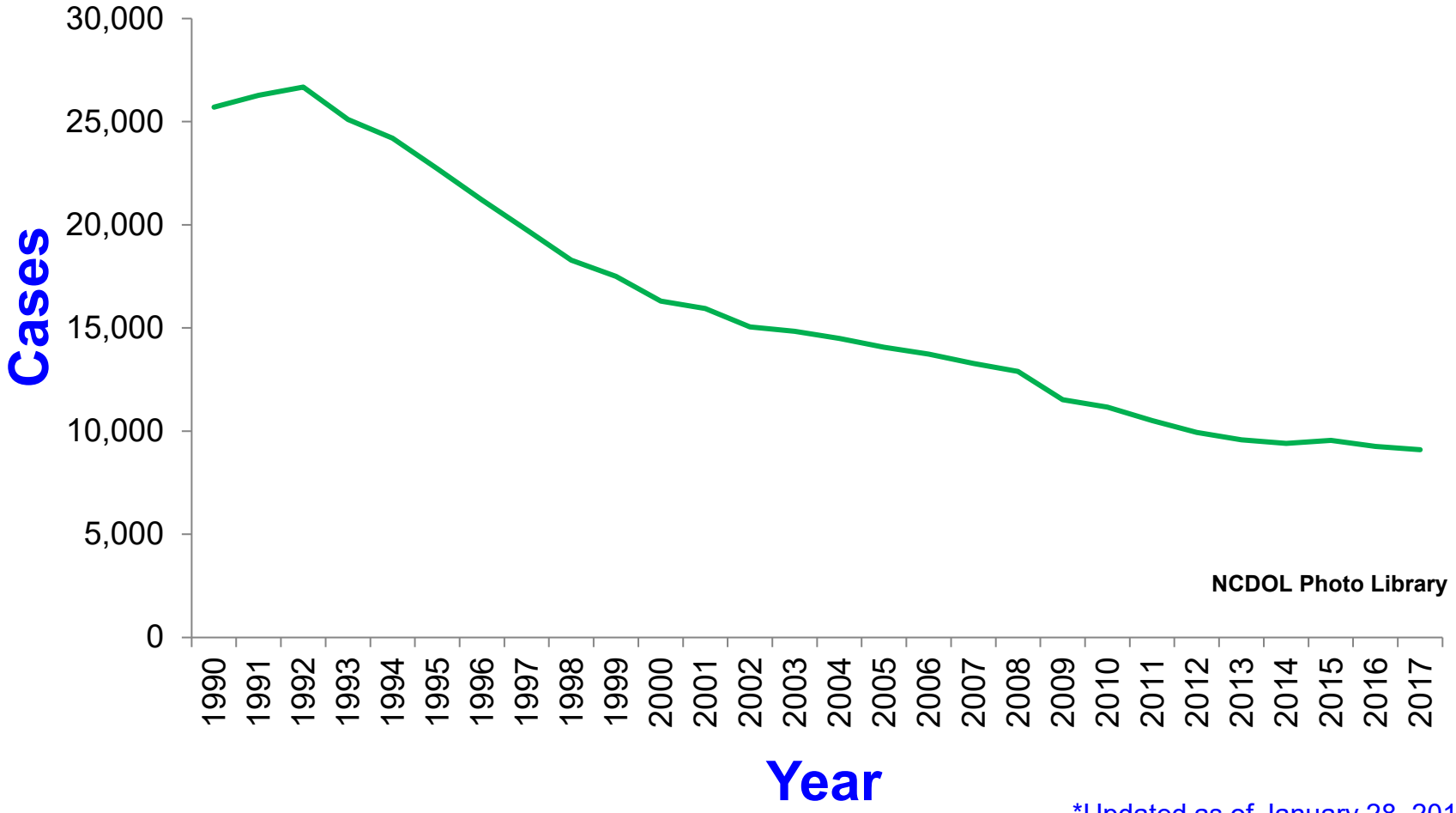
OSH 125: Tuberculosis

Presented by: Cory Dunphy, ETTA

Objectives

- Provide a basic understanding regarding the transmission and pathogenesis of *M. tuberculosis*
- Discuss the epidemiology of TB in the US and NC
- Provide an overview regarding the enforcement procedures for occupational exposure to TB

Reported TB Cases United States, 1990-2017



*Updated as of January 28, 2019

TB Morbidity - United States, 2009 - 2017

Year	Number	Rate*
2009	11,519	3.8
2010	11,164	3.6
2011	10,509	3.4
2012	9,940	3.2
2013	9,582	3.0
2014	9,412	3.0
2015	9,547	3.0
2016	9,272	2.9
2017	9,105	2.8

*Cases per 100,000. Updated as of January 28, 2019

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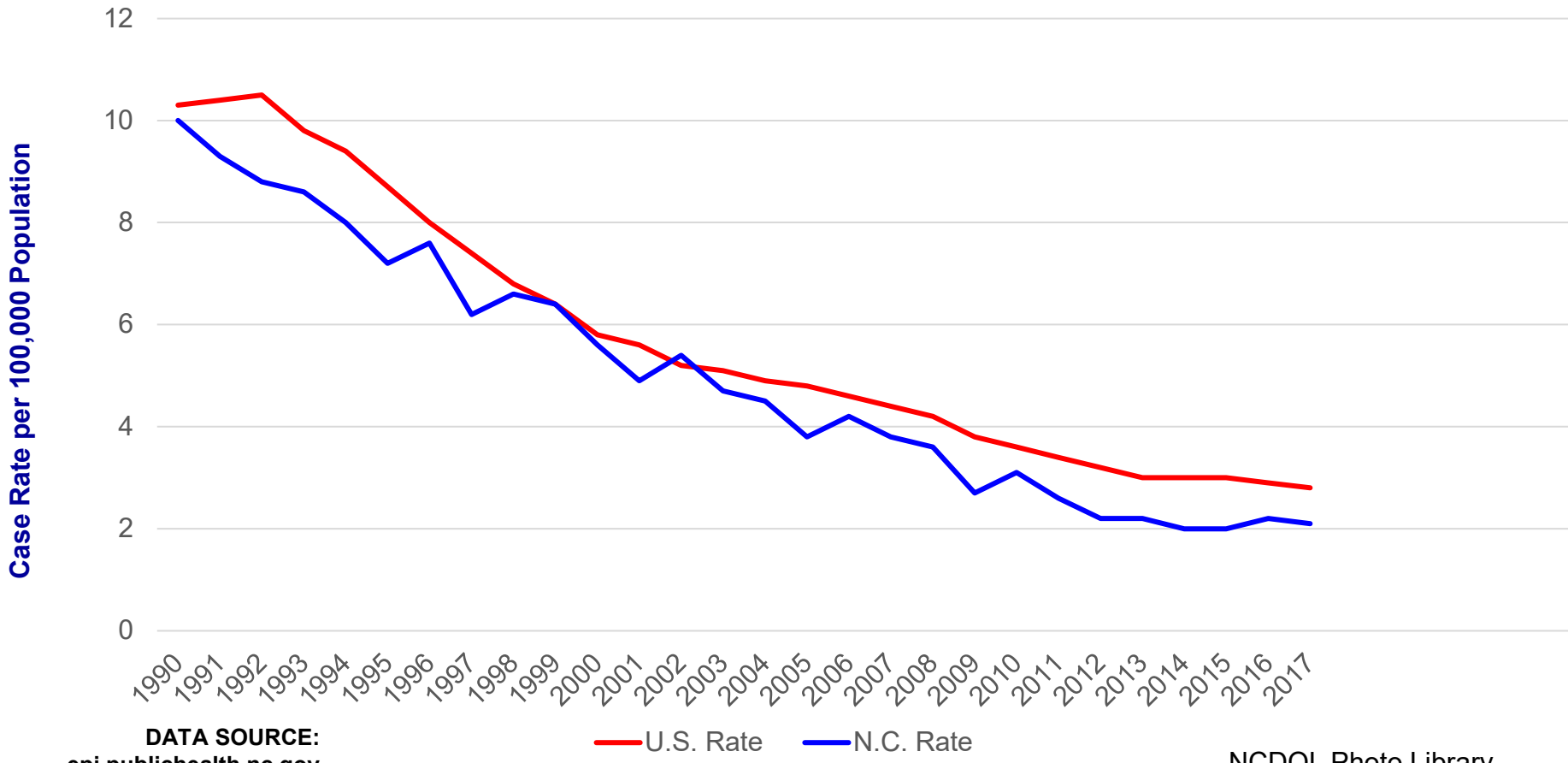
Comparison of N.C. and U.S. TB Case Rates (1990-2017)



DATA SOURCE:
epi.publichealth.nc.gov

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NCDOL N.C. Department of Labor Cherie Berry, Commissioner
OSH Division Internal Training

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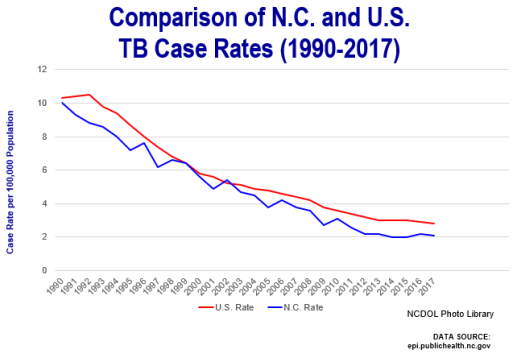
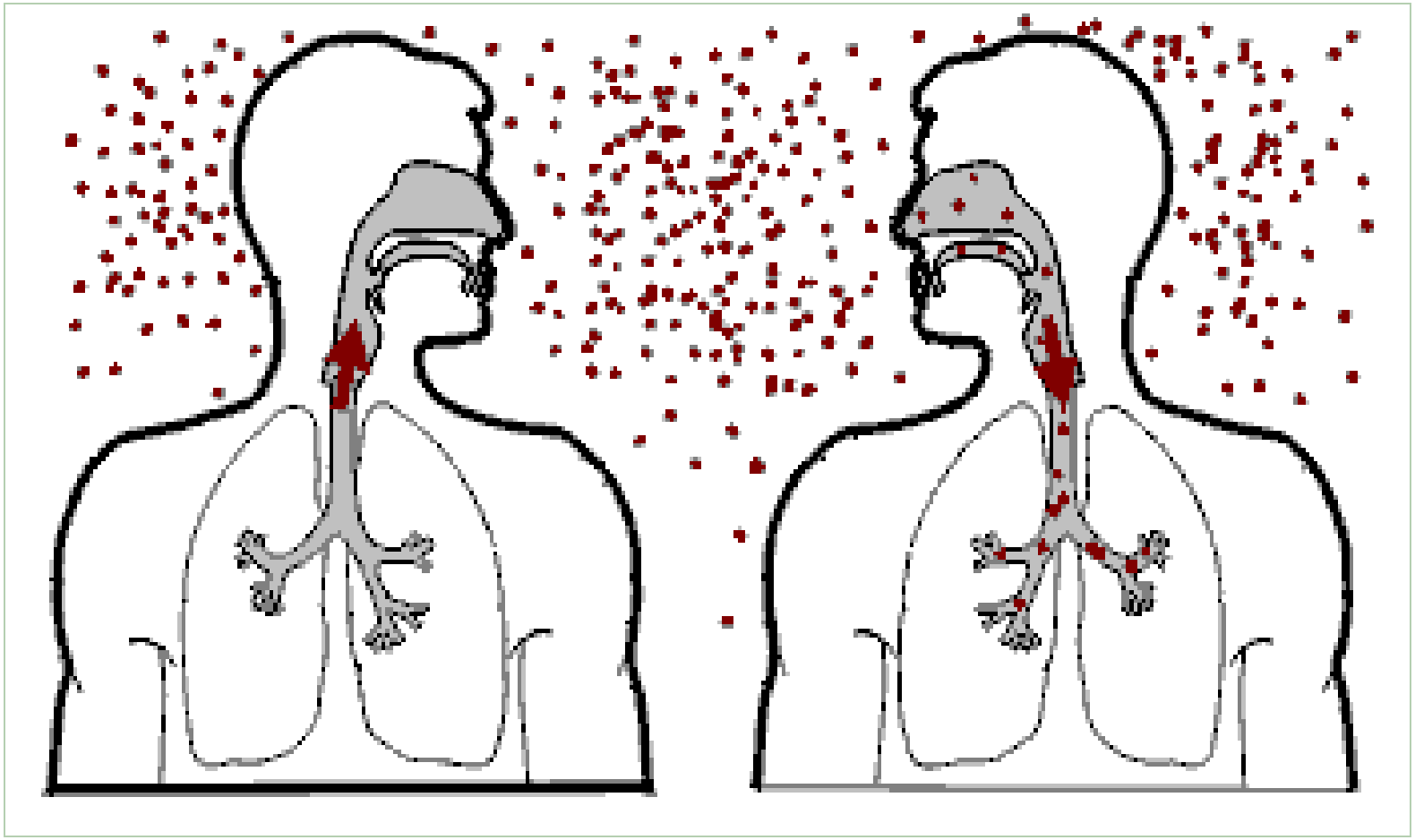
North Carolina 2017 TB Cases

- North Carolina's Tuberculosis Case Rate decreased from **3.8** to **2.1** from 2007 through 2017
  - *During the same time frame, Tuberculosis Case Rate in the United States decreased from **4.4** to **2.8***



Transmission and Pathogenesis



Transmission of *M. Tuberculosis*

- Spread by droplet nuclei (1-5 μm)
- Expelled when person with infectious TB coughs, sneezes, speaks, or sings
- Close contacts at highest risk of becoming infected
- Transmission occurs from person with infectious TB disease (not latent TB infection)

Probability of TB Transmission

- Infectiousness of person with TB
- Environment in which exposure occurred
- Duration of exposure
- Virulence of the organism

TB Pathogenesis - Latent TB Infection

- Once inhaled, bacteria travel to lung alveoli and establish infection
  - Can travel through blood to other body parts
- 2–12 wks after infection, immune response limits activity; infection is detectable
- Some bacteria survive and remain dormant but viable for years (latent TB infection, or LTBI)

TB Pathogenesis - Latent TB Infection

- Persons with LTBI are:
  - Asymptomatic
  - Not infectious
- LTBI formerly diagnosed only with TST
- Now QFT-G can be used

TB Pathogenesis - Active TB Disease

- LTBI progresses to TB disease in:
  - Small number of persons soon after infection
  - 5%–10% of persons with untreated LTBI sometime during ***lifetime***
  - About 10% of persons with HIV and untreated LTBI ***per year***

Pathogenesis

- 10% of infected persons with normal immune systems develop TB at some point in life
- HIV strongest risk factor for development of TB if infected
  - Risk of developing TB disease 7% to 10% each year
- Certain medical conditions increase risk that TB infection will progress to TB disease

Conditions That Increase Risk…

….of progression to TB disease

- HIV infection
- Substance abuse
- Recent infection
- Chest radiograph findings suggestive of previous TB
- Diabetes mellitus
- Silicosis
- Cancer of the head and neck

(cont…)

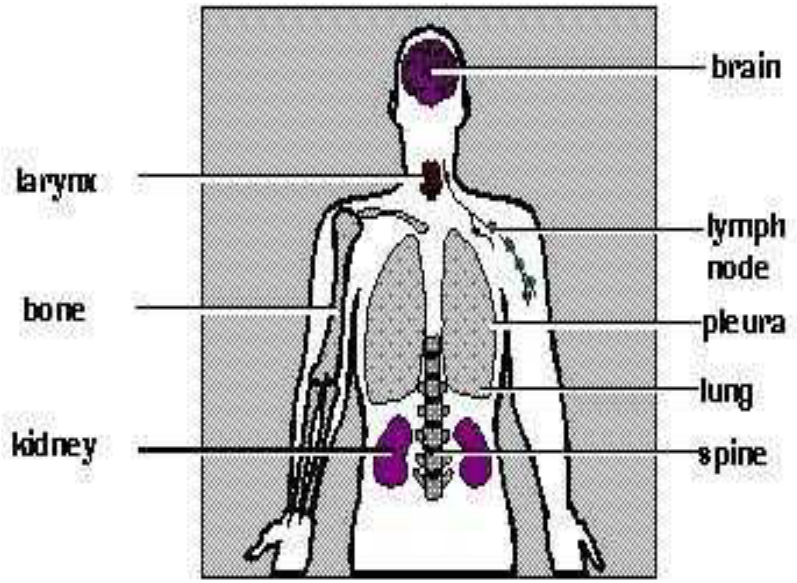
Conditions That Increase Risk…

….of progression to TB disease

- Hematologic and reticuloendothelial diseases
- End-stage renal disease
- Intestinal bypass or gastrectomy
- Chronic malabsorption syndromes
- Low body weight (10% or more below the ideal)
- Prolonged corticosteroid therapy
- Other immunosuppressive therapy

Common Sites of TB Disease

- Lungs
- Pleura
- Central nervous system
- Lymphatic system
- Genitourinary systems
- Bones and joints
- Disseminated (miliary TB)



Classification System for TB

Class	Type	Description
0	No TB exposure Not infected	No history of exposure Negative reaction to tuberculin skin test
1	TB exposure No evidence of infection	History of exposure Negative reaction to tuberculin skin test
2	TB infection No disease	Positive reaction to tuberculin skin test Negative bacteriologic studies (if done) No clinical, bacteriological, or radiographic evidence of active TB
3	TB, clinically active	*M. tuberculosis* cultured (if done) Clinical, bacteriological, or radiographic evidence of current disease
4	TB, not clinically active	History of episode(s) of TB **or** Abnormal but stable radiographic findings Positive reaction to the tuberculin skin test Negative bacteriologic studies (if done) **and** No clinical or radiographic evidence of current disease
5	TB suspected	Diagnosis is pending

Drug-Resistant TB

- Drug-resistant TB transmitted same way as drug-susceptible TB

- Drug resistance is divided into two types:
  - Primary resistance develops in persons initially infected with resistant organisms
  - Secondary resistance (acquired resistance) develops during TB therapy

First-Line Anti-TB Drugs

- Isoniazid (INH)
- Rifampin (RIF)
- Pyrazinamide (PZA)
- Ethambutol (EMB) or Streptomycin (SM)*

Second-Line Anti-TB Drugs

- Capreomycin
- Kanamycin
- Amikacin
- Ethionamide
- Para-aminosalicylic acid
- Cycloserine
- Ciprofloxacin*
- Ofloxacin*
- Levofloxacin*
- Clofazamine

Chronology

- ***May 1992***, Region II OSHA issues "Enforcement Guidelines for Occupational Exposure to Tuberculosis" in response to increasing complaints

- ***October 8, 1993*** - Memorandum from Roger A. Clark, Directorate of Compliance Programs
  - Based on 1990 CDC TB guidelines
  - Utilizes General Duty Clause (GDC) to enforce CDC guidelines

- ***February 9, 1996*** -- OSHA Instruction CPL 2.106, "Enforcement Procedures and Scheduling for Occupational Exposure to Tuberculosis"
  - Based on 1994 CDC revised guidelines

Chronology

- ***October 17, 1997*** -- Proposed standard (NPRM) on occupational exposure to tuberculosis.

- ***December 31, 2003*** -- OSHA terminates rulemaking and revokes 29 CFR 1910.139 (respiratory protection against tuberculosis)

- ***March 2, 2004*** – NCDOL adopts revocation of 1910.139, effective 6/30/04.

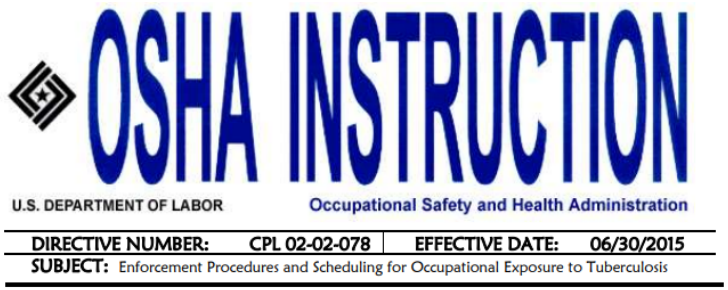
Chronology

- ***June 30, 2015*** – OSHA introduces CPL 02-02-078: Inspection Procedures for Occupational Exposure to Tuberculosis which replaces CPL 02.106.

- ***September 9, 2015*** – NCDOL adopts CPL 02-02-078, which provides guidance to the CSHO for Tuberculosis inspections.

OSHA Instruction CPL 02-02-078

Inspection Procedures for Occupational Exposure to Tuberculosis



OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR — Occupational Safety and Health Administration

DIRECTIVE NUMBER:	CPL 02-02-078	EFFECTIVE DATE:	06/30/2015

SUBJECT: Enforcement Procedures and Scheduling for Occupational Exposure to Tuberculosis

ABSTRACT

Purpose: This Instruction provides general enforcement policies and procedures to be followed when conducting inspections and issuing citations related to occupational exposure to tuberculosis (TB).

Scope: This Instruction applies OSHA-wide.

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Inspection Scheduling and Scope

- Inspections conducted in response to:
  - Valid employee complaints or referrals
  - Related fatality/catastrophes
  - Part of all industrial hygiene inspections in covered facilities
  - Part of all inspections covered by ***OPN 132: SEP for Log Term Care Facilities***

Covered Facilities

- Health care facilities
  - Include hospitals where patients w/ confirmed or suspect TB are treated or transported
  - Non-hospital health care settings
    - Applies only to personnel present during performance of high-hazard procedures
    - Dental personnel covered only if treat suspect or confirmed active TB patients in hospital or correctional facility

Covered Facilities

- Correctional institutions
- Long-term care facilities for the elderly
- Homeless shelters
  - Present unique problems for protection of workers
  - Must establish protocols for rapid early identification followed by immediate transfer if shelter not treating patients
- Drug treatment centers

Inspection Procedures

- **Has the facility had a suspect or confirmed active case within previous 6 months?**

  ☑No, TB enforcement procedures do ***not*** apply

  ☑Yes, CSHO to proceed with TB portion of inspection

Inspection Procedures

- Employer's TB plan will be verified through employee interviews and direct observation where feasible
- CSHO shall use professional judgement to determine what areas shall be inspected
- When smoke-trail visualization tests are used
  - Be prepared to present SDS for smoke

CSHO Protection

- Use professional judgement and extreme caution to avoid potential exposure
- Generally should not enter airborne infection isolation rooms (AIIRs)
- If you must enter, comply with facility-imposed PPE
  - With at least a half-mask negative pressure respirator with an N95 filter
  - Wash hands afterwards with soap & water

Citation Policy

- Employers who have employees occupationally exposed to TB must comply with the following provisions:
  - NCGS 95-129(1) -- *General Duty Clause*
  - 29 CFR 1910.132 – *Personal Protective Equipment*
  - 29 CFR 1910.139 -- *Respiratory Protection*
  - 29 CFR 1910.145 -- *Accident Prevention Signs and Tags*
  - 29 CFR 1910.1020 -- *Access to Employee Exposure and Medical Records*
  - 29 CFR 1904 -- *Recording & Reporting Occupational Injuries & Illnesses*

General Duty Clause

- **NCGS: 95-129(1)**
  - Each employer shall furnish to each of his employees conditions of employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.

General Duty Clause Violation

- **Four Required Elements**

1) The employer failed to keep the workplace free of a **hazard to which employees** of that employer **were exposed**;

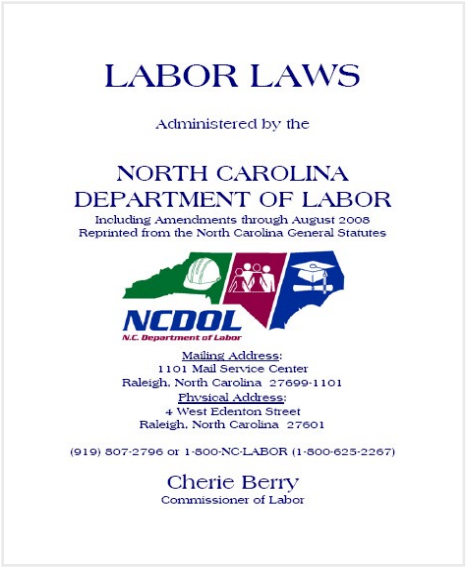
2) The hazard was **recognized** in the industry;

3) The hazard was causing or likely to cause **death or serious physical harm**; ***and***

4) There was a **feasible and useful abatement method** to correct (abate) the hazard.

Invoking the General Duty Clause

- The basis of a **General Duty Clause** violation is exposure to the hazard, not the absence of a particular abatement method.



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Cherie Berry
Commissioner of Labor

Recognizing Exposure to a Serious Hazard

- Employers with employees working in one of the high risk occupational settings,
- When employees not provided with appropriate protection, ***and***
- Who have occupational exposure to TB

Occupational Exposure to Tuberculosis

- Exposure to exhaled air of an individual with suspected or confirmed pulmonary TB disease, ***or***

- Employee exposure without appropriate protection to a high hazard procedure performed on individual with suspected or confirmed infectious TB disease and which has potential to generate infectious airborne droplet nuclei.

High Hazard Procedures

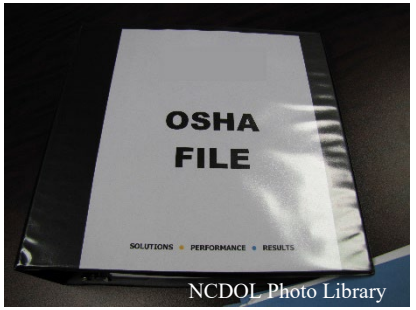
- Aerosolized medication treatment
- Bronchoscopy
- Sputum induction
- Endotracheal intubation and suctioning procedures
- Emergency dental procedures
- Endoscopic procedures
- Autopsies conducted in hospitals

Feasible and Useful Abatement Methods

- Early identification of patient/client
  - Employer must implement a protocol for early identification of individuals with active TB
  - Program must identify and characterize each area within the facility
  - Characteristics of effective TB IC program (see Table 3, CDC Guidelines)

Inspection Procedures

- CSHOs should evaluate the following
  - TB Infection Control Program
  - TB Risk Assessment for incoming patients
  - Medical Surveillance of Employees
    - » Initial testing
    - » Periodic evaluations
  - Case Management for infected employees
  - Education and Training
  - Engineering Controls



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Respiratory Protection

1910.134(a)(2)

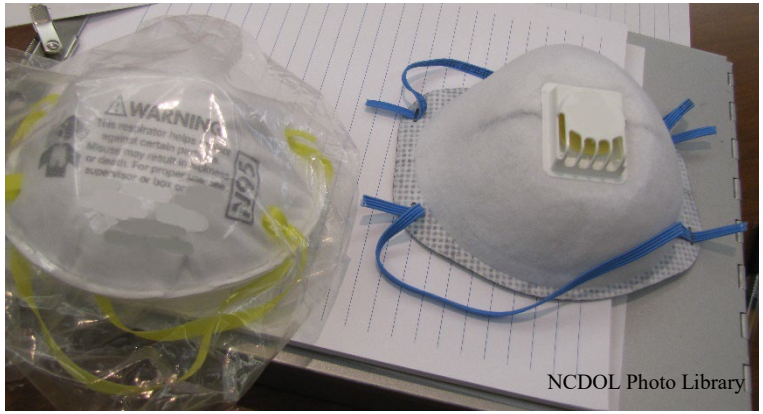
- “Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee.
- The employer shall provide the respirators which are applicable and suitable for the purpose intended.
- The employer shall be responsible for the establishment and maintenance of a respiratory protection program which shall include the requirements outlined in paragraph (c) of this section.”

Respiratory Protection

- HEPA respirators or respirators certified under 42 CFR Part 84 Subpart K are required:
  - When workers enter rooms housing individuals with suspected or confirmed infectious TB
  - When workers present during performance of high hazard procedures on individuals with suspected or confirmed infectious TB
  - When emergency-medical-response personnel or others transport, in a closed a vehicle, an individual with suspected or confirmed infectious TB

Respirator Program Requirements 1910.134(c)

- Written operating procedures
- Proper selection
- Training and fitting
- Cleaning and disinfecting
- Storage
- Inspection and maintenance
- Work area surveillance
- Inspection/evaluation of program
- Approved respirators



Employee Medical/Exposure Records 1910.1020

- Employee access to records
  - A record concerning employee exposure to TB is an employee exposure record.
  - A record of TB skin test results and medical evaluations and treatment are employee medical records.

Accident Prevention Signs and Tags 1910.145(f)(8)

- A warning shall be posted outside the respiratory isolation or treatment room or a message referring one to the nursing station for instruction may be posted.

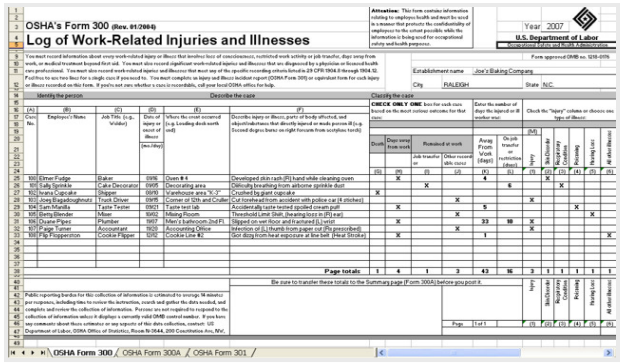
Accident Prevention Signs and Tags 1910.145(f)(4)

- A signal word/phrase (“STOP”, “HALT”, “NO ADMITTANCE”), ***or***
- Biohazard symbol *and* major message (“RESPIRATORY ISOLATION” or “AFB ISOLATION”) along with necessary precautions.
- Biological hazard tags are also required on air transport components (*e.g.,* fans, ducts, filters) that transport contaminated air.

OSHA 300 Log

1904.11

- Both TB infections (positive skin test) and TB disease are recordable
- Original entry must be updated if TB infection progresses to TB disease during 5 year maintenance period
- Positive skin test within first 2 weeks of employment does not have to be recorded on the OSHA 300 form



OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Year 2007

U.S. Department of Labor

Establishment name Joe's Baking Company

City RALEIGH State NC

(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from scalding tank)	CHECK ONLY ONE box for each case based on the most serious outcome for that case: (G) Death	(H) Days away from work	(I) Remained at work: Job transfer or restriction	(J) Other recordable cases	(K) Days away from work (days)	(L) On job transfer or restriction (days)	(M) Injury	(M) Skin Disorder	(M) Respiratory Condition	(M) Poisoning	(M) Hearing Loss	(M) All other illnesses
						(G)	(H)	(I)	(J)	(K)	(L)	(M)(1)	(M)(2)	(M)(3)	(M)(4)	(M)(5)	(M)(6)
100	Elmer Fudge	Baker	09/06	Oven # 6	Developed skin rash (PI) hand while cleaning oven		X			4		X					
101	Sally Spinkle	Cake Decorator	09/05	Decorating area	Difficulty breathing from airborne sprinkle dust			X			6		X				
102	Ivana Cupcake	Shipper	09/10	Warehouse area "X-3"	Crushed by giant cupcake	X											
103	Joey Bagadonghuts	Truck Driver	09/15	Corner of 12th and Cullen	Cut forehead from accident with police car (4 stitches)				X			X					
104	Sam Mandla	Taste Tester	09/21	Taste test lab	Accidentally taste tested spoiled cream puff		X			5					X		
105	Betty Blender	Mixer	10/02	Mixing Room	Threshold Limit Shift. (hearing loss in (P) ear)				X							X	
106	Duane Pipez	Plumber	10/07	Men's bathroom 2nd Fl.	Slipped on wet floor and fractured (L) wrist		X			33	10	X					
107	P'age Turner	Accountant	10/10	Accounting Office	Infection of (L) thumb from paper cut (Rx prescribed)				X			X					
108	Flip Flopperston	Cookie Flipper	10/12	Cookie Line #2	Sent dizzy from heat exposure at line belt (Heat Stroke)		X			1							X
					Page totals:	1	4	1	3	43	16	3	1	1	1	1	1

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

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- **NIOSH**

  1-800-232-4636

  http://www.cdc.gov/niosh/homepage.html

Summary

- Provided a basic understanding regarding the transmission and pathogenesis of *M. tuberculosis*
- Discussed the epidemiology of TB in the US and NC
- Provided an overview regarding the enforcement procedures for occupational exposure to TB

Thank You For Attending!

Final Questions?

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