



# THE HANFORD SITE

## Update on Tank Farm Vapors

Jim Lynch, Tank Farm Vapors Program Manager  
U.S. Department of Energy, Office of River Protection

# How We Got to Where We Are Today

Tank Vapor Assessment Team Recommendations



Phased Implementation Plan



Additional Recommendations from Workforce and External Assessors



Hanford Vapors Integrated Safety Management Strategy



Comprehensive Vapor Action Plan (CVAP)

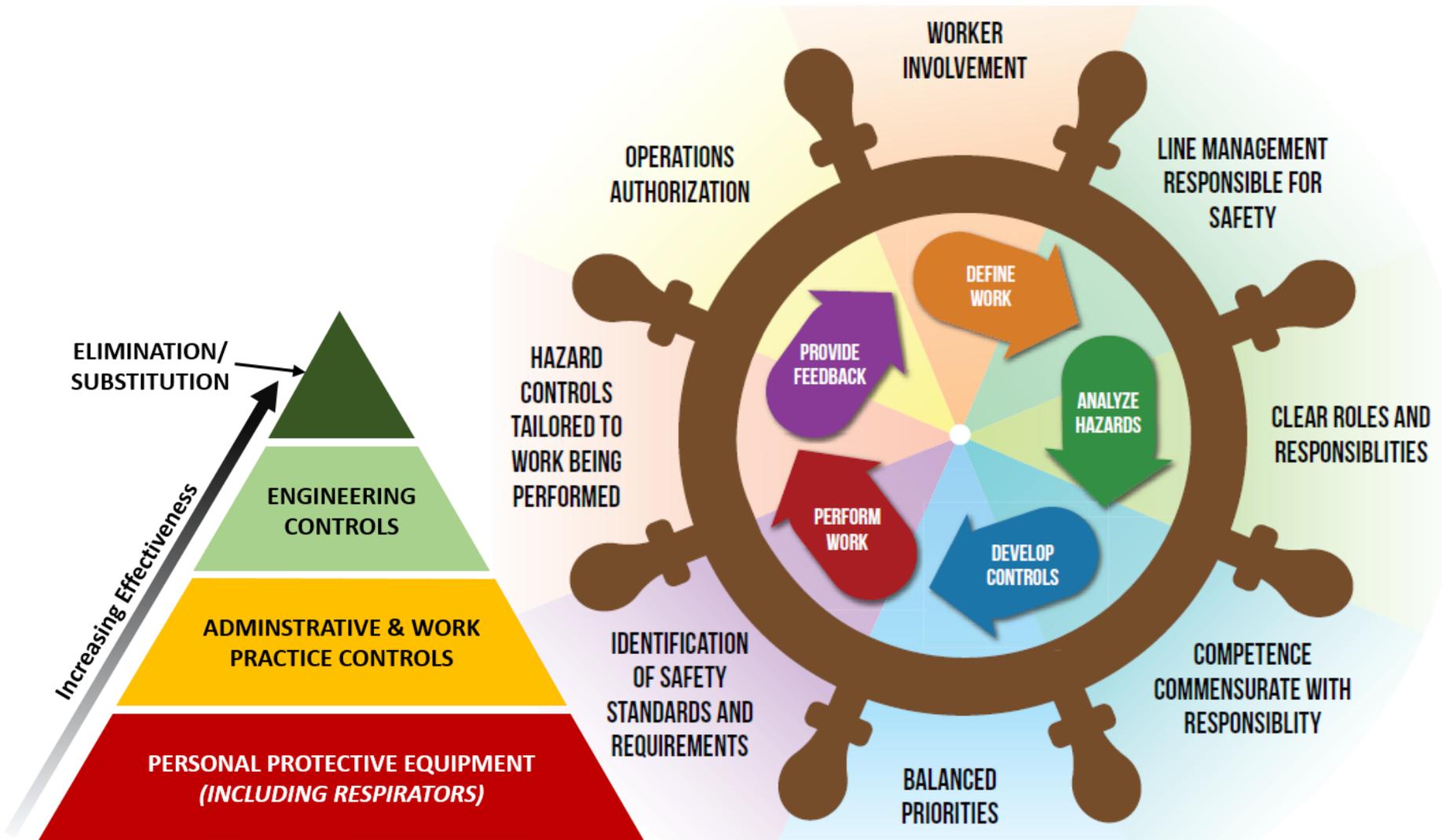
# Recommendations and Engagement

The U.S. Department of Energy (DOE), Office of River Protection and Washington River Protection Solutions LLC (WRPS) are addressing over 360 recommendations provided by experts through an integrated safety management system strategy and comprehensive vapor action plan.

Pulled expertise and coordinated with multiple groups: Tank Farms Project management; environmental, safety, and quality programs; tank farm operational teams; Chief Technology Office; Chemical Protection Programs Office / Communication and Public Affairs; and legal counsel.



# Integrated Safety Management System and Hazard Controls



## *Hanford Vapor Management Vision*

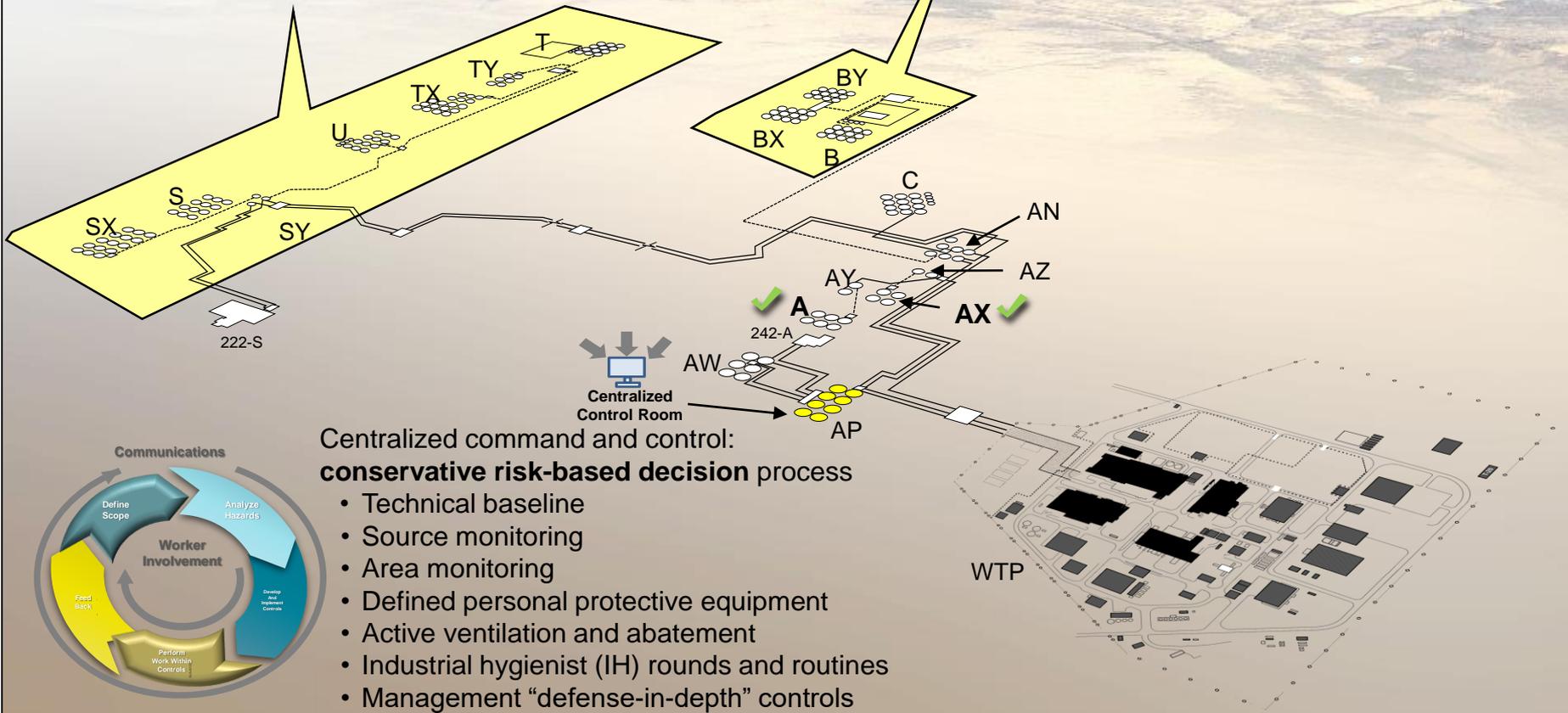
Implement a comprehensive vapors management strategy that protects and is actively embraced by all workers on the Hanford Central Plateau so that workers are safe and feel safe.

- Limited access to nine single-shell tank farms
- Centralized control room for command and control
- Establish a strategy for odor management/response
- Improved vapor related communications
- Configure monitoring and controls specific to each farm
- Install engineering controls and abatement technologies
- Use conservative risk-based decision-making process
- Transition to a modernized tank farm of the future

### Limited access to nine single-shell tank farms

- Goal to reduce entry to semiannual
- Maintain respiratory controls
- Future priorities will dictate engineering controls and infrastructure improvements

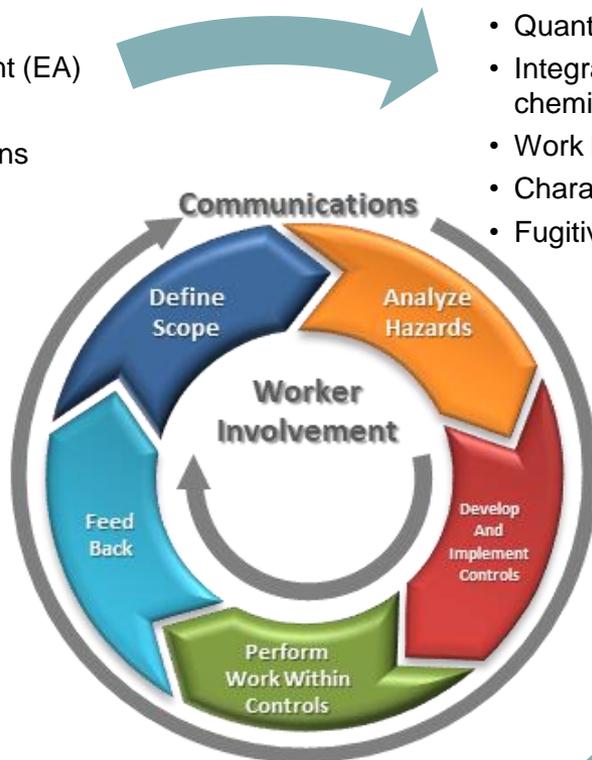
Odor management strategy implemented outside the fence lines



# Comprehensive Vapor Action Plan Outcomes

- Industrial hygiene program
- Technical basis
- Start exposure assessment (EA)
- IH staffing
- IH training and qualifications
- Chemical worker training

- Continued exposure assessment
- Quantitative risk assessments
- Integrated data analysis and visualization EA / chemical mixtures methods tools
- Work boundaries
- Characterization and monitoring
- Fugitive emissions



- Data Fusion and Advisory System (DFAS) IH / IH technician (IHT) data analysis
- IH exposure reporting
- Abnormal Operating Procedure-015 response and investigation
- Employee communications and feedback\*

- IH work permit
- Vapor Data Management System stack monitoring
- Area monitoring
- ToxiRAE personal monitoring
- Cartridge testing and personal protective equipment election
- Improved exhausters and stack height increases

- DFAS real-time monitoring in control room for stack and meteorological data
- IH personal and area monitoring
- NUCON testing
- Public announcement systems / reader boards

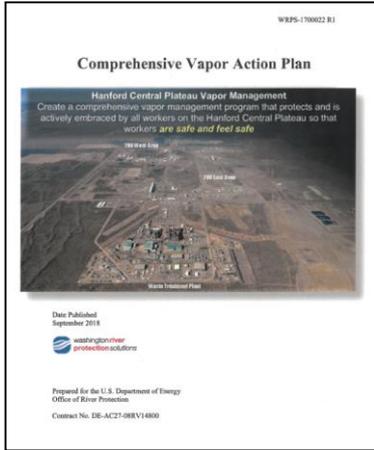
\* Root cause analysis completed in FY 2019 (looked back historically at vapors concerns) and stressed that continued communications with the work force, including better collection and sharing of vapor monitoring data, is key.



- **Stack Extensions:**
  - 242-A Evaporator completed in FY 2017 – from 65 ft up to 111.5 ft
  - AW Tank Farm – from 28 ft up to 60 ft abovegrade, permit submitted to Washington State Department of Ecology, targeting for FY 2020 completion if permit is received
- **IH Programmatic Updates:**
  - Internal/External review process for chemicals
  - World-class IH/IHT program for risk-based approach to work boundaries/controls (parity with radiological controls)
- **Chemical Cartridge Evaluation Testing:**
  - Unique cartridge testing process using jig to run real tank farm headspace air through cartridges
  - Full face air purifying respirators were successfully implemented in actively ventilated farms
- **Vapor Monitoring and Detection System:**
  - Final testing and turnover to operations of the stack monitors was completed in FY 2019. Stack monitoring now in place in AN, AW, AX, AP, and 702-AZ (for AY and AZ) Tank Farms for real-time monitoring of tank vapor concentrations and meteorological conditions for operations
- **NUCON Thermal Oxidation System (Research and Development):**
  - Two phases of testing (proof of concept at Nucon in Columbus, Ohio and bench scale at Pacific Northwest National Laboratory [PNNL] completed)
  - Design and permitting efforts underway for potential future field testing

- Settlement agreement effective as of October 31, 2018
- Majority of the agreement actions have been completed. Continuing settlement agreement actions include:
  - Engineering controls: NUCON thermal oxidation unit testing (chemical destruction)
  - Interim worker protections: WRPS and Hanford Atomic Metal Trades Council (HAMTC) memorandum of agreement (MOA) for cartridge testing / IH program analysis by independent third party (Stoneturn Consultants [STC])
  - Information sharing:
    - Post AOP-15 event investigation reports publicly
    - Annual reporting (if changes are made) on the tank farm waste worker medical surveillance program (routine occupational tests)

# HAMTC and WRPS Memorandum of Agreement



CVAP



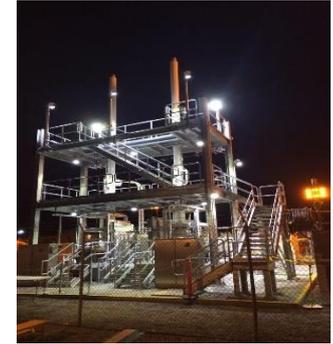
Cartridge Testing



FFAPR



ToxiRAE Pro



New AP Tank Farm Exhauster

FY 19

Work with STC on steps to transition to risk-based controls:

- Demonstrate effective implementation of the IH EA
- Establish guidelines for determining when no respiratory protection is required
- Recognize ammonia as the sentinel chemical for monitoring the source and the worker breathing zone for change conditions
- Implement and maintain vapor rounds and routines
- Timely evaluation and communication of monitoring results
- Communication/Training to support risk-based decision making

Implement FFAPRs in actively ventilated farms:

- Concurrence from STC received
- Cartridges implemented in SY, AN, and AX/AY/AZ Tank Farms
- Completed implementation in AP and AW Tank Farms in March 2019
- Implemented ToxiRAE Pro for ammonia monitoring in actively ventilated farms

Demonstrate full-face air-purifying respirators (FFAPR) and powered air-purifying respirators chemical cartridges are effective with tank farm mixture

Implement HVISM and complete CVAP activities

HAMTC and WRPS MOA signed in 2016

Supplied air required until chemical cartridges are proven effective and concurred by HAMTC third party, STC

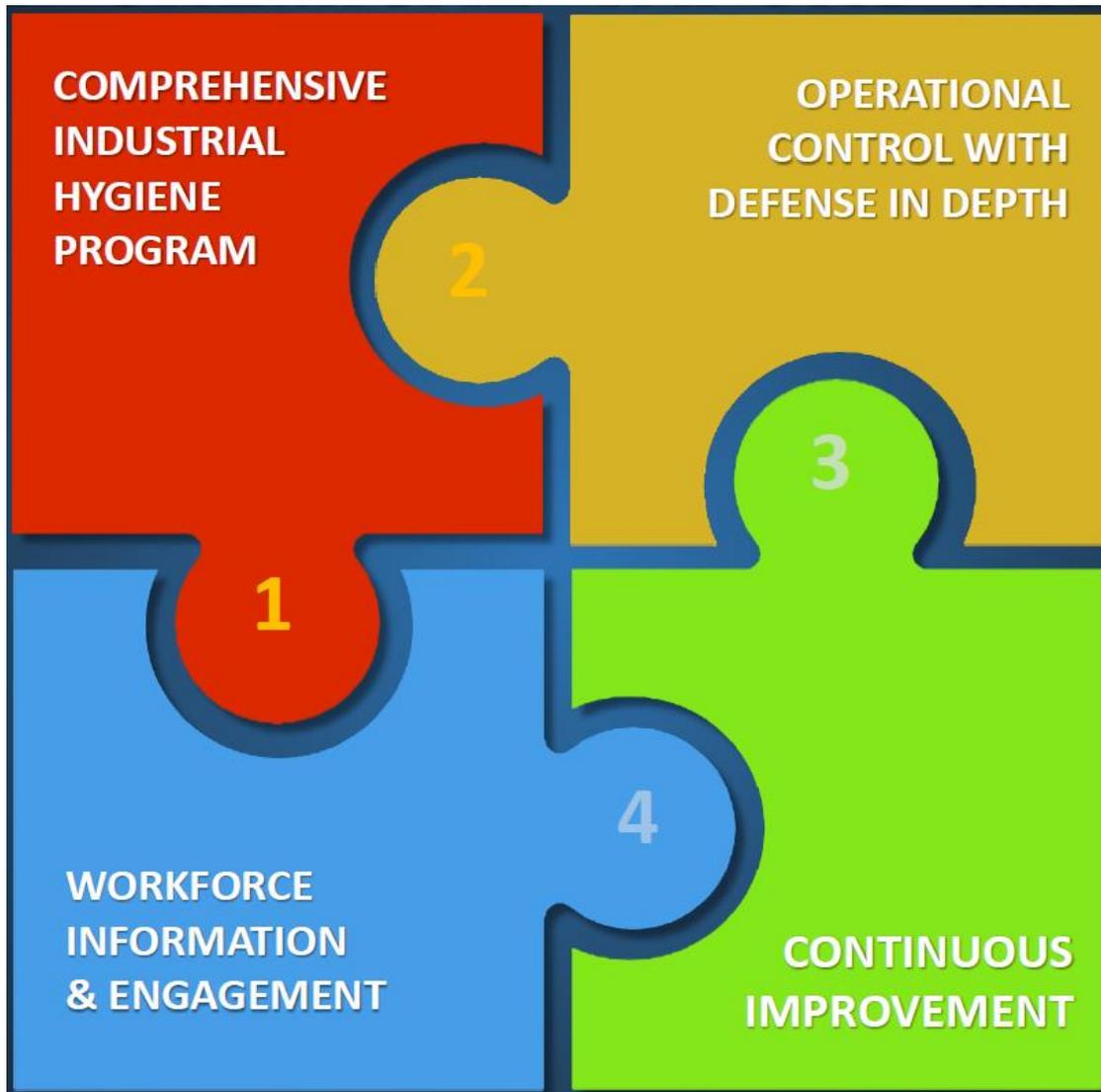
Interim mandatory respiratory protection required until engineering controls or other approaches proven effective



Tank Headspace Sampling

- Continued integration and engagement with the workforce
- Gather data during waste-disturbing and other work activities to support current and future pace of operations
- Install stack monitoring for SY Tank Farm and new A Tank Farm exhausters
- Design and permitting for potential field testing of NUCON unit

# Four Pieces to Institutionalize



- Publicly available website here: <https://hanfordvapors.com/>
  - WRPS-1700777, *Hanford Vapor Integrated Safety Management Strategy* and WRPS-1700022, *Comprehensive Vapor Action Plan* available here: <https://hanfordvapors.com/reference-materials/document-library/>
  - Want to see settlement agreement items?  
[https://hanfordvapors.com/wp-content/uploads/2018/08/SA-Page-4\\_30\\_webpage-items.pdf](https://hanfordvapors.com/wp-content/uploads/2018/08/SA-Page-4_30_webpage-items.pdf)
  - Want to see the AOP-15 event investigation reports?  
<https://hanfordvapors.com/whats-in-the-tanks/vapors-events/aop-015-event-investigation-reports/>
- Want to see the tank farm vapors data?  
<https://www.tankvaporsexplorer.com/>
  - Also linked through the PNNL-Hanford Online Environmental Information Exchange (or PHOENIX) application:  
<https://phoenix.pnnl.gov/apps/gallery/index.html>

- Overt and continuous **communication and worker engagement** must be the key focus area
- VMDS, DFAS Smart Sites, personal monitoring, reader boards to achieve **pre-emptive vs. reactive program**
- Stoneturn Consultants, independent third parties, are validating the IH program as technically sound and **progressing towards risk-based controls**
- Striving towards the ***Are safe and feel safe*** vision everyday as we institutionalize the safety program and process improvements with the help of our workforce