SAND2011-5424P

National Labs: History and Impact

Session 1:

Growth—The Nuclear Weapons Complex, Sandia, and Albuquerque

Osher Lifelong Learning Institute

June 3, 2011

Rebecca Ullrich
Corporate Historian
Sandia National Laboratories

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

What's in a Weapon?

Sandia National Laboratories

Oxnard Field: 1928

Sandia National Laboratories

Z Division: Choosing a Site

Sandia National Laboratories

PostWar on the Base: Aircraft Demolition

Sandia National Laboratories

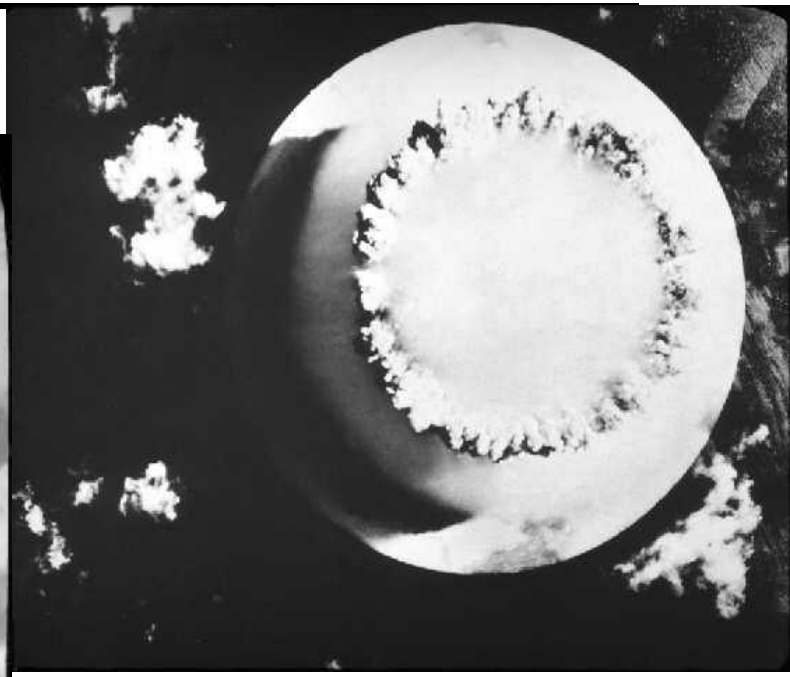
1946: Building a Lab

Sandia National Laboratories

JTF-1: Operation Crossroads

Sandia National Laboratories

Operation Crossroads



21 kt Baker Shot; July 24, 1946

Sandia National Laboratories

Early Assembly Facilities

Sandia National Laboratories

Transition in Sandia Lab Status

THE WHITE HOUSE
WASHINGTON

May 13, 1949

Dear Mr. Wilson:

I am informed that the Atomic Energy Commission intends to ask that the Bell Telephone Laboratories accept under contract the direction of the Sandia Laboratory at Albuquerque, New Mexico.

This operation, which is a vital segment of the atomic weapons program, is of extreme importance and urgency in the national defense, and should have the best possible technical direction.

I hope that after you have heard more in detail from the Atomic Energy Commission, your organization will find it possible to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.

I am writing a similar note direct to Dr. O. E. Buckley.

Very sincerely yours,

Harry Truman

Mr. Leroy A. Wilson,
President,
American Telephone and Telegraph Company,
195 Broadway,
New York 7, N. Y.

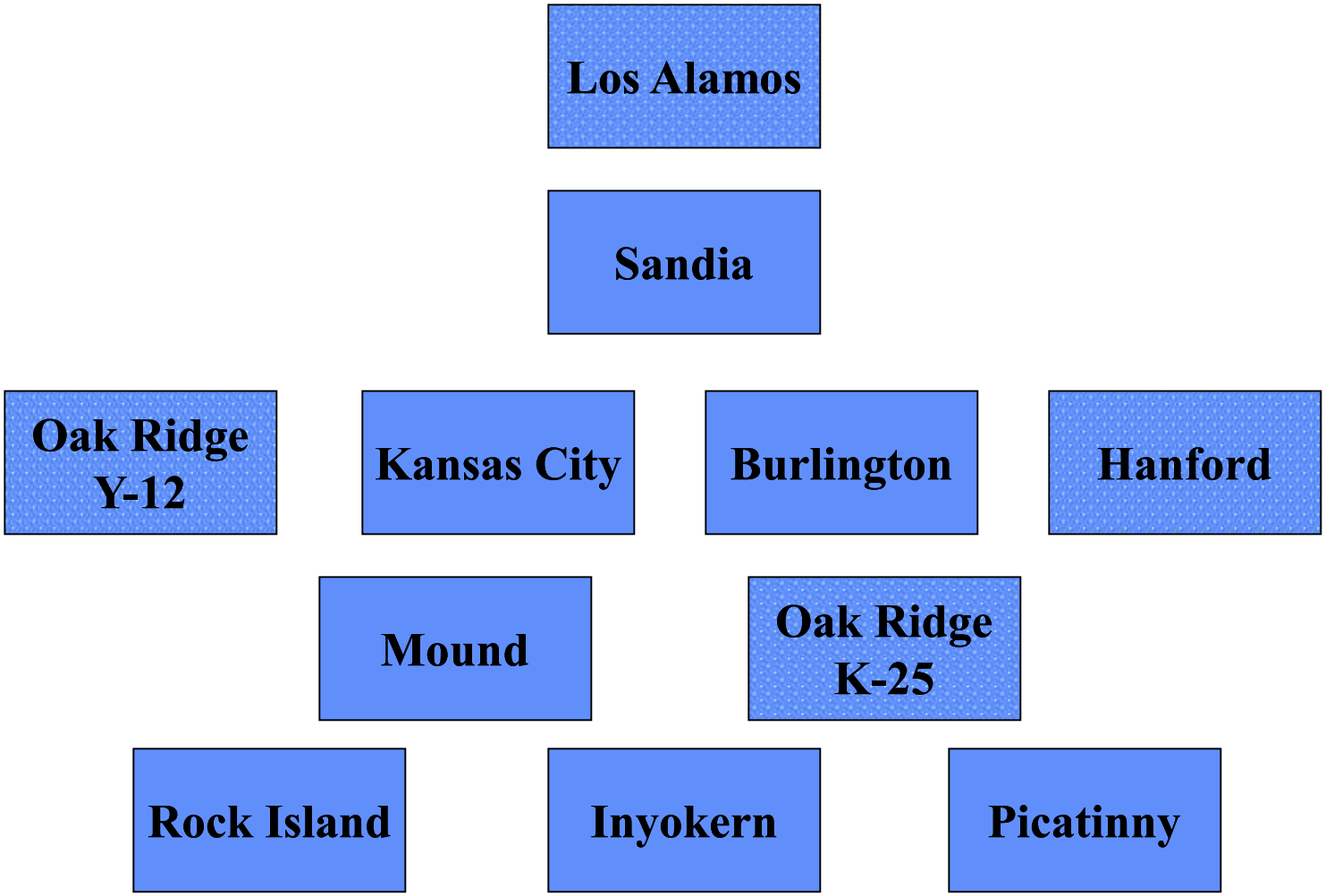
First Sandia Corporation President, George Landry

Sandia National Laboratories

Main Sandia Tech Area: 1949

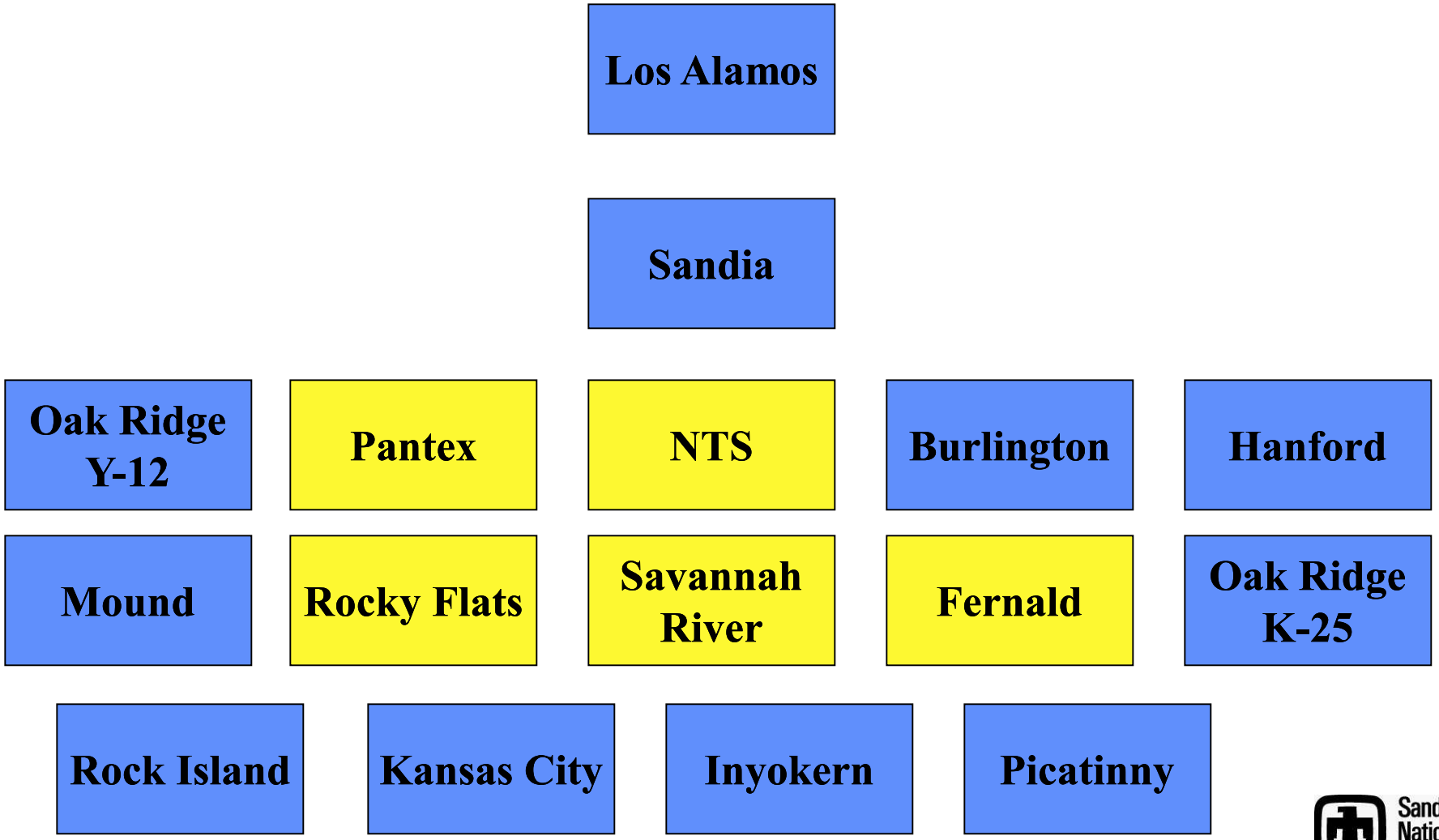
Sandia National Laboratories

The Nuclear Weapons Complex
1949



Sandia National Laboratories

The Nuclear Weapons Complex
1950-1951



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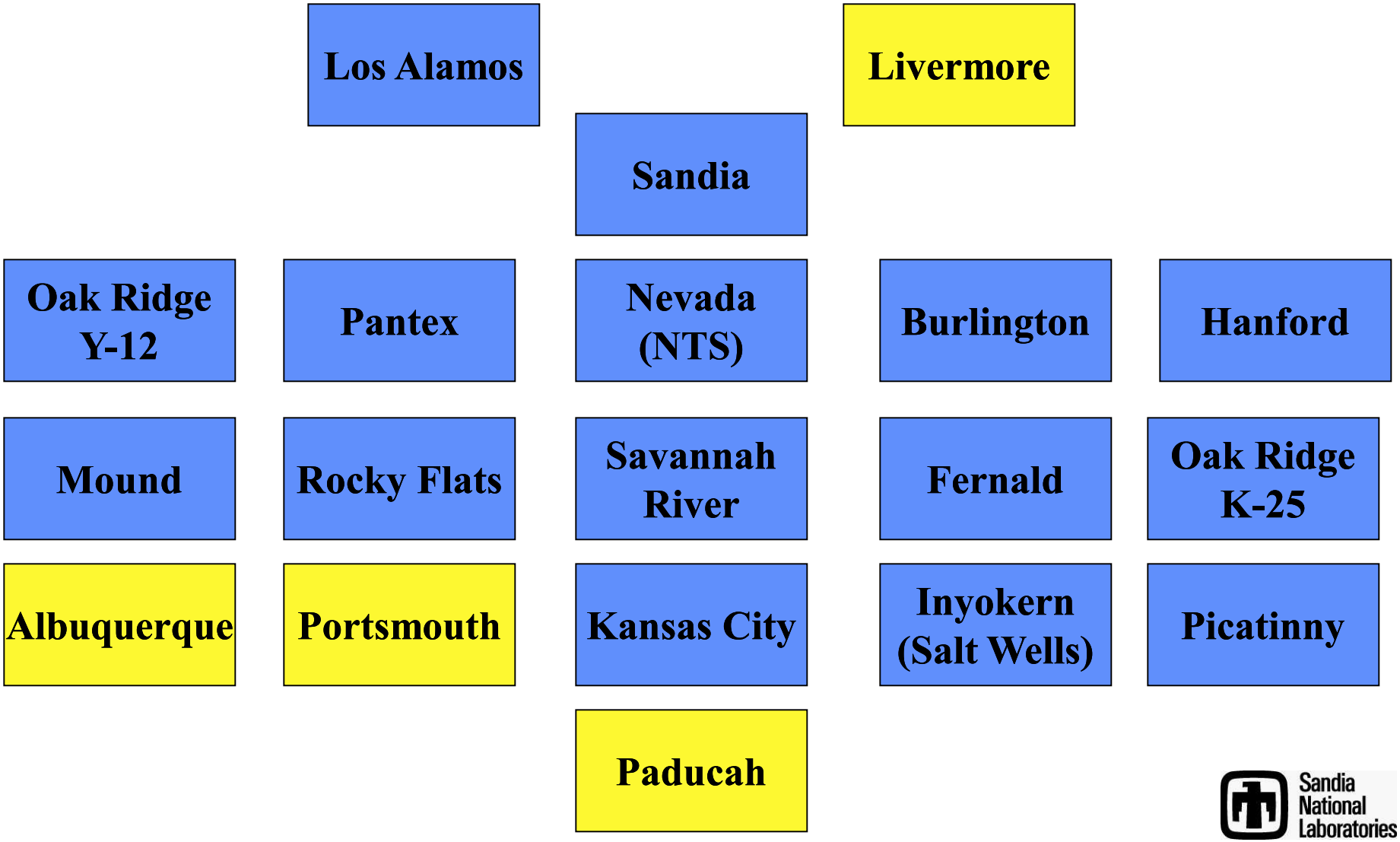
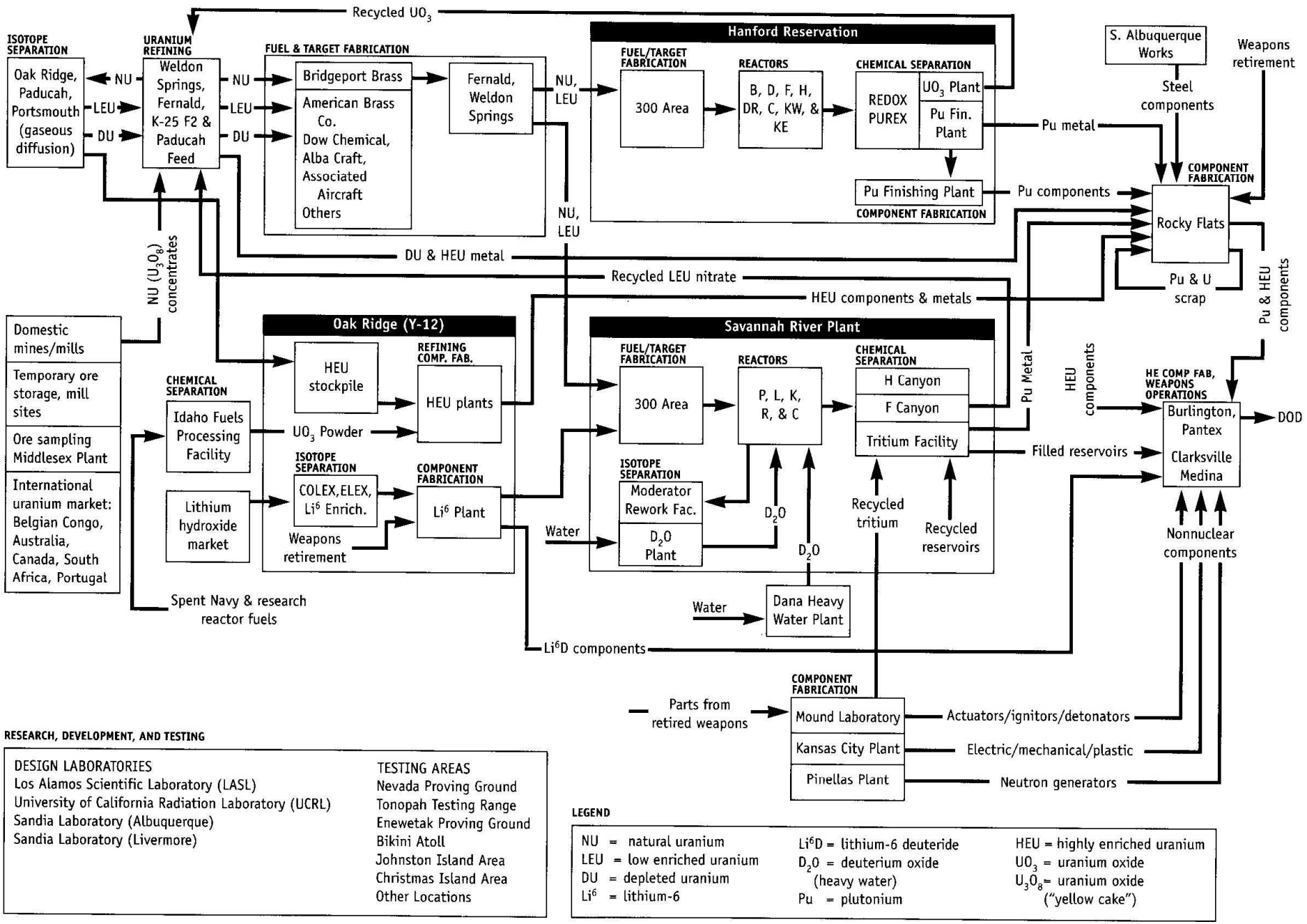
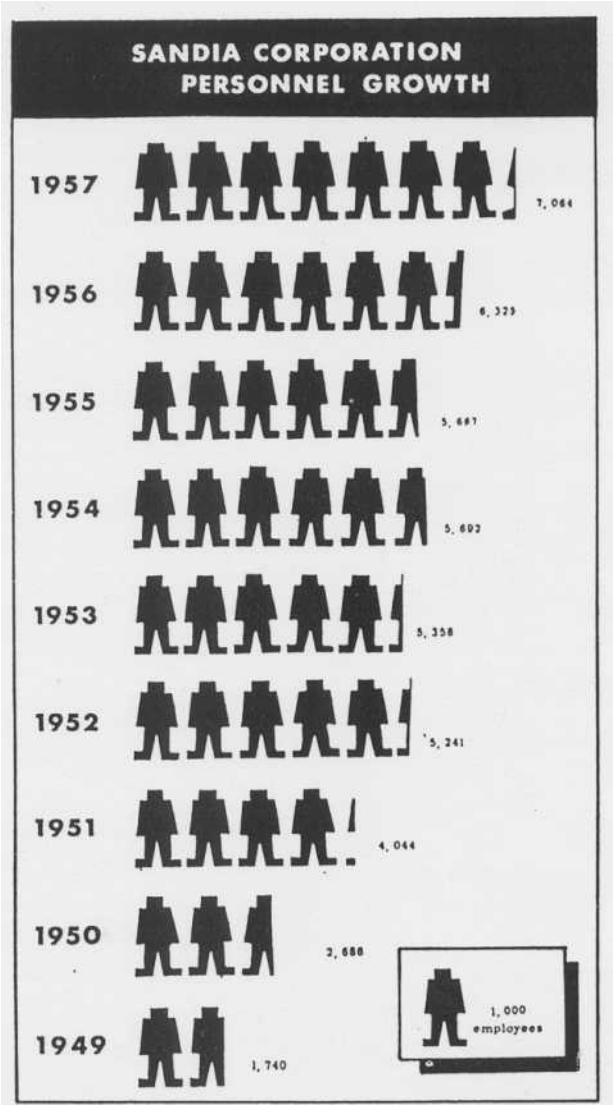
The Nuclear Weapons Complex
1952-1953



Sandia National Laboratories


Recycled UO_3
ISOTOPE SEPARATION
Oak Ridge, Paducah, Portsmouth (gaseous diffusion)
NU
LEU
DU
URANIUM REFINING
Weldon Springs, Fernald, K-25 F2 & Paducah Feed
FUEL & TARGET FABRICATION
Bridgeport Brass
American Brass Co.
Dow Chemical, Alba Craft, Associated Aircraft
Others
Fernald, Weldon Springs
NU, LEU
Hanford Reservation
FUEL/TARGET FABRICATION
300 Area
REACTORS
B, D, F, H, DR, C, KW, & KE
CHEMICAL SEPARATION
REDOX PUREX
UO_3 Plant
Pu Fin. Plant
Pu Finishing Plant
COMPONENT FABRICATION
Pu metal
Pu components
S. Albuquerque Works
Steel components
Weapons retirement
COMPONENT FABRICATION
Rocky Flats
Pu & U scrap
Pu & HEU components
$NU (U_3O_8)$ concentrates
DU & HEU metal
Recycled LEU nitrate
HEU components & metals
Domestic mines/mills
Temporary ore storage, mill sites
Ore sampling Middlesex Plant
International uranium market: Belgian Congo, Australia, Canada, South Africa, Portugal
Oak Ridge (Y-12)
HEU stockpile
REFINING COMP. FAB.
HEU plants
CHEMICAL SEPARATION
Idaho Fuels Processing Facility
UO_3 Powder
Lithium hydroxide market
ISOTOPE SEPARATION
COLEX, ELEX, Li^6 Enrich.
COMPONENT FABRICATION
Li^6 Plant
Weapons retirement
Spent Navy & research reactor fuels
Savannah River Plant
FUEL/TARGET FABRICATION
300 Area
REACTORS
P, L, K, R, & C
CHEMICAL SEPARATION
H Canyon
F Canyon
Tritium Facility
ISOTOPE SEPARATION
Moderator Rework Fac.
D_2O Plant
Water
D_2O
Recycled tritium
Recycled reservoirs
Pu Metal
HEU components
Filled reservoirs
HE COMP FAB, WEAPONS OPERATIONS
Burlington, Pantex
Clarksville Medina
DOD
Nonnuclear components
Water
Dana Heavy Water Plant
Li^6D components
COMPONENT FABRICATION
Parts from retired weapons
Mound Laboratory
Kansas City Plant
Pinellas Plant
Actuators/ignitors/detonators
Electric/mechanical/plastic
Neutron generators
RESEARCH, DEVELOPMENT, AND TESTING
DESIGN LABORATORIES
Los Alamos Scientific Laboratory (LASL)
University of California Radiation Laboratory (UCRL)
Sandia Laboratory (Albuquerque)
Sandia Laboratory (Livermore)
TESTING AREAS
Nevada Proving Ground
Tonopah Testing Range
Enewetak Proving Ground
Bikini Atoll
Johnston Island Area
Christmas Island Area
Other Locations
LEGEND
NU = natural uranium
LEU = low enriched uranium
DU = depleted uranium
Li^6 = lithium-6
Li^6D = lithium-6 deuteride
D_2O = deuterium oxide (heavy water)
Pu = plutonium
HEU = highly enriched uranium
UO_3 = uranium oxide
U_3O_8 = uranium oxide ("yellow cake")

Result of Growth: Sandia



Sandia National Laboratories

Early Years—Traditional Roles

Assembling electronics, 1957

Mildred Whitten
Visiting Nurse
1951

Shorthand Class Graduates, 1956

Sandia National Laboratories

Early Years—Technical Staff

Clockwise from left: Dorris Tendall, Betty Brake, Katheryn Lawson, Betty Carrell, Mary Jo Vaughn

Sandia National Laboratories

AEC Housing on Base: Early 1950s

Sandia National Laboratories

Sandia Bulletin

FROM THE DEPARTMENTS ....

Terry McCreary reports from A.E.C. that George Froelich, though unsuccessful in his hunt for a buck over the holiday weekend, performed his good deed by severely reprimanding a hunter who was deliberately shooting at does. George Huff is still out on the Mogollon Range. However, his party doesn't believe too much in "roughing" it. Or did you ever go on a hunting trip delux with a special cook and handy man to handle the chores? Our New Mexican stalwarts will be requiring gun bearers next. Dorie and Floyd Knepports, accompanied by the Dauts of SLD, returned from Juarez with quite a load. They claim they saw more familiar faces there than they ever do here.

Pat O'Hara has this to say about SLR -- Don McMillin, SLR-2, leaves Albuquerque Dec.2 for Rockford, Illinois. He will be gone until the New Year makes its appearance. Should anyone be interested in taking a trip East at that time, call Don at Ext. 26131. Don is taking Highway 54 through Wichita, Kansas, Springfield, Ill., Chicago, and Rockford. --- Much talk and discussion regarding the opening of deer season. Many disappointments and a few happy smiles. James (Meat Head) Snyder, SLR-4 bagged a 123 pounder after a couple of days of tough going. W.D. Mason, SLR-4, had the perfect hunter's luck. He left Albuquerque at about 6 AM one morning last week and was back again at 8:30 AM the same day with a good fat buck - that guy has all the luck. Not so fortunate was Henry Weems, SLR-4 - in fact, he ran into the worst luck that could befall any hunter -- or anybody else. Henry and a couple of friends had quite a nice camp all set up and were set for a couple of days good hunting. While they were gone for water at a nearby stream, a sudden gust of wind blew hot coals from the fire on their tent. They happened back in time to discover it a roaring mass of flames. Luckily their rifles and ammunition were in the car, but all their extra clothes, sleeping bags, and food were destroyed. Henry told us that they had quite a tough time fighting a small brush fire that was started by the fire. We hoped to be able to report that they bagged a huge fat buck to sort of compensate them for their tough luck - they didn't! Dick Pershing, SLR-7 had a hard time of it too. While hunting he got a "busted" knee, but he's all taped up and back at work now. All's well that ends well.

Frank Reeder tells us that congratulations are in order for SLF-3 and part of SLF-4 on their location in the new building A-23a. John Risley, Al Hall and cohorts seem quite satisfied with their surroundings. The offices are closed from noises, etc., which makes Leona Merryman of SLF-3 quite happy. The rest of SLF are anxiously awaiting full completion of our building so we too may move. John Hitchins, our Millwright, was the master mind behind the setting up of the machines. Stanley Swanson drew up the plans for moving and with Hitchins scheduled the operation. Jim Bedeax was "Engineer in Charge" of the fork lift operation. Here are some of the deer hunting stories we promised. We will report first on the ones that didn't get away. The first item to be reported is a shining example of luck. It seems that Clem Soroul, SLF-4 was sitting close to a deer trail and after being there a few minutes, a buc came up the trail. Clem put his gun to his shoulder and shot. Nothing happened except a soft click. The buck ran back the we he had come. Clem called his companion over to see what he knew about a 30-0-6 Springfield. His buddy pointed out the thick coat of Cosmoline on the bolt. Clem cleared the bolt and reassembled the gun. It wasn't lor 'til the same buck came prancing up the trail again. Clem shot hi through the head and killed him. The buck had four points and dressed out at 135 pounds. Clem was located on Cepilla Peak close to the village of Manzano. The next report is on a combination deer-hunt and bull-dogging contest. Walter Clark, SLF-4 went down to the Magdalena Country

SANDIA
WEEKLY BULLETIN

Sandia National Laboratories

Coronado Club

Sandia National Laboratories

Coronado Club

Sandia National Laboratories

Sandia National Labs: History and Impact

Session 2:

Becoming a Multi-Program Laboratory

Osher Lifelong Learning Institute

June 10, 2011

Rebecca Ullrich
Corporate Historian
Sandia National Laboratories

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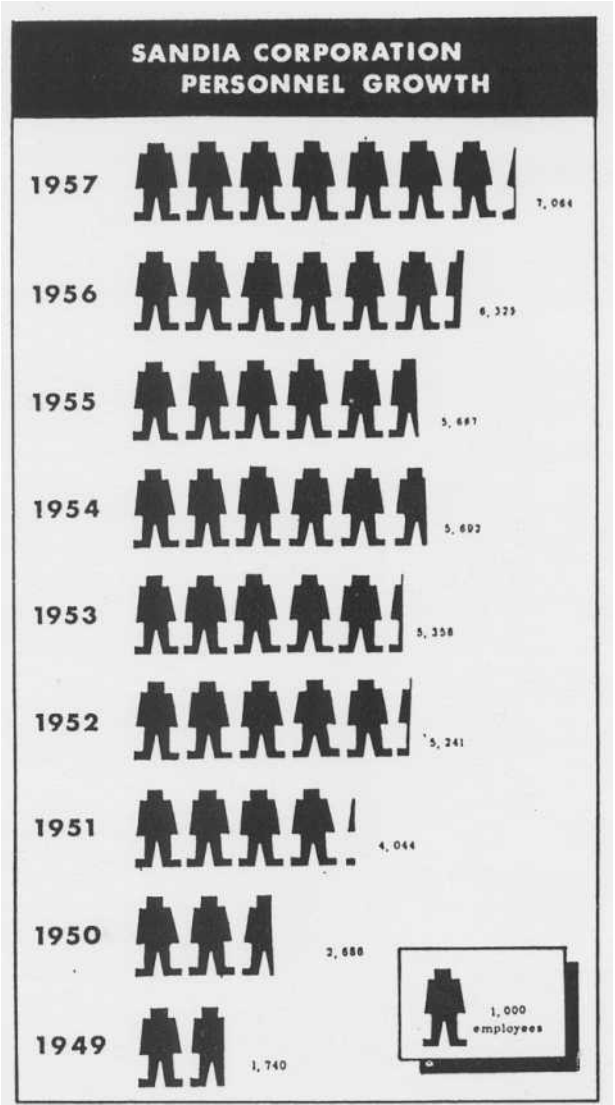
Result of Growth: Sandia



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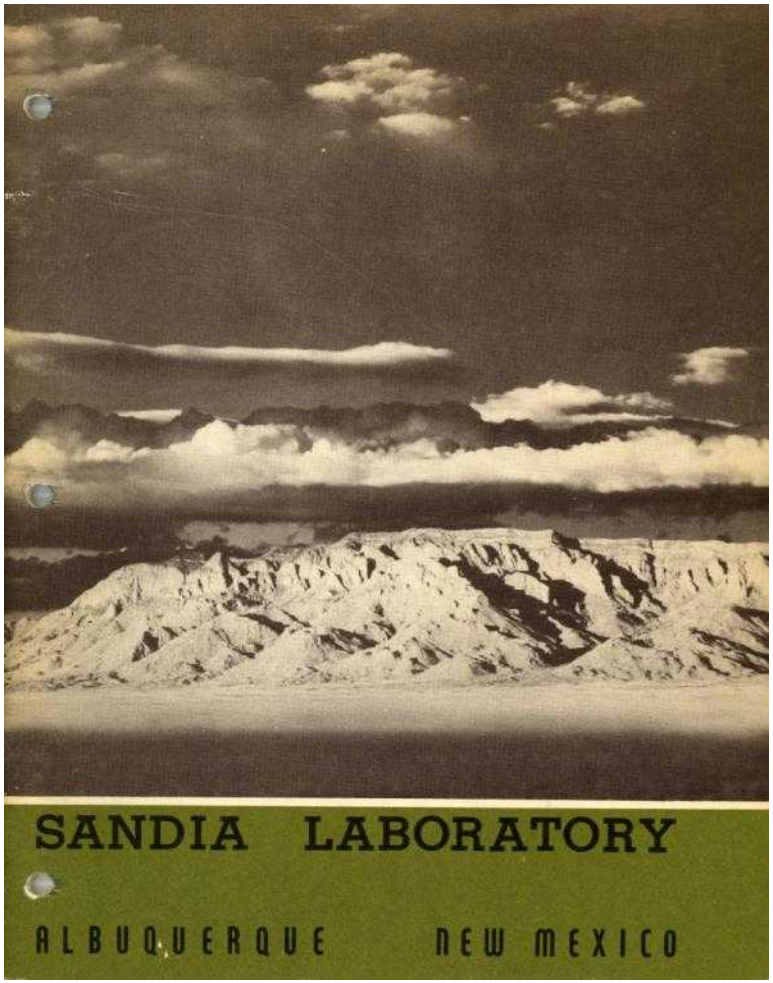
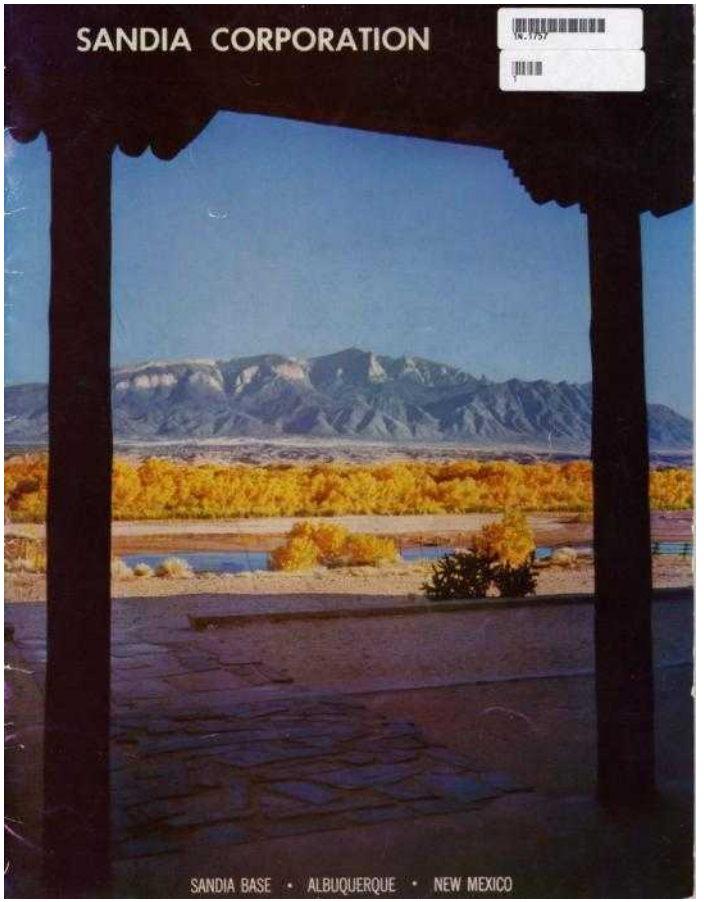
Recruiting Brochures



1950



1955

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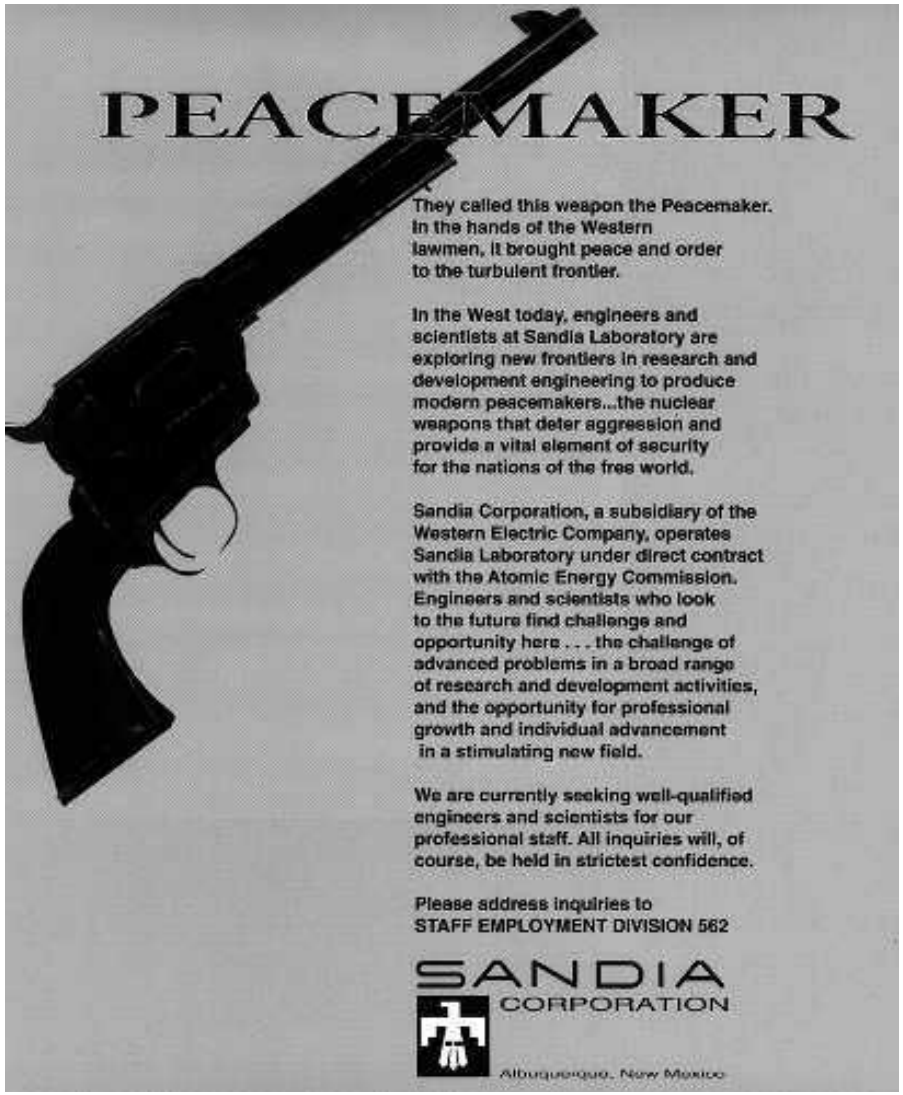
Reflecting Policy and Place (1958)



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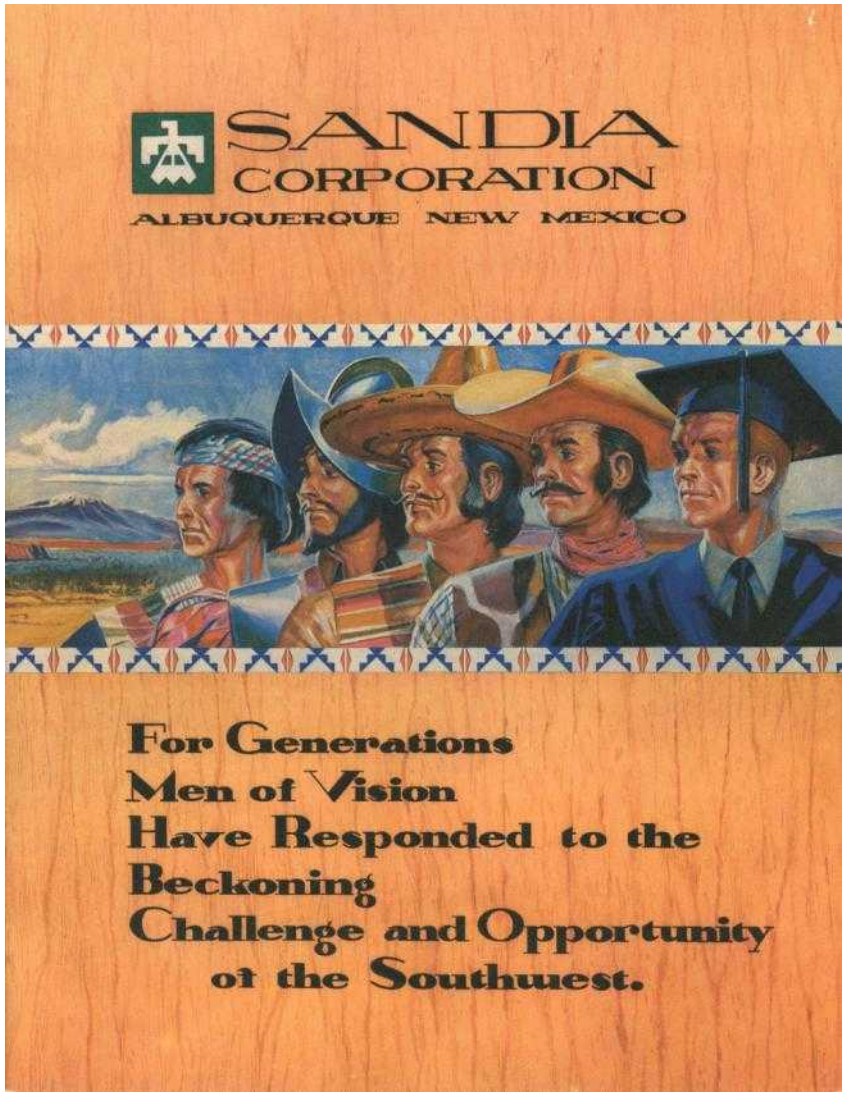
1958 Employee Brochure



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Albuquerque: 1940s

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Key Leadership

Senator Dennis Chavez

"Mayor" Clyde Tingley

Senator Clinton Anderson

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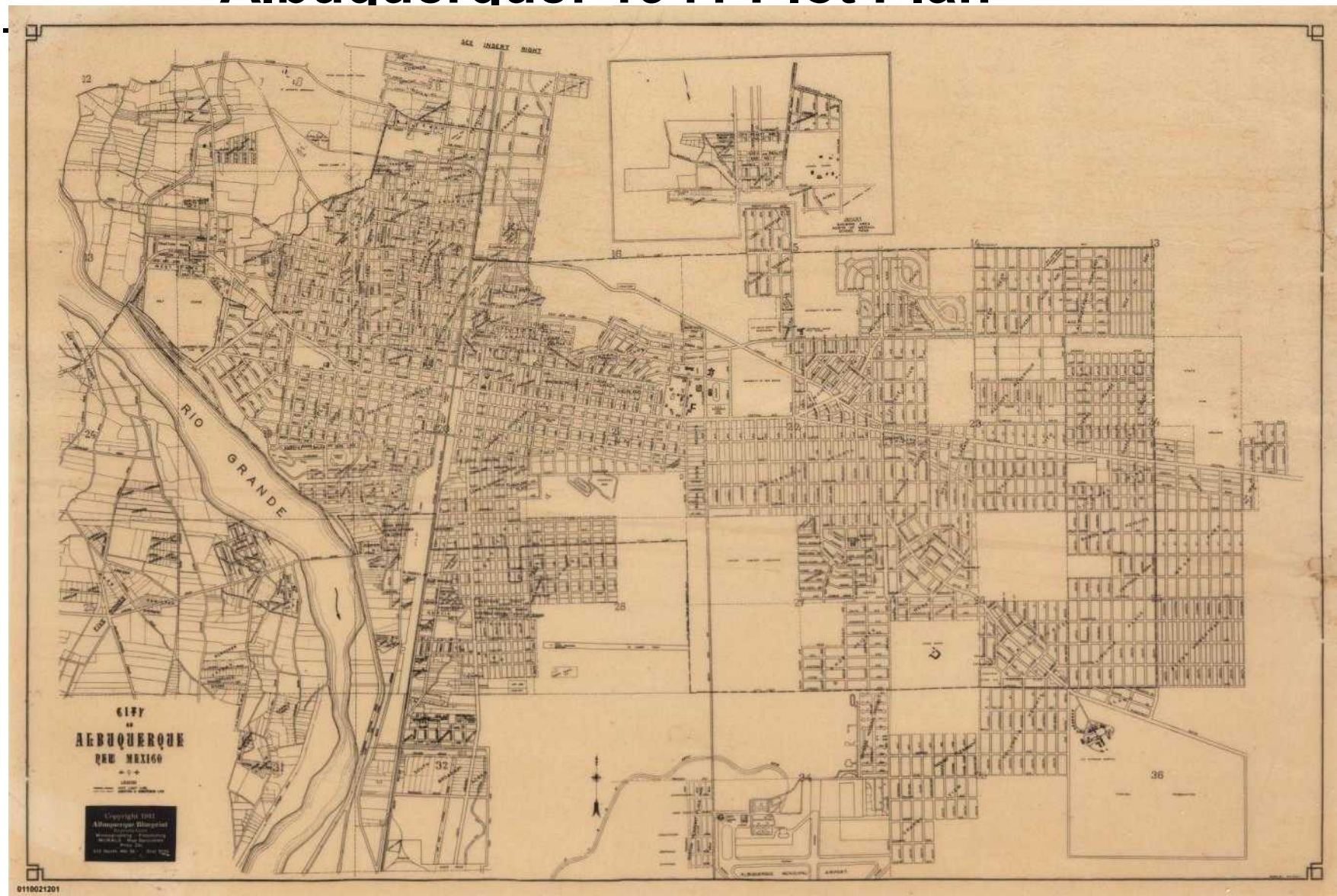
Albuquerque: 1941 Plot Plan



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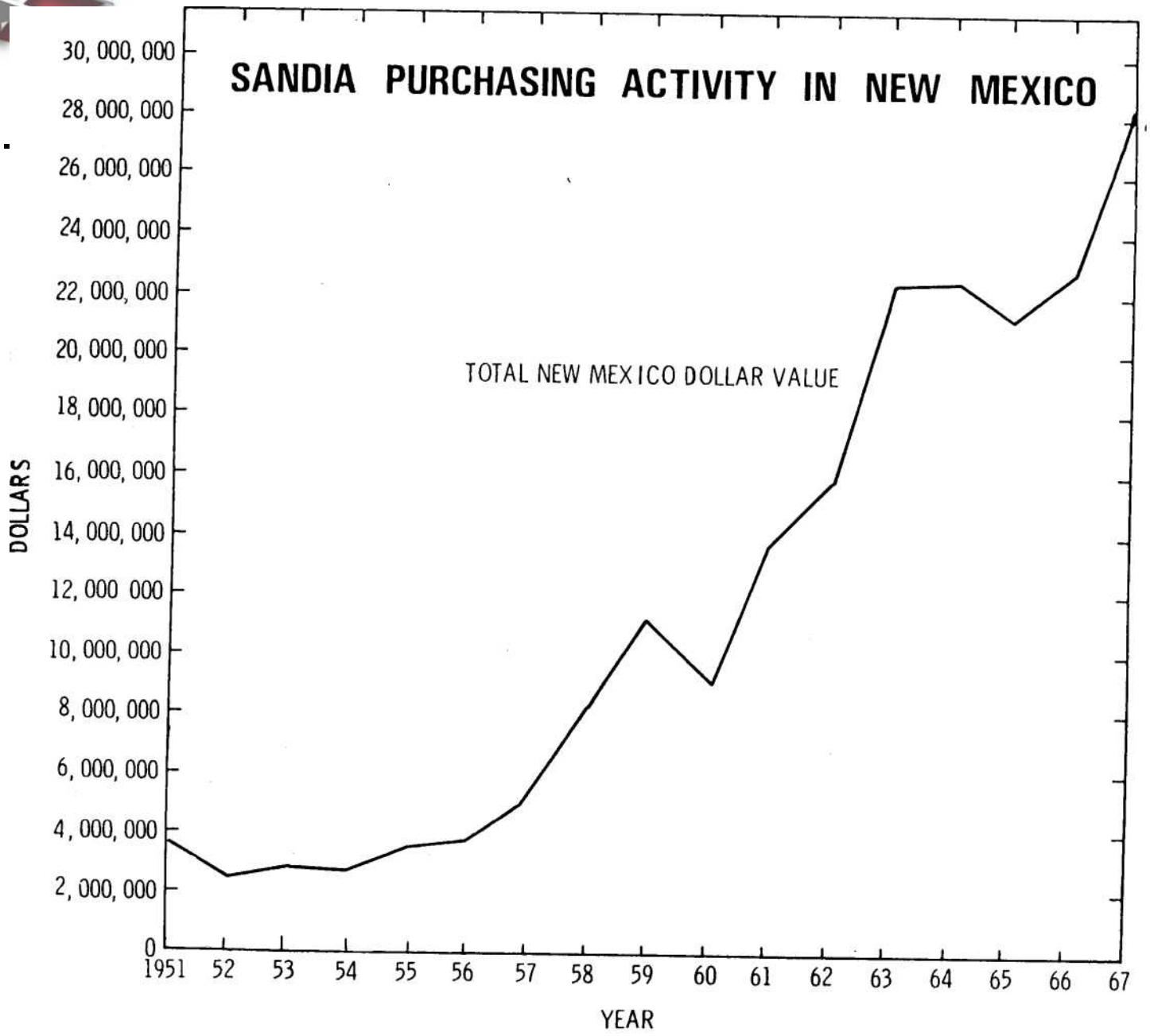
Populations

Year	Albuquerque Population	Bernalillo County Population	Sandia Workforce	Base Workforce
1930	26,570			
1940	35,449	69,391		
1946			100	979
1949			1,740	1,627
1950	96,815	145,673	>2,100	2,723
1954		185,800	>5,600	6,025
1955	150,000	205,500	5,725	5,414
1957			7,064	
1960	201,189	262,199		



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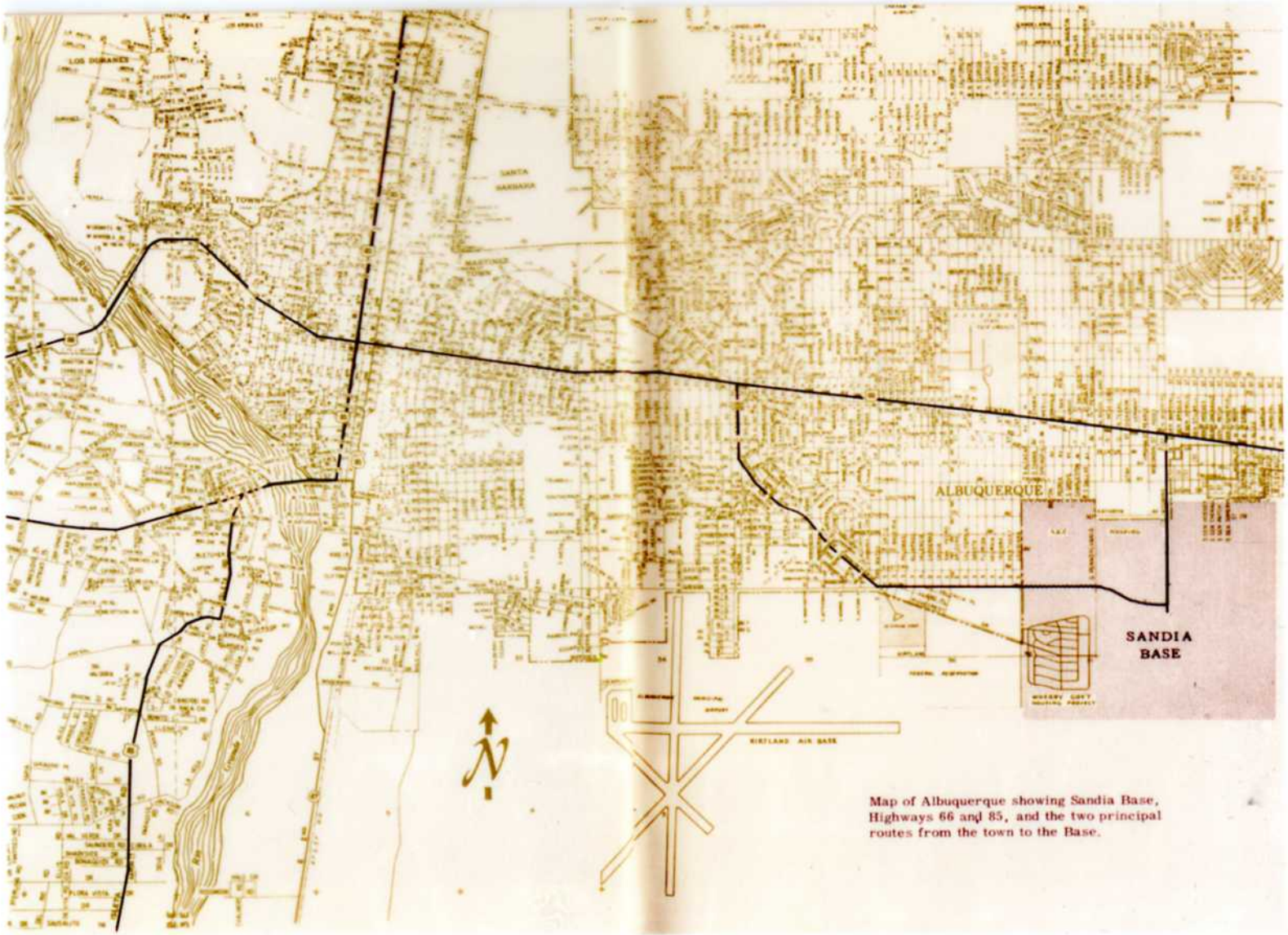
Albuquerque 1952



Map of Albuquerque showing Sandia Base, Highways 66 and 85, and the two principal routes from the town to the Base.

Housing Permits, 1940-1954

Year	Housing Permit $
1940	>2.3 million
1949	20.4 million
1952	>25 million
1954	<37.4 million

Real Estate—Growing north

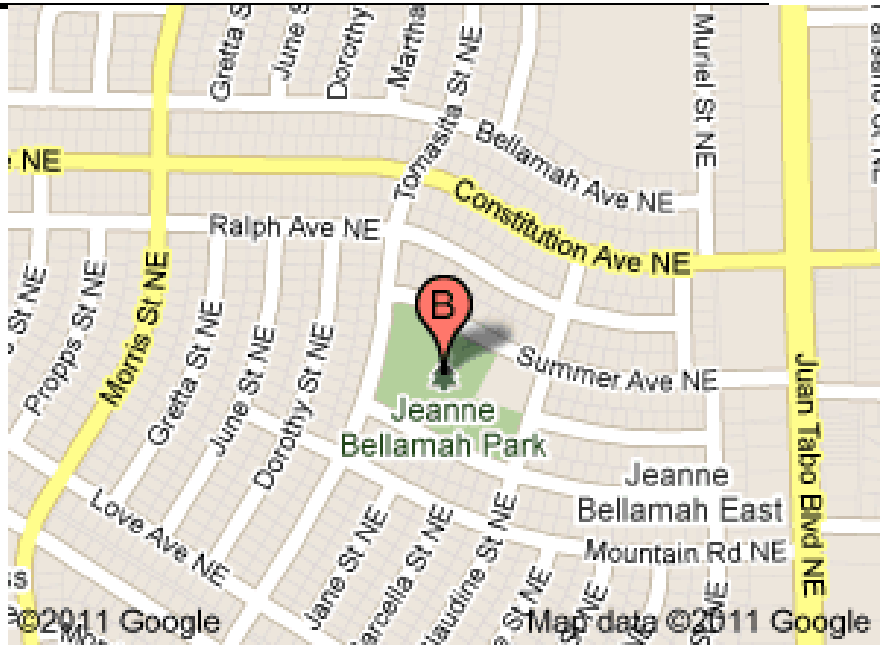
$7500 TOTAL

No closing costs and only $41.00 per month with reasonable down. Sandia employees can knock the high cost out of rent and transportation costs. Phone 5-2023 or 4-1237 and ask for Mr. McIntosh. for full particulars on this home located at 2413 N. Valencia Dr.

CRESCENT REALTORS

5701 E. Central

Neighborhoods—NE Heights



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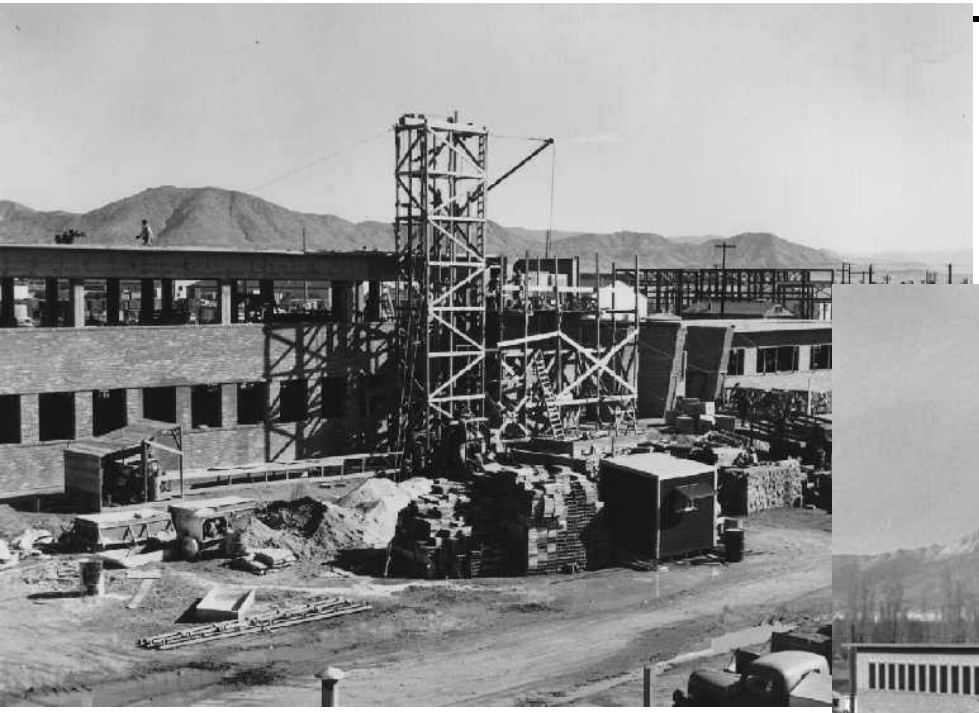
Building 800—Kruger Design



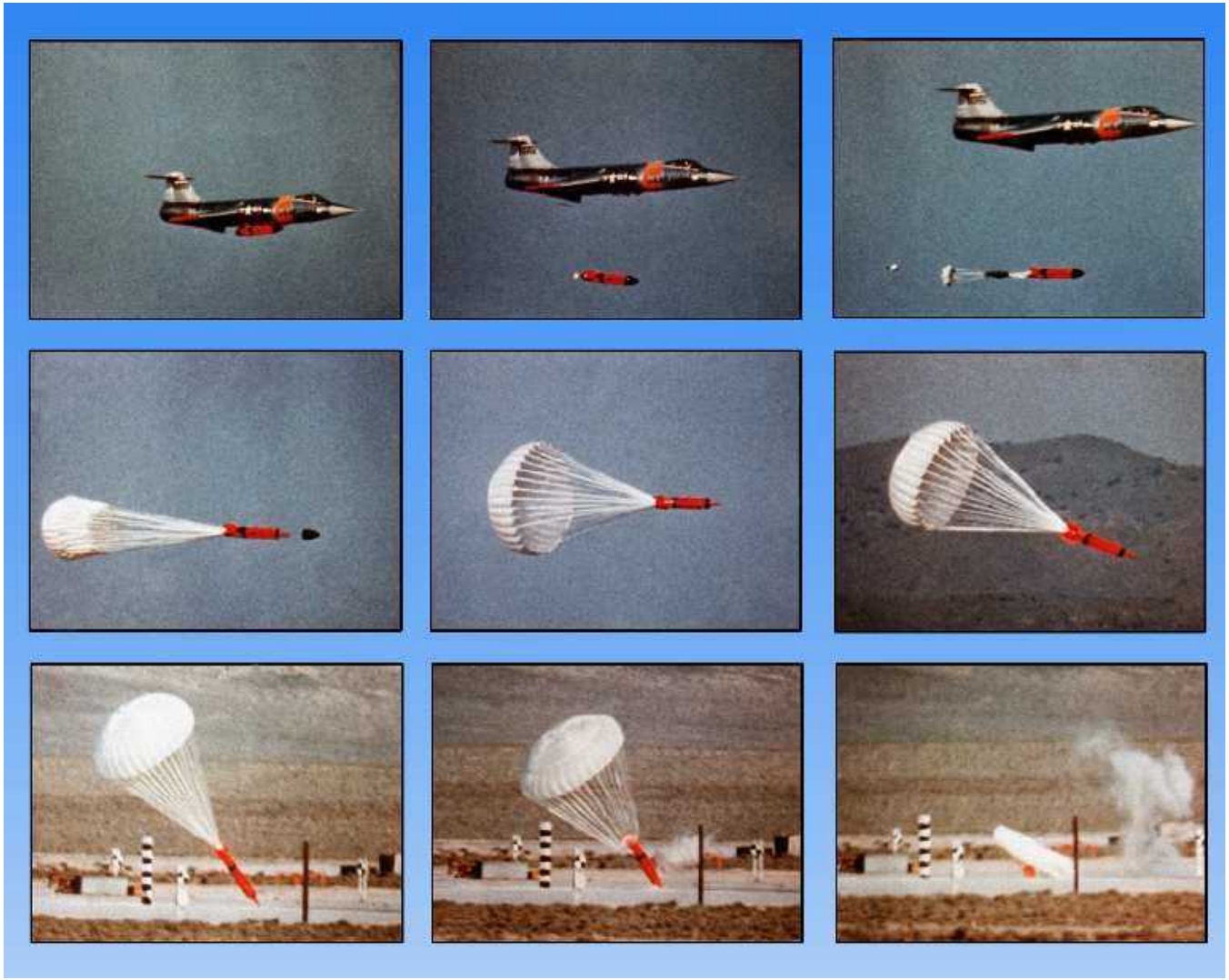
Building 804—Flatow Design

Sandia National Laboratories

Pushing for Variety in Weapons Designs

Sandia National Laboratories

Laydown Weapons

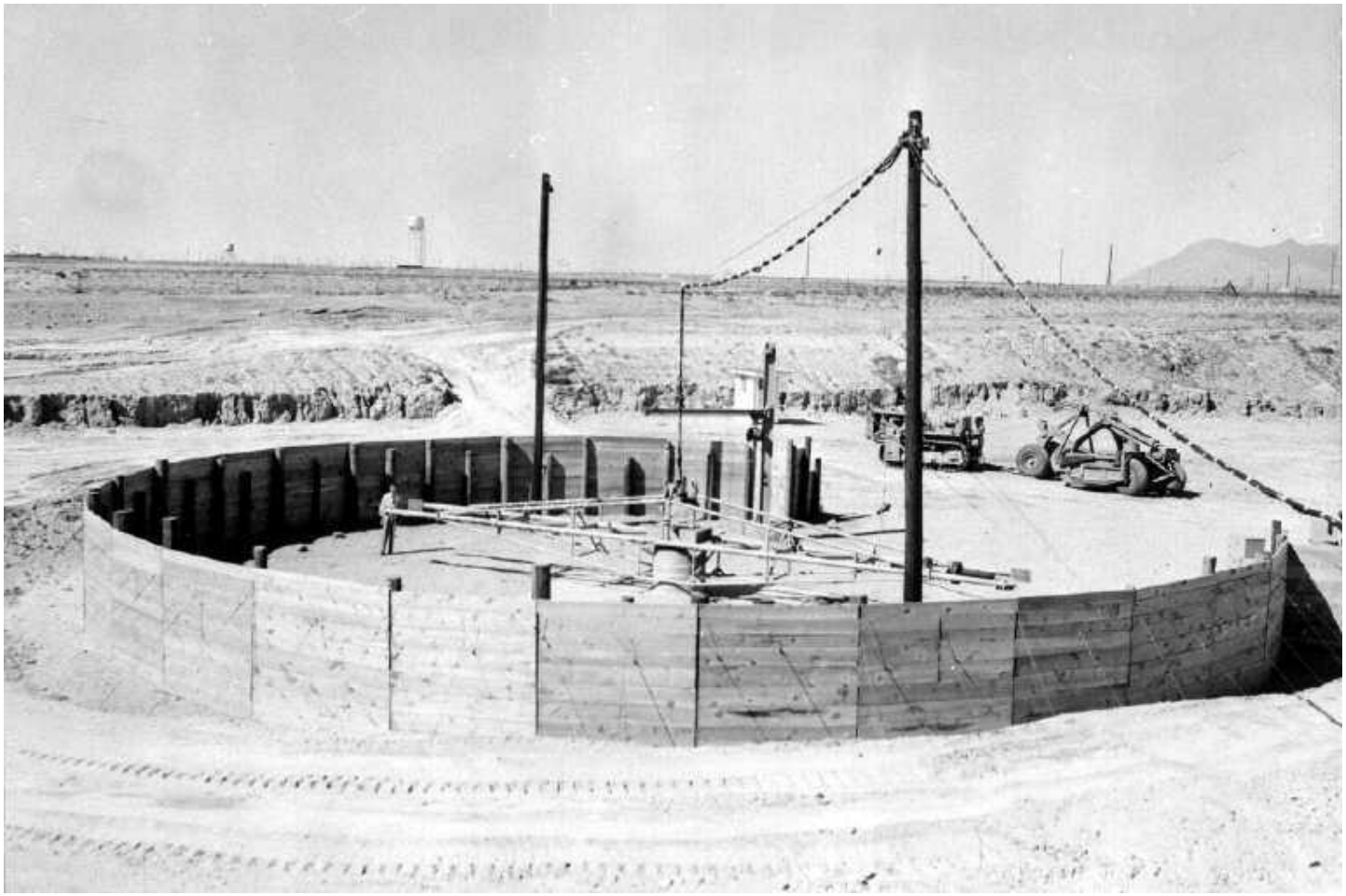


Sandia National Laboratories

Fat Man

Sandia National Laboratories

Environmental Testing



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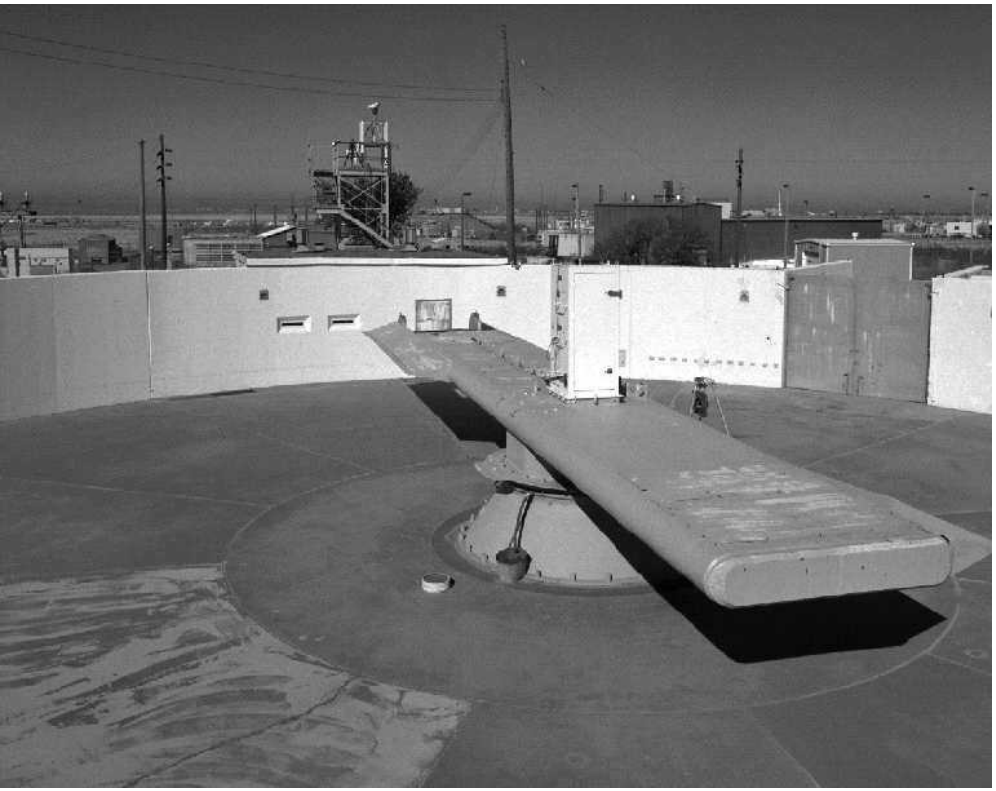
Environmental Testing



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Environmental Testing

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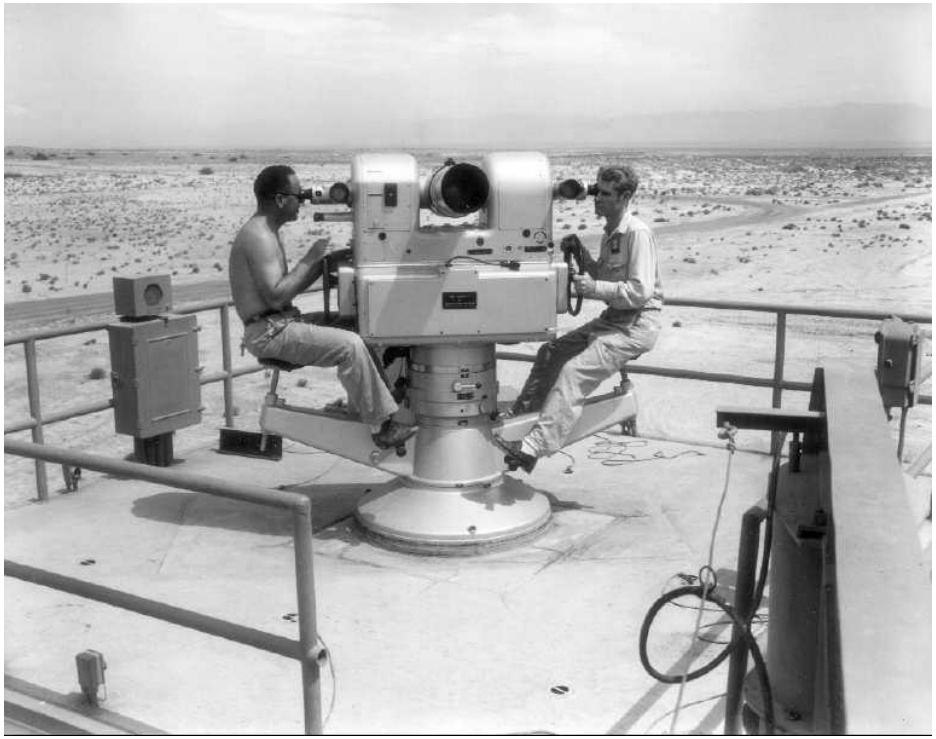
Testing: Salton Sea Test Base



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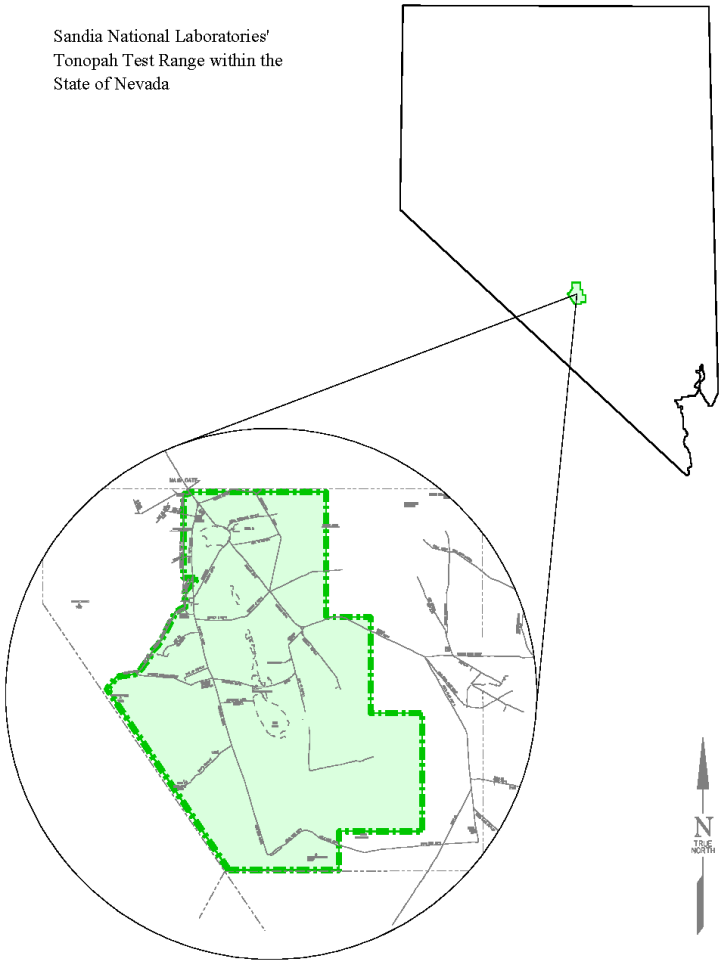
Testing: Tonopah Test Range



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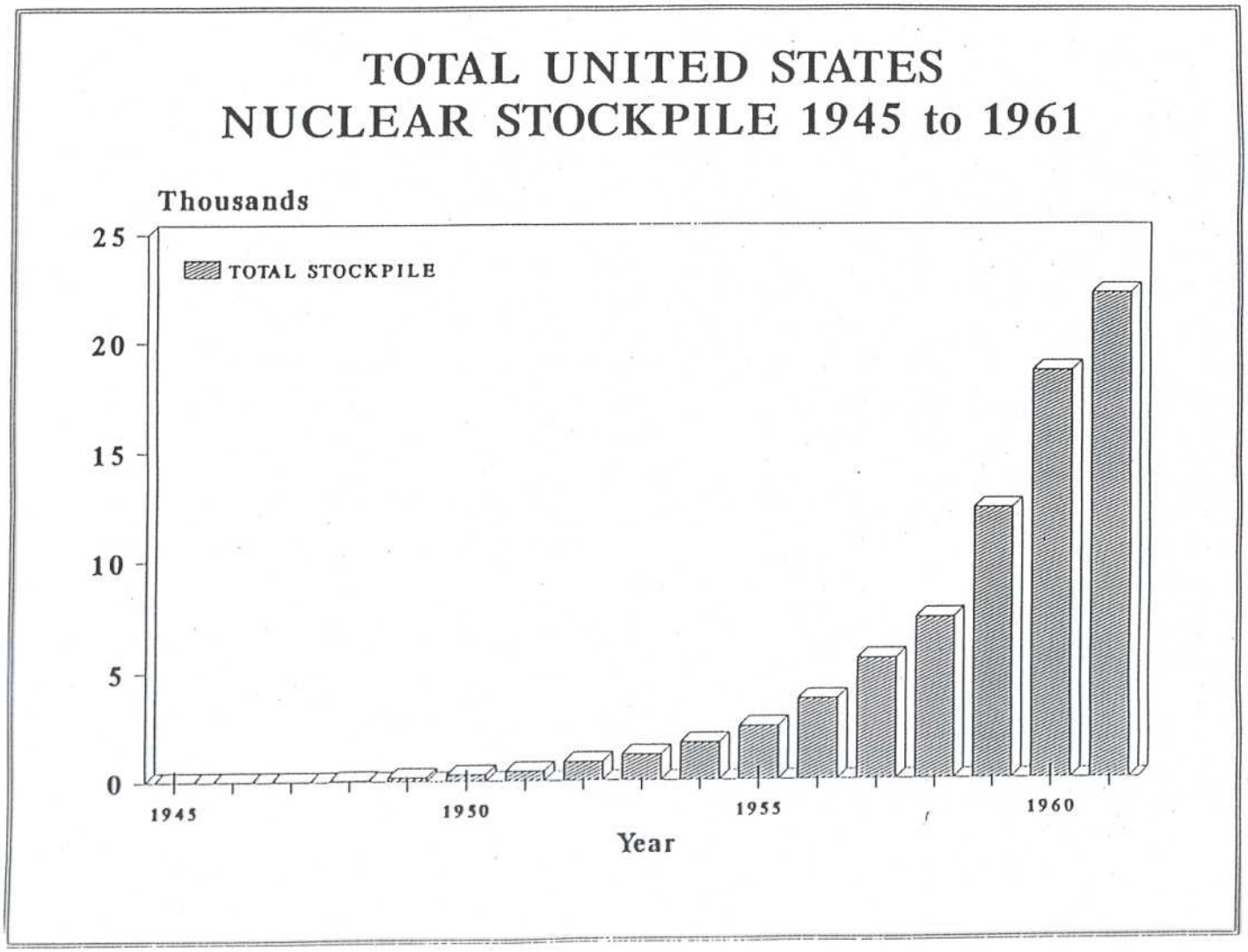
Result of Growth: Complex



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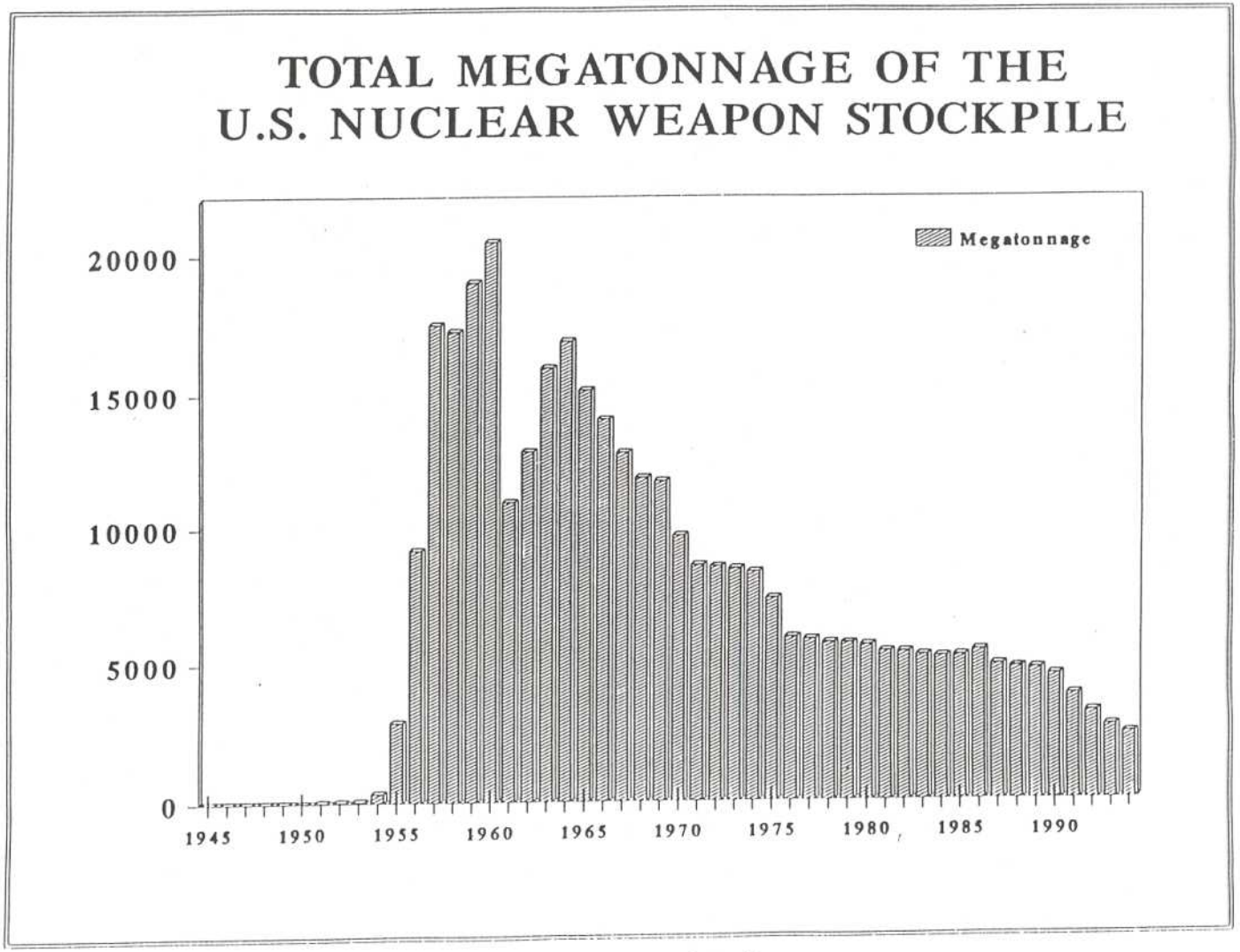

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Adding Research Depth

Glenn Fowler, VP of Research, 1955

R.S. Neiman & Ruth Whan, 1967

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Recruiting Higher Degrees

SANDIA CORPORATION

PhD's

Sandia Corporation is vitally interested in PhD's who are seeking professional growth through full-time research.

Sandia offers exceptional opportunity for the research-oriented PhD in the following fields: Physics, Materials Science, Engineering, Mathematics, Chemistry and Ceramics. A representative example of our research:

Magnetohydrodynamics—Magnetohydrodynamics research is carried out at Sandia working with plasmas having a high electron density but with a low temperature (10^4 to 10^5 K). Such a plasma provides opportunities for a wide variety of studies of the interactions with changing magnetic structures.

Sandia, a prime contractor to the Atomic Energy Commission, is operated as an industrial laboratory with regard to personnel policy and compensation. As a subsidiary of the American Telephone and Telegraph system, the management includes outstanding executives and scientists from the Bell Telephone Laboratories and Western Electric.

Established in 1946, Sandia has grown from 200 employees to more than 7900 and now maintains a branch laboratory in Livermore, California.

Our $120 million laboratory offers the latest in scientific equipment and a technical staff composed of 140 PhD's, 600 MS's, 1750 BS's, plus 1600 technical assistants. Sandia encourages journal publication with strong support available from a technical library specifically designed to aid the research scientist.

Albuquerque, a city of 250,000, is a sunny, dry, Southwestern cultural center with unlimited year-round recreational opportunities.

Send resume to
Sandia Corporation
P. O. Box 5800
Albuquerque, N. Mex.
Attn: Professional Employment, 3151
Reference 569

May
Scientific American
Physics Today
Electrical Engineering
Mechanical Engineering

SANDIA CORPORATION
AN EQUAL OPPORTUNITY EMPLOYER
ALBUQUERQUE, NEW MEXICO
LIVERMORE, CALIFORNIA

SANDIA CORPORATION

PhD's

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High Pressure Physics — Static pressures up to 100,000 atmospheres are being utilized to study basic interactions in solids. Currently the properties of ferroelectrics, such as single crystal barium titanate, are being studied as a function of pressure, with the aim of an understanding of the physical basis of ferroelectricity. Similarly, recent studies on ferromagnetic materials should give a greater knowledge of the fundamental exchange interactions in magnetic solids. Basic information is also being provided by studies of the effects of pressure on the electrical conductivity in semiconductors and other solids.

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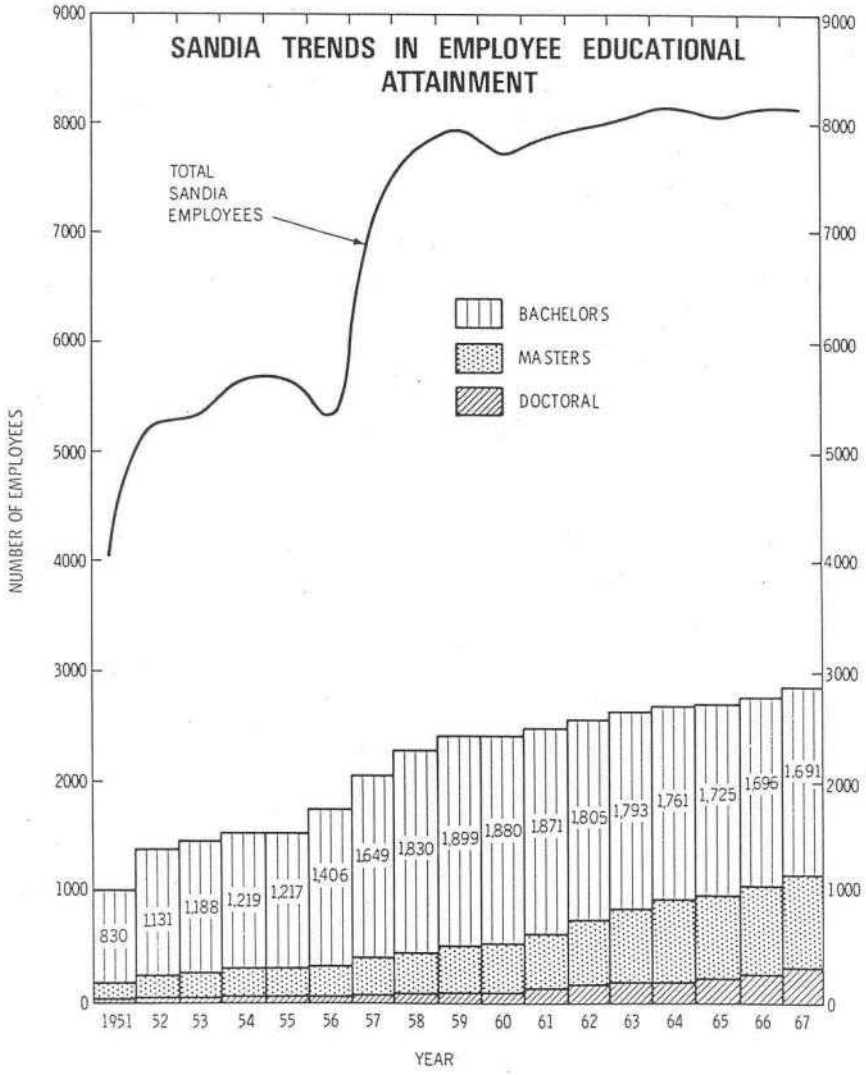
AN EQUAL OPPORTUNITY EMPLOYER
ALBUQUERQUE, NEW MEXICO
LIVERMORE, CALIFORNIA

Sandia National Laboratories

Educational Attainment



Sandia National Laboratories

Sandia National Labs: History and Impact

Session 3:

End of the Cold War and a Post-Cold War Identity

Osher Lifelong Learning Institute

June 17, 2011

Rebecca Ullrich
Corporate Historian
Sandia National Laboratories

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Sandia in Livermore

Sandia National Laboratories

Sandians in the Community: Employee Contribution Plan

Sandia National Laboratories

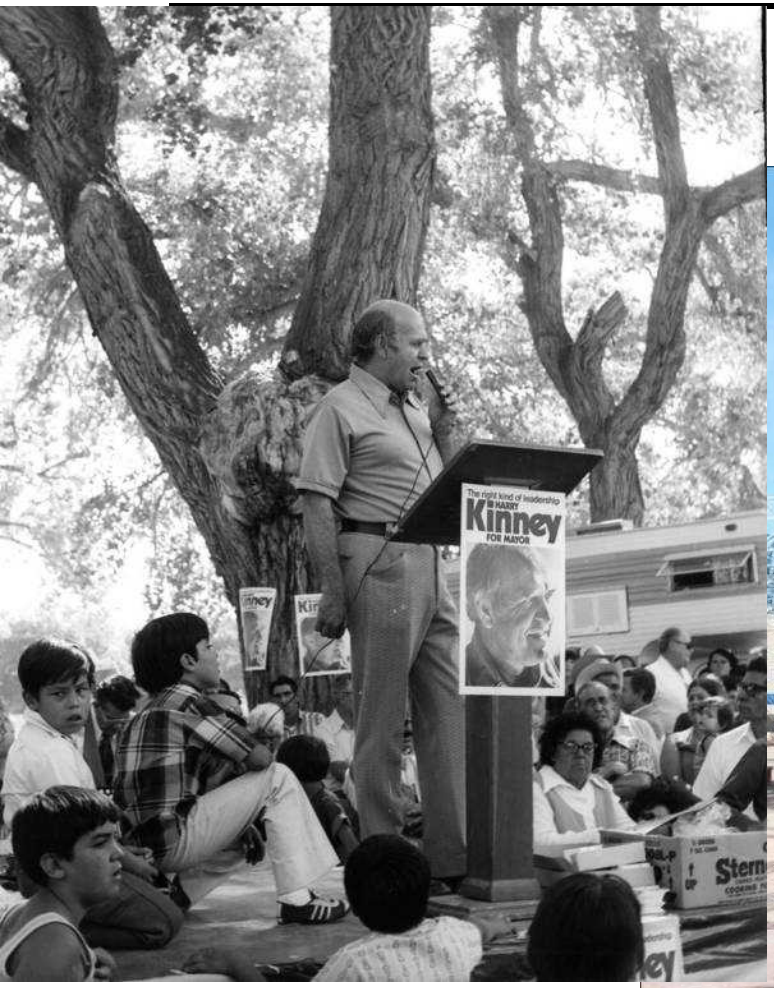
Sandians in the Community: Museums and Politics

Groundbreaking at Albuquerque Museum
(Dick Bice and Harry Kinney)
1977

Ray Powell and Bruce King
1985

Sandia National Laboratories

Sandians in the Community: Participating in Political Activities



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Fallout Shelters: Planning and Advice

Sandia National Laboratories

Kauai Test Facility

Sandia National Laboratories

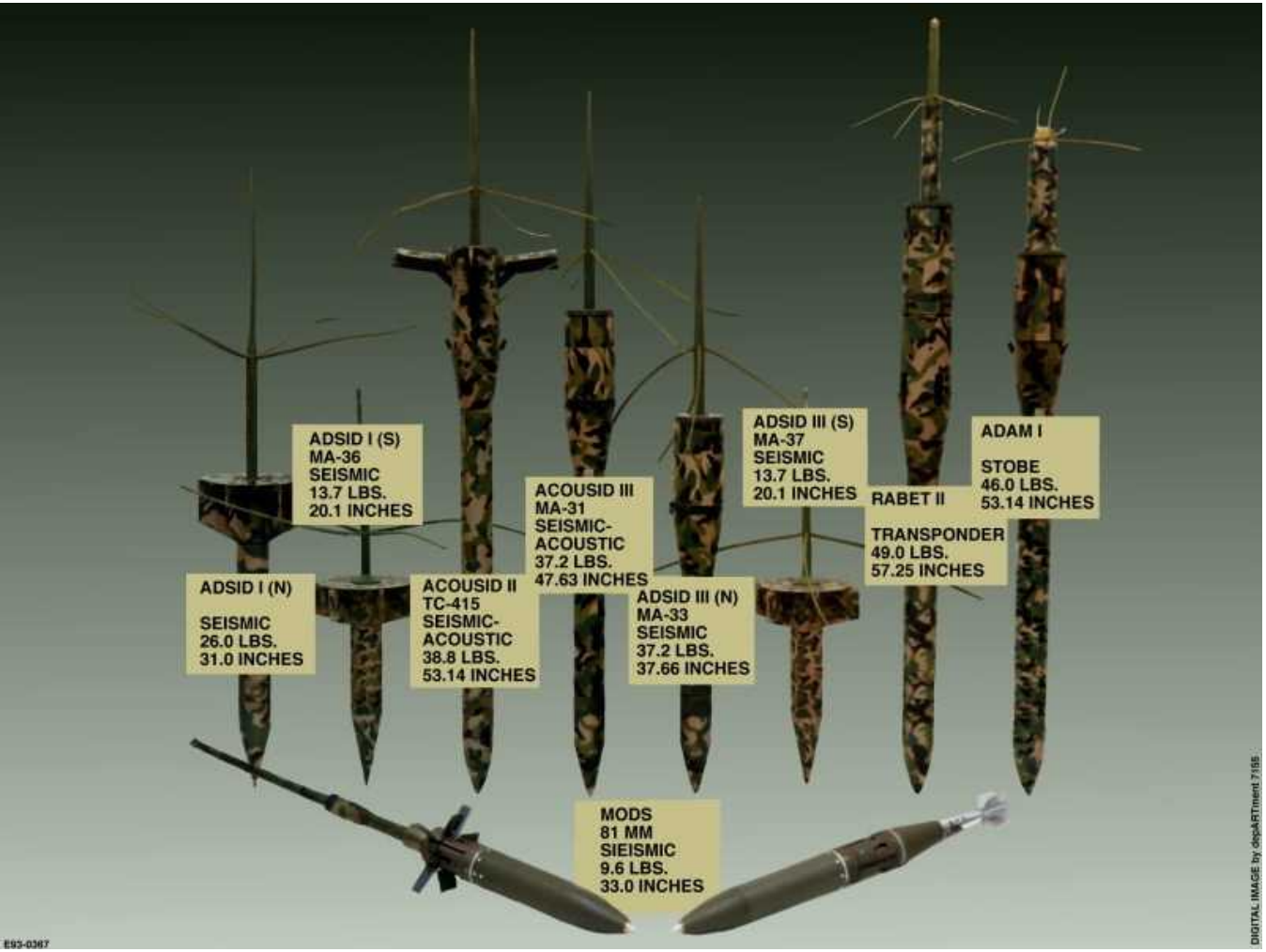
Spin-offs: Plowshare

Sandia National Laboratories

Spin-offs: Vela and Clean Room

Sandia National Laboratories

Spin-offs to Multiprogram: Sensors



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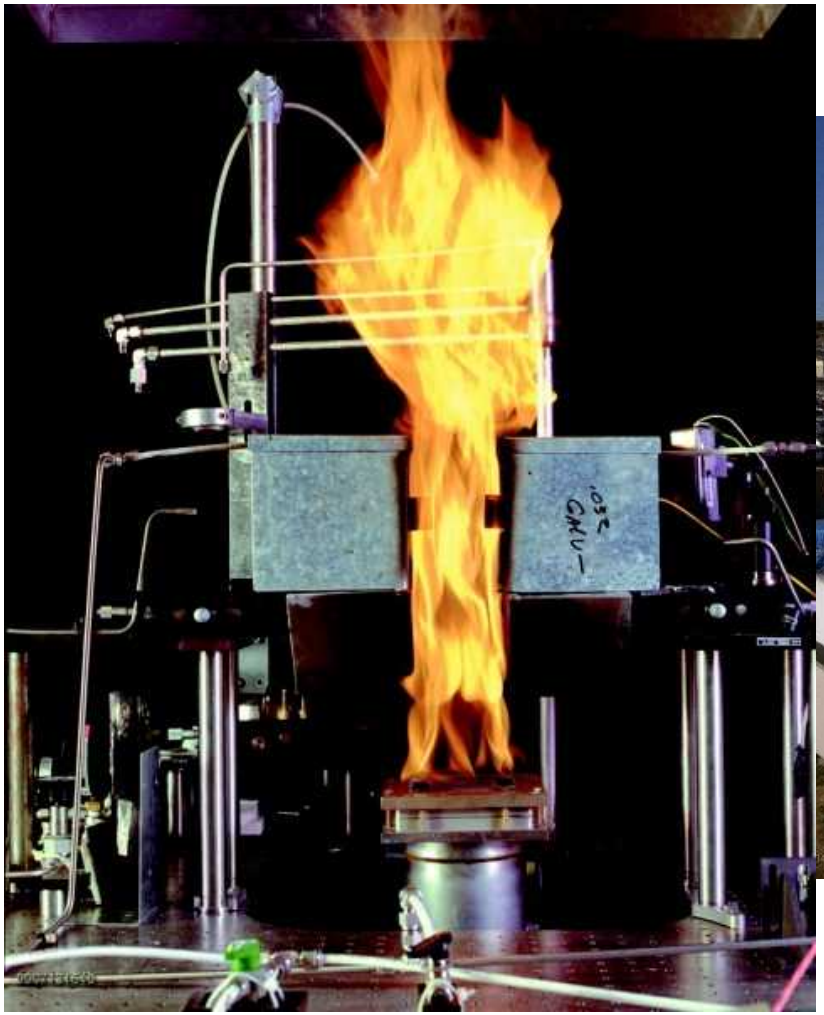
Diversification: Alternative Energy

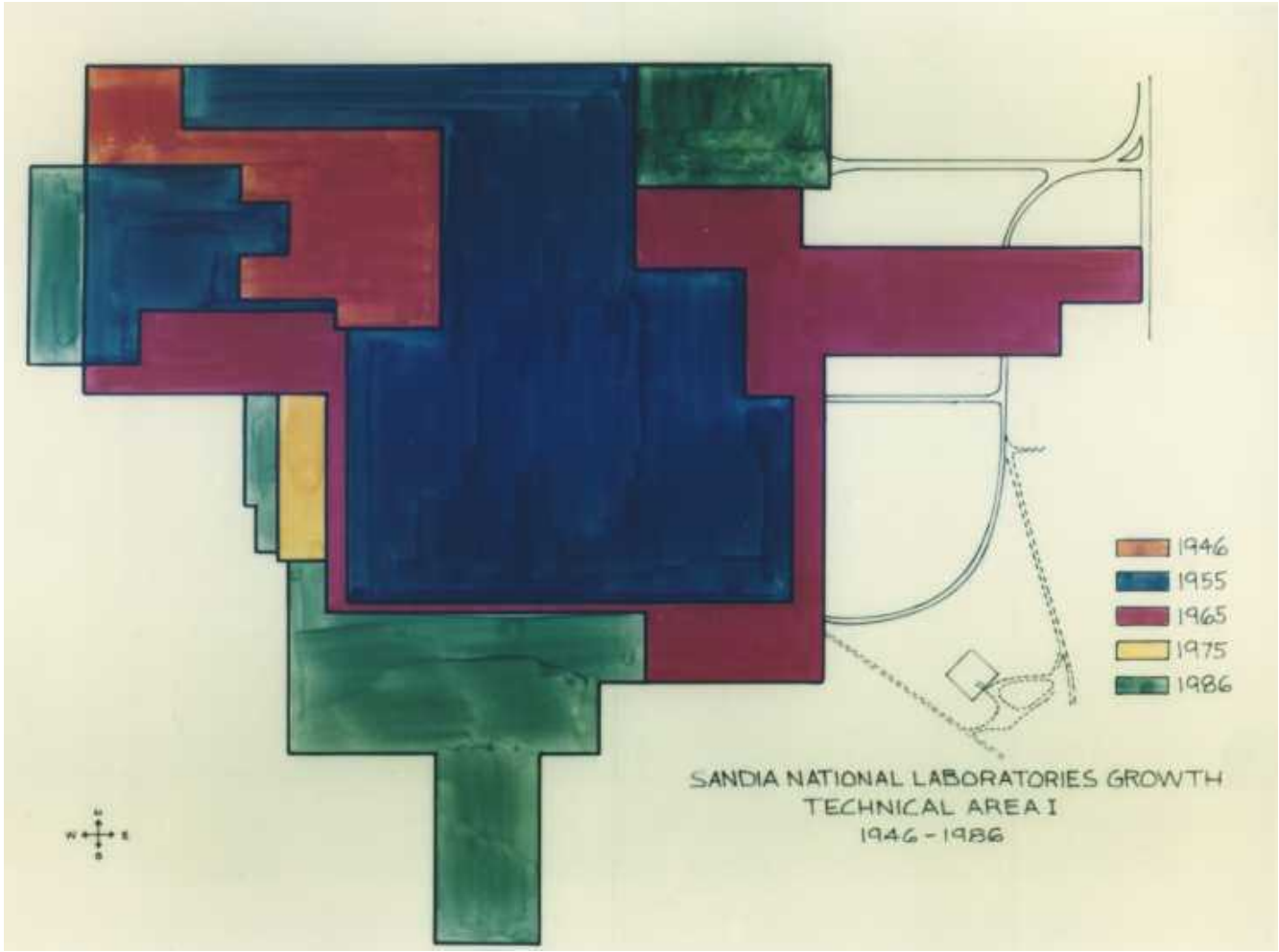
Sandia National Laboratories

Diversification: User Facilities



Sandia National Laboratories

Growth



Sandia National Laboratories

Post-Cold War Sandia

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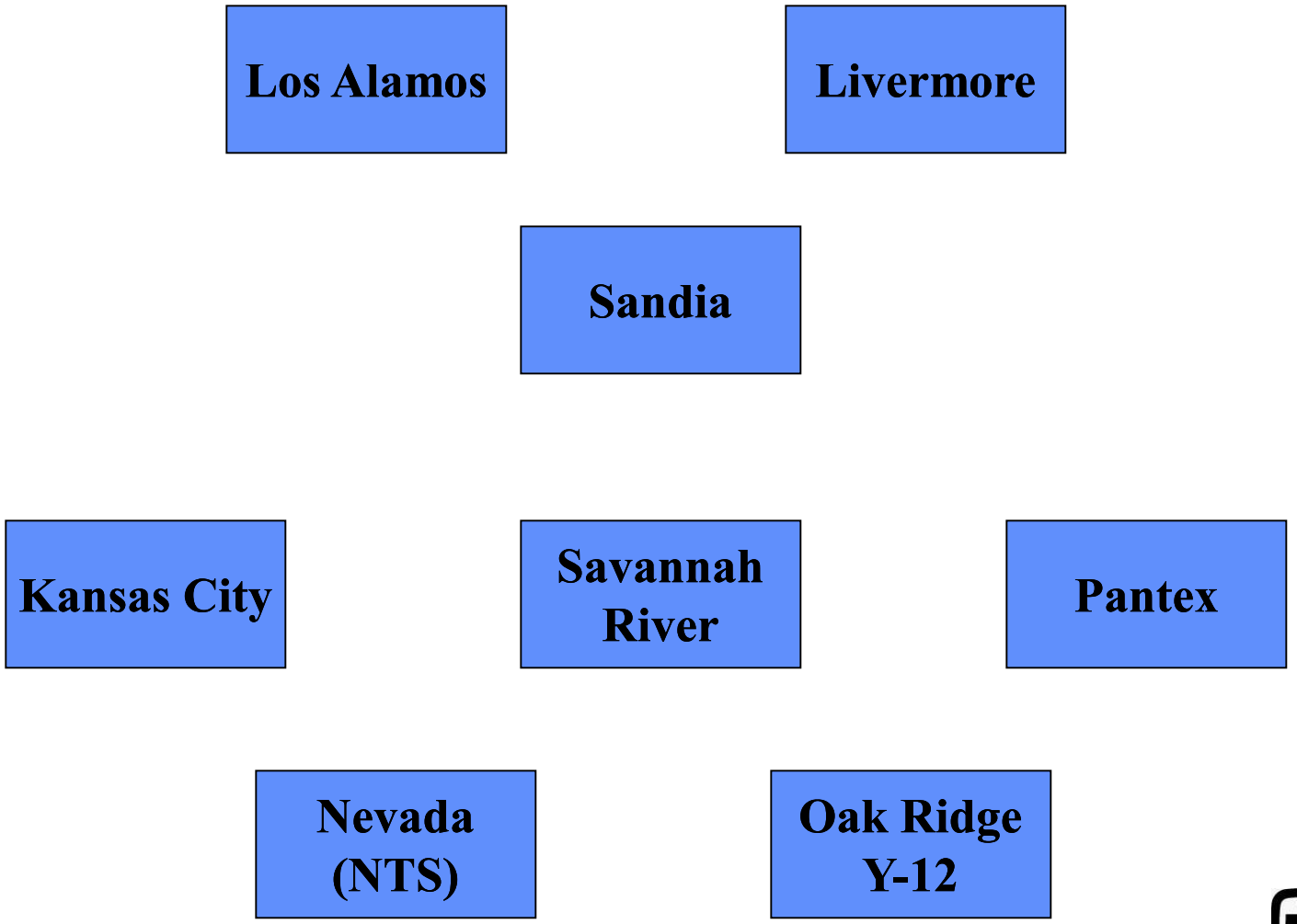
The Nuclear Weapons Complex
1995



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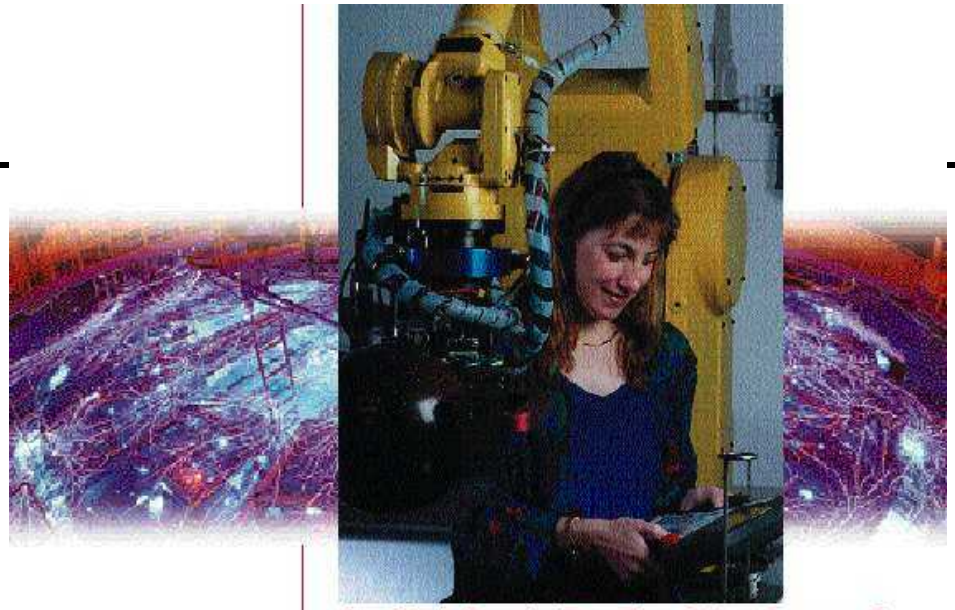

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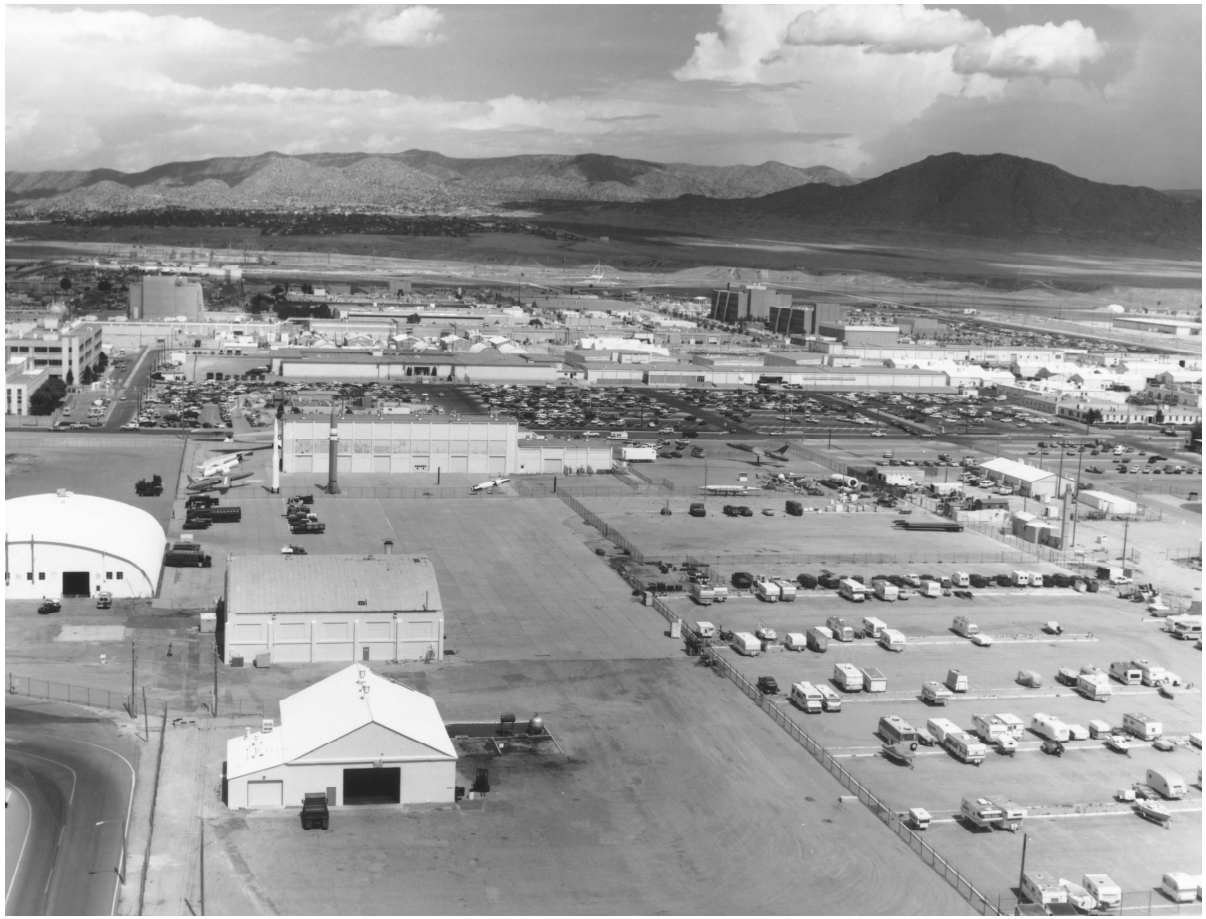
Changing Space
Oxnard Field: 1928-2001



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Changing Demographics: Women in the Workforce: 1950-2010

Year	Sandia On-Roll Total	% Female	% of US Workforce that is Female
1950	2289	20	30
1965	8067	19	
1970	7581	18	
1990			45
2000	7620	30	
2005		31	
2010	8200	32	47

In 2009, at Sandia

- 32% of Sandia employees were women
- 19% of the technical staff were women
- 14% of the PhDs were held by women
- about 1/3 of first line management positions were held by women
- about 1/3 of executive management positions were held by women

In 2009, in the U.S.

- 47% of the workforce was female
- 47% of the jobs in the life, physical and social sciences were held by women
- 30% of chemists were women
- 37% of the physical scientists were women

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Impact
Science Indicators: R&D as GSP in NM

Indicators	Year	State NM	US Average	Note
Financial Research and Development Inputs				
R&D as Share of Gross Domestic Product	2007	7.53	2.62	NOTES: R&D includes R&D performed by federal agencies, business, universities, other nonprofit organizations, and state agencies. R&D and GDP reported in current dollars. For explanation of EPSCoR and non-EPSCoR averages, see chapter introduction.
	2002	8.93	2.46	
	1998	6.6	2.47	
	1995	7.81	2.42	
	1991	8.39	2.72	
Source: SEI 2010 State Data Tool http://www.nsf.gov/statistics/seind10/c8/c8s7.htm And Science Indicators, 2007.				