Y/TS-616

Y-12

OAK RIDGE
Y-12
PLANT

MARTIN MARIETTA

ENVIRONMENTAL ISSUES AT THE Y-12 PLANT

T. R. Butz

Health, Safety, Environment
and Accountability Division

January 26, 1990

Ahearne Committee
Pollard Auditorium
Oak Ridge, Tennessee 37831
January 26, 1990

Y-12 CENTRAL FILES
RECORD COPY

Prepared by the
Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831
operated by
Martin Marietta Energy Systems, Inc.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

#968

ENVIRONMENTAL ISSUES AT THE Y-12 PLANT

T. R. BUTZ

MANAGER, HEALTH, SAFETY, ENVIRONMENT,
AND ACCOUNTABILITY DIVISION
Y-12 PLANT

Y-GA 90-384
RAD 1/90

IN 1982–1983 TIME FRAME, WASTE MANAGEMENT AND ENVIRONMENTAL PRACTICES WERE ANTIQUATED AND GENERALLY LESS SATISFACTORY THAN THOSE CARRIED OUT BY EQUIVALENT MAJOR INDUSTRY IN TENNESSEE

- MERCURY CONTAMINATION
- DIRECT DISCHARGE OF LIQUID WASTE
- INADEQUATE SOLID WASTE MANAGEMENT
- URANIUM DISCHARGES TO ATMOSPHERE
- INADEQUATE/NONEXISTENT PERMITS

Y-GA90-385
JLR 1/90

IN 1983, ACTIONS WERE INITIATED WHICH LED TO SUBSTANTIAL CHANGE IN ENVIRONMENTAL PROTECTION:

- COMPLIANCE EVALUATION INSPECTION BY STATE
- INTERAGENCY TASKFORCE FORMED
- MEMORANDUM OF UNDERSTANDING SIGNED
- CONGRESSIONAL HEARINGS ON MERCURY
- ENVIRONMENTAL ADVISORY COMMITTEE INITIATED
- LEAF AND NRDC SUIT AGAINST DOE
- CLEARANCES INITIATED FOR REGULATORS

Y-GA 90-386
JLR 1/90

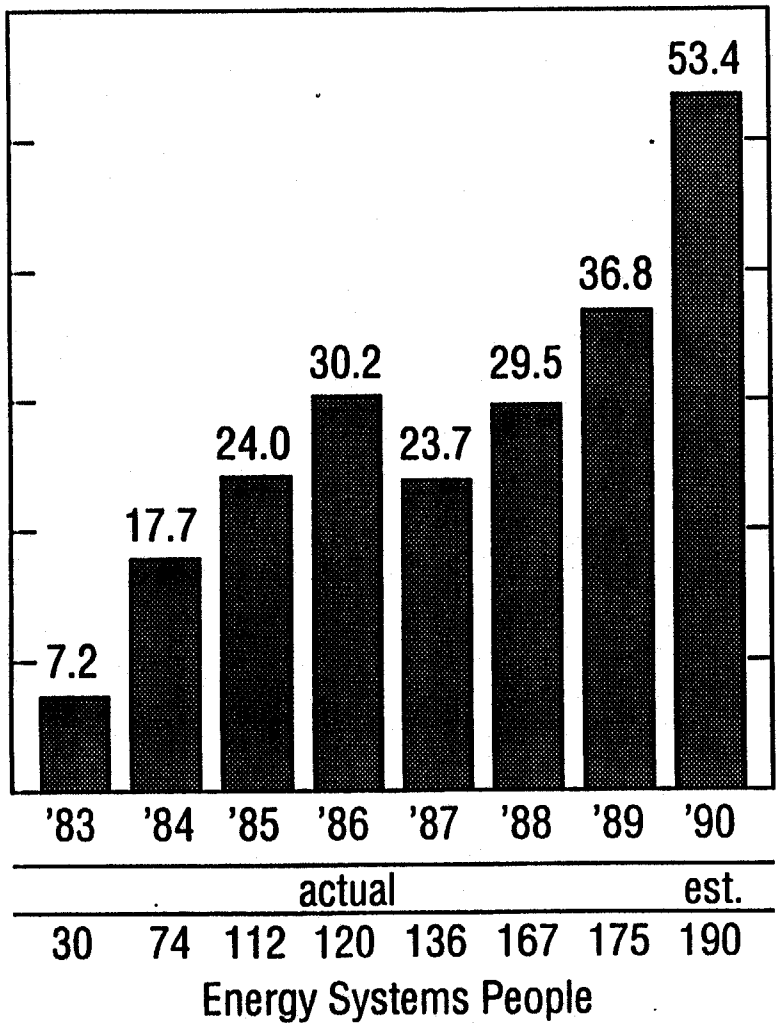
SINCE 1983, ATTITUDES AND PRACTICES HAVE CHANGED IN A POSITIVE WAY:

- REGULATORY AUTHORITY OVER PLANT ACTIVITIES CLARIFIED
- FUNDING AND STAFFING PROVIDED TO ACHIEVE CORRECTIVE ACTIONS
- DOE ESTABLISHED SITE OFFICE
- REGULATORS INVOLVED IN DECISION PROCESS
- MARTIN MARIETTA BECAME CONTRACTOR

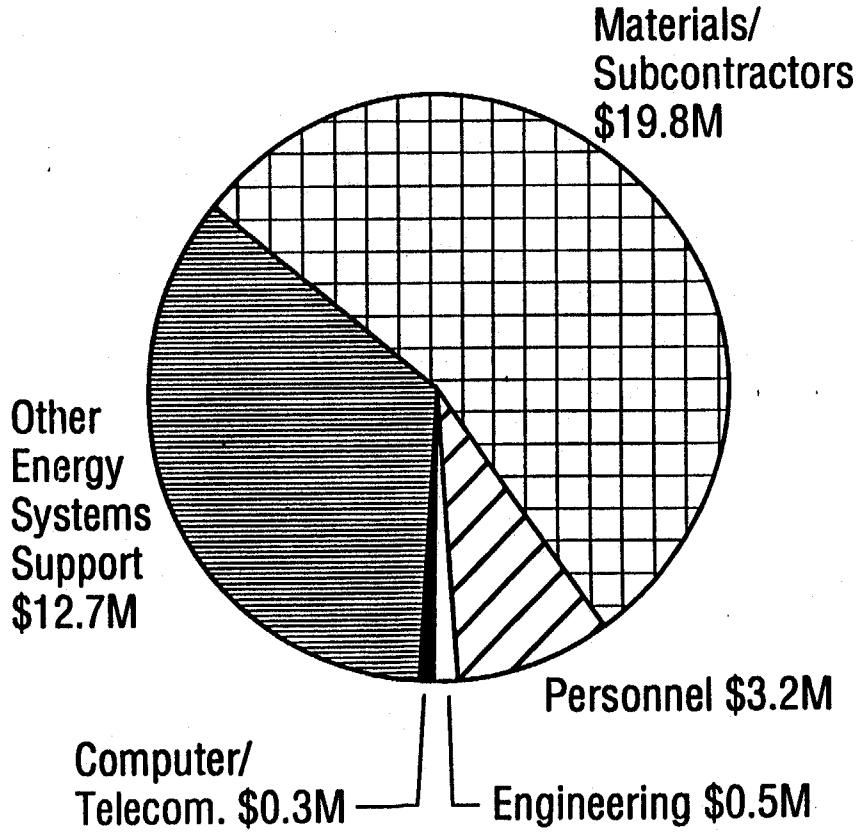
Y-GA 90-387
JLR 1/90

Y-12 ENVIRONMENTAL PROGRAM FUNDING

CONSTANT FY 90 $ IN MILLIONS



FY 1990 BUDGET



Y-GA 86M-447R6 KSD 1/90

MAJOR CAPITAL OR CAPITAL-LIKE FUNDING HAS BEEN INVESTED FOR IMPROVEMENT

		($ ×1000)
1978	STEAM PLANT IMPROVEMENTS	$14,000
1981	CONTROL OF EFFLUENTS AND POLLUTANTS	7,800
	M-WING COOLANT CHANGEOUT	5,900
1982	PROCESS EXHAUST EQUIPMENT RESTORATION	2,700
1985	AIR AND WATER POLLUTION CONTROL	29,000
	ENVIRONMENTAL IMPROVEMENTS	56,275
1986	ENVIRONMENTAL HAZARDS ELIMINATION	7,600
	STACK RADIOLOGICAL MONITORING	9,200
1988	ENVIRONMENTAL RESTORATION	39,300 (THRU '89)

Y-GA 90-388
JLR 1/90

AUDITS AND APPRAISALS CONTINUE TO IDENTIFY ENVIRONMENTAL COMPLIANCE ISSUES AND AREAS FOR IMPROVEMENT

- INTERNAL AUDITS, APPRAISALS, INSPECTIONS, AND TECHNICAL EVALUATIONS FEED INTO A COMPLIANCE SELF ASSESSMENT
  - MONTHLY UPDATE
  - ACTION PLAN , FUNDING, STATUS
- DOE HQ TIGER TEAM ENVIRONMENTAL ASSESSMENT, SEPTEMBER-OCTOBER 1989, VERIFIED COMPLIANCE STATUS OF PLANT

Y-GA 90-389
JLR 1/90

TIGER TEAM FINDINGS WERE IN THREE CATEGORIES:

- COMPLIANCE FINDINGS: THOSE AREAS NOT IN COMPLIANCE WITH ENFORCEABLE REGULATIONS AND/OR DOE ORDERS
- BEST MANAGEMENT PRACTICES FINDINGS: THOSE SHORTFALLS DERIVED FROM REGULATORY AGENCY, DRAFT DOE ORDERS, ACCEPTED INDUSTRY PRACTICE, AND PROFESSIONAL JUDGMENT
- NOTEWORTHY PRACTICE FINDINGS: EXCEPTIONAL PRACTICE, ACTIVITIES, OR PROGRAMS WORTHY OF SHARING WITH OTHERS

Y-GA 90-390
JLR 1/90

TIGER TEAM FINDINGS:

- NONE OF THE FINDINGS IDENTIFIED A SITUATION WHERE CONTINUED OPERATION WOULD POSE UNDUE RISK TO PUBLIC HEALTH OR ENVIRONMENT
  - 61 TOTAL NEGATIVE FINDINGS (54 PREVIOUSLY IDENTIFIED BY MMES)
  - 24 NONCOMPLIANCE SITUATIONS WITH FEDERAL, STATE REGULATIONS OR DOE ORDERS
  - 37 RELATED TO BEST MANAGEMENT PRACTICES
- GREATEST NUMBER OF FINDINGS WERE IN AIR AND WASTE MANAGEMENT PROGRAMS

Y-GA 90-391
JLR 1/90

HIGHLIGHTS OF ENVIRONMENTAL FINDINGS:

- UNDETERMINED RCRA STATUS OF ENRICHED URANIUM RECOVERY OPERATIONS
  - PROCESS RECOVERY OPERATION vs. WASTE PROCESSING
- INDEFINITE STORAGE OF MIXED RADIOACTIVE AND HAZARDOUS WASTE
  - LACK OF TREATMENT OPTION CAUSES STORAGE FOR LONGER THAN ONE YEAR
- NEPA PROCESS NOT APPROPRIATELY APPLIED TO ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL IMPACT STATEMENTS
  - DECISIONS HAVE BEEN MADE WITHOUT APPROPRIATE NEPA DOCUMENTS
  - EA AND EIS HAVE BEEN INITIATED AND TERMINATED WITHOUT WRITTEN RECORDS OF THE DECISIONS
- NOT ALL DISCHARGES INTO EFPC ARE SPECIFICALLY LISTED IN THE EXISTING NPDES PERMIT

Y-GA 90-392
JLR 1/90

FOUR NOTEWORTHY ENVIRONMENTAL PRACTICES WERE IDENTIFIED:

- THE QUALITY OF CONTINUOUS SURFACE WATER MONITORING ALLOWING ENHANCED EARLY DETECTION AND RESPONSE CAPABILITY
- DEVELOPMENT OF INNOVATIVE METHOD TO TEST INTEGRITY OF RAD STACK EMISSION SAMPLING AND MONITORING SYSTEMS
- IMPLEMENTATION OF INTERNAL RCRA AUDIT SYSTEM PROVIDING UPPER LEVEL MANAGEMENT WITH RAPID SURVEILLANCE AND RESPONSE CAPABILITY
- A COMPREHENSIVE GROUNDWATER PLAN

Y-GA 90-393
JLR 1/90

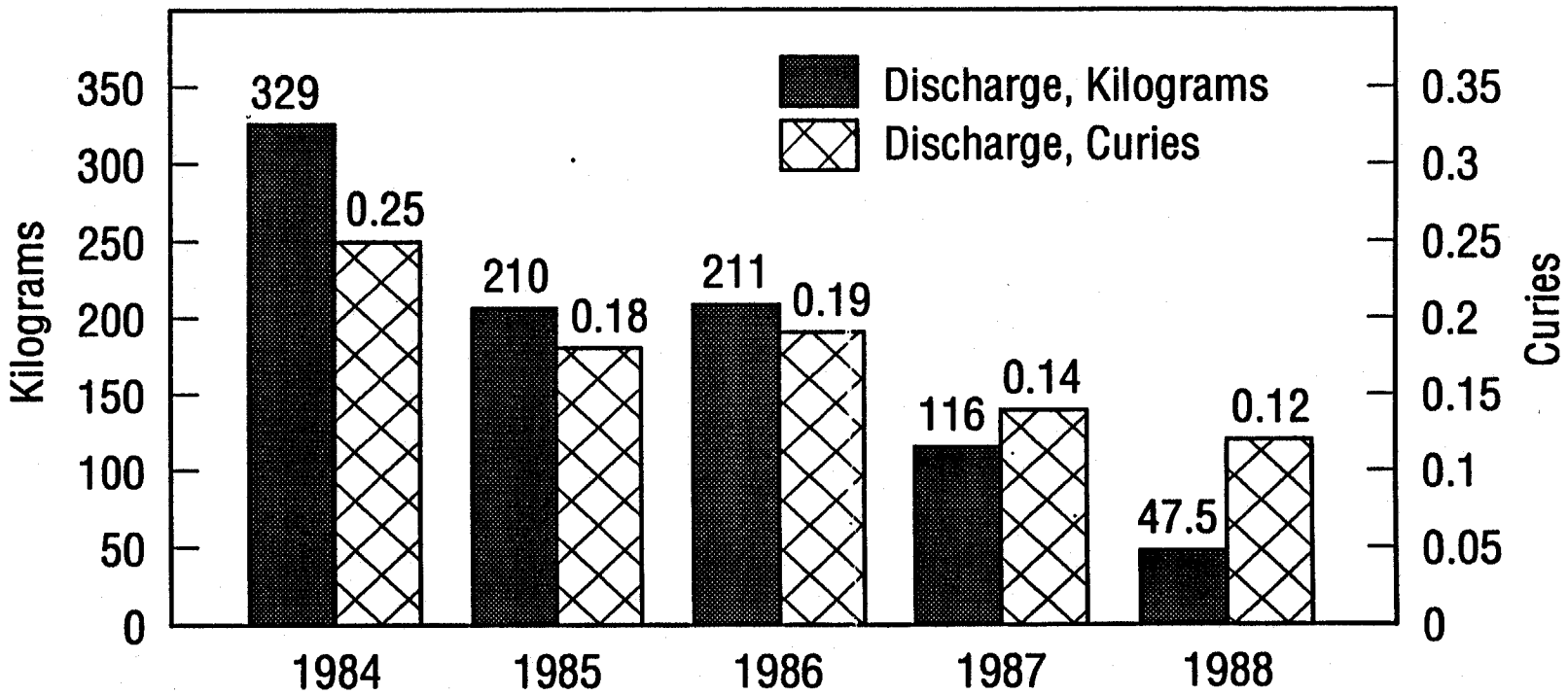
IMPROVEMENTS HAVE BEEN MADE IN AIR POLLUTION CONTROL:

- IMPLEMENTED PROGRAM FOR AIRBORNE RADIONUCLIDE MONITORING FOR ALL PROCESS STACKS WITH POTENTIAL TO EMIT URANIUM
- MAJOR UPGRADE IN PROGRESS TO EMISSION CONTROLS
- INSTALLED BAGHOUSES ON STEAM PLANT AND CONVERTED BOILERS, IGNITION SYSTEMS TO NATURAL GAS
- REDUCED USE OF TETRACHLOROETHYLENE AS MACHINE COOLANT AND EMISSIONS BY SEVERAL HUNDRED TONS PER YEAR
- REDUCED USE OF CHLORINATED SOLVENTS AS DEGREASERS BY MORE THAN 50% SINCE 1987
- IMPLEMENTED SITE METEOROLOGICAL PROGRAM

Y-GA 90-394
JLR 1/90

RESULTS ACHIEVED IN AIR POLLUTION CONTROL:

- SIGNIFICANT REDUCTION IN URANIUM EMITTED TO ATMOSPHERE



- 1988 DOSE TO MAXIMUM EXPOSED INDIVIDUAL WELL WITHIN STANDARDS
  - 5.5 MREM CRITICAL ORGAN (7.3% STANDARD)
  - 0.0007 MREM WHOLE BODY (0.003% STANDARD)

Y-GA 90-413
KSD 1/90

ISSUES REMAINING IN AIR POLLUTION CONTROL PROGRAM:

- CONTINUED NEED TO REDUCE USE OF VOLATILE ORGANIC COMPOUNDS
- FURTHER ASSESSMENT OF RADIOACTIVE OR HAZARDOUS DISCHARGES FROM GENERAL BUILDING VENTILATION SYSTEMS
- VERIFYING COMPLIANCE WITH AIR PERMIT LIMITATIONS AND CONDITIONS FOR MINOR SOURCES

Y-GA 90-395
JLR 1/90

PHOTOGRAPH NO. 250349

PHOTOGRAPH NO. 232140

PHOTOGRAPH NO. 250380

IMPROVEMENTS HAVE BEEN MADE IN WATER POLLUTION CONTROL:

- ELIMINATED OR PERMITTED OVER 160 PROCESS DISCHARGES TO CREEK
- S-3 POND USE ELIMINATED
- BROUGHT NEW TREATMENT FACILITIES ON LINE
  - 5 MAJOR TREATMENT FACILITIES FOR PROCESS WASTE
  - WASTE FROM BIOLOGY DIVISION AREA DIVERTED TO SANITARY SEWER
- NEW DISCHARGE POINT FOR BOILER ASH
- MAJOR MERCURY CLEAN UP AND CONTROL PROGRAM COMPLETED

Y-GA 90-396
JLR 1/90

RESULTS ACHIEVED IN WATER POLLUTION CONTROL:

- HIGH DEGREE OF COMPLIANCE WITH NPDES PERMIT AT OVER 200 MONITORING POINTS
- EVIDENCE OF RECOVERY IN EAST FORK POPLAR CREEK (EFPC) AND BEAR CREEK
  - POPULATION ABUNDANCE AND NUMBER OF SPECIES OF FISH INCREASING IN EFPC
  - INCREASE IN POPULATION ABUNDANCE AND NUMBER OF FISH SPECIES IN UPPER BEAR CREEK, EXCEPT EXTREME UPPER REACH AT S-3 POND
  - LITTLE CHANGE IN MORE SENSITIVE BENTHIC INVERTEBRATE COMMUNITY
- SINCE MARCH 1987, NO TOXICITY DETECTED BELOW LAKE REALITY THROUGH LABORATORY BIOASSAY TESTS
- TOXICITY OBSERVED INSTREAM WITHIN PLANT

Y-GA 90-397
JLR 1/90

RESULTS ACHIEVED IN WATER POLLUTION CONTROL:

- NO SIGNIFICANT CHANGE IN MERCURY CONCENTRATION IN EFPC THROUGH TIME, ALTHOUGH 2000 lbs. REMOVED FROM SYSTEM
  - INCREASE DURING REMEDIAL WORK
  - RANGE BELOW LAKE REALITY 0.6 TO 13 ppb, AVERAGE 1.7 ppb (EPA DRINKING WATER STANDARD 2 ppb)
  - HIGHEST VALUES IN SUMPS BELOW BUILDING 9201-4 (80 ppb)
- NO SIGNIFICANT CHANGE IN LEVELS OF MERCURY IN FISH IN EFPC BETWEEN 1984 AND 1989
  - RANGE AT NEW HOPE POND SITE 0.6 TO 1.5 ppm, AVERAGE 1 ppm
  - INCREASE DURING REMEDIAL WORK
  - MERCURY IN FISH SUSTAINED BY MERCURY LEVELS IN STREAM WATER

Y-GA 90-398
JLR 1/90

ISSUES REMAINING IN WATER POLLUTION CONTROL PROGRAM:

- MERCURY FROM PAST CONTAMINATION RESULTS IN AVERAGE LEVEL OF 2 ppb IN SPITE OF CLEANUP OF MAJOR SOURCES
- NEED TO REDUCE INSTREAM TOXICITY WITHIN PLANT
  - ENHANCE TREATMENT
  - REDUCE CHLORINE DISCHARGES TO STREAM
  - REDUCE CHEMICAL USE AT STEAM PLANT
- PLAN FOR REDUCTION OF LOAD ON CITY SEWAGE TREATMENT PLANT
- FINAL SYSTEM FOR DRY HANDLING OF STEAM PLANT ASH

y-ga 90-399
rad 1/90

IMPROVEMENTS HAVE BEEN MADE IN SOLID WASTE MANAGEMENT:

- CORPORATE APPROACH TO WASTE MANAGEMENT DEVELOPED
- DEMONSTRATION PROGRAM INITIATED
- HIGH DEGREE OF RCRA COMPLIANCE ACHIEVED IN OPERATIONS
- WASTE PROCESSING AND STORAGE FACILITIES BROUGHT ON LINE
- WASTE MINIMIZATION PROGRAM AGGRESSIVELY PURSUED

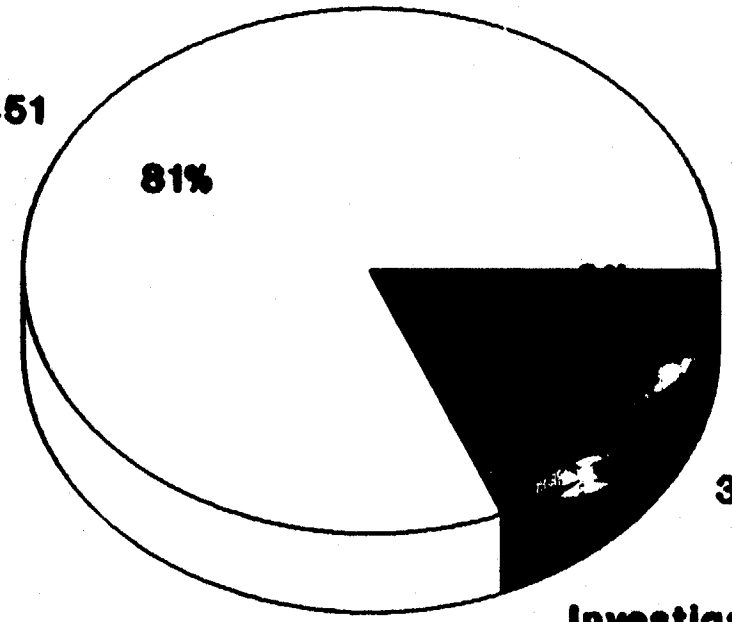
Y-GA 90-400
RAD 1/90

RESULTS ACHIEVED IN SOLID WASTE MANAGEMENT:

- 25% REDUCTION IN LOW-LEVEL RADIOACTIVE WASTE GENERATION
- BULK LOW-LEVEL RADIOACTIVE WASTE BEING STORED RATHER THAN DISPOSED
- DEPLETED URANIUM TURNINGS CONVERTED TO OXIDE AND STORED RATHER THAN DISPOSED
  - SINGLE LARGEST URANIUM WASTE STREAM
  - ALLOWS FOR FUTURE USE
- BETTER CONSTRUCTION PLANNING REDUCING "PROBLEM" WASTE STREAMS

Y-GA 90-401
RAD 1/90

ENVIRONMENTAL RESTORATION PROGRAM
FY 1989 Budget
Total Program Budget $26,400



(Dollars in Thousands)

ISSUES REMAINING IN SOLID WASTE MANAGEMENT:

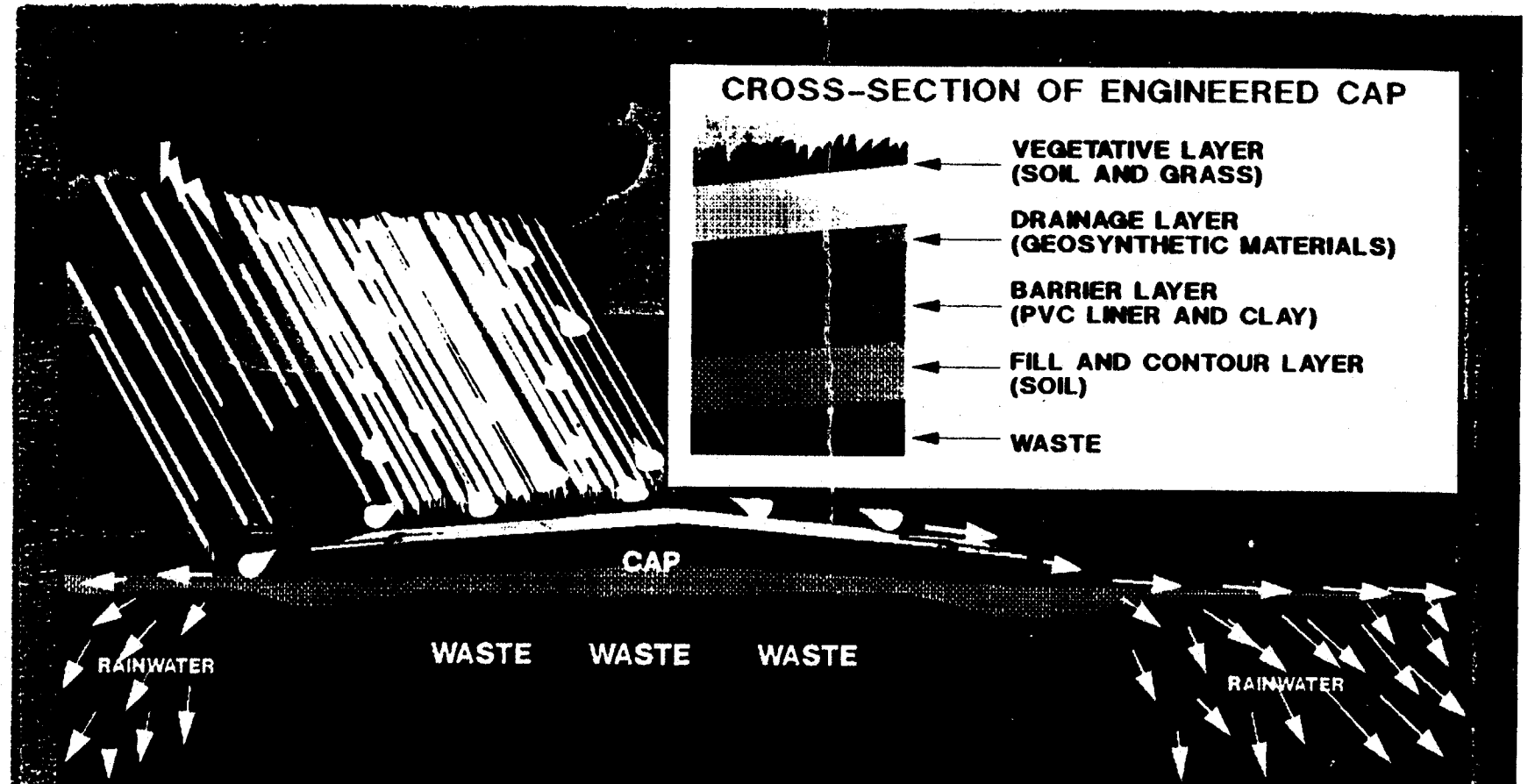
- LONG TERM DISPOSITION OF URANIUM CONTAMINATED WASTE
- INDEFINITE STORAGE OF MIXED WASTES
  - WATER TREATMENT SLUDGES CONTAINING URANIUM
  - OILS AND SOLVENTS CONTAINING URANIUM

Y-GA 90-402
RAD 1/90

SUBSTANTIAL PROGRESS HAS BEEN MADE IN ENVIRONMENTAL RESTORATION:

- BEEN WORKING HARD ON RESTORATION SINCE 1983
- DOE ISOLATED RESTORATION IN SEPARATE BUDGET IN 1988
  - PRIORITIZATION SYSTEM
  - SIMPLIFIED PLANNING
  - FLEXIBLE FUNDING
- BEGAN CLOSURE OF 8 RCRA LAND BASED UNITS
  - 3 CERTIFIED CLOSED AND ACCEPTED BY TDHE
  - 1 CERTIFIED CLOSED AND PENDING ACCEPTANCE BY TDHE
  - 2 COMPLETE, BUT NOT CERTIFIED YET
  - 2 IN PROGRESS
- COMPLETED CLEAN CLOSURE AT 7 RCRA SITES

Y-GA 90-403
RAD 1/90



Engineered Caps

Y-12 engineers designed "caps" for seven of the closure projects. These caps are multilayered coverings of earth and man-made materials. They will promote the run-off of rainwater in the landfill and enhance the isolation of the waste material from the environment.

PHOTOGRAPH NO. 250384

PHOTOGRAPH NO. 232229

PHOTOGRAPH NO. 241662

PHOTOGRAPH NO. 260179

PHOTOGRAPH NO. 260755

PHOTOGRAPH NO. 260999

PHOTOGRAPH NO. 262721

PHOTOGRAPH NO. 265944

PHOTOGRAPH NO. 241338

PHOTOGRAPH NO. 265898

SUBSTANTIAL PROGRESS HAS BEEN MADE IN ENVIRONMENTAL RESTORATION: (continued)

- 23 OF 39 PETROLEUM UNDERGROUND STORAGE TANKS REMOVED/FILLED
- 4 OF 7 HAZARDOUS SUBSTANCE UNDERGROUND STORAGE TANKS REMOVED/FILLED
- GROUNDWATER ASSESSMENT PROGRAM IN PLACE WITH 581 WELLS INSTALLED (164 RCRA COMPLIANCE WELLS)
- INITIAL ASSESSMENT OF EFPC FLOODPLAIN COMPLETE BY TASK FORCE
- 185 SOLID WASTE MANAGEMENT UNITS IDENTIFIED
  - 35 WILL HAVE RCRA FACILITY INVESTIGATIONS
  - 24 OF 35 PLANS SUBMITTED TO REGULATORS
- FEDERAL FACILITIES AGREEMENT IN DEVELOPMENT TO CONSOLIDATE RCRA 3004(u), CERCLA, AND NEPA REQUIREMENTS INTO ONE PROGRAM

Y-GA 90-404
RAD 1/90

THREE AREAS OF ENVIRONMENTAL RESTORATION WARRANT PARTICULAR EMPHASIS:

- MERCURY CONTAMINATION IN AND AROUND FACILITIES
- FLOODPLAIN CONTAMINATION
- GROUNDWATER CONTAMINATION

Y-GA 90-405
RAD 1/90

MERCURY CONTAMINATION IN AND AROUND FACILITIES:

- SOURCES HAVE BEEN DETECTED AND HIGHEST PRIORITY CLEANUP CONDUCTED
  - SEDIMENTS IN STORM SEWERS
  - BUILDING STRUCTURES
  - DRAIN PIPES
  - FOUNDATIONS
  - SOIL

Y-GA 90-406
RAD 1/90

MERCURY CONTAMINATION IN AND AROUND FACILITIES: (continued)

- BUILDING 9201-4 CONTAINS PROCESS EQUIPMENT FROM THE 1950s AND IS THE LAST OF THE PRODUCTION FACILITIES NOT TO BE "STRIPPED"
  - CURRENTLY MAINTAINED IN CONTROLLED STANDBY
  - LIMITED ENTRY
  - VENTILATION STOPPED TO REDUCE EMISSIONS
  - EQUIPMENT DRAINED
  - 3 ALTERNATIVES
    - DEMOLITION
    - DECONTAMINATE
    - CONTROLLED STANDBY
  - CURRENTLY UNFUNDED PROJECT IN ENVIRONMENTAL RESTORATION BUDGET

PHOTOGRAPH NO. ORO 55-131

FLOODPLAIN CONTAMINATION IS PRESENT DOWNSTREAM OF THE Y-12 PLANT FOR THE LENGTH OF EAST FORK POPLAR CREEK:

- APPROXIMATELY 240,000 POUNDS OF MERCURY LOST TO CREEK MOSTLY BETWEEN 1951 AND 1963
- URANIUM, PCBs, METALS ALSO PRESENT AS CONTAMINANTS
- DETAILED EVALUATION OF HAZARD COMPLETED BY INTERAGENCY TASK FORCE
  - SOME "HOT SPOTS" IN OR RELATED TO FLOODPLAIN REMOVED
  - STREAM POSTING CONTINUED
  - SOILS NOT A THREAT TO HUMAN HEALTH
- PROGRAM CHANGING EMPHASIS FROM HAZARD EVALUATION TO ONE OF ASSESSMENT FOR PURPOSES OF CORRECTIVE ACTION IN ACCORD WITH REGULATIONS
- WETLANDS STUDY BEING DONE DURING 1990 GROWING SEASON

Y-GA 90-408
JLR 1/90

FLOODPLAIN CONTAMINATION IS PRESENT DOWNSTREAM OF THE Y-12 PLANT FOR THE LENGTH OF EAST FORK POPLAR CREEK (continued)

- USGS IDENTIFIED CONTAMINATION IN SHALLOW WELLS IN EFPC FLOODPLAIN IN AREAS OF HIGHEST SOIL/SEDIMENT CONTAMINATION
  - SEVERAL WELLS EXCEEDED EPA DRINKING WATER STANDARDS FOR:
    - CHROMIUM
    - LEAD
    - MERCURY
    - SELENIUM
    - PHENOLS
    - STRONTIUM-90
    - ORGANICS (COAL DERIVED)
  - URANIUM WAS PRESENT IN 11 SAMPLES RANGING FROM 2 TO 350 ppb
- FURTHER INVESTIGATION OF SHALLOW CONTAMINATION BEING PURSUED

Y-GA 90-410
RAD 1/90

GROUNDWATER CONTAMINATION IS PRESENT AT SEVERAL PLANT LOCATIONS AS DETECTED THROUGH THE GROUNDWATER ASSESSMENT PROGRAM:

5 PRINCIPAL LOCATIONS SHOW CONTAMINATION BY RCRA ASSESSMENT MONITORING:

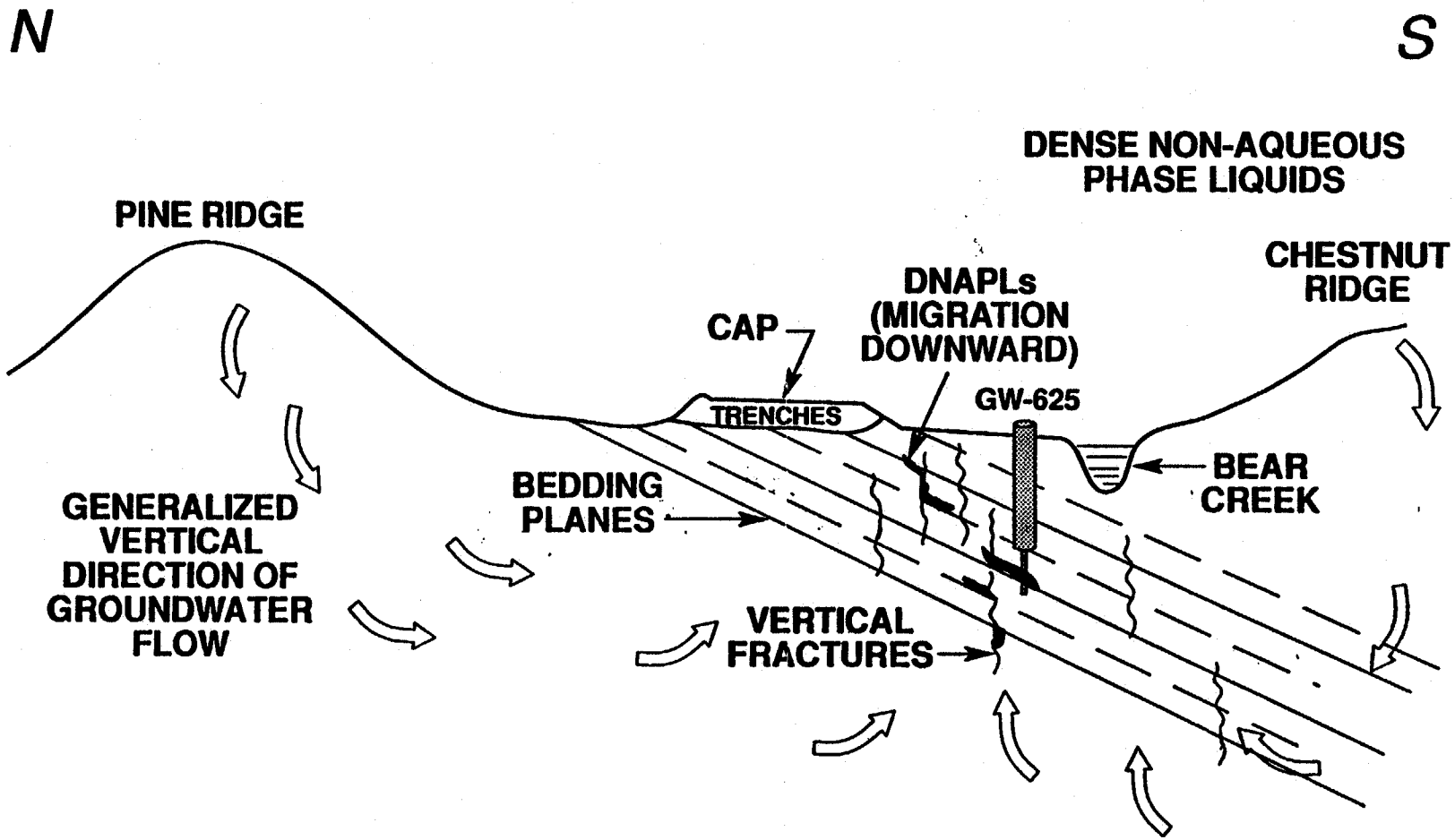
BEAR CREEK BURIAL GROUND	OIL LANDFARM	S-3 SITE	CHESTNUT RIDGE SECURITY PITS	NEW HOPE POND
VOCs 0–13%	VOCs 0–3 ppm	VOCs 0–7000 ppm	VOCs 0–1.4 ppm	VOCs 0–10 ppm
PCBs 0–27,000 ppm		NITRATE 0–20,000 ppm		
		METALS (MAXIMUM VALUES) As 0.7 ppm Ba 425 ppm Be 0.3 ppm Cd 7.8 ppm Cr 0.6 ppm Co 2.8 ppm Cu 180 ppm Pb 0.6 ppm Hg 0.2 ppm U 158 ppm Zn 11 ppm		
		RADIONUCLIDES GROSS ALPHA >BACKGROUND GROSS BETA >BACKGROUND Tc-99 >BACKGROUND		

Y-GA 90-411
JLR 1/90

PHOTOGRAPH NO. 272428

PHOTOGRAPH NO. 231925

oak ridge Y-12 plant



NOT TO SCALE

Y-GA 90-499
JLR 1/90

GROUNDWATER CONTAMINATION IS PRESENT AT SEVERAL PLANT LOCATIONS AS DETECTED THROUGH THE GROUNDWATER ASSESSMENT PROGRAM (continued)

- EXTENSIVE STUDIES HAVE CONCLUDED THAT CONTAMINATED GROUNDWATER IN Y-12 AND RELATED BURIAL GROUNDS DOES NOT POSE A THREAT TO USERS OF GROUNDWATER BECAUSE OF NATURAL HYDROGEOLOGIC BARRIERS
  - NEAREST PUBLIC USER 8 MILES AWAY
  - NEAREST PRIVATE USER 0.7 MILES AWAY
- APPROACH TO LEVEL OF GROUNDWATER CLEANUP IS THROUGH ALTERNATE CONCENTRATION LIMITS (ACLs)
  - ACL DEMONSTRATION PREPARED FOR U, Cd, NITRATE, AND TETRACHLOROETHYLENE
  - REMOVAL IS TECHNICALLY FEASIBLE, BUT NOT TO "ZERO" LEVELS
- FIRST GROUNDWATER TREATMENT FACILITY FOR BEAR CREEK BURIAL GROUND CONTAMINATION IS CONSTRUCTED WITH STARTUP PLANNED FOR MARCH 1990 (PENDING NPDES PERMIT)

Y-GA 90-412
JLR 1/90