

Looking Back to See Forward: Lessons from a Plant Explosion

April 2019

Dawn Mason

ALL IN FOR SAFETY

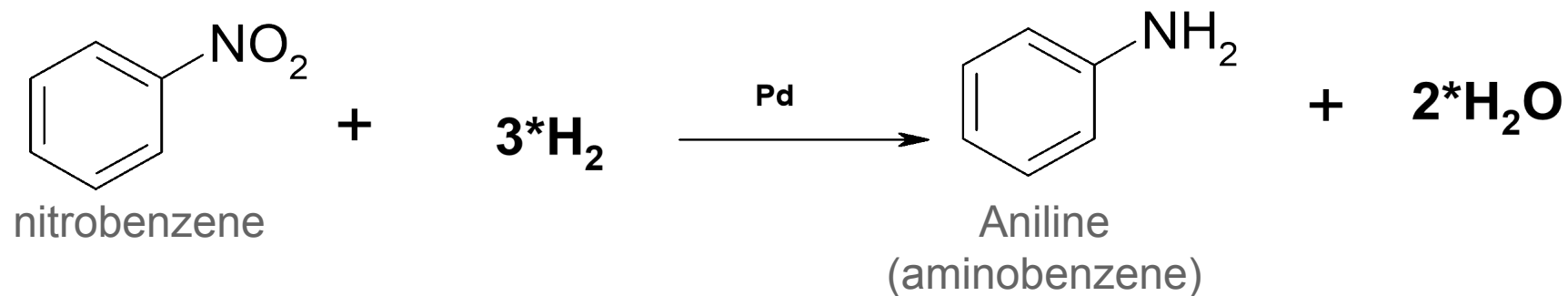
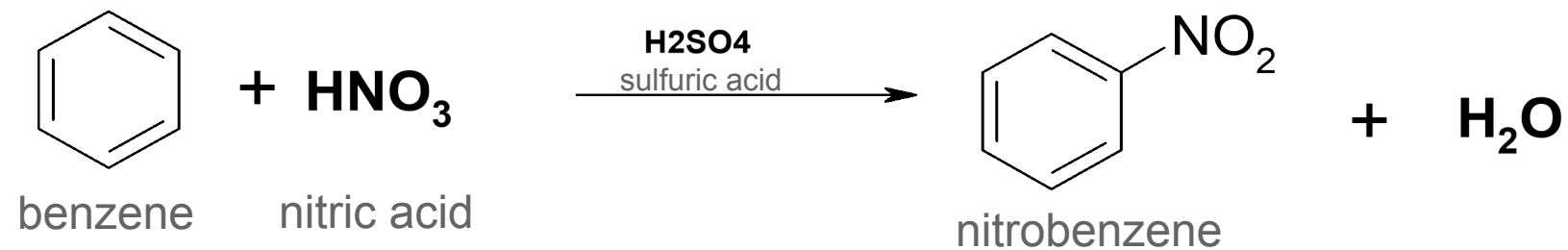
EASTMAN

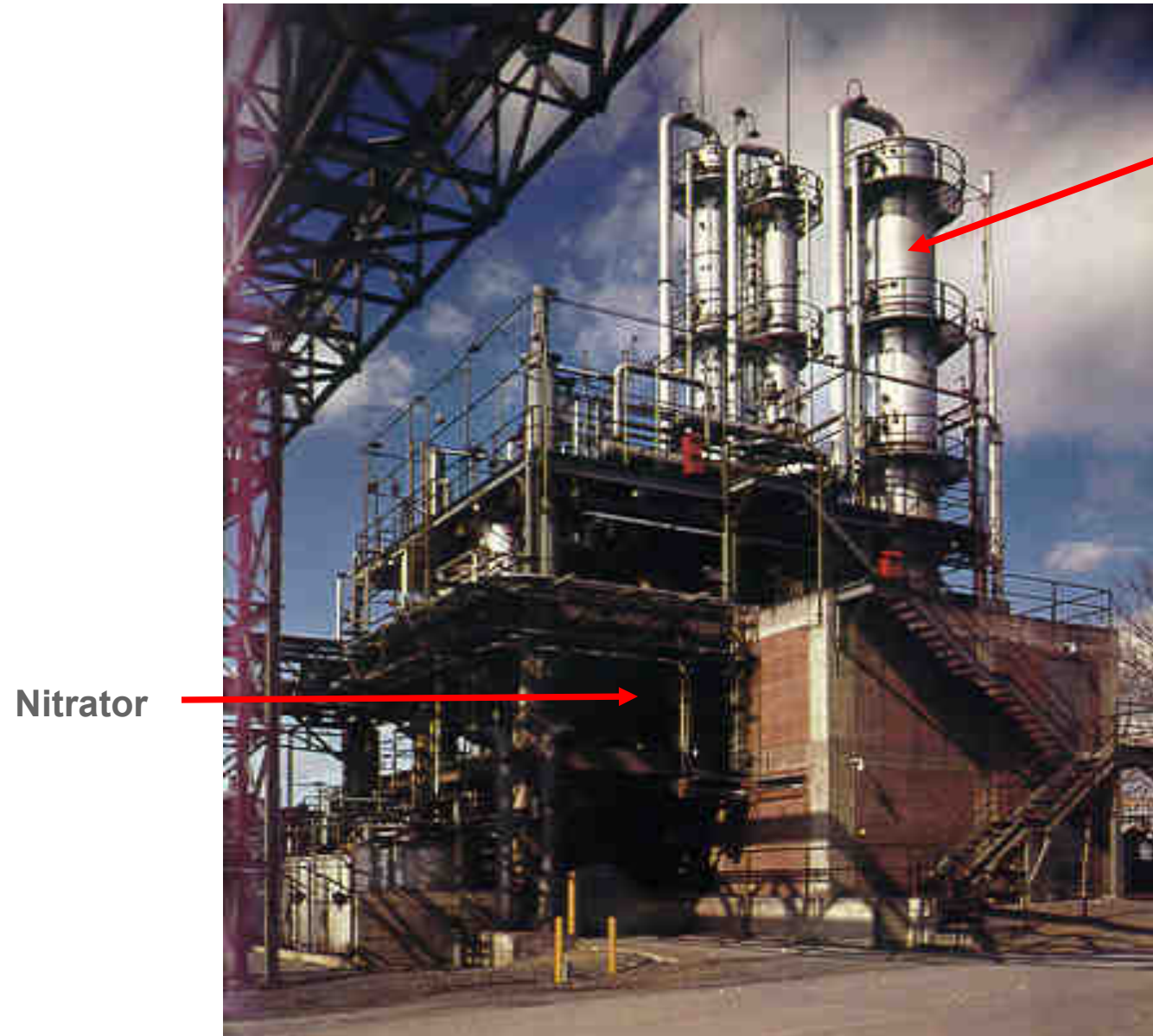
- Eastman is committed to enabling a safe and secure workplace for our team members, customers, and clients
- Ultimate goal of zero injuries and process safety incidents worldwide
- Safety is personal and everyone is accountable to work as safely as possible



Each person is ALL IN FOR SAFETY.
Every shift, every day, here and away from work, in all activities

Aniline Chemistry





Nitrobenzene
Column

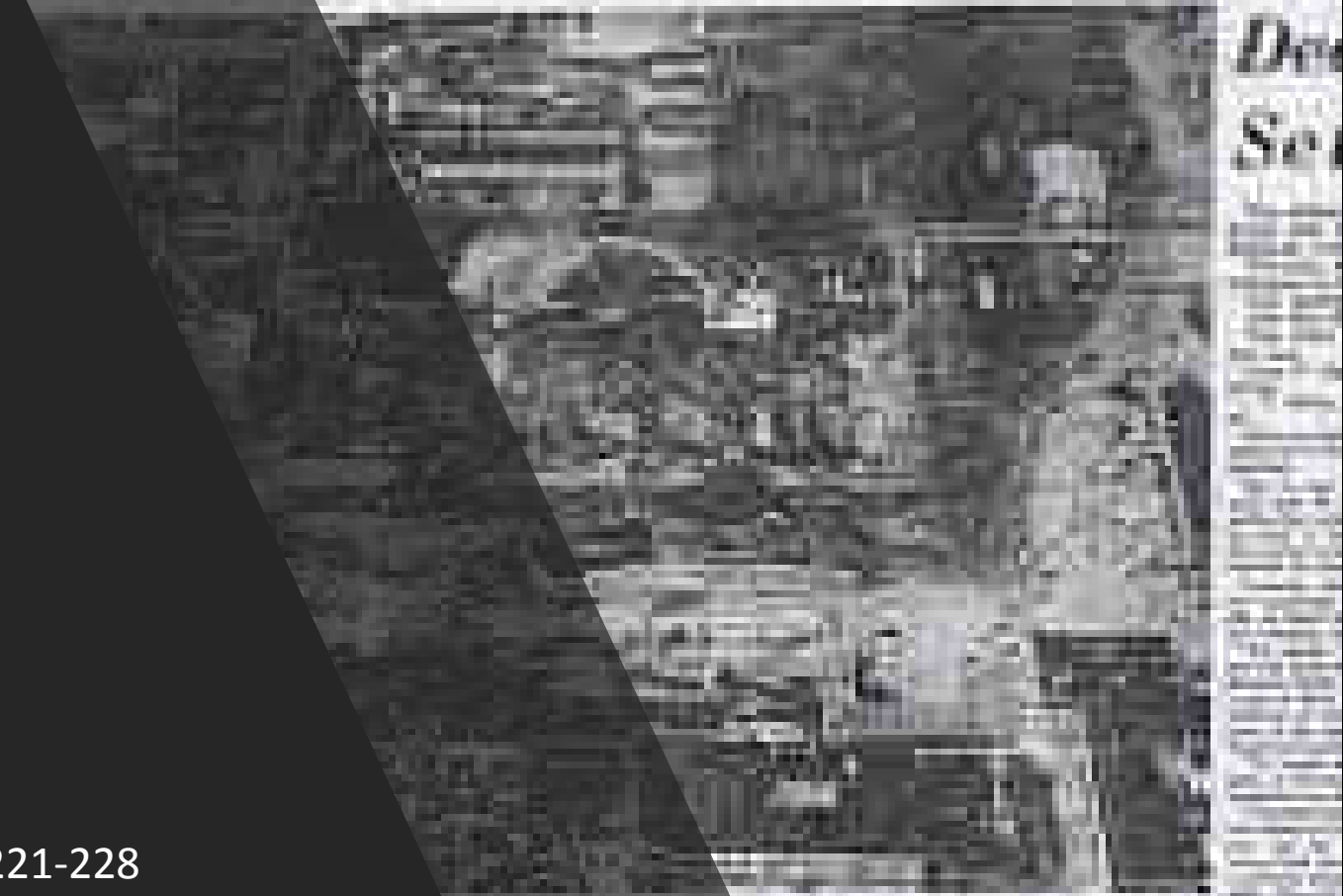
Nitrator

October 4, 1960

Eastman's Aniline Plant Explosion

Lodal, P. N. *Process Safety Progress*, vol. 23, 2004, 221-228

KINGSFORT NEWS TEC BLAST VICTIMS IDENTIFIED



Morning After Tragedy Struck



- 16 dead
- 48 hospitalized
- >250 injured

Aniline Plant Explosion Video



darkest day
50 years ago



It was a sunny Tuesday afternoon — still change at Eastman Chemical Co. Ben first shows preparing to head home for the day. So were Howard Young and his Johnson, and hundreds of other Eastman employees. But not Cliff Hasey. The 5-year-old head of the Aniline Division was desperately trying to figure out why his plant's ammonia gas system. He had delivered a report earlier in the day, citing problems with its operation. Now Hasey was reporting to check a process over to see if he could pinpoint the problem. Across town, Hasey's son, Russ, 12, was locking up his room, getting ready to go outside and play basketball. That's when it blew. A massive explosion followed by several smaller blasts caused the transformation across the town.



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Building 156



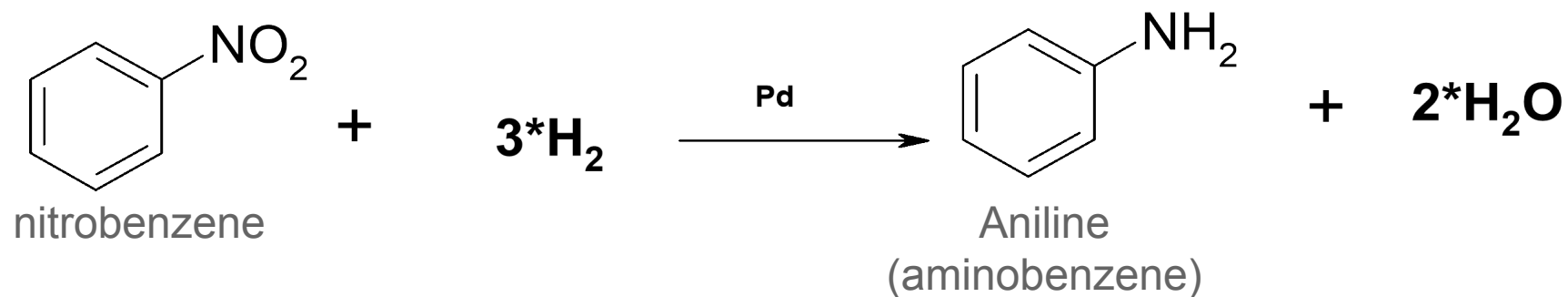
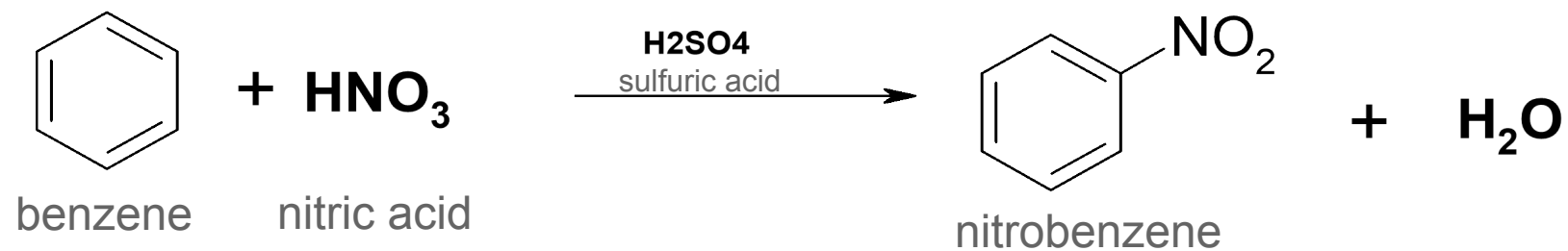
Looking east on D Avenue

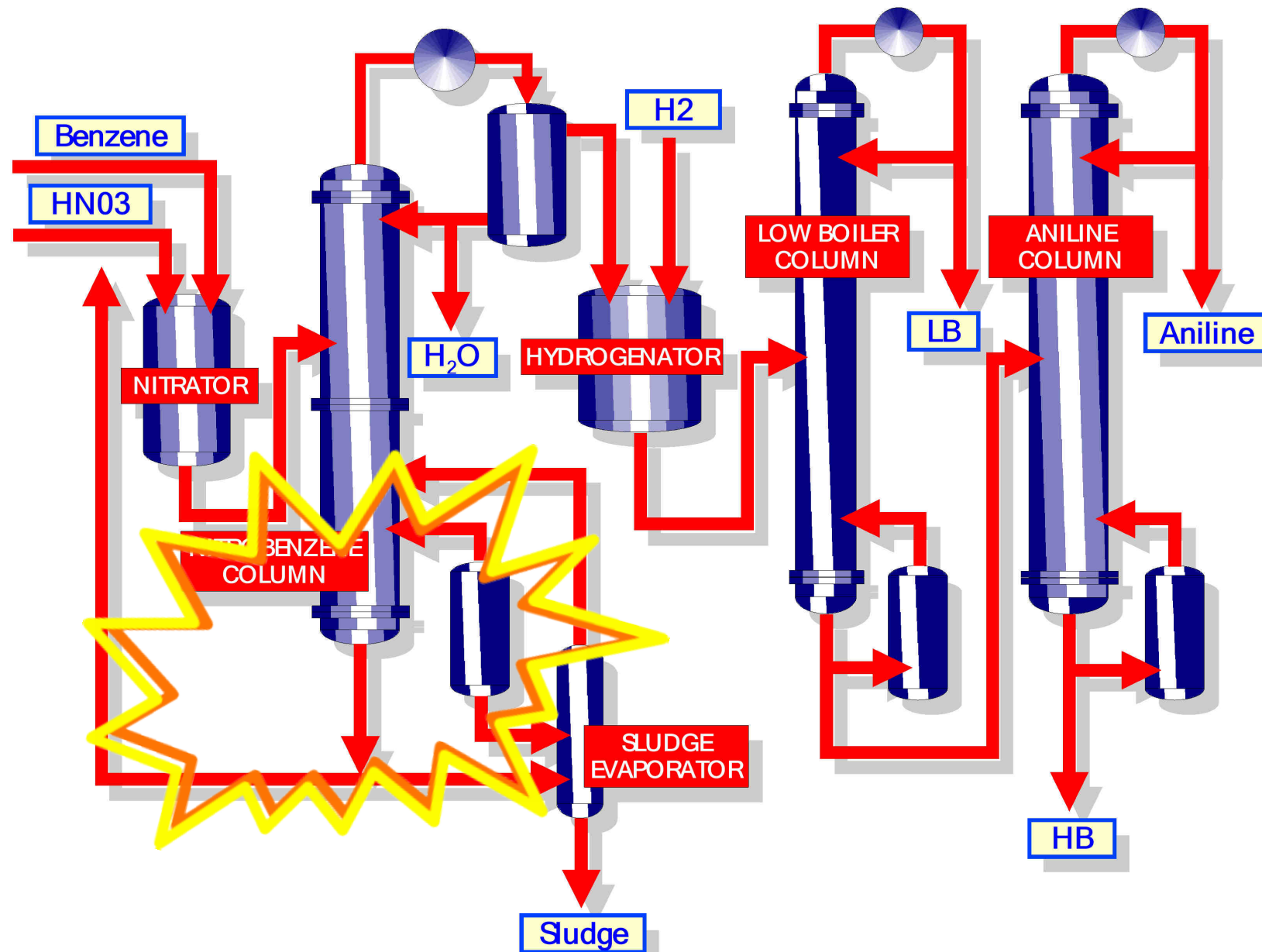




View from site Bldg. 207 looking north

Aniline Chemistry





Process flow diagram

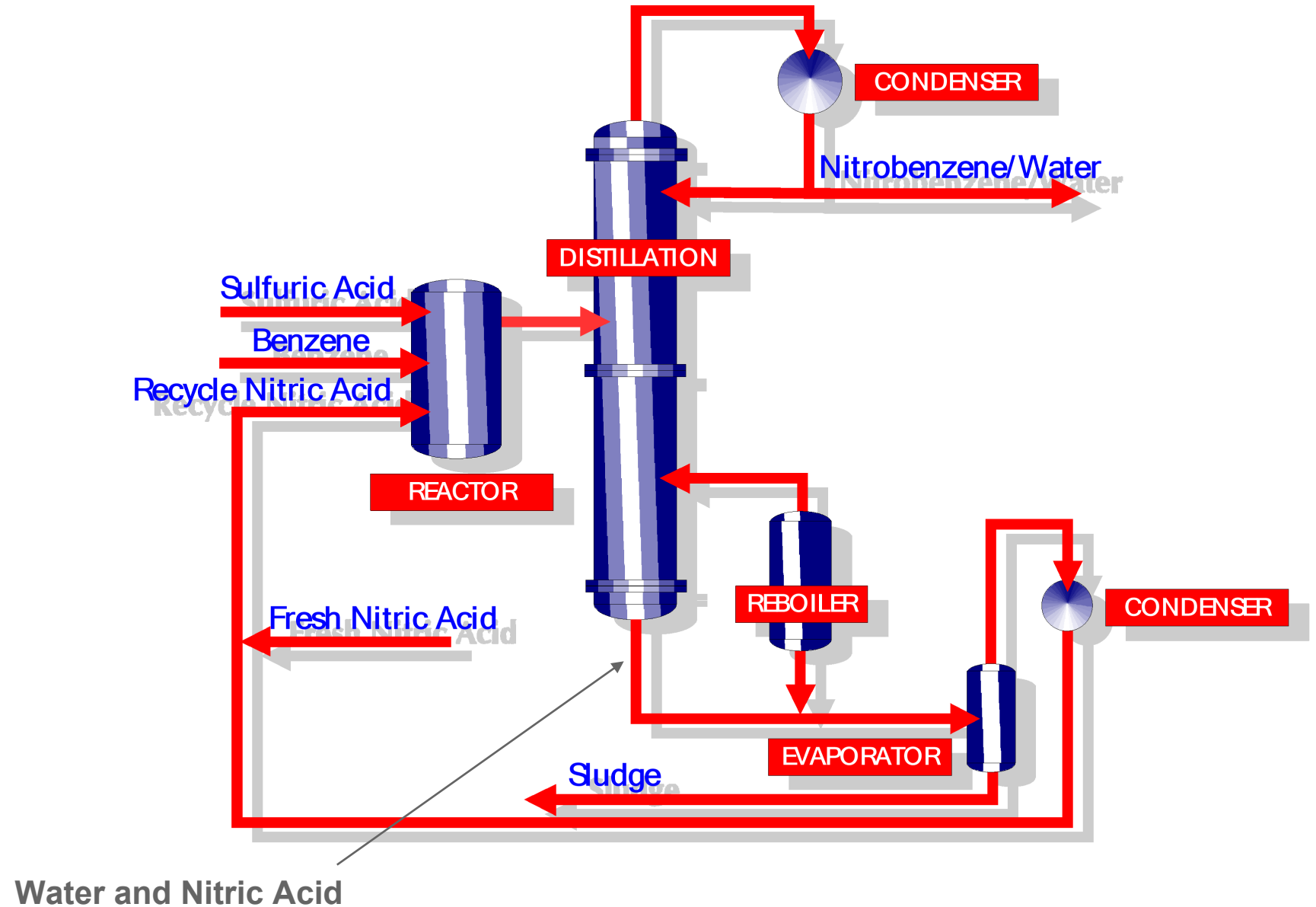
“...the cause of the nitrobenzene column failure and initiation detonation is not known”

-Jan. 31, 1961 incident report

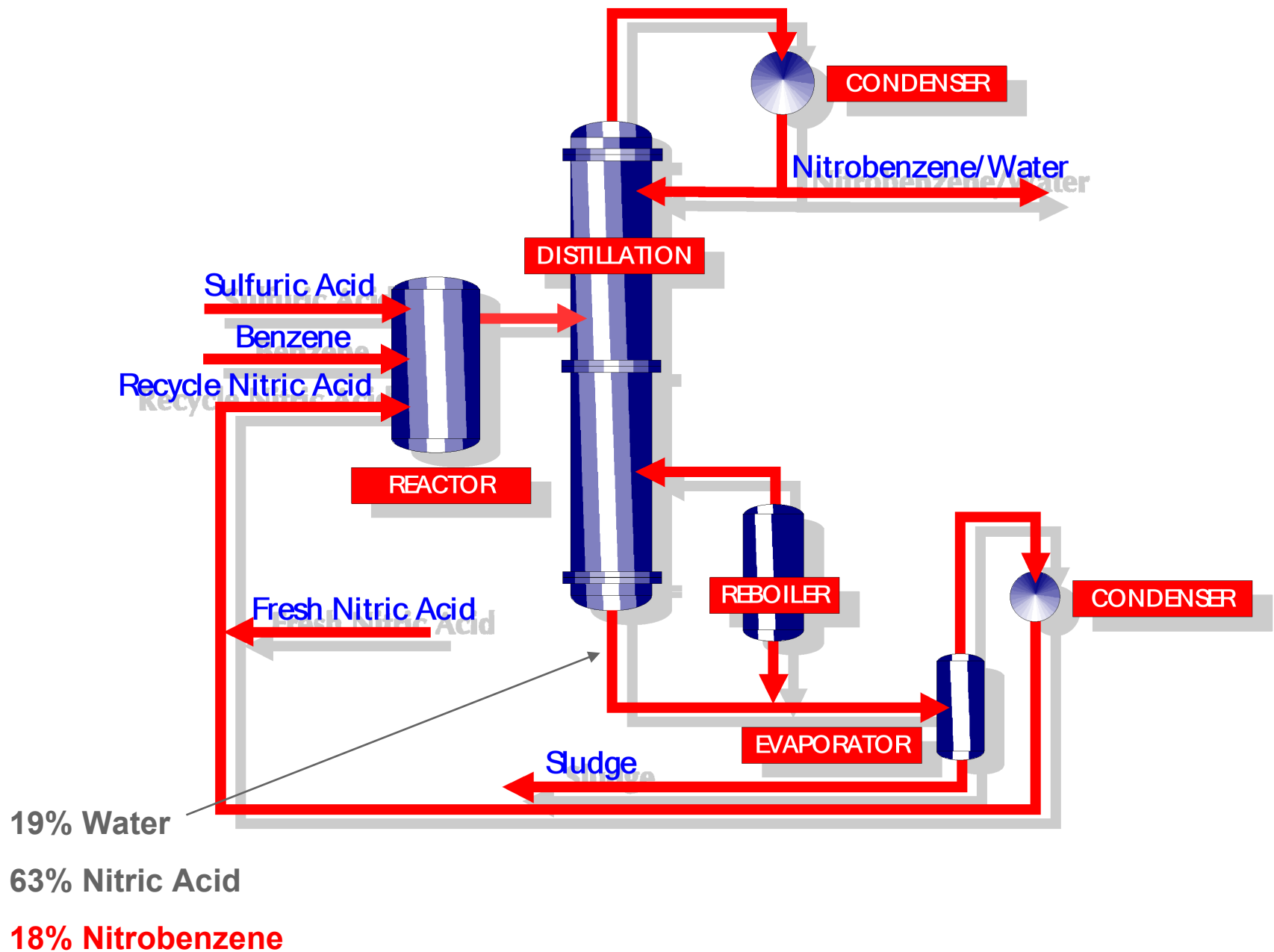
“...using newer analysis techniques and obtaining physical property data...have allowed us to piece together a possible scenario...”

-Lodal, P. N. *Process Safety Progress*, vol. 23, 2004, 221-228.

Normal Conditions



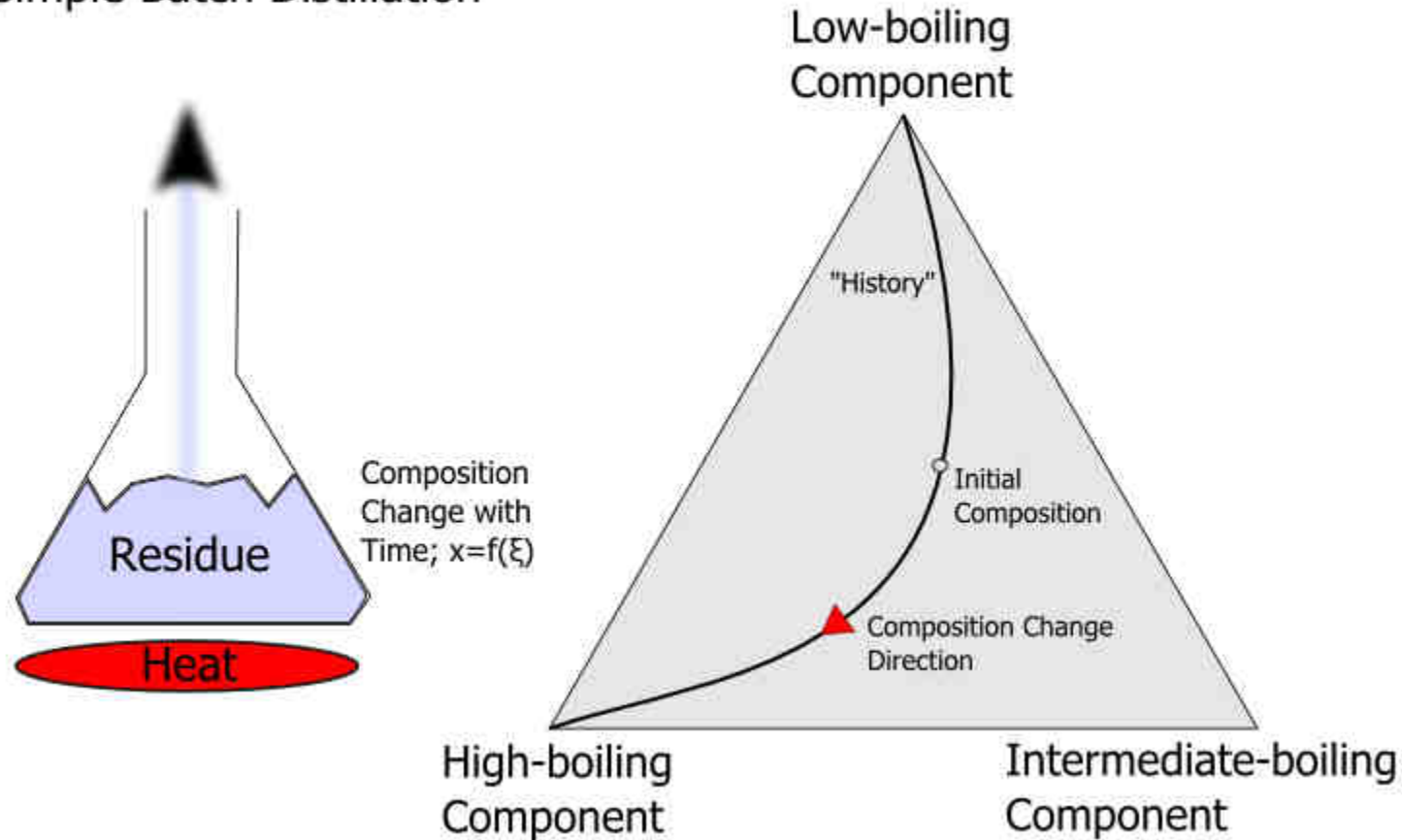
Conditions on
Oct. 4, 1960



Residue Curve Principle

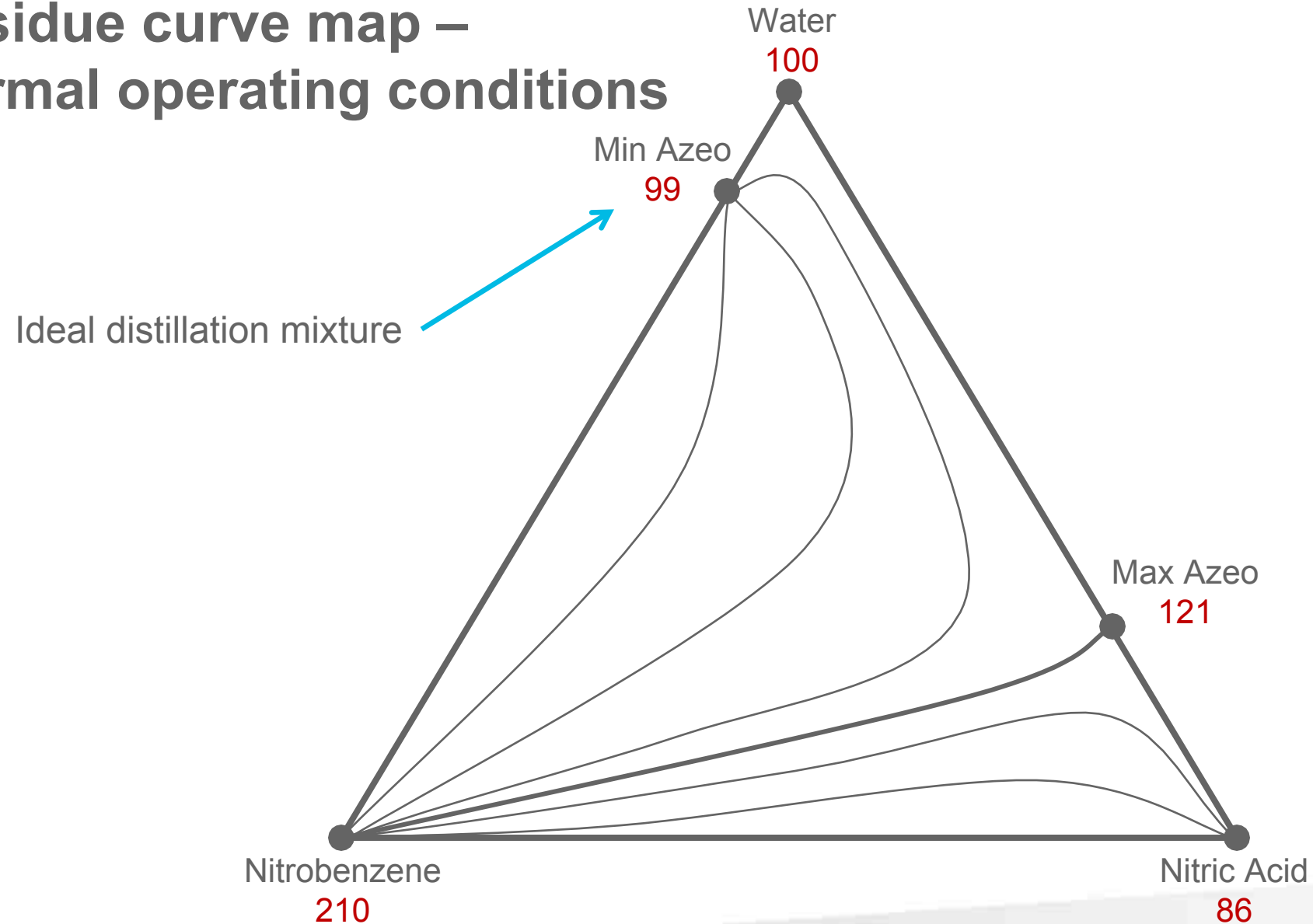
Simple Batch Distillation

EASTMAN

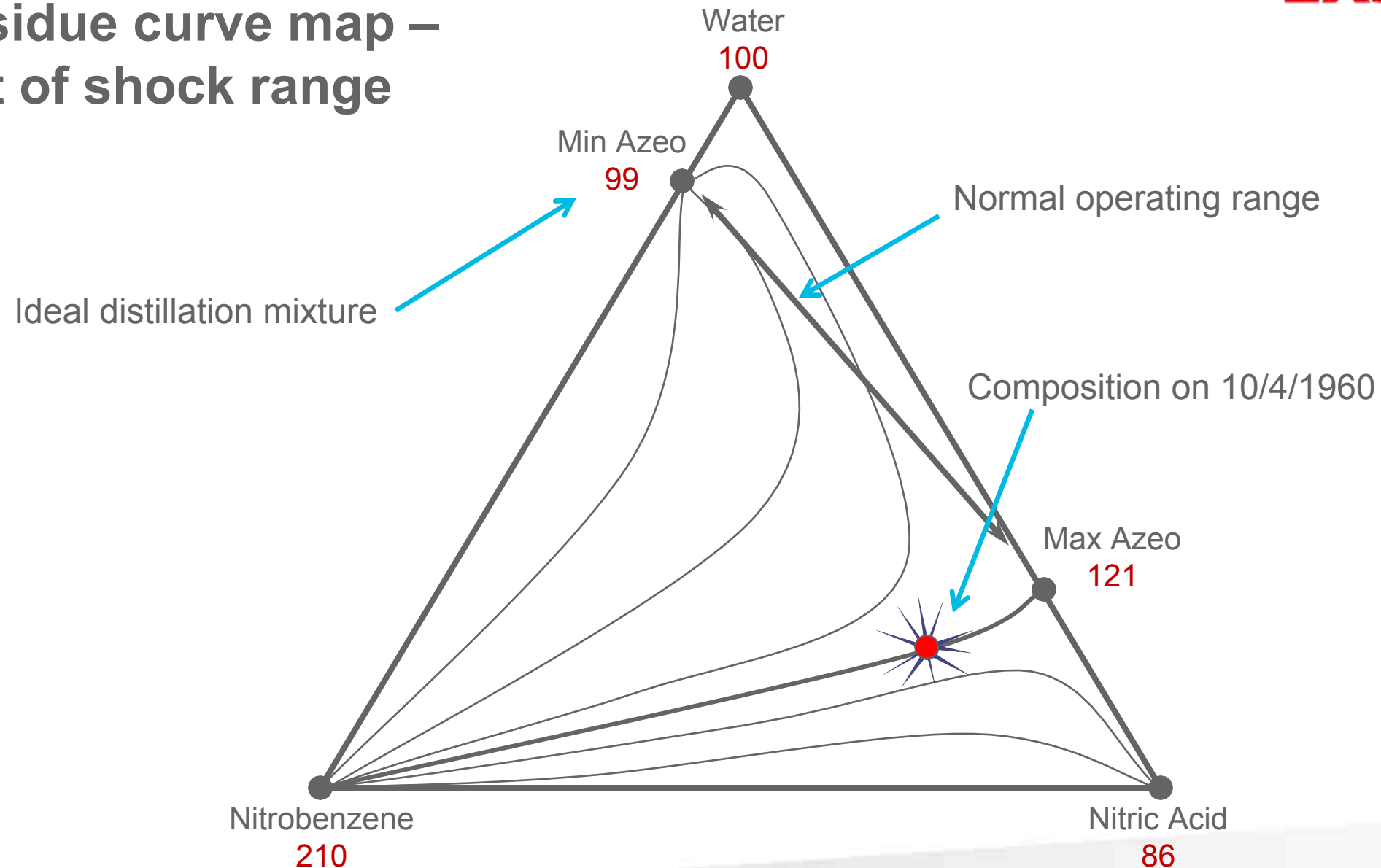


A **residue curve** describes the change of the composition of the **liquid phase** of a chemical mixture during continuous evaporation at the condition of **vapor-liquid equilibrium** (open distillation). Multiple residue curves for a single system are called *residue curve maps*.

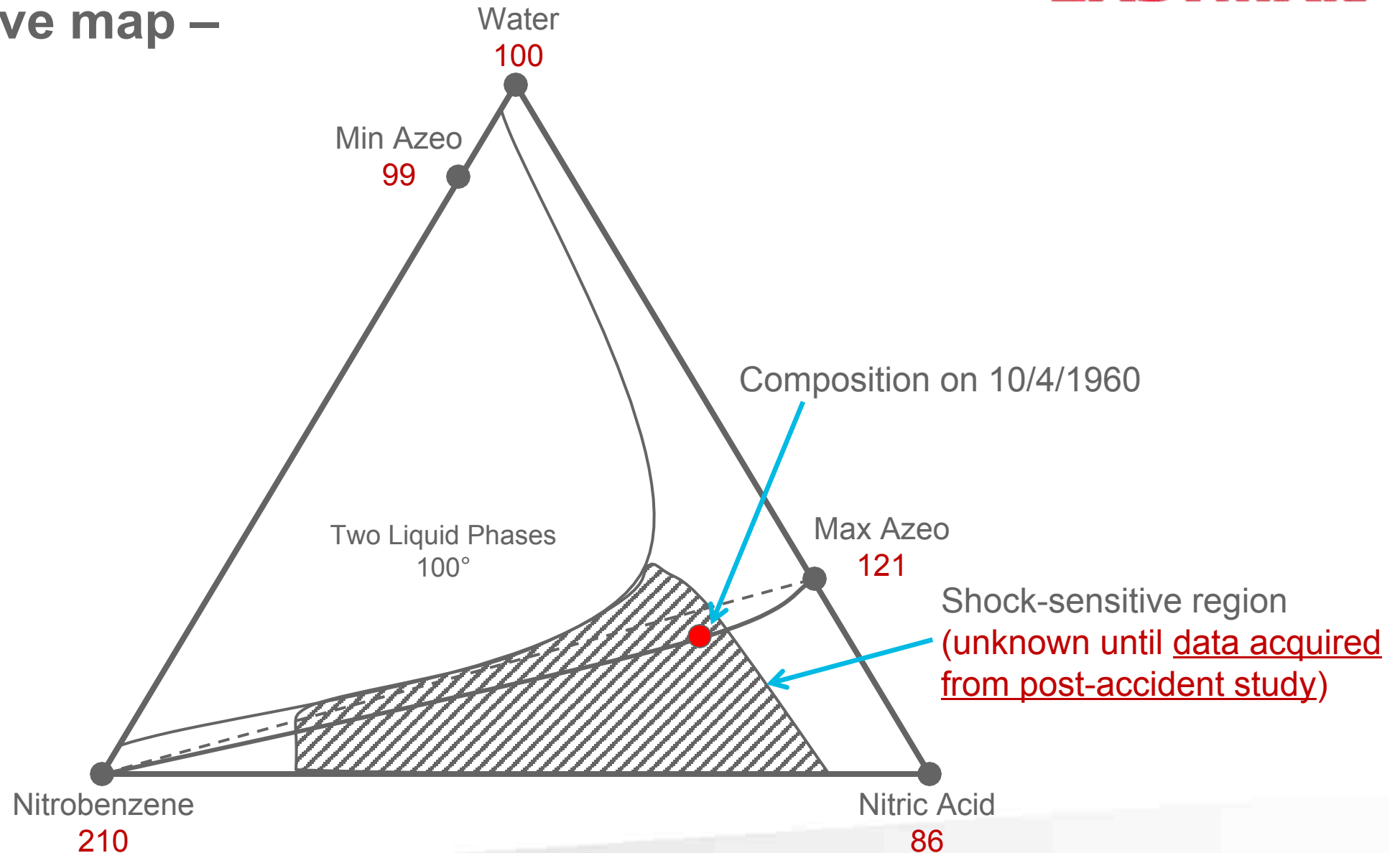
Residue curve map – Normal operating conditions



Residue curve map – Out of shock range



Residue curve map – Detonation



"The farther back one can look, the
farther forward one can see."

--Winston Churchill