

Redefining Pollution Prevention (P2):

Leading a Federal P2 Program to Tackle the Impossible Problems



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10/30/2019



Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

Pollution Prevention Act of 1990 – Defined

Pollution prevention is **reducing or eliminating waste** at the source by **modifying production processes**, promoting the use of **nontoxic or less toxic substances**, implementing **conservation techniques**, and **reusing materials** rather than putting them into the waste stream.

Pollution prevention means source reduction and EPA defines P2 in this [Memorandum - May 28, 1992, Subject: EPA Definition of "Pollution Prevention."](#)

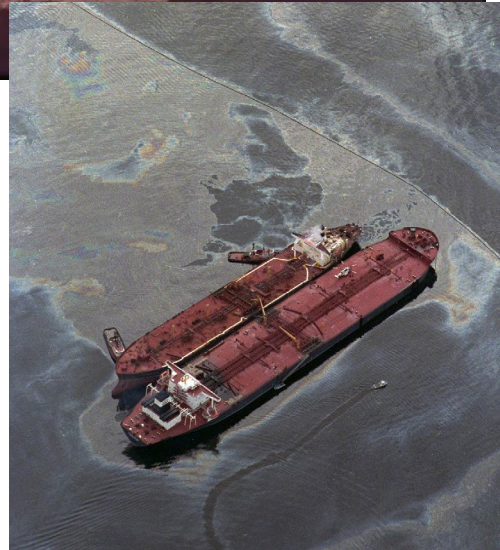
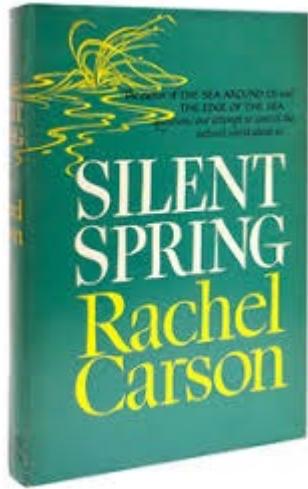
The Pollution Prevention Act defines **"source reduction"** to mean any practice which:

- Reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions); prior to recycling, treatment or disposal; and
- Reduces the hazards to public health and the environment associated with the release of such substances, pollutants or contaminants.

The term includes: equipment or technology modifications; process or procedure modifications; reformulation or redesign of products; substitution of raw materials; and improvements in housekeeping, maintenance, training or inventory control.

Under the Pollution Prevention Act, recycling, energy recovery, treatment and disposal are not included within the definition of pollution prevention.

Then...

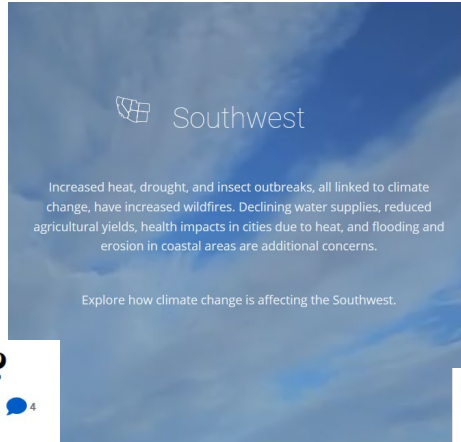


Now...



Is it too late to do anything about climate change?

By Richard W. Murray · October 1, 2019, 2 hours ago



'We know they aren't feeding': fears for polar bears over shrinking Arctic ice

Expert Steven Amstrup says 'the longer the sea ice is gone from the productive zone the tougher it is on the bears'



graph:

Flint's water crisis: what went wrong

After the water supply was found to contain high levels of lead, evidence is mounting that officials ignored or neglected indicators of a growing crisis



▲ LeeAnne Walters shows water samples from her home from 21 January and 15 January after city and state officials spoke during a forum discussing growing health concerns being raised by residents about the water. Photograph: Ryan Garza/AP



The Planpincieux glacier located in Italy's Alps is melting, officials say. ANTONIO CALANNI/ASSOCIATED PRESS/ASSOCIATED PRESS

'It's heartbreaking': a coastal community watches its beach wash away

Manmade sea walls and the effects of climate change eating away at Stockton beach, and locals are rallying to save it



▲ Aerial footage of dramatic erosion at NSW's Stockton beach - video

Where does that leave the LANL Pollution Prevention (P2) program?

- The Difference of the “new” P2 Program:
 - Steps beyond traditional buzz words of “waste minimization,” “zero waste,” “green practices,” “reuse,” etc. and tackles the deeply entrenched issues.
 - Tackles projects clearly emphasized as “that’s impossible,” focusing on:
 - Structural change
 - Customer service
 - Social responsibility/Worker safety
 - Innovation
 - Steps into the world of climate change and climate change preparedness.
 - Completely new to the P2 concept, but completely relevant to today’s world!

Where does that leave the LANL P2 Program?

- Important similarities to the original P2 concept:
 - Source reduction is emphasized
 - Process improvement, technological improvement, and return on investment are still key wins for P2 projects.

What new services do we bring to the table?

- Connect silos of organizations, people, and information for the sake of a solution.
- Behavior modification is not considered a solution, fixing the structural issues is considered first
- Provide staff for the deep dive understanding of a problem
 - Apply technical expertise (provided by P2) to best understand the problem/solutions.
- Resource those who have ideas, technical innovation, or vetted solutions for a problem (who have had difficulty obtaining resources via other means)
- Never blindly accept the path of “we have always done it this way...”

What new services do we bring to the table?

- Always eliminate selection bias for funded P2 projects by using stringent selection criteria evaluating:
 - Structural change
 - Source reduction
 - ROI
 - Social impact
 - Transferability
 - Mission resiliency

Case Study: Successful Implementation of the “New” P2, and its criteria, for SF₆ elimination

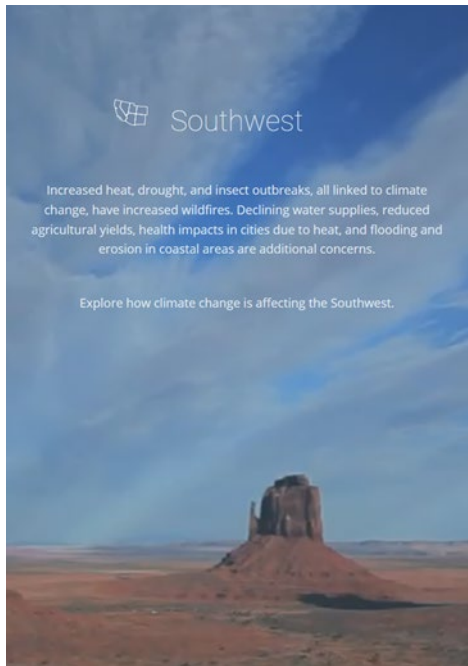
- Fall of 2016, DOE queries LANL on the use of SF₆, an extremely potent greenhouse gas
- One user of SF₆ and SF₆ mixed gas was an engineer in Plasma Physics.
 - His process used “home built” switchgear for pulse power that utilized these gases as a dielectric insulator.
 - Switchgear was found to be inefficient, would arc on occasion, and was cumbersome to customize to experiments
- P2 scored the potential project and funded a two year effort to redesign this switchgear without SF₆.

Case Study: Chemical Management at LANL

- In FY 2019, LANL lab packed 11,115 items as hazardous waste.
 - Equates to millions of dollars in wasted purchase cost + disposal cost + burdened labor costs.
 - Unused/unspent chemicals have historically made up a large % of these lab packs.
- P2 providing services with the largest deep-dive to-date as chemicals are used in almost every organization of the Lab. Too many structural issues to list.
- Finding so far: The common solution of reusing chemicals not the answer. Improved procurement practices, improved database functionality, more efficient inventory tools, and the implementation of support staff (ie., deep structural change) will be the solution to waste.

What about water?

- Climate change, mission resiliency, be a good neighbor, do the right thing...



3.17 Climate Trends and Greenhouse Gases

The study, identification, and tracking of variation in the climate are vital to DOE in order to protect the mission conducted at LANL. Trends in climate may represent a vulnerability in the conduct of operations if it results in limitations of consumption of resources or utilities provided to LANL.

Source: Supplemental Analysis of the 2008 Site-Wide Environmental Impact Statement for Los Alamos National Laboratory (2018)

Source: <https://nca2014.globalchange.gov/report/regions/southwest>

What about Water?



D0 - Abnormally Dry

- Short-term dryness slowing planting, growth of crops
- Some lingering water deficits
- Pastures or crops not fully recovered



D1 - Moderate Drought

- Some damage to crops, pastures
- Some water shortages developing
- Voluntary water-use restrictions requested



D2 - Severe Drought

- Crop or pasture loss likely
- Water shortages common
- Water restrictions imposed



D3 - Extreme Drought

- Major crop/pasture losses
- Widespread water shortages or restrictions



D4 - Exceptional Drought

- Exceptional and widespread crop/pasture losses
- Shortages of water creating water emergencies

Source: drought.gov/drought/states/new-mexico

Drought in New Mexico from 2000 - 2019

The [U.S. Drought Monitor](#) started in 2000. Since 2000, the longest duration of drought (D1-D4) in New Mexico lasted 329 weeks beginning on May 1, 2001 and ending on August 14, 2007. The most intense period of drought occurred the week of June 21, 2011 where D4 affected 49.09% of New Mexico land.

- Drought from 2000
- Drought from 1895

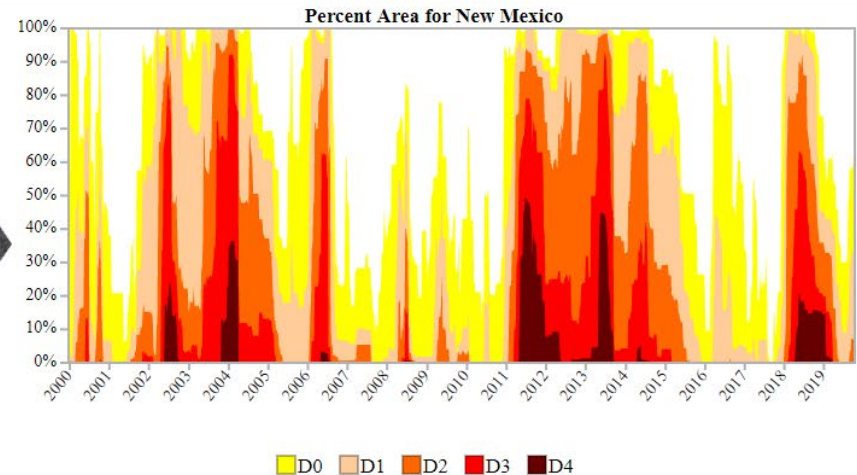
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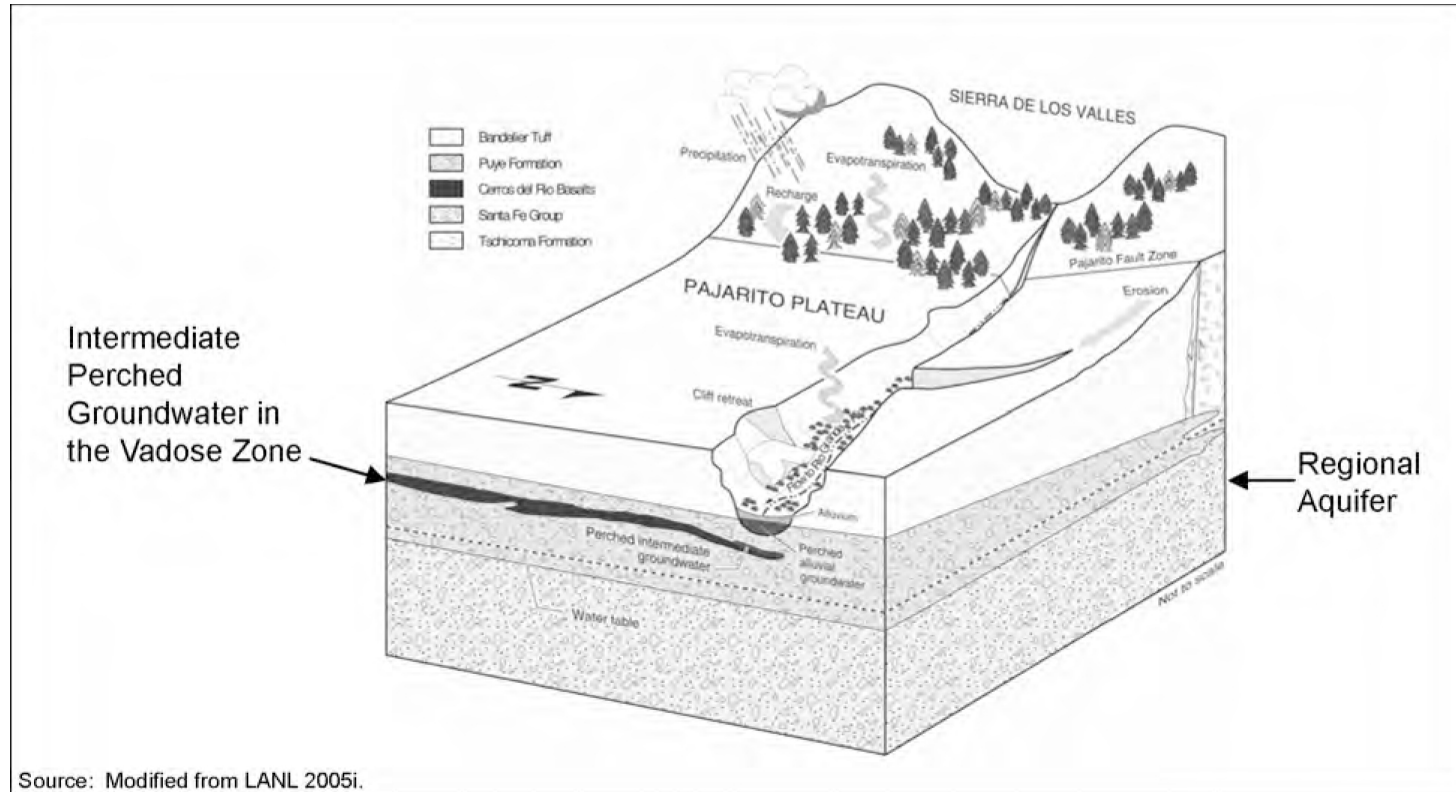
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What about water?

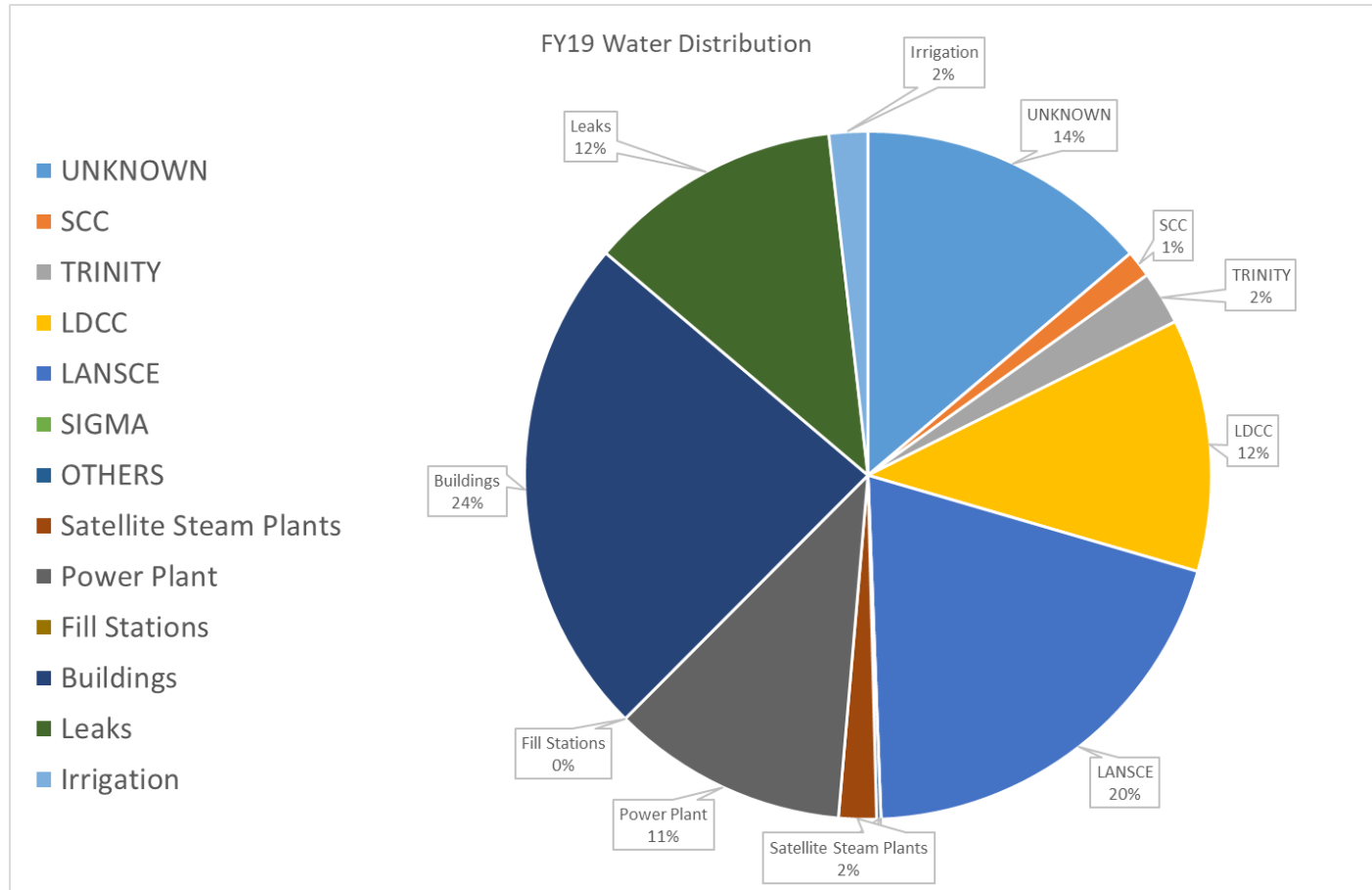


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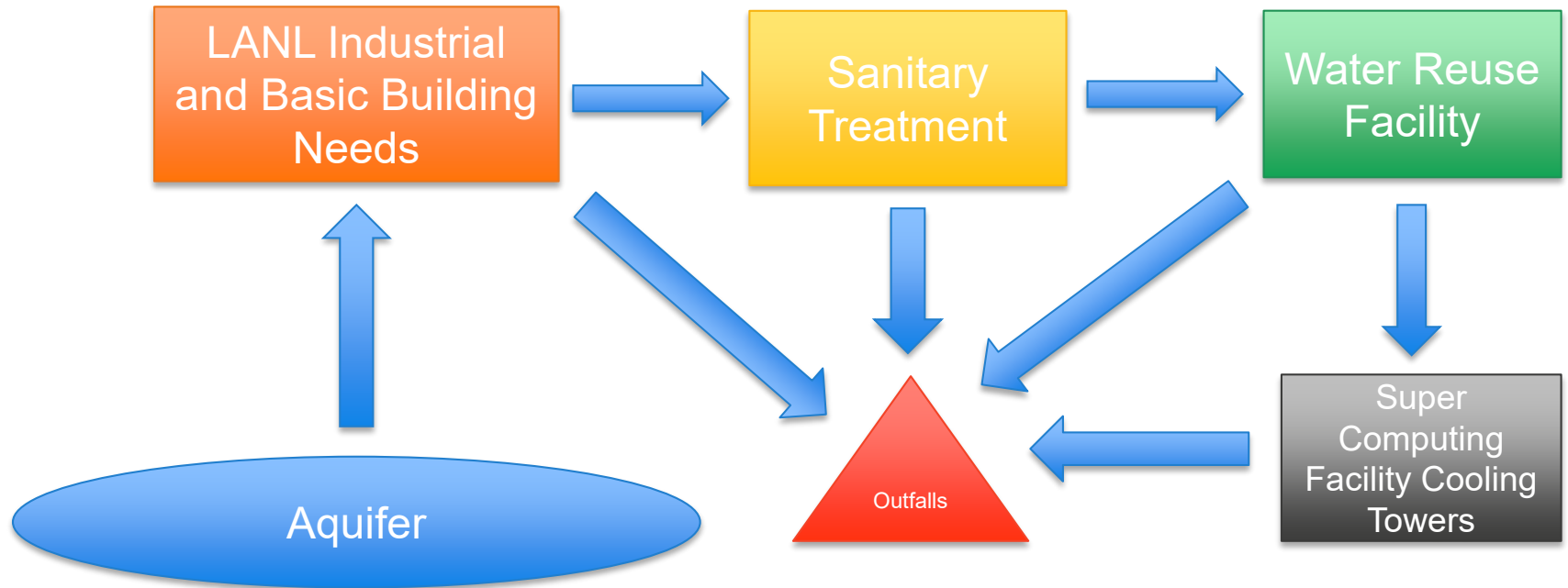
What about water?

- Do we know enough about our aquifer, in the face of climate change, to say with confidence that...
 - we can keep using water at existing rates?
 - we know that the water quality will remain unchanged?
 - our mission requirements (requiring water) will be unaffected in the face of water restrictions, water shortages, and/or water politics?
- P2 will be in the long-term discussion, and sometimes initiating discussions, to lead the way on asking these hard questions.
 - Example: Working to fund continued, and improved, groundwater modeling capabilities

LANL Uses of Water



LANL's Water Cycle



Case Study: Cooling Towers

- Large water using cooling towers are mission critical, or science priorities
 - Supercomputing
 - LANL business computer systems
 - Accelerator Science (~30% of water usage on the site from cooling)
- P2 has pushed for resources this year to characterize all LANL cooling towers to add value by identifying structural change opportunities within LANL.
 - Funding 3-4 pilot or benchtop projects which will benefit the quest for improved cooling tower management.

Sanitary Waste Water Treatment

- Biological system which accepts industrial inputs
 - Outfall which accepts treated water has had repeated exceedances, specifically of PCBs
 - Reduced water efficiency due to overtreatment
- P2 provided value by establishing an in-house sampling and analysis program at LANL, analyzing site contribution of PCBs
 - Multi-year effort
 - Faster review of results, increased data review
 - Identified several sites of interest (machine shops and others)
 - Capability for a permanent program to analyze water inputs, and other sample types, and those constituents that could effect compliance, or the environment (ie. going beyond compliance)

Wrap-Up

- P2 is so much more than waste minimization, reuse, zero waste, and green practices.
- P2 is:
 - Structural change for entrenched and difficult issues
 - Customer service
 - Social responsibility
 - Technical innovation
 - Return on investment
 - Going beyond compliance
 - Stepping away from the original policy language to address the issues of today, such as climate change