Beryllium Health and Safety Committee

Kathy Creek, Committee Chairman
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Meeting Minutes
October 19, 2004
Desert Research Institute
Las Vegas, Nevada

Kathy Creek (Los Alamos National Laboratories, Committee Chair) provided the welcome; John McKenney (Sandia National Labs, Committee Secretary) gave a review of the last meeting minutes.

Kathy Creek – Announcements, Old Business:

Announcements:

In the next calendar year there are several activities that will be occurring concerning the DOE complex / beryllium community that will be posted on the web site (www.sandia.gov/BHSC). Kathy also discussed forming a committee to hold a symposium that would have international attendance and hosted by Steve Abeln at Los Alamos National Laboratories. Tony Quinn was nominated and the committee approved the vote. This symposium is slated for the spring of 2006, more details to follow from Tony Quinn and Kathy Creek in the coming months.

Old Business:

None was covered at this time.

Subcommittee Reorganization:

Kathy emphasized the need that the sub committee chairs need to be available for the semi annual meetings as well as organizing intermediate events / activities / tasks.

Technical Practices, Standards and Measures subcommittee:

Kathy discussed nominating David Weitzman as a potential chair, and it was discussed that the DOE office frequently has travel funding limitations. As a result, George Fulton was nominated to vice-chair the committee. The issue was voted on by the committee and approved

Chronic Beryllium Disease (CBD) Research Needs Committee:

Mark Hoover has indicated that he is not available to continue to chair this committee. Mike McCawley was nominated as the chair for this subcommittee. Sam Johnson (NNSA) discussed issues out of EH that NNSA is seeking to do with regard to funding / budget from a research needs perspective (more to follow in his presentation later in the meeting). Real time monitoring was discussed in terms of responsibility, and that it is the top priority within Sam Johnson's office. Ken Groves pointed out that because of the broad attendance (i.e. DOE, NNSA complex members, AWE, contractors, etc.) that the sub committee chair of the research needs that there would be value if the attendance of the chair at various user's needs for funding, but that if the past tendency to put forward

ideas where there is no follow through, it would not be valuable. Sam Johnson – we need to look at why previous efforts have failed to determine why we can succeed in subsequent attempts. Kathy pointed out that we also need to have participation from the DoD side of the house as well. Mike Brisson bought up the point that previous attempts failed because of validation issues (i.e. materials standards, lack of a beryllium aerosol lab, etc.). Marc Kolanz discussed possibly deferring the nomination of the chair until after hearing Sam's presentation because it may be valuable to have a chair that understands the political nature of pursuing funds and navigating through issues that would facilitate getting results. Kathy tabled the discussion on the chair until after Sam's discussion.

Kathy would like to evaluate the need to rework the description of the BHSC (Technical Standards, Practices, and Measures?):

> *The Beryllium Health and Safety Committee (BHSC) is comprised of medical and operations personnel involved with beryllium processing issues across the Department of Energy complex. The BHSC is committed to the accumulation and dissemination of information concerning beryllium processes best work practices, as well as data from health studies concerning the hazards associated with beryllium.*

Kathy Creek discussed the need to have a medical community centered subcommittee that would be chaired by someone external to the DOE complex. Kathy nominated Dr. Mark Wood from Lockheed Martin as the chair Medical and Epidemiology Subcommittee. Ken Groves pointed out that there are specific DOE entities that oversee the medical aspects of DOE issues including beryllium. However, the committee discussed the desire to be more inclusive of other entities that are in the beryllium community (i.e. DoD, contractors, EU, etc.), and that a sub committee that was inclusive of these other entities would have value to contributing to discussions within the BHSC. George Fulton discussed remaining focused on DOE / NNSA issues, that primarily the constituents of the BHSC are DOE / NNSA centric and are primarily concerned with 10 CFR 850 implementation and maintenance issues, and that we have oversight by DOE and NNSA. Jeff Braeburn from the DoD complex (Army) discussed that while there is primary concern within the DOE complex, there are emerging concerns / issues where the DOE rule where dictate how beryllium issues external to DOE will be handled. Kathy pointed out that the BHSC has lost the technology / operational component of this committee where we were once the strongest, and that the industrial hygiene constituency has increased. The question was posed of whether we need to broaden our scope or remain focused on the DOE complex. Dr. Deanna Harkins was nominated from the U.S. Army as a vice chair. The issues was taken to vote and approved the nomination of Dr. Mark Wood as the chair and Dr. Harkins as the vice chair.

The CBD prevention committee:

Dan Field, CIH Bechtel Nevada – Beryllium Legacy Issues at the Nevada Test Site

***This Presentation is available on the web at http://www.sandia.gov/BHSC/events/events.htm**

Sampling Strategies were discussed:

- Surface sampling of facility components and equipment
- Bulk sampling of carpets, soils, debris/dirt
- Air sampling of employees with the potential for exposure
- General air sampling to verify IAQ

Legacy Be Sites

- Facility or area where Be was used or buried, based on a historical review of archived records

    - Sample data
    - Historical documents
    - Personal Recollections

- Sites were discussed with a high sampling priority (42 sites). Looked at nine different aspects to make a matrix (likelihood of disturbance, occupancy types, activities, etc.) to determine which sites have the highest probability of having significant beryllium legacy issues.

Beryllium Characterization:

- A significant effort by BN to characterize each facility associated with operations at NTS was implemented
- Each facility is sampled in accordance with a statistical sampling plan for the presence of beryllium. Sampling includes surface areas, air, and carpet

Characterization Sampling Plan:

- Random, statistically based sampling plan after MARSSIM model for buildings
- 20 foot grid sampling for trailers, transportainers, sheds, boxcars, etc.
- When results exceed 0.1 µg/100cm^2, additional sampling at closer spcings (5 foot grid)
- Facilities with carpet, collect bulk vacuum carpet samples

BN Assumptions

- Draft NNSA report cites tracking of beryllium from a forward site as principle cause of sensitization cases in "B" Complex.
- NTS projects, including shots, involved use of beryllium that was deposited on site based on historical review by subcontractor.
- Be and radiological contamination are strongly associated based on historical review by subcontractor. Therefore rad measurements can be used as a screening tool.
- Areas not identified as Be legacy sites are not contaminated.
- BN EHS will continue to characterize the facilities of NTS to ascertain beryllium exposure hazard based on prioritized sampling plan.

Types of Characterization Samples

Swipes (wet, ghost)--compare with 0.2 µg/100 cm^2

- Ambient air (high volume)—screening
- Personal air—compare with 0.2 µg/m^3
- Bulk carpet vacuum samples—compare with 0.2 µg/100 cm^2
- Bulk Soil (geologists collect, evaluate)—compare with national averages

Analysis

- Swipe, bulk carpet, soil and air samples analyzed by ICP-AES
- NIOSH 7300 Method

Be Sample Types and Methods

Surface

- Swipes (dry, wet, ghost wipe) NIOSH 7300; OSHA ID-125G; ASTM E1728-02
- Bulk carpet vacuum samples ASTM D5438-00

Air

- BZA (0.8 MCEF) NIOSH 7300; OSHA ID-125G
- Ambient or general area NIOSH 7300

Surface Sampling of Computers, copiers, Bulk Carpet Sampling, Sampling Concerns, and Air Sampling methods, were discussed with picture examples.

Activities With Potential Beryllium Exposure

- Machining Be-Cu Alloys
  - Machine using immersion/flood to control exposure
- Shaker/Aggregate/Concrete Operations
  - Dust suppression reduces exposure
  - PPE controls skin contact during concrete pouring/finishing
- Crushing Fluorescent Light Bulbs
  - Local exhaust ventilation removes airborne Be oxides
- Environmental Restoration; D&D; Reactivation in "Legacy" Areas
  - "Legacy" means areas with elevated environmental levels
  - Dust suppression reduces exposure
- Aerospace/Weapons/Nuclear Manufacture & Testing, including Pulsed Power
  - Dust suppression reduces exposure
  - PPE may be needed to manage skin and inhalation exposures

NTS BZA Sampling Status

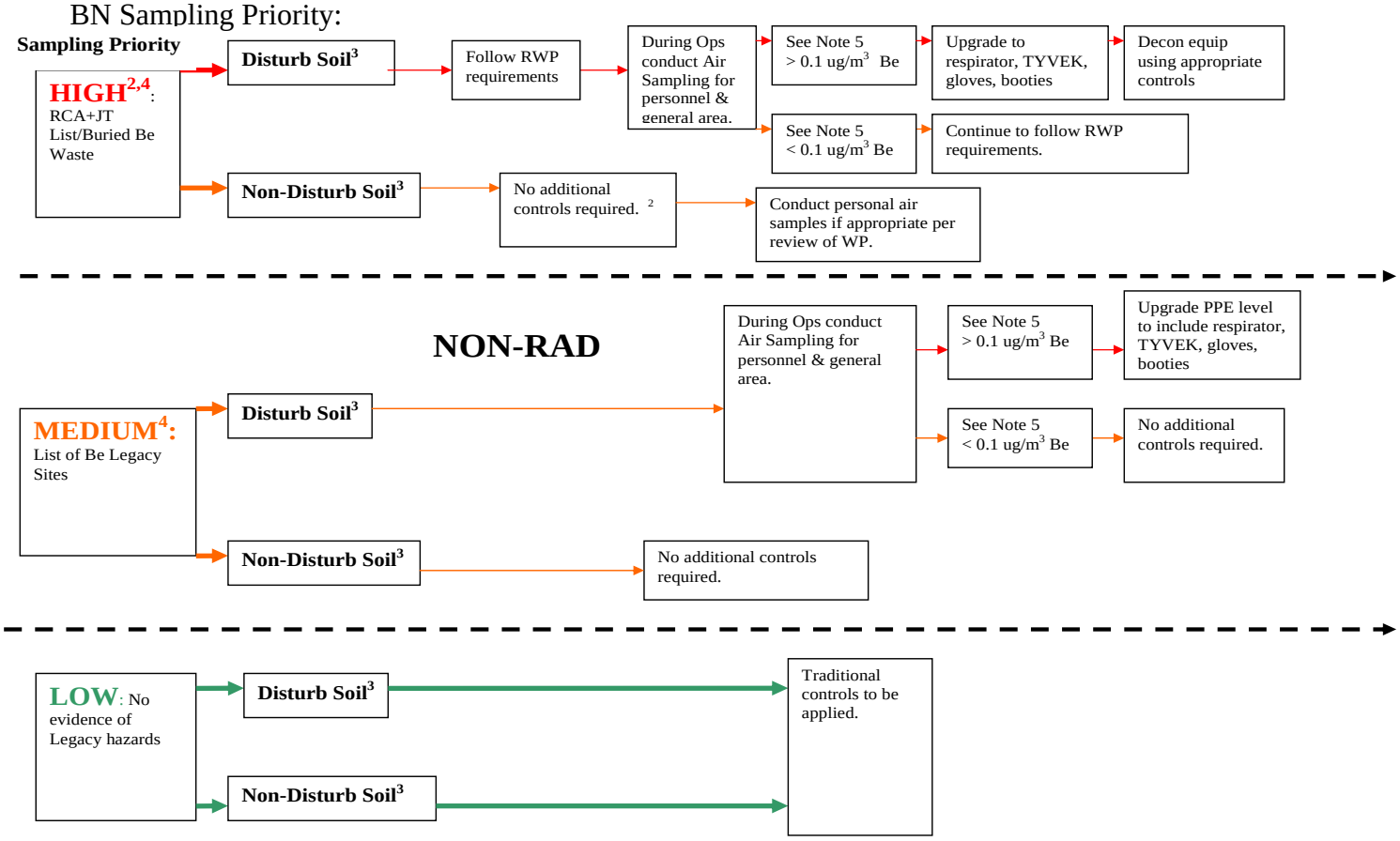
- 143 Personal Air Samples during ER and D&D Ops in High/Med Risk Areas
  - Equipment Operators, Spotters (laborers), Craft employees
  - May 03– October 2004
  - High sample – 9.635 ug/m3*** (one time)**
  - All other results less than the DOE std (0.2 ug/m3)
- Back-hoe operator was wearing prescribed PPE (including respirator) which protected him from the exposure. Investigation by BN IH revealed that their were concerns with controlling dust. Additional controls put into place include the use of an enclosed cab, improved dust suppression techniques, and full-face respirators for the laborers.

BN Interim Controls

- Training

        - All IDPs will include Be awareness training.
        - Personnel working "Medium or High" Risk projects – Be Worker training is required. HAZWOPER training will be updated to include Be.
    - Surveillance
        - High Priority – WPs to be reviewed by IH. Sampling (personal, area (air, soil)) to be conducted during operation per approved project sampling plan. These areas are in RCAs.
        - Medium Priority – WPs be reviewed by IH. Initial personal, area (air, soil) sampling for negative determination.
    - Distribute Approach
        - Develop & provide risk communication briefing to tenants & customers to include process flow sheet, list of Be legacy sites and their responsibility to inform subcontractors under their purview.
    - Medical Surveillance
        - Offered voluntary to all Be Workers.
        - BN/DOE have discussed expanding Be surveillance to all employees.

BN Sampling Priority:



Note 1: Beryllium awareness training to be included in IDPs or provided during employee orientation training.
Note 2: In High Risk Areas employees must follow applicable RWP.
Note 3: Removal of >0.25 ft^3 of soil during any single operational event or act is defined as "Disturbing Soil".
Note 4: IH approval of Work Packages & HASPs and/or SSHASPs is required.
Note 5: IH will compare sample results to background levels and/or regulatory requirements and/or historical information and apply controls as needed.

BN Characterization Status

- 326 of 673 Total Facilities (48%), 227 of 359 Operating Facilities (63%),
- ALL OCCUPIED FACILITIES COMPLETED. An additional 78 bldgs slated in fwd areas completed.

- 12997 Swipes
  - Avg – 0.0064 ug/100cm2
  - 53 samples above 0.2 ug/100cm2*
- 368 Ambient Air samples
  - Avg - 0.00190 ug/m3
  - no samples above 0.1 ug/m3
- 636 Bulk Carpet samples
  - Avg – 0.019 ug/100cm2
  - no samples above 0.2 ug/100cm2

- 60 other Bulk Samples (including Vehicles
-
  - No samples above 0.2 ug/100cm2

- 117 Bulk Soil Samples in High/Med Risk Areas

  - Avg – 0.742 ppm
  - High – 4.22 ppm
  - Background 3-5ppm
  - Includes 11 samples from CAUs currently being worked.

- 33 samples in 16 bldgs slated for D&D – see next slide

  - 14 samples in 6 bldgs in legacy areas
  - 6 samples in 5 other bldgs
  - High dust loading on swipes caused abnormally high readings but were normal compared to background levels.

BN Characterization Status D and D buildings

- 99 buildings slated for D&D completed.

  - Most are in the high and medium priority areas.
  - High dust loading on swipes causes abnormally high readings.
  - 520 Swipes

    - High - 2.0 ug/100cm2
    - Avg – 0.090 ug/100cm2
    - 33 Swipes above 0.2 ug/100cm2 in 16 bldgs

      - Area 1 – Shaker Plant – Control Tower (pit)(2) & Sand Bay bldg(2)
      - Area 5 – RadSaf bldg(1)
      - Area 6 – Machine shop (1), Decon Facility(7), Decon Laundry(4)
      - Area 12 – 7 bldgs(9)
      - Area 23 – Q-33(1)

  - Other Legacy Metals

    - Lead

      - High – 8070 ug/100cm2, Avg – 12.9 ug/100cm2, 123 samples above BN Admin Limit (50)

        - 123 samples above BN Admin Limit

    - Cadmium

        - High – 401 ug/100cm2, Avg – 1.02 ug/100cm2, 78 samples above BN Admin Limit (10)

    - Chromium

        - High – 1800 ug/100cm2, Avg – 2.83 ug/100cm2, 28 samples above BN Admin Limit (50)

    - Arsenic

        - High – 33 ug/100cm2, Avg – <1.0 ug/100cm2, 3 samples above BN Admin Limit (10)

"B Complex" Be Investigation Total # of Be Samples

	Air	**Swipe**	**Bulk***	**Total**
B-1	265	1202	414	**1881**
B-2	14	193	67	**274**
B-3	177	1179	248	**1604**
B-4	26	62	0	**88**
A-1	239	1948	126	**2313**
Total	**721**	**4584**	**855**	**6160**

✶ Includes 275 bulk carpet samples. 20 above the DOE std 0.2 ug/100cm2

NTS Characterization Results:

- 113 / 12,997 (0.87%) of swipes exceeded 0.2 ug/100 cm2, indicating the need for housekeeping in localized areas.
- All facilities cleared for occupancy.
- Graded approach to controls in legacy areas is effective in controlling exposure.

Tony Quinn, AWE - Material Handling Glovebox

***This Presentation is available on the web at http://www.sandia.gov/BHSC/events/events.htm**

Requirement:

- To identify and sentence legacy beryllium material so that it can be recycled.

Issue

- AWE has a large Be inventory of which only about 10% is useful.
- MoD wishes to dispose of the majority, which comprises swarf, powder and old components.
- The material is stored in 45 gallon drums and other packages, identified only as "Beryllium".
- The inventory must be reduced to minimise a potential environmental hazard - a Regulatory issue.

Material Ownership and recyclability

- All material - including swarf - belongs to MoD.
- Disposal cannot be progressed without their approval.
- Brush Wellman (BW) will accept material back IF we can positively identify it; we therefore need to open the drums and packages.

Current Repacking Position

- There is a temporary ventilated enclosure (tent) for emergency repacking but this involves an RPE operation.
- This approach cannot be used routinely - contrary to CoSHH hierarchy, which has use of RPE at the bottom.
- An engineered solution was therefore required.

Engineered Scheme

- Requirement agreed (1995) and scheme funded (2000).
- "New" approach adopted - involve workforce from "Day 1".
- Many previous schemes developed by remote managers in isolation - costly errors resulted.

Contractor Selection

- External design & build approach chosen.
- AWE shop floor staff involved in selection process - shown proposals and comments invited.
- Gravatom chosen on cost grounds. Like the other suppliers, they have experience of providing similar equipment for eg BNFL, and their proposal did what we wanted.
- This selection meant known technology was being used, as opposed to the "innovative" approach often followed by AWE previously.

Outline Design

- Stainless steel air glove box with large entry/exit fume cupboard.

- Box chosen because powder being handled.
- Glovebox contains drum port for accessing drums, CCTV system and drum lifter.
- Similar to plant installed at BNFL.

Manufacture

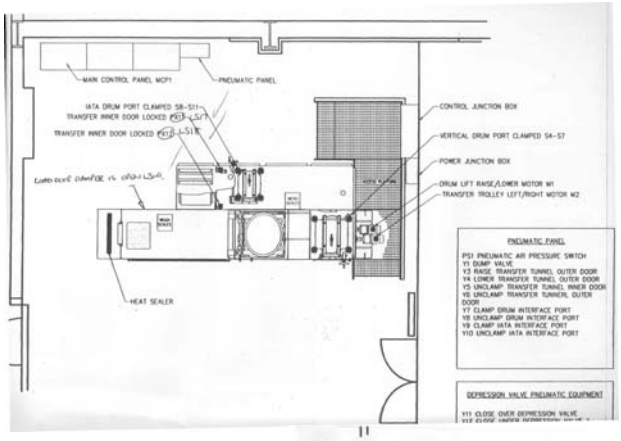
- Much work done at the project front-end in design to ensure minimisation of construction problems.
- AWE staff have visited Gravatom on several occasions for ergonomic assessments.
- For instance a plywood mock-up was used to develop the optimum location for the gloveports.

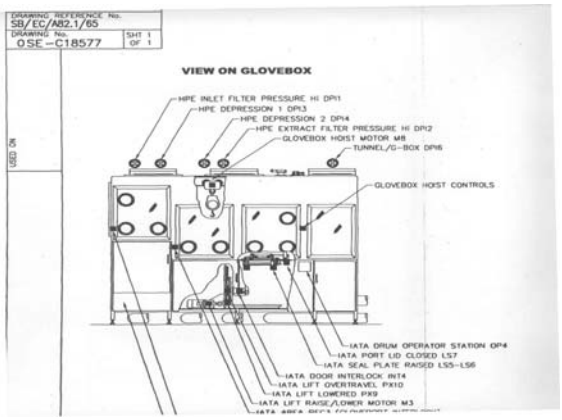
Installation and Commissioning

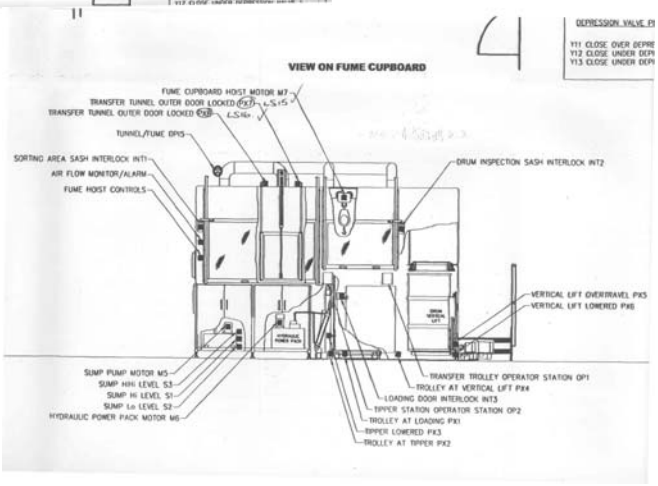
- Factory testing scheduled for completion end March 2003 with delivery to AWE to follow.
- Handover to AWE scheduled for end December 2004.
- At present, these programme dates will be met.

Conclusions

- Involvement of staff at all levels early on gives confidence that the plant will be accepted upon handover
- Devoting much early effort to resolving design issues has minimised fabrication problems.
- Using known technology has meant that few errors have been unearthed as the project progressed.
- The Glovebox will be a great asset.







Clive LeGresley, AWE - Beryllium legacy issues at AWE Aldermaston - Plant and Equipment

***This Presentation is available on the web at http://www.sandia.gov/BHSC/events/events.htm**

Be Legacy Issues

- Two strands to the legacy issues;
    - Material – solid, powder and swarf.
    - Plant, equipment and buildings.

Component Buildings

- Three buildings comprise the Be Facility;
- A4 (1952) – Original Be Building. Contained powder handling, manufacturing, inspection and R&D capabilities.
- A48 (1958) – Mechanical test house.
- A82 (1960) – Additional powder handling and manufacturing capabilities.
- All these buildings contain equipment which require disposal – particularly A4.

Assumptions

- No plant or equipment is cleared for "free release" to the public.
- Disposal of all items will be progressed unless it can be reused within a Be area.
- "Disposal" of any Be contaminated item – drum or package - is to a licensed landfill site.

Outline Disposal Procedure

- Consider RPE zone requirements
- Remove obvious waste – paper, gloves.
- Remove hand tools, "sharps" and chemicals.
- Collect Be swarf (for recycling - possibly).
- "Coarse clean" eg soak up machine tool oil.
- Disconnect from services.
- Backfill with soft waste – coveralls etc.
- Double wrap in PVC.
- Dispose.

Procedures

- There is no "one size fits all" solution; each case is considered individually.
- Detailed SSoW produced with supporting assessments, and reviewed by appropriate specialists – maintainers etc.
- Generally these tasks involve RPE.
- Process equipment eg lathes generally requires a tent.
- Process plant eg motors generally don't.

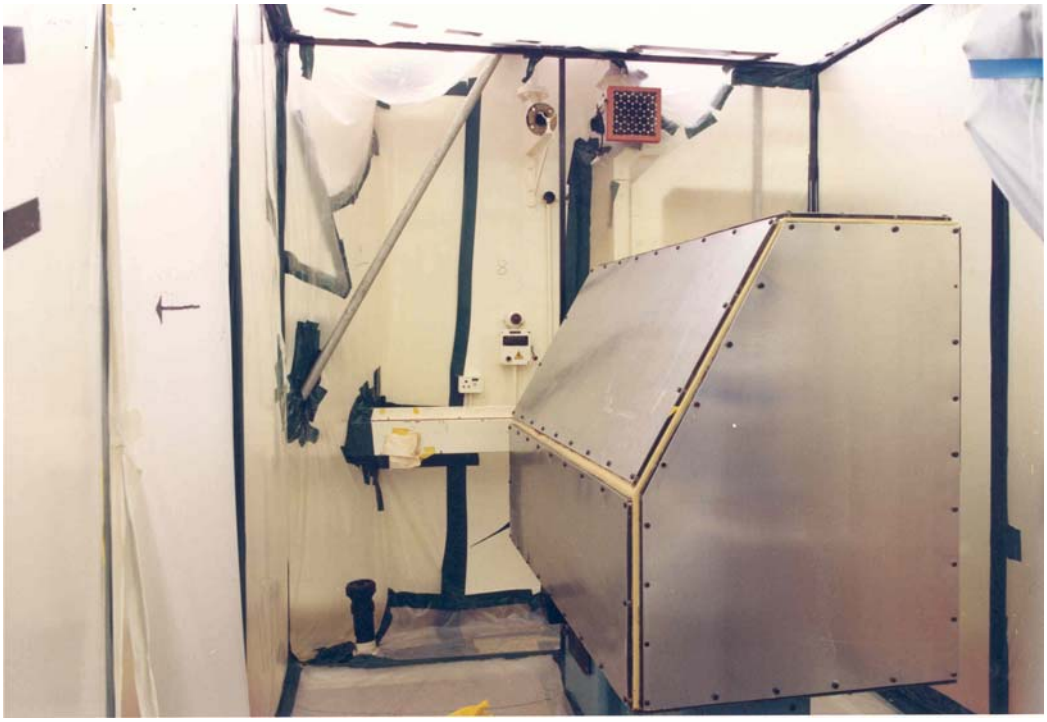
Tents

- Built from Dexion/Speediframe.

- Covered with PVC, taped seams.
- Connected to building HVAC to provide depression for particulate containment. If this doesn't work, use a portable air-mover (HEPA filtered exhaust).
- Double cell entry/exit airlock chamber built onto tent.
- Clear vision panels provided.
- Certified by HVAC specialists to confirm appropriate construction and airflows through airlock.

Example:

Package (1)



Package (2)

19, 2004

Package (3)

Work Site

9, 2004

Success!

Buildings

- Facility team progress POCO.
- Handover to decommissioning team.

October 19, 2004

- Existing ventilation and electrical systems replaced.
- Plant & equipment progressed as above.
- Spoil treated as Be contaminated

Conclusions

- Each "disposal" is considered on its merits – no "one size fits all" approach.
- By not allowing "free release", the potential for exposing the public to Be is eliminated.
- This approach has been successfully followed within AWE's Be Facilities for many years.

George Fulton, LLNL – Lawrence Livermore National Laboratory Legacy Issues

George briefed the committee on LLNL legacy issues. George is in the review process with some of the information for general release, and elected to send his presentation at a later date. This presentation will not be available on the web

Historical process sites need to be adequately evaluated:

- Questions have been raised about the statistical validity of the sampling for the baseline inventory
- Major issue – the suitability of the dry swipe methodology has been questioned
- LLNL has taken or proposes the following actions
    - A statistical sampling protocol has been developed
    - Conduct research into processes for evaluating surface contamination
    - Request DOE/NNSA to provide the technical basis for the method DOE/NNSA-LSO is REQUIRING for use
    - DOE/NNSA-LSO is of the opion that ONLY wet swiping is appropriate and has declined to provide any technical basis for it's use

The committee discussed the issues with wet versus dry swipe samples (i.e. practicable application of wetting agents on components that are not conducive to having samples, uniformity of the term 'particles' whether it applies to plutonium, beryllium, etc.).

The primary issue that George wanted to raise is that there are many issues that proliferate out of many other sub issues and that there is insufficient information to determine an adequate approach to sample swiping. The main point is to minimize the level of airborne contamination.

Minimization of spread of contamination

- DOE/NNSA-LSO raises the dry swipe issue, again, industrial hygiene policies, and a review of the field implementation of the CBDPP
- LLNL has taken or will take the following actions
    - IH policies are being revised to include statistical sampling
    - The swiping issue is not separately addressed here
    - A date for the field implementation review of the CBDPP has been set; the review will utilize a checklist similar to that used by DOE for the initial CBDPP plan review

Are uncontrolled areas monitored?

- DOE/NNSA-LSO recommends a documented, statistical sampling protocol for non-beryllium areas adjacent to beryllium work areas

Conclusions:

- The benefit to LLNL and to the DOE will be mixed
  - Sampling will have a statistical basis
  - LLNL IH policies will be more proscriptive and allow less professional judgement
  - The cost-benefit is undefined; the cost of the proposed corrective action plan is approximately $1,500,000

An issue of timliness was raised to reduce the cost estimate, why is there a rush and why hire one person instead of two and just spread the cost over time.

How much risk are we willing to accept, and how good is good enough? This question was raised by George Fulton. A guidance document out of NNSA is being looked at by Sam Johnson's office. Jim Johnson had input that the document review is the most inexpensive part of the issue. The next issue of why not wait and Jim Johnson has said that the site office will dictate the time period. All this gets back to the main issue of risk management, and we can't make those decision based on the amount of information.

Harvey Grasso from the LLNL site office has bought the point that as long as we are collecting the data dry, we have no comparison for how valid the data is. This could have implications for release criteria that passes dry wipes, and is released to the public and swiped wet and found to be contaminated. Another point is that we have much in the way of sensitizations that cannot be accounted for. The unexplained issues are not proactive and are not acceptable. This is the issue that the site office is attempting to resolve.

This issue was discussed last time, and the committee's recommendation was that wet swipe is preferred. Kathy has asked the Technical Standards, Practices

Jim Jenkins, Y-12 - Declaring Victory on Legacy Issues

***This Presentation is available on the web at http://www.sandia.gov/BHSC/events/events.htm**

Beryllium Legacy at Y-12

- The processing of beryllium has been an important part of the Y-12 mission since the 1950's
- Mission completion has required the execution of:
  - beryllium processing
  - Research
  - Storage activities in numerous locations throughout the plant
- Dynamic nature of Y-12's mission has resulted in
  - Frequent changes in physical location
  - Frequent changes in process requirements
- Potential for beryllium contamination existed on equipment, building surfaces, or other surfaces

Purpose and Objectives of Characterization Effort

- Purpose
  - Evaluate and identify the presence of beryllium in accordance with 10 CFR 850 and in conjunction with ongoing efforts to ensure worker protection and pubic safety
  - Document a scientifically based beryllium characterization sampling plan for evaluating buildings at the DOE Y-12 National Security Complex

- Objectives
  - Systematically characterize locations of potential beryllium contamination so that a baseline beryllium inventory could be prepared in accordance with 10 CFR 850.20
  - Provide data that can be utilized in conducting the beryllium hazard assessments in accordance with 10 CFR 850.21
  - Utilize a risk-based approach that is logical and defensible as well as flexible in application

Beryllium Characterization Plan

- Y/TS-1815 *Surface Beryllium Characterization at the U.S Department of Energy's Y-21 National Security Complex*
- Date of Issue: March 13, 2001
- Plan Prepared by:
  - L. C. Brantley, CIH, Industrial Hygiene
  - L. E. Cooke, CIH, Industrial Hygiene
  - S. M. Hollenbeck, CIH, Industrial Hygiene
  - R. S. Leete, Jr., PhD, Statistician
  - J. R. Brown CIH, Consultant
  - S. D. Anderson, CIH, PrSM Corporation
- Plan Approved by: R. T. Ford, CIH, Industrial Hygiene Manager

Survey Technical Approach

- Identify Characterization Areas using Historic Data and Interviews
- Establish the Characterization Area Groups (CAGs)
- Develop the Building Specific Sampling Strategy
- Implement the Sampling Strategy
- Prepare the Characterization Report

Identification of Characterizing Areas using Historic Data and Interviews

- Compile all known data sets into a single comprehensive population of beryllium data
  - Current and historical beryllium areas list maintained by Industrial Hygiene
  - Search the Industrial Hygiene sampling database (over 500,000 beryllium samples)
- Research historic activities that generated the need for sampling
  - Preservation database
  - Past Records
  - Interviews

Establish the Characterization Area Groups (CAGs)

- Establish specific areas for statistical evaluation
- Sort Characterization areas by past sampling data
- Assignment to three categories based on past sampling results to help define CAG area size.
  - Category 1: Less than the limit of quantification at the time of the sample analysis
  - Category 2: Results range from "non-detect" to 5.0 ug/100 cm2
  - Category 3: Results are 5.0 ug/100 cm2 or above.

- Result is CAGs based on past data and process knowledge.

Grouping Multiple Characterization Areas

- Characterizing areas by past sampling results provides information on potential contamination levels that could still possibly exist and serves as a basis for a strategy to evaluate all the areas within a building.
- Similarly categorized areas, through the use of process knowledge and professional judgment, can be grouped to form logical CAGs for evaluation
- Careful consideration must be applied to this task since the results obtained may apply to all areas included in the group regardless of the actually location of samples collected and analyzed

Grouping Multiple Characterization Areas (cont)

- Square footage of the group
  - Groups composed of Category 1 areas comprise more square footage as the expectation for positive sample data is low. Positive results are a higher probability for Category 2 and 3 areas, which limited the size of these groups.
- Building Layout
  - Similar groups are logically assembled according to geographical proximity depending upon building size, number of characterization areas in a given category and area location
- End Result
  - A list of characterization areas grouped together by category, which serve as a foundation upon which a building-specific sampling and analysis plan can be developed

Develop the Building Specific Sampling Strategy

- Stratify each CAG into three similar surface types
  - Floors
  - Equipment surfaces such as desks, shelves, machinery and process equipment that would be directly contaminated from beryllium operations
  - Horizontal surfaces such as window ledges, structural steel, conduits, light fixtures, and ventilation equipment that would be indirectly contaminated by beryllium operations
  - Additional similar surface types may be evaluated separately if needed

Develop the Building Specific Sampling Strategy (cont)

- Sample Collection
  - Evaluate each strata within a CAG
  - Use a minimum of 30 random samples
  - This approach, and the computation of the average plus three standard deviations was chosen so the results could be evaluated, regardless of the underlying distribution of the population being sampled, to estimate the approximate 99th percentile and use it as a basis for making decisions
- The total number of samples for a given building or building set equals the number of CAGs (regardless of size) x 90 samples /characterization group, not including field blanks

Enhancement the Sampling Strategy

- Professional Judgment
  - With random sampling, it could occur that some characterization areas included within a larger group being sampled could be missed in the random sampling process. If this

could cause management/worker concerns as to the sample fairly representing the population being sampled the taking of additional random samples in these overlooked areas is acceptable

- Additional or Corrective Actions
  - An advantage is that the approach allows for additional or corrective actions to be isolated to the similar surface types in the same CAG
- Elective Sampling
  - Elective or bias sampling may be conducted in addition to the random sampling to determine if contamination is present. However no statistical confidence is implied

Statistical Analysis

- Don't shoot me, I am only the messenger!
- A statistical approach with an appropriate sample size that would with confidence identify areas without sample results greater than 0.2 ug/100 cm2 and also indicate areas were 10% of the samples had values higher than 0.2 ug/100 cm2. The method would need the ability to flag the "bad" areas more than 99% of the time
- Statistics evaluated
  - Largest value in the sample
  - Value computed by adding three times the standard deviation of the results to the average
  - Value computed by adding three times the standard deviation of the results to the average, where the computed standard deviation was corrected for small sample bias
  - The value computed by adding "k"times the standard deviation of the results to the average, there "k" is a tolerance interval factor published in statistical tables
- Simulation studies on repeat samples showed that a sample size of 30 and the use of he the value computed by adding three times the standard deviation of the result of the average provided a high reliability and ease of computation
- By taking a sample size of 30 and flagging the area if the average plus three standard deviations exceeds 0.2 ug/100 cm2, the "good" area is accepted and the "bad" area is flagged more than 99% of the time
- For a normal distribution, given the average and standard deviation, then 99.6% of the population values would lie below the value computed by taking the average plus three standard deviation.
- However, beryllium sampling results do not follow a theoretical parametric distribution
- Distributions of contamination data are almost always skewed to the right, or left censored. Giving more high readings than would be expected from a bell-curve.
- An internationally know statistician, Don Wheeler, and others have shown that regardless of the underlying distribution of results, the value established by the Average plus three standard deviations almost always bound about 99% of the population
- With this approach one can be 95% confident that 90% of the population will fall below the largest value in a sample of 30
- The tail of the distribution will not be mis-represented using a sample size as small as 30

Implementation

- Operational Rule
  - The surface level of 0.2 ug/100 cm2 beryllium is considered to be exceeded for a surface being evaluated when:
    - A single sample result representing the surface exceeds this level or
    - The average plus three standard deviations of at least 30 random samples that represent the similar type exceed this level
  - Areas represented by smears that have a beryllium surface level that does not meeting the Operational Rule can be excluded from any further concerns or actions. Areas that have a beryllium surface level that meets the Operational Rule
    - Line management will be notified in writing and provided recommendations for continuing operations
- Surface type within strata not at the randomly generated location
  - Use a substitute randomly generated location to sample that surface or
  - Skip the location missing a surface an sample all surfaces at a substitute randomly generated location
  - A safe sampling location within ten feet of the randomly generated point may be used.
  - Use an alternate random sampling location noted on the drawing if each of the three homogeneous surfaces is not present at a location
- Sampling above 8' will not be performed due to safety and logistic concerns. Areas will be characterized as needed as part of individual projects or work packages

Air Sampling

- Representative personal air sampling will be conducted on field team personnel during surface sampling activities. A minimum of one personal breathing zone sample per day will be obtained during the surface sampling activities

Characterization Report

- Provide line and program management with prompt and concise report of the evaluation performed.

Characterization Overview

- Number of candidate buildings
- Number requiring characterization
- Number all non-detects
- Number detectable but less than 0.2 ug/100 cm2
- Number equal to or greater than 0.2 ug/100 cm2
- Number of samples taken
- Number of current Beryllium Operational Areas and Beryllium Storage Areas
- Response to Las Vegas Report

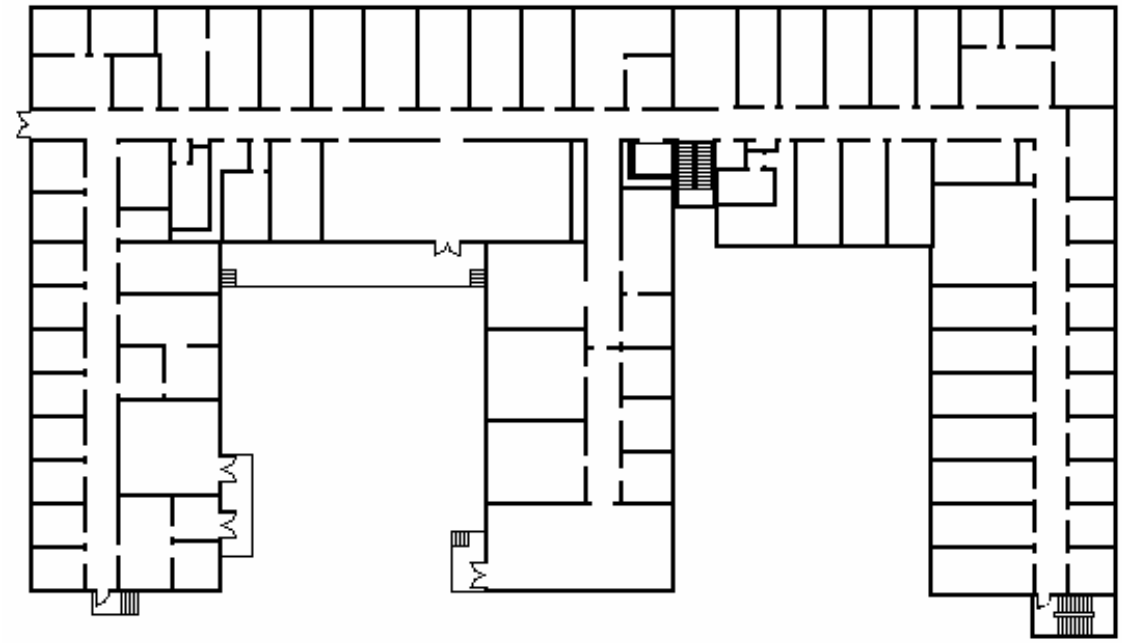
Gary Whitney, LLNL - Legacy Beryllium in a Multiuse Building (Presentation Pending Review for Posting on BHSC web site)

Baseline Beryllium Survey

- Records reviewed and interviews conducted to identify known and potential historical beryllium operations.

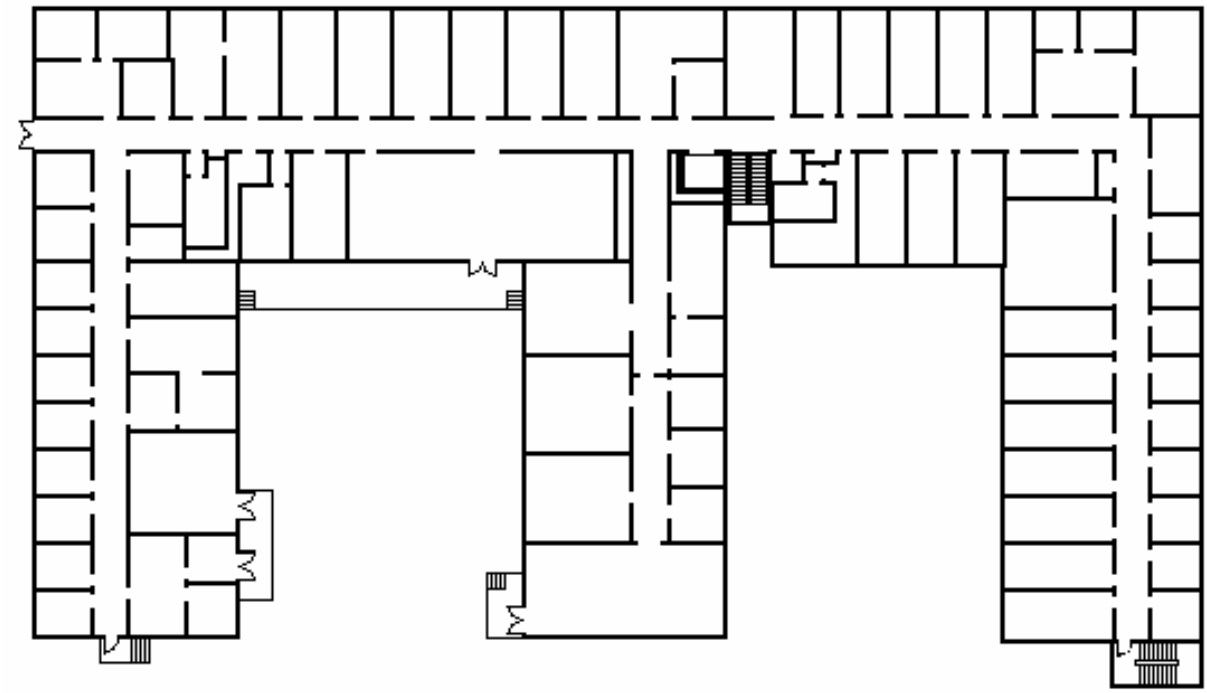
- Survey surface samples collected in locations likely to accumulate and retain potential contamination.
- More than 120 buildings and structures sampled.
- Vast majority below 0.2 ug/100 cm2.
- Some fairly low level contamination found in “expected” locations (shops, analytical labs, firing points, etc.).
- One unexpected exception.

1st Floor Plan:



- Weapons Test Support Facility is a multiuse building that houses office, meeting, laboratory, light shop, and x-ray calibration facilities.

Basement Floor Plan

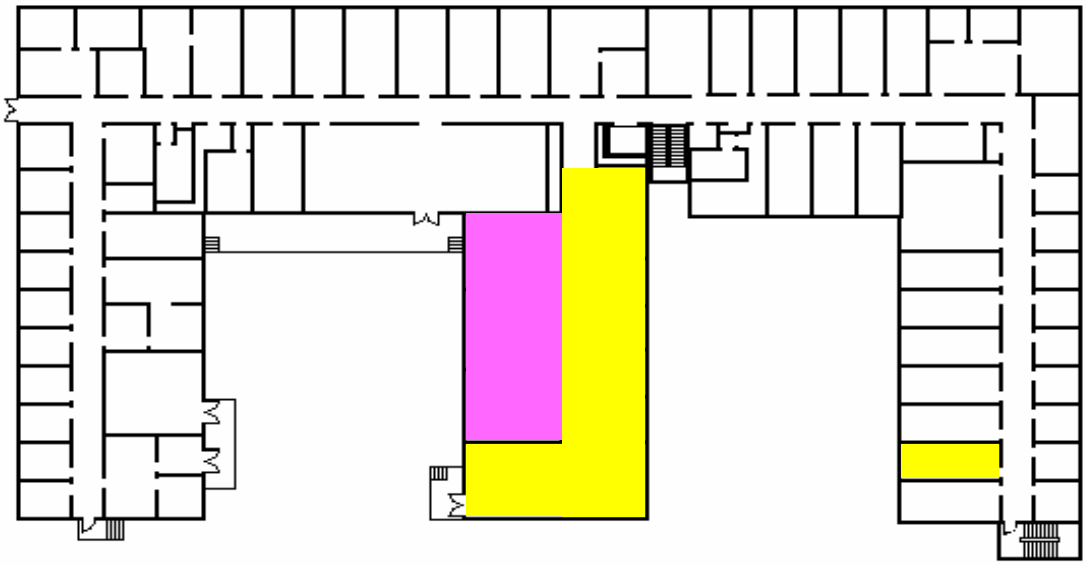


- Basement of building supported x-ray calibration and instrument testing. Beryllium windows in instruments and beryllium parts tested.

Unexpected Beryllium Contamination

- Routine sampling prior to removal of unused chemical hood in center wing identified unexpected beryllium contamination in ductwork.
- Further sampling revealed clear beryllium contamination on the upper surface of ceiling tiles in two rooms and other "spot" contamination in other areas of the center wing.
- Samples on ceiling tiles in the two rooms averaged 0.46 ug/100 cm2. (n=20, 70% > 0.2 ug/100 cm2, range 0.03 to 2.33 ug/100 cm2)
- Remainder of building areas sampled.

1st Floor Plan



- Approximate sampling locations marked (n = 263).
- Suspect rooms and randomly selected rooms.

Basement Floor Plan

- Approximate sampling locations marked (n = 66).
- Historical beryllium parts handling/testing in yellow.

Review and Evaluation of Sampling Results

- Is the building clean? Does it meet accepted criteria?
- Four building strata were identified:
  - Central Wing
  - Central Wing Ventilation Exhaust
  - Remainder of Building
  - Central Wing, Post Cleaning
- Data evaluated using the **R** statistical package.
- Experiences using **R.** (Not as painful as you might think.)

Sampling Results – Center Wing

- Clearly exceeds accepted criteria.
- Although contamination levels were not high enough to indicate an immediate exposure risk, the pattern and distribution clearly indicate that at one time beryllium was airborne in two rooms.
- Selected **R** program output:

N = 100 Mean = 0.231 Maximum = 2.33
Non-Detect = 40% Exceeds 0.2 ug/100 cm2 = 20.7%
Exceeds UCL = 26.6%

Sampling Results – Center Wing Vent Exhaust

- A no brainer.
- Contamination levels were relatively high, although in locations not normally accessible to workers or with a pathway into the workspace.
- Selected **R** program output:

N = 13 Mean = 39.1 Maximum = 188
Non-Detect = 7.7% Exceeds 0.2 ug/100 cm2 = 74.4%
Exceeds UCL = 88.9%

Sampling Results – Remainder of Building

- Clean. No corrective actions were needed.
- Only one sample exceeded 0.2 ug/100 cm2.
- Selected **R** program output:

N = 162 Mean = 0.012 Maximum = 0.22
Non-Detect = 90.7% Exceeds 0.2 ug/100 cm2 = 0.68%
Exceeds UCL = 2.2%

Sampling Results – Center Wing, Post Cleaning

- Clean. No further corrective actions were needed.
- No samples exceeded 0.2 ug/100 cm2.
- Selected **R** program output:

N = 54 Mean = 0.018 Maximum = 0.05
Non-Detect = 90.7% Exceeds 0.2 ug/100 cm2 = 0%
Exceeds UCL = 1.16%

Summary

- Source of contamination was not clearly defined. Most likely a single event involving a spill or work on contaminated equipment.
- Contamination was contained to a limited area.
- Decontamination efforts were successful.
- The **R** statistical program appears to be a useful tool for evaluating sampling results and determining compliance with accepted criteria.

Ken Meyers, Pantex – Legacy Beryllium Issues, Construction Projects

***This Presentation is available on the web at http://www.sandia.gov/BHSC/events/events.htm**

History

- Beryllium operations at Pantex involve finished beryllium components.
- No significant facility contamination was expected
- 34 facilities with 235 work areas identified as potentially contaminated.
- 3 µg/100cm2 used as cleaning criteria
- 38 work areas cleaned to as low as practical below 3µg/100cm2
- Most of contamination found in ceiling and inaccessible areas

Original Conditions of Release

- Buildings formerly <3 μg/100cm2 (not cleaned)
  - Released for all operations, maintenance, & construction

- Buildings formerly ≥3 μg/100cm2 (cleaned)
  - Released for normal operations & maintenance
  - Work involving demolition or removal of fixed equipment require beryllium work permit.

Construction Projects

- Facility Demolition
- Revamp of building for new mission
- Fire Alarm System Replacement (multiple)
- Warehouse roof replacement
- Facility Upgrade (2)

Additional Beryllium Associated Workers

- Subcontractors
  - Beryllium worker training
  - Offer of medical surveillance
  - PPE at workers discretion and employers expense
  - Monitoring

Revised Release Conditions

- All released for normal operations & maintenance
- <0.2 μg/100cm2 – released for construction
- Originally <3 μg/100cm2 cleaned to <0.2 μg/100cm2 – released for construction
- Originally >3 μg/100cm2 or <3 μg/100cm2 and not cleaned – Require:
  - IH evaluation (beryllium work permit?)
  - Workers treated as beryllium associated workers

<u>Jon Spezialetti, CHMM – Westinghouse Savannah River</u>

SRS Be Legacy Area Investigation

- Original examination of historical documents indicated no wide spread Be use at SRS
- Complications
  - Various classified work
  - Poor record keeping involving Be work activities
  - Loss of personal testimony due to retirements
  - No consideration of low percentage Be alloy at the time
- Examples
  - Machining equipment moved from one area/facility to another
  - Revised building layout
- SRS Laboratory issues confounded efforts to analyze swipe data to confirm the presence of Be surface contamination
- Lab Analysis problems were due to matrix interferences

- Use of ghost wipes (wet)
- In 2004 a site task team was formed to establish and / or clear all suspect Be Legacy Areas
- Emphasis put on currently occupied buildings and D&D activities
- Additional sampling campaigns are being conducted to establish baseline for new processing work
- 29 facilities w/ 70+ discrete areas within are being investigated
- Air sample results revealed no airborne Be > 0.2 ug/m3 (66 collected)
- Path Forward
    - Once area identified must backtrack and identify various work groups potentially impacted by elevated Be levels
    - Post areas and provide briefings and offer Medical Surveillance
    - Be Legacy assessment scheduled for 2006
    - Site wide training scheduled by February of '05

Mike Brisson, SRS - Progress Report BH&SC Analytical Subcommittee

Subcommittee Charter

- Key goals:
    - Improve quality and consistency of methodologies
    - Foster communications among analytical and IH communities
    - Develop technical guidance and offer assistance to others

Current Subcommittee Membership

DOE Sites Represented:
- DOE-HQ (EH-52)
- Hanford
- KCP
- LANL
- LLNL
- NTS
- ORNL
- Paducah GDP
- Pantex
- Rocky Flats
- Sandia (NM)
- SRS
- Y-12

Other Agencies Represented:
- AWE-Aldermaston
- Dept. of Defense (Army and Navy)
- IRSST (Quebec)
- NIOSH (Cincinnati and Morgantown)
- OSHA (Salt Lake City)

Opportunities (partial list):
- Brush-Wellman
- AIHA
- PNNL

Subcommittee Activities

- Regular conference calls since 12/03
  - Every 2-3 weeks
  - Typically 15-20 participants each call
- Subcommittee meetings in tandem with full BH&SC meetings

Subcommittee Working Groups

- Sampling (co-leads: David Weitzman, Steve Jahn)
- Digestion (lead: Tom Oatts, Y-12)
- Analysis/Reporting (lead: Kevin Ashley, NIOSH)
- Accreditation (lead: Melecita Archuleta, Sandia)
- Future Needs (lead: Amy Ekechukwu, SRS)

Major Accomplishments since April

- Baseline questionnaire compilation
- Progress on standard protocols
- Progress toward BeO SRM
- Study plan for different wipes
- Round robin in progress for LANL-developed field analyzer ("BeFinder")
- Draft analytical guidance for Release Criteria Technical Standard
- Radiological beryllium analytical capabilities
- ASTM Beryllium Symposium (April 2005)

Questionnaire Summary - Background

- Total responses – 17 (U.S., U.K., Canada)
- Four have processes producing BeO
  - Firing temp. unknown or classified
- Five handle rad-contaminated samples
- Annual sample volumes:
  - Air: 25,000 (range 37 to 12,000); AWE does nearly as many as all others combined
  - Wipes: 96,000 (range 3 to 33,250)
- U.S. and Canadian labs are AIHA accredited
  - Exception: SRS Rad IH lab is "equivalent" but is pursuing accreditation
  - AWE has HSE approval

Questionnaire Summary – Wipe Sampling

- Media
  - Most use Ghost Wipes
  - Whatman 41, ECM, Smear Tabs also used
  - 12 use wet wipes; 6 use dry (H2O is dominant wetting agent but alcohols also used)
- Sampling Plans: split between overall strategy guidance and investigation-specific plans
- No consensus on collection methods
  - HUD, NIOSH, ASTM, EPA, OSHA
- Nearly unanimous call for BeO SRM for use in PAT testing

Questionnaire Summary - Digestion

- Energy systems: hotplate, hotblock, microwave (OV and CV)
- Wide variety of reagents/combinations
  - HNO3, H2O2, HCl, H2SO4, HClO4, HF
- Final sample volumes
  - Air filters: Range 5-50 mL, avg. 21 mL
  - Wipes: Range 5-100 mL, avg. 40 mL
  - Affects reporting limits
- Most sites have done recovery studies
- Wide variety of digestion and storage vessel materials

Questionnaire Summary – Air Analysis

- Wide variety of methods
  - NIOSH 7300 (7 total, 2 with mods), EPA (3), OSHA (2), in-house methods (3)
- Reporting limits vary widely
  - Differences in units (mg/filter, mg/sample, mg/L, ppb) make evaluation difficult
- Variety of batch sizes, QC, blanks, and spikes
- Instrumentation: ICP-ES (11), ICP-MS (3 primary, 2 secondary), AA (1)
- Emission lines (ICP-ES): 313.107 nm, 313.042 nm, 234.861 nm

Questionnaire Summary – Wipe Analysis

- Wide variety of methods
  - NIOSH 7300 (7 total, 1 with mods), EPA (4), OSHA (2), in-house methods (2)
- Reporting limits vary widely
  - Differences in units (mg, mg/sample, mg/wipe, ppb, mg/L) make evaluation difficult
- Variety of batch sizes, QC, blanks, and spikes
- Instrumentation: ICP-ES (8), ICP-MS (1 primary, 2 secondary), AA (1)
- Emission lines (ICP-ES): same lines but more use 313.042
- Elemental interferences (ICP-ES)
  - Most common: Fe (5); Cr and V (4); Al, Ca, Cu, Mg, Mn, Ti (3); 23 others mentioned by one or two sites
  - Depends on line(s) used

Standard Protocols Status

Sampling Methods
- Guidance: use wet wipes unless they cannot be used for technical reasons
- Wet Wipes – ASTM D6966 – published
- Dry Wipes: ASTM method to be developed
  - Y-12 and NTS methods as templates
- Bulk Sampling – ASTM Micro-vacuum method being balloted
  - Alternative method using disposable sampling chamber under discussion
- Skin Sampling – ASTM method proposed
  - <u>Issue for BH&SC</u>: What are the objectives?

Sample Preparation
- ASTM method to be developed
- Specific reagent(s) not yet identified, but hoping to avoid use of HClO4 or HF

Analysis Methods
- ICP-ES: ASTM method being balloted

- ICP-MS: Evaluate applicability of ASTM D5673
- AA: No standard method yet proposed
- Fluorometric: Data being generated to support an ASTM standard method

Reporting Limits

- Subcommittee evaluating options

Be Oxide SRM Status

- Evaluating BeO from several suppliers
  - All appear based on UOX125
  - Want SRM to be commercially available
- Estimated two-year effort
  - Year 1: Establish SRM pedigree on selected material
  - Year 2: Establish proficiency samples based on BeO SRM
  - Issue for BH&SC: What matrix or matrices should be used for proficiency samples?
- Request for FY05 funding is pending
- LLNL is offering material for round-robin
  - Lead-free soil containing BeO with nominal 0.5 mg/g available Be
- LANL has developed a BeO slurry that will be tested at three DOE sites

Study Plan for Surface Sampling

- Would use BeSO4 solution
- Would test smooth, slightly rough, and porous surfaces
- Would test several methods
  - Whatman 541 (wet and dry)
  - Ghost Wipes
  - Dry linen paper
  - Kansas City method
  - Vacuum method
  - Pressure controlled method
- Study not yet funded

Be Finder Round Robin

- Field-portable analyzer
- Uses 1% NH4HF2 at room temperature
- Round-robin involving six sites
- Potential issues so far:
  - Recovery on Ghost Wipes
  - Recovery of BeO (particle size?)

Analytical Guidance (Tech Std.)

First draft submitted to DOE – Outline:

- Purpose of analysis and DQO
- Standard methods
  - Performance-based (alternate methods should demonstrate equivalent or superior performance)
- QA/QC

- Communication between IH and lab
- Field instrumentation
- Lessons learned

Radiological Beryllium Labs

- Y-12 can do U-contaminated samples
- Need identified for lab to handle Pu-contaminated Be samples
- SRS has established capability
  - Equivalent under 10 CFR 850 but pursuing accreditation
  - Discussions in progress with interested sites

Beryllium Symposia

ASTM
- April 21-22, 2005 – Reno, NV
- Organizers: K. Ashley, K. Creek, M. Brisson, A. Ekechukwu
- Analytical Subcommittee co-sponsoring
- For all interested parties (IH, analytical, operations, vendors, etc.)
- Abstract deadline has passed

ACS
- March 13-17, 2005 – San Diego, CA
- One-day session on IH analyses in nuclear environments (Be, Pb, etc.)
- Organizers: A. Ekechukwu, M. Brisson
- Abstract deadline: 11/12/04

AIHA
- Roundtable proposed for 2006

Other Open Action Items

- Develop performance criteria for field analyzers (awaiting funding)
- Resolve shipping issues
- Make AIHA accreditation more "value-added"
  - What evaluators should look for
  - How the post-BeO process should look
  - Input to AIHA policy manual
- Lexicon of standard terminology

Don Harvey, DOE – Beryllium Legacy Issues

Office of Fossil Energy (FE)

- Strategic Petroleum Reserve
  - New Orleans Site Office, Four Sites - LA & TX
- National Energy Technology Laboratory
  - Pittsburgh, PA & Morgantown, WV
- Rocky Mountain Oil Technology Center
  - Casper, Wyoming
- Albany Research Center
  - Albany, OR

FE Facilities

- Government Owned-Government Operated
- Contractors on site are for DOE support
- Subject to OSHA Jurisdiction
- Comply with all DOE Regulations and Orders
- Not subject to 10 CFR 851 but will comply with intent

Albany Research Center (ARC)

- Metallurgical Research Laboratory Former Bureau of Mines Facility
- Became FE Facility in 1996
- Researchers address fundamental mechanisms and processes; melt, cast and fabricate up to one ton of materials; completely characterize the chemical and physical properties of materials; and deal with the waste and by-products of materials processes.
- 81 Federal Employees in 30 Buildings

ARC Beryllium Legacy

- Nov. 2003 Safety Meeting
- No Current Beryllium Operations
- Little Institutional Knowledge
  - Be Research Scope Unknown
  - Few Current Employees
  - No project records
- Employee Notification
- August 2004 Review of existing records

ARC Safety Office Records

- AEC Classified Research 1960 – 197?
- General Activity Descriptions – No project files or Be program outline
- Sampling and Ventilation Survey Logs
- BZ and Swipe sampling results
- Locations of beryllium operations and research
- Medical Surveillance Program Information

ARC Beryllium Information

- "OWL" Room
  - Casting (?) and Machining
- Support Laboratories
  - Six Labs?
- 60+ Employees Involved
  - Bi-weekly Spirometry
  - Annual Physical Exam
  - Close-out Physical

Complications to Consider

- No AEC/DOE Beryllium Work since 1980
- Classification Concerns
- Possible non-AEC Beryllium Research

- 1989 “OWL” Room FUSSRAP Cleanup
- “OWL” Room is now the ARC Wellness Center
- Although ARC is a EEOICPA Rad site, ARC is not a EEOICPA covered Beryllium site prior to DOE taking ownership in 1996

FE/ARC Next Steps

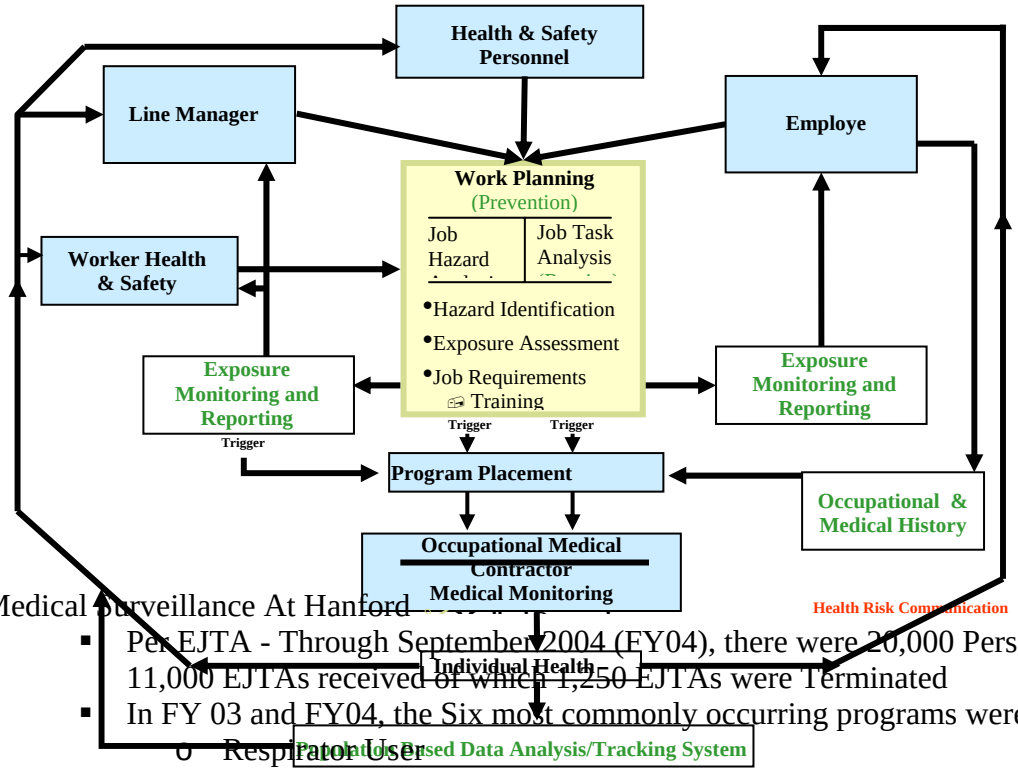
- Interviews with retired Deputy Manager and Safety Director
- Interviews with 3 current Be workers
- Define Locations of Interest
  - “OWL” Room
  - Laboratories in six buildings
- Develop Sampling Strategy
- Develop Beryllium Inventory & CBDPP

BHSC Issues

- Swipe Sampling Methodology & Recommendations
- Swipe Sampling Strategy Guidance (Statistical Approach)
- Non-Beryllium Operations Surface Contamination Clearance Criteria
- Statistical Package (R)

The committee discussed several issues with where information could be found on the legacy sites.

Joseph Samuels, CIH, PhD Hanford - Population Health Analysis Team Lead



Medical Surveillance At Hanford

- Per EJTA - Through September 2004 (FY04), there were 20,000 Person Programs with 11,000 EJTAs received of which 1,250 EJTAs were Terminated
- In FY 03 and FY04, the Six most commonly occurring programs were:
  - Respirator User
  - Hearing Conservation
  - Bloodborne Pathogen
  - Hazardous Waste Worker
  - Hazmat Medical
  - Beryllium Exposure – Previous Worker

Beryllium Programs

PROGRAM	FY03	FY04
Beryllium Exposure – Previous	**982**	**1100**
Beryllium Assigned Worker	**267**	**800**
Number of BeLPTs Performed	**3700**	

Beryllium Affected Workers

- Chronic Beryllium Disease 13
  - 5 no longer on Site
- Beryllium Sensitization 46

    - 17 no longer on Site

- Single Positive Be-LPT 18
    - 6 no longer on Site
    - Meeting DOL criteria for EEOICPA

Beryllium Affected Worker Occupations

- HPT/RCT/RM/HM
- Electrician/Carpenter/Driver
- Engineer/Administrative
- Fire/Medical/Security
- Power Operator/NPO/NCO
- Millwright/Insulator
- Fitter/Painter/Rigger
- Instrument/Chemist/Specialist
- Manager/Executive/Supervisor

Craig Clairmont, IH Manager Hanford – Beryllium History Site wide

History of Beryllium Usage

- Earliest use at Hanford about 1952.
- Limited experimental work in 1950s.
- Production operations including machining began around 1960.
- Production work ceased in 1987, when virtually all beryllium operations (outside a laboratory) ceased

Historic Beryllium Usage Information

- 313 and 333 facilities doing production work.
- 5 facilities involved in machining (272-W, 306-W, 325, 328, 3731-A).
- 9 facilities in pilot operations (231-Z, 303-F, 308, 314, 326, 327, 1706-KE, 3706, 3720).
- 42 other facilities "associated" with beryllium, but had little exposure potential.

Historic Beryllium Exposure Control

- Hazards of beryllium recognized by DOE from start.
- Airborne beryllium monitoring in 1952.
- Exposure limit was 2 ug/m3.
- Program to control exposures was put in place in 1966 or before.
- Hanford Environmental Health Foundation (HEHF) had "Safe Practices Guide".
- Contractor had Be Control Procedure.
- Established Control Zones for Be exposure areas. (such as lines painted on the floors)

Historic Beryllium Exposure Monitoring

- Monitoring performed during incidents and routinely in production areas.
- Both airborne and wipe sampling.
- Most airborne sampling were area.
- Some personal sampling performed.

End of Beryllium Production

- Be production work discontinued 1987
- Be production facilities decontaminated, but little information on the extent of the decontamination.
- Some sampling performed to establish that Be had been cleaned up.
- No known Be production work since 1988.

Recent Activities Involving Beryllium

- Laboratory Operations (analyses and PNNL research operations).
- Work with beryllium-alloy tools.
- Possible contact with residual beryllium contamination in facilities. ("UNLIKELY" in most facilities)
- Site CBDPP implemented in 1998.
- List of suspect facilities prepared 1998.
- Beryllium Awareness Group formed.

Laboratory Operations

- Very limited and closely controlled.
- Primarily at PNNL except Be analyses.
- Not considered as being a significant source of beryllium exposure.

Beryllium-Alloy Tools

- Used at various sites at Hanford.
- Considered to be low potential exposure.
- Use discontinued in early 2002 by all Hanford site contractors except PNNL.

Possible Be Contamination

- Possible residual beryllium contamination from past operations.
- List of about 60 facilities with "possible" beryllium contamination prepared. (31 of 60 managed by Fluor)
- List prepared based on records review, personnel interviews, etc.
- Many facilities had very low or no potential for exposure.

NOTE: Hanford used a very, very low threshold of credibility for placing a facility on the list of beryllium suspect facilities. Unverified claims, second and third hand oral history and other such information was all accepted in order to generate the Hanford "universe of possible beryllium facilities".

Beryllium Characterization

- Initial characterization of FH facilities performed in 1999.
- Additional facilities subsequently added to list of facilities with possible contamination.
- Initial characterization completed on facilities with possible beryllium contamination.
- 1 facility had surf. cont > 3 ug/100cm2 (333).
- 5 facilities surf. cont. > MDL (0.2 or 0.5 ug/100cm2) (313, 324, 334A, 350, 3716).

Wipe Sampling Detection Limit

- Original (1999) characterization levels:
    - MDL – 0.5 ug/100 cm2 (method limit).
    - Hanford 1999 limit – 1.0 ug/100 cm2.
- 10 CFR 850 (2000):
    - No specified level for facility characterization.
    - Equipment release level - 0.2 ug/100 cm2.
- Recent characterization sampling performed with MDL of 0.2 ug/100 cm2.

Recent Characterization Effort

- All facilities with evidence of past, recent or current beryllium contamination characterized.
- Additional sampling performed in selected areas of facilities based on work being performed in area.
- Did not attempt to "re-characterize" all facilities sampled in 1999 as many of these facilities were closed and locked.

Facilities Characterized since 1999

- Characterization performed based on facility activity.
- Characterization performed with MDL of 0.2 ug/100 cm2.
- FH Facilities characterized to the 0.2 ug/100 cm2 level: 272-W, 303-C, 303-J, 306-E, 313, 314, 328, 350, 3708, 3745-B.

CBDPP at Hanford

- Initially implemented in 1998.
- FH appointed by DOE to coordinate.
- Have "Site Level CBDPP".
- Each contractor has implementing document for their specific work type.
- HEHF (now AMH) has medical support plan to support CBDPP.

Fluor Hanford CBDPP

- Consists of two documents.
- Site level CBDPP:
  - Provides consistency between contractors in areas such as facility postings.
  - Provides standard definitions such as beryllium contamination.
- Contractor CBDPP:
  - Provides details of program implementation.

Definitions in Hanford CBDPP

- Based on 10 CFR 850, but provides several new definitions:
  - Beryllium assigned worker.
    a current worker assigned to perform work that is anticipated to involve exposure to airborne beryllium at or above 0.01 ug/m3
  - Beryllium affected worker.
    an individual who has been diagnosed with beryllium sensitization or chronic beryllium disease
  - Beryllium-contaminated material.
    Used in beryllium production work, or discovered to have surface contamination levels greater than 0.2 ug/100 cm2 or the background level for local soils (dust), whichever is greater.
  - Beryllium facilities list.
    listing of locations where the presence of beryllium has been evaluated; equivalent to the baseline beryllium inventory required in 10 CFR 850.20.

Hanford CBDPP versus 10 CFR 850

- Goes beyond 10 CFR 850 in many areas:
  - Defines "beryllium exposure" as airborne beryllium exposure > 0.01 ug/m3.
  - Creates beryllium assigned workers who will perform all work with Be exposure.
    - Medically qualified and trained for Be work.
  - Defines beryllium contamination as >0.2 ug/100 cm2 and uses for evaluating buildings.

Employee Protection

- Beryllium-affected workers are offered a medical restriction from airborne beryllium exposure and can opt out of work in beryllium suspect facilities.
- Prior to work in a facility with evidence of past beryllium usage, a job hazard analysis will be performed.
- Work with airborne beryllium exposure done by Be assigned workers only.

Hanford Be Programs and Supporting Programs

- Site CBDPP.
- FH Implementing Procedure (6155).
- FH Be Management Plan (19326).
- Automated Job Hazard Analysis.
- Accommodation of Work Restrictions.
- Employee Job Task Analysis.
- Respiratory and Personal Protection Programs.
- Written IH Sampling Plans
- Written plans prior to release or transfer of equipment from beryllium suspect facilities.

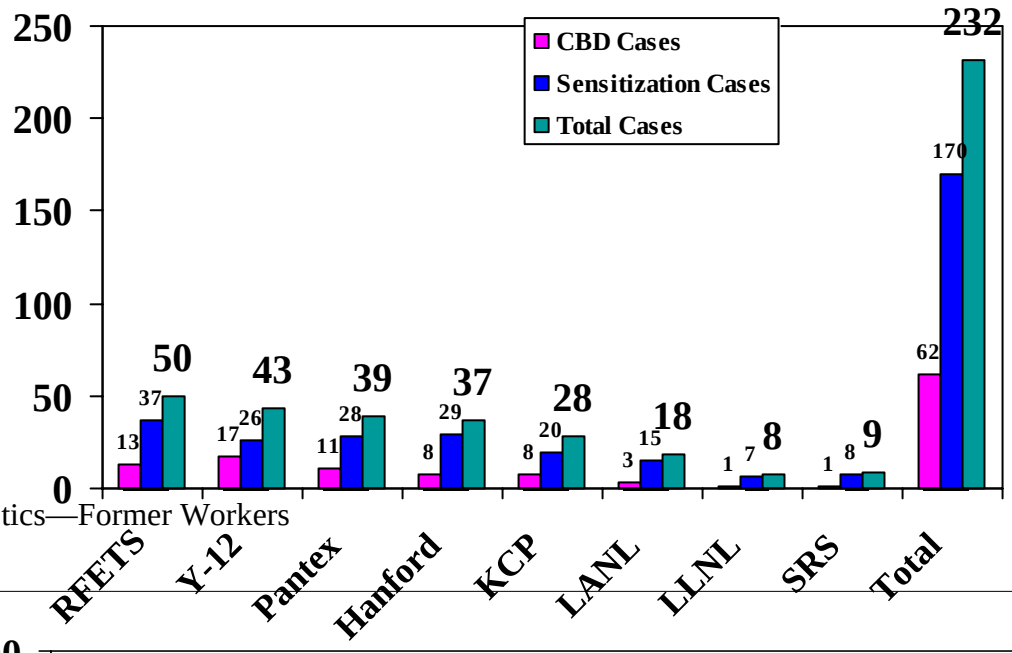
Be Sampling Information

- Exposure monitoring results provided to employees in writing and/or posted.
- Field file contains all sampling data (wipe, bulk and airborne) for facility.
- Exposure database (HIH2) functions as repository for exposure monitoring results and provides summary reports.

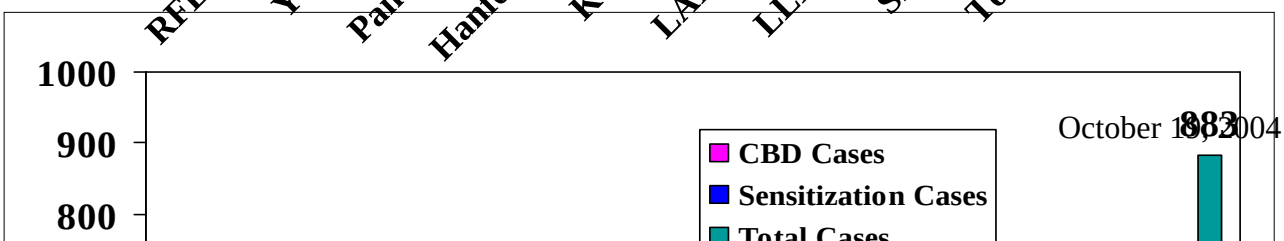
The committee discussed potential concerns for delineating between occupational beryllium exposure and naturally occurring background beryllium exposure. Craig discussed the methodology of how Hanford will be addressing the issues

<u>Sam Johnson, NNSA - Beryllium Health Research Agenda: Enhancing Worker Protection by Increasing Our Knowledge Base</u>

DOE Statistics—Current Workers



DOE statistics—Former Workers



R&D Goals

1. Real-time monitor development
2. Address legacy issues
3. Manage risks

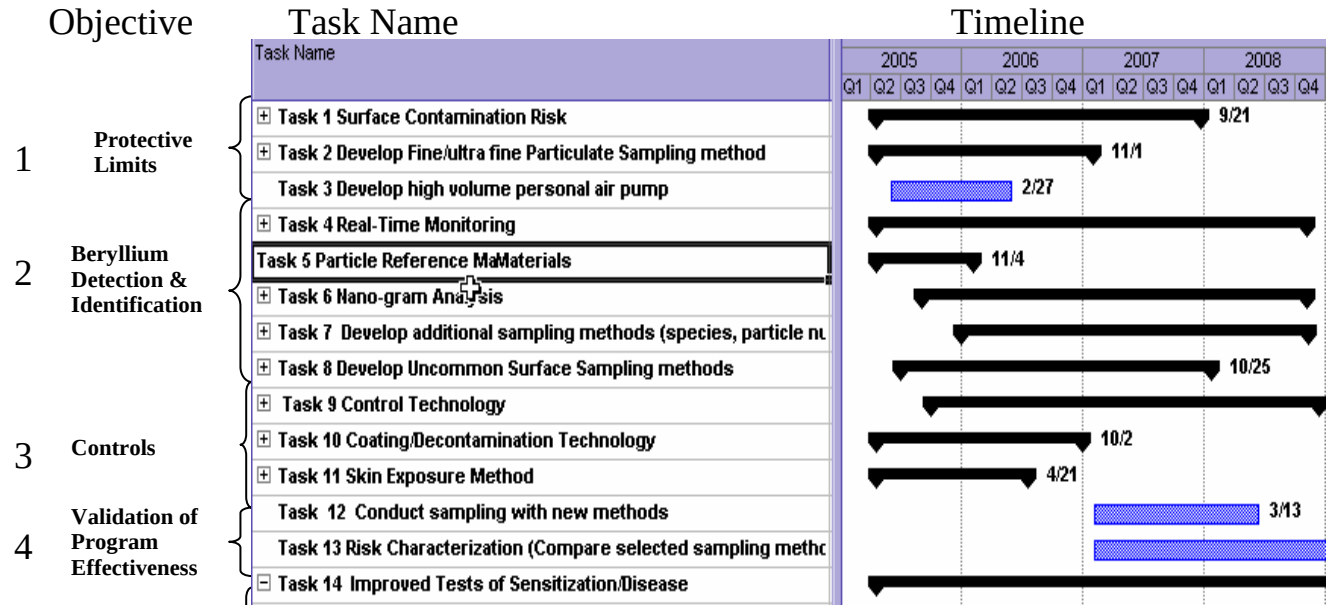
Projected Costs and Timeline

- Projected cost of $2 to $4M for 4 to 5 years for total of $12.45M

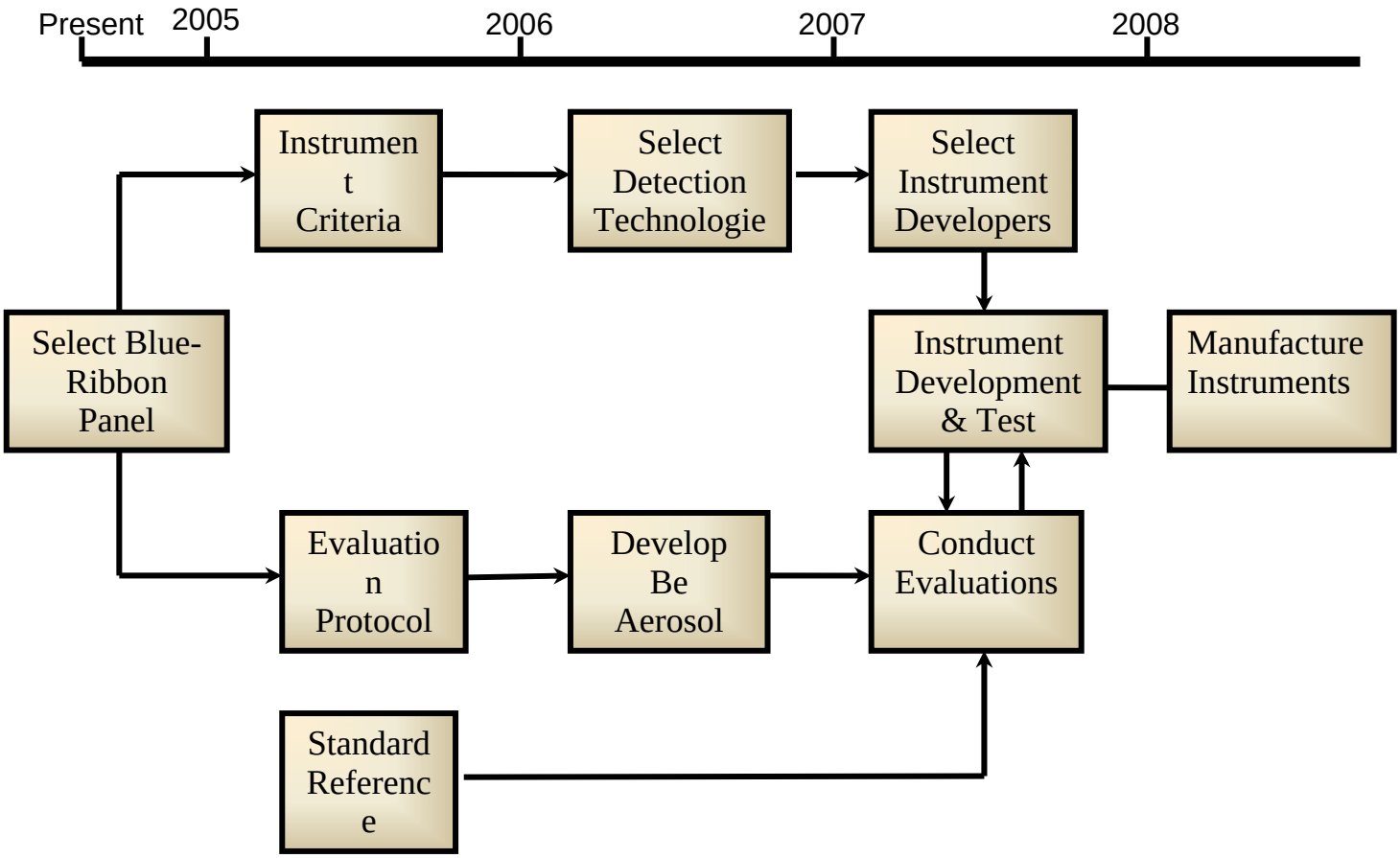
Objective 1—Protective Limits	$850k
Objective 2—Beryllium detection/identification	$6,550k
Objective 3—Controls	$1,900k
Objective 4—Validation of program effectiveness	$ 2,000k
Objective 5—Tests for sensitization& disease tests *	$1,150k
TOTAL	$12,450k

- Options on objective 5 an addition $2,250k

Proposed Project Plan



Realizing a Real Time Be Monitor



October 19, 2004

			FY2005	FY2006	FY2007	FY200
1	**Beryllium Aerosol Laboratory**					
	Location:	LANL				
	Scope:	Develop project plan and complete initial design to	30%			
	Schedule:	Complete above scope by June 30, 2005				
	Cost ($K):	$200	200	900	900	0
	Cost to complete ($K):	$2,000				
	Time to Complete (years):	3				
	Justification:	A beryllium aerosol laboratory is necessary to evaluate real-time beryllium aerosol monitors. A laboratory of this type does not currently exist that we are aware of				
2	**High Flow Deposited Submicrometer Sampler**					
	Location:	LANL				
	Scope:					
	Schedule:	Start in late 2005 or early 2006				
	Cost ($K):	$200	0	300	200	0
	Cost to complete ($K):	$500				
	Time to Complete (years):	2				
	Justification:	Effective method to assess workplace risk is necessary. Current methods have proven to be ineffective at assessing workplace risk.				
3	**Standard reference materials**					
	Location:	Y12				
	Scope:					
	Schedule:					
	Cost ($K):	$300	300	0	0	0
	Cost to complete ($K):	$300				
	Time to Complete (years):	1				
	Justification:	Prerequisite for Real Time Be Monitor development Standard reference materials are needed to provide consistent and adequate laboratory analysis				
4	**Criteria for real-time beryllium detection instrumentation**					
	Location:	SRS NL				
	Scope:					
	Schedule:					
	Cost ($K):	$200	300	0	0	0
	Cost to complete ($K):	$300				
	Time to Complete (years):	1				
	Justification:	development Specifications to real-time beryllium detection instruments must be developed in advance of developing instruments so that the instruments will provide what is needed in the field.				
5	**Evaluate Wet vs. Dry Sampling methods**					
	Location:	LLNL & Y12				
	Scope:	Determine conditions when wet or dry is best				
	Schedule:	Complete by January 31, 2005				
	Cost ($K):	$0 0	0	0	0	0
	Cost to complete ($K):	$0				
	Time to Complete (years):	1				
	Justification:	evaluation Allow for a collection efficiency weighting factor for comparison of results to surface contamination limits				

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				Projected Funding Profile			
				FY2005	FY2006	FY2007	FY200
6	**Validate Improved Lymphocyte Proliferation Test (iLPT)**						
	Location:	LANL through contract with a certified laboratory					
	Scope:	Conduct testing on volunteers to validate sensitization tests (4 total)					
	Schedule:	Complete by April 2006					
	Cost ($K):	$200	300	300	300	0	0
	Cost to complete ($K):		$600				
	Time to Complete (years):		2				
	Justification:	Resolve inconsistencies in test results to enable accurate determination of sensitization. Possibly identify tests for sensitization that are more accurate than the current test for sensitization					
7	**Develop Vacuum Sampling Method**						
	Location:	LANL					
	Scope:	Develop and validate vacuum sampling method					
	Schedule:	Complete validation by April 2006					
	Cost ($K):	150					
	Cost to complete ($K):		$250	150	100	0	0
	Time to Complete (years):		2				
	Justification:	Vacuum method will allow for consistent sampling of surfaces that are common to legacy areas					
8	**Develop Skin Sampling Method**						
	Location:	LANL					
	Scope:	Develop and validate skin sampling method					
	Schedule:	Complete validation by April 2006					
	Cost ($K):	100		100	150	0	0
	Cost to complete ($K):		$250				
	Time to Complete (years):		2				
	Justification:	Skin surface sampling method will provide a tool for better understanding of skin exposure risk in the workplace					
9	**Develop Evaluation Protocol for Instrument Validation**						
	Location:	LANL through contract with LBNL and SRS NL					
	Scope:	Develop protocol that will be used to test and validate real-time beryllium monitors					
	Schedule:	Complete protocol by June 2005					
	Cost ($K):	200		200	0	0	0
	Cost to compete ($K):		$200				
	Time to Complete (years):		1				
	Justification:	An evaluation protocol is necessary to provide for objective and definitive evaluation and validation of real-time airborne beryllium monitors					
10	**Develop Real-time Beryllium Monitors**						
	Location:	LANL through competitive contracts at instrument developers					
	Scope:	Select and foster several real-time detection technologies to final stages of development					
	Schedule:	Complete selection of technologies by December 2005					
	Cost ($K):	200		200	300	400	300
	Cost to compete ($K):		$1,200				
	Time to Complete (years):		4				
	Justification:	Real-time beryllium detection is necessary to improve worker and public protection, improve productivity, characterize contamination migration, and evaluate					
			Subtotals:	**$1,750**	**$2,050**	**$1,500**	**$300**
			TOTAL:		**$5,600**		

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Marc Kolanz, Brush Wellman – Most Recent Statement of Current Knowledge

Marc handed out the most recent Statement of Knowledge and a series of Frequently Asked Questions (FAQ's). These documents are available on the BWI website www.brushwellman.com along with additional health and safety information.

Kathy Creek, Committee Chair – Future Business Items, Meeting Locations, etc.

Sub committee break out sessions – the Committee Chair (Kathy Creek) organized the sub committee break out sessions, re-emphasizing the need to revitalize the subcommittees with the Analytical Subcommittee as the model for useful activity outside of the meeting and with respect to action item identification, development, maturation, and realization.

Medical and Epidemiology – Dr. Mark Wood chair, meeting at 1:30 in separate room, speaker phone arranged

Technical Standards, Practices, and Measures – David Weitzman chair, George Fulton (LLNL) vice chair will convene, no phone line for teleconferencing will be available, meeting offline with Kathy, David, and George will

CBD Prevention Needs Subcommittee – George Fulton will provide the basis for the white paper and finish before taking over the Technical Standards, Practices, and Measures

Analytical Subcommittee – Mike Brisson (SRS) chair, meeting in main room with speaker phone

Research Needs Subcommittee – Chair TBD, meeting in separate room upon reconvening

The next meeting site will be held in Washington, D.C. April 12 – 14 at the Forestall Facility

On the agenda for the next meeting is the development of the committee charter, revisiting the committee charter, mission, and JOWOG 30-1-1 (Facilities, Beryllium Technology, Safety)

Beryllium Health and Safety Committee Meeting
Las Vegas, Nevada
October 19 & 20, 2004

AGENDA

Desert Research Institute, Room 181, 755 E. Flamingo Road
Tuesday, October 19, 2004

8:15	Coffee	
8:30	Welcome	K. Creek
8:45	Overview of last meeting minutes	J. McKenney
9:00	Committee Issues, Future Events	K. Creek
9:30	Nevada Test Site Legacy Issues	D. Field
10:00	Break	
10:30	AWE Legacy Materials	T. Quinn
11:00	AWE Legacy Equipment	C. LeGresley
11:30	Lunch	
1:00	RFETS Legacy	J. Morris
1:30	LLNL Legacy	G. Fulton
2:00	Y-12 Legacy Issues	J. Jenkins
2:30	LANL Legacy	G. Whitney
3:00	Break	
3:30	Savannah River Legacy	John Spezialetti
4:00	SNL Legacy	L. Hooper
4:30	Subcommittee Breakouts	
5:00	Adjourn	

Wednesday, October 20, 2004

8:15	Coffee	
8:30	Fossil Fuel Energy Legacy	D. Harvey
9:00	Hanford Legacy	J. Samuels C. Clairmont
9:30	Pantex Legacy	K. Meyer
9:45	Brush Wellman Updates	M. Kolanz
10:00	NNSA Be Health Research Agenda	S. Johnson
11:00	Subcommittee Breakouts	
11:30	Lunch	
1:00	Subcommittee Breakouts	
3:30	Subcommittee Reports	
4:30	Next Meeting Wrap-Up	
5:00	Adjourn	