INHALATIONAL ANTHRAX OF UNKNOWN SOURCE
Connecticut, November 2001

America's Oldest Continuously Published Newspaper

Hartford Courant.

WEATHER
Rain,
Highs Near 55. Bc.

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A Diagnosis No One Wanted To Believe

In Victim's Memory

Family, friends and neighbors of Ottilie Lundgren say goodbye in a private memorial service, as investigators try to figure out how she contracted anthrax.

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Unlikely Anthrax Case Unfolds Under Microscope

By GARRET CONDON
COURANT STAFF WRITER

DERBY — It seemed absurd to even mention anthrax, and when she did, Dr. Lydia Barakat was only half serious.

It was just before 10 a.m., Saturday, Nov. 17, and she was peering into a microscope in the cramped, brightly lit Griffin Hospital laboratory. Barakat, an infectious-disease specialist, saw rod-shaped bacteria, chained together in spaghetti-like strands, stained violet by a substance that is used to help identify such germs.

She remarked that it looked a lot like anthrax.

Medical technologist Harold Hebb, a 29-year Griffin veteran who has specialized in microbiology, chided her.

"Come on, Dr. Barakat, where is a 94-year-old woman living by herself in Oxford going to get anthrax?"

Good point. Barakat suspected some other rod-shaped bacteria. Perhaps it was bacillus cereus, a bug that can plague the elderly. Or maybe clostridium, which is often food-borne. She immediately put the patient, Ottilie Lundgren, on antibiotics to combat a host of related germs, including anthrax.

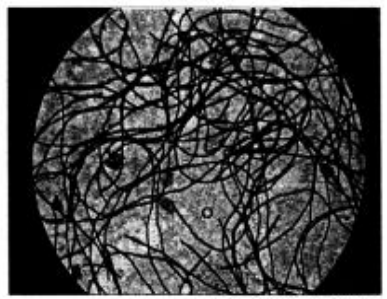
Lundgren had been admitted the day before with fever and some vague complaints. On Saturday, she was still only mildly ill, and her condition appeared stable.

"What are the odds that this is going to be anthrax?" Barakat thought.

The odds were unbelievably long, but it was anthrax nonetheless. On Wednesday morning, Lundgren became the fifth American to die of inhalation anthrax in recent weeks.

The source of the deadly spores remains an immense mystery. However, health officials might never have discov-

PLEASE SEE **STARTLING**, PAGE A12



COURTESY OF GRIFFIN HOSPITAL

A PHOTOMICROGRAPH of a a blood culture sample from Ottilie Lundgren shows anthrax infection. The strands are the anthrax colonies in the blood.

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

CO-INVESTIGATORS
Connecticut Anthrax Investigation Team

Team Leaders

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CDC – Eric Mast, David Swerdlow

Anthrax Investigation Team

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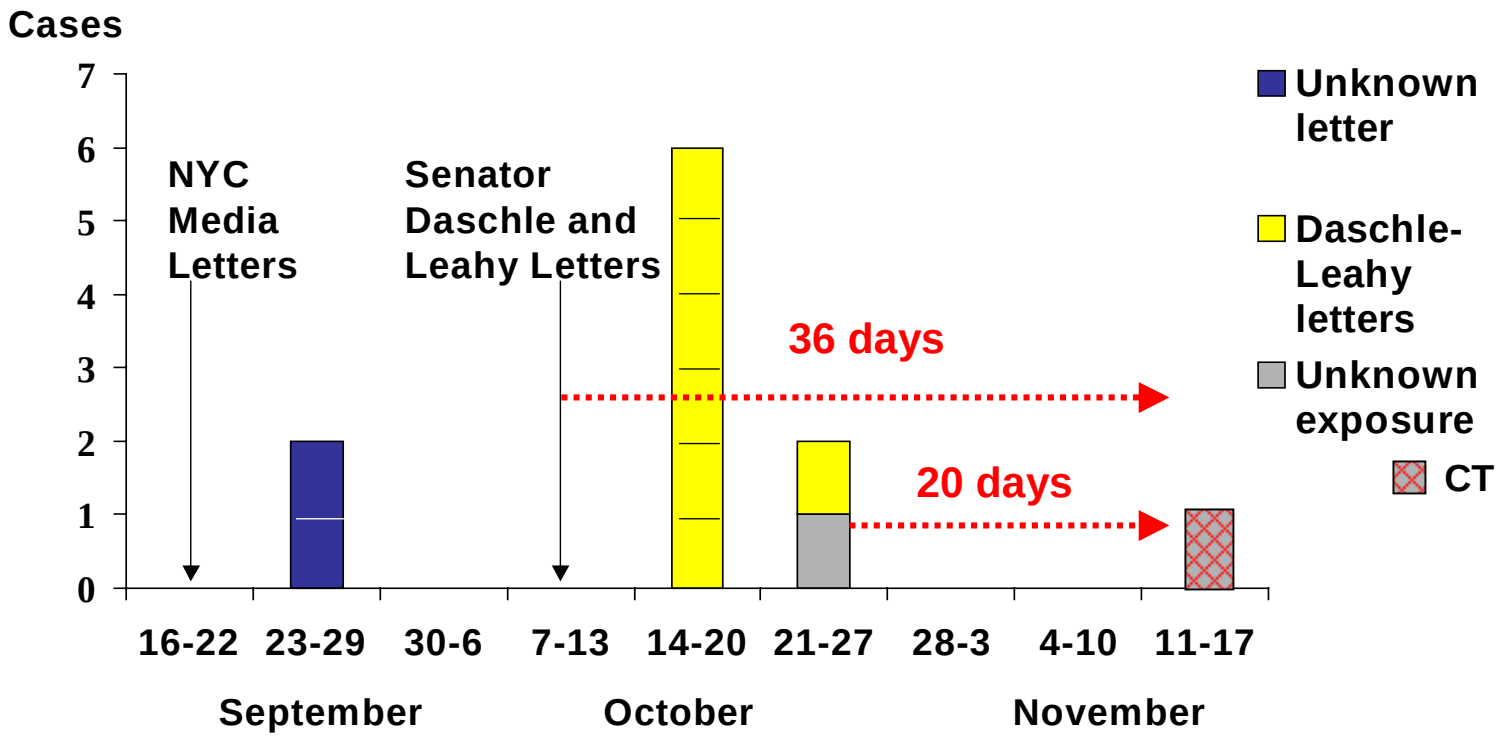
USPS – Gerald Newlan, Susan Lindquist, David Brandt, Hal Stephens, Mark Borofsky

FBI –Brian Donnelly; Ken Gray, Chris Counihan, Ted Kuhlmeier, Art Nieves, Wallace Salisbury, Craig Olsen, Jack Eckenrode, Michael Webster

INTRODUCTION

- November 19 - suspect case reported
- November 20 – CTDPH lab confirmation
- Connecticut - first human since 1968
- US – 11th inhalational case since 10/4

INHALATIONAL ANTHRAX CASES BY EXPOSURE SOURCE, U.S. 2001



EPIDEMIOLOGIC CONTEXT

- Inconsistent with epidemiology of 9 of 10 recent cases

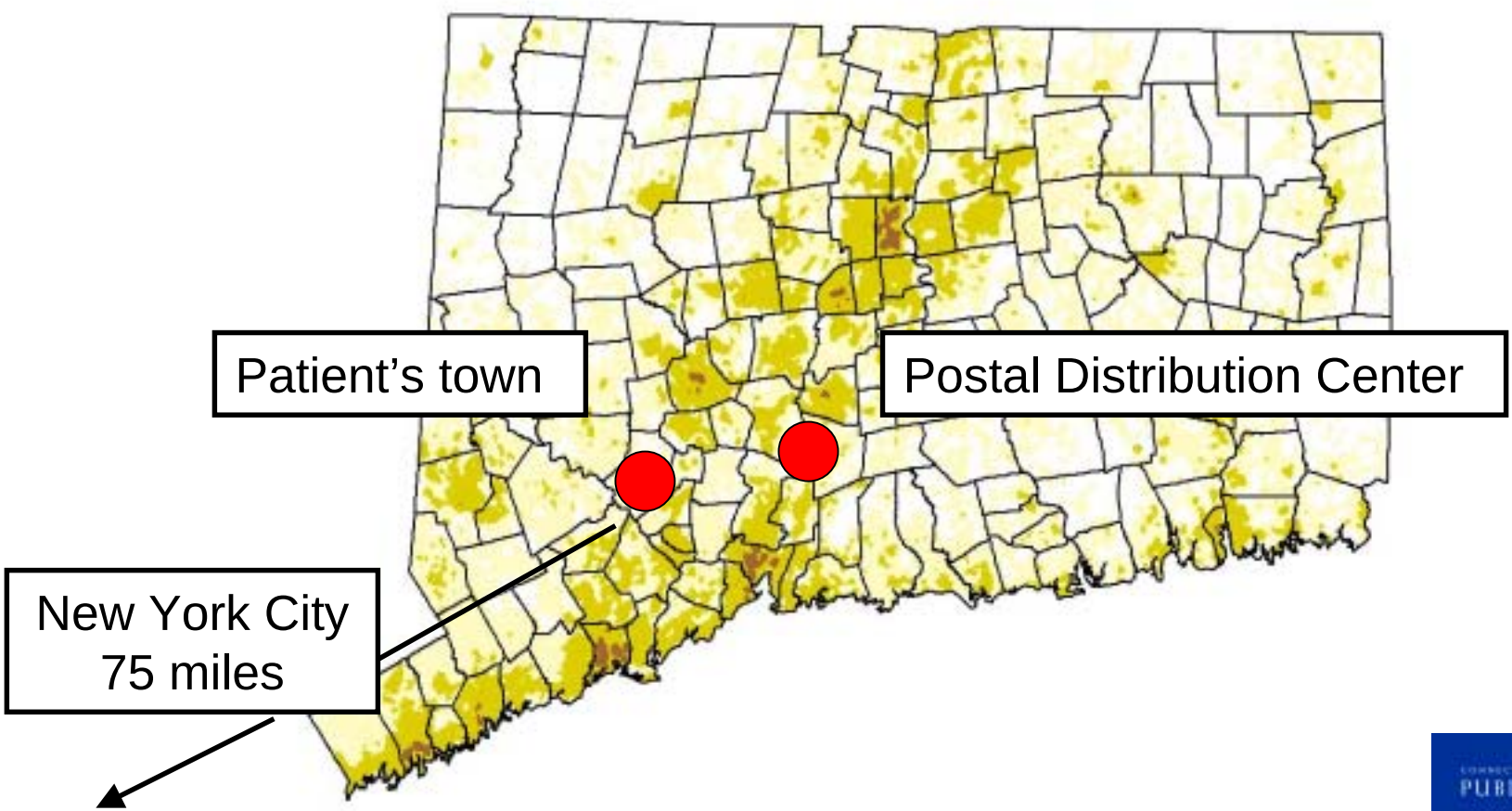
NOT:

– Media, government, high profile

– Postal worker in postal distribution facility through which Daschle or Leahy letters passed

EPIDEMIOLOGIC CONTEXT

- 94 year old woman who lived by herself



PUBLIC HEALTH INVESTIGATIONAL OBJECTIVES

To determine:

- whether associated with BT-related cases
- whether is an isolated case or index of larger exposure
- when, where, how exposed

LAW ENFORCEMENT INVESTIGATIONAL OBJECTIVES

To determine:

- if there is a perpetrator

- whether anyone with a possible means or motive to expose the case is a genuine suspect

To obtain information in a manner to be able to establish a legal case.

METHODS - SURVEILLANCE

- *Bacillus anthracis* isolate to CDC

- Extensive Surveillance
  - **Retrospective 75 days – to September 1**
    - Death certificate review
    - Medical examiner records
    - Laboratory records (G+ rod isolates)
    - Postal employee absentee records
    - Veterinary Survey
  - **Prospective 30 days**
    - Hospital admissions
    - Laboratory reports
    - Health care practitioners
    - Postal employee absences
    - Veterinary reports

METHODS - PATIENT

- Epidemiologic – past 60 days
  - Interviews/Calendar
  - Inspection of the house/trash
  - Comparison with NYC case

- Environmental sampling for spores
  - Home, personal items (clothes, medicines)
  - All indoor air spaces
  - Select outdoor locations

METHODS - POSTAL

- Epidemiologic
  - **Trace backward**: patient's known mail
  - **Trace forward**:
    - mail from contaminated postal distribution centers in NJ and DC to the patient's home, the local post office, the distribution center
    - 1st class – USPS electronic data base
    - Bulk mail using mail lists
- Environmental sampling for spores
  - Mail Distribution Center in CT
  - Local Post Office

RESULTS - SURVEILLANCE

- Patient isolate ***consistent with all other BT-associated isolates***
- ***No additional human or animal illness***

RESULTS - PATIENT

No environmental field samples tested positive, including her home, mail, personal items.

Sample Location	Number of Samples
Patient's home & personal items	***258***
Five Physician Offices	41
Eleven Restaurants	55
Two Churches	19 → ***181***
Bank, Salon, and Public Building	24
Seven Cars	21
Five Homes of Close Contacts	21
Select Outdoor Locations	***17***

RESULTS - PATIENT

- ***Very little in common with NYC case***
  - In common:
    - Inhaler
    - Perfume
    - ***both culture negative***
  - Not in common:
    - places visited
    - 1st class or bulk mail received
    - acquaintances

RESULTS – POSTAL EPIDEMIOLOGY

- **Trace Backward**
  - 29 letters recovered
    - 6 (21%) 1st class, cleanly opened
      - All postmarked in CT
    - 23 (79%) ***bulk, torn in half***
      - None from New Jersey
  - ***All cultured negative***

RESULTS – POSTAL EPIDEMIOLOGY

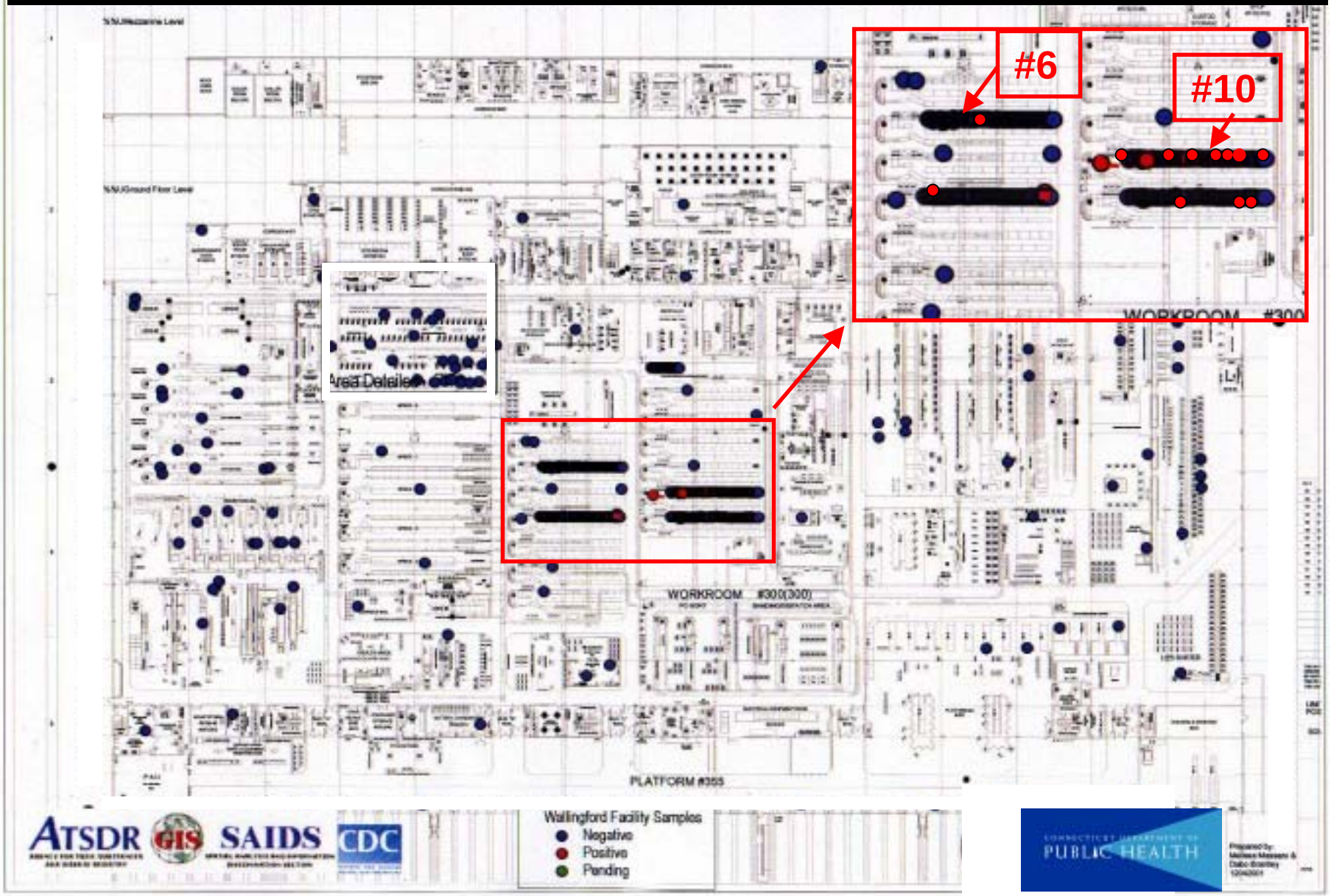
- **Trace Forward**
  - 8 first class letters sent to her address
    - ***None from outside Connecticut***
  - ***No known bulk mail from NJ to her address***
    - 31/33 lists from bulk mailings checked
  - Letter sorted in NJ – 283rd after Leahy – to her postal route
    - ***Outside positive***, inside negative
    - 36 additional samples negative

RESULTS - POSTAL

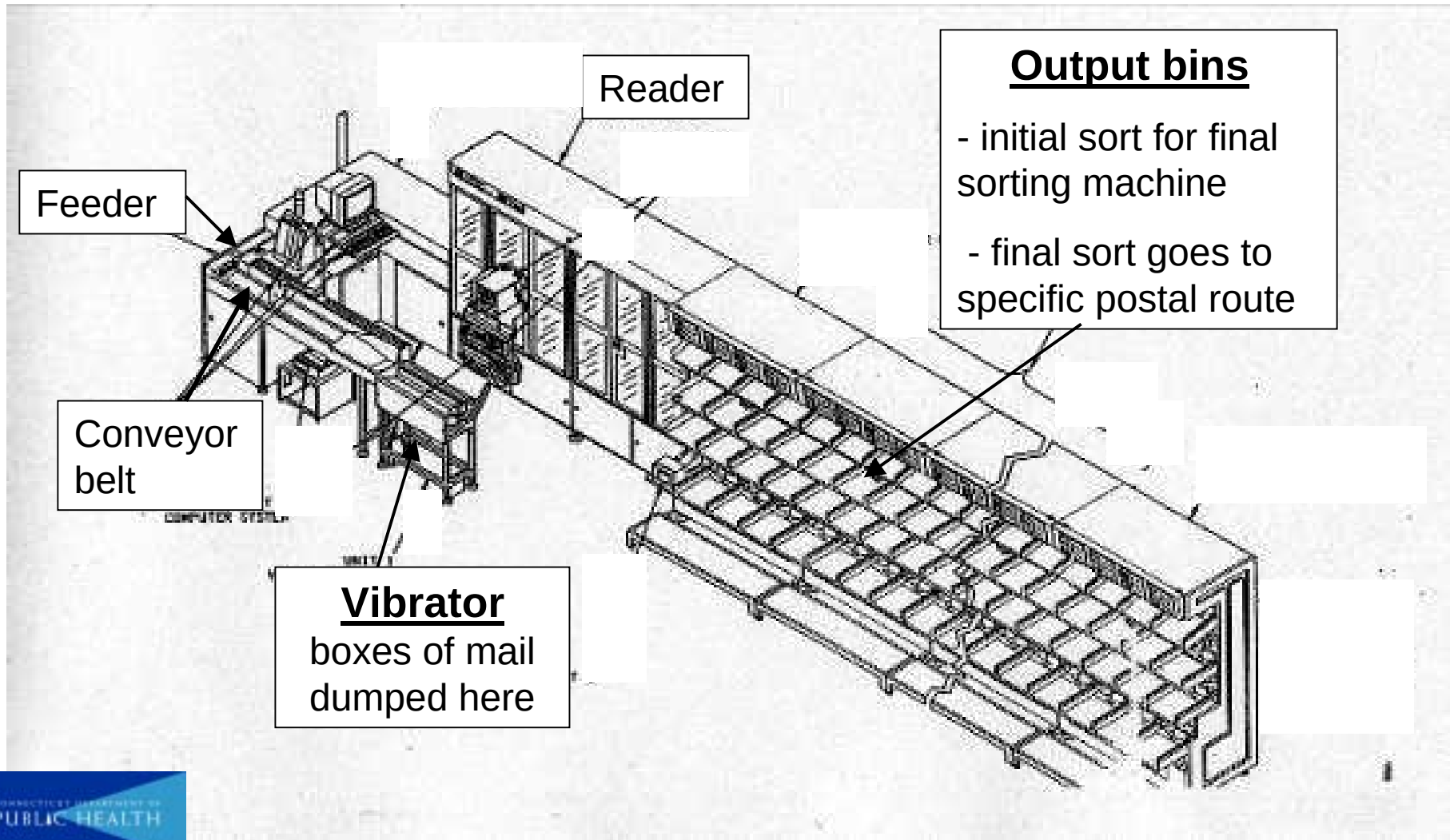
- **Local Post Office and trucks –** All 63 negative

- **Postal Distribution Center** – *41 (7%)* of 590 *positive*
  - All positives on 4 of 13 sorting machines
    - ***One heavily contaminated machine***
      - 34/52 samples positive
      - sorts mostly bulk" mail
    - ***Mail sorting machine for her postal route***
      - 1/52 samples positive.

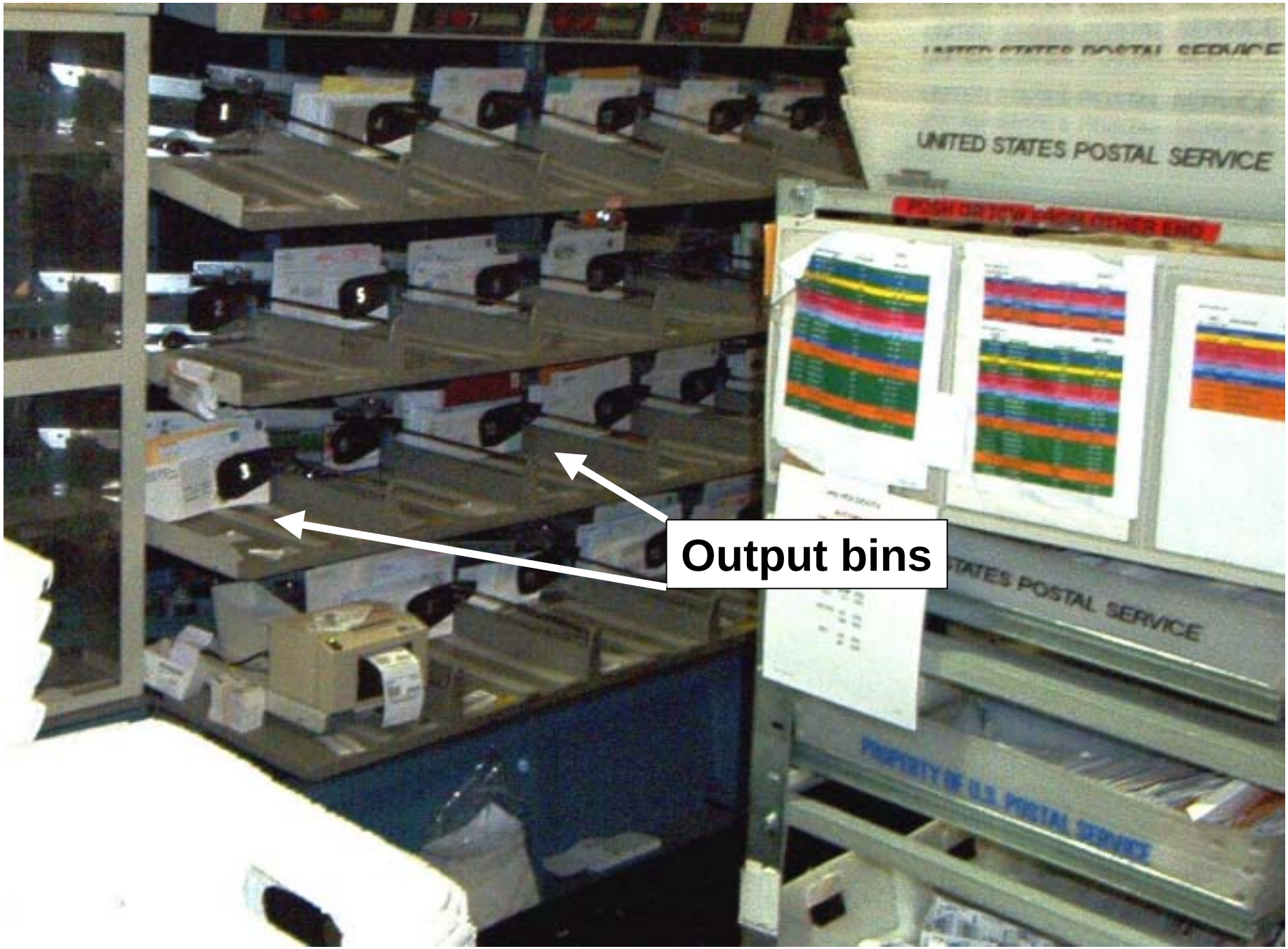
ENVIRONMENTAL SAMPLING RESULTS, POSTAL DISTRIBUTION CENTER



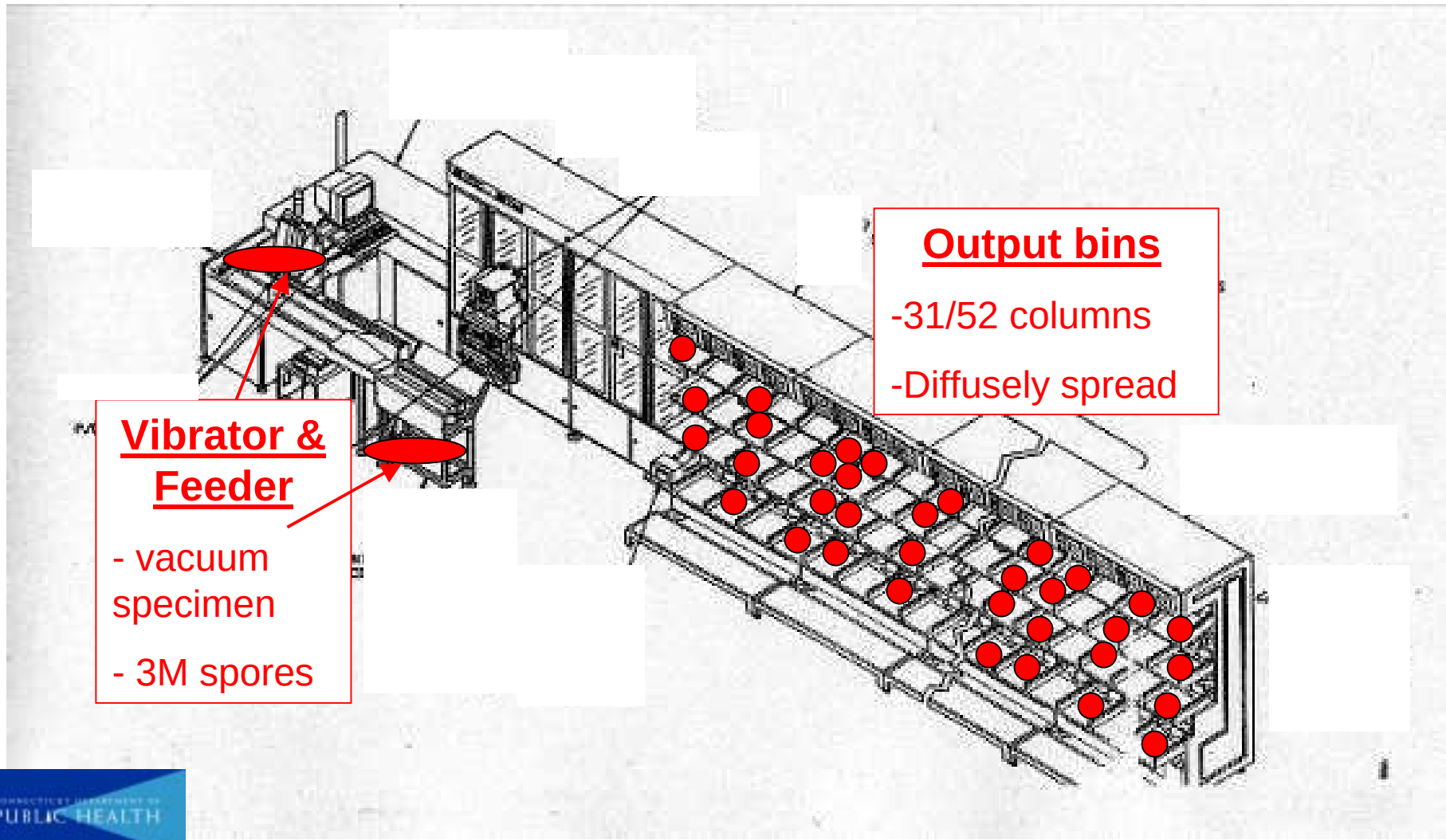
MAIL SORTING MACHINE



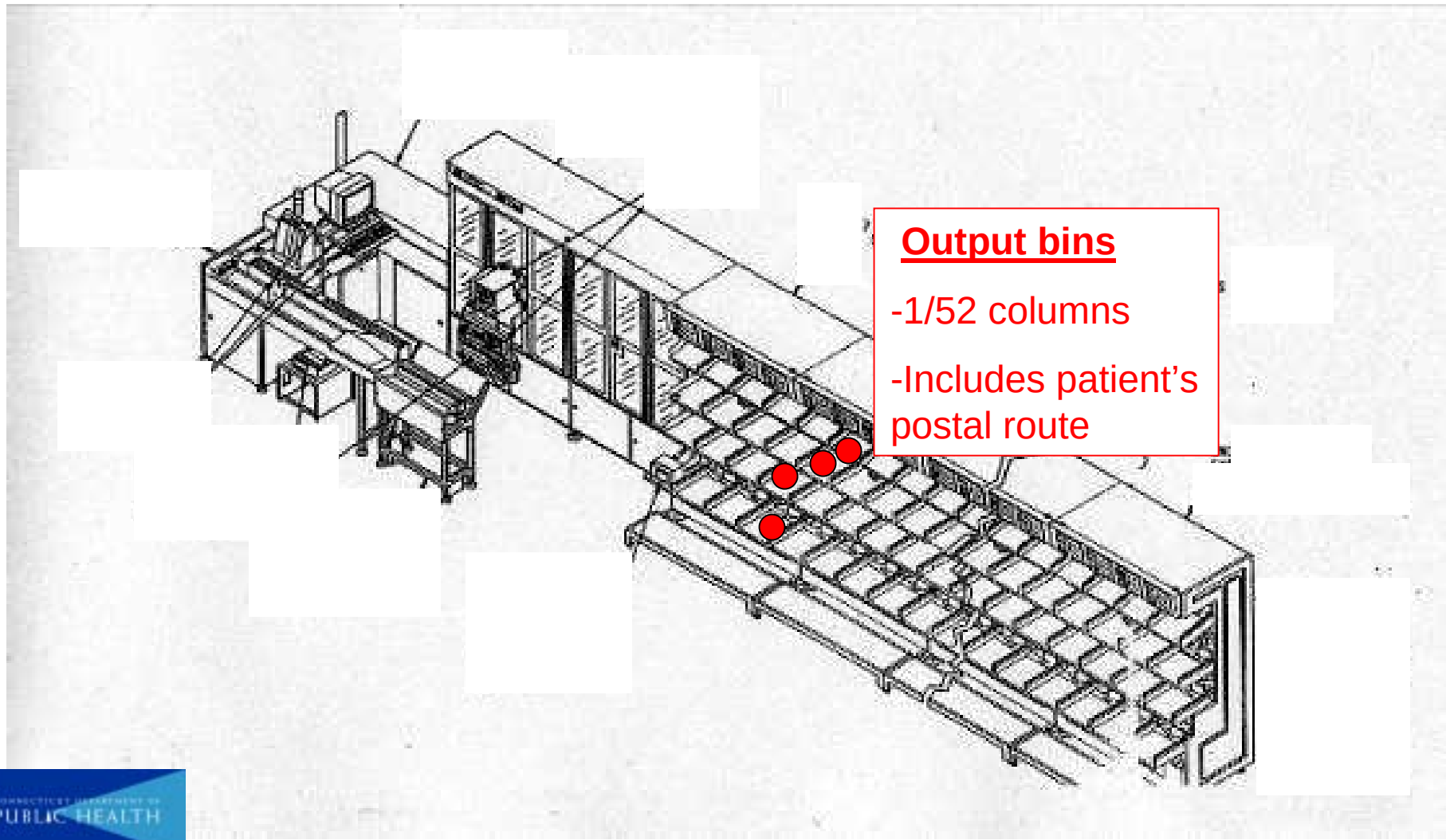

13
ElectroCom Automation L.P. DBCS III
Vibrator


UNITED STATES POSTAL SERVICE
Output bins

POSITIVE ANTHRAX CULTURE SITES
MAIL SORTING MACHINE #10



POSITIVE ANTHRAX CULTURE SITE
MAIL SORTING MACHINE #6



CONCLUSIONS

- Association with BT-related outbreak
- Single victim in CT
- Spores on cross-contaminated envelopes can remain attached to final destination
- Sorting machines in CT mail distribution center were contaminated, including machine sorting for patient's route

but …..

- How exposure occurred remains unknown

PROPOSED MECHANISM FOR EXPOSURE

Exposure source:

- cross-contaminated mail

Place:

- in house, low dose

Mechanism:

- contaminated bulk mail
- spore release via tearing it

LESSONS THAT STUNNED US

1. That ***inhalational*** anthrax can occur so far down the postal chain from the source of contamination.
   - Risk is low
   - *Can provide warnings on handling mail in event of a future attack*

2. That there could be disturbingly large but localized deposits of spores in cross-contaminated mail distribution centers.
   - Acute risk negligible, but could be aerosolized in future.
   - *Need to maintain new postal cleaning guidelines*
     - Wet mopping, HEPA-filtered vacuums, no compressed air

LESSONS THAT STUNNED US

3. That we could not detect anthrax spores in the homes of either of the two unexplained inhalational cases.
   - May be indicator of low dose exposure
   - Possibly missed the real source of exposure.
   - Need research into:
     - Sensitivity of environmental cultures
     - What types of mail surfaces spores are most likely to “stick” to or be imbedded in.
     - How spores can be released from mail surfaces into the air.

ACKNOWLEDGEMENTS

For cooperation and collaboration

END

MAIL VOLUME FROM TRENTON NJ POSTAL FACILITY, October 9-16, 2001

Total to any place (1st class and bulk)

- 1st 24 hours – 1 million
- October 9-16 – 5 million

To CT Distribution Facility (1st class)

- 1st 24 hours - 3,645
- October 9-16 – 20,451

To Patient's Local Post Office (1st class)

- 1st 24 hours - 9
- October 9-16 - 39

MAIL VOLUME FROM BRENTWOOD DC POSTAL FACILITY, October 9-21, 2001

Total to any place (1st class and bulk)

- 1st 24 hours – 1.1 million
- October 9-21 – 13 million

To CT Distribution Facility (1st class)

- 1st 24 hours - 3,836
- October 9-21 – 24,181

To Patient's Local Post Office (1st class)

- 1st 24 hours - 9
- October 9-21 - 66

INVESTIGATION COORDINATION

High Level of Coordination Needed

- Workgroup consisting of leaders from CT-DPH, CDC-CT and CDC-Atlanta, representation from each investigative team, USPS**,** FBI, local health
- Daily workgroup conference calls 8 am and 6 pm
- Workgroup leaders/agency representatives communicate daily with relevant people in their home agency (DPH & Commissioner's Office, CDC command center & Director's office, USPS, FBI)
- DPH-CDC presence at FBI command center
- As needed conference calls with CDC Director's Office, Secretary of DHHS's office to discuss important findings with national implications (Commissioner, DPH & CDC team leaders)
- As needed meetings in Governor's Office to discuss important findings at state and national levels (Commissioner, DPH team leader)

RESULTS: SURVEILLANCE

Detailed Results:

- 59 suspect clinical cases for inhalational or cutaneous anthrax found from hospital, clinician, laboratory and postal worker surveillance sources
  - Specimens sent to CDC on 14 of them – none positive

- Total of 131 suspect deaths identified.
  - ***One emergency autopsy done*** – negative
  - Medical records reviewed on 66 who died in hospitals – none highly suspect for inhalational anthrax

- 33 animal deaths reported from veterinarians – no anthrax

- One necropsy done on dead cat in Oxford – negative.

RESULTS: POSTAL EPI INVESTIGATION

Trace Backwards

- 29 pieces of mail found in OL's house
  - 6 first class – all with CT postmarks
  - 23 standard – none were mailed in NJ or DC

Majority of OL's mail was standard mail, which is difficult to trace.

RESULTS: POSTAL ENVIRONMENTAL CULTURES

Negatives

- Postal trail from Seymour post office to home – 63 samples.
- All samples from 3 initial visits to Southern CT postal distribution facility – 178 samples
- All cultures other than sorting machines from Southern CT facility

Positives

- Selected samples from **4 mail sorting machines** in South. CT facility
  - **Many samples from one machine** – sorts mostly bulk mail and mail to Cheshire and Southington
  - One of 52 samples from machine that sorts for Seymour – from **end-sort trays in machine where final sort for OL's postal route goes.**

RESULTS FROM LABORATORY-BASED INVESTIGATION

- OL did not usually open standard mail – tore it in half before putting it in the trash. 1st class mail was neatly opened with letter openers.

- Seymour resident's mail envelope that was processed in Trenton near letter addressed to Daschle was **repeatedly positive on swabs taken from outside – but did not shed spores in home.**

- Mail sorting machine test cards used daily in sorting machine #10 during November were negative for anthrax.

PROPOSED MECHANISM FOR EXPOSURE

Exposure source:

- cross-contaminated mail

Place:

- in house, low dose

Mechanism:

- contaminated standard mail
- spore release via tearing it

LIMITATIONS

- Threshold for detecting spores
- Incomplete data on standard letters
- Time lapse from likely contamination to when investigation started

CONCLUSIONS FROM INVESTIGATION

Case-specific

1. Isolated case of bioterrorism-associated inhalational anthrax.
2. Most likely source and place of exposure was cross-contaminated bulk mail that was handled in her home.
3. Exposure likely occurred from mail delivered in mid-October.
4. Dose of exposure was likely a low dose.
5. Exposure may have occurred as a result of tearing mail before disposing in the trash.
6. Exposure was likely inadvertent.

Other Conclusions

1. Southern CT mail sorting machine #10 was heavily but locally contaminated – likely from a box of bulk mail that came from Trenton.
2. Cross-contaminated mail can continue to carry spores to individual households.
3. Assuming the above conclusions are true, many other people in CT and other states likely had similar exposures as OL had. Risk at household level from cross-contamination extremely low.

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

PUBLIC HEALTH IMPLICATIONS

- Cross-contaminated mail may be a vehicle for anthrax exposure**:**
  - *Can provide warnings on handling mail in event of a future attack*

- Residual spore caches may be in post offices around the country**:**
  - *Need to maintain new postal cleaning guidelines*

RESULTS: PROPHYLAXIS EFFORTS - 1

Initial Prophylaxis Candidates

- all with realistic exposure potential
  - Visitors to house
  - Seymour postal workers
  - Southern CT postal workers

Resources for Administration of Prophylaxis

- No DPH capacity
- USPS medical resources limited
- Midstate Medical Center (Wallingford HD not enough)
- Naugatuck Valley Health Department (not Griffin Hospital)
- DPH/CDC staff and Pomperaug HD
- National Antibiotic Stockpile

RESULTS: PROPHYLAXIS EFFORTS - 2

Risk Evaluation

- Exposure likely a result of contaminated mail introduced to CT around 10/9-10/-18.
  - No cases in postal workers between 10/9 and 11/21
  - No nasal cultures positive on 490 postal workers and all 16 household contacts
  - No environmental cultures positive from house, Seymour post office, friend's houses
  - No Southern CT postal facility environmental cultures positive outside of those directly associated with sorting machines.

Final Recommendations:

- 60 days antibiotics from time began them for all in original group
  - Could have been 60 days from time of likely exposure
  - no recommendation for more

Evaluation of Prophylaxis

- Being done by CDC staff and CDC-contract team – results pending

COMMUNICATION OF SIGNIFICANT FINDINGS

Issue

- High profile but need to minimize compromising criminal investigation. Thus, information about investigation often limited – no one had carte blanche to talk to the press.

Important Audiences – Methods of Communication

- **General Public** – Governor press conferences; DPH Press releases/media – single DPH contact
- **CT Health Care Providers** – Directed communications via HAN
- **Local Health Directors** – Directed communications via HAN
- **USPS-CT** – meetings with management & labor leadership
- **National Health Care Provider/Public Health** – copies of directed communications via HAN/Epi-X; *MMWR* updates

LESSONS LEARNED – 1

Process Lessons

- Things will be intense initially - many partners to get involved - may be oversights (e.g., forgot to notify Oxford HD of confirmed + culture)
- With such a multifaceted, pressured investigation, initial organizational planning and understanding of relative roles of agencies and individuals is critical.
- Is an important role for local health in such large investigations: at a minimum a) to be informed; b) to facilitate investigation in whatever ways are needed; c) to assure that intervention services are available.
- To be part of inner work group can be complex for local health: have access to breaking information, pressure as a health director to share it with local community, and no one to answer to. However, can't remain part of the group unless follow its rules for release of information.
- Communication can be more tentative in criminal investigations
- At local level, need to work with community providers to have plans for prophylaxis/vaccination clinics in an emergency. Wallingford/Midstate well prepared – Griffin hospital not well prepared. May need back-up plan.
- Helped to have had experience with anthrax threats and to have had tabletops: for initial interagency collaboration & prophylaxis

LESSONS LEARNED – 2

Investigation Lessons

- Surveillance for G+ rod isolates may be a sensitive means to detect initial inhalational anthrax cases early.
- Hospital admission surveillance most useful once had a case.
- Need to be prepared to do repeated interviews of same people/reculturing of places previously cultured as new hypotheses/additional information arises.
- Some methods of environmental sampling for anthrax spores may be much more sensitive than others – previous experience can be critical.

Intervention Lessons

- Need to be very careful about extrapolating infective doses and risks from experimental BT data.
- Need to be flexible in intervention response: one size may not fit all.
- Epi data worked well to determine real risk to postal workers.
- If there is a next time, could consider prospective notification of persons receiving potentially anthrax cross-contaminated mail.
- Still are lessons to learn re: compliance with prophylaxis

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

DATES OF ONSET OF INHALATIONAL ANTHRAX CASES, U.S., Sep-Nov 2001