CSIMILE ELECTRO MAIL TRANSMITT

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SECTION I - TO BE COMPLETED BY ORIGINATOR

CLASSIFICATION	TRANSMISSION	PAGE 1 OF 9 PAGES
UNCLASSIFIED	☐ IMMEDIATE ☒ ROUTINE	
☒ FOR OFFICIAL USE ONLY		

TO (Organization and Functional Address Symbol)	FAX NO. DSN	FAX NO. COMMERCIAL
Program Manager, RCRA Permits Hazardous & Radioactive Bureau NMED Santa Fe, NM 87502	—	(505) 827-4361

ATTENTION	VOICE NO. DSN	VOICE NO. COMMERCIAL
Ms. Barbara Hoditschek	—	(505) 827-4308

SUBJECT

Emergency Explosive Ordnance Disposal in Clovis NM - 25 July 95

FROM (Organization and Functional Address Symbol)	FAX NO. DSN	FAX NO. COMMERCIAL
27 CE/CEV 111 Engineers Way Cannon AFB NM 88103-5136	681-2208	(505) 784-2208
	VOICE NO. DSN	**VOICE NO. COMMERCIAL**
	681-6022	(505) 784-6022

REMARKS

The Curry County's Sheriffs Dept faxed their report to us this morning. Two letters have been forward to the Wing for signature, either B Gen Guth or Col. Koerner will be the signature authority. The signed originals will be forward to your office through Fedx Service when the package is returned to our office. The Part A applications were sent back with Legals comments and change request or our justification, those originals we hope to get back next week to forward. *

RELEASER'S SIGNATURE	DATE	TIME
Vera Wood	28 July 95	1510

SECTION II - TO BE COMPLETED BY ELECTRO MAIL OPERATOR

DATE TRANSMITTED	TIME TRANSMITTED	TRANSMITTER'S SIGNATURE
DATE ADDRESSEE CONTACTED	**TIME ADDRESSEE CONTACTED**	**CONTACTOR'S SIGNATURE**

AF FORM 3535, SEP 91 *(EF)*

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 27th FIGHTER WING (ACC)
CANNON AIR FORCE BASE, NEW MEXICO

William M. Guth, Brigadier General, USAF
Commander
100 S DL Ingram Blvd Suite 100
Cannon AFB NM 88103-5214

Ms. Barbara Hoditschek
Program Manager, RCRA Permits
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
1190 St Francis Drive
PO Box 26110
Santa Fe NM 87502

Dear Ms. Hoditschek

The intent of this letter is to proivde you with written notification concerning the base assisting the local community with a safe detonation. The items detonated were two sticks of 40 percent Gelatin Dynamite and four feet of Time Fuse. The Curry County Sheriff's Department called the base to request emergency detonation assistance from our 27th Civil Engineers Explosive Ordnance Disposal (EOD) personnel.

Captain Michael O'Sullivan, Environmental Law Advisor, contacted Mr. Steve Zape at the Hazardous Waste Bureau to determine whether the base or Sheriff's Department would need an emergency permit or any other specific guidance in this matter. Mr. Zape spoke with his supervisor then returned Capt O'Sullivan's call. The New Mexico Environment Department (NMED) recommended we provide your office with a written notification within 7 days and that an emeregency permit was not necessary.

In accordance with procedures outlined in Technical Order (TO) 60A-1-1-38, the base EOD personnel transported the dynamite from the Sheriff's Department to the Clovis Police Department Small Arms training range at 7th and Humphrey, Clovis, New Mexico. The detonation to safe the dynamite and fuse occurred at approximately 10:45 a.m., on 25 Jul 95. The Explosive Ordnance Disposal Report is attached for your records.

I do not have information concerning the permit status of the Clovis Police Department's firing range. The point of contact to obtain this information is Sam Hatty at (505) 769-1921.

A local auction company purchased the dynamite sticks at an estate sale in Quay NM. Returning to Clovis, they opened the and found the dynamite and non-attached time fuse. The auction company contacted and turned the dynamite into the Sheriff's department. Upon examination, the sticks of dynamite were noticed to be sweating and the Sheriff's Department called the base requesting disposal assistance. Mrs. Wood spoke with Ms. Leah Schoeffel at the Sheriff's department requesting a fax copy of their report for your office. Reference the State of New Mexico Uniform Incident Report at Attachment 2. Any additional information you require from the county may be directed to Ms. Schoeffel by calling (505) 769-2335 or writing to the Curry County Sheriff's Department, PO Box 1043, Clovis NM 88101-1043.

I hope this information satisfies your notice requirement. Please express my deepest appreciaton to Mr. Steve Zape and the NMED staff for their excellent coorporation with my staff. If you have any additional questions concerning this matter, or if my staff can assist you further, please contact Mrs. Vera Wood at 784-4820 or Mr. Danny Barnett at 784-6377.

Sincerely

WILLIAM M. GUTH
Brigadier General, USAF
Commander

Attachments:
1. EOD Report AF Form 3579, 4 Pages
2. State of NM Uniform Incident Report

EXPLOSIVE ORDNANC DISPOSAL REPORT

1. Control Symbol: HAF-CE(AR)9355

TO	THRU (MAJCOM)	FROM
HQ AFCESA/DXO 139 BARNES DRIVE, SUITE 1 TYNDALL AFB FL 32403-5319	HQ ACC/CEXE 129 Andrews St. STE 102 Langley AFB, VA 23665-2769	27 CE/CED 111 Engineers Way Cannon AFB, NM 88103-5136

1. REPORTED BY: Curry County Sheriffs Dept.

2. UNIT CONTROL NUMBER: F-817-95-0023

3. REPORTED	TIME	DATE
	08 15	25 Jul 95
START	09 00	25 Jul 95
STOP	11 45	25 Jul 95

4. PARTICIPATING		M/H
EOD	5	14

5. SPECIAL IDENTIFIER (Codes for Blocks 5, 6, and 7 on Reverse)

INCIDENT	ORDNANCE	SUPPORT	CATEGORY
A 1 4	B 1 5	C 0 6	D 0 1

6. INJURY/DAMAGE INFORMATION

INJURY	PROPERTY INFO
A 0 1	B 0 1

7. ORDNANCE INVOLVED

NATL A	CLASS B	QUANTITY C	NOMENCLATURE D	RSP E	DP F	TECH DATA G
0 2	2 0	2	Commercial Dynamite 40% Gelatin 2 sticks	0 3	0 1	
0 2	2 0	1	Commercial Time Fuse aprox. 4 ft	0 3	0 1	
				0	0	
				0	0	
				0	0	
				0	0	
				0	0	
				0	0	
				0	0	
				0	0	

8. NARRATIVE (Use continuation sheets as necessary.) On 25 July 95 at 0815 hrs we received a call from Mrs. Leah Schoeffel, a dispatcher at the Curry County Sheriffs Department in Clovis NM, that they had recovered two sticks of commercial dynamite and some time fuse. The dynamite was in a corroded condition, was over 20 years old, and they were stating it posed a public safety hazard. They requested our support in disposing of the explosives. We instructed them to call the base command post in order for us to be involved. The Sheriffs department called the command post who called us and base legal. We were contacted by Captain O'Sullivan at legal to find out more about the facts and circumstances. Captain O'Sullivan called the New Mexico Enviromental Department , (NMED), and requested guidance on whether the Air Force or Curry County needed an emergency permit for disposal of the dynamite, in the interest of public safety. As this was going on we pulled our explosives from the bomb dump at 0900 hrs and proceeded to the Sheriffs department to pick up the dynamite. We waited at the Sheriffs department for the permit to be issued. Captain O'Sullivan called back after speaking with NMED. NMED advised no permit would be required, but NMED would need a written report within 7 days which explained all the facts and circumstances concerning the disposal.NMED gave authorization as relayed by Capt. O'Sullivan. After the authourization was issued, we moved the dynamite to the Sheriff departments firing range with two deputies. We set up the shot to destroy the dynamite and time fuse, cleared the area, and initiated the shot. The disposal was successful. Participating members : SSgt Sgambato, SSgt Heitman, Sra Beach, Amn Hood. Liaison to the County: SMSgt Lorelli

9. NUMBER OF ATTACHMENTS	10. TYPED/PRINTED NAME AND SIGNATURE OF TEAM CHIEF	11. TYPED/PRINTED NAME AND SIGNATURE OF SUPERVISOR	12. DATE
0	MARK A. SGAMBATO, SSGT, USAF	ERNEST J. LORELLI, SMSGT, USAF	25 Jul 95

13. SIGNATURE OF MAJCOM STAFF MANAGER	14. MAJCOM COMMENTS	15. DATE
	☐ CONCUR ☐ NON-CONCUR ☐ N/A	

BLOCK 5: SPECIAL IDENTIFIER

5A. TYPE OF INCIDENT

01 MONTHLY REPORT
02 AIRCRAFT CRASH
03 AIRCRAFT/FLIGHTLINE INCIDENT OR ACCIDENT
04 RANGE CLEARANCE
05 VIP SUPPORT
06 PICKUP AND/OR DISPOSAL
07 DISPOSAL OF UNSERVICEABLE/EXCESS MUNITIONS (ADRs)
08 IED INCIDENT
09 ENEMY ATTACK
10 JETTISON
11 TEST SUPPORT
12 STORAGE AREA INCIDENT
13 FOREIGN MATERIAL INTELLIGENCE REPORT
14 REQUEST OF EOD EVALUATION OF POSSIBLY HAZARDOUS/DAMAGED MUNITION(S)
15 OTHER (SPECIFY IN NARRATIVE)

5B. ORDNANCE

01 NOT APPLICABLE/MUNITIONS NOT INVOLVED
02 IED ACTUAL
03 IED HOAX
04 IED SUSPECT
05 IED NEGATIVE FIND
06 U.S. MILITARY CONVENTIONAL MUNITIONS/COMPONENTS/BULK EXPLOSIVE(S)
07 U.S. MILITARY CHEMICAL (CHEMICAL AGENT-FILLED) MUNITION(S) (SEE 60a-1-1-15 FOR DEFINITION OF CHEMICAL AGENT)
08 U.S. MILITARY NUCLEAR MUNITION(S) OR NUCLEAR WEAPONS COMPONENT(S)
09 U.S. MILITARY MULTIPLE TYPE MUNITION(S)(E.G., ACCIDENT INVOLVING CONVENTIONAL/CHEMICAL/NUCLEAR WEAPONS)
10 U.S. MILITARY/FOREIGN UNKNOWN MUNITION(S)(ITEM CANNOT BE POSITIVELY IDENTIFIED
11 FOREIGN CONVENTIONAL MUNITION(S) COMPONENT(S)/BULK EXPLOSIVE(S)
12 FOREIGN CHEMICAL MUNITION(S)
13 FOREIGN NUCLEAR MUNITION OR NUCLEAR MUNITION(S) COMPONENTS
14 FOREIGN MULTIPLE TYPE MUNITION(S)(E.G., ENEMY ATTACK INVOLVING CONVENTIONAL)
15 COMMERCIAL EXPLOSIVES, EXPLOSIVE DEVICES, OR OTHER HAZARDOUS ITEMS (E.G., DYNAMITE, BLASTING CAPS, ETC.)
16 MORE THAN ONE OF THE CATEGORIES 01 THROUGH 15 (SEE NARRATIVE)

5C. SUPPORT TYPE

01 ASSIGNED UNIT
02 OTHER AIR FORCE ACTIVITIES/UNITS
03 OTHER MILITARY AGENCIES
04 NON-DOD FEDERAL AGENCIES
05 FOREIGN GOVERNMENTS/AUTHORITIES
06 LOCAL U.S. - CIVILIAN AUTHORITIES
07 SECRET SERVICE
08 MORE THAN ONE OF THE CATEGORIES 01 THROUGH 07 (SEE NARRATIVE)

5D. CATEGORY ASSIGNED

01 NOT APPLICABLE/CATEGORY NOT ASSIGNED
02 CATEGORY A
03 CATEGORY B
04 CATEGORY C
05 CATEGORY D

BLOCK 7: ORD[illegible] INVOLVED

7A. NATL (NATI[illegible]TY)

01 PLO
02 U.S.
03 U.K.
04 BELGIUM
05 CANADA
06 DENMARK
07 FRANCE
08 GERMANY (PRE WWII)
09 ITALY
10 NETHERLANDS
11 NORWAY
12 TURKEY
13 AUSTRALIA
14 ALGERIA
15 AUSTRIA
16 BULGARIA
17 CHINA (PEOPLES REPUBLIC)
18 CHINA (NATIONALIST)
19 CUBA
20 CZECHOSLOVAKIA
21 GERMANY PEOPLES REPUBLIC (POST WWII)
22 FINLAND
23 HUNGARY
24 INDONESIA
25 ISRAEL
26 JAPAN
27 NORTH KOREA
28 POLAND
29 ROMANIA
30 GERMANY (FEDERAL REPUBLIC) (POST WWII)
31 SPAIN
32 SWEDEN
33 SWITZERLAND
34 EGYPT
35 U.S.S.R.
36 VIETNAM
37 YUGOSLAVIA
38 SYRIA
39 MOROCCO
40 UNKNOWN COUNTRY
41 ARGENTINA
42 VENEZUELA
43 PORTUGAL
44 BRAZIL
45 GREECE
46 SOUTH AFRICA
47 URUGUAY
48 SOUTH KOREA
49 MULTIPLE COUNTRY DEVELOPED
50 CHILE

7B. CLASS (ORDNANCE CLASS)

01 SMALL ARMS AMMUNITION
02 MUNITION FUSES
03 SUBMUNITION (BLUs, BOMBLETS DISPENSED MINES)
04 PRACTICE BOMBS
05 BOMBS (INCLUDING GBUs)
06 CLUSTERS/DISPENSERS
07 PROJECTILES
08 GRENADES
09 ROCKETS
10 GUIDED MISSILES
11 LANDMINES
12 AIRCRAFT EXPLOSIVE ITEM
13 PYROTECHNICS (FLARES)
14 MISCELLANEOUS EXPLOSIVE CHAFF CARTS, FIRING DEVICES, ETC.
15 IMPROVISED EXPLOSIVE DEVICES
16 NUCLEAR ORDNANCE
17 NAVAL MINES
18 NAVAL TORPEDOES
19 DEPTH CHARGES, MISCELLANEOUS UNDERWATER MARKERS, SIGNALS, ETC.
20 COMMERCIAL BULK EXPLOSIVES, PROPELLANTS, DEMOLITION DEVICES, ETC.
21 MILITARY BULK EXPLOSIVES, PROPELLANTS, DEMOLITION DEVICES, ETC.
22 UNKNOWN TYPE MUNITIONS
23 OBSOLETE MUNITIONS (OLD ORDNANCE WITH NO IDENTITY, CIVIL WAR, ETC.)
24 MUNITIONS ASSOCIATED COMPONENTS (ROCKET MOTORS, BATTERIES, ETC.)

6A. INJURY/DAMAGE INFORMATION - INJURY

01 NO
02 YES - SEE NARRATIVE ENTRY

6B. INJURY/DAMAGE INFORMATION -PROPERTY INFO

01 NO
02 YES - SEE NARRATIVE ENTRY

7E. RSP (RENDER SAFE PROCEDURE)

01 YES (COMPLETED)
02 ATTEMPTED UNSUCCESSFUL (SEE NARRATIVE)
03 NOT APPLICABLE/REQUIRED

7F. DP (DISPOSAL PROCEDURE)

01 YES (COMPLETED)
02 AWAITING INSTRUCTIONS/DISPOSITION
03 NOT APPLICABLE/REQUIRED

MEMO FOR RECORD: Attachment to AF Form 3579, report # RCSHAF-CE(AR)9355

On 25 July 1995, I responded as team chief, with four other EOD personnel, in request from the Curry County Sheriff Department. As the report states, there were two (2) sticks of 40% gelatin dynamite and approximately four (4) feet of time fuse.

In this MFR, I will describe the condition of the dynamite and the reason(s) why it posed a threat to public safety.

Upon arrival at the Sheriff's department, I was led to the dynamite by two sheriffs deputies. First glance at the dynamite showed that the outer casing had indeed started to deteriorate. I then took hold of the dynamite, stick by stick, and felt that the outer casing was moist and somewhat softer than normal. Field analysis, with guidance from T.O. 60A-1-1-38, (see attachment), states that liquid on the outside of the dynamite, from a safety standpoint, assume the presence of nitroglycerin. Closer inspection of the sticks showed that some crystals had formed on the ends of the sticks and the paper casing was stained.

I then discussed my findings with SMSgt Lorelli and we both agreed that the dynamite was in hazardous state and posed an immediate threat to public safety.

Mark A Sgambato

MARK A. SGAMBATO, SSgt, USAF
Explosive Ordnance Disposal Craftsman

c. DOT 23 G Shells. The Department of Transportation 23 G specification covers a strong, spiral-wrapped, paperboard tube which is authorized as both a cartridge and shipping container. This container must carry the DOT 23 G identification, and may be made in diameters up to 9 inches and in weights not to exceed 65 pounds gross. This container is also used for some blasting agents and dynamites.

d. Plastic Cartridges. Plastic cartridges can be classed in two categories, flexible and nonflexible. The flexible cartridges are typically of polyethylene or nylon polyester tubing, and are sealed at the ends by squeezing the tubing together with a clip or tie, much like a sausage. For water gels, where this package is most frequently employed, the tubing may be several feet long in a continuous tube, packed in a coil in the shipping case for continuous borehole loading. Diameters range from near 1 inch to several inches. Nonflexible plastic cartridges are produced for special applications where the additional water resistance or other handling properties of the plastic cartridge cases are needed. They are frequently supplied with integrally molded threads on the ends of the cartridges to facilitate quickly joining the cartridges into a column load. Blasting agents are also packaged in both types of plastic cartridges.

3-2. LABELING OF U.S. COMMERCIAL DYNAMITE. The name of the manufacturer and date-plant-shift code are required on all dynamite cartridges manufactured in the U.S. after 12 February 1971. In some cases a corporate log is also used. Manufacturers have adopted various methods of coding the date-plant-shift code required. This coded information may be stamped anywhere on the cartridge and is normally found as a single line in closed-up form. The color of the label printing is not significant, there are no restrictions regarding color, and black is the color used most often. Figures 3-2 through 3-7 provides some typical examples of dynamite labeling and coding.

NOTE

Trade names given to various dynamite products are many and varied. Many trade names products formerly manufactured are now in production and new products are being introduced frequently. Table 3-1 provides a listing of some typical U.S. dynamite trade names and types. Federal law requires manufacturers to maintain records for 5 years of explosives manufactured, these records must be available for inspection by various government agencies.

* 3-3. DETERIORATION. The wide variety of ingredients used as fillers in commercial dynamites, together with the wide variety of possible storage histories, makes the exact form of deterioration difficult to predict. Obvious signs of deterioration are hardness, discoloration, excessive softness, leaking that has proceeded to the extent of saturating the sawdust in shipping cartons, and staining of shipping cartons. Since the explosive salts used in dynamite have some tendency to absorb moisture from the atmosphere, there always exists the possibility that liquid exuding from a cartridge is merely a water solution of the salts. However, the determination of the liquid exudate is difficult in the field. One must assume the presence of nitroglycerin from a safety standpoint.

STATE OF NEW MEXICO UNIFORM INCIDENT REPORT

ORI NO: NM | INCIDENT NO. | PAGE 1 OF 1

OCCURRENCE DATE(S) ON / OR / BETWEEN: MM/DD/YY 07/25/95 | MM/DD/YY / | TIME / | DAY OF WEEK

DATE REPORTED: MM/DD/YY 07/25/95 | TIME 0800 | DAY OF WEEK Tu

AGENCY / COUNTY: Curry Cnty | DISTRICT NO. | OPTIONAL USE (CASE NO., ETC.) | BURGLARY ALARM | NO OF UNITS

ADDRESS/LOCATION OF INCIDENT | CITY: Clovis | ZIP: 88101 | CASE REL. | FATAL/NON FAT. CODE

OFFENSE

AGE OF SUSP	OFFENSE / INCIDENT	STATUTE OR ORDINANCE	FEL. MISD.	ATTEMPTED	CRIME RELATED	UCR OFFENSE CODE	CRIMINAL ACTIVITY CODE	LOCAT CODE	WEAPON CODE	OFFENDER(S) SUSPECTED OF USING: ALCOHOL	DRUGS	COMP	UNK
1	Removal of Dynamite												
2													
3													

SUBJECTS (VICTIMS / SUSPECTS / PERSONS / BUSINESSES)

AGE OF SUSP | PERSON CODES: V-VICTIM, C-CITED, S-SUSPECT, A-ARRESTED, G-PARENT/GUARDIAN, W-WITNESS, I-INTERVIEWED, R-REPORTING PERSON, M-MISSING PERSON/RUNAWAY | TYPE CODES: I-INDIVIDUAL, B-BUSINESS, F-FINANCIAL INST., P-POLICE, O-OTHER, G-GOVERNMENT, S-SOCIETY/PUBLIC, U-UNKNOWN | INJURY CODES: B-APPARENT BRUISING, F-POSSIBLE INTERNAL INJURY, L-SEVERE LACERATION, M-APPARENT MINOR INJURY, O-OTHER MAJOR INJURY, 1-DOA OR LT. III, D-UNCONSCIOUS, N-NONE

PERSON CODE	TYPE CODE	INJURY CODE	1-NAME (LAST, FIRST, MIDDLE)	SOCIAL SECURITY NO.	DOB	AGE (RANGE)	SEX	RACE
R	I	N	Will Auction Services	- -	/ /			

STREET ADDRESS: 4205 S. Prince | APT. NO | RES. PHONE ( ) | HEIGHT | WEIGHT | HAIR | EYES | ETHNIC | ALIAS ARRAIGNMENT JUSTIFICATION CODE

CITY: Clovis | STATE: NM | ZIP: 88101 | BUS. PHONE (505) 763-7341 | VICTIM OF OFF. NO | VICT. OF SUSP. NO | REL. | VICT. OF SUSP. NO | REL. | VICT. OF SUSP. NO | REL.

OCCUPATION: Auctioneer | EMPLOYER / SCHOOL: Will Auction | EMPLOYER / SCHOOL ADDRESS: 4205 S. Prince | GANG AFFILIATION: N/A

ALIAS / NICKNAME: James Priest | MARKS, SCARS, TATTOOS | ARMED WITH (SEE CODES) | TYPE OF ARREST: ON-VIEW, CITED, CUST.

DRIVER'S LICENSE NO. | D.L. STATE | ARREST / CITATION NO. | F.B.I. NO. | S.I.D. NO | NIC NO | REG. STATUS: REG., NON

PERSON CODE	TYPE CODE	INJURY CODE	2-NAME (LAST, FIRST, MIDDLE)	SOCIAL SECURITY NO.	DOB	AGE (RANGE)	SEX	RACE
				- -	/ /			

STREET ADDRESS | APT. NO | RES. PHONE ( ) | HEIGHT | WEIGHT | HAIR | EYES | ETHNIC | ALIAS ARRAIGNMENT JUSTIFICATION CODE

CITY | STATE | ZIP | BUS. PHONE ( ) | VICTIM OF OFF. NO | VICT. OF SUSP. NO | REL. | VICT. OF SUSP. NO | REL. | VICT. OF SUSP. NO | REL.

OCCUPATION | EMPLOYER / SCHOOL | EMPLOYER / SCHOOL ADDRESS | GANG AFFILIATION

ALIAS / NICKNAME | MARKS, SCARS, TATTOOS | ARMED WITH (SEE CODES) | TYPE OF ARREST: ON-VIEW, CITED, CUST.

DRIVER'S LICENSE NO | D.L. STATE | ARREST / CITATION NO. | F.B.I. NO | S.I.D. NO | NIC NO. | REG. STATUS: REG., NON

PERSON CODE	TYPE CODE	INJURY CODE	3-NAME (LAST, FIRST, MIDDLE)	SOCIAL SECURITY NO.	DOB	AGE (RANGE)	SEX	RACE
				- -	/ /			

STREET ADDRESS | APT. NO | RES. PHONE ( ) | HEIGHT | WEIGHT | HAIR | EYES | ETHNIC | ALIAS ARRAIGNMENT JUSTIFICATION CODE

CITY | STATE | ZIP | BUS. PHONE ( ) | VICTIM OF OFF. NO | VICT. OF SUSP. NO | REL. | VICT. OF SUSP. NO | REL. | VICT. OF SUSP. NO | REL.

OCCUPATION | EMPLOYER / SCHOOL | EMPLOYER / SCHOOL ADDRESS | GANG AFFILIATION

ALIAS / NICKNAME | MARKS, SCARS, TATTOOS | ARMED WITH (SEE CODES) | TYPE OF ARREST: ON-VIEW, CITED, CUST.

DRIVER'S LICENSE NO | D.L. STATE | ARREST / CITATION NO. | F.B.I. NO | S.I.D. NO | NIC NO | REG. STATUS: REG., NON

VEHICLE

AGE OF SUSP | VEH. STATUS CODE: 1-STOLEN, 2-BURNED, 3-REC. (STOLEN LOCALITY), 4-REC. (STOLEN OTHER JURIS.), 5-SEIZED, 6-MANDOCINED, 7-DAMAGED (VANDALIZED), 8-SUSPICIOUS VEHICLE, 9-VICTIM'S VEHICLE | VEH. TYPE CODE: 01-AUTOMOBILE, 02-MOTORCYCLE, 03-BUS, 24-OTHER MOTOR VEHICLE, 26-MOTOR HOMES, 37-TRUCK (PICKUP), 38-WATERCRAFT, 41-MOTOR CYCLE, 39-AIRCRAFT, 42-ATV, 43-ATV

YEAR	MAKE	MODEL	BODY STYLE	LICENSE NO	LIC. YEAR	LIC. ST	TOP COLOR	BTM COLOR	VALUE / DAMAGE EST.

REGISTERED OWNER'S NAME (OR SAME AS SUBJECT NO.) | VIN | DISTINGUISHING FEATURES / VISIBLE DAMAGE

ADDRESS | ICW ID / BY | CONVER. REC. YES, REL. | NIC NO

AGENCY OPTIONAL USE

PROPERTY STATUS

1-STOLEN
2-STOLEN & RECOVERED
3-RECOVERED (STOLEN THIS JURIS.)
4-RECOVERED (STOLEN OTHER JURIS.)
5-EVIDENCE
6-LOST
7-FOUND
8-COUNTERFEIT/FORGED
9-DAMAGED/DESTROYED/VANDALIZED
10-BURNED
11-SEIZED
12-USED IN CRIME
13-SAFEKEEPING
14-UNKNOWN

PROPERTY TYPE

01-ALCOHOL
02-BICYCLES
03-CLOTHING/FURS
04-COMPUTER HARDWARE/SOFTWARE
05-CONSUMABLE GOODS
06-CREDIT/DEBIT CARDS
07-DRUGS/NARCOTICS
08-DRUGS/CHEMICAL EQUIPMENT
09-FIREARMS
10-GAMBLING EQUIPMENT
11-HEAVY CONSTRUCTION/INDUSTRIAL EQUIP.
12-HOUSEHOLD GOODS
13-JEWELRY/PRECIOUS METALS
14-LIVESTOCK
15-MERCHANDISE
16-MONEY
17-NEGOTIABLE INSTRUMENTS
18-NON-NEGOTIABLE INSTRUMENTS
19-OFFICE EQUIPMENT
20-PURSES/WALLETS/WALLETS
21-RADIO/TV/VCR
22-RECORDINGS/MEDIA
23-RESTAURANTS-SINGLE OCCUPANCY
24-STRUCTURES-OTHER
25-STRUCTURES OTHER COMM/BUSINESS
26-STRUCTURES-PUBLIC/COMMUNITY
27-STRUCTURES-STORAGE
28-STRUCTURES-OFFICE
29-VEHICLES
30-VEHICLE ACCESSORIES
31-EXPLOSIVES EQUIPMENT
32-OTHER
33-PENDING INVENTORY
34-PROM. FAVORITE

DRUG TYPE

A-CRACK
B-COCAINE
C-HASHISH
D-HEROIN
E-MARIJUANA
F-MORPHINE
G-OPIUM
H-OTHER NARCOTICS
I-LSD
J-PCP
K-OTHER HALLUCINOGENS
L-AMPHETAMINE
M-OTHER STIMULANTS
N-BARBITURATES
O-OTHER DEPRESSANTS
P-OTHER DRUGS
U-UNKNOWN
X-OVER 3 TYPES

FIELD UNIT OF MEASURE

GM-GRAM KG-KILOGRAM OZ-OUNCE LB-POUND GL-GALLON NP-NO. PLANTS LT-LITER FO-FLUID OUNCE DU-DOSAGE UNITS ML-MILLILITER

PROPERTY

1-PROPERTY STATUS / QUANTITY TYPE	TYPE OF ITEM	MAKE / BRAND	MODEL	CALIBER	VALUE (EXCEPT DRUGS)
SUBSTANCE DRUG TYPE / QUANTITY UNIT OF MEA.	DESCRIPTION (COLOR, SIZE, FEATURES, ETC.)		SERIAL / OAN		NIC NO.
2-PROPERTY STATUS / PROPERTY TYPE	TYPE OF ITEM	MAKE / BRAND	MODEL	CALIBER	VALUE (EXCEPT DRUGS)
SUBSTANCE DRUG TYPE / QUANTITY UNIT OF MEA.	DESCRIPTION (COLOR, SIZE, FEATURES, ETC.)		SERIAL / OAN		NIC NO.
3-PROPERTY STATUS / PROPERTY TYPE	TYPE OF ITEM	MAKE / BRAND	MODEL	CALIBER	VALUE (EXCEPT DRUGS)
SUBSTANCE DRUG TYPE / QUANTITY UNIT OF MEA.	DESCRIPTION (COLOR, SIZE, FEATURES, ETC.)		SERIAL / OAN		NIC NO.
4-PROPERTY STATUS / PROPERTY TYPE	TYPE OF ITEM	MAKE / BRAND	MODEL	CALIBER	VALUE (EXCEPT DRUGS)
SUBSTANCE DRUG TYPE / QUANTITY UNIT OF MEA.	DESCRIPTION (COLOR, SIZE, FEATURES, ETC.)		SERIAL / OAN		NIC NO.

M.O. EVENT CODES (AGENCY OPTIONAL USE)

TOTAL VALUE STOLEN $

TOTAL VALUE REC. $

NARRATIVE

On July 25, 1995, I responded to W&J Auction Services 4205 S. Prince, Clovis to remove two sticks of dynamite that had been obtained through an Estate Sale in Curry County. James Briel advised me that he didn't know the dynamite was in the lot of property and that he started discussion of an L.E. he was in Clovis. I transported the dynamite to the sheriff's office and contacted EOD at Cannon AFB for destruction instructions. Deputy Plotkin assisted EOD officials in the destruction of the dynamite.

CERT. / STATUS

I WILL PROSECUTE/TESTIFY SHOULD THE OFFENDER BE ARRESTED. YES NO

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LONG-TERM INSTITUTIONAL MANAGEMENT OF U.S. DEPARTMENT OF ENERGY LEGACY WASTE SITES

Committee on the Remediation of Buried and Tank Wastes

Board on Radioactive Waste Management
Commission on Geosciences, Environment, and Resources

National Research Council

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SYNOPSIS

This study examines concerns raised by the U.S. Department of Energy (DOE) in its planning for transition from active waste site management and remediation to what the department terms "long-term stewardship." It examines the scientific, technical, and organizational capabilities and limitations that must be taken into account in planning for the long-term institutional management of the department's numerous waste sites that are the legacy to this country's nuclear weapons program. It also identifies characteristics and design criteria for effective long-term institutional management.

Of the sites in DOE's inventory, few will be cleaned up sufficiently to allow unrestricted use. At many sites, radiological and non-radiological hazardous wastes will remain, posing risk to humans and the environment for tens or even hundreds of thousands of years. In some cases, contaminants have migrated off-site or are likely to do so in the future. Future changes in the uses of sites and nearby areas make predicting risks even more difficult. In response to the technological, budgetary, and societal problems posed by these sites, DOE plans to rely on institutional controls and other stewardship measures to prevent exposure to residual contaminants following activities aimed at stabilization and containment. One message that emerges from this study, however, is that effective long-term stewardship will likely be difficult to achieve.

In this study it is argued that, while stewardship as defined by DOE is essential, a much broader-based, more systematic approach is needed. For any given site, contaminant reduction, contaminant isolation, and stewardship should be treated as an integrated, complementary system: one that requires foresight, transparently clear and realistic thinking, and accountability. Today's waste management actions should become an integral part of stewardship planning. Scientific, technical, and organizational deficiencies or knowledge gaps should be acknowledged frankly and, where possible, research investments should be made to correct them. The long-term institutional management plan for a legacy waste site should strive for stability, balanced by flexibility and provisions for iteration over time. No plan developed today is likely to remain protective for the duration of the hazards. Instead, long-term institutional management requires periodic, comprehensive reevaluation of those legacy waste sites still presenting risk to the public and the environment to ensure that they do not fall into neglect and that advantage is taken of new opportunities for their further remediation.

SUMMARY

It is now becoming clear that relatively few U.S. Department of Energy (DOE) waste sites will be cleaned up to the point where they can be released for unrestricted use. "Long-term stewardship" (activities to protect human health and the environment from hazards that may remain at its sites after cessation of remediation) will be required for over 100 of the 144 waste sites under DOE control (U.S. Department of Energy, 1999). After stabilizing wastes that remain on site and containing them as well as is feasible, DOE intends to rely on stewardship for as long as hazards persist—in many cases, indefinitely. Physical containment barriers, the management systems upon which their long-term reliability depends, and institutional controls intended to prevent exposure of people and the environment to the remaining site hazards, will have to be maintained at some DOE sites for an indefinite period of time.

The Committee on Remediation of Buried and Tank Wastes finds that much regarding DOE's intended reliance on long-term stewardship is at this point problematic. The details of long-term stewardship planning are yet to be specified, the adequacy of funding is not assured, and there is no convincing evidence that institutional controls and other stewardship measures are reliable over the long term. Scientific understanding of the factors that govern the long-term behavior of residual contaminants in the environment is not adequate. Yet, the likelihood that institutional management measures will fail at some point is relatively high, underscoring the need to assure that decisions made in the near-term are based on the best available science. Improving institutional capabilities can be expected to be every bit as difficult as improving scientific and technical ones, but without improved understanding of why and how institutions succeed and fail, the follow-through necessary to assure that long-term stewardship remains effective cannot reliably be counted on to occur.

Other things being equal, contaminant reduction is preferred to contaminant isolation and the imposition of stewardship measures whose risk of failure is high. While DOE can do much to assure that stewardship considerations become more pervasive in all aspects of DOE operations, many of the limitations in current capabilities pointed to in this report will likely require higher-level attention. Prominent among these are assured funding for long-term institutional management. Moreover, the current regulatory framework for waste site remediation appears to encourage a constrained and piecemeal approach that makes it difficult to assure that the broader needs of effective long-term institutional management get the consideration they deserve.

This study examines the capabilities and limitations of the scientific, technical, and human and institutional systems that compose the measures that DOE expects to put into place at potentially hazardous, residually contaminated sites. The committee finds that, at a minimum, DOE should plan for site disposition and stewardship much more systematically than it has to date. At many sites, future risks from residual wastes cannot be predicted with any confidence, because numerous underlying factors that influence the character, extent, and severity of long-term risks are not well understood. Among these factors are the long-term behavior of wastes in the environment, the long-term performance of engineered systems designed to contain wastes, the reliability of institutional controls and other stewardship measures, and the distribution and resource needs of future human populations.

Because uncertainty is inherent in many of these areas, and because DOE's preferred solutions—reliance on engineered barriers and institutional controls—are inherently failure-prone. step-wise planning for DOE legacy sites must be *systematic*, *integrative*, *comprehensive*, *and iterative* in its execution through time, *adaptive* in the face of uncertainty, and *active* in the search for new and different solutions. Planning for long-term institutional management should commence

while remediation is underway. Ideally, its needs are taken into account as facilities are being designed and waste management operations initiated.

To the extent that long-term stewardship imposes costs and risks on future generations, questions of intergenerational equity are raised that should be recognized in current planning. Waste site remediation is appropriately left to future generations if risks are low, if it is impractical with currently available technology, or if it would impose unacceptable costs on society were it to be undertaken today. Remediation is inappropriately left to future generations if the risks are such that what is a tractable remediation problem today becomes much less so in the future as a result of events or changes in conditions that could reasonably have been foreseen. Unfortunately, for most waste sites, little information is presently available that facilitates well- considered examination of such tradeoffs. To the extent that long-term institutional management becomes a logical extension of today's waste management activities, as the committee believes it should, the need to confront such difficult tradeoffs should lessen. Developing new facilities and managing today's wastes with the needs of long-term stewardship in mind is an important aspect of the integrative approach embodied in the committee's framework for long-term institutional management.

This study uses the term *long-term institutional management* to refer to a planning and decision-making approach that strives to achieve an appropriate balance in the way it employs contaminant reduction measures, engineers barriers that isolate residual contaminants from the human environment and retard their migration, and places reliance on institutional controls and other stewardship measures. Decisions are guided by consideration of contextual factors that include:

- risks to members of the public, workers, and the environment;
- legal and regulatory requirements;
- technical and institutional capabilities and limitations, and the current state of scientific knowledge;
- values and preferences of interested and affected parties;
- costs and related budgetary considerations; and
- impacts on and activities at other sites.

To the extent that the above contextual factors constrain decisions, a well-functioning long-term institutional management system works to curtail those constraints that compromise the basic goal of containing and minimizing the risks that prevent unrestricted release of DOE sites.

The limitations of "hardware" systems and supporting scientific understanding are amplified by the inherent fallibility of the human and organizational systems upon which stewardship ultimately depends. For this reason, emphasis is placed in this report on the management systems for long-term planning and decision making at individual DOE sites. The report recommends that DOE apply five planning principles to the management of residually contaminated sites: 1) plan for uncertainty, 2) plan for fallibility, 3) develop appropriate incentive structures, 4) undertake necessary scientific, technical, and social research and development, and 5) plan to maximize follow-through on phased, iterative, and adaptive long-term institutional management approaches. For this purpose, a long-term commitment to both basic and applied research is needed. This research must address not only improvement of technical and human systems performance, but also basic scientific questions about the behavior of wastes in the diverse environments of the nation's nuclear waste sites. While there is no assurance that management systems will continue to be effective for the future, even short-term effectiveness cannot be assured without continued, adequate funding.

Numerous measures are necessary to assure that the integrity of engineered barriers intended to isolate wastes from the environment is maintained, that the behavior of unconfined wastes in the

environment is as expected, and that unanticipated exposure pathways to humans or other sensitive species do not develop. Experience to date, both at DOE sites and at hazardous waste sites elsewhere, suggests that the tools available for these purposes are of doubtful technical effectiveness. The building of an effective long-term program for DOE legacy waste sites poses a substantial challenge to "remediation technology," broadly construed. It challenges the basic science upon which technological advance depends, as well as the knowledge of organizational and human behavior upon which our ability to design effective long-term management systems ultimately rests.

The committee believes that the working assumption of DOE planners must be that many contamination isolation barriers and stewardship measures at sites where wastes are left in place will eventually fail, and that much of our current knowledge of the long-term behavior of wastes in environmental media may eventually be proven wrong. Planning and implementation at these sites must proceed in ways that are cognizant of this potential fallibility and uncertainty.

How site planning and management should proceed, given this working assumption, is a primary focus of this report. DOE has not as yet developed in any detail the institutional arrangements through which long-term site management would be implemented. Nor have these arrangements been discussed very much among DOE and its partners in state and federal regulatory agencies, site host communities, affected Indian tribes, and environmental organizations. It is important that DOE involve its Site Specific Advisory Boards in its long-term stewardship planning as early as possible. Although the rationale for long-term stewardship at DOE waste sites has been put forward in a general way in several recent studies (Probst and McGovern, 1998; U.S. Department of Energy, 1999), no coherent framework for long-term planning at individual DOE waste sites has as yet emerged. This report tackles the question of the character of the management systems that the committee believes are necessary, applying information gleaned from numerous sites to develop a general conceptual approach that can be applied on a site-specific basis. While complex-wide integration and planning are also needed, the committee's framework is intended to apply primarily on the individual, site-specific level.

What is Long-Term Institutional Management of Waste Sites?

Long-term institutional management is the committee's conception of an approach to planning and decision making for the management of contaminated sites, facilities, and materials. It represents the framework in which tradeoffs among contaminant reduction, reliance on contaminant isolation, and stewardship measures are made. The framework represents a synthesis of the committee's examination of what is and is not likely to work in long-term waste site management. It incorporates the measures available to site managers as remediation or stewardship planning moves forward, the factors that influence the site management choices made at particular points in time, and the iterative character of decision making through time as new information emerges or planned site end state goals are adjusted.

The committee's metaphor for balancing the three basic elements that waste-site managers have at their disposal—contaminant reduction, physical isolation of residual contaminants, and deployment of stewardship activities—is a "three-legged stool." These three basic sets of measures are represented by the stool's "legs." The goals or end state they are trying to achieve are represented by the stool's "seat," and the contextual factors listed earlier that constrain their use are represented by the "rungs." Metaphorically, the rugged terrain upon which the stool rests represents the variability of contamination scenarios within and among sites. This framework is developed in anticipation of the numerous questions DOE will face as it develops long-term plans for contaminated sites. *In all cases reviewed by the committee, current DOE remediation planning and planning for post-remediation stewardship can fit within the conceptual framework developed in this*

study. In no case, however, was planning and management as highly developed as the committee's framework suggests it should be.

Why Is Long-Term Institutional Management Necessary at DOE Waste Sites?

For reasons that are technical, social, fiscal, and political, most DOE sites will not be cleaned up well enough to allow unrestricted release of the land. In a few cases the rationale for leaving contaminants in place includes a judgment that the collateral environmental damage of available remediation technologies outweighs the benefits likely to be achieved. According to recent departmental estimates, 109 of the 144 DOE waste sites, including its largest sites (such as the Hanford Site in Washington, Oak Ridge Reservation in Tennessee, Savannah River Site in South Carolina, and Idaho National Engineering and Environmental Laboratory) are unlikely to become available for site-wide unrestricted use (U.S. Department of Energy, 1999). *The large inventory of sites requiring long-term management, the nature and complexity of many of these sites, coupled with the limitations of subsurface science, requires comprehensive and systematic planning that embraces the principles of long-term institutional management described in this report.*

The fiscal limitations that preclude more complete remediation are largely a matter of national policy. At some sites the preferred land uses following completion of DOE's mission are still being debated, while at others the future roles of the sites in national defense preparedness or new to non-defense missions are under discussion (Probst and Lowe, 2000). Total cleanup costs are very sensitive to the nature of the cleanup end states selected, with large increments in estimated costs associated with moving sites from a restricted-access "iron fence" condition to the point where they can be released for unrestricted use (U.S. Department of Energy, 1996). Roughly $50 billion has been spent on remediation to date; a recent report prepared by the U.S. Department of Energy (2000b) estimates that the life-cycle costs yet to be incurred are approximately $151 to $195 billion.

By contrast, DOE officials view the long-term stewardship efforts, which are likely to rely heavily on land control, site surveillance, monitoring, maintenance, record keeping, and related activities, as inherently low cost. *The real long-term costs of site stewardship cannot be estimated with any confidence, however. Even after the details of a comprehensive long-term institutional management plan are in place, large uncertainties are likely to cloud true economic costs. In addition, equating long-term management costs with the costs of the specific stewardship activities envisioned over as long a peroid as several thousands of years fails to account for the societal costs of stewardship system failures (e.g., aquifers becoming contaminated by residual wastes whose propensity for offsite migration was not understood at the time active remediation ended). A well-designed long-term institutional management system should have as a goal the anticipation of stewardship failures and minimization of the costs and risks associated with them. It accomplishes this through investment in improving the management system itself, and in improved scientific understanding and improved remediation technology, each of which is capable of reducing these potentially large costs and risks to society in the future.*

At the larger DOE sites where local economic, political, and environmental factors already exert a strong influence on site decision making, the necessity for an integrated and forward-looking approach to long-term planning becomes especially clear. For example, growth in the Denver metropolitan region that is encroaching upon the Rocky Flats site, or the rapidly growing Las Vegas area that might one day look to areas around the Nevada Test Site for water. A different approach to long-term institutional management planning might be appropriate for sites where significant changes in the pattern of future uses are less likely. However, projections of future land uses and the values of members of the public must receive careful consideration, no matter where the site is located. At

some sites, subsurface contaminants are now known to be migrating further from their sources than originally predicted, with future consequences that are not well understood at present.

Implications of Scientific, Technical, and Institutional Capabilities and Limitations for Long-Term Institutional Management

The site management measures that DOE has at its disposal, whether they are the "hardware" systems used for waste remediation and containment or the institutional systems under which all site activities occur, share the characteristic of being limited in what they can accomplish. Were contaminant reduction efforts able to perform at anything like their theoretical ideal, many of the site custodianship problems that DOE now faces would disappear. As a general rule, however, the greater the degree of decontamination, the greater the cost and, in some cases, the greater the worker risk and adverse environmental effects. Groundwater contamination is pervasive at DOE sites, and "pump and treat" operations, whether intended to reduce contamination levels or to retard migration, are expected to run for decades—or even centuries—to achieve their desired results.

In some cases, the lack of sufficient pre- or post-remediation characterization of either the wastes or the environments into which they have been placed can render realistic estimation of the effectiveness of contaminant reduction measures nearly impossible. A key question for each site must be "How much characterization is sufficient to overcome this impasse?" A major concern is the adequacy of understanding of the physical and chemical properties of the environment in which contaminants reside and their transport through the environment over time. Mathematical modeling of contaminant fate and transport is an essential tool for long-term institutional management, but its track record to date at DOE sites, particularly where contaminants reside in the unsaturated, or "vadose" zone, has been mixed. This necessitates integration of a science and technology program into both site remediation planning (National Research Council, 2000b) and the activities that follow after remediation activities cease.

In situ engineered barriers are likely to be widely applied as the need for them is closely coupled to the extent to which contaminant reduction measures are effective. Once in place, the ongoing effectiveness of the systems that are emplaced to isolate and prevent the movement of contaminants depends on institutional management, typically in the form of monitoring and maintenance. Knowledge of the effective lifetimes of the materials and systems used in barrier design is limited, however, and comparatively little performance monitoring data exists. *The lack of experience with the long-term performance of engineered barriers, coupled with the heavy reliance being placed upon them at DOE sites, is another factor that necessitates an approach to long-term institutional management that actively seeks out and applies new knowledge.*

In situ barriers used to isolate long-lived contaminants from the environment will have to be not only maintained, but in some instances completely replaced. Initial emplacement of barrier systems must therefore take that possibility into account. *Irrespective of the management systems put in place in support of other aspects of long-term stewardship programs, physical barrier systems to keep hazardous wastes in isolation will require their own on-going support from the institutional management system.*

Stewardship in its broadest sense includes all of the activities that will be required concerning potentially harmful contamination left on-site following the completion of remediation. The issues for long-term institutional management include not only what will be done, but how, and when, and by whom. Institutional controls, often especially important elements of stewardship, consist mainly of land use or access restrictions, and they can take the form either of legal restrictions imposed through covenants, easements, and the like, or of physical restrictions, such as

fences, warning signs, or the posting of guards. Stewardship is not limited to institutional controls, however. It also includes information management and dissemination, oversight and enforcement, monitoring and maintenance, periodic reevaluation of protective systems, and cultivating new remediation options.

Without constant attention, stewardship measures imposed today are not likely to remain effective for as long as residual contamination presents risks. It will, however, be very difficult to assure that proper attention continues over time. This means that stewardship and science—both basic science and applied science and technology research and development—are interdependent and must be managed together. *Site stewardship that includes the monitoring and encouragement of emerging new technologies and scientific breakthroughs for their relevance to further reducing the risks associated with residual contaminants would, over the long run, decrease the potential consequences of stewardship failures.*

Many weaknesses in institutional controls and other stewardship activities stem from inherent institutional fallibilities. Understanding and predicting the nature and pervasiveness of institutional fallibility, particularly where long-term attention to mission is required, is essential if the organizations charged with long-term management of waste sites are to be designed in ways that make them resistant to failures that compromise the safety of sites with residual wastes. *Because the organizational systems charged with long-term care and custodianship of hazardous materials and for some types of public goods have proven so fallible in the past, the research and development efforts that are part of long-term institutional management needs to extend to the social, institutional, and organizational aspects of long-term management systems as well.*

"Bigger Picture" Factors That Argue for a Long-Term Institutional Management Approach

Long-term institutional management decisions are often constrained by contextual factors not easily controllable by site managers. These include risks, the state of scientific understanding, technical and institutional capabilities, costs, laws and regulations, the views of interested and affected parties, and activities at other sites. The latter includes nearby contaminated sites, nearby lands outside the facility, receptor sites, and similar sites, particularly similar sites within the DOE complex.

The status of lands around a contaminated site, including the presence of other contaminated sites nearby, can strongly affect site disposition decisions. Often, however, the separation of sites for administrative purposes (e.g., into operable units or solid waste management units) conflicts with the logic suggested by a site's natural geography, hydrology, and geology. Changing land uses or resource consumption patterns beyond the administrative boundaries of a site, but within its natural environment, can both affect and be affected by the conditions of the site. Human-induced changes in hydrologic conditions, for example, may affect the ability of isolation technologies to keep soil contaminants out of groundwater. The combination of changing human demand for water, coupled with the induced change in the availability of contaminants to the same groundwater system, can thus create risks that might not otherwise exist. *Successful management of risks will require that the institutional management system be able either to anticipate and prevent such problems before they occur, or to detect and reverse the underlying changes before harm is done.* Whether either of these can be done reliably over the long term is open to question.

One way to attempt to overcome both technical and institutional limitations is to forge links between technical and institutional capabilities. The two can be mutually reinforcing in (1) the periodic reevaluation of site disposition decisions, and (2) the development of new technologies that

lessen the dependence on fallible institutional arrangements that were necessitated by the technical limitations of the past.

Designing and Implementing a Site's Institutional Management System

General design criteria exist that can help assure that a site's system of institutional management reflects an appropriate balance in the reliance it places on each of the three "legs" of the long-term institutional management "stool." Nine such criteria (discussed in Chapter 8) emerge from this study.

- *Defense in depth* refers to layering by using more than one measure to accomplish basically the same purpose, and redundancy by having more than one organization responsible for basically the same task.
- *Complementarity* refers to the support that each measure provides to the others.
- *Foresight* refers to the ability, despite uncertainties, to anticipate how the components of the system will or will not work individually and as a whole. Adjustments are then made beforehand or contingencies planned for accordingly.
- *Accountability*, which extends to both the public and government authorities, requires both a willingness to be made answerable and the technical means to identify and correct performance defects.
- *Transparency* means that the basis for site management decisions is clear and that the public has the opportunity to review and comment on these decisions before they are finalized. Transparency lays the groundwork for accountability.
- *Feasibility* refers to having an institutional management system that is technically, economically, and institutionally possible to implement within a specific time period.
- *Stability through time* refers to the likelihood that, based on reasonable estimates, the individual components of the site management system and the system as a whole will continue to perform as initially configured.
- *Iteration* refers to the concept that the whole system requires periodic reexamination to determine whether the various parts of a site's protective system are functioning as expected and whether system performance can be improved.
- *Follow-through* and *flexibility* refer to a commitment to taking innovative action to correct or redirect a site's management system when a need is identified.

In addition to these design criteria, there are other characteristics that institutional management systems should have that fall into the category of implementation criteria—that is, attributes of the system that, if included, increase chances that it will be successfully implemented and maintained over time. These include:

- *Clear objectives* and a desire on the part of those responsible for institutional management to carry out those objectives with *diligence over time*.
- A *clear system of governance* that specifies what is to be done and by whom and is founded on precepts that are enduring on the one hand and flexible on the other.
- An *integrated overall approach* that coordinates activities across the responsible entities and assures that site management measures are complementary rather than conflicting.
- *Incentives* both within and outside the institutional management organization to encourage diligence in carrying out mission objectives.

The mechanisms for creating and implementing effective long-term institutional management do not necessarily have to be created "from scratch." Some mechanisms with at least some of the

attributes mentioned here already exist, both within and outside of DOE, and others, such as the program within the DOE Environmental Management Office of Long-Term Stewardship, are coming into being. Nevertheless, a systematic approach is needed for the many challenges that such mechanisms will have to face to be overcome. By the same token, a number of other factors that do not appear as specific characteristics of institutional mechanisms are essential to maintain their effectiveness through time. These include, for example, positive incentive structures that encourage system personnel to behave in ways that reinforce the management system's basic purpose, and stable funding through time.

In conclusion, given that unrestricted use will not be possible for many DOE legacy waste sites, and given that decisions that affect sites' futures are often made under conditions of considerable uncertainty, the best decision strategy overall appears to be one that avoids foreclosing future options where sensible, takes contingencies into account wherever possible, and takes seriously the prospects that failures of engineered barriers, institutional controls, and other stewardship measures in the future could have ramifications that a good steward would want to avoid. A forward-looking strategy is essential because today's scientific knowledge and technical and institutional capabilities are insufficient to provide much confidence that sites with residual risks will continue to function as expected for the time periods necessary. "Cookbook" approaches are unlikely to be successful, and there is no "one size fits all" formula for successful institutional management. In designing long-term institutional management systems, flexibility, equity, efficiency, and environmental and human health protection objectives must be attended to, more or less simultaneously. Management strategies that are iterative and provide "follow-through" on these objectives over time enhance the chances that the ultimate health and safety objectives will be met.

Nuclear Sites May Be Toxic In Perpetuity, Report Finds

WASHINGTON, Aug. 7 — Most of the sites where the federal government built nuclear bombs will never be cleaned up enough to allow public access to the land, and the plan for guarding sites that are permanently contaminated is inadequate, the National Academy of Sciences said today in a report.

"At many sites, radiological and nonradiological hazardous wastes will remain, posing risks to humans and the environment for tens or even hundreds of thousands of years," the report said. "Complete elimination of unacceptable risks to humans and the environment will not be achieved, now or in the foreseeable future."

The idea that the production of nuclear weapons has produced "national sacrifice zones," land that the public can never use again, is not new. The term became common in environmental circles in the late 1980's, when the United States began recognizing the environmental legacy of the Manhattan Project, the effort during World War II to develop atomic weapons, and the cold war.

But the report, commissioned by the Department of Energy, goes a step further. It says that the government can try to declare certain areas permanently off-limits, but that it lacks the technology, money and management techniques to prevent the contamination from spreading.

In addition, some of the contaminants have already "migrated" outside plant boundaries and others will follow, the report said.

Thomas M. Leschine, the chairman of the committee that wrote the report, said managers could use barbed wire and guards at the sites.

But Dr. Leschine, an associate professor in the School of Marine Affairs at the University of Washington, added: "There's no assurance that we can maintain any of that control. It's one thing to put a fence up around something, but it's really something else to maintain it in perpetuity."

Controls on the use of some of the land are already breaking down, the report said. For example, in the early 1990's, the Department of Energy sold land near its Oak Ridge Reservation in Tennessee for use as a golf course, stipulating that the groundwater was contaminated and was not to be used. "Within a few years, however, D.O.E. discovered that a well was being drilled to irrigate the golf course," the report said.

Dr. Leschine said the committee had found another case in which the Department of Energy had posted "no fishing" signs at a creek near Oak Ridge because of radiation contamination in the water.

"The signs all got stolen, because the local high school kids thought they were nice things to have," he said. "Then there were months of protracted battles between the local authorities and the Department of Energy, over whose responsibility it was to replace the signs."

At the Department of Energy, Gerald G. Boyd, the deputy assistant secretary for science and technology, said his agency established a long-term stewardship office a year ago to cope with the problem, with about a dozen people working with engineers and planners at the various sites. The office was established soon after the department requested the study from the National Academy of Sciences, Mr. Boyd said.

The department has accelerated its clean-up efforts, reduce the costs involved and minimize risks to surrounding communities, but a perfect cleanup is not possible, he said.

As an example of the breakdown of control, Dr. Leschine cited the fire that endangered the Los Alamos National Laboratory, in New Mexico, in May. The fire set the stage for mudslides in the coming rainy season that could contaminate the Rio Grande with radioactive and chemical toxins from the laboratory.

But the cause of the blaze was not natural or malicious; the fire was set by another government agency as part of its land-management efforts.

The report said that no plan written now to minimize the spread of uncontained wastes would suffice over the tens, hundreds or even thousands of years that some of the contaminants would remain dangerous.

It urged the department to assume that engineered barriers like concrete and steel would eventually fail, and that most of what was known about the behavior of contaminants in air, soil or water might "eventually be proven wrong." The department needs a long-term program that "actively seeks out and applies new knowledge," the report said.

The report identified 144 sites where the department and its predecessors, notably the Atomic Energy Commission, processed nuclear materials, and it said that 109 would not be cleaned up enough for unrestricted release, because of insufficient money, technical skill or political will to do the job.

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