

## ESSAY

# The Power of Nuclear Things

**GABRIELLE HECHT**

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On 28 January 2003, U.S. President George W. Bush declared in his State of the Union address that “the British government has learned that Saddam Hussein recently sought significant quantities of uranium from Africa.” The clear implication: Iraq was building nuclear weapons. The scenario wasn’t implausible. After all, weapons inspectors had uncovered a clandestine program there back in 1991. Surely it would try again? Bush and his advisors had been implying as much for months, most notably when national security advisor Condoleezza Rice warned on national television that “we don’t want the smoking gun to be a mushroom cloud.”<sup>1</sup> The evidence Rice initially invoked—that Iraq had imported aluminum tubes whose only plausible use was in “nuclear weapons programs, centrifuge programs”—had gained only modest traction in the media; behind the scenes, many intelligence officials disputed its validity.<sup>2</sup> Recent international inspections of Iraqi facilities hadn’t turned up any evidence of weapons programs. The case for war was not going well. In this context, “uranium from Africa” seemed promising. It certainly sounded much scarier than “aluminum tubes.” It could be fleshed out, into 500 tons of “yellowcake from Niger.” Displacing the source of informa-

Gabrielle Hecht is associate professor of history at the University of Michigan. Research for this essay was supported by funding from the National Endowment for the Humanities, as well as Grant No. 0237661 from the National Science Foundation. Its first draft was circulated at the NSF-sponsored SHOT Fiftieth Anniversary Workshop in Washington, D.C., supported by the National Science Foundation under Grant No. 0623056. The author thanks Bruce Seely for his encouragement, and co-panelists Michael Adas, Mats Fridlund, and Rosalind Williams for their engagement. Subsequent drafts benefited tremendously from extensive comments by Rebecca Herzig, Dan Hirschman, Arne Kaijser, Nina Lerman, Chandra Mukerji, Bill Storey, and—as always—Paul Edwards.

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0040-165X/10/5101-0001/1–30

1. The quotes are from Rice’s appearance on CNN on 8 September 2002, available at <http://archives.cnn.com/2002/ALLPOLITICS/09/08/iraq.debate/> (accessed 21 May 2009).

2. David Albright, “Iraq’s Aluminum Tubes: Separating Fact from Fiction” (Institute for Science and International Security, 5 December 2003), available at <http://www.isis-online.org/publications/iraq/> (accessed 21 May 2009). My thanks to Alex Montgomery for this reference.

tion over to the British made it possible to sideline controversies among U.S. intelligence agencies. What could go wrong?

When IAEA experts finally obtained the thin folder of documents substantiating the claim in early March, it only took them a few hours to determine that these were forgeries. But by then it was too late. In the public eye, “uranium from Africa” had topped the list of a lot of other dubious evidence.<sup>3</sup> Things were in motion. On 19 March 2003, the U.S. launched its assault on Iraq. We now know that there was no uranium deal, and no evidence that Iraq had restarted its nuclear weapons production.<sup>4</sup>

The salience of “uranium from Africa”—both in the lead-up to the war and in subsequent opposition to it—traded on three sets of fears and assumptions widespread in the American public sphere:

- the fear of nuclear weapons, and the assumption that acquiring “uranium” is tantamount to building an atomic bomb;
- the fear of “Africa” as a dark, corrupt continent, and the assumption that actions there are ultimately unknowable or incomprehensible;
- the fear of any nuclear materials not within direct Western control, and the assumption that the difference between licit and illicit nuclear trade is clear-cut.

Commentators on the Iraq war spilled a lot of ink on the first of these, very little on the second, and only a bit more on the third. But they largely missed the complex technological and political threads that bind these three outlooks together.

In this essay I attempt to break these restraints by offering three genealogies for “uranium from Africa.” First, I consider the problem of when uranium counts as a “nuclear” thing, when it doesn’t, and what Africa has to do with it. Before “uranium” becomes weapons-usable, it must be mined as ore, processed into yellowcake, converted into uranium hexafluoride, enriched, and pressed into bomb fuel. At what stage in this process does it come to count as a “nuclear material”? The answer, I argue, has depended on time, place, purpose, and markets. Second, I excavate the phrase’s more specific rendition, displaying fragments of a history of “yellowcake from Niger.” Places matter. Niger is not merely an avatar for global threats, but a nation with its own politics, priorities, and conflicts, all of which have sig-

3. In fact, Secretary of State Colin Powell’s presentation to the UN Security Council in February 2003 didn’t even mention the uranium claim, supposedly because Powell himself found it unconvincing. The evidence that he did present also proved weak and questionable later on, but an analysis of those issues lies beyond the scope of this essay.

4. Iraq had acquired uranium from Niger, Portugal, and Brazil in the 1970s, when launching its nuclear program, but had stopped these purchases in the 1980s. Bush’s claim did not refer to these earlier purchases. See Joseph Cirincione, “Niger Uranium: Still a False Claim,” *Carnegie Proliferation Brief*, vol. 7, no. 12, available at <http://www.carnegieendowment.org/publications/index.cfm?fa=view&id=1595> (accessed 9 November 2009).

nificant bearing on the production and distribution of its uranium. Third, I examine another moment when African provenance of uranium was geopolitically contested: the flow of Namibian uranium to the U.S., Japan, and Europe during the height of international sanctions against apartheid. In this instance, licit trade and black markets were materially entwined in ways that made African things invisible.

Understanding the transnational networks that shape the power of technology in the contemporary world is a complex and difficult proposition. Only a bird's-eye view can reveal the patterns, flows, and imbalances that map the distribution of technologies and the powers they serve or exert. Yet the view from above is always partial; it runs the risk of deceiving us into thinking that some places don't matter enough to deserve our attention. This is a dangerous illusion. We must land in unfamiliar places and study them on their own terms.

The result is necessarily a fractured history. The fault lines between these multiple narratives gape because transnational history is not smooth and seamless, but uneven and disjointed. As shifting signifiers, nuclearity and markets run through these histories; their meanings are shaped by place, but not always in the same way. The notion of technopolitics helps to highlight such shifts and indeterminacies. Elsewhere, I have used the term in discussions of politically strategic technological design.<sup>5</sup> Here I use it more expansively, seeking to highlight the *distribution* of power in material things and symbolic circulations. These hybrid forms of power, I argue, make some things nuclear, some things commodities, some things African, and some things all three.

ESSAY

## Is Uranium a Nuclear Thing?

Nuclear exceptionalism has been a recurring theme in political discourse since the U.S. dropped an atomic bomb on Hiroshima in 1945. American and European cold warriors and their activist opponents portrayed atomic weapons as fundamentally different from any other human creation. "The bomb" appeared as the ultimate trump card: first for the superpowers, then for waning colonial powers, then for other nations. Geopolitical status seemed directly proportional to the number of nukes a nation possessed. Such nuclear exceptionalism went well beyond discourse; indeed, its technopolitical qualities made it particularly robust. "Nuclear" scientists and engineers gained prestige, power, and funding far beyond their colleagues in "conventional" research. Fission meant splitting atoms, and the resulting rupture in nature's very building blocks propelled claims to a corresponding rupture in historical space and time.

5. Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, Mass., 1998; new edition, 2009).

Nuclear exceptionalism could be made, unmade, and remade. In the early decades of civilian nuclear power, exceptionalist claims came primarily from experts and atomic energy institutions. As anti-nuclear groups gained prominence, however, they articulated their own exceptionalist claims by highlighting the unprecedented qualitative and quantitative dangers posed by exposure to radioactive substances. In response, the industry sought to make itself mundane: radioactivity was part of nature, nuclear power merely a form of energy among others. When reactor accidents at Three Mile Island (1979) and Chernobyl (1986) challenged the banality of nuclear things, experts re-branded exceptionalism: the industry, they argued, spent more money preventing deaths from occupational exposure than any other industry. Whatever the political leaning, the stakes of exceptionalism were amplified by morality-talk: nuclear things were either sacred or profane. Whatever the political leaning, too, exceptionalist claims carried the sense that an immutable ontology distinguished the nuclear from the non-nuclear, that the difference was ultimately a clear-cut matter of fission and radioactivity.<sup>6</sup>

Historically, however, the degree to which—and purpose for which—a nation, a program, a technology, or a material counted as “nuclear” hasn’t always been a matter of consensus. Consider: Yellowcake from Niger made Iraq nuclear enough to justify war in 2003. But in 1995, yellowcake didn’t suffice to make Niger itself nuclear. According to an Office of Technology Assessment report that year, neither Niger, nor Gabon, nor Namibia had *any* “nuclear activities.” Yet together, these three nations accounted for about a quarter of the world’s uranium production that year.<sup>7</sup>

So when does uranium count as a nuclear thing? When does it lose its nuclearity? And what does Africa have to do with it?

These questions were present from the beginning of attempts to define, regulate, and market a global nuclear order, via the creation of the International Atomic Energy Agency. The agency’s 1956 statute allocated five permanent seats on its Board of Governors to states globally deemed the “most advanced in the technology of atomic energy *including the production of source materials*,” and another five according to geographic region.<sup>8</sup> Uranium “producers” in Eastern and Western bloc nations would rotate through another two seats; “suppliers of technical assistance” would rotate through one. Remaining board members would be elected by delegates from all IAEA member states.

6. The introductory material in this section draws on Gabrielle Hecht, “Nuclear Ontologies,” *Constellations* 13, no. 3 (September 2006): 320–31.

7. Office of Technology Assessment, *Nuclear Safeguards and the International Atomic Energy Agency*, OTA-ISS-615, April 1995, Appendix B.

8. In 1956, members of the first category were the U.S., the USSR, the UK, France, and Canada; members of the second were South Africa, Brazil, Japan, India, and Australia. See David Fischer, *History of the International Atomic Energy Agency: The First Forty Years* (Vienna, 1997).

In those initial negotiations, the South African delegate had pushed hard to include “source materials” as an indicator of “advancement” in the IAEA statute.<sup>9</sup> Contracts with the U.S. and Britain had already made uranium vital to the apartheid economy and turned South Africa into one of the world’s largest producers.<sup>10</sup> Pressures for decolonization of the African continent were mounting; the South African delegate suspected that apartheid policies would make it impossible to obtain an elected seat. As it was, India had tried to relegate South Africa to one of the rotating seats for “producers.” Indeed, in 1956, South African “nuclear” activities consisted only of uranium ore production, underwritten by a very small research program; in terms of technological “advancement,” this was equivalent to Portugal, Australia, and others who qualified for “producer” seats. Worse, it seemed that South Africa’s competitors for the Africa/Middle East regional seat—Israel and Egypt—had more developed research programs. The Suez Crisis heightened the political risks (for the U.S. and the UK) of granting either of those countries the right to represent the whole region. But the region’s choice of representative had to be technologically justified too. If “source materials” could count, then South Africa would easily qualify as the region’s “most advanced [nation] in the technology of atomic energy”—not the least because the other African producers were not (yet) nations. This argument carried the day; South Africa won its seat.

So in 1956 “source materials” included uranium ore, which in turn seemed nuclear enough to trump the increasingly vocal opposition of post-colonial nations to the apartheid state. But this didn’t compel the nuclearity of uranium ore to remain stable for all time.

Let’s not forget why South Africans craved a board seat: they wanted to influence the formation of a uranium market. Today’s media cover the IAEA primarily as the UN’s “nuclear watchdog,” conducting inspections to certify that civilian installations haven’t been diverted to military ends. But this function of the IAEA emerged historically; it was not built into the institution from the beginning. Crucially, the IAEA emerged—partly in response to the “Atoms for Peace” initiative—in order to *facilitate* the circulation of nuclear things.<sup>11</sup> The South Africans certainly lost no time explor-

9. “International Atomic Energy Agency,” annex to South Africa minute no. 79/2, 28/7/56, pp 10–11, National Archives of South Africa (hereafter NASA), BLO 349 ref. PS 17/109/3, vol. 2. The position of South Africa vis-à-vis the IAEA is thoroughly documented in the BLO 349, BVV84, and BPA 25 series of these archives.

10. South Africa’s uranium was located in the same mines that produced its gold. In the decade following WWII, supplying uranium to the U.S. and Britain saved many of these mines from economic collapse and served as conduits for massive foreign investment in the nation’s industrial infrastructure. See Thomas Borstelmann, *Apartheid’s Reluctant Uncle: The United States and Southern Africa in the Early Cold War* (New York, 1993); Jonathan E. Helmreich, *Gathering Rare Ores: The Diplomacy of Uranium Acquisition, 1943–1954* (Princeton, N.J., 1986); and David Fig, *Uranium Road: Questioning South Africa’s Nuclear Direction* (Johannesburg, 2004).

11. I elaborate on this point in Gabrielle Hecht, “Negotiating Global Nuclearities:

ing commercial possibilities. When he wasn't occupied with agency politics, their delegate used the personal contacts he'd made at the IAEA to deepen relationships with potential uranium customers. In 1959, for example, he escorted two representatives of the South African Atomic Energy Board (AEB) all over Western Europe. This "sales survey team" sought to forecast supply and demand for the upcoming decade, guess at the probable price structure of commercial contracts, and assess how safeguards might constrain the sale of uranium.<sup>12</sup> The tour proved so fruitful that the AEB's sales committee repeated it regularly, building on their IAEA delegate's expanding network of contacts.<sup>13</sup>

South Africans were by no means alone in using the agency in this way. From its inception, the IAEA served as a forum for its members. They learned about competing technologies and materials. They made commercial contacts. They offered or applied for technical assistance—and when such exchanges materialized, they inevitably involved buying and selling. And yes, *as part of all this*, they discussed international rules for regulating the flow of atomic knowledge and things.

The problem with the trade in nuclear things was the exceptionalism of things nuclear. How to buy and sell technologies that carried such heavy moral baggage and destructive potential? "Safeguards" sounded like an attractive answer. But what exactly would they entail? The U.S. promoted a pledge system: purchasers should agree not to use nuclear technologies and materials toward military ends and accept international inspections verifying compliance. Most other nations *selling* nuclear systems paid lip service, at least, to such a scheme. Buyers, however, rejected the prospect of controls. India, in particular, argued that regulating access would perpetuate colonial inequalities and undermine national sovereignty.

Arguments on both ends obscured more mundane political and commercial issues. South Africa, for example, wanted to avoid mandatory controls on uranium end-use which might commercially disadvantage its product. It had concrete reasons for such fears: South Africans suspected that Israel had "broke[n] off negotiations for supplies of Rand concen-

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Apartheid, Decolonization, and the Cold War in the making of the IAEA," in "Global Power Knowledge: Science, Technology, and International Affairs," ed. John Krige and Kai-Henrik Barth, special issue, *Osiris* 21 (July 2006): 25–48. For an even more detailed analysis, see Astrid Forland, "Negotiating Supranational Rules: The Genesis of the International Atomic Energy Agency Safeguards System" (Dr. Art. thesis, University of Bergen, 1997). For parallel developments with respect to Euratom, see John Krige, "The Peaceful Atom as Political Weapon: Euratom and American Foreign Policy in the Late 1950s," *Historical Studies in the Natural Sciences* 38, no. 1 (2008): 9–48.

12. Donald Sole, "Uranium Sales Survey: Interim Report on Continental Western Europe," 8 June 1959, NASA, HEN 2756 ref. 477/1/17.

13. For example, as reported in AEB Sales Committee, Minutes of the 5th meeting, 24 February 1961, NASA, HEN 2756 ref. 477/1/17 (among many other documents in this series).

trates” in 1962 because it had “instead obtained the supplies [it] required from France, without [the] safeguard inspection requirements”<sup>14</sup> that South Africans had initially agreed to in order to placate the U.S. and the UK. Within India, experts disagreed over whether to build an atomic bomb, but at the IAEA they wanted to keep their options open by minimizing international controls. The U.S., the UK, and the Soviet Union, meanwhile, refused to accept inspections on their soil. Western European designers of nuclear systems feared that inspections would open the door to commercial spying, accusing the U.S. and the UK of seeking competitive advantage. Western Europe should also receive inspection exemption and remain subject only to Euratom safeguards. “Third world” nations deemed such proposals straightforward moves by the North to dominate the global South.<sup>15</sup>

The 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) expressed (but did not resolve) all of these tensions. Under the NPT, “nuclear weapons states” pledged not to transfer atomic weapons or explosive devices to “non-nuclear weapons states” and to make “good faith” efforts to reduce their atomic arsenals. Other signatories renounced atomic weapons and agreed to accept IAEA compliance measures. The treaty thus tried to permanently fix which states had nuclear weapons and which didn’t. It also sought to establish the relationship between these by invoking another ontology of global order, that of human rights and “development.” The NPT referred to “the inalienable right of all the Parties to the Treaty to . . . nuclear energy for peaceful purposes,” which in turn would be facilitated by international cooperation that would proceed “with due consideration for the needs of the developing areas of the world.”<sup>16</sup>

The NPT codified global nuclearity but left the IAEA to implement its vision. The agency launched a major “technical assistance” program aimed at developing nations. It also tried to design a safeguards system. This was difficult, and the agency’s solution to the problem of which things were nuclear enough to require safeguards kept changing. Secure in its position on the board, South Africa pushed to exclude mines and ore-processing plants from official definitions so as to minimize external oversight of its

14. A. J. Brink to H. R. P. A. Kotzenberg, “Sale of Uranium by France,” 14 March 1962, NASA, HEN 2756 ref. 477/1/17.

15. Lawrence Scheinman, *The International Atomic Energy Agency and World Nuclear Order* (Washington, D.C., 1987); Itty Abraham, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Postcolonial State* (New York, 1998); George Perkovich, *India’s Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, 1999); Forland.

16. Article IV of *The Treaty on the Non-Proliferation of Nuclear Weapons* (signed at Washington, London, and Moscow, 1 July 1968), emphasis mine. For the full text of the treaty and the U.S. State Department’s triumphalist version of its history, see <http://www.state.gov/www/global/arms/treaties/npt1.html> (accessed 9 November 2009). Hugh Gusterson has insightfully called the worldview implemented and legitimated by the NPT “nuclear orientalism”; see Gusterson, “Nuclear Weapons and the Other in the Western Imagination,” *Cultural Anthropology* 14, no. 1 (February 1999): 111–43.

industry. The IAEA's 1968 safeguards document defined a "principal nuclear facility" as "a reactor, a plant for processing nuclear material, irradiated in a reactor, a plant for separating the isotopes of a nuclear material, a plant for processing or fabricating nuclear material (excepting a mine or ore-processing plant)."<sup>17</sup> Uranium mines and mills were thus specifically excluded from the category of "principal nuclear facilities." The 1972 safeguards document further excluded uranium ore from the category of "source material," thereby exempting its production from the ritual of inspections.<sup>18</sup>

By offering mechanisms to balance the spread and containment of nuclear things, inspections (and safeguards) themselves served to define nuclearity. For the NPT had never been specific on this point. How would exporters know what they could sell? In 1971, a committee formed to draft a list of things nuclear enough to trigger safeguards.<sup>19</sup> Published in 1974, the first trigger list included reactors, fuel fabrication and reprocessing plants, and isotope separation plant equipment. Still, not all "nuclear exporters" agreed with its specifications. Competing lists developed.<sup>20</sup> They grew longer and more detailed.<sup>21</sup> Much remained unresolved or under-specified. Did uranium ore count as "source material" or not? It depended on the IAEA document. Did yellowcake count as "natural uranium" for export purposes? Also unclear. In any case, safeguards on uranium sales, when they existed, consisted merely of lines in a contract, paper promises that the buyer wouldn't use the ore for military ends. In and of themselves, uranium ore and yellowcake did not trigger inspections.<sup>22</sup>

The safeguards/inspections regime didn't simply aim to preserve the global nuclear weapons order. The regime's fine-grained distinctions about nuclearity also served as a technopolitical frame for global trade. At the most basic level, it did this by ontologically separating things which could safely be bought and sold from things which could not. Limiting safeguards on uranium sales to lines in a contract represented an accommodation between the exceptionalism of nuclearity and the banality of commerce. This

17. IAEA, INFCIRC/66/Rev. 2, 16 September 1968.

18. IAEA, INFCIRC/153 (Corrected), June 1972. Article 112 reads: "*nuclear material* means any source or any special fissionable material as defined in Article XX of the Statute. The term source material shall not be interpreted as applying to ore or ore residue."

19. This was the so-called Zangger committee (after its chairman, Claude Zangger), initially composed of 15 states that were "suppliers or potential suppliers of nuclear material and equipment"; IAEA, INFCIRC/209/Rev. 1, Annex.

20. Notably, two trigger lists developed in parallel: one under the rubric of INFCIRC/209, and another under the rubric of INFCIRC/254. Different nations adhered to different lists; the two streams were brought into synch in 1977 but continue to develop separately at this writing.

21. For example, IAEA, INFCIRC/209/Rev. 1/Mod. 4, 26 April 1999.

22. Gabrielle Hecht, "A Cosmogram for Nuclear Things," *Isis* 98 (March 2007): 100–8.



accommodation, in turn, laid down the technopolitical conditions in which “the uranium market” could exist as both concept and object. In the 1940s and 1950s, the U.S. and the UK had strongly resisted the notion of a “market value” for uranium.<sup>23</sup> Invoking the specter of Soviet supremacy (and knowing full well that they were the only large-scale buyers at that stage), they’d strong-armed suppliers into cost-plus pricing arrangements and kept contract terms secret. Cold war ideology had thus placed uranium beyond “the market.”<sup>24</sup> Only after safeguards on uranium ore became defined as end-use pledges written into sales contracts did the “uranium market” emerge as an object and practice of political economy. A critical component of this process, freedom from direct inspections meant that the production of commercial-grade yellowcake could proceed under the mundane conditions that obtained for any other commodity. Producers paid penalties if the chemical and metallurgical content of their yellowcake didn’t meet the specs laid down by conversion plants, but no one followed the ore from its site of production to its final destination.

These accommodations held sway until the mid-1990s. Until then, inspections consisted of verifying declarations states made concerning their own “nuclear material and activities.” Revelations that inspections had missed secret Iraqi and North Korean weapons programs, however, pushed the IAEA to expand its purview. The resulting “Additional Protocol” (1997) specified a set of technopolitical practices intended to increase the agency’s ability to detect *undeclared* nuclear activities. For the first time, uranium mines and mills would be included in inspection rituals.<sup>25</sup> Adoption of the “Additional Protocol” remained voluntary. If a state signed on, however, the resulting inspections promised a definitive verdict on weapons programs. States would subject themselves to more intrusive inspections precisely to achieve this apparent finality. Each inspection that exonerated a nation of evil intentions would contribute to global security—and market stability.<sup>26</sup>

The Additional Protocol’s more inclusive prescriptions restored (at least ontologically) some of uranium’s lost nuclearity. Uranium regained nuclearity through other means too—most notably thanks to the Bush administration, which did not accept the verdict of the IAEA’s 2002 inspections in Iraq. Instead, it displaced Iraqi nuclearity in time and space: back into the failed 1990 inspections, and over onto “uranium from Africa.”

23. Helmreich (n. 10 above), and Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–1952* (London, 1974).

24. Early (failed) proposals to use the IAEA as an international fuel bank would have placed uranium beyond “the market” in a slightly different way, by fully centralizing its distribution.

25. For a summary of these measures, see the IAEA’s fact sheet, “IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols,” available at [http://www.iaea.org/Publications/Factsheets/English/sg\\_overview.html](http://www.iaea.org/Publications/Factsheets/English/sg_overview.html) (accessed 29 June 2006).

26. As of May 2006, 107 nations had signed Additional Protocols, 75 of which put them into force.

## Yellowcake from Niger

JANUARY  
2010  
VOL. 51

“Uranium from Africa” offered a powerful motive for invading Iraq. When intelligence officials, journalists, and bloggers began questioning Bush’s claim, they rapidly transformed the phrase into “yellowcake from Niger.” That begged an irresistible headline: “Follow the Yellowcake Road!”<sup>27</sup> In *The Wizard of Oz*, the yellow brick road led travelers to the Emerald City, a place sustained by illusion.<sup>28</sup> Similarly, the yellowcake road led American commentators to the forged documents and manipulation of intelligence that had produced the illusion of Iraqi nuclear weapons. The allusion was even more loaded with irony than journalists seemed to realize. As traced by the U.S. media, the yellowcake road led only to American destinations; like its fictional referent, it remained parochial and unidirectional.

As it turns out, there is an actual yellowcake road in Niger, known locally as the *route de l’uranium*. Over 600 kilometers long, this highway reaches farther north than any other paved road in the country, up to the mining town of Arlit. Since the road’s inauguration in 1981, most Nigérien yellowcake follows the *route de l’uranium* from Arlit, through Agadez, then on to Tahoua on the edge of the Sahel. There the yellowcake rolls on to another highway and continues south over the border into Benin and down to the port of Cotonou, where it boards ships destined for conversion and enrichment plants in France. Much else besides yellowcake travels on the *route de l’uranium*, of course, which among other things has helped to revive Agadez as a major stop for trans-Saharan trade, travel, and tourism.<sup>29</sup>

The history of this very material yellowcake road requires a detour through French nuclear exceptionalism. Nuclear technology was a major frame for remaking national identity in post-WWII France, and nationalism and colonialism went hand-in-hand.<sup>30</sup> The founders of the Commissariat à l’Énergie Atomique (CEA) quickly realized that France couldn’t be fully nuclear without its colonies. There was uranium on metropolitan soil, but not enough of it. The U.S. and Britain had turned to Africa in order to fuel their own nuclearity; France did the same. Starting in 1947, CEA

27. The phrase was a subheading in Michael Duffy and James Carney, “Iraq: A Question of Trust,” *Time*, 13 July 2003, available at <http://www.time.com/time/printout/0,8816,1005234,00.html> (accessed 10 February 2009). It became the title phrase in Michael Isikoff and Evan Thomas, “Follow the Yellowcake Road,” *Newsweek*, 21 July 2003, available at <http://www.newsweek.com/id/57977/output/print> (accessed 10 February 2009). More recently, it headed an editorial: Scott Horton, “Follow the Yellowcake Road,” *Harper’s*, 10 April 2007, available at <http://www.harpers.org/archive/2007/04/horton-follow-the-yellowcake-road> (accessed 9 November 2009).

28. Given how much more cultural currency (at least in the U.S.) the film has over L. Frank Baum’s book *The Wonderful Wizard of Oz* (Chicago, 1900), I’m assuming the reference is primarily cinematic; in any case, the difference is irrelevant for this purpose.

29. Emmanuel Grégoire, *Touaregs du Niger: Le destin d’un mythe* (Paris, 1999).

30. Hecht, *The Radiance of France* (n. 5 above).

prospectors scoured the French colonies in search of uranium. In the decades that followed, they found more than they could have imagined—especially in Madagascar, Gabon, and Niger.

At first, the French geologists who went to Africa in search of uranium saw themselves embarking on a great colonial adventure. But the CEA couldn't allow this perspective to flourish, at least not formally, and certainly not after decolonization. Instead, it prescribed a new way of thinking about the Self and the Other, in a booklet aimed at "Europeans likely to leave for Africa or Madagascar." There, CEA agents learned that Africa had changed: "adventure" was still possible, but "not adventure with a capital A. Gone is the time when one could succeed after having left on impulse, as an escape, with a desire to restart from scratch." The rupture with the colonial past had to take place deep inside the European Self: "Do not harbor any illusions by thinking that 'once there, you'll figure it out.' Bluffing might work in Paris; it will not stand up to the climate of the tropics." Above all, CEA agents had to remember that they were operating in independent states, whose laws demanded respect. They had to "be sufficiently non-conformist" to learn about "the true face of the African." French universities trained Africans as doctors, professors, lawyers, administrators, and bishops; this showed that Africans were fully capable of "elevating themselves intellectually." A similar argument obtained for manual and technical training. Africans were not inferior to Europeans, the booklet admonished—just less developed. Respecting their potential was a matter of national duty: "remember that the CEA and France are often judged through you."<sup>31</sup>

ESSAY

This formulation offered a new prescription for the radiance of France, a way of conjugating the colonial past into a nuclear future. But let's be clear: this future only seemed nuclear and exceptional to CEA employees from metropolitan France. Malagasies, Gabonese, and Nigériens who worked with uranium barely thought about the nuclearity of their work. Nuclearity was not a category of exceptionalism for them—at least, not initially. Uranium, for them, enacted continuities in practices and structures that had become utterly mundane under colonialism: mining and its horrifying accidents; corporate capital and its modes of discipline.

In the 1960s and 1970s, the Africans who paid most attention to the links between their rocks and the exceptional nuclearity of France were heads of state, especially Hamani Diori, the first president of independent Niger. Soon after he came to power in August 1960, he learned about the potential for enormous uranium deposits in the Sahara. Diori immediately began thinking about how such a resource might shape the Nigérien econ-

31. CEA/DP/DREM, Groupement Afrique-Madagascar, "Notice d'information destinée aux Européens susceptibles de partir pour l'Afrique ou Madagascar (1.2.63)," 2 (Cogéma archives, Bessines). For more, see Gabrielle Hecht, "Rupture-Talk in the Nuclear Age: Conjugating Colonial Power in Africa," *Social Studies of Science* 32, nos. 5–6 (October–December 2002): 691–728.

omy. He hoped things would move quickly; in Gabon, the mine had begun producing uranium five years after initial discovery. Not so in Niger: delineating the extent and nature of the reserves proved a tremendous challenge in the desert.<sup>32</sup>

Once the CEA finally deemed the huge deposits commercially viable, Diori and his advisers bargained long and hard to ensure that the state derived maximum advantage from its resources. Somaïr, the first mining company, formed in 1968; Niger held 20 percent of its initial capital (an investment itself financed by the French state).<sup>33</sup> Two years later, negotiations began to form a second company, Cominak, to mine another set of deposits; this time the Nigérien state insisted on a 32 percent participation.<sup>34</sup>

Diori waited impatiently during the long process of digging the mines, testing treatment methods for the ores, and erecting processing plants. Meanwhile, he followed from afar the French “war of the systems,” a knock-down, drag-out institutional battle in the late 1960s over which reactor design should prevail in France’s future nuclear power development.<sup>35</sup> Diori fully grasped how France’s will to national exceptionalism saturated its nuclear dreams, and how the two fused together. How could he not? In his country, the French wanted to translate nuclear exceptionalism into fiscal exemptions by minimizing their tax burden. Diori, of course, sought to maximize tax and other revenues.

A 1961 defense treaty had specified that Niger would give France priority access to uranium and other strategic materials. For Diori, this meant that uranium negotiations had to be conducted at the state-to-state level. He insisted on direct contact with French president Charles de Gaulle and his successor, Georges Pompidou. Both presidents acknowledged the unique-

32. Gabrielle Hecht, “Quelques mots coloniaux à propos de la nucléarité exceptionnelle de la France, et de la banalité du nucléaire français,” *Cosmopolitiques* 16 (septembre 2007): 181–95. Parts of this argument appeared in Gabrielle Hecht, “Uranium from Africa,” *Chimurenga 14: Everyone Has Their Indian* (March 2009): n.p.

33. Somaïr stands for Société des Mines de l’Air. The CEA’s initial participation was 40 percent, and the CFMU and Mokta—which had invested in uranium mining in France and Gabon—each put up 20 percent of the initial capital. The proportions allocated to non-Nigériens would change as more investors bought in, but the proportion held by the state of Niger increased to over 35 percent by 1988. See Antoine Paucard, *La Mine et les mineurs de l’uranium français. III: Le Temps des Grandes Aventures, 1959–1973* (Brive, 1996), 264–72, and Robert Bodu, *Les Secrets des Cuves d’attaque: 40 ans de traitement des minerais d’uranium* (Vélizy, 1994), 79.

34. Cominak stands for Compagnie minière d’Akouta. Though initial agreements were signed in 1970, Cominak didn’t formally come into existence until June 1974, after the commercial viability of the operation had been established to everyone’s satisfaction, and also after Diori was ousted by a coup d’état. Over half the participation assigned to Niger—i.e., 18 percent of the total capital—would be free. Other investors included the CEA (34 percent), OURD (Overseas Uranium Resources Development Company, a Japanese firm, 25 percent), and ENUSA (the Spanish Empresa Nacional de Uranio SA, 10 percent). See Paucard, 287–92, and Bodu, 125.

35. See Hecht, *The Radiance of France*, chap. 8.

ness of uranium-related negotiations in diplomatic correspondence. In 1968, de Gaulle signed off on the creation of a *Commission franco-nigérienne de l'uranium* (CFNU), which would provide the forum for discussions on profits, security of supply, development, cooperation, and fiscal revenues.<sup>36</sup>

Above all, the CFNU discussed price, value, and market. This was a complicated conversation, and to understand some of its terms we need to step out of Niger briefly. While governments, utilities, and the mining industry often referred to “the uranium market,” no one seemed quite sure what this market was, or what its characteristics were. Many in the industry wondered whether it existed at all. Consider, for example, the entirely typical debate held at the 1975 conference of the World Nuclear Fuel Market (WNFM), a U.S.-based trade organization. At issue was whether it might be feasible to mount a futures market for uranium. Here’s one French report on the discussion:

Is it [uranium] like cattle, grain, and soy, a banal commodity that can be the object of speculation and exchange . . . ? The answer according to the Nuclear Assurance Corporation—which organizes these WNFM conferences—is affirmative.

Participants, which include buyers and sellers of uranium, are a bit more skeptical. They point to the uncertain character of the uranium market, whose mechanisms remain confused even for traditional transactions like spot or long-term contracts. How can one . . . envisage a futures market when there isn’t even a real market for cash transactions?<sup>37</sup>

Similar questions were raised year after year: at international conferences, in contract negotiations, in the production of knowledge about ore reserves.<sup>38</sup> The IAEA and the NPT may have framed technopolitical conditions of possibility for a trade in nuclear things, but the objects, organizations, and practices that performed “the uranium market”—an entity whose very existence was perpetually in question—were distributed much more widely (and mundanely). In addition to the purchasing contracts themselves, these included the OECD, which produced “global” estimates of ore reserves in the “free world”; the U.S. broker Nuexco, which began

36. Jacques Baulin, *Conseiller du Président Diiori* (Paris, 1986); Jacques Foccart, *Le Général en Mai. Journal de l'Élysée, tome II* (Paris, 1998).

37. “Principales Informations Nucléaires,” Octobre–Novembre 1975, p. 6 (although unattributed, this document is clearly part of a series of documents produced by the Cogéma for its subsidiaries), COMUF archives, Mounana, Gabon.

38. These debates played out in numerous sites over the course of two decades, including the meetings of the World Nuclear Fuel Market and the symposia hosted by the Uranium Institute in London on uranium supply and demand. See the annual proceedings of both of these meetings. A full analysis of these debates must await my book-length treatment of uranium’s African histories.

JANUARY  
2010  
VOL. 51

publishing a “spot price” for uranium in 1968; a short-lived uranium cartel in the early 1970s that included South Africa, Canada, France, and the British multinational Rio Tinto Zinc; and many, many others. (It would be 2007 before a futures market for yellowcake was created; a scant two years later, bankruptcy left the Lehman Brothers investment firm holding half a million pounds of yellowcake that it had bought before uranium prices began to plummet—enough, as the financial bloggers put it, to build a nuclear bomb.<sup>39</sup>)

Ironically, the more such organizations and practices proliferated, the more controversy they generated over the “uranium market” as concept and object. Even if uranium could be treated like any other commodity, brokers couldn’t decide what *kind* of commodity it was (mineral or fuel?). Nuexco claimed that its monthly “spot price” could serve as a reference point for all transactions. But spot transactions—one-time sales of small lots of ore—formed only a small proportion of uranium sales. Most worldwide transactions fell under long-term contracts. Price formulas in these contracts took into account capital investments that customers had made in the mines, diplomatic links between states, the total quantity of uranium sold, and the time span of the contract. The resulting prices could be wildly different from one contract to the next, and (especially before the mid-1980s) had almost nothing to do with Nuexco’s spot price. How, then, to determine the “value” of uranium, or a “fair price” for a given transaction?

Although unrelated to long-term prices, however, Nuexco’s spot price remained the only published price for uranium: prices in long-term contracts were secret. And so the spot price served as a technopolitical referent, if only in fantasies about possible profit, reports on the future of “the market,” efforts to determine whether deposits were commercially viable, and mining companies’ attempts to attract large investors. When it plummeted, everyone worried. When it rose, everyone celebrated. And if one was the president of a poor country like Niger, one repeatedly questioned the distribution of profits. Especially after a drought in 1970 led to widespread famine. And after neighboring petroleum producers set an example for how to change geopolitical power relations by raising the price of crude oil in 1973. And after France announced the expansion of its nuclear power program later that year. Diiori learned that the erection of nuclear power plants brought large bonuses to French rural communities, staggering sums when set against Niger’s national budget. Inspired by OPEC, Diiori called for meetings between France, Niger, and Gabon in order to negotiate price and profits.<sup>40</sup>

Diiori sought to place these discussions under the rubric of nuclear

39. See for example the Bloomberg announcement at [http://www.bloomberg.com/apps/news?pid=email\\_en&sid=aNJJYNBs1rQA](http://www.bloomberg.com/apps/news?pid=email_en&sid=aNJJYNBs1rQA) (accessed 15 April 2009).

40. Baulin; André Salifou, *Le Niger* (Paris, 2002); Grégoire (n. 29 above); François Martin, *Le Niger du Président Diiori: 1960–1974* (Paris, 1991).

exceptionalism. One of his advisers would later describe the “Nigérien thesis on the unusual character of uranium,” which argued that “the content of uranium transcended commercialism.”<sup>41</sup> Diori never lost sight of the fusion between nuclear exceptionalism and French national identity. During one meeting in early 1974, one of the CEA’s directors admitted that “over the next decade, Nigérien uranium was indispensable to the French energy boom.” Diori reasoned that if Niger could contribute to the exceptional nuclearity of France, then surely France could make exceptional contributions to the economic development of Niger. (Gabonese delegates supported Diori on this point—after all, more funds could only be good! But for them the stakes weren’t as high: Niger had little to sell besides uranium, while Gabon derived the vast majority of its revenues from oil.)

In response, the French delegation attempted to de-nuclearize uranium by making claims about the banality of the market. CEA executives may have questioned the existential possibility of a uranium market while attending conferences in Europe and North America. But when they traveled south to Niamey, they insisted that the only possible way to determine the value of uranium was to treat it like an ordinary market commodity. Revenues to African states could conceivably increase, they argued, but only if pegged to the international “re-valuation” of uranium. To Nigérien ears, their explanation sounded hollow and condescending:

The recent increase in the price of uranium in international transactions allows us to anticipate a re-valuation of the price of African uranium.

The French delegation affirms France’s desire to give Nigérien and Gabonese producers the benefit of the best possible market conditions . . . . She declares herself ready to study with Niger and Gabon the means for conducting a common action to push for the re-valuation of international uranium prices.<sup>42</sup>

The African delegations countered that when it came to uranium, the problem of calculability<sup>43</sup> transcended ordinary commercial considerations:

Outside of the calculable parameters, there are other more significant ones that are not a function of calculation, such as the economic independence of France, the guaranteed satisfaction of its energy needs, a substantial savings in foreign currency and the reinforcement of the

41. “l’uranium [était] réellement un métal à contenu extra-commercial”; Baulin, 101–19. As of this writing, archives that might enable me to deepen or nuance this discussion remain closed.

42. Cited in Baulin, 116.

43. On “calculability” in this theoretical context, see especially Michel Callon, ed., *The Laws of the Market* (Hoboken, N.J., 1998), and Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley, 2002).

franc zone, and finally the solidarity of the three countries which could together represent 15% of the world uranium market if they coordinated [their efforts].<sup>44</sup>

JANUARY  
2010  
VOL. 51

Nigériens and Gabonese thus appealed to France's particular breed of nuclear exceptionalism. Referring to the "planetary dimensions" of uranium-related problems, they insisted that this exceptionalism itself had a value which could be expressed (among other ways) in terms of market shares.

Negotiations ground to a halt, without resolution. In April 1974, two months after the big meeting, Diiori was overthrown in a military coup by Lieutenant-Colonel Seyni Kountché. French troops did not come to Diiori's aid (as they had in Gabon in 1964, when a military coup threatened to unseat president Léon M'Ba). Some rumors hold that France was only too glad to see him go, while others insist that Pompidou's sudden death two weeks earlier made coordinating a rescue impossible.

Whatever the case, Diiori's opponents dismissed his efforts to stand up to the French on matters nuclear, characterizing these as no more than "demagogic declarations aimed at international opinion."<sup>45</sup> They accused him of pandering to French capital and allowing deplorable living conditions for Nigérien mineworkers. Kountché promised to take a harder line with the former colonial power. Rather than pushing for greater revenues from sales that would in the end still be conducted by the French, the new president negotiated an agreement that entitled Niger to sell—directly and independently—a proportion of yellowcake output equal to the percentage of its capital holdings in the mining companies. Other non-French investors in the mines could do the same.

Reliable, accessible sources on subsequent contracts signed by Niger are scant. Most agree that customers for the Nigérien state's portion of uranium included:<sup>46</sup>

- Libya—perhaps up to 1,200 tons in the early to mid-1970s. These purchases apparently occurred between the time that Libya signed the NPT (1968) and the time that it ratified it (1975).<sup>47</sup> Some reports suggested a second sale, perhaps up to 1,500 tons, in 1980–81.<sup>48</sup>

44. Cited in Baulin, 117.

45. "Niger: Le prix de l'uranium," *Politique-Hebdo*, 4 avril 1974, quoted in Martin, 373.

46. Figures culled from information compiled by the Nuclear Threat Initiative (NTI) and posted in its country profiles at <http://www.nti.org/>. See also International Institute for Strategic Studies, *Nuclear Black Markets: Pakistan, A. Q. Khan, and the Rise of Proliferation Networks, A Net Assessment* (London, 2007).

47. Qaddafi had refused the central premise of nuclear exceptionalism expressed in the NPT, declaring in 1974 that "the future will be for the atom. . . . Atomic weapons will be like traditional ones. . . . And we in Libya will have our share of this new weapon"; quoted in John Yemma, "Will 'New Boys' Joining Nuclear Club Be Responsible?" *The Christian Science Monitor*, 4 May 1981, 8.

48. Peter Blackburn, "Niger's Koutoubi Says He Is 'Prudently Optimistic' about Future of World Uranium Market," *Nuclear Fuel* 11, no. 14 (14 July 1986): 7.



- Iraq—around 300 tons in 1981.<sup>49</sup>
- Pakistan—around 500 tons in 1979, mostly routed secretly through Libya; perhaps more in the mid-1980s.

Under Kountché, the state apparently found it more lucrative to plunge into “the uranium market” directly.

During these years, Niger’s market had a distinct technopolitical geography—one that many Western governments would find increasingly dangerous and come to characterize as a black market. Niger—like France—didn’t accede to the NPT until 1992. Local and regional issues mattered far more to its leaders than cold war superpower politics. For example, Kountché threatened to cut off supplies to Qaddafi in January 1981, after Libya attempted to annex Chad.<sup>50</sup> But he apparently changed his mind a few months later, reportedly declaring that Niger needed the funds so badly that “if the devil asks me to sell him uranium today, I will sell it to him.”<sup>51</sup> Kountché’s exceptionalism was not that of the NPT heavyweights; compared to the intense economic pressures faced by his government, northern nuclear anxieties seemed distant and insignificant. For a time, meanwhile, France also found advantages in partitioning responsibility for sales. When it came under fire after news coverage of sales to Libya and Pakistan, it could plausibly deny involvement in these transactions by insisting that each shareholder controlled only its own portion of mine product.<sup>52</sup> In some respects, then, allowing this wide range of political tensions to fester enabled the mines themselves to thrive.

In the end, however, there were limits to how much uranium Niger could sell on its own. It had begun resorting to spot transactions, and in 1981 the spot price began to decline. Other spot sellers could respond to the drop by stockpiling uranium in the hope that the price would increase again. The Nigérien state could not afford that strategy.<sup>53</sup> The Cogéma—a French parastatal company formed in 1977 to take the nuclear fuel cycle over from the CEA—agreed to fill in the gap. But its chairman noted self-righteously that “the best support for Niger is to not give them artificial prices”; simply guaranteeing sales would be far more valuable.<sup>54</sup> After several more rough years, the two states renegotiated arrangements again,

ESSAY

49. Note that this is NOT the transaction to which the Bush administration was referring in 2002–2003.

50. Thomas Gilroy, “Niger Cuts off Libyan Uranium Supply as Fear of Internal Disruption Spreads,” *Nuclear Fuel* 6, no. 3 (2 February 1981): 4.

51. Quoted in Yemma, 8.

52. “France Denies Uranium Sales,” Associated Press, 3 January 1980, International News at <http://www.lexisnexis.com>.

53. In addition to the obvious reasons, the state had taken out huge loans for infrastructural development, using projected sales as a guarantee. See Salifou (n. 40 above) and Grégoire (n. 29 above).

54. Michel Pecqueur, quoted in Douglas Glucroft, “Cogéma Registered Its First Loss Last Year but Says It Prepared Well for a Dry Spell,” *Nuclear Fuel* 7, no. 15 (19 July 1982): 7.

leaving Cogéma in charge of marketing Niger's uranium. Later, this renewed French control of marketing led Joseph Wilson—the American diplomat sent by the U.S. Central Intelligence Agency to investigate whether Saddam Hussein had sought Nigérien yellowcake in the 1990s—to conclude that no recent sales had occurred.

Before we leave Niger altogether it's worth noting that transnational and regional technopolitical geographies continue to shape the power of nuclear things in Niger. The spot price of uranium skyrocketed in 2005–2007, precipitating worldwide interest in Nigérien reserves. In 2007, president Mamadou Tandja demanded that France increase the price paid for yellowcake, and that it (once again) make some available for Niger to sell on its own. Anxious not to lose its largest uranium supplier in the midst of the world's biggest boom in reactor construction, Areva (the successor to the Cogéma) agreed on both counts.<sup>55</sup> The concession paid off: in January 2009, Areva obtained a license to operate the new Imouraren mine, which company and government both proudly claim will make Niger the world's second largest uranium producer. Nevertheless, the Nigérien state continues to hedge its bets and has also entered into uranium partnerships with Chinese and Canadian companies.

Within Niger, a group of armed rebels known as the Mouvement des Nigériens pour la Justice (MNJ) responded to these developments by demanding a greater part of uranium revenue and jobs for the Tuareg nomads who inhabit the desert into which the mines were carved. Their grievances had a long history, one that spans the Sahara and reaches out in many non-uranic directions.<sup>56</sup> Nevertheless, uranium—with all its ambiguous, fluctuating nuclearity—certainly helped the MNJ attract international attention. Its November 2007 blog post entitled “La route de l'uranium” ended with the following warning:

AREVA,

From now on, all traffic on the uranium axis is forbidden!

Any truck that travels there will do so at its own risk.

The MNJ will no longer let Areva and Tandja decide the fate of Nigériens,

55. Niger's first independent sale under this new market regime was to an American utility. Areva's holdings—which include industrial installations in 40 countries and a commercial network spanning over 100 countries—cover the entire nuclear power system, from mines to power plant construction to waste disposal. The French state remains the primary shareholder, but the company's chairwoman, Anne Lauvergeon, has been pushing hard to increase the percentage of shares quoted on the Paris stock exchange from its current 4 percent.

56. See Grégoire, and Jeremy Keenan, “Resource Exploitation, Repression, and Resistance in the Sahara-Sahel: The Rise of the Rentier State in Algeria, Chad, and Niger,” in *Extractive Economies and Conflicts in the Global South: Multi-regional Perspectives on Rentier Politics*, ed. Kenneth Omeje (Burlington, Vt., 2008).

Will no longer let Areva pillage our Country  
 Will no longer let Areva destroy our Environment,  
 Will no longer let Areva mine the hope of a whole generation of  
 Youth who aspire to more Equity and Justice  
 The MNJ will treat Areva, and its subsidiaries, the same way that it  
 treats the Nigérien Armed Militias [i.e., the Nigérien armed forces]!<sup>57</sup>

ESSAY

Making good on its threats, the MNJ conducted several raids on mine exploration outposts and kidnapped four Areva employees (releasing them unharmed after a few days). Tandja long refused to recognize the group, calling them terrorists and bandits. The multitude of interests invested in the Imouraren mine may change his position, but at this writing it is too soon to tell.<sup>58</sup>

Meanwhile, some Somair and Cominak employees have begun to think about their work as a specifically nuclear activity. Concerned about the effects of radiation exposure on their health and environment, they contacted French legal and anti-nuclear NGOs, which in turn conducted preliminary studies finding exposure levels in excess of international norms.<sup>59</sup> At a press conference in March 2007, these groups threatened Areva with a lawsuit if it didn't volunteer compensation and clean up its operations.

Finally, how did Nigériens react to Bush's claims? One civil society group called for a libel suit against the U.S. government. Detailing the saga of how forged documents and contradictory intelligence reports led up to the Iraq war, writer and activist Moustapha Kadi concluded in February 2007:

Faced with all this irrefutable proof, George Bush could do no better than present a hypocritical verbal apology to our impoverished, bruised nation. The damages suffered by Niger and its 13 million Nigériens were not on the order of the day! For this enormous lie, which destroyed the image and credibility of our country, it would

57. <http://m-n-j.blogspot.com/2007/11/la-route-de-luranium.html> (accessed 4 May 2009); translation mine.

58. At this writing (May 2009), it appears that Tandja's position may be about to change, in part to avoid further conflict in the uranium development zone but also for other reasons too complex and rapidly changing to detail here.

59. Samira Daoud and Jean-Pierre Getti, *LA COGEMA au Niger: Rapport d'enquête sur la situation des travailleurs de la SOMAÏR et COMINAK, filiales nigériennes du groupe AREVA-COGEMA*, 25 avril 2005 (a report for the NGO Sherpa). The same two NGOs also sent a mission to the shut-down mining site in Gabon, resulting in Samira Daoud & Jean-Pierre Getti, *Areva a Gabon: Rapport d'enquête sur la situation des travailleurs de la COMUF, filiales gabonaise du groupe AREVA-COGEMA*, 4 avril 2007 (a report for Sherpa). Both missions were conducted by Sherpa in collaboration with the CRIIRAD (an NGO that seeks to provide independent scientific expertise on radiation levels at nuclear sites), as well as with Nigérien and Gabonese NGOs representing local uranium mine workers and an NGO that represents former expatriate mine employees currently living in France.

JANUARY  
2010  
VOL. 51

be normal to press charges against the USA . . . in order to obtain at least 1000 billion CFA francs (about 2 billion dollars) of compensation for Niger. But despite everything, history will show that Nigérien politicians and heads of state kept their traps shut at a moment when the dignity and honor of their country was gratuitously dragged in the mud by a global superpower!<sup>60</sup>

Like presidents, rebels, and mineworkers before him, Kadi too sought ways to marshal the political promises of nuclearity, using his country's nuclear innocence (in this instance) to call attention to its political and economic plight.

The yellowcake road in Niger took us into the heart of the uranium market and out to some of the most contested land in the Sahara. Along the way, we saw how nuclear things are embedded in extreme imbalances of geopolitical power and wealth—and the multiple ways in which different actors draw upon them to maintain or redress those imbalances. We saw how nuclear things could be claimed as exceptional or mundane, depending on the context. And we glimpsed, just for a moment, the tenuous border between licit trade and black markets. Let's take this last point up in another venue.

### The Technopolitics of Provenance

American journalists doubtless felt pleased with their witty injunction to “follow the yellowcake road,” but the wordplay wasn't new in 2003. In 1980, the same phrase headlined a documentary aired on British television. That journey down a yellowcake road took aim at the Rössing uranium mine in Namibia. The documentary was part of a transnational effort to persuade Western governments and Japan to stop purchasing uranium from apartheid states in southern Africa. For the Namibian liberation struggle and its European allies, such an embargo played a key role in efforts to end South African colonial occupation of Namibia. In this instance, it was the provenance of uranium that underwent technopolitical transformations and redistributions (more than—though never divorced from—its nuclearity or its markets).

Rössing Uranium Limited began exporting uranium ore from the Namibian desert in 1976. Still operating today, the company is a subsidiary of the British-based multinational Rio Tinto Zinc (RTZ). In the 1970s and 1980s, other investors included the French-based Total Compagnie Minière (TCF), the Atomic Energy Organization of Iran (AEOI), and the South

60. Moustapha Kadi, “Procès Niger-USA: Les raisons d'une plainte contre l'Administration George Bush,” *Énergie Pour Tous* 1 (10 février 2007), posted on [http://max1412.powweb.com/htdocs/joomla/index.php?option=com\\_content&task=view&id=561&Itemid=2](http://max1412.powweb.com/htdocs/joomla/index.php?option=com_content&task=view&id=561&Itemid=2) (accessed 8 May 2007); translation mine.

African parastatal entity known as the Industrial Development Corporation (IDC, which also controlled most of the voting shares). Before the mine opened, RTZ secured large long-term contracts with German and Japanese utilities and with the United Kingdom Atomic Energy Authority (UKAEA). By the late 1970s Rössing boasted the largest uranium open pit in the world.<sup>61</sup>

On many readings of international law, Rössing's operation was illegal from the start. South Africa had taken over administration of South West Africa (as Namibia was then known) from the German empire after WWI. After WWII the United Nations asked that the territory revert to international trusteeship in preparation for independence. South Africa refused, intensifying its colonial control after the National Party came to power in 1948 on the platform of apartheid. Starting in 1966, the UN formally ended South Africa's mandate to govern the territory, shifted that mandate to the newly created UN Council for Namibia (UNCN) pending independence, and demanded the immediate withdrawal of South African troops. In 1971 the International Court of Justice ruled that these UN measures were binding. In 1973 the UN General Assembly recognized the freedom-fighting South West Africa People's Organization (SWAPO) as the "sole authentic representative" of the Namibian people.<sup>62</sup> Emboldened by the refusal of several countries to recognize the UNCN's authority, however, the apartheid state refused to budge.<sup>63</sup> In September 1974 the UNCN issued its first

ESSAY

61. In 2004, I obtained unrestricted access to Rössing's corporate archives in Swakopmund, Namibia (I extend my thanks to Rössing's management for this access). The archives were filed, but not cataloged or numbered. In the citations that follow, I have done my best to reflect the organizational scheme I found at that time. The history of British contracts for Rössing uranium is documented in archives held at the National Archives of the United Kingdom. I consulted those records in 2001, when the archives were named the Public Records Office. Individual documents are too numerous to cite in full.

62. SWAPO had taken up armed resistance in 1966 and became the most prominent group in the Namibian liberation struggle. There were other organizations besides SWAPO within the liberation struggle. While activists in Europe and Africa interpreted UN recognition as a sign that Namibians, not white South Africans, had legitimate sovereignty over the territory, within the liberation movement UN recognition served to strengthen SWAPO's position over other groups. See Gretchen Bauer, *Labor and Democracy in Namibia, 1971–1996* (Athens, Ohio, 1998), and Colin Leys and John S. Saul, *Namibia's Liberation Struggle: The Two-edged Sword* (Athens, Ohio, 1995).

63. Several states abstained or voted against the various UN resolutions terminating South Africa's mandate and creating the UNCN. Many "Western" government officials agreed with the assessment of one British civil servant that the UNCN was "an extremist body" without much "Western" support (Martin Reith, Central and Southern African Dept, FCO to W. E. Fitzsimmons, Dept of Energy, 10 Oct 1974, PRO: EG 7/139 AB16 PRO notes, 14). In a 1984 report to the UNCN, Nico Schrijver wrote that "the composition of the Council . . . has not helped its international image, especially in the eyes of major western countries. Originally there were eleven members of the Council, all coming from Africa, Asia and Latin America. Later it was successively increased to 18 (in 1972), to 25 (in 1974) and to 31 (in 1978). Among the 31 members there are only four

JANUARY  
2010  
VOL. 51

decree. Known simply as Decree No. 1, the edict prohibited the extraction and distribution of any natural resource from Namibian territory without the UNCN's explicit permission, provided for the seizure of any illegally exported material, and warned that violators could be held liable for damages. Projected to become Namibia's largest mining operation, Rössing was the decree's primary target.

Many Western governments refused to accept Decree No. 1 as binding. Legal scholars and government officials spilled a great deal of ink on whether the decree was juridically sound, whether and how it might apply, and which courts might enforce its application.<sup>64</sup> But the bottom line, as everyone knew, was that Rössing aimed to supply an average of at least 10 percent of the (capitalist, Western) uranium market. Parsing by country, this translated into one-third of Britain's needs, and probably more for Japan. Decree No. 1 therefore sparked a fifteen-year international struggle over the legitimacy of Rössing uranium.

Starting in 1975, the UNCN sent out numerous delegations to convince governments to suspend their dealings with Namibia. They heard many expressions of support for the independence process, but before the mid-1980s only Sweden (among the large Western uranium consumers) pledged to boycott Rössing's product. Activists stepped up the pressure in a wide variety of forums. In the UK and the Netherlands, they joined forces with the anti-nuclear movement, resulting in organizations like the British CANUC (Campaign Against the Namibian Uranium Contracts). The UNCN held a week-long hearing in July 1980, during which experts and activists from Europe, Japan, and the U.S. gave presentations on Rössing's operations and contracts.<sup>65</sup> Testimony focused on the relationship between southern Africa and the Western nuclear industry,<sup>66</sup> arguing that all pur-

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Western countries, viz. Australia, Belgium, Finland and Turkey." See Nico J. Schrijver, "The Status of Namibia and of Its Natural Resources in International Law," 27 July 1984, A/AC.131/GSY/CRP.13.

64. In "The Status of Namibia," Schrijver reviews and adds to this literature; see especially pp. 36–42 of his report.

65. The hearings included a screening of *Follow the Yellowcake Road*; United Nations Council for Namibia, "Report of the Panel for Hearings on Namibian Uranium, Part Two: Verbatim Transcripts of the Public Meetings of the Panel Held at Headquarters from 7 to 11 July 1980," 30 September 1980, A/AC.131/L.163.

66. This relationship wasn't limited to uranium; the South African liberation struggle had already pointed to the complex connections binding Western and South African nuclear systems in discussions leading up to UN Resolution 418 (1977), which, among other measures, required member states to "refrain from any cooperation with South Africa in the manufacture and development of nuclear weapons" (Security Council Resolution: The Question of South Africa, S/RES/418, 4 November 1977, item 3). The main vehicle for the ANC and other South African liberation activists for drawing attention to Western nuclear and military ties with South Africa was the World Campaign against Military and Nuclear Collaboration with South Africa, launched in 1979 with a high-profile seminar at the United Nations. Paul Edwards and I discuss these matters in our

chases of Namibian uranium effectively supported the colonial occupation via the taxes paid by Rössing. In an analysis of “global” uranium supply and demand,<sup>67</sup> one economist noted that southern African uranium “could account for as much as 50 per cent of the total . . . available for net export.” Reminding his audience that South African (IDC) shares in Rössing gave the apartheid state voting control of the company, he suggested that Pretoria thereby had “leverage not only as regards the supply and price of uranium but also as regards the formulation of foreign policy towards South Africa itself and . . . [its] present position in Namibia.”<sup>68</sup>

Other efforts followed these hearings. In 1981, for example, SWAPO helped organize a seminar for West European trade unions. Presentations on living and working conditions at Rössing and on the mine’s paramilitary security forces appealed to the loyalties of the international socialist movement. More pragmatically, the seminar detailed the secret movements of Rössing uranium through European planes, ships, docks, and roads, noting that European transport workers had unknowingly handled barrels of radioactive substances.<sup>69</sup> A 1982 seminar organized by the American Committee on Africa on the role of transnational corporations in Namibia focused heavily on uranium, reprising many of the arguments mounted by European activists. In subsequent years CANUC redoubled its efforts to enlist the British peace movement.<sup>70</sup>

Despite all the bad publicity, Rössing’s customers held firm in their contracts through the mid-1980s. The company helped: it responded to the pressure by papering over the transnational dimensions of its operations. To address “the unwillingness of certain customers to deal direct with a SWA company,”<sup>71</sup> RTZ set up a front company in Switzerland under the name RTZ Mineral Services (Minserve). Customers could thus sign contracts that didn’t mention Rössing, whereupon Minserve would sign corresponding “back-to-

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essay, “History and the Technopolitics of Identity in (and against) Apartheid South Africa,” *Journal of Southern African Studies* (forthcoming).

67. By “global,” this economist, like most market analysts at the time, meant “non-Communist.” The economist in question was Stephen Ritterbus, who described himself as a “consultant on international resource issues” and noted that he’d been at the Center for Science and International Affairs at Harvard’s Kennedy School of Government.

68. United Nations Council for Namibia, “Report of the Panel for Hearings on Namibian Uranium, Part Two: Verbatim Transcripts of the Public Meetings of the Panel Held at Headquarters from 7 to 11 July 1980,” 30 September 1980, A/AC.131/L.163 (Part II), pp. 177–82.

69. SWAPO, *Trade Union Action on Namibian Uranium: Report of a Seminar for West European Trade Unions Organized by Swapo of Namibia in Co-Operation with the Namibia Support Committee, London, 29–30 June 1981* (n.p., 1982).

70. CANUC, *Namibia: A Contract to Kill, The Story of Stolen Uranium and the British Nuclear Programme* (London, 1986), 67.

71. RUL, Board of Directors 44th meeting, 28 April 1977, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

back” contracts with the mine.<sup>72</sup> Minserve’s marketing emphasized that RTZ owned uranium mines in three countries; should one mine prove unable to deliver, ore from elsewhere could take its place. Management referred to customers by number rather than name to reinforce discretion. This protected not just Rössing’s customers but also its board of directors (i.e., investors), who officially remained ignorant of customer identity and contract prices. Until late 1985 (when the threat of sanctions made such topics impossible to ignore), the “market reports” Minserve delivered at company board meetings in Windhoek pointedly avoided discussing how anti-apartheid activism constrained Rössing’s business. The omission was especially glaring because the reports discussed just about every other international political development affecting the flow of uranium.

Nevertheless, records of Minserve’s London sales meetings show that customers began expressing unease in the early 1980s. Japanese utilities in particular worried that their government might cave to international pressure and began asking Minserve to substitute non-Namibian origin material. To secure new contracts, Minserve had to devise increasingly arcane arrangements. In September 1983, for example, one customer who’d previously held a direct contract with Rössing made a new inquiry. A sales associate reported:

Politically [they] cannot buy Namibian material but they are willing to discuss taking swapped material in the form of spot deliveries of UF<sub>6</sub> [uranium hexafluoride, the feed for enrichment plants]. Any contract should preferably be with a third party, either the converter or the contracting party and not an RTZ Company.<sup>73</sup>

Minserve’s role as a front was an open secret, and utilities increasingly sought to maximize their distance from RTZ.

As international pressure for Namibian independence mounted, Rössing and Minserve began using “flag swaps” to fulfill contracts. Such arrangements could follow several scenarios. In one, the material would be re-labeled by conversion plants. Comurhex (in France) and BNFL (in Britain) proved particularly cooperative: after they converted Rössing’s yellowcake into uranium hexafluoride, they would state its origin as French or British on the customs declaration forms accompanying the material to enrichment plants in the U.S.<sup>74</sup> In a second scenario, Minserve would swap contracts with another RTZ customer: the contract originally intended to

72. RUL, Board of Directors 43rd meeting, 17 February 1977, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

73. Minutes of Sales Meetings, 16 September 1983, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

74. Minserve, London Office Memorandum, J. H. G. Senior to P. Daniel, 21 February 1986, Archives of Rössing Uranium Limited, Swakopmund, Namibia; Minserve, London Office Memorandum, G. R. Elliott to Sir Alistair Frame, 9 March 1988, Archives of Rössing Uranium Limited, Swakopmund, Namibia.



use Rössing yellowcake would get filled with uranium from another RTZ mine, while the contract signed by that mine would get filled with Rössing uranium. This scenario depended on the willingness of the other RTZ customer to accept Namibian uranium; Swiss utilities usually obliged happily.<sup>75</sup> Yet another scenario involved two conversion plants shuffling titles to uranium oxide and hexafluoride. All told, the quantity of swapped material rose from a few hundred tons in 1982 to several thousand by 1985–1986.<sup>76</sup>

At first, the pressures that made Rössing uranium increasingly illicit also made it more profitable. Sales contracts were denominated in U.S. dollars, but most costs were incurred in South African rand. As opposition to apartheid drove down the value of the rand, profits mounted: in 1985 Rössing showed the highest profit to date, recorded at over 190 million rand after taxes.<sup>77</sup> This was especially remarkable given “the continued weakness in the world uranium market.”<sup>78</sup> Still, a favorable exchange rate would not help if Rössing lost all its buyers. Talks on Namibian independence had stalled and South African state violence had intensified. In 1985 even the staunchest allies of the apartheid state began discussing full-scale mandatory sanctions. Rössing didn’t fret too much about interruptions to its supply chain, since it could circumvent restrictions with purchasing agents, offshore accounts, and more front companies.<sup>79</sup> But Minserve did worry about specific prohibitions on the import of Namibian uranium: Rössing’s main customers had “enough of the product and could manage quite well without buying any more . . . [They] might welcome an excuse to renege on their contract.”<sup>80</sup> At

75. Minutes of Sales Meetings, 22 November 1984, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

76. Needless to say, conversion plants and utilities that helped Minserve re-title Rössing material didn’t do so for free: swap fees ranged from 70 cents/lb. to \$2/lb; Archives of Rössing Uranium Limited, Swakopmund, Namibia.

77. Minutes of the 19th Meeting of the Board of Directors, Rössing Uranium Limited, 5 March 1986, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

78. RTZ 1984 Annual Report, quoted in Alastair Macfarlane, “Labour Control: Managerial Strategies in the Namibian Mining Sector” (Ph.D. thesis, Oxford Polytechnic, 1990), 271. Macfarlane explains (pp. 268–69) that the “effect of the decline in value of the rand was threefold. A) It raised the price of imports thus raising operating costs since the majority of mining equipment and some consumables were imported. B) It raised the value of sales in local currency since worldwide sales were denoted in dollars. C) The value of profits attributable to RTZ were reduced as a result of the devaluation against the pound.”

79. GLS/mje, “Mandatory UN Sanctions,” 11 June 1986. There were no shortage of banks willing to establish offshore accounts to facilitate such transactions. In March 1987, for example, Barclay’s Bank tendered a proposal for an “offshore arrangement which would enable Rössing to purchase mining equipment and supplies in such a way as to avoid a direct RSA linkage and at the same time continue to use existing buying agents in the United States and the United Kingdom.” I did not find evidence of whether or not Rössing accepted this proposal. See S. G. J. Rowley to R. B. Carlisle, 13 March 1987, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

80. GLS/mje, Rössing Uranium Limited, “Mandatory UN Sanctions,” 11 June 1986, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

JANUARY  
2010  
VOL. 51

best, flag swaps and related measures would only give Rössing some breathing space. "We have to accept that in any coordinated imposition of sanctions uranium is the easiest material for the authorities to trace and block. Without the assistance of the converter or the falsification of origin records it is inevitable that the sales of Rössing material will be severely curtailed. . . . Any study on the counter effects of sanctions on Rössing has therefore to be one of damage limitation."<sup>81</sup>

One form of damage limitation involved working the finer points of anti-apartheid legislation, particularly in the U.S. after Congress overrode President Reagan's veto of the Comprehensive Anti-Apartheid Act (CAAA) in October 1986. By proscribing the import of southern African material to the U.S. the CAAA paralleled the IAEA's trigger lists, albeit keyed to matters of provenance rather than nuclearity. Its risks for Rössing were considerable: a significant portion of its yellowcake went to plants in the U.S. for conversion to hexafluoride. In addition, much of Rössing's yellowcake converted elsewhere went to U.S. plants for enrichment. Stopping the flow of Namibian-origin uranium oxide or hexafluoride through U.S. plants could therefore shut down Rössing's business altogether. To help work around the bill, Minserve hired the consulting firm Wrightmon USA for a monthly retainer of \$15,000.<sup>82</sup>

Diane Harmon, the firm's president, employed a double strategy to maximize the amount of Namibian uranium imported into the U.S. On the one hand, she formed an alliance with U.S. conversion plants which stood to lose a lot of money if Rössing's business disappeared. On the other hand, she also exploited a loophole in the CAAA that went against the interests of the converters. Rössing yellowcake that entered the U.S. directly clearly counted as Namibian. But if that yellowcake got converted and relabeled as British UF<sub>6</sub>, hadn't its nationality changed? In which case, surely it could enter the U.S. as enrichment feed? If Rössing transferred all its conversion business to European plants, its customers could maintain their U.S. enrichment contracts. Harmon pointed out that U.S. enrichment plants would suffer if they lost southern African feed; combined with other im-

81. Minserve, London Office Memorandum, J. H. G. Senior to P. Daniel, 21 February 1986, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

82. This was a risky move. U.S. law required lobbyists to reveal whom they represented; disclosure in turn would open the door to the UN Council for Namibia to present its perspective, and thereby nullify the entire effort. Furthermore, the South African government had specifically asked Rössing to "do nothing in Washington to attempt to influence the situation." The links between Wrightmon and Minserve had to remain as discreet as possible. Officially, Wrightmon served as "consultants" rather than lobbyists, and Rössing's board of directors was told that the company had decided against a "formal lobbying approach." See Minserve, London Office Memorandum, G. R. Elliott to Alistair Frame, 9 March 1988, Archives of Rössing Uranium Limited, Swakopmund, Namibia; and RUL, Board of Directors 93rd meeting, 21 November 1986, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

port restrictions, the impact might force one of the plants to close. Job losses would ensue.<sup>83</sup> By the end of 1987, Harmon had obtained a ruling that

South African–origin uranium ore and uranium oxide that is substantially transformed into another form of uranium in a country other than South Africa is not to be treated as South African uranium ore or uranium oxide and is therefore not barred.<sup>84</sup>

ESSAY

This became known as the “UF<sub>6</sub> loophole.” Pleased with this outcome, Minserve asked Sir Alistair Frame, RTZ’s well-connected chairman, to “have a word” with BNFL and the British Foreign Office to ensure that they continued to relabel converted material as UK-origin.<sup>85</sup>

In the Netherlands, meanwhile, the technopolitics of provenance also proved useful in stalling a case filed by the UNCN in the District Court of The Hague. The case charged Urenco (a British/German/Dutch uranium enrichment consortium) and the Dutch government with violations of Decree No. 1 because they allowed the passage of Namibian uranium through Urenco’s enrichment plant in Almelo. Since the Netherlands did recognize the UNCN’s sovereignty, the court should prohibit Urenco from carrying out enrichment orders that used Namibian uranium. In response, Urenco claimed that British and French conversion plants mixed Rössing’s yellowcake with material from other nations in the normal course of operations, making it technologically impossible to determine which bits of Urenco’s uranium hexafluoride feed had once been Namibian.<sup>86</sup>

The gathering momentum of anti-apartheid measures steadily weakened the technopolitics of provenance. In 1988, U.S. congressional Democrats began working to close the UF<sub>6</sub> loophole. The State Department’s

83. Diane Harmon, “Report for the September 1, 1987 meeting with Minserve Administration A.G.,” 31 August 1987, Archives of Rössing Uranium Limited, Swakopmund, Namibia; Diane Harmon to John Senior, 26 September 1987, Archives of Rössing Uranium Limited, Swakopmund, Namibia; RUL, Board of Directors 95th meeting, 5 June 1987, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

84. NRC, SECY-87-223, “Imports of South African origin uranium,” 17 September 1987. This was a ruling by the Nuclear Regulatory Commission; the Treasury Department and the Commerce Department made similar judgments. See Diane Harmon to John Senior, 17 September 1987, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

85. Minserve, London Office Memorandum, G. R. Elliott to Sir Alistair Frame, 9 March 1988, Archives of Rössing Uranium Limited, Swakopmund, Namibia.

86. Dutch activists, including one parliamentarian, first articulated this argument at the 1980 UNCN hearings (n. 65 above, p. 123 *passim*.) For more on the Urenco lawsuit from an activist perspective, see David de Beer, “The Netherlands and Namibia: The Political Campaign to End Dutch Involvement in the Namibian Uranium Trade,” in *Allies in Apartheid: Western Capitalism in Occupied Namibia*, ed. Allan D. Cooper (New York, 1988). An overview of the suit can be found in Nico Schrijver, *Sovereignty over Natural Resources: Balancing Rights and Duties* (Cambridge, 1997).

Office of Nonproliferation and Export Policy did as well, declaring that “it is not possible to avoid the provisions of the Comprehensive Anti-Apartheid Act by swapping flags or obligations on natural uranium physically of South African origin before it enters the USA.”<sup>87</sup> Nevertheless, the technopolitics of provenance had worked well enough: they enabled Rössing to delay the implementation of restrictions which could have put it out of business. And in the end, delay sufficed. SWAPO, the South African state, and other negotiating parties signed an independence accord in December 1988. Under the circumstances, the UNCN decided not to pursue its lawsuit against Urenco. Namibia’s official transition to independence began in April 1989, with free elections held in November. In March 1990, Namibia formally became independent, and Rössing uranium became legitimate.

When does licit trade become black (or gray) marketeering? The answer depends on provenance: not just of the material being traded, but also of the traders and those who monitor them. Rössing, Minserve, and the various facilities that conducted or abetted flag swaps never thought of themselves as engaging in black market activities. For anti-apartheid activists, however, the trade in Namibian yellowcake was born illicit. As Rössing uranium went further underground, the technologies of transportation, conversion, and enrichment increasingly served to conceal its origins and movements. The *technopolitics* of the capitalist uranium market worked hard to invest yellowcake from southern Africa with sufficient legitimacy to enable its circulation, while activists strove to reveal these efforts as *technopolitics*. Marked power imbalances—between multinational corporations and freedom fighters, between international organizations perpetually fighting for their own legitimacy and wealthy nation-states—shaped the strategies and opportunities available to these different actors, and the resulting boundaries between licit trade and illicit flows.

### “Uranium from Africa”

Unresolvable tensions between technopolitical exceptionalism and economic banality reverberate through the history of uranium, as it oscillated between apocalypse-inducing rock and tradeable commodity. In 1957, uranium ore was nuclear enough to give apartheid South Africa a central role in the IAEA. A decade later, the nuclear industry in the West found that cre-

87. The quote continues: “If a US broker arranged for an obligation swap to take place in Europe between South African natural uranium and French natural uranium and then sought to bring that unprocessed material into the USA as French origin material and so declared it to the US Customs Service, then the Customs Service would regard that action as a fraudulent declaration since the true origin of the natural uranium would be South African”; quoted on pp. 48–49 of F. McGoldrick, “Flag Swaps,” *Uranium and Nuclear Energy, 1988: Proceedings of the Thirteenth International Symposium held by the Uranium Institute, London, 7–9 September 1988* (London, 1989), 43–50.

ating markets for reactors—and for uranium itself—would go more smoothly if uranium mines and yellowcake plants lost their status as nuclear facilities for purposes of inspections and safeguards. As one outcome of efforts to reconcile nuclear exceptionalism with the mundanity of markets, nuclearity no longer inhered in raw materials.

In the 1970s, France could thus counter Niger's attempt to value its yellowcake in terms of nuclear exceptionalism by framing uranium in ordinary market terms. The tremendous imbalance of power and wealth gave France the upper hand. When the two states finally did renegotiate their marketing arrangements, that same imbalance thrust Niger into sales contracts that seriously undermined (the capitalist world's view of) the Nuclear Non-Proliferation Treaty. In Niger, Western nuclear exceptionalism slammed into postcolonial capitalism, regional politics, and the horrible mundanity of poverty. Yellowcake from Niger may not have gone to Iraq in 2002, but it did so in 1981; chances are overwhelming that it ended up in the Pakistani bomb of 1998, and that it would have fueled a Libyan bomb had Qaddafi not renounced his effort to build one. Divesting uranium of nuclearity did push Nigérien yellowcake into a market, just not a licit market by NPT definitions. France's refusal to include nuclear exceptionalism in the "market" value of African uranium turned out to be risky business.

The distinction between licit and illicit market activities depended on one's place in the geography of nuclear things. From the late 1970s onward, Namibian yellowcake played a central role in the (cold war, capitalist) uranium market. Its presence and its price helped keep conversion and enrichment plants in business; it fueled power reactors as well as bombs. When the liberation struggles in southern Africa threatened to render its uranium illicit, producers recruited these allies and their technopolitical mechanisms in an increasingly desperate (and ultimately successful) effort to remain in business. In this instance provenance, rather than nuclearity or markets, became reconfigured. The technopolitics of provenance not only served to materially intertwine licit trade and black markets; they also enacted a profound symbolic erasure of African things from Western nuclear systems.

We cannot fully account for the power of nuclear things without understanding the many histories of uranium from Africa. Rendering these histories visible requires us to grapple with multiple performances of nuclear exceptionalism, and with the ongoing tensions between those performances and the mundanity of markets, the exigencies of poverty, and the sovereignty of states. Any commitment to analyzing technologies that lay claim to global power—nuclear or not, exceptional or mundane—demands a transnational approach fully grounded in local and regional histories, however fractured or fragmented.

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ESSAY

In 2004, the U.S. Senate conducted an investigation into the full range of intelligence claims used to justify the Iraq war. Among its many findings:

interagency consensus was that Iraq's efforts to acquire uranium were not key to the argument that Iraq was reconstituting its nuclear program. . . . [T]he key judgments [about Iraq's ambitions] were drawn from a CIA paper which only highlighted the acquisition of aluminum tubes as the reason Iraq was reconstituting its nuclear program.<sup>88</sup>

JANUARY

2010

VOL. 51

Information about the tubes *had* genuinely concerned CIA experts, although officials in other intelligence agencies found such evidence weak and misleading.<sup>89</sup> Evidence concerning “uranium from Africa,” however, had seemed flimsy to everyone. Experts contested it from the start and fought to leave it out of their reports. Why, then, did the *weakest* piece of evidence—the piece that was actually fabricated, rather than merely misinterpreted—come to play the starring role in the buildup to the war?

“Aluminum tubes from an undisclosed location” just didn't have the same power as “uranium from Africa.”

88. U.S. Senate Select Committee on Intelligence, “Report on the US Intelligence Community's Prewar Intelligence Assessments on Iraq,” 7 July 2004, 53.

89. Albright (n. 2 above).