


Summary of Preliminary Findings for the Phase I Public Health Screening Risk Assessment

Camp Justice Public Health Review

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Agenda

- Risk Assessment – Guidance Followed
- Cancer Clusters – Guidance Followed
- What did we do?
- What did we learn?
- Epidemiology Study
- Medical Surveillance

Risk Assessment Process

- EPA Superfund Risk Assessment Framework
- EPA Sampling & Analytical Methods
- OSHA/NIOSH Reference Methods
- Accredited Laboratories (QA/QC, Data Validation)
- CDC Guidelines for investigating Suspected Cancer Clusters

What Did We Do?

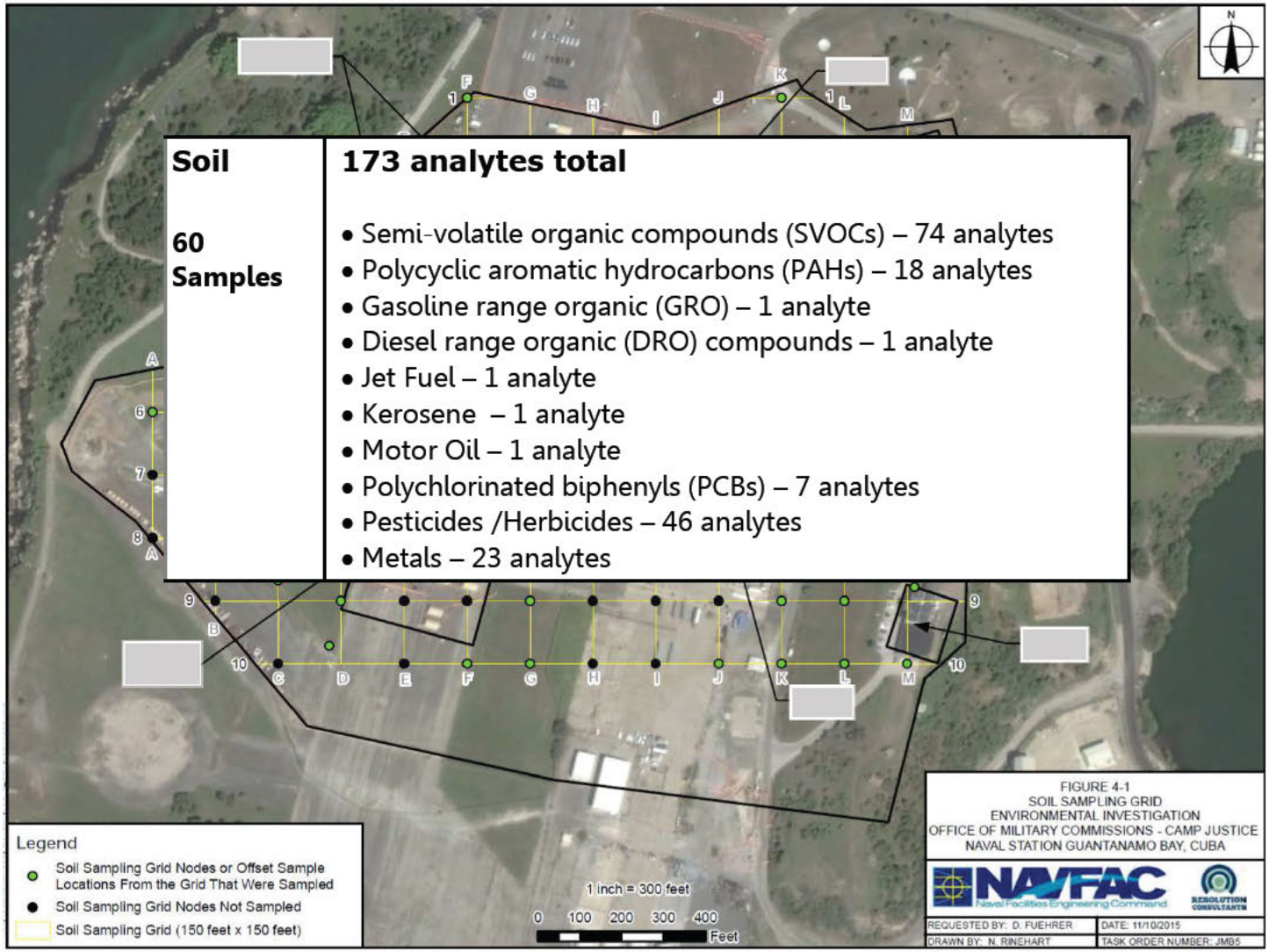
We collected tap water, soil, and indoor air samples from numerous locations throughout Camp Justice. We tested samples for hundreds of chemicals (collectively).

Tap Water **12 analytes total**	• Total Trihalomethanes – 4 analytes • Haloacetic acids – 5 analytes • Lead – 1 analyte • Copper – 1 analyte • Total coliform – 1 analyte	18 Samples were collected for all analyses
Soil **173 analytes total**	• Semi-volatile organic compounds (SVOCs) – 74 analytes • Polycyclic aromatic hydrocarbons (PAHs) – 18 analytes • Gasoline range organic (GRO) – 1 analyte • Diesel range organic (DRO) compounds – 1 analyte • Jet Fuel – 1 analyte • Kerosene – 1 analyte • Motor Oil – 1 analyte • Polychlorinated biphenyls (PCBs) – 7 analytes • Pesticides /Herbicides – 46 analytes • Metals – 23 analytes	60 Samples were collected for all analyses
Air **65 analytes total**	• Asbestos (AV-29, AV-31, AV-32, and AV-34) – 1 analyte • Formaldehyde – 1 analyte • Mercury – 1 analyte • Volatile organic compounds (VOCs) – 62 analytes	15 samples were collected for asbestos 28 samples were collected for formaldehyde 108 samples were collected for mercury 32 samples were collected for VOCs

Buildings Sampled

- Building AV-29
- Building AV-31
- Building AV-32
- Building AV-34
- ELC
- Cuzcos
- Tents

Soil Sampling Locations

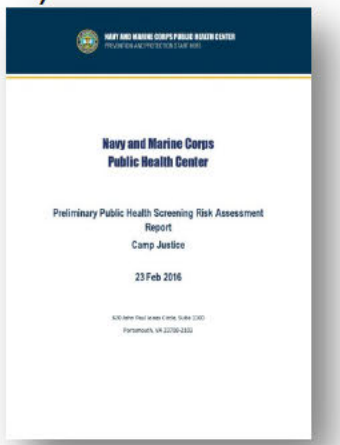


What Did We Learn from Phase I?

We sampled for hundreds of chemicals in tap water, soil, air (collectively) and we did not detect the vast majority of the chemicals tested.

In almost all cases, the few chemicals that we did detect were less than EPA MCLs, OSHA Permissible Exposure Limits (PELs), and/or EPA SLs. The following chemicals were detected at concentrations that warranted further discussion/investigation/action:

- **Tap Water**
  - Total Trihalomethanes (TTHMs) (in one portable latrine near the ELC)
- **Soil**
  - Arsenic
  - Benzo(a)pyrene (near building AV-34)
- **Indoor Air**
  - Mercury (building AV-29)
  - Formaldehyde (modular buildings/cuzcos)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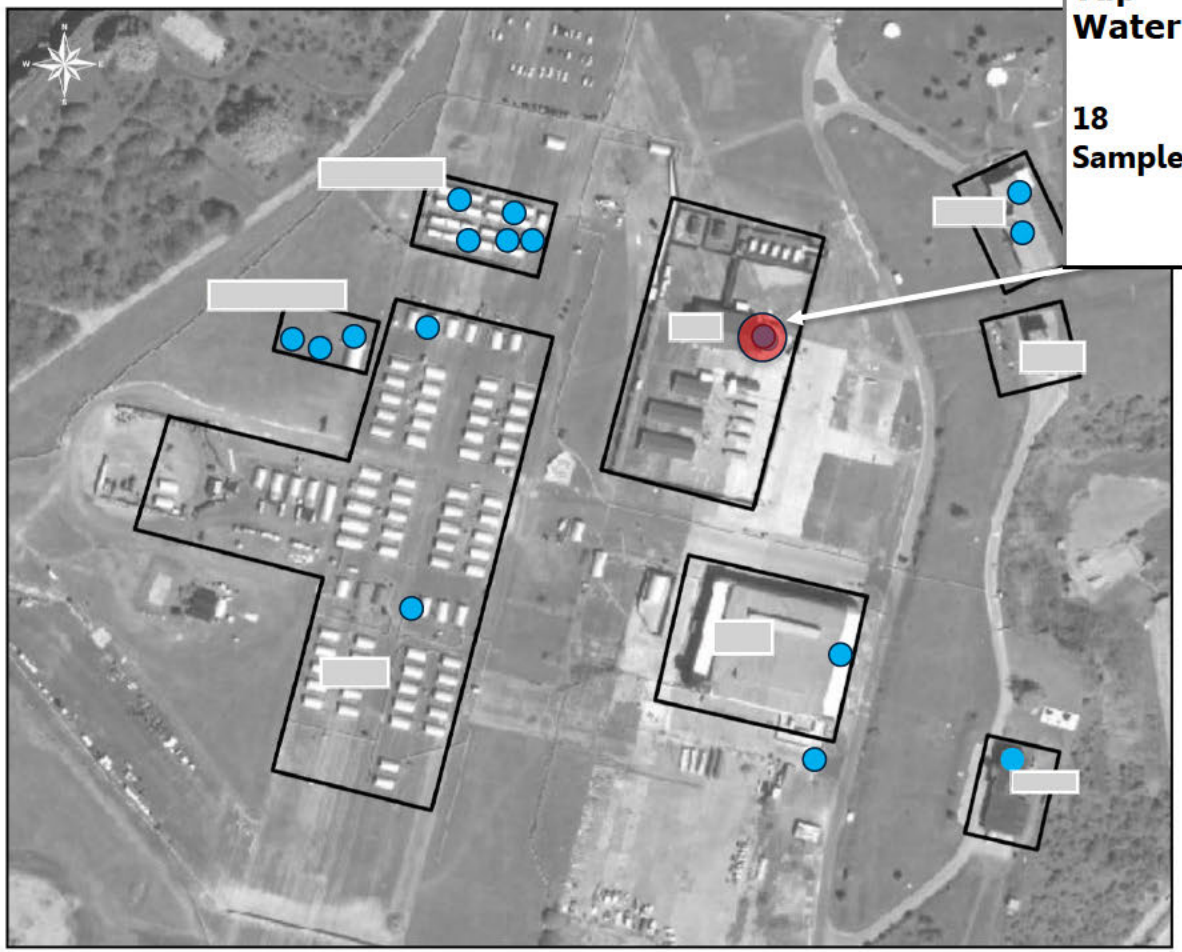
Preliminary Public Health Screening Risk Assessment Report
Camp Justice

23 Feb 2016

What Did We Learn from Phase I? Tap Water TTHM



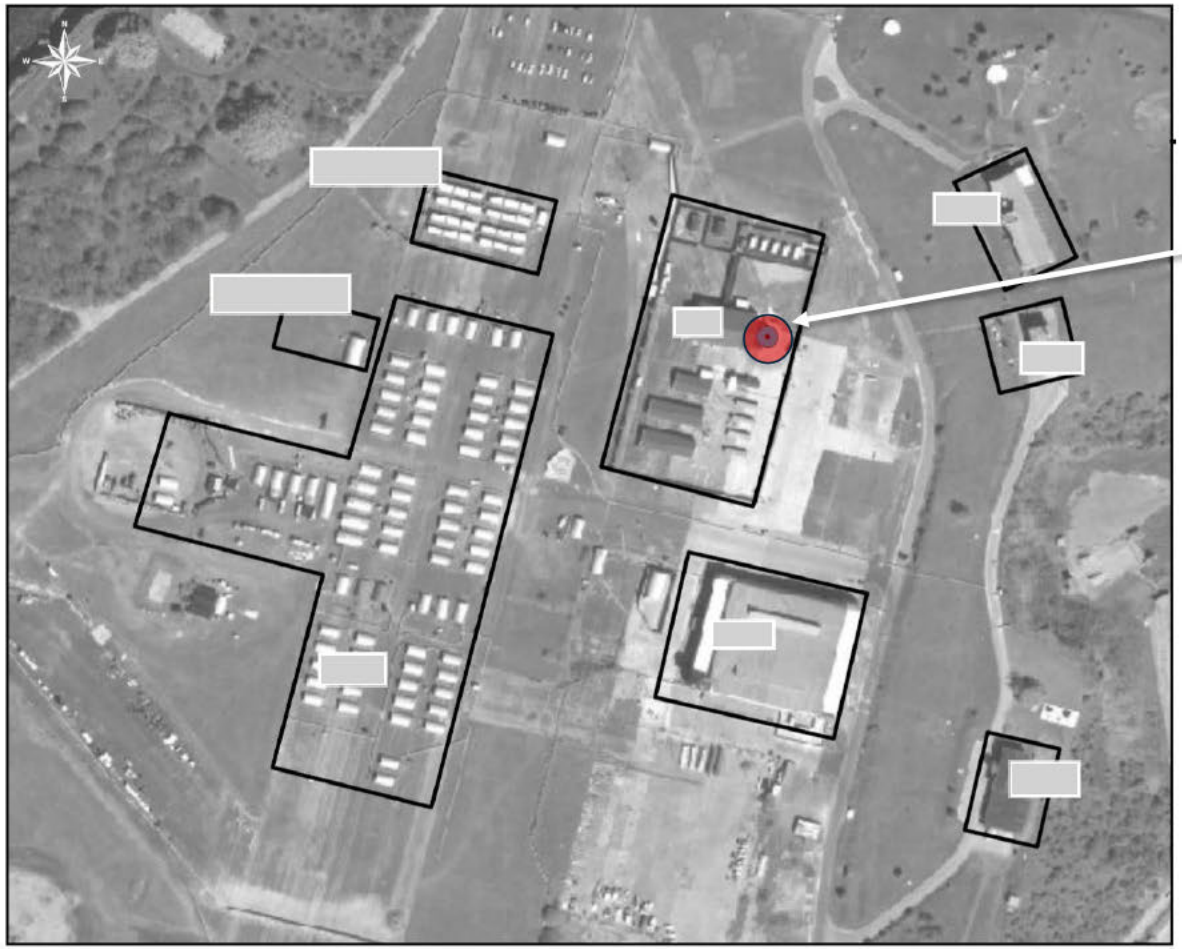
Tap Water	12 analytes total
18 Samples	• Total Trihalomethanes – 4 analytes • Haloacetic acids – 5 analytes • Lead – 1 analyte • Copper – 1 analyte • Total coliform – 1 analyte

concentration

Exceeded the MCL. This location is a portable latrine.

Note: TTHMs are a byproduct of disinfection of water from the Water Treatment Plant.

What Did We Learn from Phase I? Tap Water TTHM



Only Location where the TTHM concentration Exceeded the MCL. This location is a portable latrine.

What Did We Learn from Phase I? Tap Water TTHM

Camp Justice TTHM level is: 81 ug/L

- There was only one exceedance of the EPA Maximum Contaminant Level (MCL) in the 18 tap water samples that were collected. The one sample that exceeded the MCL was collected from the ELC portable male latrine.

EPA MCL is: 80 ug/l

- The maximum detected TTHM concentration was 81 ug/L and the MCL is 80 ug/L

Context

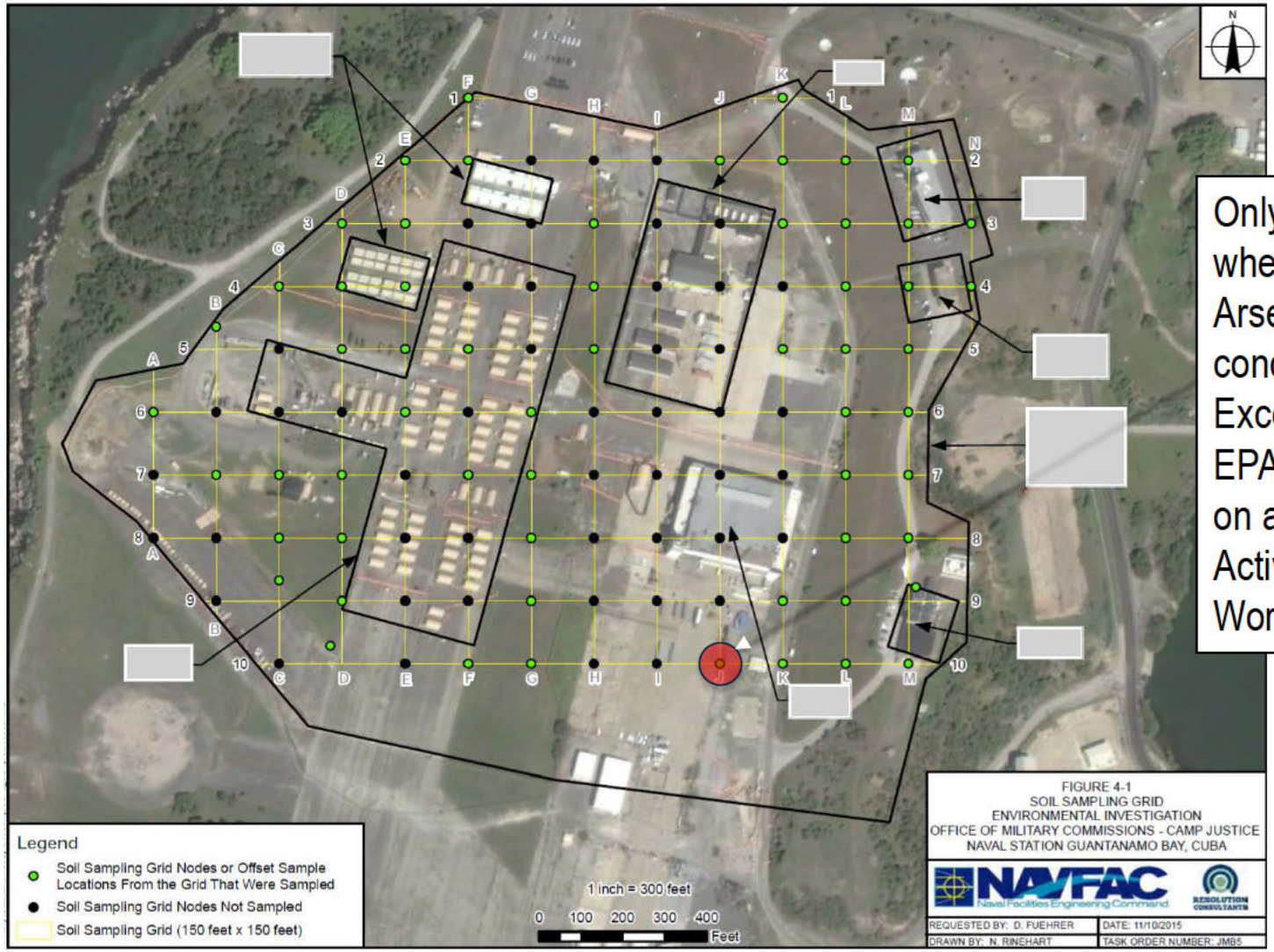
- This chemical is a common byproduct of drinking water disinfection.
- Bottled water is and will continue to be provided for drinking at Camp Justice.

Action Being Taken Based on Phase I Data: No action is being taken based on this result since the: (1) exceedance was very infrequent, (2) exceedance was very low, and (3) water is not used for drinking.

Summary of the Phase I Results

- There was only one exceedance of the EPA MCL in the 18 tap water samples that were collected and the exceedance was very slight (81 ug/L versus the EPA MCL of 80 ug/L).
- Conditions are safe – bottled water is use. No risk management actions are required at this time based on the Phase I results.

What Did We Learn from Phase I? Soil Arsenic



Only Location where the Arsenic concentration Exceeded the EPA SL Based on a 6-Year Active Duty Worker.

What Did We Learn from Phase I? Soil Arsenic

Soil Samples were Collected in October 2015

- October 2015 – 60 locations throughout Camp Justice. Avg is 2 mg/kg and Max is 25 mg/kg.
- April 2016 – 14 Background samples collected outside of Camp Justice (near the lighthouse). These were collected in October 2015 but were held for analysis until April 2016. Avg is 1.6 mg/kg and Max is 2.7 mg/kg

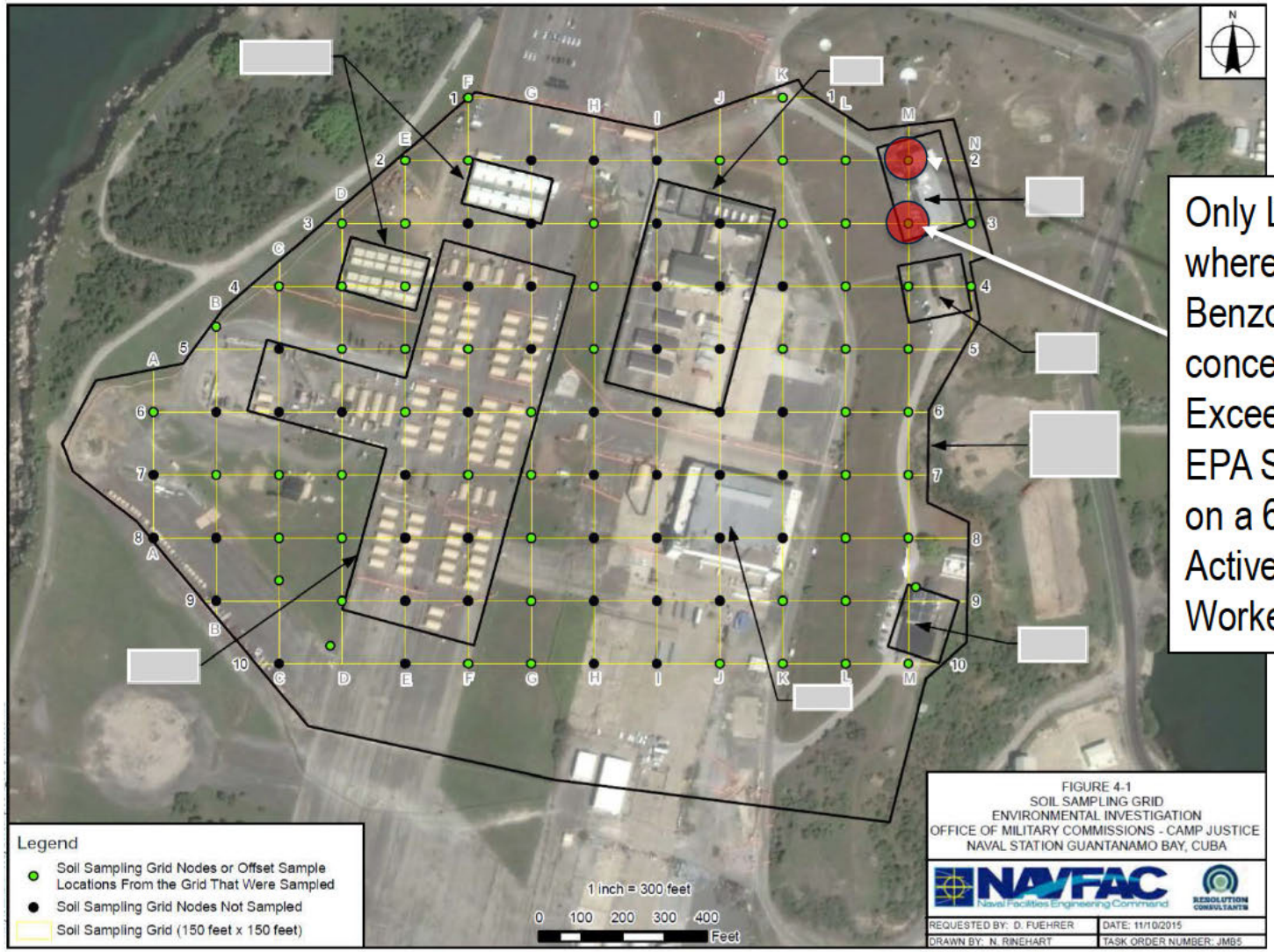
Context

- **EPA screening levels (EPA SLs) are:** 3 mg/kg (25-yr worker), 12.5 mg/kg (6-yr worker), 16 mg/kg (3-yr worker), and 45 mg/kg (9-month worker/resident)
- Arsenic is naturally occurring and is commonly detected in soil throughout the U.S. and other parts of the world. The arsenic levels found at Camp Justice are comparable to naturally occurring levels found in the United States.
- Arsenic in soil can also be associated with human activities (e.g., applying arsenic based herbicides/pesticides).

April 2016 Results

- **Arsenic Background concentrations were:** Average is 1.6 mg/kg and Maximum is 2.7 mg/kg
- **Conclusion:** 32 of the 60 samples locations were non-detect. 13 of the 60 soil locations sampled within Camp Justice exceeded the maximum site-specific background concentration of 2.7 mg/kg. 6 of the 60 soil locations sampled within Camp Justice had arsenic concentrations greater than or equal to 4 mg/kg: (i.e., , 4.0, 4,8, 5.5, 5.5, 7.1, and 25 mg/kg).
- The comparison of Camp Justice soil concentrations to site-specific background concentrations indicate:
  - The 25 mg/kg result is clearly elevated (one sample location).
  - The 4 mg/kg to 7.1 mg/kg results are moderately elevated with respect to background (5 locations)
  - The 2.9 mg/kg to 3.9 mg/kg results are slightly elevated with respect to background (7 locations).
- **Recommendation:** While the level of total risk is still to be determined, conditions are safe for individuals to live and work in Camp Justice per EPA Guidance. All results will be re-evaluated in the Final HHRA when the cumulative risks are calculated.

What Did We Learn from Phase I? Soil Benzo(a)pyrene



Camp Justice Benzo(a)pyrene Soil Sample Results Summary Proximate to AV-34

October 2015		April 2016	
Sample Location	Result (mg/kg)	Sample Location	Result (mg/kg)
M2	8.6	M2-1	5.7
		M2-2	9
		M2-3	0.36
		M2-4	1.2
		M2-5	5.1
M3	1.8	M3-1	10
		M3-2	2.3
		M3-3	3.2
		M3-4	16

Concentrations from April 2016 were similar (for location M2) or slightly higher (for a few locations) than the October 2015 results. However, they are consistent with typical U.S. Urban Background Concentrations which range from 0.002 to 7.9 mg/kg.

Note: These results are not unexpected given that the samples were collected adjacent to an asphalt parking lot which is a source of benzo(a)pyrene and other PAHs.

What Did We Learn from Phase I? Soil Benzo(a)pyrene

Soil Samples were Collected in October 2015 and April 2016 near AV-34

- October 2015 – 2 locations
- April 2016 – 9 locations were sampled around the 2 locations sampled in October 2015

Context

- **EPA Screening Levels (EPA SLs) are**: 0.29 mg/kg (25-yr worker), 1.2 mg/kg (6-yr worker), 2.4 mg/kg (3-yr worker), and 6.7 mg/kg (9-month worker/resident).
- Typical Urban Background in the U.S. ranges from 0.002 to 7.9 mg/kg

October 2015 Results

- **Benzo(a)pyrene concentrations were:** M2 = 8.6 mg/kg and M3 = 1.8 mg/kg
- **Conclusion:** Concentrations detected at Camp Justice are similar to concentrations typically found in urban areas in the U.S.
- **Recommendation:** Even though these levels are generally within the typical background range, additional samples should be collected near these locations to ensure that concentrations within the area are also consistent with background.

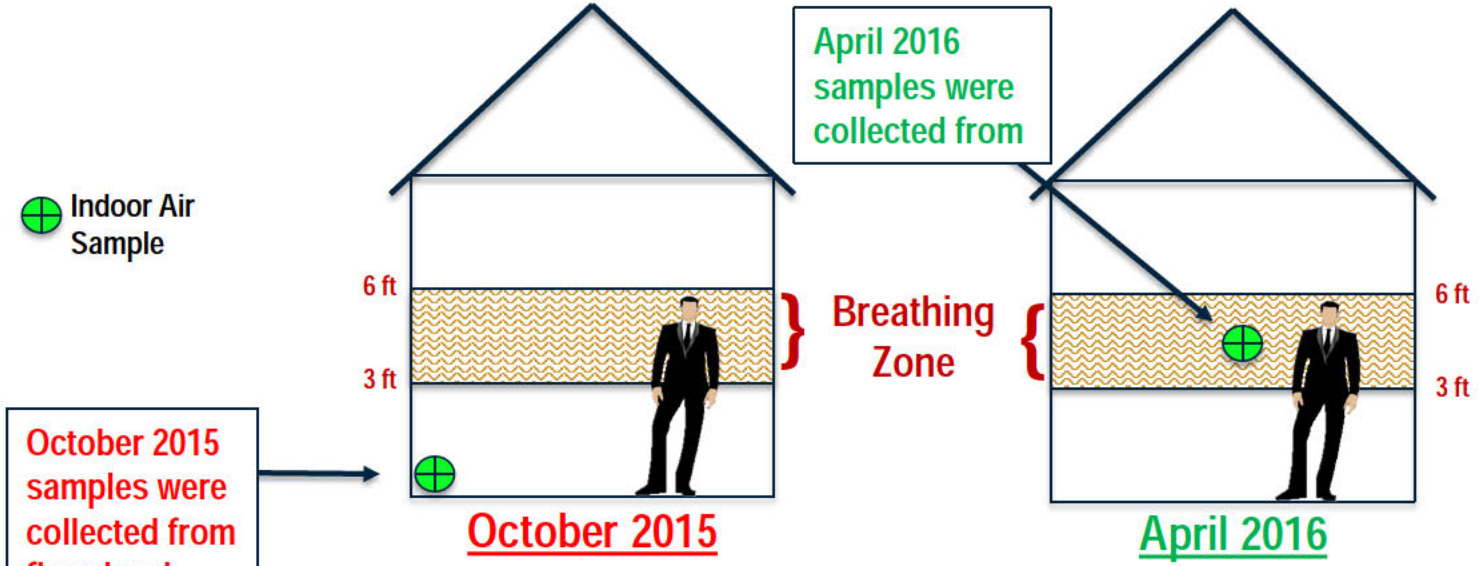
April 2016 Results

- **Benzo(a)pyrene concentrations ranged from:** 0.36 mg/kg to 16 mg/kg
- **Conclusion:** Concentrations detected at Camp Justice are similar to concentrations typically found in urban areas in the U.S.
- **Recommendation:** No further action is recommended for benzo(a)pyrene in soil at Camp Justice.
- While the level of total risk is still to be determined, conditions are safe for individuals to live and work in Camp Justice per EPA Guidance.

What Did We Learn from Phase I? Indoor Air Mercury

Building where Mercury Concentrations Exceeded the EPA SL in October 2015 Screening Samples Collected from the Floor Seams/Cracks. Note: This is a former Dental Clinic.

What Did We Learn from Phase I? Indoor Air Mercury



Take Home Message

- All breathing zone samples were non-detect in April 2016.
- A more sensitive laboratory method was used.
- Air concentrations are safe for occupancy.

Samples were collected at floor level, which are:

- Worst case locations
- Below the breathing zone

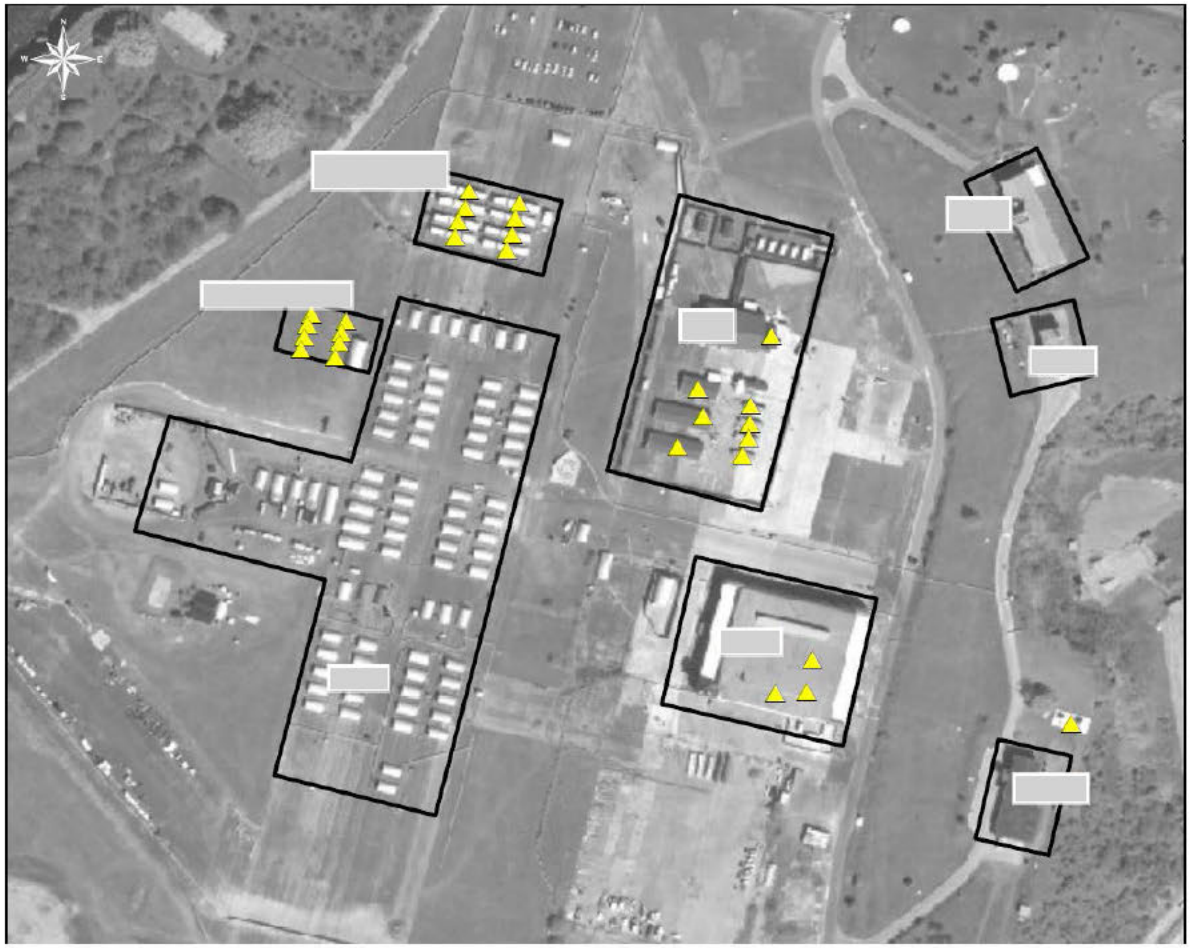
Samples were collected in the breathing zone, which are:

- Representative of actual (occupational) exposures

	October 2015	April 2016
Number of Samples	108 (29 of 108 samples exceeded SL)	19
Average Concentration	2.8 ug/m^3	Non-detect (Detection Limit: 0.31 ug/m^3)
Maximum Concentration	6.0 ug/m^3	

April 2016 Results less than OSHA PEL and less than EPA SLs

What Did We Learn from Phase I? Indoor Air Formaldehyde



- Locations where Formaldehyde Concentration Exceeded EPA SLs based on **October 2015** samples.

What Did We Learn from Phase I? Indoor Air Formaldehyde

Indoor Air Samples were Collected in October 2015 and April 2016

- October 2015 - 28 locations
- April 2016 - 31 locations (three new locations)

Context

- **EPA screening levels**: 0.8 ppb (25-yr worker), 3.2 ppb (6-yr worker), 6.4 ppb (3-yr worker), and 5.9 ppb (9-month worker).
- **CDC Indoor Air Background:** These levels were within typical range of formaldehyde concentrations reported by the CDC for homes in the United States.

October 2015 Results

- **Indoor Air Formaldehyde levels were**: Avg is 15.4 ppb and Max is 61 ppb.
- **Conclusion:** Concentrations in these buildings are similar to concentrations in homes throughout the U.S. This is due to typical construction materials, carpet, furniture, et cetera.
- **Recommendation:** Even though these levels are within the typical background range identified by CDC, HVAC modifications should be implemented in these buildings to reduce indoor air concentrations of formaldehyde.

April 2016 Results (After HVAC Modifications Had Been Implemented by OMC)

- **Indoor Air Formaldehyde levels were**: Avg is 5.8 ppb and Max is 13 ppb.
- **Conclusion:** Concentrations in these buildings are safe. The HVAC modifications have resulted in significant reductions in formaldehyde concentrations (i.e., approximately 70% or more).
- **Recommendation:** OMC should implement an operation and maintenance plan that includes regular inspections to ensure that the HVAC modifications are in place as long as the buildings are in use. OMC should consider implementing HVAC modifications at all modular buildings/cuzcos not identified/labeled as formaldehyde-free at Camp Justice.

Summary of HVAC Modifications Implemented by OMC Prior to Indoor Air Sampling in April 2016

All Cuzcos were modified as follows:

- All bathroom exhaust fans have been wired to run continuously (24/7).
- All air conditioner units are having the coils cleaned.
- OMC has told occupants to keep the bathroom door shut during and immediately after showering and to leave the air conditioners running at all times, set at no greater than 72 degrees Fahrenheit.
  - Further they were told to use the economy setting so that outside air is brought through the air conditioner instead of just recirculating interior air.
  - Signs will be posted in the cuzcos reminding occupants of these guidelines.
- OMC is ordering silicone caulk in order to re-caulk the air gaps.
- OMC has requested that air conditioner/dehumidifier combination units be placed on the list of units that they can easily purchase. BEEF has indicated that it is near time for a life cycle replacement of the air conditioners and they are evaluating if now is the proper time to do such a replacement.

Camp Justice Formaldehyde Sample Results Summary

- **Locations sampled**
  - October 2015 - 28 locations
  - April 2016 - 31 locations (28 original locations plus three new locations)

- **EPA screening levels**: 0.8 ppb (25-yr worker), 3.2 ppb (6-yr worker), 6.4 ppb (3-yr worker), and 5.9 ppb (9-month worker).

- **CDC Background in U.S. Air:** 10 – 50 ppb

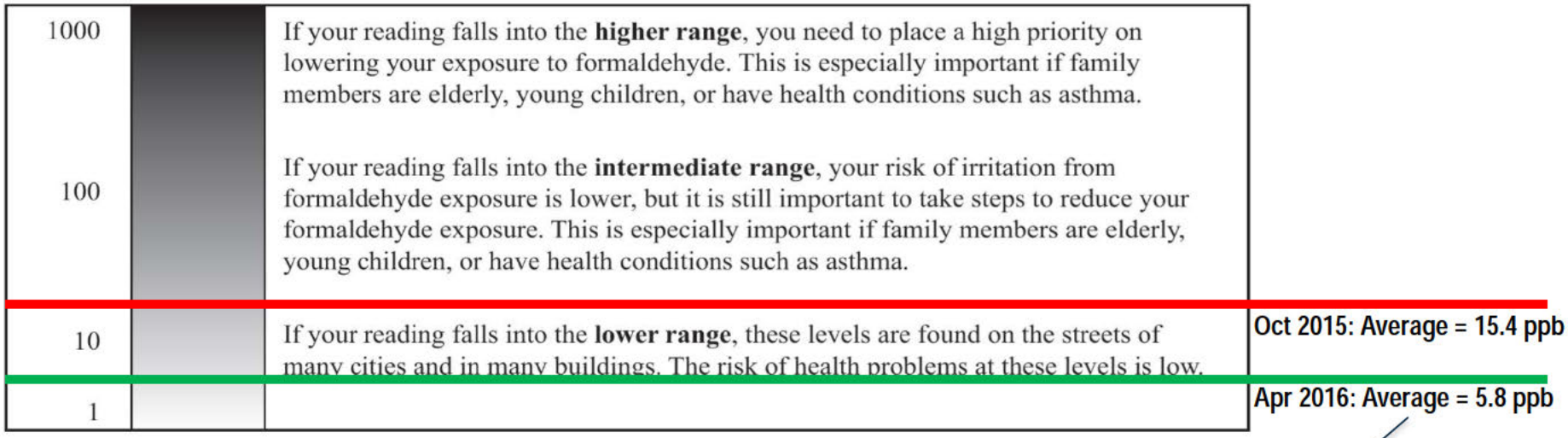
- **Sampling Event Comparison:**
  - Indoor air concentrations decreased at 23 of the 28 locations
    - Sample Range October 2015: 3.7 – 61 ppb
    - Sample Range April 2016: 1.9 – 13 ppb

  - Indoor air concentrations increased slightly at 5 of the 28 locations sampled
    - 8.9 – 12 ppb
    - 4.3 – 4.8 ppb
    - 4.6 – 5.0 ppb
    - 8.1 – 8.9 ppb
    - 3.7 – 6.1 ppb

HVAC modifications were made at 16 of these locations (i.e., the Cuzcos) and the concentrations at all location where HVAC modifications were made decreased in April 2016.

These are all locations where HVAC modifications <u>were not</u> implemented prior to re-testing. If HVAC modifications were to be implemented, it is expected that the concentrations would decrease consistent with the other locations that were re-tested in April 2016.

What Did We Learn from Phase I? Indoor Air Formaldehyde Comparison of Average Concentrations (October vs April)



Note: Levels are expressed at parts per billion (ppb). To convert to parts per million (ppm), divide by 1000.

Source: CDC

Take Home Message is that the HVAC Modifications Implemented by OMC were Very Effective

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There was a 63% decrease in the average formaldehyde concentration from October 2015 to April 2016

Cancer Background – 2nd Leading Cause of Death

Cancer has a multifactorial causal pathway:

- Genetic: Cancer is an uncorrected alteration of genetic material that may be caused by external factors or occur naturally in the cell division process. Cancer is considered an individual disease because each person's genes may make a person more or less susceptible to the cancer process.
- Lifestyle/Behavioral: The things we eat, drink, or are otherwise exposed are a significant source of external stressors on the body in the cancer causal pathway.
- Occupational/Environmental: Some agents directly alter a biologic process that may lead to cancer.
- As a person ages, cancer is more likely to be diagnosed.
- Also, a statistically significant excess of cancer cases can occur within a given population without a discernible cause and might be a chance occurrence.

Cancer Background – 2nd Leading Cause of Death

- Types of cancers vary in etiologies, predisposing factors, target organs, and rates of occurrence
- Cancers often are caused by a combination of factors that interact in ways that are not fully understood.
- Finally, for the majority of cancers, the long latency period (i.e., the time between exposure to a causal agent and the first appearance of symptoms and signs) complicates any attempt to associate cancers occurring at a given time in a community with local environmental contamination.
- One common but false assumption is that a single environmental contaminant is likely to cause any or all kinds of cancer.
  - Toxicological and epidemiologic studies do not support this assumption.
  - Cancer is not one disease, but rather many different diseases with different causal mechanisms.

Background on Epidemiology Studies

- The distribution of disease and risk factors or determinants of disease in specified populations
- The basic science of public health
- Required conditions of an epidemiologic (EPI) study:
  - National Cancer Institute requires a minimum of 16 cases of the same type of cancer to calculate a rate. As many as 100 case of the same cancer are required to study associated exposures.
  - Established complete pathway of exposure
  - Sufficient latency period from first exposure to cancer diagnosis (usually decades unless exposure is extremely high)
- If these conditions are not met, a qualitative review is conducted (weight of evidence).

Status of Camp Justice Epidemiology Study

- NMCPHC EPI Data Center conducted case validation on 11 individuals among active duty assigned to OMC from IG hotline complaints
  - Confirmed 9 cases of cancer through review of administrative medical records:
  - The number, types, and average latency periods of each cancer investigated did not meet the CDC definition of a cancer cluster; therefore, a case series analysis is warranted instead of a formal cluster investigation.
- A medical review of all military personnel assigned to OMC is underway.

Cancer Case Finding Process

Using personal identifiers provided by OMC, the following Military Health System (MHS) databases were searched to find any diagnosis of or treatment for cancer…

- Electronic health record review of provider notes
- Ambulatory care encounters
- Inpatient discharge records
- Purchased care claims data for inpatient and ambulatory care reimbursed by TRICARE
- Pathological confirmation of cancer in DOD registry

Case Ascertainment

For a case to be considered a valid cancer diagnosis

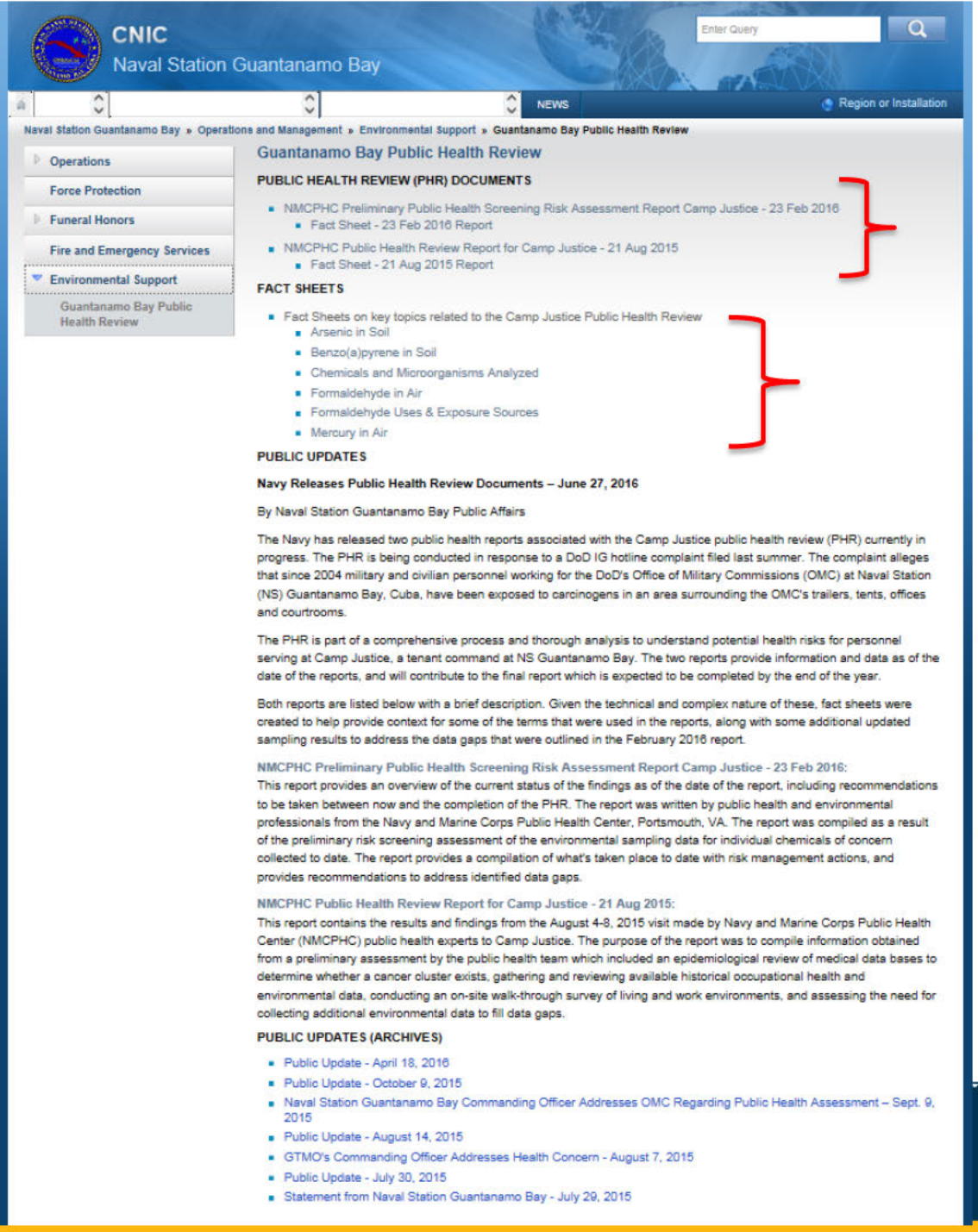
- The cancer type must be malignant
- The patient must have a medical encounter or treatment pattern consistent with the diagnosis
    - Provider notes in the electronic health record specifically address the diagnosis and/or treatment of the cancer
    - Pattern of surgery, chemotherapy, radiation, or other adjuvant treatment associated with the cancer type
    - Pathological confirmation of cancer in cancer registry
- For cases outside the MHS - Documentation from a medical provider that provides the cancer type and date of diagnosis

Medical Surveillance

- No specific occupational or environmentally related medical screening is recommended at this time for Asbestos, Arsenic, Benzo(a)pyrene, Mercury, PCBs, or Formaldehyde based on the sampling results and preliminary screening risk assessments to date. Medical surveillance is based on OSHA action level exceedances for workers.

- Occupational Exposure:
  - Medical Surveillance Procedures Manual & Medical Matrix (NMCPHC – TM OM 6260 Apr 2016)
    - http://www.med.navy.mil/sites/nmcphc/occupational-and-environmental-medicine/oemd/Pages/medical-matrix-online.aspx

- Environmental Exposure:
  - U.S. Preventive Services Task Force Recommendations
    - http://www.uspreventiveservicestaskforce.org/BrowseRec/Index



Under Security Review:

- Indoor Air Quality Assessment Report (Resolution Consultants - 29 Oct 15)
- Overseas Baseline Environmental Assessment Report (Resolution Consultants - 7 Apr 16)
- Environmental Investigation Report (Resolution Consultants - 11 Apr 16)

What's left?

- Complete the Final Human Health Risk Assessment
  - Calculate cumulative cancer and non-cancer risks
    - All chemicals, all pathways, all exposure durations
      - Include exposures from the Air Curtain Incinerators
- Complete the Epidemiological Evaluation
- Complete the Final Public Health Review Report

Questions?