15.

103. Patricia Kahn, "A Grisly Archive of Key Cancer Data," *Science* 259 (1993): 448-51; "The Legacy of Schneeberg," *Nuclear Engineering*, February 1991, p. 7; Reimar Paul, *Das Wismut Erbe* (Göttingen: Die Werkstatt, 1991).

104. Forschungsinstitut, *Wismut und die Folgen*, pp. 15-16.

105. Ibid., p. 13. A 1991 survey by Bavaria's environmental ministry found that about half of all homes in the Oberpfälzischen town of Neunburg have radon concentrations in excess of 415 Bq/m³ (= 11 pCi/l) in the winter; see Max Daunderer, *Gifte im Alltag: Wo sie vorkommen, Wie sie krank machen, Wie man sich vor ihnen schützt* (Munich: Beck, 1995), p. 137.

106. Jonathan E. Helmreich, *Gathering Rare Ores: The Diplomacy of Uranium Acquisition, 1943-1954* (Princeton: Princeton University Press, 1986), p. 248.

107. "Mitteilungen," *Monatsschrift für Krebsbekämpfung* 5 (1938): 324.

108. Norman M. Naimark, *The Russians in Germany: A History of the Soviet Zone of Occupation* (Cambridge: Harvard University Press, 1995). The Soviet director of Wismut, Major General Andrei Mal'tsev, had earlier organized the construction of the Moscow subway and, by forced labor, a massive, secret tunnel under the Amur River in Soviet Asia. See Nikolai Grishin, "The Saxony Uranium Mining Operation ('Wismut')," in *Soviet Economic Policy in Postwar Germany*, ed. Robert Slusser (New York: Research Program on the U.S.S.R., 1953), pp. 127-52.

109. Helmreich, *Gathering Rare Ores*, p. 248.

110. See my *Cancer Wars*, p. 27.

111. Rostoski, Saupe, and Schmorl, "Die Bergkrankheit," p. 371. The authors identified a latency period of ten to eighteen years.

112. Körbler, *Strahlen*, p. 76. The *Latenzzeit* between exposure to chromium and the development of lung cancer was "between twenty and forty years" according to official commentaries on Germany's occupational health legislation; see the *Monatsschrift für Krebsbekämpfung* 7 (1940): 215.

113. Pfeil, "Lungentumoren." Tobacco dust inhalation in cigar and cigarette factories was another early worry, one that looks somewhat odd in retrospect, given how slowly the medical profession responded to the much larger threat posed by cigarettes themselves (see chapter 6).

114. Richard Fischer, *Die industrielle Herstellung und Verwendung der Chromverbindungen, die dabei entstehenden Gesundheitsgefahren für die Arbeiter und die Massnahmen zu ihrer Bekämpfung* (Berlin: A. Seydel, 1911); also "Die Gefährlichkeit der Chromatbetriebe—eine Sage?" *Beilage zum Proletarier*, May 18, 1912.

115. W. Alwens, E.-E. Bauke, and W. Jonas, "Auffallende Häufung von Bronchialkrebs bei Arbeitern der chemischen Industrie," *Münchener medizinische Wochenschrift* 83 (1936): 485-87.