

## APPENDIX A

### RESTRICTED DATA AND FORMERLY RESTRICTED DATA

Since their introduction at the end of World War II, nuclear weapons have been seen as so radically different from other weaponry, so uniquely destructive, that extraordinary measures are needed to slow their spread. To this end, Congress enacted the AEA to assure firm Government control over all aspects of nuclear technology relating to the creation, design, production, or use of nuclear weapons. An important element of this control is the RD system, established by the Act to secure nuclear weapons-related information by providing it with a unique system of classification. RD is defined by section 11y of the AEA of 1954 (as amended): **"The term 'Restricted Data' means all data concerning (1) design, manufacture, or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of nuclear energy; but shall not include data declassified or removed from the Restricted Data category pursuant to section 142."**

This statute-based system operates outside of the NSI system established by Executive order for all other Government classified information.

RD is specifically exempted from all provisions of E.O. 12958. In particular, Restricted Data is never subject to automatic declassification but can only be declassified by the Secretary of Energy or delegated DOE authority. RD is generally technical. Some of it has enduring value so long as it is not compromised. In the hands of an adversary, a nuclear weapon based on even an early design could be as great a threat as a modern weapon.

A subset of RD, referred to as FRD, concerns the military utilization and deployment of nuclear weapons. Although the name implies otherwise, FRD is classified

information and is also not subject to the automatic declassification provisions of E.O. 12958.

This appendix is intended to aid the reviewer in detecting the possible presence of RD or FRD in documents, which may be either unmarked or improperly marked as NSI. Much information that was once RD or FRD has been declassified over the years. Therefore, information fitting the descriptions or containing key words provided below is not necessarily classified as RD or FRD. All such documents shall be referred to a DOE, or DOE contractor, authorized derivative classifier, who will use the appropriate topical classification guide(s) and procedures to make a classification determination. Pending such review, the documents will be held and protected as classified. Final decision on classification will rest with the DC.

In general, information in the following areas is RD or FRD:

- a. Designs, shapes, specifications, internal physical conditions, functional descriptions, or arming, fuzing and firing of nuclear explosives;
- b. Material properties under conditions achieved in nuclear explosions;
- c. Vulnerabilities of U.S. nuclear weapons to sabotage, countermeasures or unauthorized use;
- d. Logistical and operational performance information (specific weapon deployments, yields, capabilities);
- e. Details of the critical steps in nuclear material production processes; and
- f. Features of military nuclear reactors not common to, or required in, civilian power reactors.

RD and/or FRD is likely to be found in documents dealing with any of the following areas:

**Nuclear weapon design, fabrication, and utilization:** Nuclear weapons apply the physical process of nuclear fission - the splitting of a heavy atomic nucleus (uranium and/or plutonium) by absorption of a neutron - to cause the release of energy ("yield") many orders of magnitude greater than would be possible from a similar amount of chemical high explosives. Some nuclear weapons also use the process of thermonuclear fusion - the joining together of light nuclei at very high temperatures - to produce additional yield by "boosting" the fission explosion with extra neutrons, or in a separate thermonuclear "stage" (e.g., the "hydrogen bomb"). Information revealing: weapon and component materials or configurations; design principles and details; mode of operation; tests; internal physical conditions (e.g., temperature, pressure); yields; methods for command/control; disablement; arming, fuzing and firing; vulnerabilities to sabotage or countermeasures; production quantities; and storage or deployment locations, may be and usually is classified. Improperly marked or unmarked RD and/or FRD are most likely to be found in historical documents dealing with weapon delivery systems (missiles or aircraft), or with defense(s) against such systems.

**Inertial confinement fusion:** This laboratory-scale research attempts to use certain directed power sources - typically very large lasers, but also accelerator-produced particle beams - to compress and heat a tiny target containing small quantities of fusion fuel (deuterium and tritium) to thermonuclear ignition conditions. The resulting "micro explosion" would resemble a miniature thermonuclear weapon. Therefore, target design and operation information judged to be revelatory of nuclear weapons technology is classified. (Alternative terms for related programs include: Controlled Thermonuclear Fusion, Magnetic Confinement Fusion, Stellarator, and Tokomak.) Military nuclear reactors: Nuclear reactors use the fission

reaction to generate electric power or for other applications. Information in this area includes: design; development; test and operation of reactor power systems for military purposes, especially for naval nuclear propulsion; and information concerning system capabilities and vulnerabilities. The emphasis here is on "military" or "naval," applications since all aspects of civilian nuclear power (e.g., commercial electric power generation) are unclassified.

**Nuclear material production:** The most certain way to discourage the proliferation of nuclear weapons is to deny access to fissile materials such as plutonium or enriched uranium. Plutonium does not occur naturally in any significant quantity, but must be produced in nuclear reactors. The unstable hydrogen isotope tritium, used for boosting fission weapons, is also made in such reactors. Information describing detailed features of the production process may be RD. Fuel and target reprocessing, in which the irradiated material is put through a sequence of chemical operations to extract the product plutonium or tritium, is an important part of the production process.

**Isotope separation:** Unlike plutonium, uranium occurs naturally and is relatively plentiful. However, only the lighter isotope  $U^{235}$  (0.7 percent of the natural element) is capable of fission by thermal neutrons. Enriching the content of this isotope over that contained in natural uranium requires a process that can separate the  $U^{235}$  from the slightly heavier but much more common isotope  $U^{238}$ . This has been done by diffusion techniques, which exploit slight thermal speed differences between gas molecules containing the different isotopes; by electromagnetic and centrifuge techniques, which exploit the difference in mass; and by laser separation techniques, which exploit differences in atomic spectra. Potentially classified information includes process and design details of these isotope separation methods and the amounts and specifications of material prepared for the weapons program.

## Key words and phrases that could indicate the presence of RD/FRD

A	
abelia	anade
active protection	anti-tampering device
AGEX	arming
alondra	atomic vapor laser isotope separation (AVLIS)
alpha	

B	
B-x (x=a number, e.g., 61)	birdyard
baffle	blackbody
bag	blackout
bagpipe	blowzer
bamboo	boll weevil
banneret	boll
bark	bonnet
barley	boosted or boosting
barrier	boron (B)
barter	breaker
baseboard	bridge
beaker	broadsword
bengal	BTV
beret	bulrush
beryllium (Be)	burn
billboard	burrito
billiard	BUTEX

C	
cabin	chicken fat
cabot	chico
caiman	cholla

C	
calamus	cicada
calutron	cider
camino	cinderella
canine	citron
canned subassembly (CSA)	cladding
canopus	cliffrose
capocollo	code X (where X is a name such as Big Mac or Coronet)
capris	COLEX
capsule	colleen
caribou	Comprehensive Test Ban Treaty (CTBT)
cascade	compromise
case	compton detector
catapult	condor
cauldron	Continuous Reflectometry for Radius vs. Time Experiment (CORRTEX)
celedon	Controlled Thermonuclear Reactor (CTR)
centrifuge	core
centurion	cork
chain reaction	cotton
chalk	coupling
channel	crosscheck
cherry	custard
chestnut	cutlass

D	
D-38	dill
daffodil	dinger
dandelion	direct drive
DAY	directed energy/output
Dayton	disablement

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D	
DEDO	disarmament
depleted uranium	dogwood
detonation points	dolphin
detonator	doorknob
deuterium (D or H <sup>2</sup> )	dorado
device	dove
device stage	dover
diffuser	DT
diffusion	

E	
early day	enhanced radiation/output
effects test	enriched
egret	enrichment
electric lighting system (ELS)	epee
electromagnetic pulse (EMP)	equation of state
electromagnetic separation	ER
ELEX	estrangere
elgin	eunuch
elmo	event
emergency destruction	explosive train
EMPTV	extended life
endcaps	

F	
410	flashback
fairwind	flicker
fallout	fluence
fat man	flux
fava	fogbank
fiesta	formula quantity

F	
fir	frontyard
fireball	frostsmoke
fire safe	fuel reprocessing
firide	fusion
firing set	fratricide
fissile	freeform
fission	fuze

G	
gallium (Ga)	goblin
gamma output, radiation, flux, spectrum, fluence	gorro
gas centrifuge	grille
gifthorse	grinch
ginkgo	grip
girdle	gun assembled, type
goblet	guppy

H	
hacha	high explosive (HE)
halite	high explosive assembled (HEA)
hamster	highly enriched uranium (HEU)
hardening	hightide
harness	hohlraum
HE	hot spot
headwind	hugoniot
heather	hydride
height of burst	hydrogen bomb
hercules	hydrodynamic
hexafluoride	hydronuclear

H	
high altitude effects (or phenomenology)	hydro test (shot)
highcard	HYTV

I	
IA	interstage
iceblink	interval time
ICF	in-flight-insertion
ignition point	INRAD
implosion assembled weapon (IAW)	instability
INCO	intermediate enriched uranium (IEU)
Indirect drive	interstage
Inertial confinement fusion (ICF)	inventory
initiator	ivory
insensitive high explosive	

J	
jailyard	jitney
java	joint test assembly (JTA)
jemima	jonah

K	
"K"	knot
kappa	konastorm
keg	Krakatoa
kiloton (kt)	krypton-85

L	
lance (not the missile)	lighteride
landbreeze	limelight
lapwing	limited life component
lark	Limited Test Ban Treaty (LTBT)
laser isotope separation	line of sight pipe

L	
laser fusion	lippizan
laser x-ray	lithium (Li)
lasso	Little Boy
leeward	lobito
leotard	lowcard
libi	lugbolt
lighter	

M	
mabium	mimas
macadamia	minerva
mandrake	minnow
mantis	mistrel
manx	mint, mint julep, or mint stick
marble	mix
mash	Mk-x (x = a number, e.g., 3)
material X (X = a number)	molasses
maybium	molecular laser isotope separation (MLIS)
maypole	morigoose
megaton (Mt)	moratorium
mesquite	moscareta
microlark	muffler
microlock	muneca
mikado	mutton
millwright	myrnaloy

N	
national technical means	night soil
naranja	noah
naval reactors, propulsion	norms
nemo	nova



N	
NEST	nuclear assembly system (NAS)
neutron	nuclear directed energy weapon (NDEW)
neutron generator	nuclear material
Nevada Test Site (NTS)	nuclear weapon

O	
oak	one point (as an adjective)
ocarina	opacity
odin	oralloy
olive	oregano
OLEX	ostrich

P	
"P"	pimento
Pacific Proving Grounds (PPG)	pin experiment, dome
paddlewheel	pine
paint	pinto
palm	pirate
pancho	pit
particle beam weapon	pizza
paz	plaudit plaza
peaceful nuclear explosion (PNE)	plutonium (Pu)
peach	plyboard
pebbles	poke
pecan	poodle
pegboard	popcorn
pell	poplar
pellet	pork
permissive action link (PAL)	postcard

P	
pent	postum
pepe	prime August
pepper	preheat
peppermint	preinitiation
perseid	primary
peyote	production reactor(s); Hanford reactors (B, C, D, DR, F, H, E, KW); Savannah River reactors (R, P, L, K, C)
phalanx	prometheus
phoebe	propagating
picket	propellant
pickup	prune
picnic	pure fusion
picosun	PUREX
pillow	pyxis
pilot	

Q	
quarterhorse	quill
quieting	quink

R	
rabenton	REDOX
RADEC	reduced metal
radiation channel, case, flow	release code
radiation	reservoir
radioactive	rhapsody
radiochemical/radchem detector or tracer	ricicle
radioisotope thermoelectric generator (RTG)	riesling
radish	rina
rancho	rink
rapier	rotor

R	
ratchet	rodeo
rattan	roundup
reaction history	rumrunner

S	
"S"	snowflake
saco	solvent
safeguards	solvex
safing	sopwith
safety	sorghum
safflower	soro
sage	space nuclear power
saguaro	special nuclear material (SNM)
salt	spica
salthaze	spinach
salvage fuze	spinnaker
sambo	springboard
samovar	spruce
sanguine	squab
scaled depth of burial (SDOB)	squall
schilling	squash
scorpion	SSIA
scythe	stage, staged, staging
seaboard	staged weapon
seabreeze	starboard
secondary	stardust
security	stetson
serpens	stick
sesame	strategic quantity
shacklebolt	strategic weapon

S	
shaft (project)	stripper
sherwood (project)	strong link
shield	styx
shiplap	succotash
significant quantity	sunflower
silo	super
simulator	super-X
sioux	Supplemental Test Site (STS)
sipapu	suppressed radiation
sombrero	surrey
skunk	syndrome
sleet	

T	
T (H <sup>3</sup> )	tile
tacos	timpany
tactical weapon	tire
taffeta	tom
tailored output	tony
tailwind	topsy
talus	Threshold Test Ban Treaty (TTBT)
tamper	TN
tangara	tradewind
tanglewood	trailmaster
tango	train
target quantity	trapeze
teaser	trinity
termite	trippa
terrazzo	tritium production

T	
test, underground, atmospheric, underwater, nuclear, weapon, effects	trout
test vehicle	trunk
thermal diffusion	TSTV
thermonuclear weapon	tuballoy
thimble	tubes alloy
thin man	tule
thundersquall	turtle
tierod	tweezers

U	
U-233, U-235, U-238	urchin
ukelele	use control
umpire	UTV
uranium (U)	

V	
vela	vineyard
venting	violet
vigor	vortex
vinegar	vulnerability

W	
W-x (x=a number, e.g., 79)	whitehorn
walkinghorse	whitehorse
walnut shells	whiteout
watusi	willow
weak link	windrift
weapon	wine
weapon grade	witch hazel
weapon stage	WL/SL

W	
weigela	wrecker
wendigo	
X	
xebec	x-unit
x-ray	
Y	
Y detector	yellowstone
yardarm	yield
Z	
"Z"	zorro
zinfandel	zorzal
zipper	

## Sites/Organizations

U.S. nuclear weapons have been designed at the Los Alamos, Livermore, and Sandia Laboratories, and manufactured in a production complex that has changed with time but has always been spread over the United States. Key sites and organizations that may be found in conjunction with nuclear information and potential RD:

Albuquerque Operations Office (AL)

ACF Industries

Advanced Research Projects Agency (ARPA)

Air Force Cambridge Research Lab (AFCRL)

Air Force Office - Atomic Testing (AFOAT)

Air Force Special Weapons Center (AFSWC)

Air Force Systems Command (AFSC)

Air Force Technical Applications Center (AFTAC)

Air Research and Development Command (ARDC)

Air Operations Center (AOC)

Amchitka

American Car and Foundry (ACF)

Armed Forces Special Weapons Project (AFSWP)

Assistant to the Secretary of Defense, Atomic Energy (ATSD-AE)

Atomic Energy Commission (AEC)

Atomic Weapons Establishment (AWE), U.K.

Atomic Weapons Research Establishment (AWRE), U.K.

Bendix Kansas City

Bethe Panel

Bettis Atomic Power Laboratory

Bikini, Bikini Atoll

Burlington

Christmas Island

Defense Atomic Support Agency (DASA)

Defense Nuclear Agency (DNA)

Division of Military Application (DMA)

Division of Peaceful Nuclear Explosives (DPNE)

Edgerton, Germeshausen, and Grier (EG&G)  
Energy Research and Development Administration (ERDA)  
Eniwetoc, Eniwetok, Eniwetak, Enewetak,  
Fernald  
General Advisory Committee (GAC)  
GE Pinellas  
Hanford  
Hawaii Area Office (HAO)  
Hiroshima  
Holmes & Narver (H&N)  
Johnston Atoll/Johnston Island  
Joint Working Group (JOWOG)  
Joint Task Force (JTF) 7, 8, and 132.1  
Joint Committee on Atomic Energy (JCAE)  
Kingman Reef  
Knolls Atomic Power Laboratory  
Lawrence Radiation Laboratory (LRL), Livermore Laboratory (LLL), or Livermore National Laboratory (LLNL) Los Alamos National Laboratory (LANL) or Scientific Laboratory (LASL)  
Manhattan Project, Manhattan Engineering District  
Marshall Islands  
Military Air Transport Service (MATs)  
Military Sea Transport Service (MSTS)  
Military Liaison Committee  
Mound Laboratories  
Nagasaki  
National Bureau of Standards (NBS)  
Navy Radiological Defense Laboratory (NRDL)  
Naval Research Laboratory (NRL)  
Nevada Operations Office (NV), (NVO), (NVOO)  
Nevada Test Site (NTS)  
Nuclear weapons complex



Oak Ridge, Y-12, or K-25 Sites  
Pacific Proving Ground (PPG)  
Pacific Test Range  
Palmyra  
Pantex  
Paducah Site or Gaseous Diffusion Plant  
Pinellas  
Pittsburgh Naval Reactors Office (PNR)  
Portsmouth Site or Gaseous Diffusion Plant  
Reynolds Electric and Engineering Co. (REECO)  
Richland Rocky Flats  
Sandia Corporation, Laboratory, or National Laboratory  
Savannah River  
Schenectady Naval Reactors (SNR)  
Space Technology Laboratory (STL)  
Special Weapons Center (SWC)  
Stanford Research Institute (SRI)  
Strategic Air Command (SAC)  
Tactical Air Command (TAC)  
Task Group (TG)  
U.S. Geological Survey (USGS)  
University of California Radiation Laboratory (UCRL)  
Weather Reconnaissance Service (WRS)

## Weapon Configurations

Schematic depictions of nuclear weapons may be found in historical documents that are lacking RD markings. Figures likely to be encountered will resemble either a single circle (have one center) for single stage weapons, or two adjacent circles (i.e., two centers of symmetry) for a staged or thermonuclear weapon. This is only a rough characterization. Weapons schematics would be considered RD.

## Possible Markings

The markings below would indicate that the document may contain RD or FRD, even if not otherwise marked:

Atomal (NATO)

ATOMIC (U.K.)

Cosmic (NATO)

Critical Nuclear Weapon Design Information (CNWDI)

Naval Nuclear Propulsion Information (NNPI)

Protect as Restricted Data (PARD)

Sigma [n], where n is a number

Weapon Data

## If Potential RD/FRD is Encountered

If the reviewer, using the information provided above, suspects that a historical document, either marked as National Security Information, Security Information, or Defense Information, or unmarked, may contain RD or FRD, the document should be controlled and marked:

**MAY CONTAIN RESTRICTED DATA  
NOT SUBJECT TO AUTOMATIC  
DECLASSIFICATION  
Requires review by the  
Department of Energy prior to  
public release.**

and directions for further action requested from DOE HQ Classification Office.