About Eastman:
An Engineer's View of History

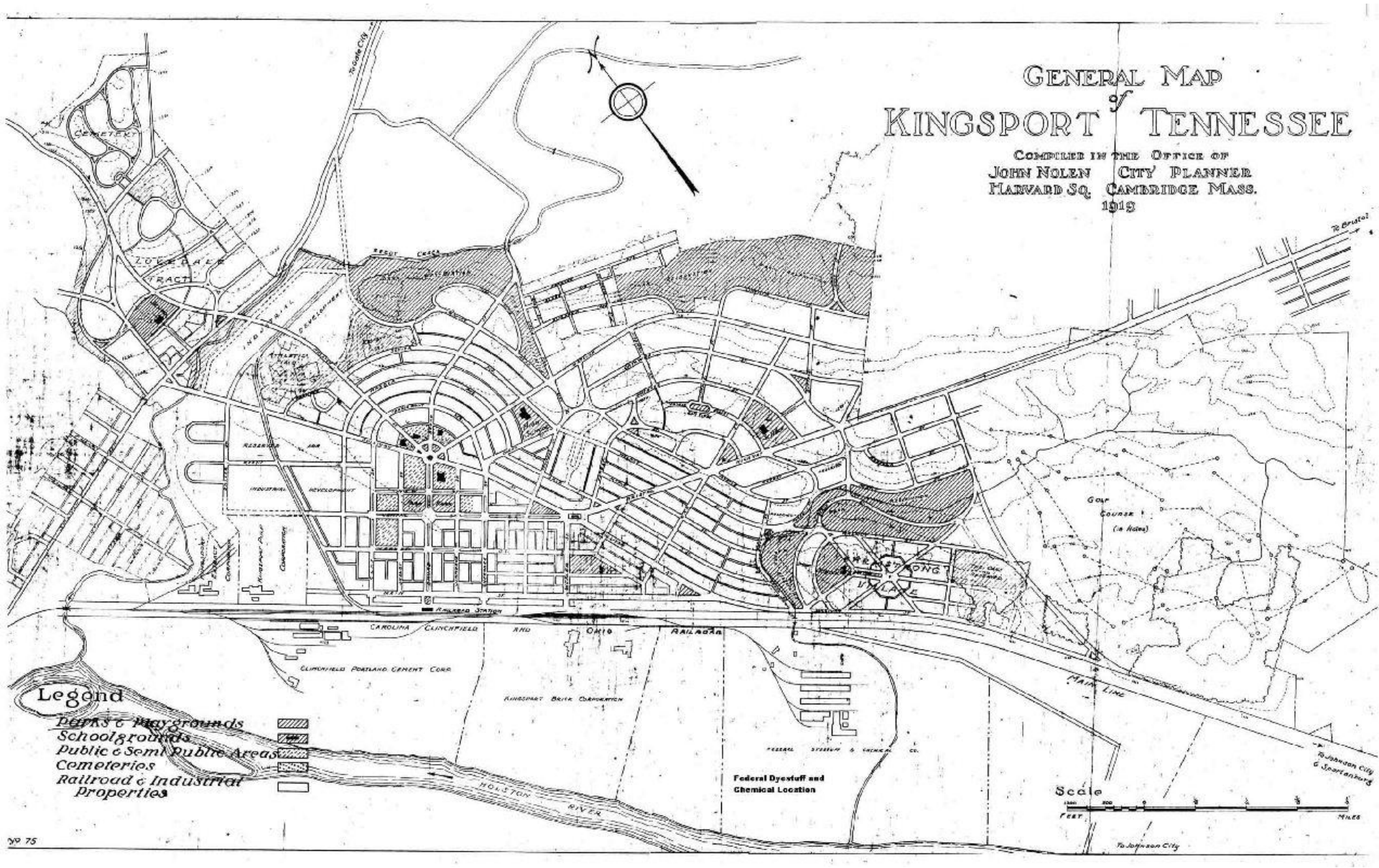
Tim Nolen, Engineering Leader and Fellow

July 2012

Eastman History Resources

- Eastman History Exhibit – B-310
- Utilities History Exhibit – B-469
- Eastman History Videos (3 on streaming media)
- Eastman Timeline (online)
- Eastman History Book: “Years of Glory. Times of Change” (1990s vintage)

Kingsport had a vision to become an industrial town.



Kodak Needed Materials

- World War I interrupted commerce and George Eastman was determined to secure his supply.
- Kingsport had a wood distillation plant, a willing spirit, and a new railroad.

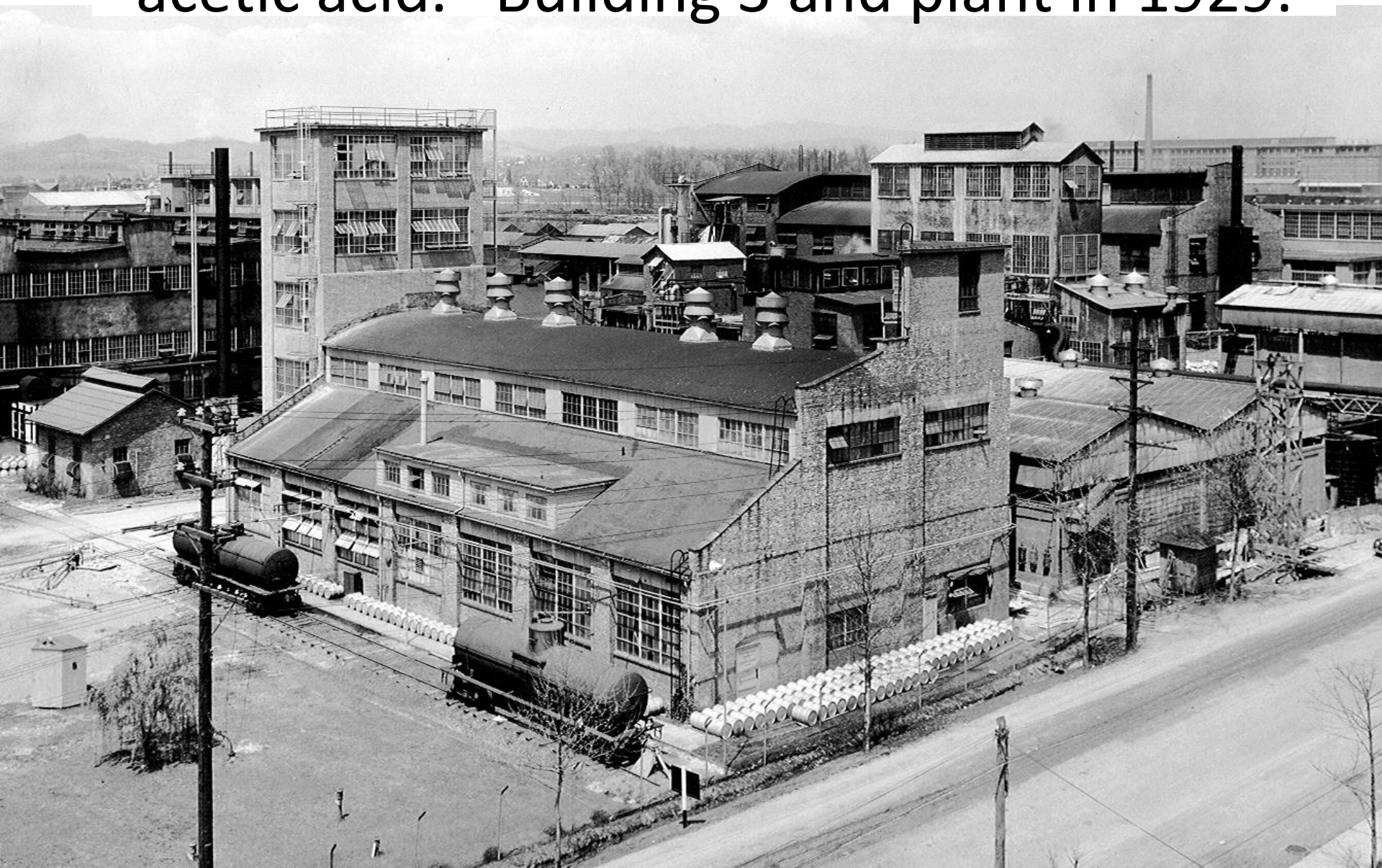
Kodak needed and we delivered

- Methanol
- Cellulose acetate (safety film)
- Hydroquinone
- PET
- Photographic chemicals

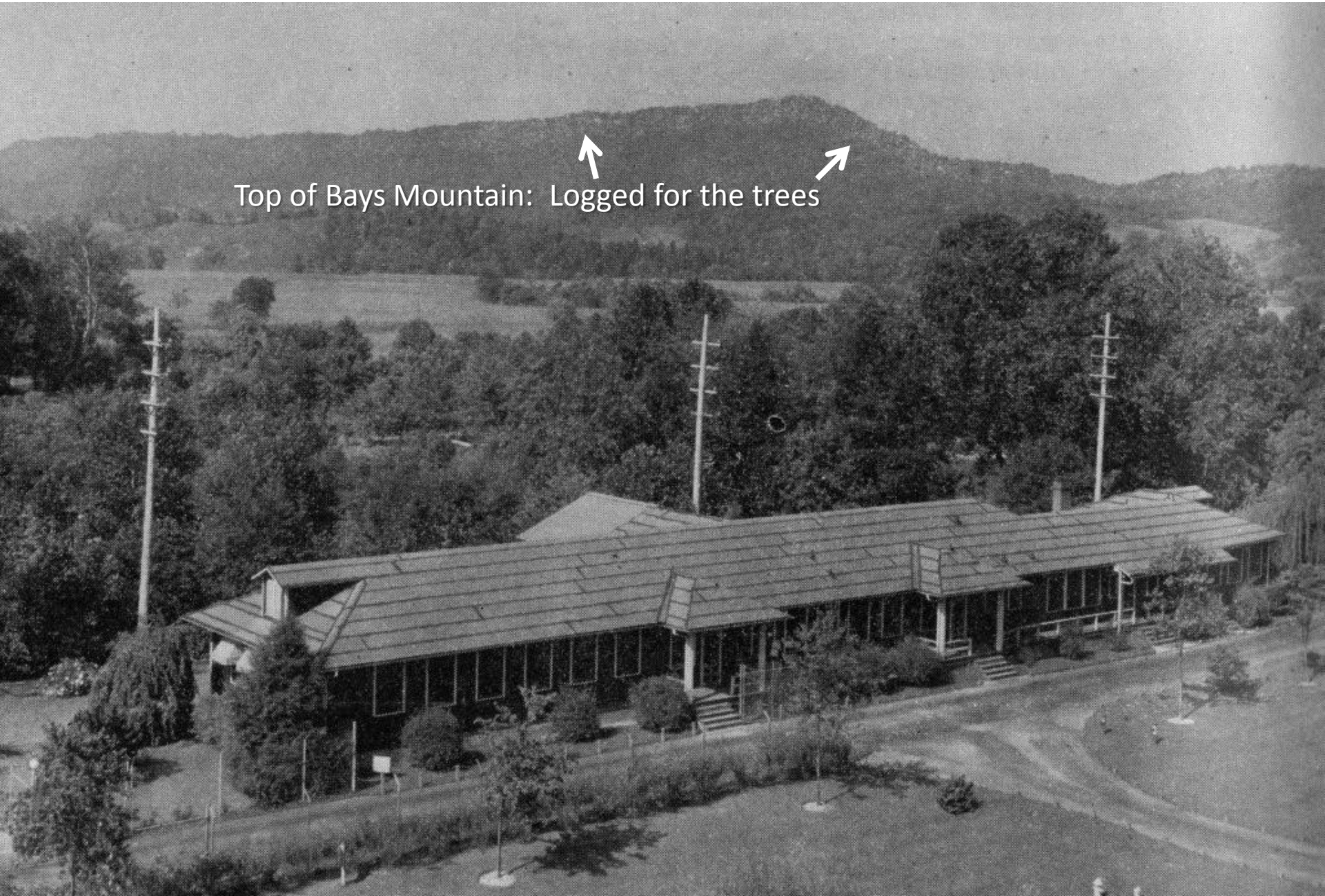
Eastman Chemical's True Founding Father: Perley Wilcox

Perley S. Wilcox (1874–1953) *was referred to as the "father" of Tennessee Eastman Corporation or, more commonly, as "Uncle Perley" by many people in Kingsport. Wilcox was elected a director and appointed general manager of the newly formed TEC in 1920. Joining Eastman Kodak Company in 1898, Wilcox served in various executive positions over the years. In 1945, he became chairman of the Kodak board. As James C. White said, " . . . it was only because of the great ability, the hard work, and especially the great determination of Perley S. Wilcox that we weathered the very substantial monetary losses that were experienced during our first 15 years of operation. It is a historical fact that except for Mr. Wilcox and the support he received from Frank W. Lovejoy at Rochester there would be no Eastman operation in Kingsport today."*

Wood Distillation provided methanol and acetic acid. Building 3 and plant in 1929.



Building 1: Administration

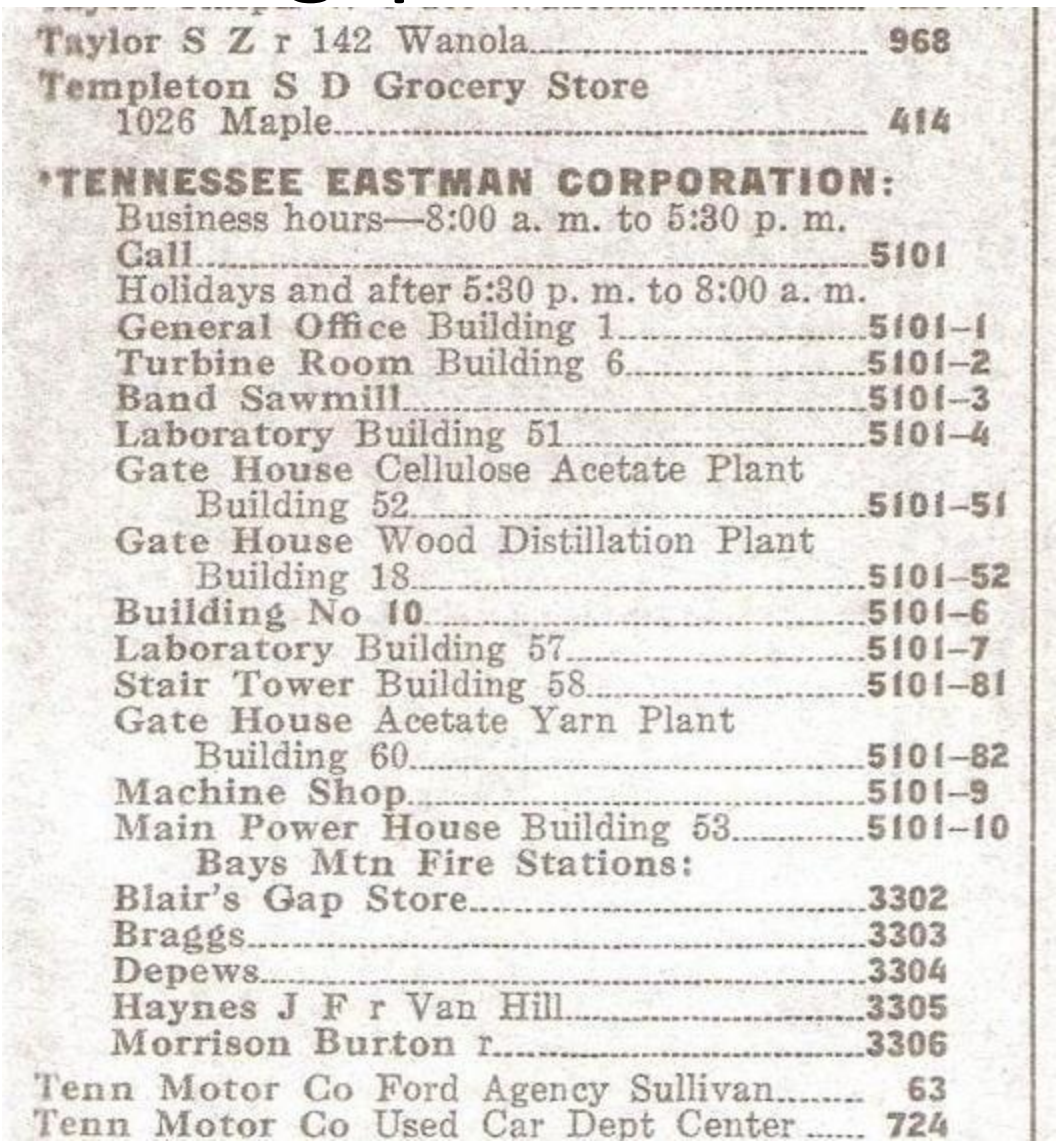


Sawmill devours ever more

From the TNO Utilities Division Archives

Adaptation: Cellulose acetate for textile fibers, not just safety film

1933 Kingsport Phone Book

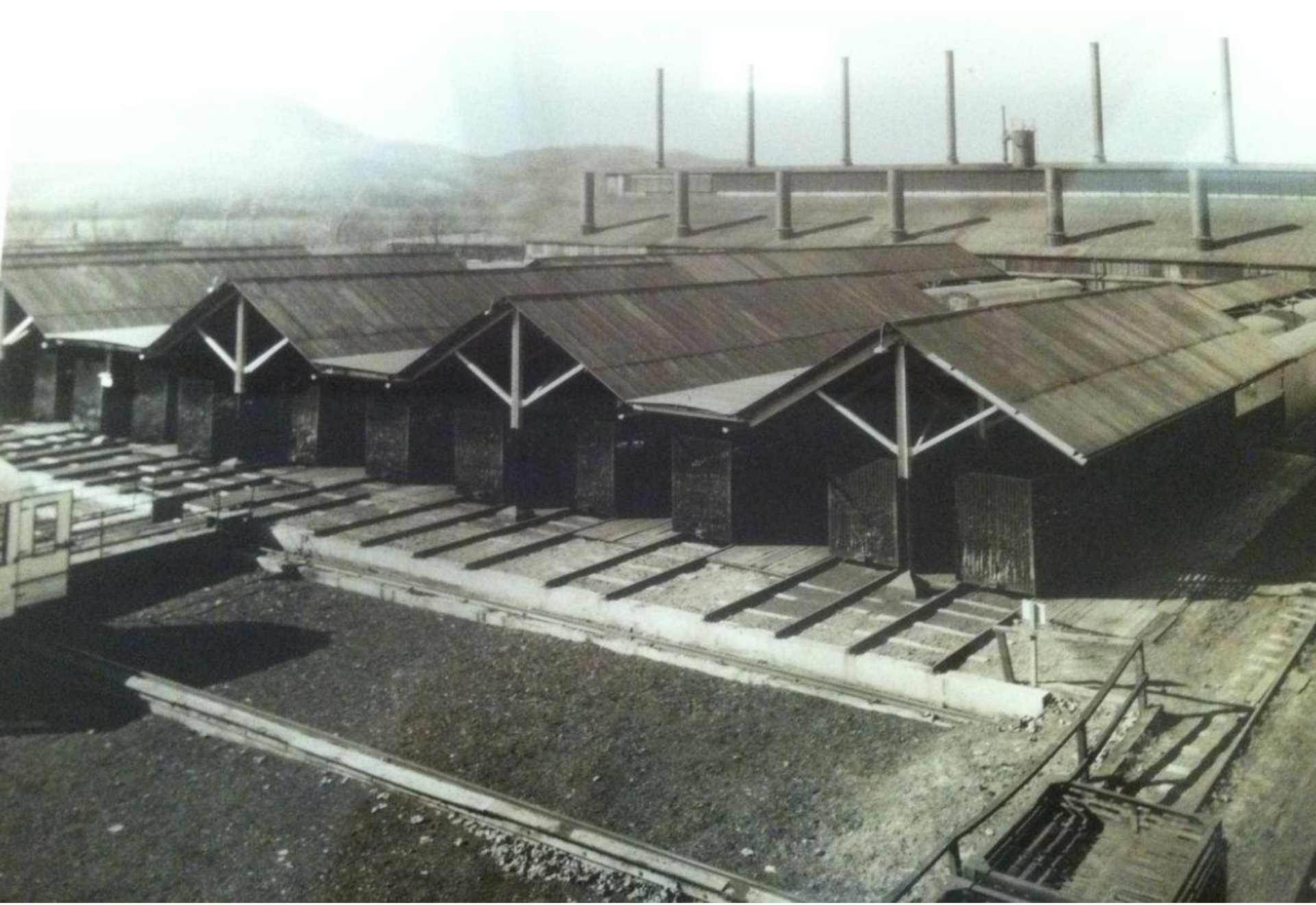


Taylor S Z r 142 Wanola 968
Templeton S D Grocery Store
1026 Maple 414

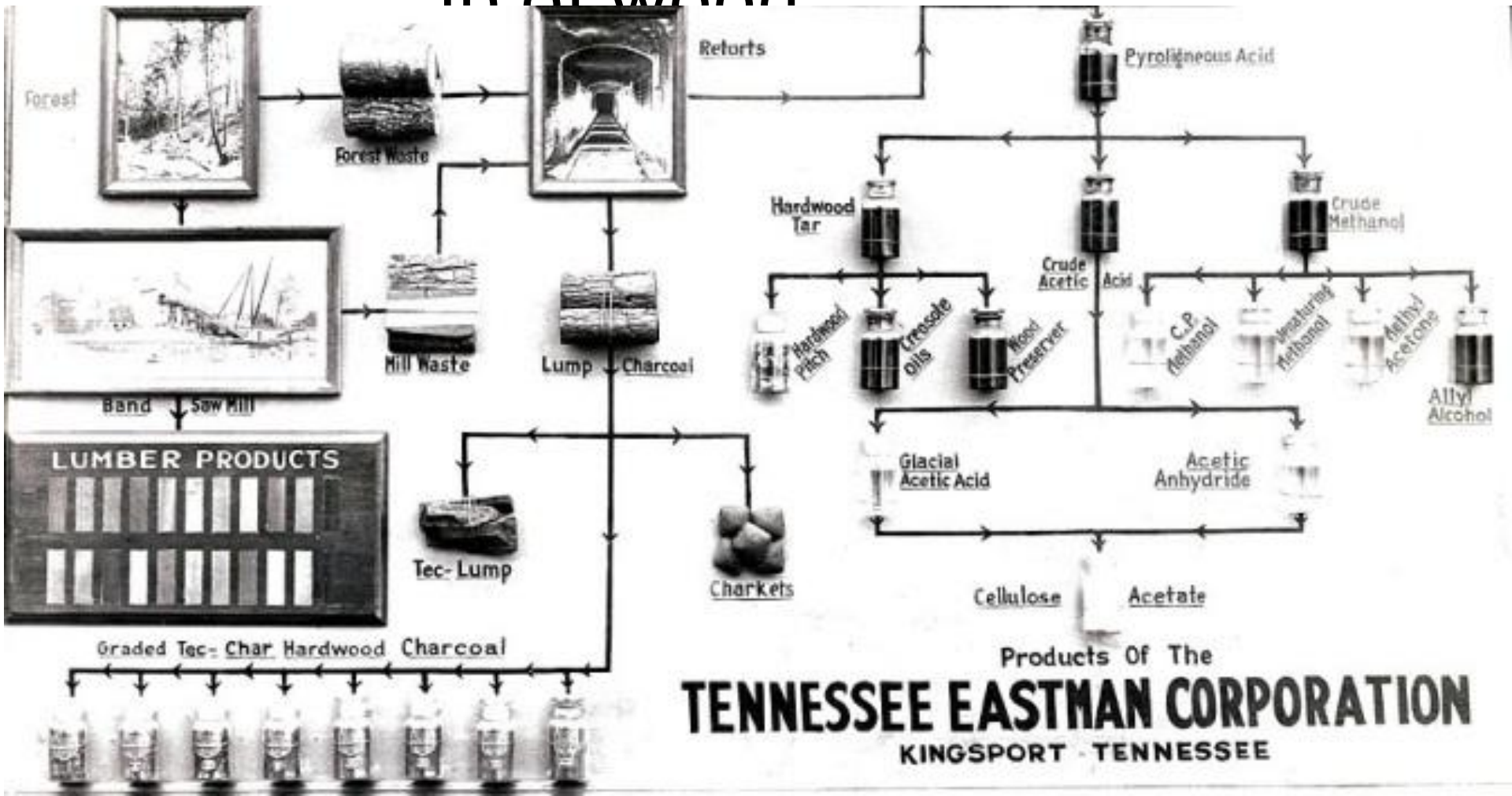
*TENNESSEE EASTMAN CORPORATION:
Business hours—8:00 a. m. to 5:30 p. m.
Call 5101
Holidays and after 5:30 p. m. to 8:00 a. m.
General Office Building 1 5101–1
Turbine Room Building 6 5101–2
Band Sawmill 5101–3
Laboratory Building 51 5101–4
Gate House Cellulose Acetate Plant
Building 52 5101–51
Gate House Wood Distillation Plant
Building 18 5101–52
Building No 10 5101–6
Laboratory Building 57 5101–7
Stair Tower Building 58 5101–81
Gate House Acetate Yarn Plant
Building 60 5101–82
Machine Shop 5101–9
Main Power House Building 53 5101–10
Bays Mtn Fire Stations:
Blair's Gap Store 3302
Braggs 3303
Depews 3304
Haynes J F r Van Hill 3305
Morrison Burton r 3306
Tenn Motor Co Ford Agency Sullivan 63
Tenn Motor Co Used Car Dept Center 724


1939

1939 – Before the War



Wood distillation provided only 1 lb of methanol / acetic per 6 lb of wood



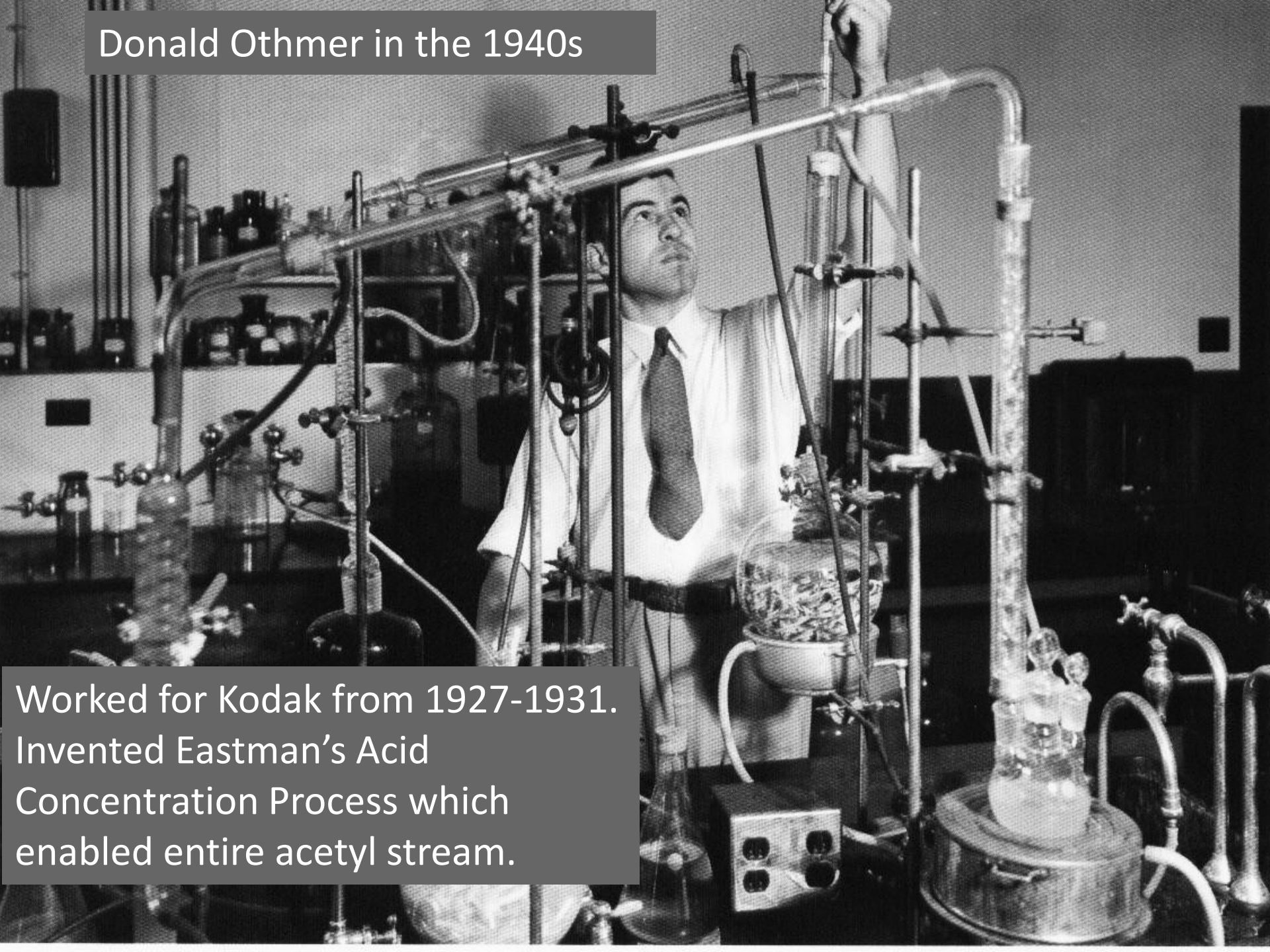
Eastman's new products in the 30's and 40's

- Acetic acid cracking
- Ethanol to acetic acid
- Butanol to butyric acid
- Tenite plastics
- Acetate Staple Fiber
- Acetate dyes
- Triethyl phosphate
- Isopropyl Acetate
- HQ and derivatives

Eastman's first profit was not realized until 1932.

Donald Othmer invented acid concentration process

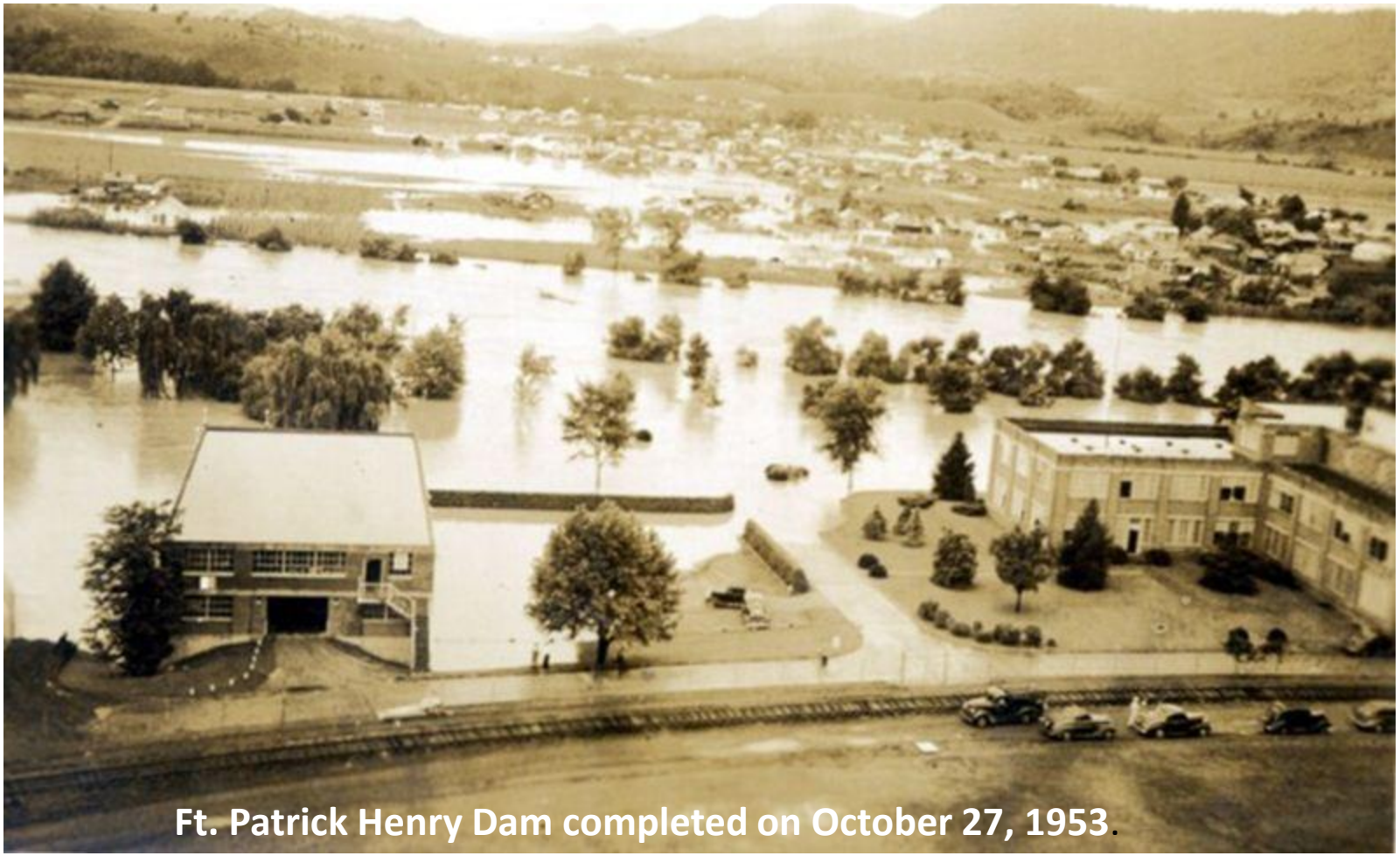
- Ph.D. in chemical engineering from U. of Nebraska in 1925.
- Worked for Kodak in Rochester from 1927 to 1931.
- Was professor at Brooklyn Polytechnic starting in 1932 (150 patents / 350 publications).
- Collaborated with Raymond Kirk on Kirk-Othmer Encyclopedia of Chemical Industry.
- Invested with Warren Buffett (also from Omaha) in the 1950s.
- Died in 1995 with an estate worth $750 million.
- He and his second wife Mildred had no children, and gave estate to many charitable organizations.



Donald Othmer in the 1940s

Worked for Kodak from 1927-1931. Invented Eastman's Acid Concentration Process which enabled entire acetyl stream.

Long Island Flood of 1940

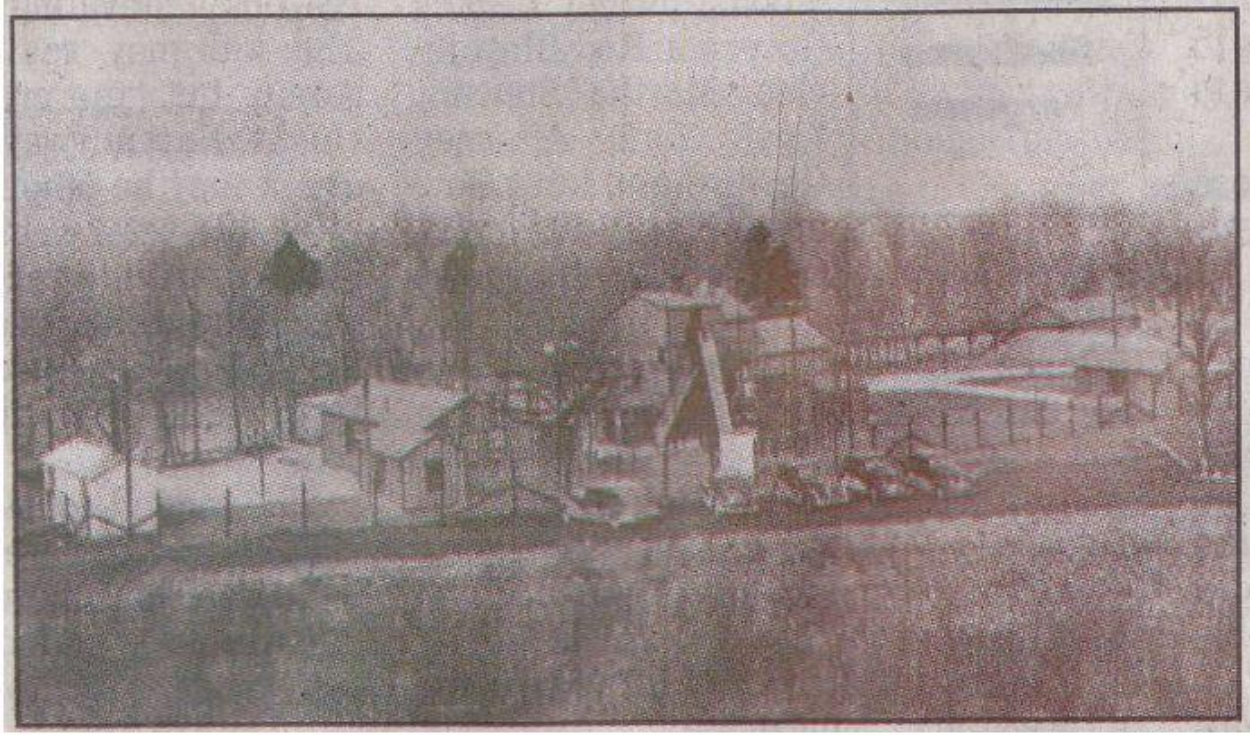


Ft. Patrick Henry Dam completed on October 27, 1953.

Tennessee Eastman Company Wins the War

- Implemented U. Michigan process to make RDX, high explosive
- Created Wexler Bend Pilot Plant to make RDX within 26 days of being asked by the government
- Was contractor for atomic bomb Manhattan Project at Oak Ridge
- Eastman employed 30,000 people at Oak Ridge and Holston Ordinance Works at height of effort(!)

Produced first RDX in 26 days

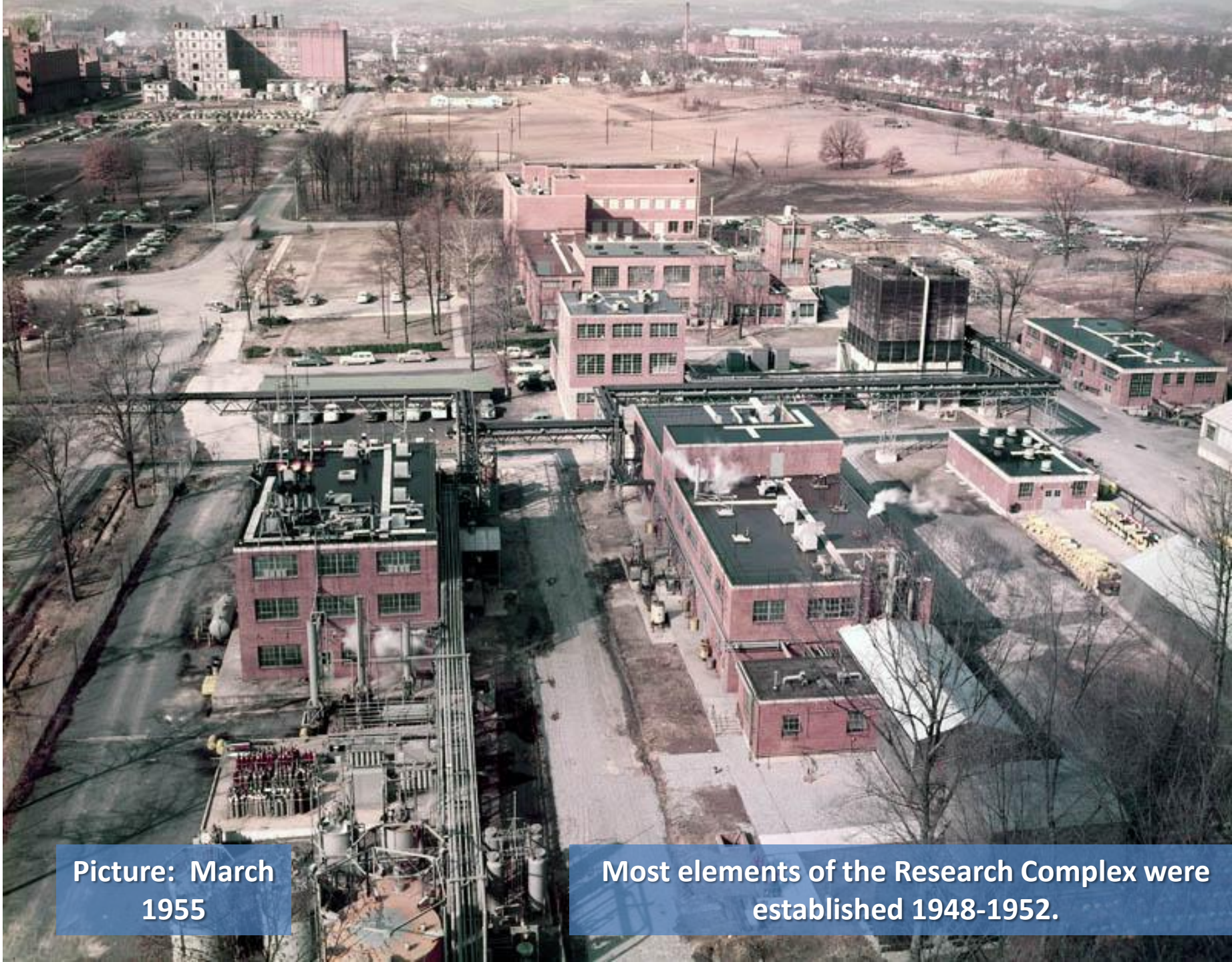


This photo contributed by the U.S. Army shows the original Wexler Bend Pilot Plant, which manufactured RDX for the Allied effort before the Horse Creek Pilot Plant and Holston Ordnance Works were constructed. The photo below, by Sharon Caskey Hayes, shows the plaque that marks the site of the Wexler Bend Pilot Plant, next to Eastman just below John B. Dennis Highway, along the Holston River.

February 1948 B-54 filtered water basins

1948 – Yes, the world was in color


1955 – Golden Age
of Manufacturing in
America



Picture: March 1955

Most elements of the Research Complex were established 1948-1952.

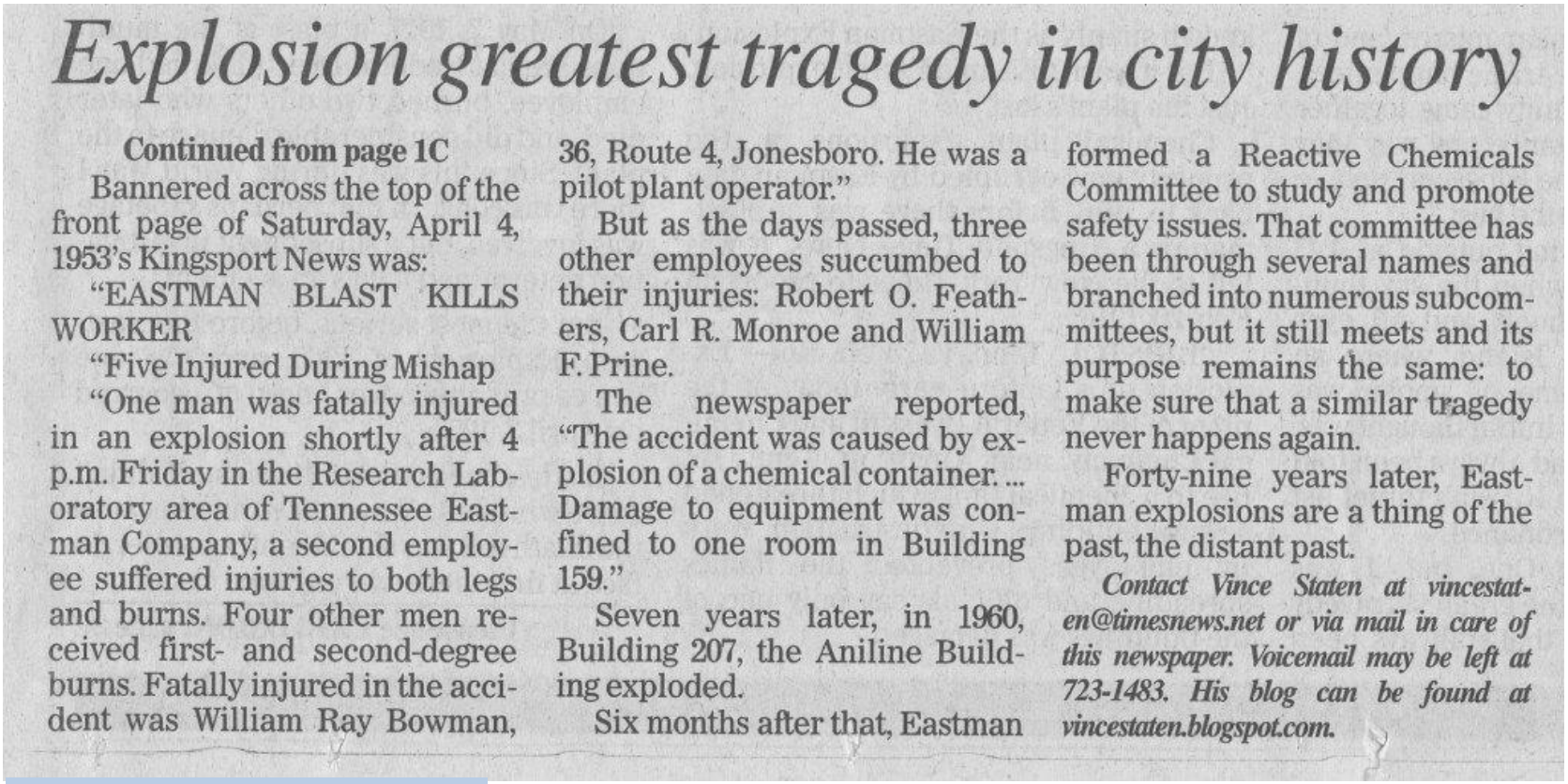
1958
We'd like the river over there,

please.

Growing Pains

April 4, 1953

- Explosion in B-159 in research – Four employees killed



Explosion greatest tragedy in city history

Continued from page 1C

Bannered across the top of the front page of Saturday, April 4, 1953's Kingsport News was:

"EASTMAN BLAST KILLS WORKER

"Five Injured During Mishap

"One man was fatally injured in an explosion shortly after 4 p.m. Friday in the Research Laboratory area of Tennessee Eastman Company, a second employee suffered injuries to both legs and burns. Four other men received first- and second-degree burns. Fatally injured in the accident was William Ray Bowman, 36, Route 4, Jonesboro. He was a pilot plant operator."

But as the days passed, three other employees succumbed to their injuries: Robert O. Feathers, Carl R. Monroe and William F. Prine.

The newspaper reported, "The accident was caused by explosion of a chemical container. ... Damage to equipment was confined to one room in Building 159."

Seven years later, in 1960, Building 207, the Aniline Building exploded.

Six months after that, Eastman formed a Reactive Chemicals Committee to study and promote safety issues. That committee has been through several names and branched into numerous subcommittees, but it still meets and its purpose remains the same: to make sure that a similar tragedy never happens again.

Forty-nine years later, Eastman explosions are a thing of the past, the distant past.

Contact Vince Staten at vincestaten@timesnews.net or via mail in care of this newspaper. Voicemail may be left at 723-1483. His blog can be found at vincestaten.blogspot.com.

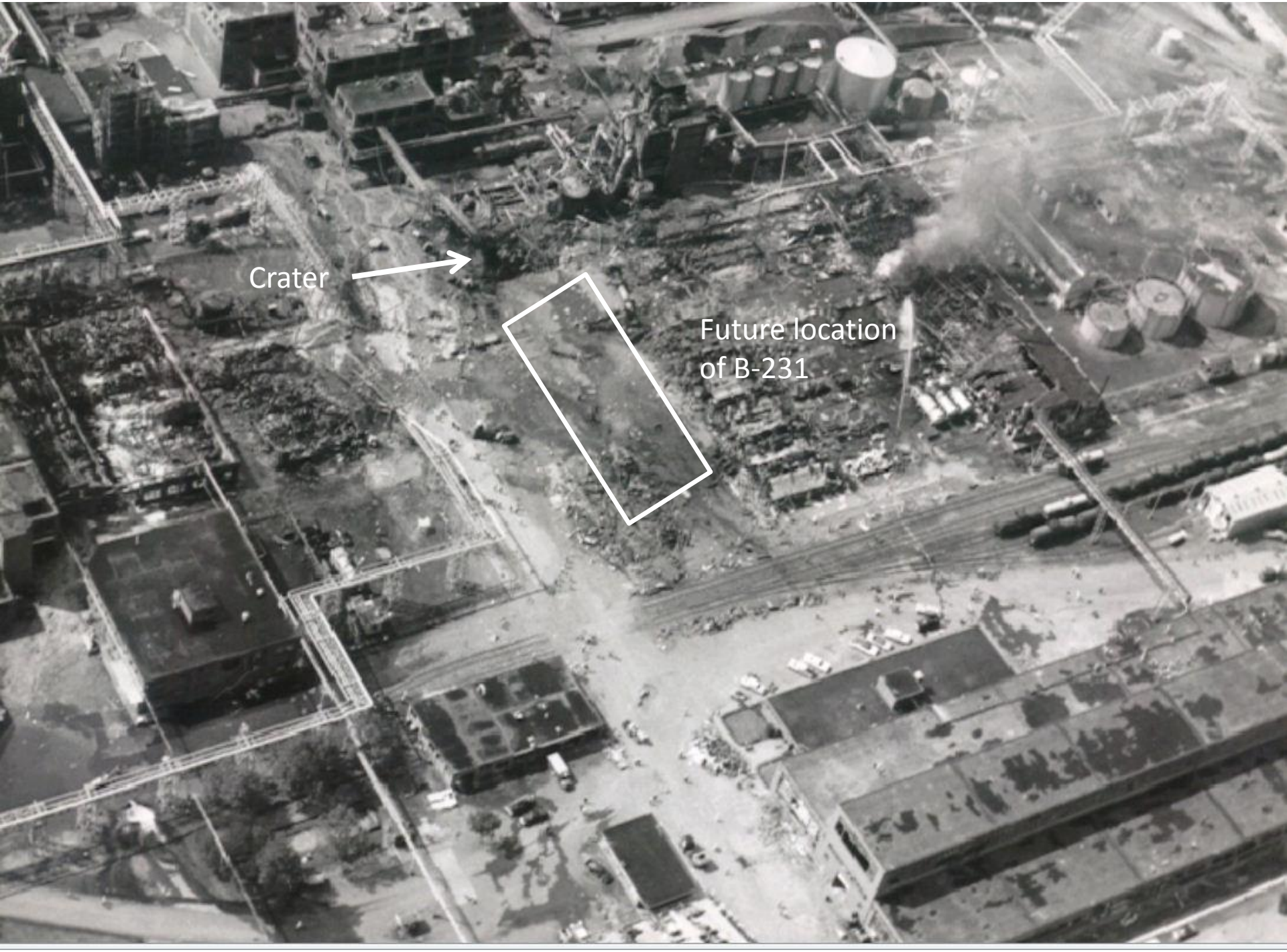
Kingsport Times-News, Oct. 4, 2009

Growing Pains

October 4, 1960

- Explosion in Aniline plant, B-207, 16 employees killed


B-207 Aniline plant
exploded Oct. 4, 1960
killing 16


Crater
Future location
of B-231

Oct. 5, 1960 – Displayed in B-469


REGISTER AND VOTE

KINGSPORT TIMES

Vol. XLV, No. 199

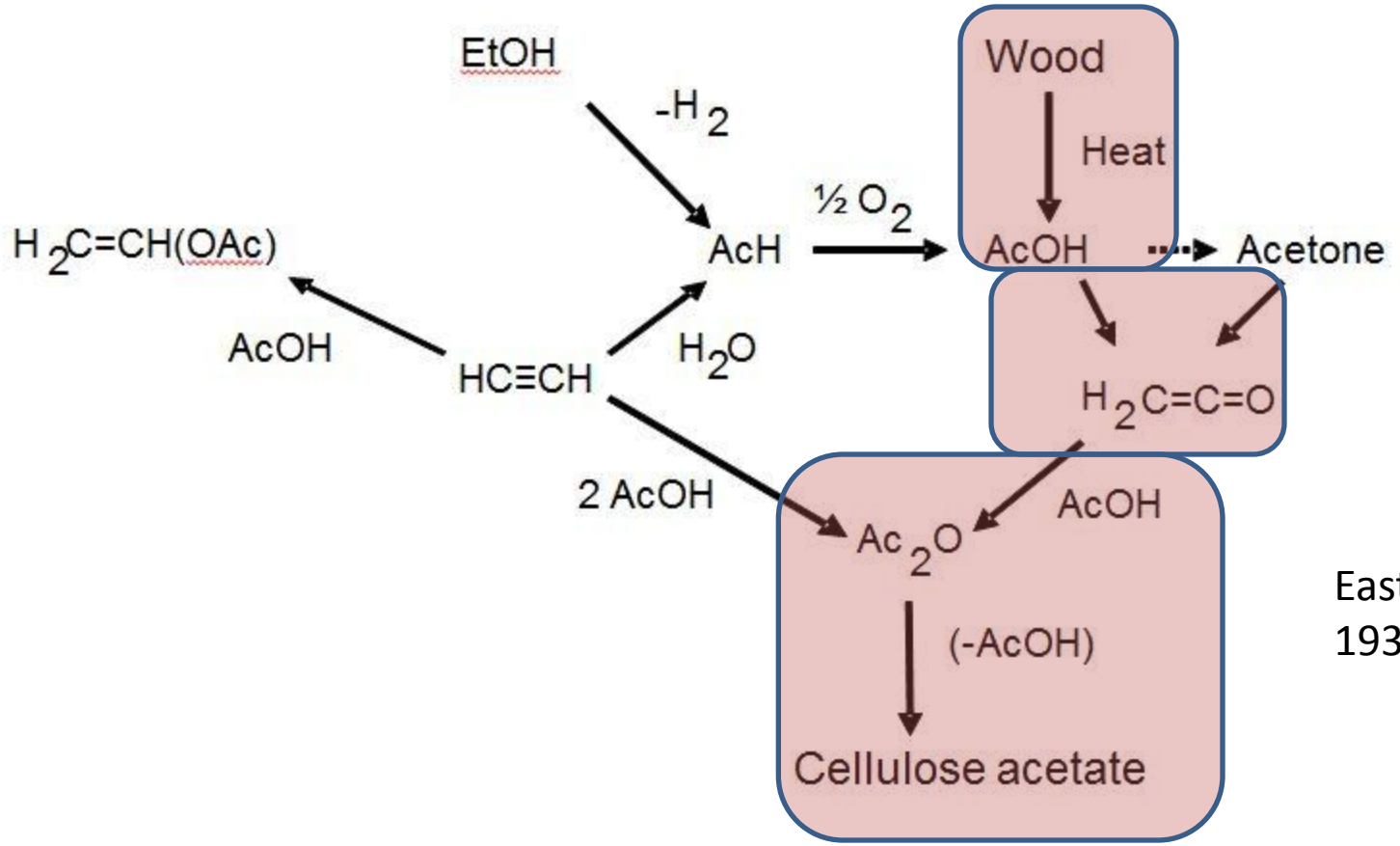
BLAST TOLL 13

Eleven Identified; Two Lost, Presumed Dead

Research Building 150, 150A in 1965

Adaptation / Innovation in Acetyls

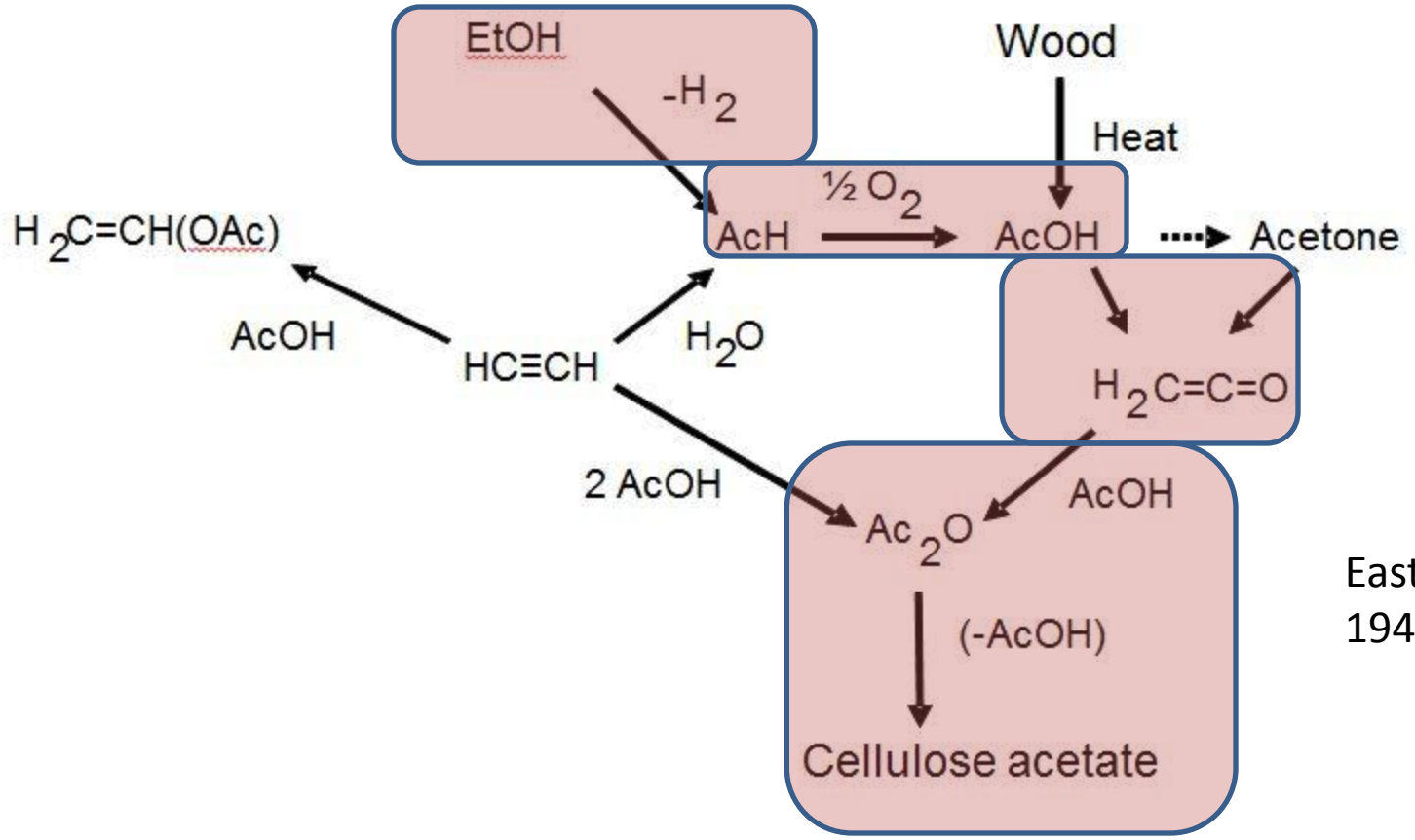
Acetyls Adaptation / Innovation Before 1950



Eastman
1930s

Credit: Joe Zoeller

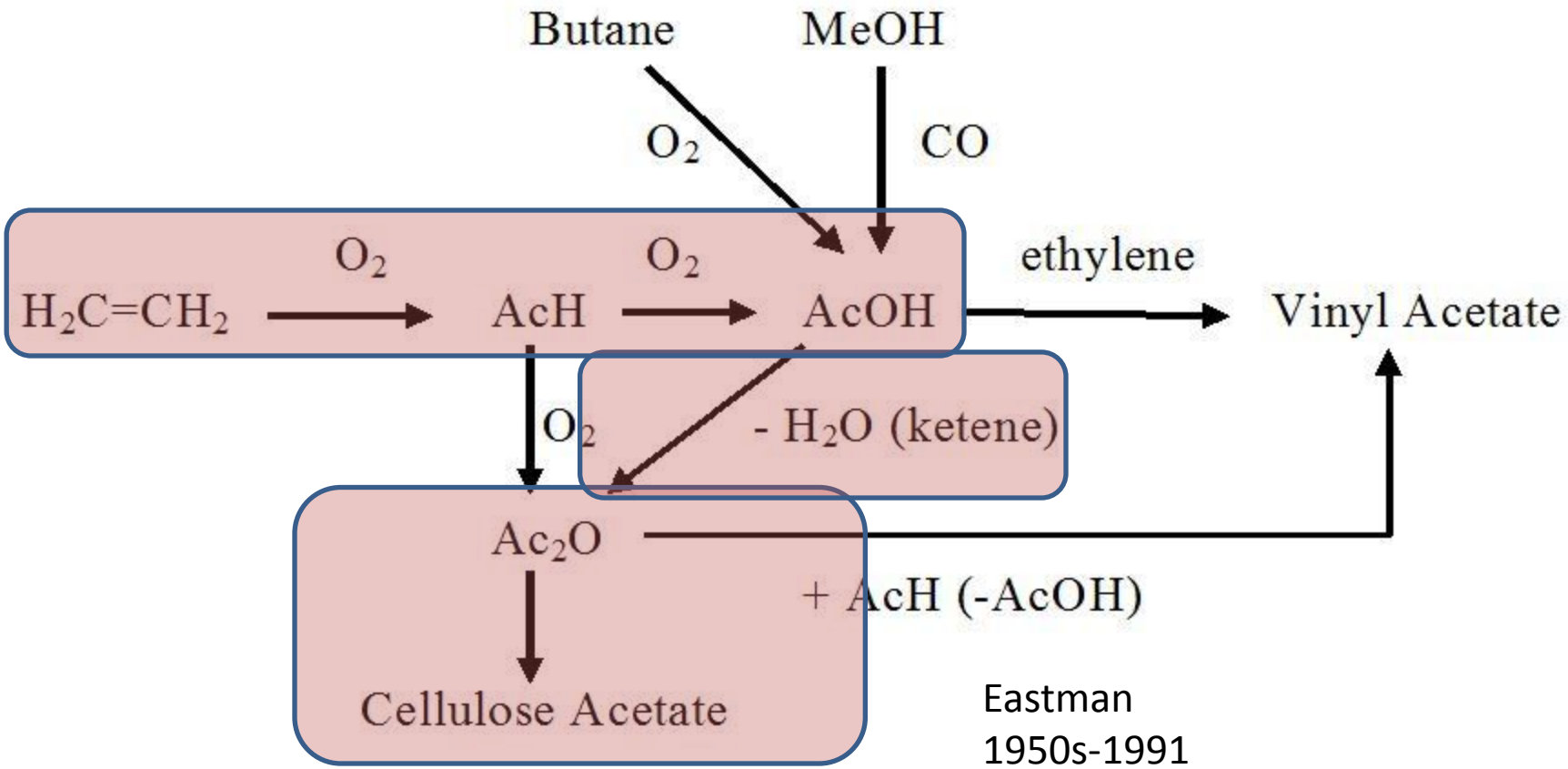
Acetyls Adaptation / Innovation Before 1950



Eastman
1940s-50s

Credit: Joe Zoeller

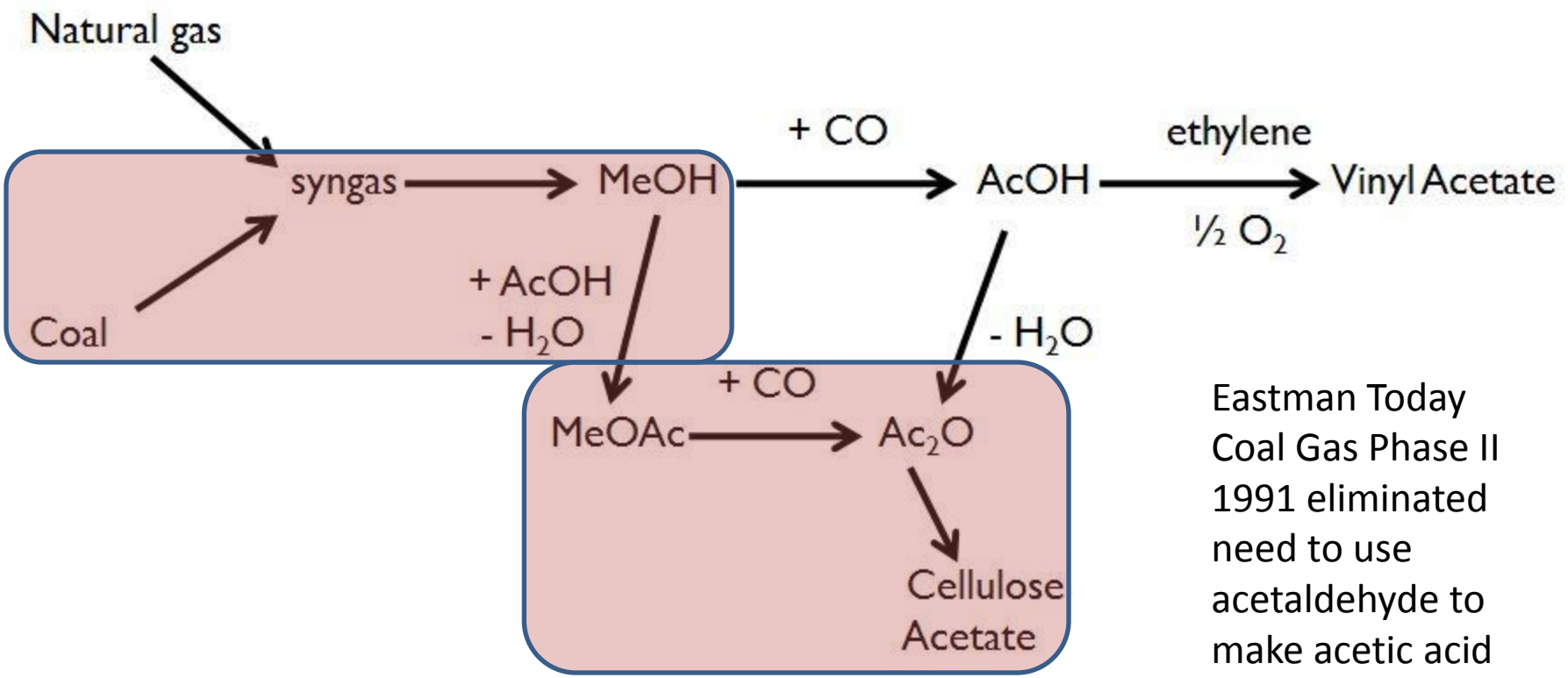
Acetyls Adaptation / Innovation 1970



Eastman
1950s-1991

Credit: Joe Zoeller

Acetyls Adaptation / Innovation Today



Eastman Today
Coal Gas Phase II
1991 eliminated
need to use
acetaldehyde to
make acetic acid

Credit: Joe Zoeller

Adapting Acetyls

- 1930 – cellulose acetate for safety film
- 1931 – cellulose acetate for textiles
- 1932 – cellulose acetate for plastics
- 1938 – cellulose acetate butyrate
- 1952 – filter tow for cigarette filters
- On and on to other applications in coatings and films


1983 – Coal Gas (Phase I) Starts Up

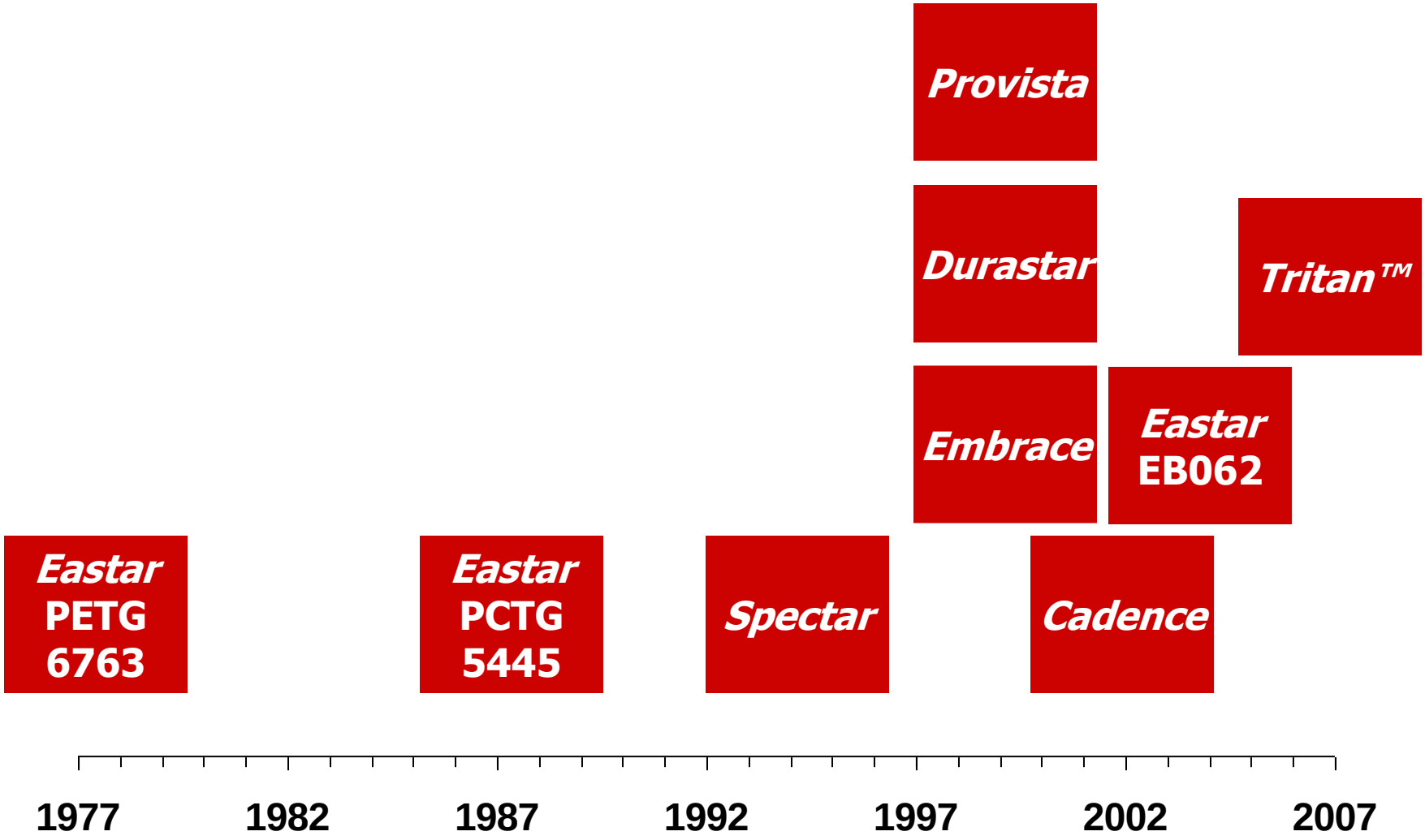
Adaptation / Innovation in Polyester

The Dawn of Polyester

- Polyethylene Terephthalate was developed at ICI in the 1930s.
- DuPont and Eastman produced it during WWII as a nylon substitute to meet war demand.
- After the war, DuPont licensed PET to Eastman for use as film base
- Eastman licensed PET bottle patents from DuPont and made its first PET for bottles in 1979.
- Eastman ended production of PET fibers for textiles in 1993.
- Eastman sold the PET business in 2011.

Polyester Adaptation / Innovation

- Got into fibers for war production (1940s)
- Adapted PET as film base for Kodak (1950s)
- Developed TPA / DMT processes (1950s)
- Built two EG plants at Texas in the 1960s to integrate
- Changed TPA chemistry in the early 1980s to avoid acetyladehyde-to-acetic acid co-production
- Adopted direct esterification of TPA (PTA)
- Created Integrex™ technology for esterification (2000s)
- Built iso-phthalic acid plant in the late 1990s
- Created co-polyesters to build specialty plastics business



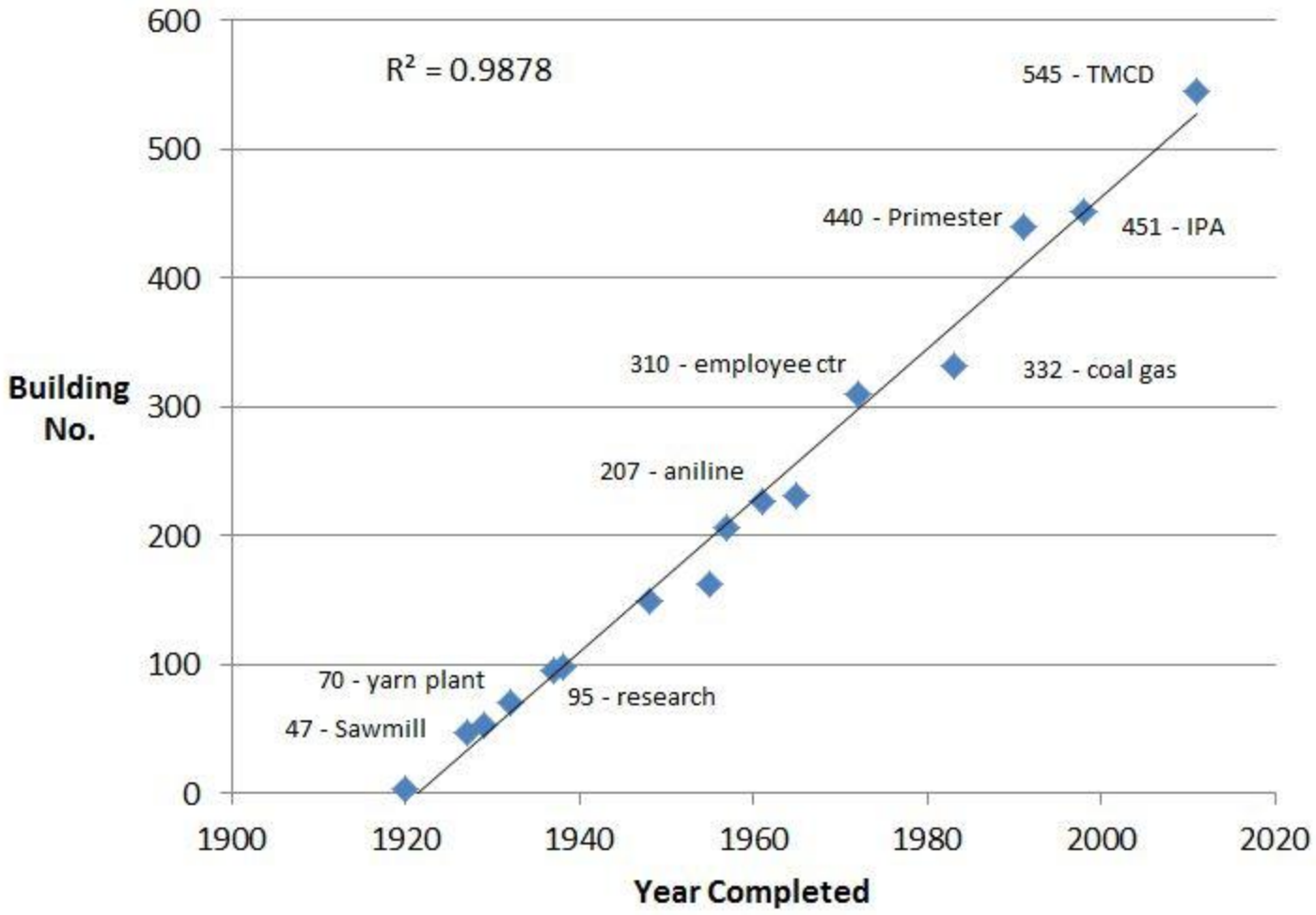
Credit: Eric Moskala

What have we done lately at Tennessee Operations?

What have we built lately in Kingsport?

- 1983 – New hydroquinone plant with improved chemistry
- 1991 – Coal gas phase II for more acetic anhydride
- 1992 – Primester JV for cellulose acetate flake
- 1998 – Isophthalic acid plant
- 1998 – New World Headquarters B-280B,C
- 1998 – Research expansion, B-150C
- 1990s – CHDA plant (1990s)
- 1990s – Liquid Phase Methanol Plant
- 2011 – TMCD for Tritan™
- 2012 – Perennial Wood Demonstration Plant
- 2012 – New Cellulose Triacetate Plant
- Plus lots of expansions and infrastructure projects

Increase in building numbers in time is a straight line

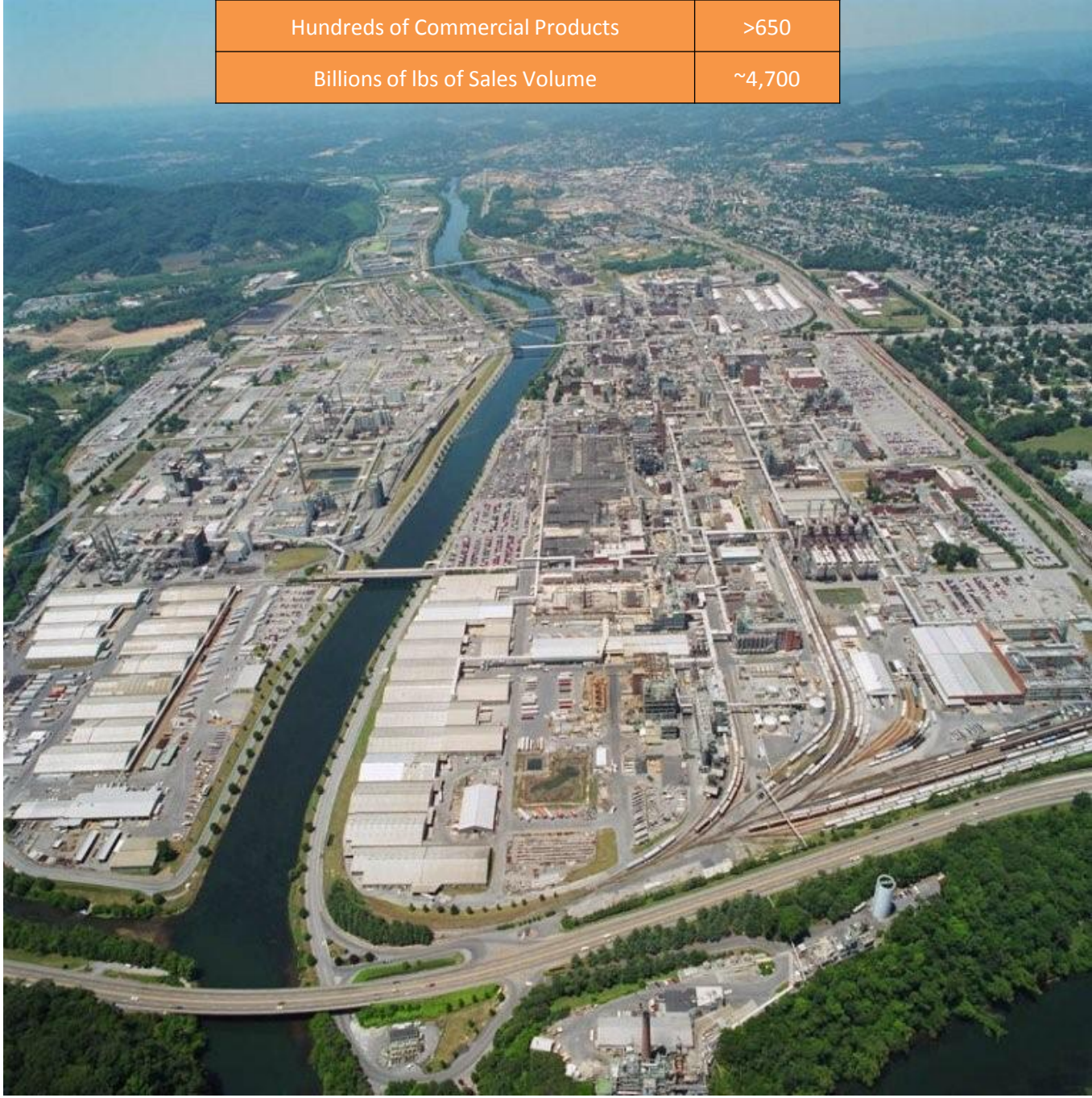


Eastman Kingsport, TN

"An integrated site"

5 Manufacturing Divisions
Hundreds of chemicals, fibers, and plastics produced
~7,000 Eastman Employees
> 1,000 Contract Employees
>500 buildings and ~4,000 acres of land (main plant occupies ~900 acres)
~90% power & 100% steam internally produced
~165MW avg. electrical use

Hundreds of Commercial Products	>650
Billions of lbs of Sales Volume	~4,700



Energy Input

Power & Steam Production

Major Steam Distribution

Major Furnaces or Stacks

Representative OUTPUT

Chemical Production Plants

Fibers Production Plants

Plastics Production Plants

Credit: Ron Sheppard

EASTMAN

A Few Words About

Texas Operations (TXO)

(a.k.a. Texas Eastman)

After WWII, TEC wanted to integrate back to raw materials

- Longview, Texas was selected because of
  - East Texas Oil Field
  - Sabine River
  - Two Railroads
  - Strong Labor Force
- Plant site is 6,000 acres!
- Artificial lake with thermal dam provides cooling water

EASTMAN LOCATES HERE

The Longview Daily News

COMBINED EDITION!

COMBINED EDITION

COMBINED EDITION MARSHALL NEWS MESSENGER COMBINED EDITION

...YEAR—NO. 121. LONGVIEW, TEXAS, THURSDAY AFTERNOON, AUGUST 25, 1949. 22 PAGES

VOL. 73, NO. 67 MARSHALL, TEXAS, THURSDAY AFTERNOON, AUGUST 25, 1949

Gregg-Harrison Counties Selected For Big Plant

This Is Parent Plant of Tennessee Eastman Corporation At Kingsport

WESTERN UNION

Mr. R. G. LeTourneau, Chairman, Citizens Committee, Longview, Texas
Mr. Carl Estes, Longview News Journal, Longview, Texas
HON. R. B. Williams, Mayor, Longview, Texas, and the Citizens of Longview
HON. EARL Sharp, Judge Gregg County, Longview, Texas, and the Citizens of Gregg County
HON. R. M. Nichols, Judge Harrison County, Marshall, Texas, and the Citizens of Harrison County
Mr. Millard Cope, Publisher of The Marshall News Messenger, Marshall, Texas

TENNESSEE EASTMAN CORPORATION IS HAPPY TO ANNOUNCE THE SELECTION OF A SITE IN GREGG AND HARRISON COUNTIES NEAR THE CITY OF LONGVIEW FOR THE HOME OF ITS NEW PLANT. WE THANK YOU FOR YOUR EFFORTS AND COOPERATION WHICH HAVE BEEN HELPFUL TO US IN REACHING THIS DECISION. WE TRUST THAT THE RELATIONS BETWEEN OUR COMPANY AND THE CITIZENS OF YOUR COMMUNITY WILL ALWAYS BE PLEASANT AND MUTUALLY ADVANTAGEOUS
JAMES C. WHITE, PRESIDENT

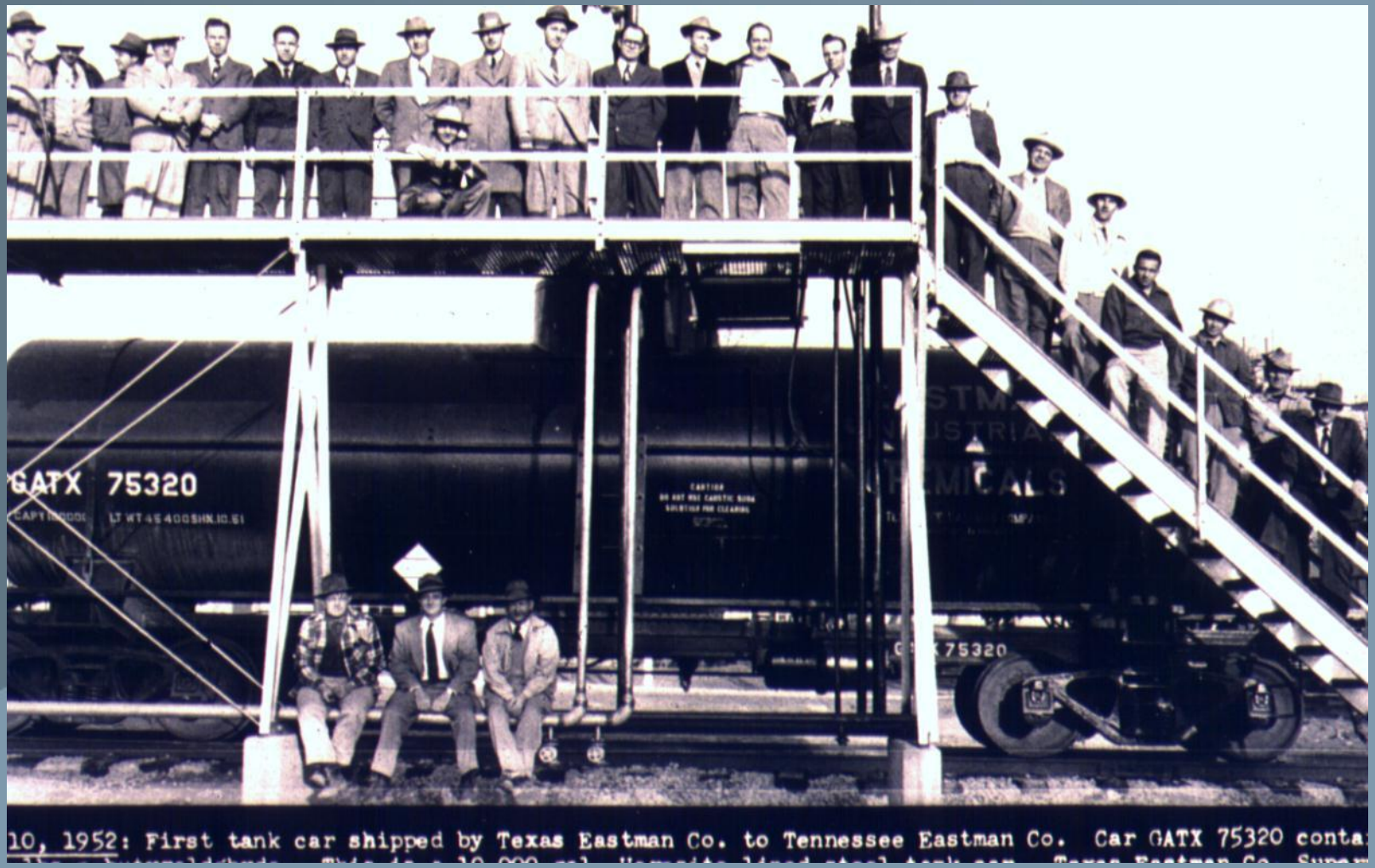
Plant Site North Of Sabine River

KINGSPORT, Tennessee, Aug. 25.—Tennessee Eastman Corporation announced today that a site has been selected in Gregg and Harrison Counties near Longview, Texas, for the erection of a plant to manufacture certain basic raw materials for use in operations at Kingsport, Tennessee.

"Deeds are being taken covering a large tract of land along the Sabine River near Longview, bring-

Texas Eastman Groundbreaking March 23, 1950

First Product Shipped



March 10, 1953


Texas Eastman 1952
250 Employees

Texas Operations - Today

~1,600 Employees

> 40 Chemicals and Plastics

~ 4 Billion Pounds/year

- Olefins
- Polyolefins
- Alcohols
- Aldehydes
- Solvents
- Resins
- Other Chemicals

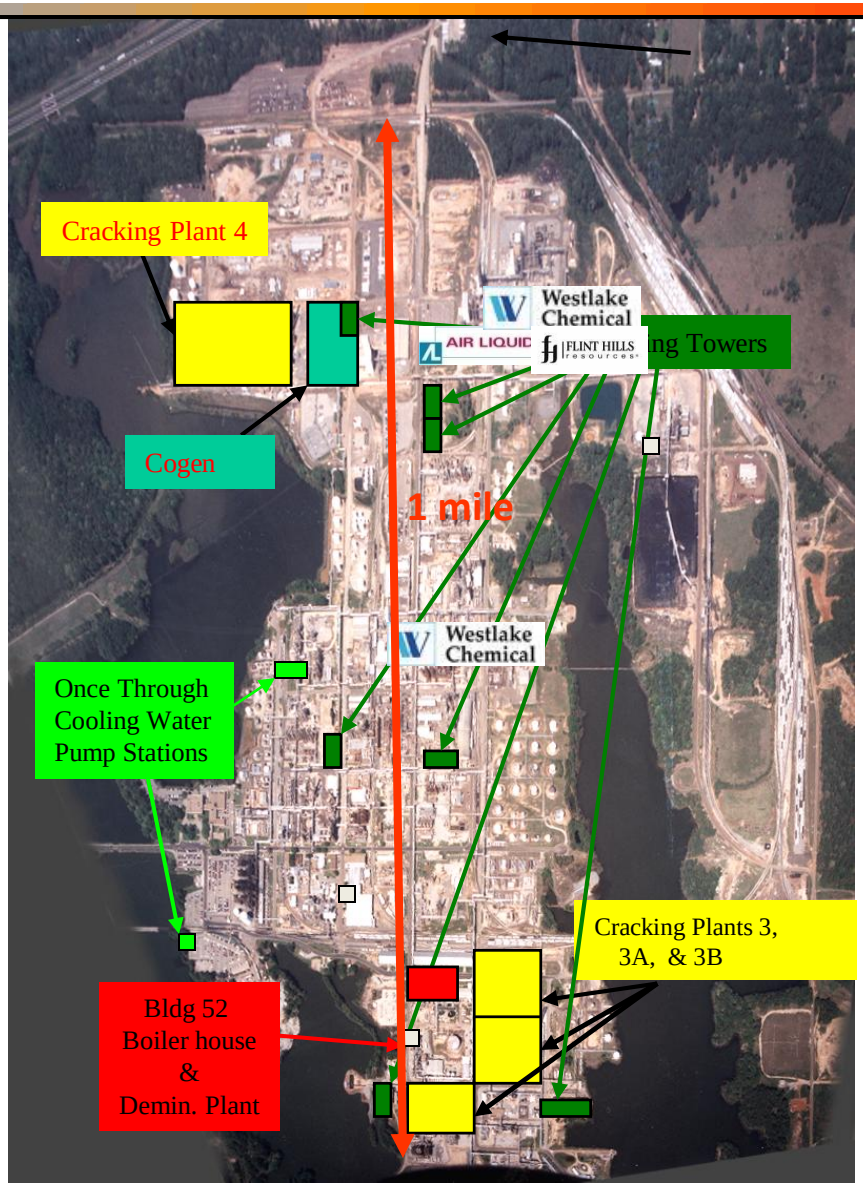
EASTMAN

Longview, Texas

6000 acres
First production
1953

1600 employees
40 products
4 Billion lb/yr

- Olefins
- Polyolefins
- Alcohols
  - Aldehydes
  - Solvents
  - Resins
  - Other Chemicals



Boilers

Cooling Towers

Cogen

Instrument Air

Once Through Cooling Water

Cracking Plants

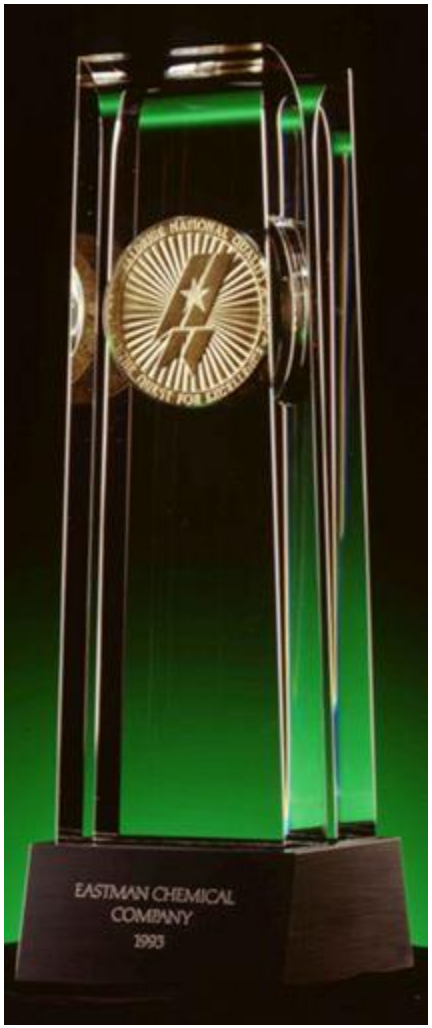
Beyond Kodak:

EASTMAN

Eastman Chemical grows up and leaves home Jan. 1, 1994

Triumph! Eastman spins free of Kodak on Jan. 1, 1994!

- Kodak facing tough future—returning to core
- Eastman Chemical fortunate to get independence with headquarters in Kingsport
- We also got billions in debt, but profits boomed in 1995 and we survived.
- We won the Malcolm Baldridge National Quality Award in 1993—but we survived anyway!



Life Before and After Kodak

Before the spin

- US chemical industry grows faster than GDP
- Focus is on organic growth – building plants
- Kodak business necessity establishes core
- Kodak strength helps ECD weather cycles
- Kodak provides corporate identity and functions

After the spin

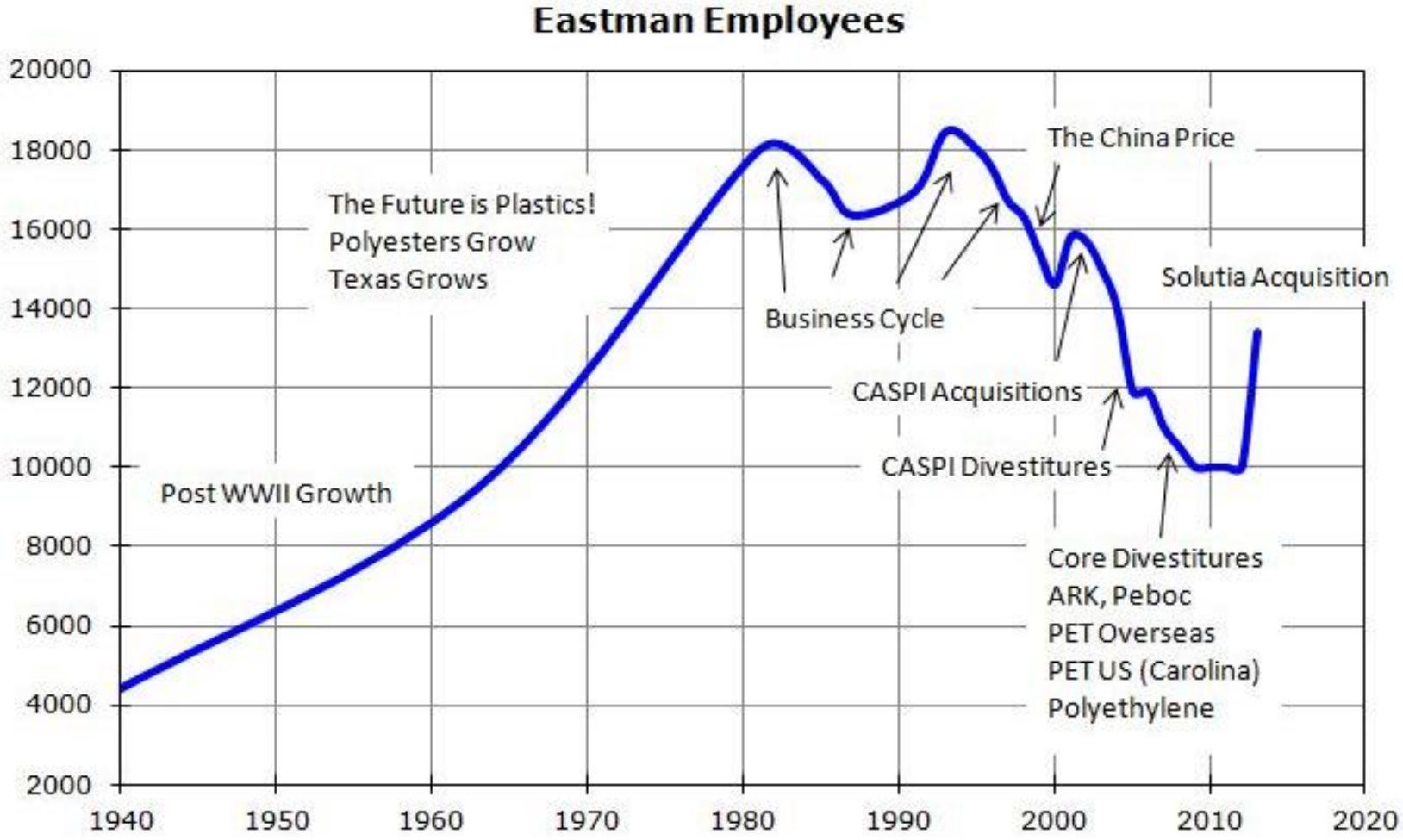
- US chemical industry matures
- Acquisitions, divestitures more prominent
- Eastman must define its own core
- Eastman must deal with stockholders
- Eastman must establish new identity and corporate functions

ECD Homegrown Plant Sites Peaked in 1981

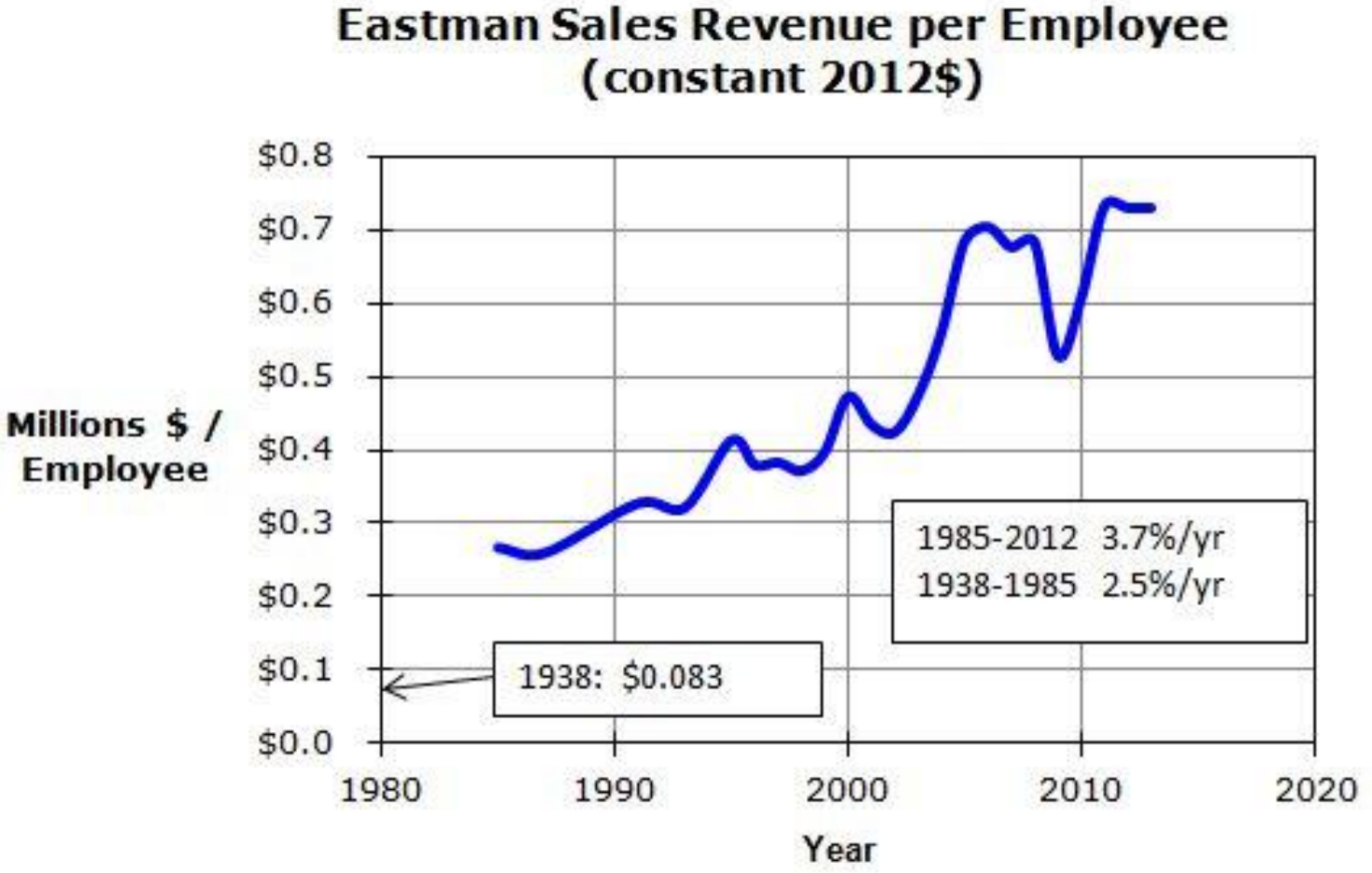
In 1981:

- TEC (Kingsport), est. 1920 – 12,500 employees
- TEX (Longview), est. 1950 – 2600 employees
- CEC (Columbia, SC), est. 1967 – 2000 employees
- ARK (Batesville, AR), est. 1977 – 600 employees

Life on our own is tough in a maturing and globally competitive industry



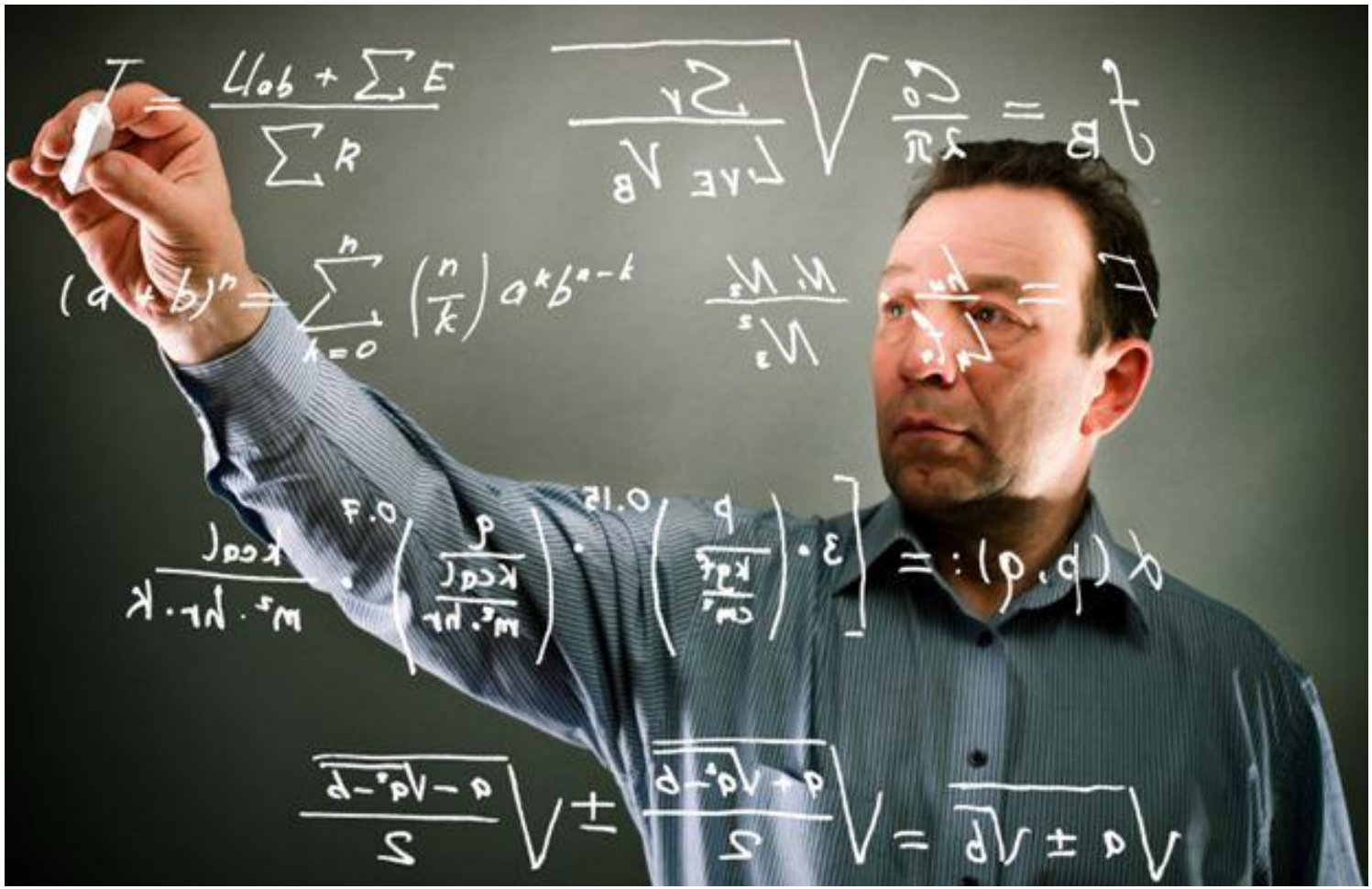
Productivity has marched ever upward



Why don’t we like commodities?

- Legacy of Kodak – Technology and market differentiation provide higher, more stable profits
- Commodities require stripped down, low cost organization
- The two models don’t mix well in the same company

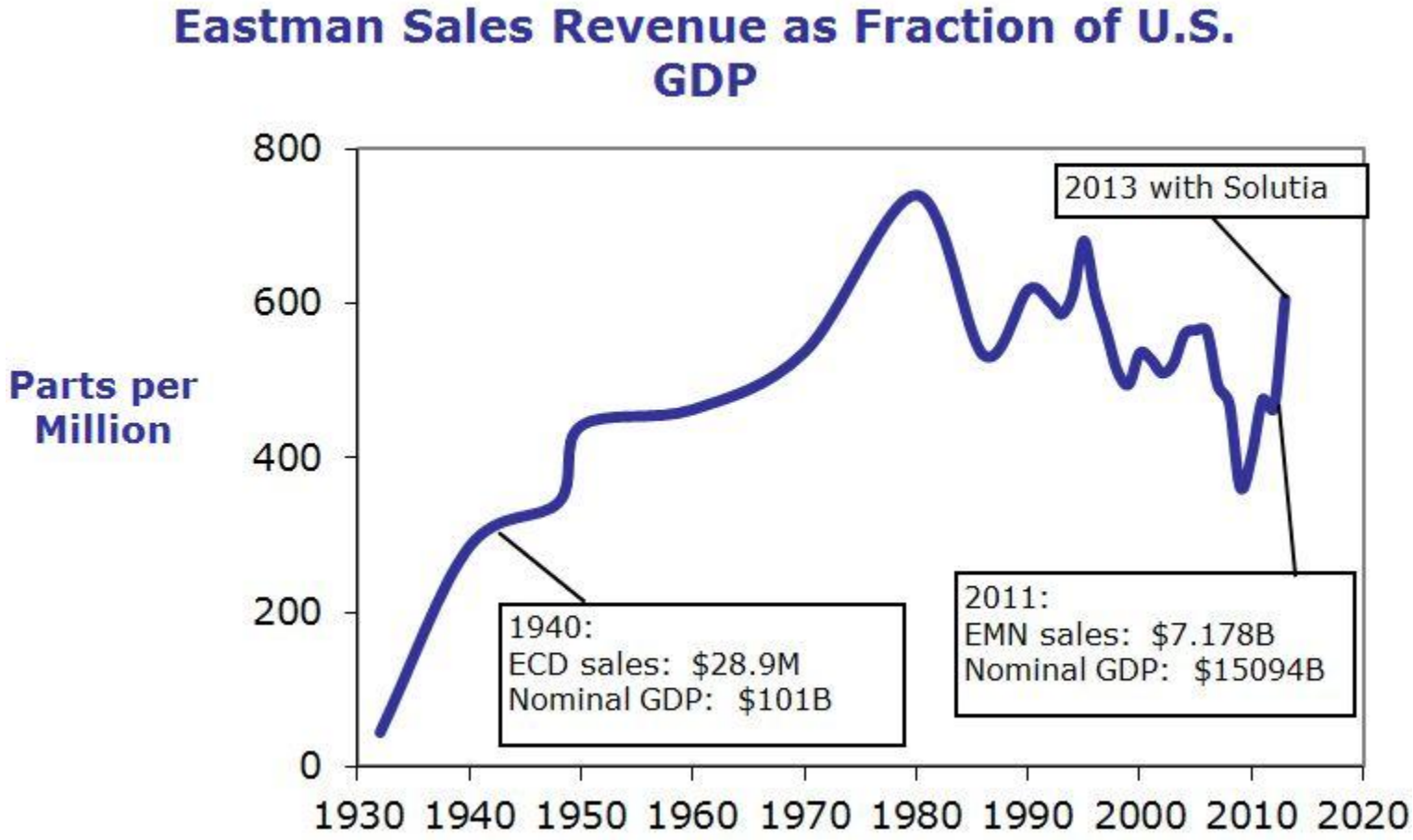
The Winning Formula – What is working



The Winning Formula – What is working

- Expanding the core
  - Fibers growth in Asia (production and sales there)
  - Plasticizers – World leader enhanced by acquisitions (Genovique, Sterling Chemicals, internal growth)
  - Specialty Plastics – Building on co-polyesters with new monomer
  - Expanding Oxo chemicals for rising demand with advantaged Longview position
  - Expanding cellulose esters for new applications at high margins
  - Acetylated Wood
- Acquiring More!
  - Solutia – major increase in industry position, complementary but expanded portfolio, high margins
  - Small Technology acquisitions to aid growth projects

Solutia will help maintain Eastman's Prominence in the US Economy



Eastman – 92 Years Old, Strong Profitable Core, and Financial Resources for Balanced Growth

- 18 years as independent Fortune 500 public company headquartered in Kingsport.
- Continuing to invest in existing plant sites and in newly acquired ones
- Solutia acquisition helps us to stay independent and integrated