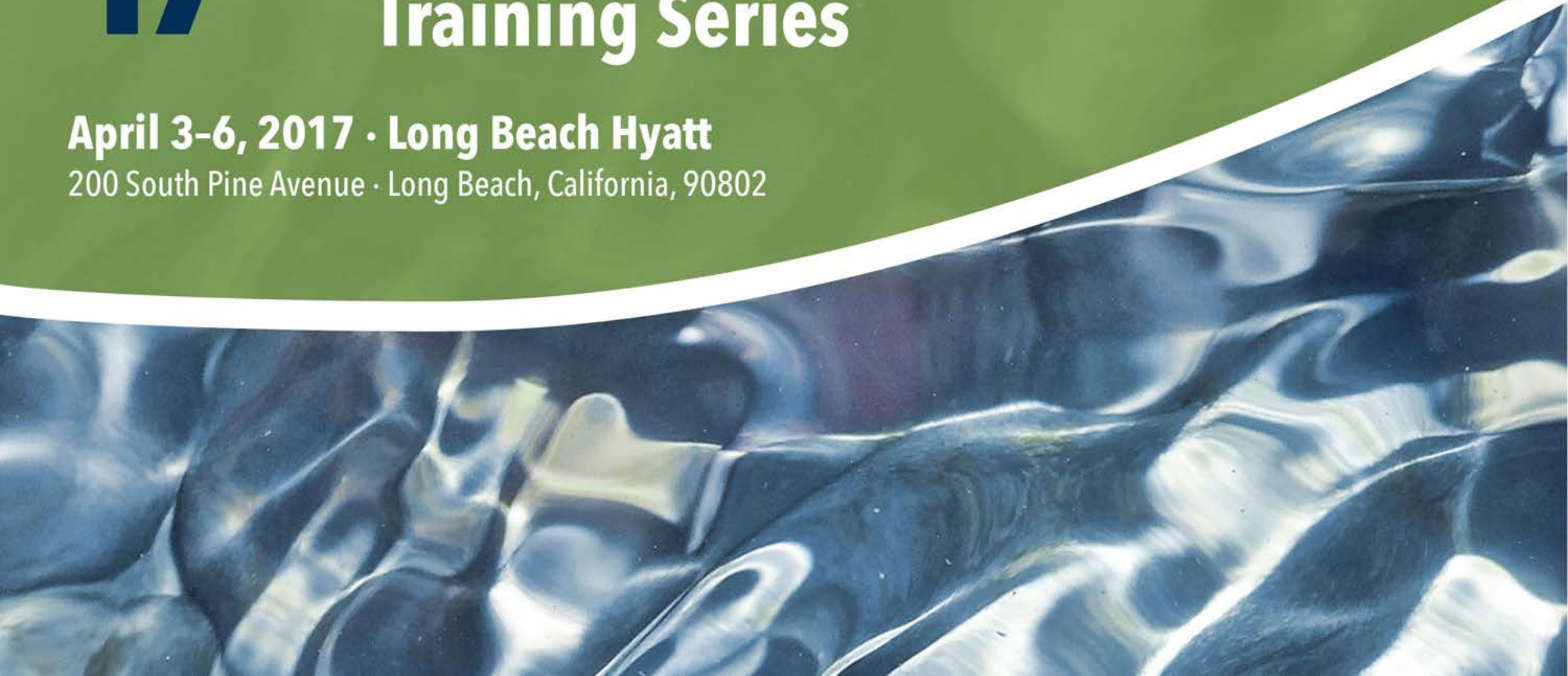
17th Technical Training Series

CalRecycle

April 3–6, 2017 · Long Beach Hyatt

200 South Pine Avenue · Long Beach, California, 90802



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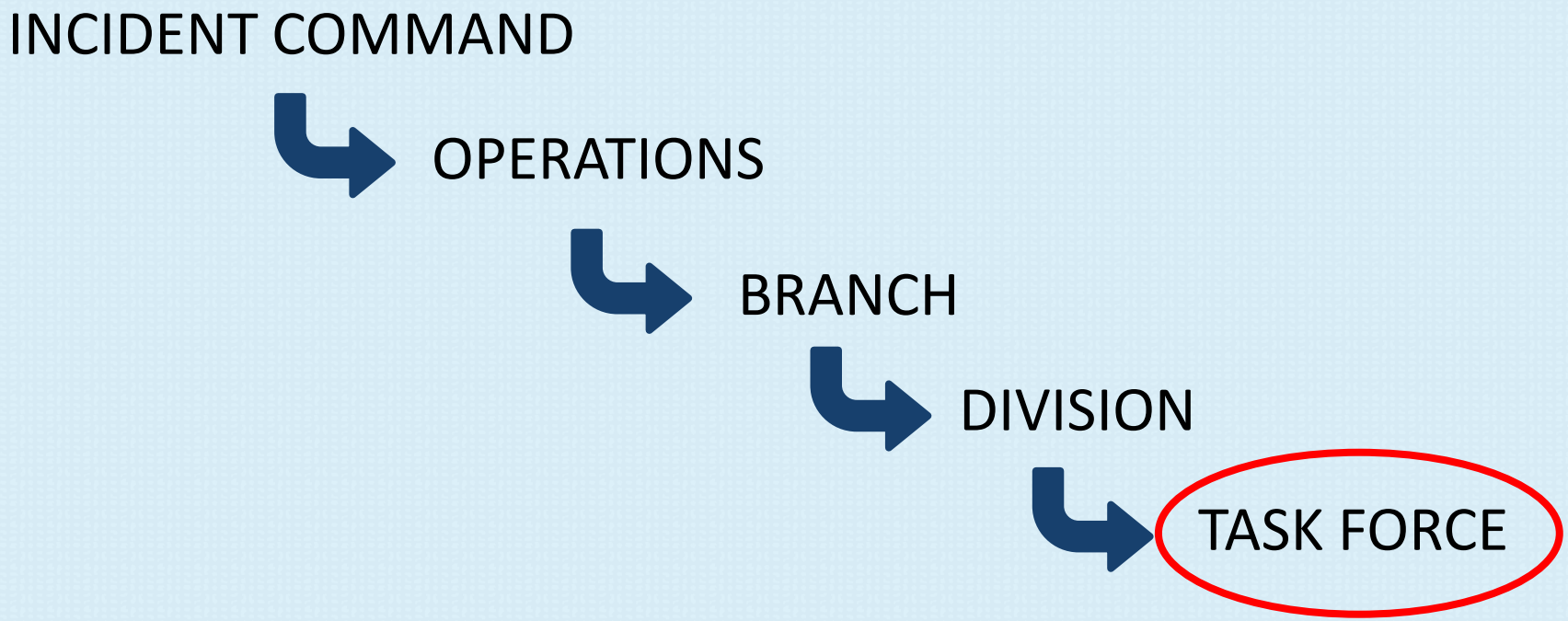
CalRecycle

How to Get from Here to There

Before

After

ICS Structure



Task Force Details

- Typically Composed of the Following Crew:
  - 1 Task Force Leader/Debris Monitor
  - 1 Foreman
  - 1 to 2 Operators
  - 3 to 4 Laborers
  - 1 Water Truck Tenders

Equipment - Excavator

Equipment - Excavator

Equipment – Skid Steer

Equipment – Skid Steer

Equipment – Skid Steer

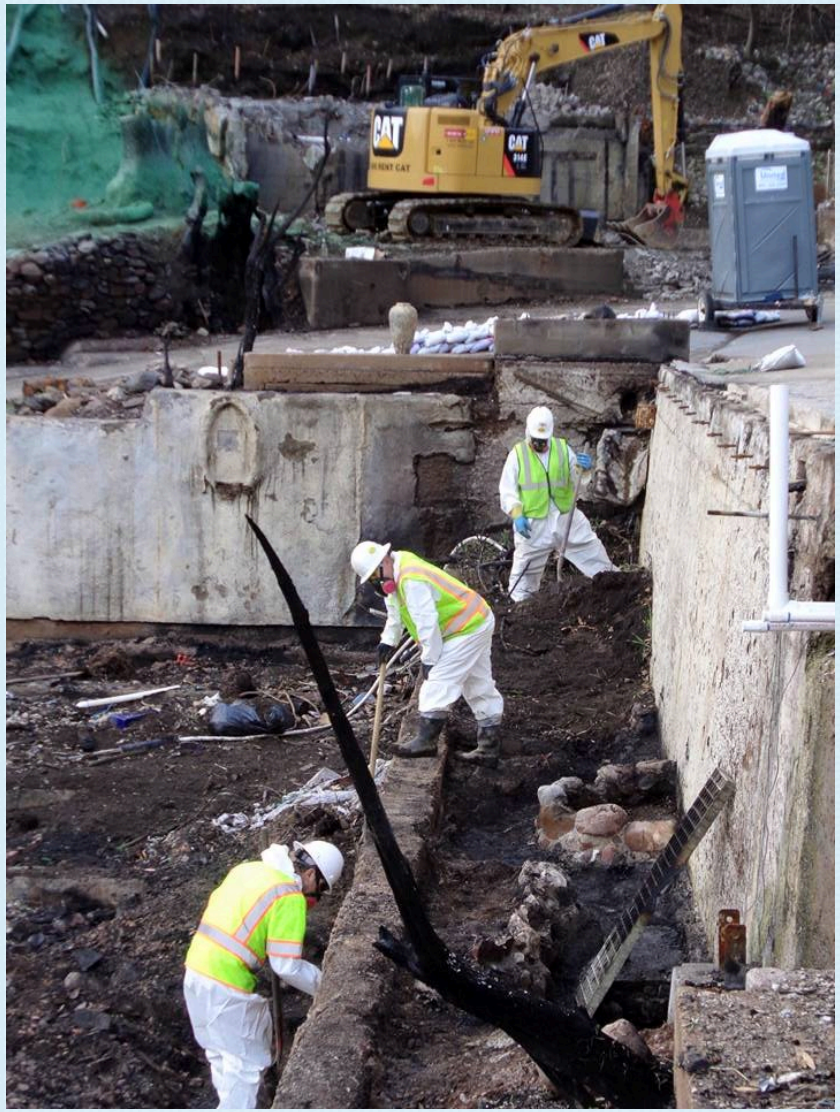
Equipment – Water Trucks

Equipment – Water Trucks

Equipment – Low Boy

Valley Fire – Approximately 50 crews completing 1 site every 1.5 to 2 days = 25 to 33 trips per day!

Physical Labor



Physical Labor

Physical Labor

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Physical Labor

Equipment – Tractor / Front Loader

Equipment – Disposal Trucks

Equipment – Disposal Trucks

Equipment – Disposal Trucks

Specialized Equipment - Roads

Specialized Equipment - Bridges

Specialized Equipment - Misc

Specialized Equipment - Misc

Debris Removal Timeline

- Typical Debris Removal Timeline:
  - Site Assessment
  - Hazardous Materials
  - Asbestos Survey and Removal
  - Vehicles / Chimneys
  - Metals
  - Ash/Debris
  - Concrete

Site Assessment

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Site Assessment

- Identify property lot lines on each property.
- Identify septic tank and leach field locations on each property.
- Identify water wells, springs, other water sources and water storage tanks on properties not serviced by the local water agency.
- Measure and record foundation and other hardscape footprints.
- Measure and record ash footprints.
- Identify other property-specific hazards (i.e. swimming pools, large vehicles, hazard trees).
- Conduct radiation sweep.
- Identify, sample, analyze, and remove asbestos containing materials.

Debris Removal – Hazardous Materials

- Pressurized tanks
- Unexploded Ordnance
- Misc. Solvents
- E Waste
- Household Hazardous Waste

Debris Removal - Asbestos

- Hauled to Lined Class III Landfill, permitted to accept asbestos
  - Insulation
  - Pipes
  - Tiles
  - Chimney mortar

Debris Removal - Vehicles

- Recycled as metal after Insurance and DMV is contacted

Debris Removal - Chimneys

- Disposed as ash/debris unless containing asbestos (new requirement)

Debris Removal - Metal

- Recycled as scrap. Money gained goes to defray cost of project

Debris Removal - Metal

- Garage doors
- Appliances
- Structural metal (I-Beams)
- Electrical equipment
- Trailers

Debris Removal – Ash/Debris

- Disposed as waste. “Burrito” wrapped in plastic

Debris Removal – Ash/Debris

Debris Removal - Concrete

- Recycled if possible, if not goes out as waste

Debris Removal - Concrete

Lessons Learned: Concrete Slab Removal

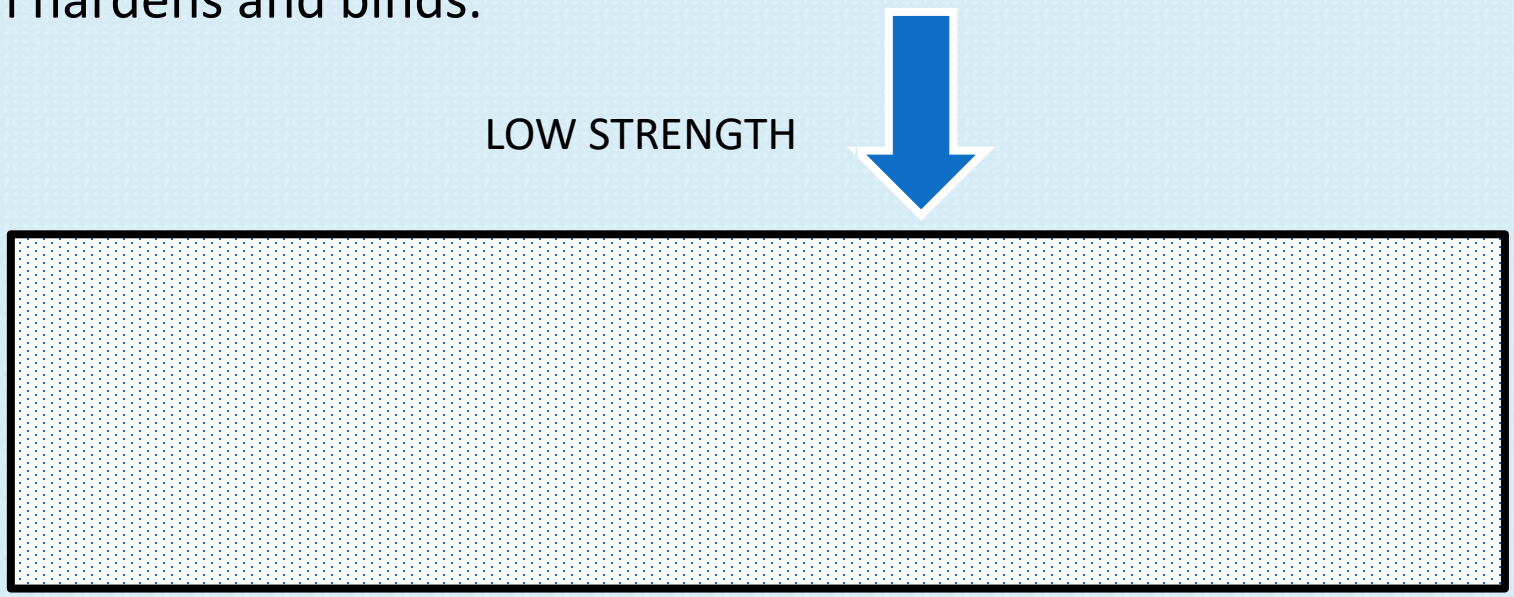
"Why do you have to remove the concrete foundation?"

Lessons Learned: Concrete Slab Removal

- What is Concrete?
- What is Reinforced Concrete?
- Other terms used: Cement, Pavement, Asphalt
- Concrete is the second most consumed material in the world after water
- Almost 3 tons of concrete produced each year for every human on the planet

Lessons Learned: Concrete Slab Removal

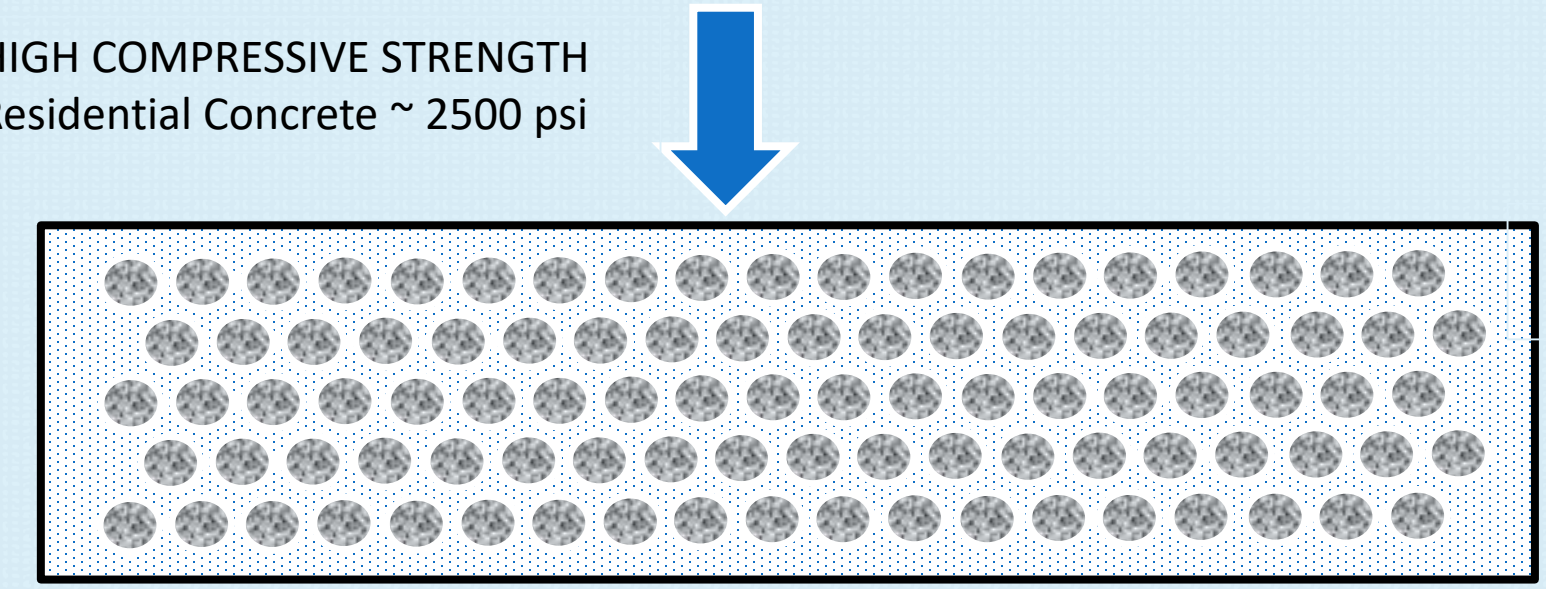
CEMENT: Fine mineral powder (mostly lime and silica). Mixed with water, produces a paste which hardens and binds.



Lessons Learned: Concrete Slab Removal

CONCRETE: Sand and gravel (aggregate) bounded with cement

HIGH COMPRESSIVE STRENGTH
Residential Concrete ~ 2500 psi



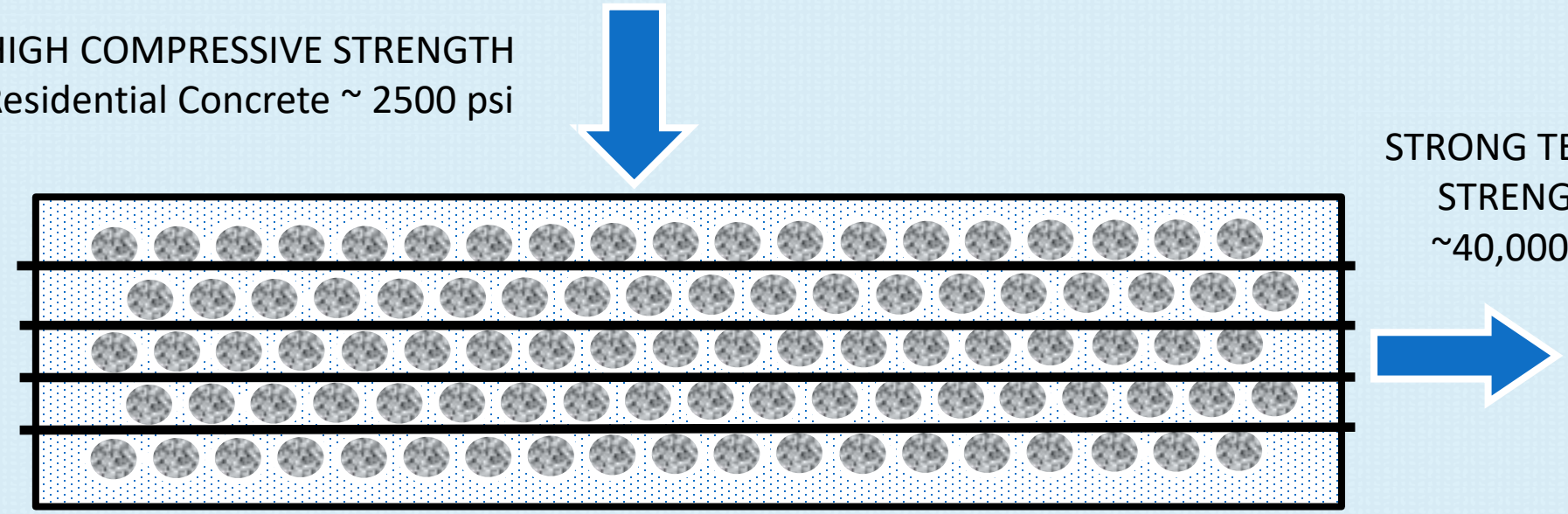
WEAK TENSILE STRENGTH

BENEFITS OF CONCRETE: Inert, High Specific Heat, Durable, Cheap

Lessons Learned: Concrete Slab Removal

REINFORCED CONCRETE: Concrete with metal

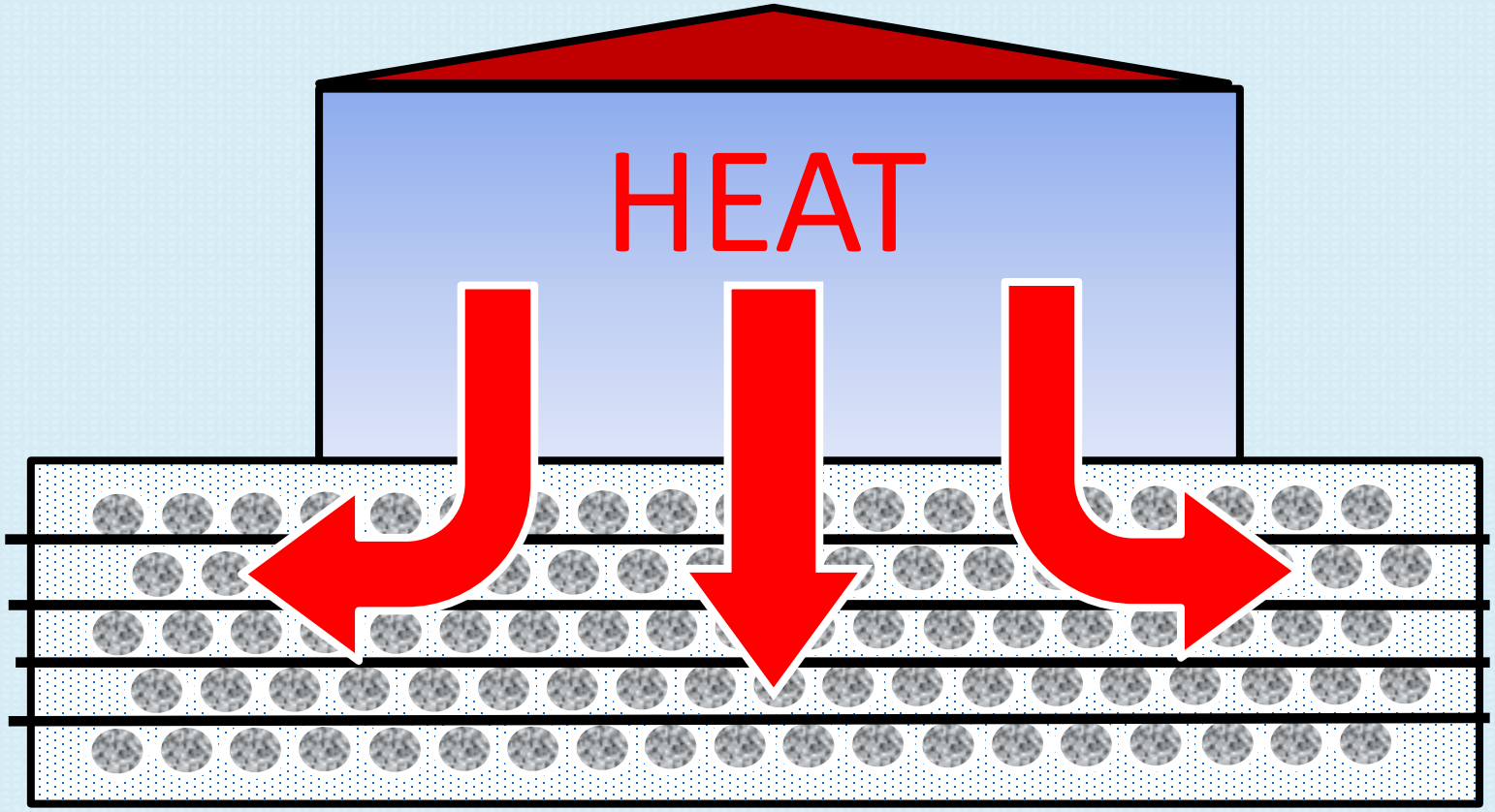
HIGH COMPRESSIVE STRENGTH
Residential Concrete ~ 2500 psi



STRONG TENSILE STRENGTH
~40,000 psi

BENEFITS OF REINFORCED CONCRETE: Durability of Concrete with tensile strength of steel

Lessons Learned: Concrete Slab Removal



Lessons Learned: Concrete Slab Removal

- Properties of Concrete
  - Inert to fire, durable, cheap
  - Conducts heat VERY slowly
    - Concrete exposed to heat for 1 hour:
    - Surface Temp = 600 °C
    - 1 inch below Surface = 300 °C
- Even at partial strength, concrete is very strong

Lessons Learned: Concrete Slab Removal

- At 300 °C, Concrete is at 85% to 60% strength
- At 550 °C, Concrete is at 45% to 30% strength
- At 900 °C, aggregates pulverize and cement paste fragments, leaving gaps in the slab
- Average Wildfire temp: 800 °C, can reach up to 1200 °C
- Embers of homes keeps elevated temperatures for days
- Heat reduces bonding strength of rebar to concrete

Lessons Learned: Concrete Slab Removal

- Nonstructural Reasons for Removal
  - Contamination around slabs
  - Limitations of future home design
  - Utility connections (reconnect)
  - Earthquake anchor bolts compromised
  - Cost for homeowners

Lessons Learned: Concrete Slab Removal

- Rebuilding on Damaged Foundation
  - Varies County by County
  - Core samples can be taken for strength testing
  - Compressive versus Sheer

Lessons Learned: Concrete Slab Removal

- Rare instances concrete is left
  - Driveways
  - Well/pump houses

Debris Removal - Soil

- Soil – Used for ADC if possible (pending approval by Water Board, depending on soil characteristics), disposed as waste otherwise

Debris Removal – 3 Year Old Standard

Items We Don’t Remove

- Trees (unless hazard to the crew)
- Areas away from living areas
- Partially burned/impacted structures
- Fences
- Swimming pools
- Retaining walls
- Septic Tanks
- Underground utilities
- Minimum debris quantity (cost driven)

Soil Confirmation Sampling

Is the Ash Hazardous or Toxic?

The ash is an immediate threat to public health and safety (source: Cal/EPA)

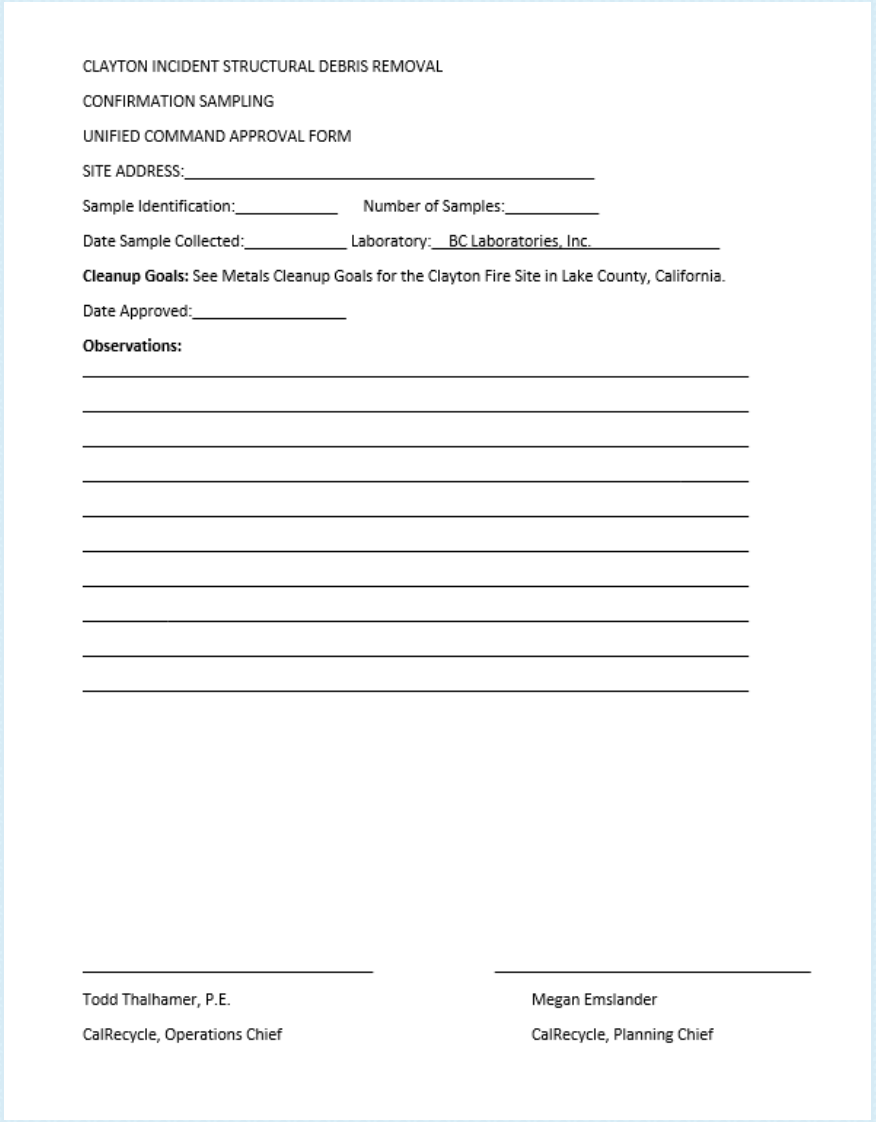
- Residual structural ash contains concentrated amounts of ”heavy metals”, such as arsenic, beryllium, cadmium, cobalt, copper, lead, mercury, nickel, thallium, vanadium, and zinc
- Asbestos is also present in older home sites (pre 1985 ish)
- Asbestos and Lead very prevalent in older communities pre-1978
- Preliminary Risk Analysis indicated health related issues with the ash from heavy metals

Soil Confirmation Sampling

- Samples locations and frequency are determined based on removal area and structures
- Collect samples and send to lab for analysis
- Compare soil results to cleanup goals
- If results exceed cleanup goals, another layer of soil will be removed for disposal and the site re-sampled
- If results are less than cleanup goals, debris removal is considered complete

Soil Confirmation Sampling

Clayton Cleanup Goals	East Div	West Div
Antimony	30	30
Arsenic	11.376	11.4
Barium	5200	5200
Beryllium	15	15
Cadmium	1.7	1.7
Chromium	36000	36000
Cobalt	24.1	24.1
Copper	3000	3000
Lead	80	125.7
Mercury	5.1	5.1
Molybdenum	380	380
Nickel	490	490
Selenium	380	380
Silver	380	380
Thallium	0.78	5
Vanadium	390	390
Zinc	23000	23000



CLAYTON INCIDENT STRUCTURAL DEBRIS REMOVAL

CONFIRMATION SAMPLING

UNIFIED COMMAND APPROVAL FORM

SITE ADDRESS:_____

Sample Identification:_____ Number of Samples:_____

Date Sample Collected:_____ Laboratory:__BC Laboratories, Inc._____

Cleanup Goals: See Metals Cleanup Goals for the Clayton Fire Site in Lake County, California.

Date Approved:_____

Observations:

_____

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Todd Thalhamer, P.E. Megan Emslander

CalRecycle, Operations Chief CalRecycle, Planning Chief