



# FUEL CYCLE TO NOWHERE

U.S. Law and Policy on Nuclear Waste

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on Nuclear Waste

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## **Fuel Cycle to Nowhere**

*For our children*

# Acronyms and Abbreviations

AEA	Atomic Energy Act
AEC	Atomic Energy Commission
AIF	assured isolation facility
ANDRA	Agence nationale pour la gestion des déchets radioactifs (French National Radioactive Waste Management Agency)
APA	Administrative Procedure Act
ASLB	Atomic Safety and Licensing Board
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
BRC	below regulatory concern
C&C	Consultation and Cooperation (Agreement)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulation
CH-TRU	contact-handled transuranic waste
CPI	Consumer Price Index
CRBR	Clinch River Breeder Reactor
CRESP	Consortium for Risk Evaluation with Stakeholder Participation
DEIS	Draft Environmental Impact Statement
DHS	Department of Homeland Security
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DOJ	Department of Justice
DOT	Department of Transportation
DSEIS	Draft Supplemental EIS
DSEIS II	Draft Supplemental EIS II
DU	depleted uranium
EEG	Environmental Evaluation Group
EHS	environmental, health, and safety
EIS	Environmental Impact Statement
EM	Office of Environmental Management, DOE
EnPA	Energy Policy Act
EPA	Environmental Protection Agency

EPC	Executive Planning Council
ERA	Energy Reorganization Act
ERDA	Energy Research and Development Administration
EW	exempt waste
FEIS	Final Environmental Impact Statement
FBI	Federal Bureau of Investigation
FCC	Federal Communications Commission
FFCA	Federal Facilities Compliance Act
FLPMA	Federal Land Policy and Management Act
FOIA	Freedom of Information Act
FRSA	Federal Railroad Safety Act of 1970
FSEIS II	Final Supplemental EIS II
GAO	Government Accountability Office (previously General Accounting Office)
GNEP	Global Nuclear Energy Partnership
GTCC	greater-than-class-C waste
HASC	House Armed Services Committee
HEW	Department of Health, Education, and Welfare
HLW	high-level waste
HMTA	Hazardous Materials Transportation Act
HMTUSA	Hazardous Materials Transportation Uniform Safety Act
HSWA	Hazardous and Solid Waste Amendments (RCRA)
IAEA	International Atomic Energy Agency
ICC	Interstate Commerce Commission
INL	Idaho National Laboratory
IFNEC	International Framework for Nuclear Energy Cooperation
IRG	Interagency Review Group on Nuclear Waste Management
ISF	intermediate scale facility
ITF	intermodal transport facility
LAMW	low-activity mixed waste
LCF	latent cancer fatalities
LILW	low- to intermediate-level waste
LILW-LL	low- to intermediate-level waste–long-lived
LILW-SL	low- to intermediate-level waste–short-lived
LLRWPA	Low-Level Radioactive Waste Policy Act
LLRWPAA	Low-Level Radioactive Waste Policy Amendments Act
LLW	low-level waste
LLRW	low-level radioactive waste
LMFBR	liquid metal fast breeder reactor
LULU	locally undesirable land use
MOU	memorandum of understanding
MOX	mixed oxide
MRS	monitored retrievable storage (facility)
MTHM	metric ton of heavy metal
MWe	megawatt electrical
NAS	National Academy of Sciences
NASA	National Aeronautic and Space Administration

NARM	naturally occurring and accelerator-produced radioactive material
nCi	nanocurie
NCNP	Nevada Commission on Nuclear Projects
NCRPM	National Council of Radiation Protection and Measurement
NEA	Nuclear Energy Agency (within OECD)
NEPA	National Environmental Policy Act
NFMDA	Nuclear Fuel Management and Disposal Act
NFS	Nuclear Fuel Services
NGA	National Governors Association
NIMBY	Not in My Backyard
NORM	naturally occurring radioactive material
NPL	National Priorities List (CERCLA)
NRC	Nuclear Regulatory Commission
NRDC	Natural Resources Defense Council
NRTS	Nuclear Reactor Test Site
NTS	Nevada Test Site
NWF	Nuclear Waste Fund
NWMO	Nuclear Waste Management Organization (Canada)
NWPA	Nuclear Waste Policy Act
NWPAA	Nuclear Waste Policy Act Amendments
NWPO	Nuclear Waste Project Office (Nevada)
NWTRB	Nuclear Waste Technical Review Board
OCRWM	Office of Civilian Radioactive Waste Management, DOE
OECD	Organization for Economic Cooperation and Development
OMB	Office of Management and Budget
ONWN	Office of Nuclear Waste Negotiator
ORNL	Oak Ridge National Laboratory
OTA	Office of Technology Assessment (Congress)
PA	Performance Assessment
PFS	Private Fuel Storage, LLC
PUREX	plutonium uranium extraction
R&D	research and development
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent in man
RH	remote handled
RH-TRU	remote-handled transuranic waste
ROD	Record of Decision
RWCA	Radioactive Waste Consultation Act
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SNF	spent nuclear fuel
SRS	Savannah River Site
SSNM	surplus special nuclear material
SSEB	Southern States Energy Board
STB	Surface Transportation Board (within DOT)
Sv	sievert



T	time it takes for 95 percent of a radioactive substance to decay
TPA	Tri-Party Agreement
TRANSCOM	Transportation Command (United States)
TRU	transuranic waste
TRUPACT	transuranic packaging container
TSCA	Toxic Substances Control Act
TSPA	total system performance assessment
TVA	Tennessee Valley Authority
UCS	Union of Concerned Scientists
USGS	United States Geological Survey
VA	viability assessment
WIPP	Waste Isolation Pilot Plant
WIPPLWA	Waste Isolation Pilot Plant Land Withdrawal Act
WIR	waste incidental to reprocessing
WVDPA	West Valley Demonstration Project Act

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This book emerged out of research that we undertook as part of our work with the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), a multidisciplinary consortium of academics at eight universities and a medical school. CRESP conducts and publishes research on the technical, scientific, economic, legal, and policy elements of U.S. nuclear waste policies.<sup>1</sup> We found that parts of the policies and their history had been told, some in great depth and in a number of cases informed by the authors' participation or close familiarity with the events. But we could not find a work that synthesized the various elements into a single comprehensive and objective account of the history and current situation of U.S. nuclear waste law and policy. This book seeks to meet this need. The authors are an academic and an environmental lawyer who have both long worked in the environmental law and policy realm but were not directly involved in the events recounted.

In researching and writing this book, we sought to consult original sources but have also necessarily drawn widely on the important contributions of many earlier authors who have written on specific aspects of the history, and on those of experts in government, the academy, and nongovernmental organizations who have examined particular regulatory and legal topics. We are deeply indebted to all of them. Their works are found in the Bibliography.

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# Fuel Cycle to Nowhere

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# Introduction

This book presents the first comprehensive account of the history and current status of U.S. nuclear waste regulatory law and policy. The history, extending over sixty years, is extraordinarily rich, with interacting technological, scientific, economic, political, social, and international security dimensions. The U.S. legal and regulatory regime for nuclear waste is also highly complex, even labyrinthine. It is a palimpsest composed of federal and state statutes, presidential executive orders, administrative regulation and guidance documents, reports of expert bodies and government agencies, and court decisions contributed by a variety of actors over many decades.

One principal aim of this book is to unravel this tangle of events, reports, laws, and policies and to present the elements in an ordered and accessible narrative while remaining faithful to the complexities and contingencies in the record. The opening chapter presents a historical overview. Subsequent chapters examine specific topics, including nuclear waste classification and regulation; waste transportation; the contrasting stories of two deep geologic repositories for permanent waste disposal, the Waste Isolation Pilot Plant (WIPP) and Yucca Mountain; and the current dilemmas posed by so-called orphan wastes that have no disposal pathway. This history has produced the nuclear waste dilemma that now confronts the administration of President Barack Obama and the nation, which leads to the second goal of this book: to analyze our nation's present legal and policy conundrum and examine the potential means for resolving it. The United States has a huge legacy of highly radioactive wastes accumulated over many decades from weapons production and nuclear power generation. Yet the Obama administration has abandoned the waste disposal repository at Yucca Mountain in Nevada that Congress designated to receive these wastes. In doing so, the administration repudiated what has been for more than two decades the country's only plan—albeit a flawed one—to deal with these wastes. The Blue Ribbon Commission on America's Nuclear Future has been appointed by the administration to study and present solutions. In order to help policy makers and the public solve our nuclear waste challenge, the final chapter of this book draws lessons from the history examined in the preceding chapters, analyzes the available options, and offers recommendations for moving forward.

This Introduction first presents an overview of the nuclear waste legal and policy questions that we confront and the means for addressing them. It then summarizes the principal events, broader developments, and institutional structures—elaborated in detail in the book—that have generated that history.



## The Current Nuclear Waste Policy Dilemma

The nuclear waste dilemma arises at the same time the nation faces momentous energy policy choices posed by the need for decisive actions to mitigate climate change and to reduce dependence on foreign oil. As a major part of an initiative to promote development of low-carbon and renewable energy resources, President Obama, with broad support in Congress but significant dissent from the public, has strongly supported big government subsidies and other initiatives to stimulate construction of large numbers of new nuclear power plants after twenty-five years in which not a single such plant has been built. George W. Bush's administration invoked both climate and energy security goals in proposing the Global Nuclear Energy Partnership (GNEP), a major initiative to make new fuel from uranium and plutonium extracted from spent nuclear fuel (SNF), after an almost forty-year period in which there was a national moratorium on SNF reprocessing. GNEP was roundly criticized on technical, security, and cost grounds by a National Academy of Sciences (NAS) committee and numerous other independent experts; it was cancelled by the Obama administration. The brief U.S. experiment with SNF reprocessing ended in the 1970s after a dismal record of operational, financial, and environmental failures. Presidents Gerald Ford and Jimmy Carter applied the coup de grace by halting federal aid for reprocessing because of the proliferation risks posed by the plutonium it produces. GNEP, however, triggered active discussion of reprocessing options, notwithstanding a barrage of powerful criticisms.

Even if the public were otherwise prepared to go along with a major expansion of nuclear power, much less reprocessing, it is unlikely to do so without a new, credible regime for disposing of our existing and future nuclear power wastes. SNF continues to accumulate at seventy-seven nuclear power plant sites across the country without a disposal destination or even a plan for one. Meanwhile, the federal government is subject to mounting liabilities, running to many billions of dollars, to nuclear utilities for breach of its commitments to take charge of SNF and start disposing of it beginning in 1998.

In addition to the massive SNF waste problem, there still reposes at Department of Energy (DOE) facilities a huge Cold War legacy of highly hazardous reprocessing wastes—high-level wastes (HLW)—from weapons production; these are being addressed by a massive, ongoing DOE cleanup effort expected to cost several hundreds of billions of dollars. DOE is obligated by agreements with the states where these facilities are located to remove these HLW by specified deadlines, but it will be unable to meet them unless the Yucca Mountain facility is built or another repository is developed soon.

The Obama administration's dilemma is this: it needs to solve the nuclear waste problem in order to advance its nuclear power agenda, but it has repudiated Yucca, the only waste solution available under current law. The nation's dilemma is somewhat different. There is an imperative need to deal responsibly with the large quantity of nuclear wastes we already have and those that will continue to be generated at existing power plants, whatever the fate of the "nuclear renaissance" advocated by the administration and many in Congress. Obama's abandonment of Yucca is currently being challenged in litigation. The wastes are left in legal and policy limbo in or near a host of communities large and small throughout the country. At this point, there is neither a plan to develop a repository nor a considered policy for how and where to store them in the interim.

This does not mean that Yucca must at all costs be built. The technical merits of