

Implementing Reproductive & Developmental Health Programs

AIHCE, PDC 415
Sunday, May 22, 2005
Anaheim, CA

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Professional Profile: Dan Markiewicz

Dan Markiewicz is President of Markiewicz & Associates Ltd. an environmental health and safety (EHS) consulting business specializing in management programs, audits, hazard and risk assessments, regulatory compliance, training, and communication.



Education and Credentials

Dan has a B.S. in Environmental Health from Ferris State College ('77) and an M.S. in Occupational Health from the Medical College of Ohio ('92). He holds certifications as an Industrial Hygienist (CIH), Safety Professional (CSP), and Hazardous Materials Manager (CHMM).

Work and Service Experience

Dan has over 25 years of broad experience in the EHS field with government (i.e. environmental/public health), business (e.g. chemical and diversified manufacturing), academia, and consulting. He has conducted more than 500 health and safety evaluations/assessments at worksites worldwide.

The majority of Dan's manufacturing experience was with Aeroquip-Vickers Inc. The company was recognized in 1997 and 1998 by *Industry Week* magazine as one of the "100 best managed companies in the world." In 1998, Dan received the Chairman's Award, the ultimate form of recognition within Aeroquip-Vickers, for his achievements in helping change the corporation's worldwide approach to health and safety.

Dan was the founding President of the Northwest Ohio section of the American Industrial Hygiene Association (AIHA), the founding Managing Director for the Ohio Society of Hazardous Materials Management and Chairman of the Board of Directors for the Safety Council of Northwest Ohio.

Since 1985, Dan has developed and taught courses on the technical and managerial aspects of EHS hazards and risks as a part-time faculty member at Bowling Green State University, University of Toledo, Oakland University and the Medical College of Ohio.

Dan has more than 140 EHS publications and he's currently writing the "Best Practices" column for Industrial Safety and Hygiene News (ISHN) magazine. ISHN (www.ishn.com) is sent to more than 73,000 monthly subscribers. Dan authored the "occupational safety" chapter in the AIHA's premier text: *The Occupational Environment: Its Evaluation, Control, and Management* (published 1997 and 2003). The *USA Today*, and other national publications, have interviewed and quoted Dan on his views on the hazards, risks, and controls of workplace exposures to chemical, physical, and biological agents.

Dan mentored and assisted manufacturing facilities in Arkansas (2), Indiana (1), and Ohio (2) into OSHA's prestigious Voluntary Protection Program. In 1999, the U.S. Department of Labor qualified Dan as a Special Government Employee to assist OSHA in conducting VPP audits. Dan is currently helping organizations, such as NASA, to qualify into VPP.

In 1991, Dan was part of an international team of medical, safety, and health experts that taught the *Management of Chemical Disasters Workshop* for the National Poison Control Center, Taiwan, Republic of China. In 2003, the Federal Emergency Management Agency qualified Dan as a Disaster Assistance Employee/Safety Officer to assist the U.S. Department of Homeland Security during Presidential declared emergencies.

Reproductive & Developmental Health

Professional Profile: Dan Markiewicz

A major focus of Dan's interest, research, and practice is minimizing risks from early life exposures to EHS hazards. Dan's published articles on this topic include:

- ❑ A short refresher course on reproductive hazards (12/96);
- ❑ Are you protecting fetal health? (12/00);
- ❑ Before they become employees: Protecting kids from conception to pre-teen years (9/02);
- ❑ Monitoring reproductive health: Use this scorecard to test your program (11/02);
- ❑ Hearing loss in newborn babies: Is your workplace a risk factor? (1/03);
- ❑ Breast milk & working women: How can an employer protect this food source? (2/03);
- ❑ Choosing a safe CO limit for a fetus ... Safety and health pros are entering into uncharted territory (8/03); and
- ❑ The \$100 million wake-up call: Employer liability for pre-natal workplace injuries (4/04).
- ❑ The National Children's Study: Its impact on EHS and the workplace (1/05)

APPEARANCE IN OTHER PUBLICATIONS

February 2, 2002: USA Today (cover story), "*Workers take employers to court over birth defects: Workplace hazards worry employees, their children.*"

July 2002: Safety + Health, National Safety Council, feature article: "*Are employers responsible for reproductive health?*"

2/05

Paul J. Schumacher

1501 Euclid Avenue
Seventh Floor - Bulkley Building
Cleveland, Ohio 44115

pschumacher@gsfm.com
(216) 522-1099

Education

- Cleveland-Marshall College of Law, Cleveland, Ohio. J.D., *cum laude*, 1983
Editor, Cleveland Law Review (1982-1983)
- University of Dayton, Dayton, Ohio. B.A., 1980

Experience

- Gallagher, Sharp, Fulton & Norman, Cleveland, Ohio, 1983 to present; partner. Manager of firm's Products Liability Group; member of firm's General Liability Group; manager of firm's Technology Committee. Specialist in toxic and chemical exposure claims, industrial machinery, and recreational vehicle claims.

Miscellaneous/Organizations/Training

Author

- DRI Product Liability Survey, Ohio Chapter, 2004
- *Defending Workplace Prenatal Injury Claims, For The Defense*, November, 2003
- *The Year 2000 Problem: Back to the Future*, 1998

Bar Admissions

- Cleveland and Ohio State Bar Associations
- Cleveland and Ohio Associations of Civil Trial Attorneys
- Trial Attorneys of America
- United States Court of Appeals for the Sixth Circuit
- United States District Court, Northern and Southern Districts of Ohio

Labeling & Warning Consulting

- Consulting services and pre-litigation analysis of product labels and warnings for product and chemical manufacturers.
- Frequent lecturer on product warnings and consumer product labeling issues.

Plant Safety Inspections

- Has received extensive OSHA training and certifications
- Conducts plant safety inspections and OSHA compliance audits.

- Provides safety and risk assessment services for industry and management.

Professional Organizations

- Defense Research Institute, Member of Products Liability, Technology, and Toxic Tort Committees
- Federation of Defense & Corporate Counsel (Membership Pending)
- American Arbitration Association - Certified AAA Commercial and Construction Industry Arbitrator; court appointed mediator and arbitrator
- Cleveland Athletic Club, Member of Board of Directors

Recognition

- Named Ohio Super Lawyer, 2003, and 2004
- Inside Business Magazine, 2001-2004; named one of the leading civil litigation lawyers for Northeast Ohio
- Martindale-Hubbell AV rated

Litigation Software

- Proficient in Casemap, Sanction, and Summation software.
- Experienced in electronic trial presentations.

Recent Trial Resume

Allianz Insurance Company v. Praxair, Inc. (March, 2004), United States District Court, Northern District of Ohio, Akron, Case No. 5:02CV1492, Judge John Adams - PRODUCT LIABILITY.

Commonwealth Industries, a large aluminum rolling mill, and their insurer, Allianz Insurance, sought indemnification and/or reimbursement from Praxair Distribution, Inc. for damages resulting from a fire that occurred at the Commonwealth premises. Commonwealth purchased a low-pressure carbon dioxide fire suppression system to protect their cold mill. They contracted with Praxair to perform inspection and function test the system on a quarterly basis. The fire began when a cold mill operator inadvertently engaged a belt wrapper while a coil was being processed, causing the strip of aluminum to break. Tension was lost on the strip, causing a spark and igniting the coolant. Commonwealth contends the fire suppression system did not discharge because the main release valve had failed. Praxair had inspected the valve two months before the fire. As a result, Commonwealth was required to utilize its backup water deluge system to extinguish the fire. Damages were alleged at \$896,000, plus contract interest making the prayer over one million dollars. After a week of trial, the jury returned a unanimous verdict in favor of Praxair Distribution, Inc. No appeal was filed.

National Plating Company v. Clinton Power (August, 2003), United States District Court, Northern District of Ohio, Case No. 1:02CV0142, Judge John Manos - PRODUCT LIABILITY.

Plaintiff purchased from defendant a number of , 9 volt, 1200 amp rectifiers for use on its high capacity electroplating line. It is alleged that they were guaranteed to operate at 9 volts and 1200 amps continuously. Plaintiff declined defendant's offer to install said rectifiers and instead chose to have its own electrician perform the wiring and installation of said rectifiers. Plaintiff brought suit against defendant because the plating line never operated at 1200 amps. The plaintiff also experienced excessive failures of expensive SCRs within the rectifiers because they were being overheated whenever plaintiff attempted to operate the line above 900 amps. Plaintiff presented damages of just over \$500,000. The defendant counterclaimed for money owed on account of \$32,289.

A two week jury trial commenced in July/August, 2003. The jury concluded that there was no defect in the product. The jury awarded plaintiff \$26,493 on combined claims of negligent misrepresentation/promissory estoppel and \$7,920 on the claim of breach of implied warranty. However, the jury awarded defendant \$32,289 on our counterclaim. The net result was a verdict for plaintiff in the total amount of only \$2124. Plaintiff's motion for new trial was denied and its appeal was dismissed following a nominal settlement.

City of Cleveland v. Thomasson Lumber Co., et al. (September, 2000), Common Pleas Court, Cuyahoga County, Ohio, Case No. 391217, Judge Ralph McAllister - PRODUCT LIABILITY.

As part of an extensive system expansion, the City of Cleveland purchased approximately 15,000 utility poles treated with the preservative known as copper naphthenate ("CuNap"). Our client, Cahaba, manufactured the utility poles, and sold them through two brokers to the City. In 1995, a few of the poles failed, rotting through in only 2-3 years. After the City inspected the remainder of its poles, it concluded that some 600-700 of its CuNap poles were defective and needed to be replaced. Some of the poles failed, causing damage to vehicles and homes. The City filed two lawsuits against various defendants, including Cahaba, which were eventually consolidated. Damages were alleged to exceed \$30 million.

A jury trial in the matter commenced in September, 2000, and after four weeks of trial, Cahaba, as lead defendant, moved for a directed verdict alleging the plaintiff had failed to prove its case. The court granted the motion and dismissed the case. The City then filed a third lawsuit in October of 2000, alleging the exact same allegations, and all defendants filed for dismissal, which was granted. The City appealed to the Eighth District Court of Appeals, which affirmed the trial court's decision. The City then appealed to the Ohio Supreme Court, which declined jurisdiction in November of 2002. The matter is now closed.

Barbara Miller, et al. v. Deluca, et al. (December, 1996), Common Pleas Court, Summit County, Ohio, Case No. CV 95 04 1236, Judge James Murphy - NEGLIGENCE.

Auto/truck accident wherein plaintiff sustained back injury which required multiple back surgeries. Plaintiff alleged she was rear-ended by defendant's semi-tractor on an interstate highway at high speed. A jury trial commenced in December, 1996. Plaintiff sought a verdict of \$900,000. The jury returned a defense verdict. The matter was appealed to the Ninth District Court of Appeals, which affirmed the trial court's decision.

Bruce B. Felder, et al. v. Community Mutual Insurance Company (April, 1995), United States District Court, Northern District of Ohio, Case No. 1:93CV172 - EMPLOYEE BENEFIT CLAIM.

This action arises out of the defendant's health insurance company's rescission of a health insurance policy issued to plaintiffs pursuant to a group health plan provided by plaintiff's employer, Major Financial Services, Inc. CMIC rescinded coverage after discovery that plaintiffs failed to disclose the wife's prior psychotherapy treatment when they completed the application for benefits. Plaintiffs originally filed their action in state court, wherein CMIC was granted summary judgment. Plaintiffs then filed an action in federal court. CMIC's motion for summary judgment was denied, and the matter proceeded to trial. The court issued his findings of fact in favor of plaintiffs in the amount

of \$38,705.60. Defendant then appealed the matter to the Sixth Circuit Court of Appeals, which reversed the magistrate's decision, and entered final judgment for the defendant and dismissed plaintiffs' claim.

Better Builders, Inc., et al. v. The Sherwin-Williams Company, et al. (November, 2004), Geauga County Common Pleas Court, Case No. 03 M 270 - PRODUCT LIABILITY AND CONTRACT.

Plaintiff, a home construction company, alleged that the defendant's stain failed after application to homes built with cedar siding. Plaintiff initially alleged that the product was defective, but that claim was dismissed prior to trial. Plaintiff sought recovery from defendant based on a claim of breach of contract and negligent misrepresentation for sums it had to pay to the homeowners to remedy the peeling stain. Defendant argued that the cedar siding contained too much moisture during application and that no contract was formed to remedy the problems. After a two day trial, the jury returned a unanimous verdict for the defendant.

Notable Cases

Bean v. Kapp Construction, Clark County Common Pleas Court, 2004

Wrongful death toxic exposure case against chemical manufacturer alleging exposure to xylene. Settlement of \$25,000 reached one week prior to trial.

Benevidez v. Busellatio, S.p.A., Seneca County Common Pleas Court, 2001

Product liability action against Italian manufacturer of automatic drilling woodworking equipment. Confidential settlement reached during depositions being taken in Italy.

Kalinic v. Dainichi, United States District Court, Northern District of Ohio, 2003

Product liability wrongful death action against manufacturers and suppliers of CNC horizontal turning lathe. Confidential settlement reached.

McKinley v. Standby Screw Co., 2002 Ohio 3112, 8th Appellate District, Cuyahoga County

Employment intentional tort and wrongful discharge claim on behalf of defendant. Plaintiff claimed permanent injuries due to serious electrical burns. Appellate court reversed summary judgment.

Nordec v. Thompson, Summit County Common Pleas Court, 2001

Product liability action against manufacturer of embossing press. Favorable settlement reached.

Peyatt v. J.K.T. Trucking, Trumbull County Common Pleas Court, 2001

Wrongful death action involving forklift which crushed the plaintiff. After summary judgment motion filed, case was voluntarily dismissed and never refiled.

Elena N. Lougovskaia
Gallagher, Sharp, Fulton & Norman

1501 Euclid Ave. 7th Fl.
Cleveland, Oh, 44115

Elougovskaia@gsfn.com
Phone: (216) 522-1037

PROFESSIONAL EXPERIENCE

- **Gallagher, Sharp, Fulton & Norman**, Cleveland, OH. *Associate Attorney*, 2000 to present. Member of Product Liability and General Liability Groups in a civil defense litigation firm. Responsible for a diverse case load for self-insured and insured clients. Individual responsibility for all aspects of civil litigation and pre-litigation liability analysis and consultation. Representative caseload includes multi-party wrongful death, severe physical injury and chemical exposure litigation.
- **Thomas J. Murray, Murray & Murray**, Sandusky, OH. *Law Clerk*, 1998 to 2000. Responsible for writing, research and discovery in multi-district plaintiff product liability litigation.

EDUCATION

- **Case Western Reserve University School of Law**, Cleveland, OH. JD, *cum laude* 2000.

Dean's Honor List
Jack Cronquist Award, Kramer Law Clinic
Paul J. Hergenroeder Trial Tactics Award
- **Denison University**, Granville, OH. B.A. in Political Science, 1997.
Dean's Honor List.

ADDITIONAL SKILLS, TRAINING & EXPERIENCE

- **Fluent in Russian**
- **Published Author:** DRI, FOR THE DEFENSE, "Defending Workplace Prenatal Injury Claims" November, 2003.
- **CLE Instructor and Public Speaker:** 2001 GSFN Spring Seminar, "Electronic Discovery" and 2004 GSFN Spring Seminar, "Workplace Toxic Torts." Also conducted lectures on Product Liability and Workplace Intentional Torts.
- **Labeling & Warning Consulting:** Provided consulting services and pre-litigation analysis of product labels and warnings.
- **Plant Safety Inspections:** Conducted plant safety inspections for clients in general industry.
- **OSHA Training:** Received 40 hours of official OSHA training in General Industry.
- **Electronic Case Management and Presentation:** User and advocate of case management and trial presentation tools, including Sanction, Summation & Casemap.
- **Professional Organizations:** DRI, Product Liability and Toxic Torts Subcommittees, Ohio State Bar Association.
- **Bar Admissions:** State of Ohio and U.S. District Court for the Northern District of Ohio.

Elena N. Lougovskaia

TRIALS AND NOTABLE CASES

Allianz Insurance Company v. Praxair, U.S.D.C., N.D. Ohio, 2004.

- Defended negligence action against fire equipment servicing company. Failure of fire suppression system resulted in alleged damages of approximately \$1,000,000. Trial. Defense verdict. Never appealed.

McKinley v. Standby Screw Company, 2002 Ohio 3112, 8th Appellate District, Cuyahoga County

- Briefed and argued employment intentional tort and wrongful discharge claim on behalf of the defendant. Appellate court reversed summary judgment.

SPS v. AMAC, Inter-Company binding arbitration, 2003.

- Defended a heat-treating company in an inter-company arbitration. The plaintiff sought damages in excess of \$300,000. Arbitration panel found in favor of the defendant.

Bean v. Kapp Construction, Clark County Court of Common Pleas, 2004.

- Defended a wrongful death toxic exposure case against a chemical manufacturer. Reached a settlement of \$25,000 one week before trial.

Benavidez v. Busellato, S.p.A., Seneca County Court of Common Pleas, 2001.

- Defended depositions in Italy in a product liability action against Italian manufacturer of furniture making equipment. Reached favorable confidential settlement during the depositions.

Grabowski v. Robinson, Cuyahoga County Court of Common Pleas, 2001.

- Defended premises liability matter involving a compression explosion resulting wrongful death and severe facial disfigurement. Settled facial disfigurement case for \$10,000 and won on summary judgment on the wrongful death matter. Summary judgment award never appealed.

Peyatt v. J.K.T. Trucking, Trumbull County Court of Common Pleas, 2001.

- Defended wrongful death forklift accident case. Case voluntarily dismissed and never refilled after a summary judgment motion was filed with the court.

Bell v. E.T.E., Medina County Court of Common Pleas, 2002.

- Defended product liability carbon monoxide poisoning case filed by a family against furnace manufacturer. Reached a settlement of \$5,000 one week prior to trial.

Bronson v. Positive Safety, Defiance County Court of Common Pleas, 2002.

- Defended a manufacturer of pull-back safety restraints. Secured voluntary dismissal of the claim, which was never re-filed.

Nordec v. Thompson, Summit County Court of Common Pleas, 2001.

- Reached a favorable settlement in a product liability action against manufacturer of an embossing press.

Kalinic v. Dainichi, U.S.D.C., N.D. Ohio, 2003.

- Reached a favorable settlement (confidential) in a product liability wrongful death action against manufacturers and suppliers of a CNC vertical turning lathe.

PDC 415 – May 22, 2005

Implementing Reproductive & Developmental Health Programs

Instructors:

Elena Lougovskaia, J.D., Esq.
Dan Markiewicz, MS, CIH, CSP, CHMM
Greg Mason, MS, CSP, CHMM
Paul Schumacher, J.D., Esq.

Schedule

TIME		TOPIC	INSTRUCTOR(S)
8:00	8:15	Welcome & Introduction	Markiewicz
8:15	9:00	Overview / Emerging Issues	Markiewicz
9:00	10:00	Legal	Lougovskaia / Schumacher
10:00	10:15	BREAK	---
10:15	10:45	Legal	Lougovskaia / Schumacher
10:45	11:30	Repro/Developmental Health Program	Markiewicz
11:30	Noon	Identifying Hazards	Mason
Noon	1:00	BREAK	---
1:00	1:30	EU Risk Assessment - Pregnant Workers	Mason
1:30	2:00	Evaluating Hazards	Markiewicz
2:00	2:30	Risk Assessment	Markiewicz
2:30	3:00	Risk Communication	Markiewicz / Mason
3:00	3:15	BREAK	---
3:15	4:45	Student Exercises	All
4:45	5:00	Final Q&A - Course Evaluation	All

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Overview / Emerging Issues

Dan Markiewicz, MS, CIH, CSP, CHMM

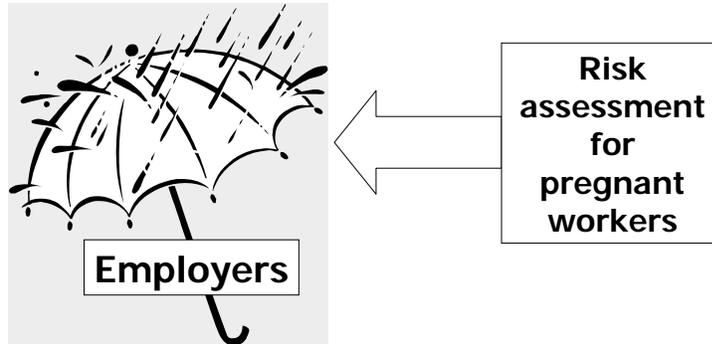
Course definition

Reproductive & Developmental Health

- includes reproductive disorders of working men and women and
- developmental disorders in embryos, fetuses, infants, and children
- caused or aggravated by hazards arising in or from the workplace.

Summary: Perfect storm

Science + Medicine + Internet + Politics + Religion +
Demographics + EU + Lawyers = Fetal Rights



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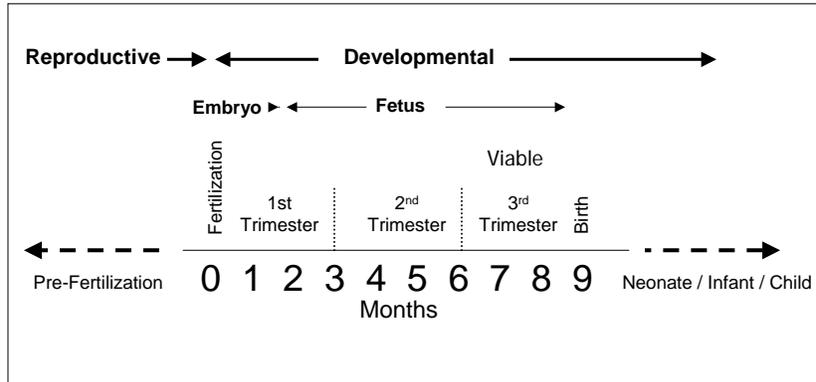
Debate: **Not** in this course!



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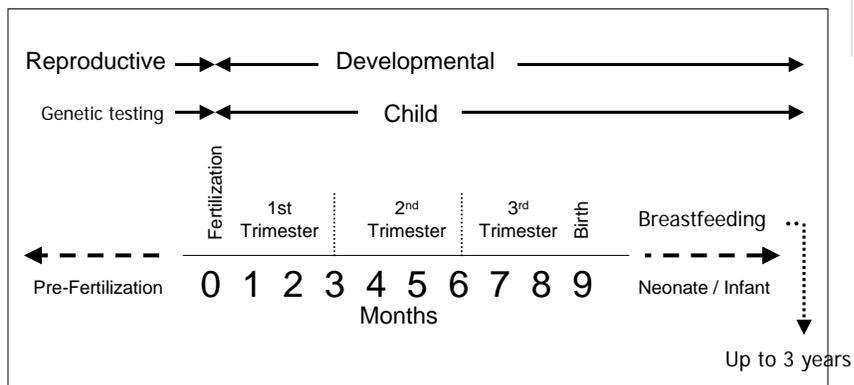
Reproductive & developmental health continuum: Historic



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Reproductive & developmental health continuum: Future



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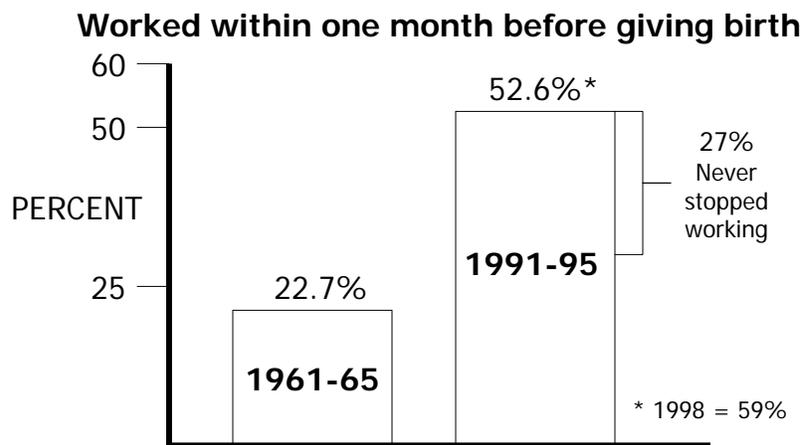
Critical time for employers

- ◆ More than one-half of all babies born in U.S. are born to working mothers.*
- ◆ More than 70% of women of reproductive age are in the workforce.



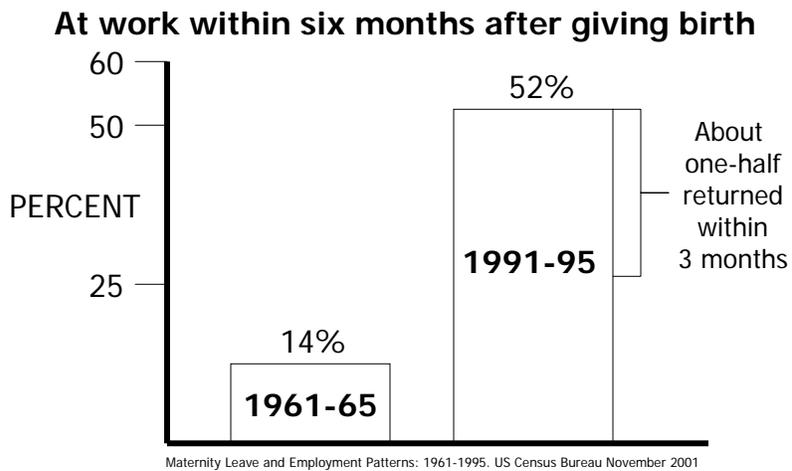
* About 2 million annual births

Staying longer



Maternity Leave and Employment Patterns: 1961-1995. US Census Bureau November 2001

Returning quicker



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Incentives: Pregnant worker



Two incomes
Modern view of workers
Etc.

◆ Laws

- 1964 Title VII Civil Rights Act
- 1973 Roe v. Wade
- 1976 tax credit on child care costs
- 1978 Pregnancy Discrimination Act
- 1991 UAW v. Johnson Controls
- 1993 Family and Medical Leave Act

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Problems

- ◆ 5-10% of couples are infertile
- ◆ About 50% of all pregnancies are unsuccessful
- ◆ Major birth defects occur in 3-5% of newborns
- ◆ Developmental defects may occur in 17% of children
- ◆ Birth defects are the leading cause of infant mortality in the U.S., accounting for more than 20% of all infant deaths

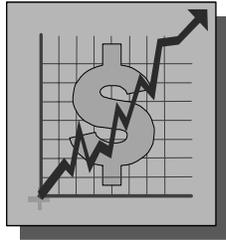
Causes

- ◆ About 3% of all developmental defects are attributable to exposure to toxic chemicals and physical agents, including environmental factors; and,
- ◆ 25% of all developmental defects may be due to a combination of genetic and environmental factors.

Source: Scientific Frontiers in Developmental Toxicology and Risk Assessment, National Research Council, 2000.

Note: "Environmental factors" include life-style choices.

Costs



- \$140,000 - \$700,000: Direct lifetime financial costs for a child with birth defects.
- \$8 + billion: Lifetime expenses for children born with just one of 12 birth defects in 1988 (2002 dollars).

OSHA HazCom*

◆ Reproductive Toxin

◆ Effects include:

- Sterility, decreased libido, impotence, interrupted pregnancy (abortion, fetal death, or premature delivery), birth defects in the offspring, altered sex ratio and multiple births, chromosome abnormalities, childhood morbidity, and childhood cancer.

* <http://www.osha.gov/dsg/hazcom/GHD100203.html> March 2003

Top 10 causes of death in U.S. by age*

Ages 1 - 4

#2 Congenital defects
#3 Cancer
#8 Prenatal conditions
#9 Benign neoplasms

Ages 5 - 14

#2 Cancer
#3 Congenital defects
#8 Benign neoplasms

Congenital defects #6 leading cause of death ages
15 – 24.

* DISCOVER JULY 2003

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Executive Order 13045

◆ Protection of **Children** from Environmental Health Risks and Safety Risks (1997)*

◆ EPA (includes):

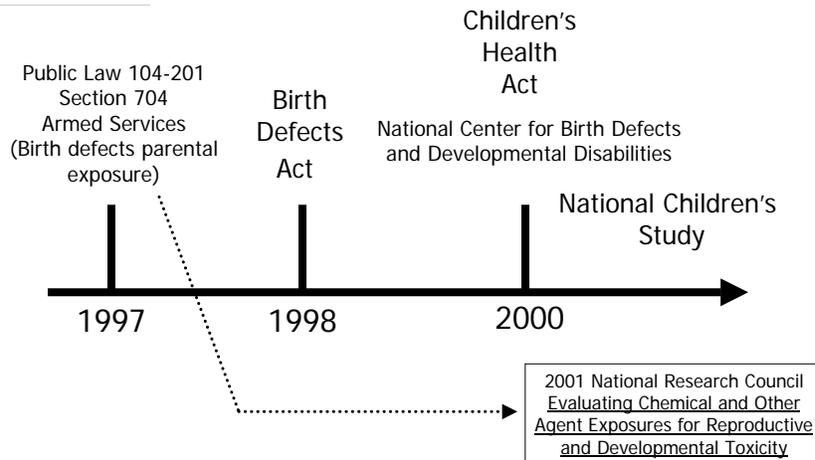
- Parental occupational exposures to toxicants before conceiving a child; and,
- Maternal exposures during gestation.

*Order reauthorized twice by President Bush

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EO 13045 leads to ...



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National Children's Study

Examine effects of environmental influences on the health and development of more than **100,000 children** across the US, following them from **before birth** to age 21



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NCS concepts

- ◆ Exposure begins in pregnancy
- ◆ Environment & genetic expression
- ◆ State-of-the-art technology
- ◆ Multiple agencies
- ◆ Public-private partnerships
- ◆ Resource for future studies
- ◆ Adjunct studies, maybe ½ million children

Adjunct study?

- ◆ Building Health Professional Capacity to Address Children's Environmental Health (USEPA-AO-OCHP-04-03)
- ◆ EPA invites MCO 12/04 funding project:

Education and Training to Address Environmental Health and Safety Risks to Children from Preconception to Adulthood: A Focus on Occupational Environments*

* Logic: EO 13045 & NCS

Health Canada

- ◆ Collaborate with US NCS
- ◆ Survey of Canadian researchers
 - e.g. environmental monitoring, risk assessment, etc.
- ◆ <http://www.hc-sc.gc.ca/hecs-sesc/oceh/survey1.htm>

“We, the undersigned organizations, are very pleased that the National Institute of Child Health and Human Development is proceeding with plans to launch the National Children’s Study (NCS)” (November 12, 2004).

- ◆ Ambulatory Pediatric Association
- ◆ American Academy of Pediatrics
- ◆ American Academy of Sleep Medicine
- ◆ American Association on Mental Retardation
- ◆ American Chemistry Council
- ◆ American College of Obstetricians & Gynecologists
- ◆ American Educational Research Association
- ◆ American Pediatric Society
- ◆ American Psychological Association
- ◆ American Society for Bone and Mineral Research
- ◆ American Society for Pediatric Nephrology
- ◆ Association of American Medical Colleges
- ◆ Association of Medical School Pediatric Chairs
- ◆ Association of University Centers on Disabilities (AUCD)
- ◆ Association of Women’s Health, Obstetric and Neonatal Nurses (AWHONN)
- ◆ Catholic Health Initiatives
- ◆ Coalition of Heritable Disorders of Connective Tissue
- ◆ Center for Children’s Health and the Environment, Mount Sinai School of Medicine
- ◆ Children’s Environmental Health Network (CEHN)
- ◆ Cooley’s Anemia Foundation
- ◆ COSSA (Consortium of Social Science Associations)
- ◆ Easter Seals
- ◆ First Candle/SIDS Alliance
- ◆ Genetic Alliance
- ◆ Jeffrey Modell Foundation

- ◆ Learning Disabilities Association of America
- ◆ March of Dimes
- ◆ National Association of Boards, Commissions and Councils of Catholic Education of the National Catholic Educational Association
- ◆ National Association of Pediatric Nurse Practitioners (NAPNAP)
- ◆ National Black Child Development Institute
- ◆ National Catholic Rural Life Conference
- ◆ National Center for Learning Disabilities
- ◆ National Family Planning and Reproductive Health Association
- ◆ National Healthy Mothers, Healthy Babies Coalition
- ◆ Osteogenesis Imperfecta Foundation
- ◆ Population Association of America
- ◆ PXE International
- ◆ Society for Maternal Fetal Medicine
- ◆ Society for Pediatric Nephrology
- ◆ Society for Pediatric Research
- ◆ Society for Research in Child Development
- ◆ Society for the Study of Reproduction
- ◆ Spina Bifida Association of America
- ◆ The Arc of the United States
- ◆ The Catholic Health Association of the United States
- ◆ United Cerebral Palsy
- ◆ United States Conference of Catholic Bishops

NCS locations & recruitment

Orange County, CA; Orange County, FL; Lincoln, Pipestone, and Yellow Medicine Counties, Minnesota; Brookings County, South Dakota; Duplin County, NC; New York City (Queens), NY; Montgomery County, PA; Salt Lake County, UT; and, Waukesha County, WI.

2006

Colbert County, AL; Benton County, AR; Apache County, AZ; Maricopa County, AZ; Pinal County, AZ; Humboldt County, CA; Kern County, CA; Los Angeles County, CA; Sacramento County, CA; San Bernardino County, CA; San Diego County, CA; San Mateo County, CA; Ventura County, CA; Denver, CO; Douglas County, CO; Litchfield County, CT; New Haven County, CT; New Castle County, DE; Baker County, FL; Dade County, FL; Hillsborough County, FL; Baldwin County, GA; DeKalb County, GA; Fayette County, GA; Honolulu County, HI; Bear Lake County, ID and Lincoln County, WY; Cook County, IL; DuPage County, IL; Johnson and Union Counties, IL; Macoupin County, IL; Will County, IL; Marion County, IN; Jefferson County, KY; Jessamine County, KY; New Orleans, LA; Worcester County, MA; Baltimore County, MD; Montgomery County, MD; Cumberland County, ME; Genesee County, MI; Grand Traverse County, MI; Lenawee County, MI; Macomb County, MI; Wayne County, MI; Becker County, MN; Ramsey County, MN; Stearns County, MN; Jefferson County, MO; St. Louis City, MO; Buncombe County, NC; Burke County, NC; Cumberland County, NC; Durham County, NC; Gaston County, NC; Rockingham County, NC; Stark County, ND; Burlington County, NJ; Middlesex County, NJ; Passaic County, NJ; Warren County, NJ; Monroe County, NY; Nassau County, NY; New York City (Brooklyn), NY; New York City (Manhattan), NY; Cuyahoga County, OH; Lorain County, OH; Cleveland County, OK; Comanche County, OK; Marion County, OR; Philadelphia County, PA; Schuylkill County, PA; Westmoreland County, PA; Providence County, RI; Spartanburg County, SC; Bradley County, TN; Cumberland and Morgan Counties, TN; Davidson County, TN; Bexar County, TX; Childress, Collingsworth, Donley, and Hall Counties, TX; Dallas County, TX; Harris County, TX; Hidalgo County, TX; Stephens and Young Counties, TX; Travis County, TX; Cache County, UT; Grant County, WA; King County, WA; and, Thurston County, WA.

2007

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Workplace samples

MANAGING BEST PRACTICES: The National Children's Study:

Its impact on EHS and the workplace

By Dan Markiewicz, MS, CIH, CSP, CHMM

POSTED: 01/01/2005

- ◆ More than one-half of study participants (women) will be employed
- ◆ Semen samples will be collected from fathers; more than 70% will be employed

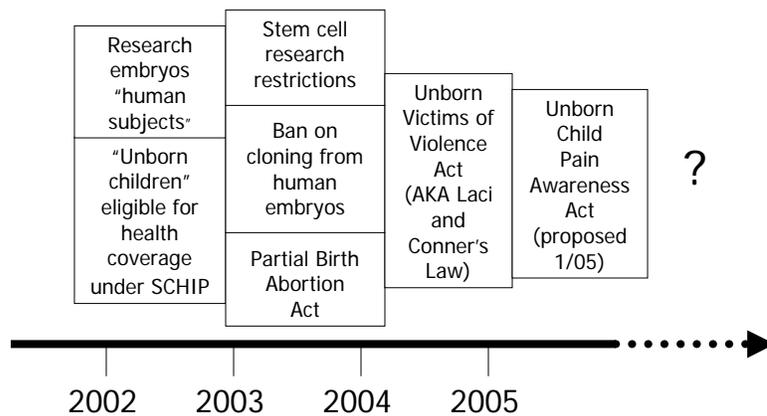
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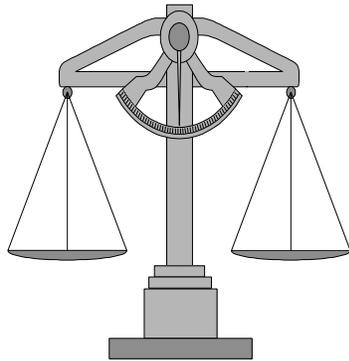
NCS equipment example

Air samplers	3 field team, 2 field teams/Study Center
Air samplers for bioaccumulative inorganics	3 field team, 2 field teams/Study Center
Air samplers for non-bioaccumulative inorganics	3 field team, 2 field teams/Study Center
Air samplers for persistent organics, Non-persistent, non-volatile organics, Non-persistent semi-volatile organics	2 field team, 2 field teams/Study Center
Dust samplers	2/Study Center
Dust samplers for bioaccumulative inorganics	2/Study Center
Dust samplers for non-bioaccumulative inorganics	2/Study Center
Dust samplers for persistent organics, Non-persistent, non-volatile organics, Non-persistent semi-volatile organics	2/Study Center
Exterior dust samplers for bioaccumulative inorganics	2/Study Center
Exterior dust samplers for non-bioaccumulative inorganics	2/Study Center
Exterior dust samplers for persistent organics, Non-persistent, non-volatile organics, Non-persistent semi-volatile organics	2/Study Center
Soil samplers	2/Study Center
Soil samplers for persistent organics, Non-persistent, non-volatile organics, Non-persistent semi-volatile organic	2/Study Center

Political directions: "Culture of life"

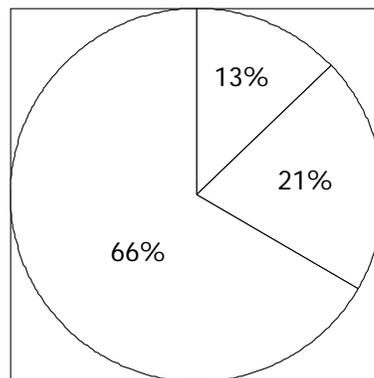


Fetal rights



More than one-half of states have enacted fetal rights laws making it a crime to harm a fetus either through violence, neglect or abuse

Should a fetus have rights?



- No
- Yes - Viable
- Yes - Anytime

Yes = same rights as children and adults

MSN-NBC "Live Vote" 6/6/03 - 50523 votes

Newsweek cover story: **How science is changing the debate**

In utero surgery



Footnote:

October 2003,
three-year old
Samuel appears
before Congress.

Why?

Helps fuel
emotional debate
over law to ban a
late-term
abortion
procedure –
signed into law
by President
Bush November
2003.

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Scientific frontiers ...

Developmental Toxicology and Risk Assessment

National Research council 2000

- ◆ "Staggering" ... discoveries 1995-2000
- ◆ "Explosive" ... future discoveries

*Developmental pathways ... fruit flies,
worms, and man*

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Unborn child*

- ◆ **Visitor** at workplace, not an employee
- ◆ Protect, but still a women's right to ask, or not ask, for help
- ◆ Deeply emotional
- ◆ Many uncertainties



* Standard "risk phrase" in the European Union

UAW v. Johnson Controls

Supreme Court (3/20/91)

"Decisions about the welfare of future children must be left to the parents who conceive, bear, support and raise them rather than to employers who hire those parents."

Supreme Court of California

- ◆ 1997 – Mikayla Snyder, a minor, may bring a tort claim outside of workers' compensation against her mother's employer for injuries Mikayla suffered *in utero* when her mother breathed in toxic amounts of carbon monoxide while at work.
- ◆ Employers "should attempt to conduct their business safely."
- ◆ Tort liability "seems remote at best" if the employer merely allows women to be exposed to teratogens at work "**while fully informing them of the risk.**"

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Employers



Caught between conflicting positions

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Unresolved conflict?



I'll sue!

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Headline news

USA Today Feb. 26, 2002



***Workers take employers to court over birth defects:
Workplace hazards worry employees, their children***

- The fetus has rights;
- The employer did not inform the parent of all workplace reproductive hazards; therefore, parent was not able to make a risk decision for the protection of their child;
- The employer did not take proper actions to anticipate, recognize, evaluate or control workplace reproductive hazards; and,
- Directly or indirectly, workplace exposure to reproductive hazards ultimately harmed the child.

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Legal issue

MANAGING BEST PRACTICES: The \$100-million wake-up call

More claims seek damages from employers for birth defects

By Dan Markiewicz, MS, CIH, CSP, CHMM

POSTED: 04/01/2004

Curtis v. IBM, March 2004

"Two birth defect cases have been teed up and two have settled, and here comes the third, and there are 52 lined up behind it"

Quote: Plaintiff's attorney

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Legal

Paul Schumacher & Elena Lougovskaia
Gallagher, Sharp
Cleveland, OH

Legal Liabilities: Can unborn child sue?

- ◆ All states allow claim of unborn for prenatal injuries, at least when injury inflicted on viable fetus born alive.
- ◆ Parents of still-born child have cause of action in wrongful death for injury sustained by a viable fetus in many states.



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Legal Liabilities

- ◆ Typically, employees injured on job may not sue their employer – *workers comp immunity*
- ◆ Unusual Claims:
 - ◆ Parents can sue on behalf of the child.
 - ◆ In many states, Workers Compensation immunity provisions will not preclude *the child's* claim

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Unusual claim

- ◆ Workers Compensation immunity does not apply
 - Majority of jurisdictions
 - Child is not an employee
 - Child does not benefit from the Workers' Compensation System
- ◆ A child can sue employer for *negligence*



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Prenatal Exposure:

What is the cause of action?

- ◆ Cause of action
 - Negligence
 - ◆ Duty
 - ◆ Breach
 - ◆ Causation
 - ◆ Damages



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Duty to the Unborn

- ◆ Does the employer have a duty to protect its employees' unborn?
 - Duty to protect against risks the employer *knows* or *should know* about

Actual knowledge

- ◆ Actual knowledge (knew)
 - When the employees in supervisory and decision-making capacity have knowledge that a risk exists (includes HS&E, forepersons, team leaders, human resources, upper management or other persons delegated specific responsibility for plant safety)

Actual knowledge: Proof

- ◆ Admission testimony (I said...)
- ◆ Accusatory testimony (He said...)
- ◆ Internal documentation (memos, e-mails, correspondence)
- ◆ Laws and regulations (usually presumed to be known)

Constructive knowledge

- ◆ The employer should have known that the risk existed:
 - Employers are presumed to have superior knowledge or superior access to information
 - Employers are expected to be proactive in acquiring information that affects the health of their employees

Constructive knowledge: Proof

- ◆ Publications
- ◆ Industry associations (meetings/news releases)
- ◆ Industry standards
- ◆ Customary practices among competitors
- ◆ Foreign practices/standards/regulations
- ◆ The Internet

Breach-of-Duty

- ◆ What should a reasonable employer do under the circumstances?
 - Legitimate explanation for inaction
 - Documentary proof

Causation



◆ Greatest, but dissipating, hurdle for plaintiffs:

- Plaintiffs must prove that the injuries claimed were a natural and direct consequence of the exposure.
- Advances in medical science continue to lighten this burden

Expert testimony

◆ Expert testimony is required:

- Expert must be qualified to testify on the subject
- Testimony must fall beyond knowledge of laypersons
- Theories/methods underlying the testimony must be scientifically reliable
- Theories must be relevant to the issue at hand, i.e. proximate causation

Expert testimony

- ◆ General causation
 - Chemical ***can*** cause an injury
- ◆ Specific causation
 - Chemical ***did*** cause the specific injury

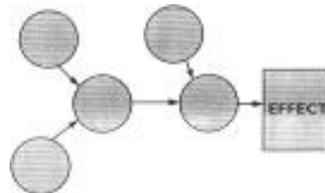


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Expert testimony

- ◆ General causation:
 - Peer-reviewed studies must show that the specific chemicals has been shown to cause the ailment under the levels for the duration of exposure
 - Statistical associations may not be enough
 - Animal studies may not be enough
 - Case studies may not be enough if they are dissimilar



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Expert testimony

- ◆ Specific causation:
 - General causation must exist
 - Temporal diagnosis usually not enough
 - Differential diagnosis (exclusion of other possible causes) has been sufficient



Proof of Causation

- ◆ Epidemiological Studies
 - Expensive, requires large sample to be considered
- ◆ Rare exposure event, causing rare defect.
- ◆ Differential Diagnosis
 - List of possible causes

Differential Diagnosis

- ◆ Process of elimination
- ◆ Is it reliable in court?



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SCOTT v. BRILLIANT AUTO TRIM, INC.

Mock statement of facts and cross-examination

U.S. District Court for the
Northern District of Ohio



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Scott v. Brilliant

- ◆ Mother: Samantha Scott
- ◆ Daughter: Angela Scott
- ◆ Employer: Brilliant Auto Trim
- ◆ January 2001, Samantha begins work

Scott v. Brilliant

- ◆ Ventilation: garage doors, fans, windows
- ◆ MSDS: no warnings to pregnant women
- ◆ No health problems during pregnancy
- ◆ Samantha pregnant in November of 2001
- ◆ Gives birth to Angela in March August of 2002

Scott v. Brilliant

- ◆ Mr. Baxt: Safety Director since '99 and Human Resources Manager
- ◆ Mr. Hastings: Safety Director before '99
- ◆ Mr. Schumacher plays the role of the plaintiffs' attorney.....

Mistakes by Employers

- ◆ False sense of security
- ◆ Improper staffing
- ◆ Haphazard training
- ◆ Lack of safety enforcement
- ◆ Poor documentation

Mistake: False sense of security

- ◆ Workers Compensation
 - Does not bar all claims
- ◆ MSDS
 - May be wrong
- ◆ Federal Regulations:
 - No preemption
 - Outdated
 - Political

Mistake: Federal Standards not enough

- ◆ OSHA exposure standards are aimed at employee protection, not fetal protection
- ◆ OSHA standards have been criticized for being outdated and inadequate to protect reproductive/fetal health

Example: Glycol Ethers

- ◆ In early 80's, NIOSH says PELs should be lowered
- ◆ In 1993, OSHA considered reducing limits, but the effort failed due to opposition and threatened litigation
- ◆ In 2002, OSHA reopened comments, but the limits remain the same

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Example: Improper Staffing

- ◆ Overworked safety personnel
- ◆ One person wearing several hats



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Continued... 66

Example: Improper Staffing

- ◆ Is it really a big problem?
 - Inattention to detail
 - Lack of follow-up
 - Lack of documentation



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Mistake: Improper hazard assessment

- ◆ Most hazard assessments do not take into account:
 - Reproductive health to women
 - Reproductive health to men
 - Health of the fetus

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Mistake: Improper Training

- ◆ Beyond bare minimum:
 - Specific to reproductive health
 - Specific to chemicals used at the plant
- ◆ Lack of continuing training
- ◆ Testing employees' knowledge



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Mistake: Lack of Discipline

- ◆ Safety rules must be enforced
- ◆ Zero tolerance policy
- ◆ Supervisors must set the example
- ◆ Enforcement must be documented



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Mistake: Poor Documentation

- ◆ Documents speak for the company
- ◆ Lack of documentation creates gaping holes in a story
- ◆ Document the decision-making process
- ◆ Document the results of the decision-making process

WHY DO EMPLOYERS MAKE THESE MISTAKES?

Why mistakes?

◆ Lack of reliable and consistent approach to:

- Identify
- Evaluate
- Communicate
- Eliminate/minimize

Reproductive & Developmental Hazards

IS THERE A SOLUTION?

Fetal Protection Policy?

- ◆ Discriminatory fetal protection policies are unconstitutional. *Int'l Union v. Johnson Ctr's* (1991), 499 U.S. 187



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Comprehensive Hazard Assessment Program

- ◆ Identify reproductive hazards
- ◆ Communicate and educate employees
- ◆ Eliminate or minimize hazards
- ◆ Institute formal periodic reviews
- ◆ Ensure compliance
- ◆ Establish strict process documentation procedures

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Who Has the Time To Do This?

Words of wisdom

- Be proactive
- Allocate budget
- Follow-through



End Legal

Thank you

Reproductive & Developmental Health Programs

Dan Markiewicz

Million dollar question



"How do you draw a class of people that is not discriminatory but protects the interests of the employer in trying to create an environment that is safe and healthy. That's the million dollar question."

Pedro Forment, employment lawyer and partner,
Ford & Harrison.

Safety + Health "Are Employer's Responsible for Reproductive Health?"
July 2002

Answer ...

PDC 108

New!
Implementing Reproductive and Developmental Health Programs
Sold Out!

Intermediate | 1.0 IH CM Point / 0.8 CEU | Saturday | 8:00 a.m.–5:00 p.m. | Fee: \$295 / \$375 | Limit: 40

Prerequisites: Ability to apply basic risk assessment techniques employing toxicological principles. Read (online & free): "Evaluating Chemical and Other Agent Exposures for Reproductive and Developmental Toxicity" (2001) and "Scientific Frontiers in Developmental Toxicology and Risk Assessment" (2000) available at www.nap.edu. Must also be familiar with basic management concepts e.g. OSHA VPP and modern risk communication practices.

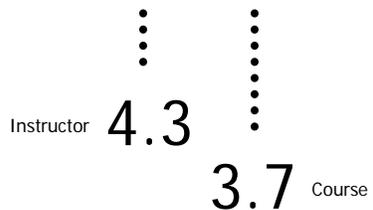


American Industrial Hygiene Conference & Expo
 May 8, 2004
 Georgia World Congress Center
 Atlanta, Georgia
 Professional Development Course

Student reaction

Responses = 36

Excellent 5	Very Good 4	Average 3	Less 2	Poor 1
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Continue course?

Key factors

Success Factors

- Management program
- Pro-active
- Team w/employees
- 3rd party
- Flexible
- Open discussions
- Internet based
- Precautionary Principle
- CIH recommended controls
- Modern risk communication practices

Failure Factors

- Focus on regulatory compliance
- Reactive
- Primary HR or safety responsibility
- No team, no employee, no 3rd party
- Ridged, closed to opinions
- Paper references
- Common sense controls
- Poor communication

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Yellow flag

"This is a huge issue that will continue to grow in importance as more women move into jobs traditionally the domain of men."

*Tim Fisher, American Society of Safety Engineers.
USA TODAY, February 26, 2002. □*

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Yellow flag

"This is a very, very serious problem, and it's the tip of the iceberg."

William DeProspero, lawyer representing the families and other IBM employees who say workplace toxins caused their problems.

USA TODAY, February 26, 2002.

Yellow flag

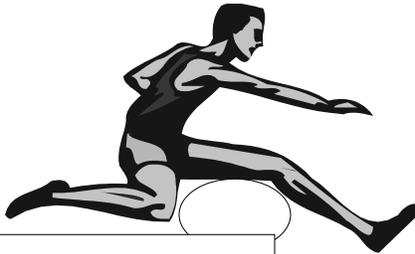
"I think as we find more scientific evidence that shows a possible link between certain kinds of environments and harm to reproductive systems, we'll see more cases like these."

Quentin Riegel, deputy general counsel for the National Association of Manufacturers.

Safety + Health July 2002

"Are employers responsible for reproductive health?"

First hurdle



Management must be informed of the yellow flags

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Biggest hurdle?

Failure to discuss new risks!



Must overcome management's "Threat Rigidity Response" or effective risk communication & management fails

"I heard we have reproductive hazards around here."

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Response to yellow flags*

1. Keep actions/inactions secret;
2. Don't let yourself know about it; or,
3. Acknowledge it and involve stakeholders' help on how to deal with it.

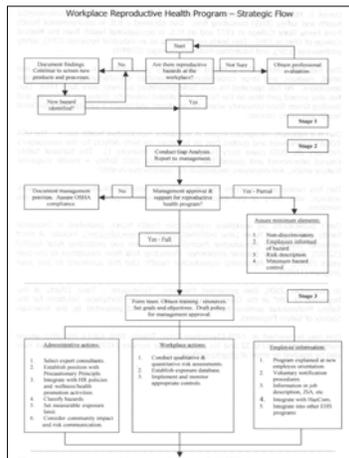
* Peter Sandman: outrage management expert
(down the hall from us now!)

Keep boss informed!



"...withhold information? Then I withhold pay!"

Strategic flow



ISHN February 2003
"Managing Best Practices" column



It says to follow this path

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Program steps

1. Awareness
2. Are there hazards?
3. Gap analysis
4. Report to management
5. Program approval
6. Establish team
7. Policy & procedures

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Program steps

8. Hazard & exposure inventory
9. Controls (reevaluate)
10. Risk assessment
11. Risk communication
12. Employee & management options
13. Reevaluate

Gap analysis/scorecard

Gap Analysis Questionnaire: Workplace Reproductive Health Program

Instructions: This questionnaire should be completed by a team that: 1) Is independent from the conditions or practices being evaluated; 2) One member of the team should be knowledgeable in workplace reproductive health issues, and 3) One member of the team should be experienced in conducting a gap analysis or environmental health and safety audit. In addition to checking the appropriate box, objective findings should be recorded for each question.

#	Topic	Yes	No or N/A	Partial
1.	Has a Reproductive Health Program been established to address work-related pre-conception (e.g. infertility, pregnancy, or recent birth concerns)?			
2.	Does the Reproductive Health Program address issues such as "take home toxics" and breast-feeding?			
3.	Is there a written and communicated (non-discriminatory) policy on reproductive health?			
4.	Are reproductive hazards identified in job descriptions?			
5.	Are newly hired employees informed of the company's Reproductive Health Program?			
6.	Is reproductive health an initiative in the workplace's wellness/health promotion activities?			
7.	Are employees encouraged to voluntarily notify employer of pregnancy or reproductive health concerns?			
8.	Has the employer established and communicated to employees their position regarding the "precautionary principle"?			
9.	Are employees at risk to reproductive hazards permitted temporary reassignment, etc. without reduction in pay?			
10.	Has the employer established a relationship with expert consultants (e.g. medical doctor for consultation regarding workplace reproductive health issues)?			
11.	Is there a current list(s) of workplace reproductive hazards (e.g. teratogens and developmental toxins)?			
12.	Does list(s) of workplace reproductive hazards include biological agents, ergonomic conditions, heat, and noise?			
13.	Does the workplace reproductive hazard list(s) classify and manage reproductive hazards by strength of information (e.g. known, suspected, human study, animal study, etc)?			
14.	Has a measurable exposure limit been established for each identified reproductive hazard?			
15.	Are reproductive health issues integrated into the workplace's OSHA hazard communication program?			

Workplace Reproductive Health Programs © 2002 Markiewicz & associates Ltd. 1

Industrial Safety & Hygiene News -
11/02
"Best Practices" column



Gap analysis

- Exercise
- Questions derived from variety of sources*
- Data used to prepare report to management

* "Reproductive and Developmental Hazard Management Guidelines"
American College of Occupational and Environmental Medicine;

"Workplace Hazards to Reproduction and Development"
Safety and Health Assessment and Research for Prevention,
Washington State Department of Labor and Industries.

Report to management

1. Format consistent with reports to company's upper management
2. Identify current strengths and weaknesses
3. Provide examples of risk
4. Explain expected benefits
5. Outline thought and process flow
6. Show estimate for needed resources and costs
7. Indicate a timeline for implementation

Program approval

1. Responsible executive
2. Budget
3. Measurable goals and objectives

Next hurdles

- ◆ Management must decide what they want to do
- ◆ Document decision
- ◆ Proceed as directed



Precautionary principle

“When an activity raises threats to harm human health or the environment, precautionary measures should be taken, even if some cause-and-effect relationship is not fully scientifically established”

The U.S. signed and ratified the United Nations 1992 “Rio Declaration” which commits the U.S. to applying The Precautionary Principle.

Team established

1. Management
2. Employees
3. Expert consultants

Employees should represent their collective group(s). This should be a volunteer assignment supported by the employee’s supervisor.

3rd party support

Expert consultants should possess the credentials and experience necessary to answer workplace reproductive and developmental health questions.

Consultants may include:

- Physician (M.D.)
- Certified Industrial Hygienist
 - Registered Nurse
- Certified Safety Professional
- Human Resource Specialist
 - Attorney

Program, policy and procedures

- ◆ Put in writing
- ◆ Must be non-discriminatory!
- ◆ Examples on the web
- ◆ Base upon company guidelines
- ◆ Why is a policy needed?

Risk assessments

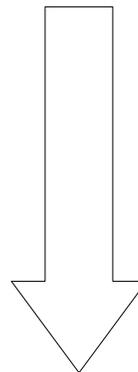
1. Conduct with competent personnel.
2. Qualitative = judgment.
3. Quantitative = measure.

Only measure if an exposure limit
is established?

Controls

- ◆ Elimination/substitution
- ◆ Engineering
- ◆ Warnings
- ◆ Administrative
- ◆ PPE

Most Effective



Least Effective

Last hurdles

- ◆ Keep program up-to-date
- ◆ Stay abreast of new scientific and medical discoveries
- ◆ Consider how evolving legal strategies may impact program activities

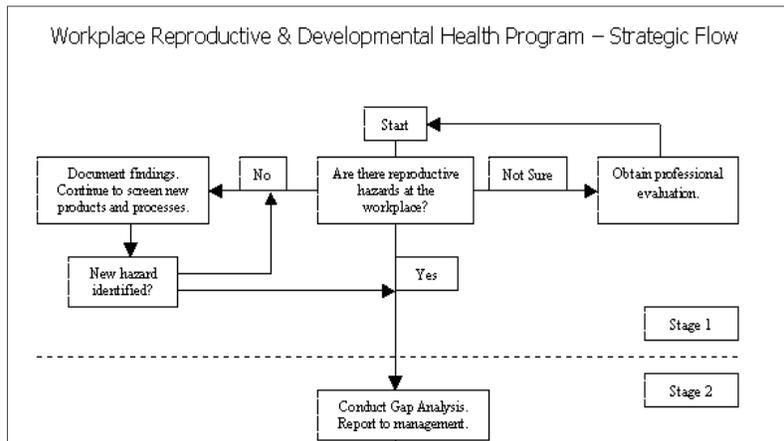


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Identifying Hazards

Gregory S. Mason, MS, CSP, CHMM

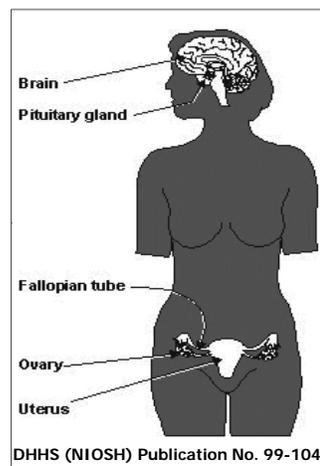
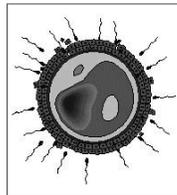
Are there hazards?



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Key systems

1. Libido and potency
2. Pituitary
3. Ovary
4. Sperm
5. DNA
6. Pregnancy
7. Breast milk



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Reproductive hazards

- ◆ Chemical
- ◆ Physical
 - Noise, heat, etc.
- ◆ Biological
- ◆ Radiological
- ◆ Psychological
 - Stress?
- ◆ Female/male
- ◆ Additive effects?



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Hazards: Women

Table 1. Chemical and physical agents that are reproductive hazards for women in the workplace

Agent	Observed effects	Potentially exposed workers
Cancer treatment drugs (e.g., methotrexate)	Infertility, miscarriage, birth defects, low birth weight	Health care workers, pharmacists
Certain ethylene glycol ethers such as 2-ethoxyethanol (2EE) and 2-methoxyethanol (2ME)	Miscarriages	Electronic and semiconductor workers
Carbon disulfide (CS ₂)	Menstrual cycle changes	Viscose rayon workers
Lead	Infertility, miscarriage, low birth weight, developmental disorders	Battery makers, solderers, welders, radiator repairers, bridge repainers, firing range workers, home remodelers
Ionizing radiation (e.g., X-rays and gamma rays)	Infertility, miscarriage, birth defects, low birth weight, developmental disorders, childhood cancers	Health care workers, dental personnel, atomic workers
Strenuous physical labor (e.g., prolonged standing, heavy lifting)	Miscarriage late in pregnancy, premature delivery	Many types of workers

DHHS (NIOSH) Publication No. 99-104

AIHCE PDC 415 (2005) Implementing Reproductive & Developmental Health Programs 110

Hazards: Women

Table 2. Disease-causing agents that are reproductive hazards for women in the workplace

Agent	Observed effects	Potentially exposed workers	Preventive measures
Cytomegalovirus (CMV)	Birth defects, low birth weight, developmental disorders	Health care workers, workers in contact with infants and children	Good hygienic practices such as handwashing
Hepatitis B virus	Low birth weight	Health care workers	Vaccination
Human immunodeficiency virus (HIV)	Low birth weight, childhood cancer	Health care workers	Practice universal precautions
Human parvovirus B19	Miscarriage	Health care workers, workers in contact with infants and children	Good hygienic practices such as handwashing
Rubella (German measles)	Birth defects, low birth weight	Health care workers, workers in contact with infants and children	Vaccination before pregnancy if no prior immunity
Toxoplasmosis	Miscarriage, birth defects, developmental disorders	Animal care workers, veterinarians	Good hygiene practices such as handwashing
Varicella-zoster virus (chicken pox)	Birth defects, low birth weight	Health care workers, workers in contact with infants and children	Vaccination before pregnancy if no prior immunity

DHHS (NIOSH) Publication No. 99-104

AIHCE PDC 415 (2005) Implementing Reproductive & Developmental Health Programs 111

Hazards: Men

Type of Exposure	Observed effects			
	Lowered number of sperm	Abnormal sperm shape	Altered sperm transfer	Altered hormones/sexual performance
Lead	X	X	X	X
Dibromochloropropane	X			
Carbaryl (Sevin)		X		
Toluenediamine and dinitrotoluene	X			
Ethylene dibromide	X	X	X	
Plastic production (styrene and acetone)		X		
Ethylene glycol monoethyl ether	X			
Welding		X	X	

DHHS (NIOSH) Publication No. 96-132

AIHCE PDC 415 (2005) Implementing Reproductive & Developmental Health Programs 112

Hazards: Men

Type of Exposure	Observed effects			
	Lowered number of sperm	Abnormal sperm shape	Altered sperm transfer	Altered hormones/sexual performance
Mercury vapor				X
Heat	X		X	
Military radar	X			
Kepon**			X	
Bromine vapor**	X	X	X	
Radiation** (Chernobyl)	X	X	X	X
Carbon disulfide				X
2,4-Dichlorophenoxy acetic acid (2,4-D)		X	X	

DHHS (NIOSH) Publication No. 96-132

Hazards: Men



- ◆ Get Laptops Off Your Laps (DISCOVER MARCH 2005)
- ◆ 20 minutes scrotum temperature rises 2 degrees F, one hour rises 6 degrees F
- ◆ Over 2 degrees F increase in scrotum and sperm start to die

Hazards: Men

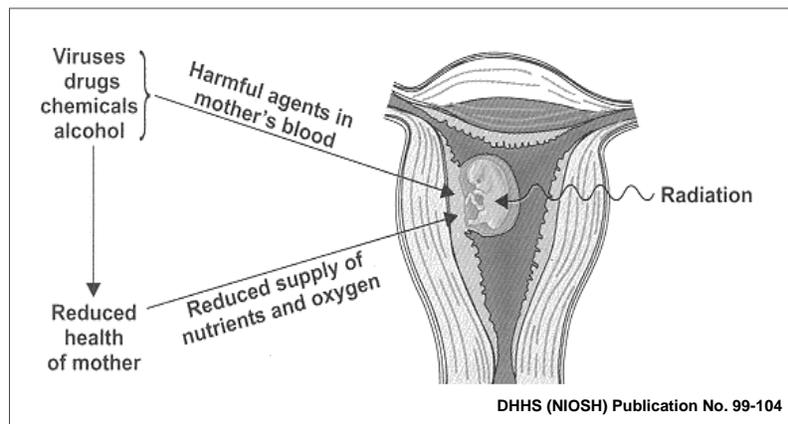
Is that a cell phone in your pocket?

MEN'S HEALTH / MARCH 2005

Worst consequence of carrying
a cell phone in pants pocket:

A possible 30 percent reduction
in healthy sperm

Hazards – embryo/fetus



Thalidomide limb deformities

Species	Dose (mg/kg)
Human	< 1
Monkey	10
Rabbit	50
Rat	200
Mouse	500
Chicken	> 500
Hamster	> 8000

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Hazard inventory

1. MSDS
2. List(s) from various sources
3. Services
4. Internet search
5. NIOSH CD "Chemical Hazards"
6. Job Safety Analysis
7. Employee suggestions for review

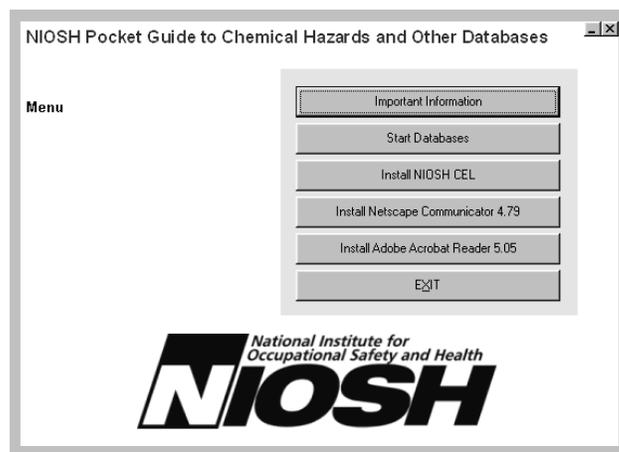
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MSDS: Use with care

- ◆ Quality?
- ◆ Timeliness
- ◆ Completeness
 - Study: Most MSDS do not list repro/developmental hazards even when required to do so
- ◆ Disclaimers
- ◆ Good: Review with International Chemical Safety Cards

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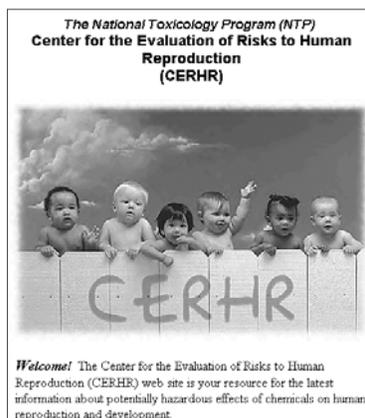
RTECS



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Reproductive health

- ◆ Best fact site
- ◆ Up-to-date
- ◆ Excellent links
- ◆ Review if Scorecard lists your facility with developmental or reproductive toxicants



<http://cerhr.niehs.nih.gov/>

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Toxnet

<http://toxnet.nlm.nih.gov/>

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New evidence

Environmental Health Perspectives
Volume 111, Number 9, July 2003

On the Cover. New evidence shows that not only do certain environmental chemicals pass from mother to fetus, they do so in greater amounts than previously thought. Further research on the long-term consequences of such exposures is critical.

Be alert to new hazard information!

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EU Risk Assessment

Greg Mason

Global standards?



- ◆ EU regulations require employers to conduct risk assessments for pregnant workers

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Commission of the European Communities

Guidelines on the assessment of the chemical, physical and biological agents industrial processes hazardous for the safety or health of pregnant workers and workers who have recently given birth or are breastfeeding (Council Directive 92/85/EEC)

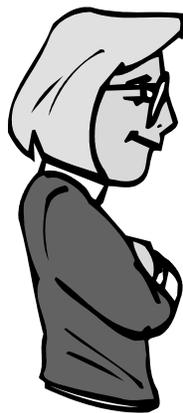
Handout

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Evaluating Exposures

Dan Markiewicz

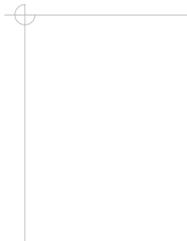
Will this exposure harm my baby?



Exposure routes:

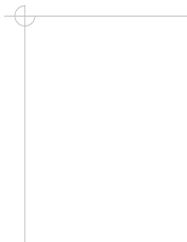
1. Inhalation
2. Skin contact
3. Ingestion
4. Injection

Workplace exposures
are only part of the
equation



Examples

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NOISE

Most common physical hazard
in workplaces

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Newborn hearing loss

- ◆ Most frequent birth defect
 - 12,000 annual
- ◆ Almost every state now requires newborns to have their hearing checked before they leave birthing hospital
 - Ohio required testing at all birthing hospitals by June 2004
- ◆ Tests possible because of rapid advances in science & technology

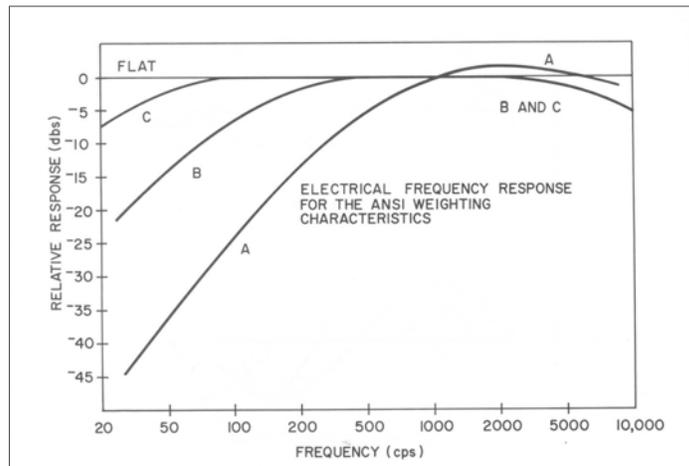
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Noise/hearing loss - warnings

- ◆ American Academy of Pediatrics (Policy Statement October 1997)
 - Noise: A Hazard for the Fetus and Newborn
- ◆ 2003 TLV® Booklet:
 - Noise exposure in excess of a C-weighted, 8-hour TWA of 115 dBC or
 - peak exposure of 155 dBC to the abdomen of workers beyond the fifth month of pregnancy may cause hearing loss in the fetus

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OSHA limits are on "A" not "C"



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ORGs – ototoxic chemicals

Occupational Reproductive Guides

U.S. employers should conduct their own risk assessments to establish what they believe is an acceptable level of exposure for pregnant employees. Jankovic and Drake methods for establishing safe exposure levels, which they call Occupational Reproductive Guidelines (ORGs), for chemicals having reproductive toxicity, should be suitable for any U.S. employer.

A comparison of OSHA permissible exposure limits (PELs) and ORGs for selected ototoxic chemicals (not a complete list) is presented in Table II.

Table II. Comparison of PEL and ORG for Selected Ototoxic Chemicals

Ototoxic Chemical	OSHA PEL (mg/m ³)*	ORG (mg/m ³)*
Arsenic	0.5	0.005
Carbon monoxide	55	14
Hexane	1800	176
Lead	0.05	0.01
Styrene	425	85
Toluene	750	9.6
Trichloroethylene	537	5.5

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Navy guidelines

1. Pregnant workers should be vigilant in wearing hearing protectors whenever environmental noise exceeds 84 dBA, to minimize potentially unhealthy maternal cardiovascular and endocrine effects on the growing fetus.
2. Extended exposures (more than 12 minutes) above 104 dBA should be avoided, even with the use of maternal hearing protection.
3. Impact/impulse noise exposure sufficient to require personal hearing protection should be avoided.
4. Although there is currently no conclusive data defining safe-for-the-fetus noise levels after 20 weeks gestation, it is prudent to avoid unnecessary exposure to loud sounds. It is recommended that for noise at 84 dBA or higher, the potential for risk (as contrasted to the actual known risk) to fetal hearing should be discussed with the mother. The aforementioned exposure limit of 90 dB recommended by Moore³⁵² provides good guidance and may be used as a starting point for those with specific expertise. If there is a question, then a team approach with OB/GYN, OBM, pediatrics, and IH may be needed.
5. The ACGIH 115 dBC TWA and peak 155 dBC noise notations should be observed as exclusion criteria starting at 20 weeks gestation. Excluding pregnant women from discharging firearms after 20 weeks gestation would be consistent with those criteria.
6. Consider job rotation after the twentieth week of pregnancy for women working around intense sound levels.³⁵³
7. Care should be taken to avoid contact between the abdomen and vibrating tools.
8. Determination as to the advisability of continuing work at a given sound level is deferred to the attending physician.

Preferred actions

1. Determine if noise levels exceed ACGIH (notice) limits
2. Assure that no other hazards such as ototoxic chemicals are an issue
3. Reduce hazards if economically and technically feasible
4. Integrate data into noise training required by OSHA – inform employees just as would be done for general noise
5. Employee decisions

CARBON MONOXIDE

Most common chemical hazard
In workplaces

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CO – choose a limit

Organization	Exposure Limit(s)	Notes
Occupational Safety & Health Administration (U.S.)	50 ppm 8-hour TWA	Does not address reproductive health
National Institute for Occupational Safety & Health (U.S.)	35 ppm 10-hour TWA 200 ppm ceiling	Does not address reproductive health
German Ministry of Labor MAK exposure limit (Germany)	30 ppm (work-shift) TWA	International Chemical Safety Card: Harmful effects probable during pregnancy in spite of observance of MAK
American Conference of Governmental Industrial Hygienists	25 ppm 8-hour TWA	Does not address reproductive health
Ministry of Social Affairs and Health (Finland)	14 ppm 8-hour TWA	Suggested limit for pregnant employees
Jankovic and Drake ⁵	12 ppm 8-hour TWA	Calculated Occupational Reproductive Guide
World Health Organization ⁶	10 ppm 8-hour TWA	Exposure limits recommended to limit COHb levels in pregnant, non-smoking women, to 2.5%
	25 ppm 1 hour	
	50 ppm 30 minutes	
	90 ppm 15 minutes	

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Preferred actions

1. Determine if CO levels exceed chosen limits
2. Assure that no other additive hazards or "take home toxic" are an issue
 - ◆ e.g. breast feeding
3. Reduce hazards if economically and technically feasible
4. Integrate data into training required by OSHA under the hazard communication standard
5. Employee decisions

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2005 TLVs® reproductive critical effect(s)

- ◆ Amitrole
- ◆ Tert-Amyl methyl ether
- ◆ Benomyl
- ◆ N-Butyl mercaptan
- ◆ Carbon monoxide
- ◆ Chloroform
- ◆ 1-Chloro-2-propanol and 2-Chloro-1-propanol
- ◆ B-Chloroprene

Examples

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2005 TLVs® fetus notes

- ◆ BEI lead
 - Women of child bearing potential blood PB > 10 ug/dl risk of delivering child over CDC guideline
- ◆ Noise
 - 5th month pregnancy > 8-hr. 115 dBC TWA, 155 dBC peak may cause hearing loss in fetus
- ◆ Ionizing radiation
- ◆ Thermal stress
 - Core temperature > 39 degree C 1st trimester may endanger fetus
- ◆ Ergonomics

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CA Proposition 65

- ◆ Maximum Allowable Dose Levels (MADLs) Adopted in Regulation for Chemical Causing Reproductive Toxicity
- ◆ Examples:
 - Benzene 24 ug/day
 - Ethylene oxide 20 ug/day
 - Lead 0.5 ug/day
- ◆ NOEL divided by 1,000

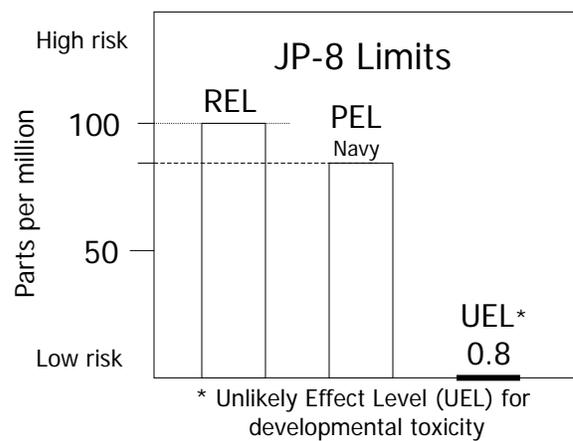
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Evaluating Chemical and Other Agent Exposures For Reproductive and Developmental Toxicity

- ◆ National Research Council (2001)
- ◆ 1997 Law – protect uniformed armed service members & dependents from exposures that may cause birth defects
- ◆ Read online (free) at www.nap.org

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Unlikely effect level



Source: [Evaluating Chemical and Other Agent Exposures for Reproductive and Developmental Toxicity](#), National Research Council, 2001

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JP-8 UEL calculation

$$\text{UEL JP-8} = \frac{\text{NOAEL (1,000 mg/kg/d)}}{1,000^*} = 1 \text{ mg/kg/d}$$

Convert 1 mg/kg/d (oral) to equivalent inhalation concentration for human = 0.8 ppm**

* Uncertainty factor: 10 for inter-individual variation, 10 for extrapolation from rats to humans, 10 for an incomplete data set.

** Assume 8 hr/d exposure, 100% absorption, 69 kg body weight, respiratory minute volume of 0.42 mL/min/kg body weight.

Source: Evaluating Chemical and Other Agent Exposures for Reproductive and Developmental Toxicity, National Research Council, 2001

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Expert advice

Ex. Occupational Health, Medical Director, DO, MPH, MBA, FACOEM, FACPM

Guidelines for continuation of various jobs

Standing	Weeks Gestation
> 4 hrs./day	24
> 30 min./day	32
< 30 min./day	40

Stooping/Bending	Weeks Gestation
> 10x/day	20
> 2-20x/day	28
< 2x/day	40

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Risk Assessment

Dan Markiewicz

Definition



Risk is the probability of something happening

Risk may expressed by numbers, words, or actions

Definitions

◆ AIHA

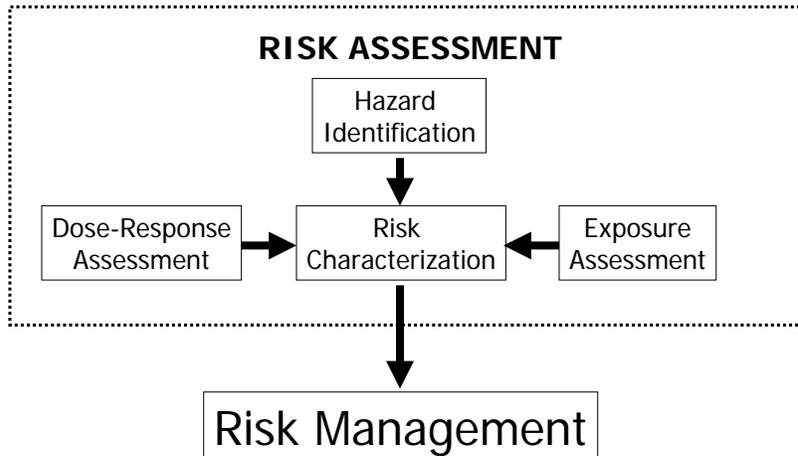
- Risk assessment is the use of **factual** information to define the health effects of exposure to individuals or populations...

◆ EPA

- Risk assessment is the process by which **scientific judgments** are made concerning the potential for toxicity to occur in humans.

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Risk assessment



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Risk matrix

EXPOSURE		TOXICITY			
		Life-threatening	Irreversible	Severe reversible	Reversible
	Continuous	1	3	7	13
	Frequent	2	5	9	16
	Occasional	4	6	11	18
	Remote	8	10	14	19
	Improbable	12	15	17	20

* Colors correspond with increasing degrees of risk from low (green) to high (red) - see Table II.

Table II – Ranking Scheme

NUMBERS	RISK
1-5	High
6-9	Serious
10-17	Medium
18-20	Low

Definitions

Table III – Exposure Definitions

DESCRIPTION	DEFINITION
Continuous	Exposed for entire shift
Frequent	2-6 hours exposure per shift
Occasional	1-2 hours exposure per shift
Remote	< 1 hour exposure per shift
Improbable	Not likely to be exposed, but possible

Table IV – Toxicity Definitions

DESCRIPTION	DEFINITION
Life-threatening	Known or potential human carcinogens or reproductive toxins. Highly toxic chemicals
Irreversible	Harmful chemicals causing permanent effects.
Severe reversible	Serious skin, eye, mucus membrane or respiratory effects causing lost-work day(s)
Reversible	Temporary usually irritant or discomfort effects

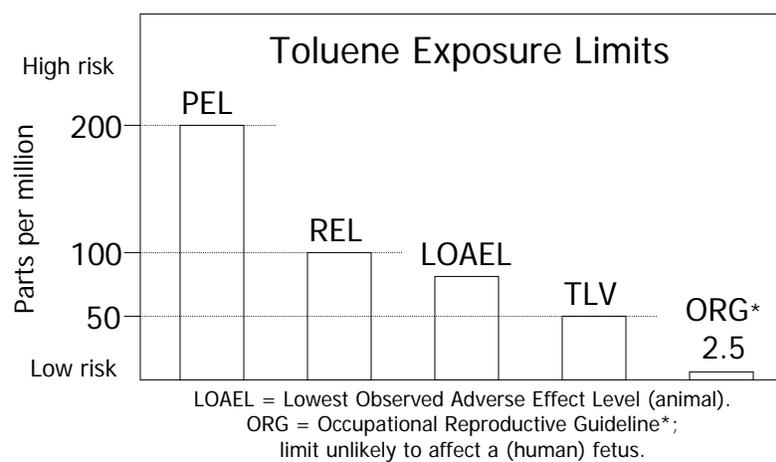
EU Risk Phrases

The following Risk Phrases used on MSDSs in Europe may also meet the category for life-threatening:

- R26 – Very toxic by inhalation
- R27 – Very toxic in contact with skin
- R28 – Very toxic if swallowed
- R45 – May cause cancer
- R46 – May cause heritable genetic damage
- R47 – May cause birth defects
- R48 – Danger of serious damage to health by prolonged exposure
- R49 – May cause cancer by inhalation
- R61 – May cause harm to the unborn child
- R63 – possible risk of harm to the unborn child

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Birth defect risk



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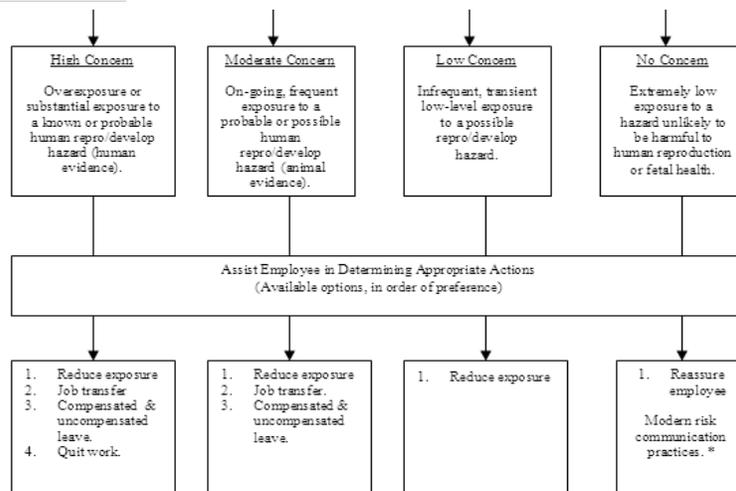
Risk categorization

Example:

- A+ Human reproductive hazard with no known no-effect dose.
- A Human reproductive hazard with known no-effect dose.
- A- Unconfirmed human reproductive hazard.
- B+ Multiple reproductive effects in animals, no human data.
- B Mixed reproductive effects in animals but no human data.
- B- Few reproductive effects in animals but no human data.
- C No reproductive data found.
- E Known not to affect animal reproduction but no human data.
- F Known not to affect human reproduction.

Hazard ID. e.g. name, CAS, etc.	Workplace use/Exposures	Classification	Reproductive/ Developmental Outcome

Risk decisions



Risk communication



1980s



1990s



2000s

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Points to consider

- ◆ Perception is reality
- ◆ Truth is simply undisputed or poorly disputed statements or positions
- ◆ Everything is harmful and nothing is harmful
- ◆ Lawsuits generally precede laws
- ◆ Communication means sending a message and receiving feedback that the message was understood
- ◆ "First seek to understand, then be understood"



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Right to know?



“Your Honor, the employer did not inform my client (the parent) of all workplace reproductive hazards; and, therefore, my client was not able to make a risk decision for the protection of their unborn child.”

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Guidance: fundamental rights

American College of Occupational and Environmental Medicine

Reproductive and Developmental Hazard Management Guidelines (1996)

- “Employees have a fundamental right to work in an environment that is free of significant reproductive health risks.”
- “Employees have a fundamental right to know about potential reproductive health risks encountered in the workplace.”

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Shy away?

1. Research shows that employers have a low level of awareness about reproductive hazards.*
2. Most (> 60%) MSDSs do not address reproductive or developmental hazards, even when the data is required.**

* "Corporate Response to Reproductive Hazards in the Workplace." American Journal of Industrial Medicine (1989).

** "Analysis of Reproductive Health Hazard Information on Material Safety Data Sheets of Lead and the Ethylene Glycol Ethers." Journal of Industrial Medicine (1994).

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Internet effect

BIRTH DEFECT!



"More than 60 million U.S. residents went online in search of health information (2000) and more than 70% of them said what they found influenced their decisions."

* Source: Journal of the American Medical Association, reported in the *USA Today*, May 23, 2001
Good and bad information is on the Internet,
but how does the average person know which is which?

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Fact or fiction?

"Sexy for her, but for baby it could be poison"

- ◆ NY Times ad
- ◆ Poison cosmetics?
- ◆ Scare tactic or responsible communication?
- ◆ Phthalates
- ◆ www.nottoopretty.com/
- ◆ Indoor air quality concern in an office?
- ◆ Right-to-know?

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Only those only employees need

~~PERSONAL & CONFIDENTIAL~~

BLOOD SAMPLING RESULTS

Births and Pregnancies	
Comment (w/ PPM in blood, April 1991)	Status
0.45	Normal child - born June 1980. Transferred out of [redacted] 4/79.
0.28	Normal child - born April 1981.
0.078	Normal child - born April 1981. Umbilical cord blood 0.055 ppm.
1.5	Five-months pregnant. <i>on pregnancy leave</i>
0.013	Five months pregnant. <i>Normal child - born August 1</i>
2.5*	Child - 2 plus years. Unconfirmed eye and tear duct defect.
0.048	Child - 4 months. <i>One possibly and eye defect. Genetic blood 0.012 ppm</i>
2.007	<i>Normal child - born July 1991</i>

*Current blood level - in [redacted] area only one month before pregnancy.

BPE:ldr

You found this online!



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Sandman's *(old)* 4D advice

- ◆ Deflect – power but no passion
 - Change subject until they lose interest
- ◆ Defeat – passion but no power
 - “we’re right, you’re wrong”
- ◆ Dismiss – no power no passion
 - Ignore
- ◆ Defer – power and passion
 - Defer to their demands as best as possible

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4D won't work in Internet era

NEXT The Future Just Happened,
Michael Lewis*

The Internet allows anyone to have power and
(support for their) passion

“Internet is the weapon for revolutionaries”

“Amateur or individual is king”

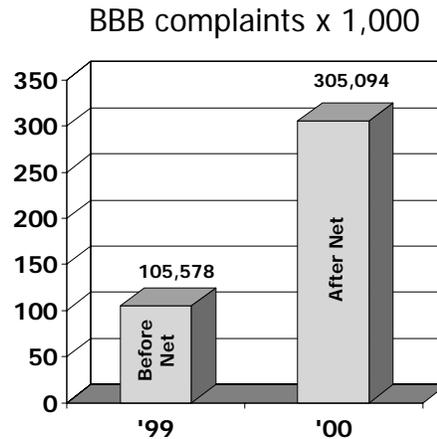
“Significant changes in the practice of
democracy”

* “Best-Selling” (#22) business book in 2001

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Business Internet effect

- ◆ Toledo Better Business Bureau (BBB) serving NW Ohio and SE Michigan
- ◆ Internet system for filing inquiries and complaints installed 2000
- ◆ 200,000 annual increase in complaints in first year!



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4C (foresee) method*

- | | |
|--|--|
| <p>1 - Curiosity</p> <ul style="list-style-type: none"> ■ Simple inquiry <p>2 - Concern</p> <ul style="list-style-type: none"> ■ Risk explanation <p>3 - Controversy</p> <ul style="list-style-type: none"> ■ Risk debates ■ In-depth inquiry ■ Third party involvement | <p>4 - Conflict</p> <ul style="list-style-type: none"> ■ Outrage ■ Demands ■ Activist support and involvement ■ Third party resolution |
|--|--|



Anticipate questions and address at the lowest number possible!

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4C steps

1. Find Internet data/other concerns
2. Team review
 - should include non-biased 3rd party
3. Identify likely questions
4. Place questions in one of the 4C categories
5. Submit questions to senior management
 - Which questions would they like answered?
6. Establish communication policy
7. Train spokesperson on how to respond to inquiries

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Ten tips for risk communication

1. Anticipate and prepare for questions
2. Establish credibility and trust
3. Demonstrate empathy and concern
4. Understand before you seek to be understood
5. Communicate at the person's level of understanding

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Ten tips for risk communication

6. Use visual aids
7. Be honest and open
8. Obtain feedback
9. Refer to credible sources and third parties
10. Stand your ground

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Risk comparisons

- ◆ Best choices
 - Same risk at two times: *The risk is 50% less than it was in ...*
 - Compare with standard: *Exposure to the chemical is less than one-half of the limit established by...*

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Thank You!

Questions?



Get ready to exercise!

EXERCISE 1

Carbon Monoxide

Background: Heightened concern: In 1997 the California Supreme Court ruled that a child could sue her mother's employer (and supervisor) for birth defects allegedly caused in-utero from her mother's exposure to carbon monoxide while at work. The case was settled for an undisclosed sum before it was heard at the trial court. The case was addressed in the February 26, 2002, USA TODAY cover story "Workers take employers to court over birth defects: Workplace hazards worry employees, their children."

Scenario: A manufacturing plant employs 275 employees, with 42% being female. Employee age ranges from 19-63 years with an average age at 27. The plant has lost sales from foreign competition and capital budgets are frozen except for critical needs.

Carbon monoxide (CO) has been measured in the manufacturing and shipping areas and occasionally reaches 15 parts per million (ppm) as an 8-hour time weighted average (TWA). Sources of CO are from heat-treating ovens and forklifts. Ceiling concentrations at 38 ppm and 48 ppm (30 minute exposure) have been measured, respectively, for employees working at the shipping area and near the heat-treat oven. CO exposure has not been measured for maintenance employees that occasionally conduct repair welding work. The CO results have been consistent for at least five years.

The plant industrial hygienist conducts new hire and annual OSHA hazard communication training. The plant IH has informed employees about the hazards & risks of carbon monoxide during the previous five years by explaining:

"Carbon monoxide is a colorless and odorless gas that can be formed by the incomplete combustion of products that burn. CO competes with oxygen in the blood. It's a fairly common story that in the wintertime poorly vented stoves in homes may produce CO and overcome some people. Over-exposure to CO may cause headaches and drowsiness, and in extreme cases death. Pregnant women are at increased risk from CO exposure. CO measurements in our workplace are below OSHA limits."

An employee with five years seniority informs the IH that she intends to have another child and she is concerned about her exposure to CO. Her first child, now three years old, was born with spina bifida. The employee states she recently found online a research study from the National Institute of Environmental Health Sciences entitled: "*Molecular Basis of Carbon Monoxide Induced Spinal Abnormalities.*" The summary of the study includes: "The results strongly indicate a functional link between CO exposure during early embryonic development, Paraxis gene expression, programmed cell death, somatic abnormalities, and vertebral defects."

The plant does not have a workplace reproductive & developmental health program. The corporate position on the issue is that these programs are discriminatory and that "decisions about the welfare of future children must be left to the parents who conceive, bear, support and raise them rather than to employers who hire those parents." The plant manager believes that compliance with OSHA regulations is all that is legally and morally necessary to protect employees from workplace hazards.

EXERCISE 1

The IH conducts a literature search on CO and finds the following with regards to exposure.

Source	Exposure Limit(s)	Notes
Published Toxicological Study	90 ppm 8-hours	LOAEL – adverse fetal and neonatal weight gain
Occupational Safety & Health Administration (U.S.) – PEL	50 ppm 8-hour TWA	Does not address repro/develop health
National Institute for Occupational Safety & Health (U.S.) – REL	35 ppm 10-hour TWA 200 ppm ceiling	Does not address repro/develop health
German Ministry of Labor MAK exposure limit	30 ppm (work-shift) TWA	International Chemical Safety Card: “Harmful effects probable during pregnancy in spite of observance of MAK”
American Conference of Governmental Industrial Hygienists TLV®	25 ppm 8-hour TWA	TLV® basis includes “Reproductive” as a critical effect
Ministry of Social Affairs and Health (Finland)	14 ppm 8-hour TWA	Suggested limit for pregnant employees
Jankovic and Drake ¹	12 ppm 8-hour TWA	Calculated Occupational Reproductive Guide
World Health Organization ²	10 ppm 8-hour TWA	Exposure limits recommended to limit COHb levels in pregnant, non-smoking women, to 2.5%
	25 ppm 1 hour	
	50 ppm 30 minutes	
	90 ppm 15 minutes	
U.S. Environmental Protection Agency	35 ppm 1 hour	Outside air considering all ages (Fetus?)
	9 ppm 8-hour TWA	

Questions:

1. What should the IH do/not do to address the employee’s concerns?
2. What limit above, if any, is “safe”? Explain “uncertainty.”
3. What should the IH do/not do to protect the company?
4. Is the corporation’s belief on reproductive & developmental programs correct?
5. What should the IH do to protect himself/herself from potential liability? If you feel no liability exists, explain why.
6. A CO exposure at 50 ppm 8-hr. TWA produces COHb at 8-10%, as will smoking 20 cigarettes per day. What, if anything, should the IH do with this information?
7. What additional questions should be asked to better address this exercise?
8. Are there any ethical or moral dilemmas to consider e.g. when did the IH’s responsibility for fetal protection begin?

¹ Jankovic, J. and Drake, F.: A Screening Method for Occupational Reproductive Health Risk. *Am. Ind. Hyg. J.* 57:641-649 (1996).

² World Health Organization, Air Quality Guidelines, Second Edition, 2000.

EXERCISE 2

Breast-Milk

The December 2002 issue of *Pediatrics* reports that breastfeeding among fulltime employed U.S. women is now at 25%, nearly double its rate from 1996, and the highest rate ever recorded. Employers may expect continued growth in breastfeeding among working women due to changes in public health policies, new state laws, and better support for this practice. Mothers may pump and store their breast-milk at work and provide this food to their infants at another time.

Breast-milk is superior over baby formula because it includes the mother's disease fighting antibodies along with great nutrition. And there's benefit for the mother, too. New research finds that women who breastfeed have a 50% less chance of developing breast cancer, although more studies are needed to determine why this is so. The American Academy of Pediatrics stresses that breastfeeding is no longer considered a lifestyle choice, but an important health choice for both the mother and infant.

Along with the rise in breastfeeding is a rising concern over chemicals in breast-milk. The US Food and Drug Administration advise on which pharmaceuticals should not be used while breastfeeding, aspirin is an example. There is limited study and guidance regarding environmental e.g. workplace chemicals in breast-milk.

Biomonitoring e.g. measuring chemicals in human tissues and fluids is a rapidly evolving technology. Breast-milk is a popular body fluid to monitor because it is the least invasive and best means to sample for chemicals stored in body fat. In 2004, the California senate passed legislation requiring the monitoring of chemicals in breast-milk to determine a possible linkage between chemical exposures and health effects. Germany and Sweden already have such a law.

In September 2003, two US studies of breast-milk found levels of polybrominated diphenyl ethers, PBDEs, used as flame-retardants in products such as electronics, at 10 to 20 times higher than those in Europe. The EU banned PBDEs in 2004 due to concerns that these chemicals may cause developmental problems in breastfed children.

Media reports on chemicals in breast-milk are growing. In January 2004 the *Wall Street Journal* published the article "Toxins in Breast-Milk: Studies Explore Impact of Chemicals on Our Bodies." And promptly thereafter, the American Chemistry Council posted online an Issue Brief on "Human Milk and Biomonitoring."

A Google search for <toxic chemicals breast milk> yielded 21,000 sites in December 2002. By March 2004 the same search yielded over 63,000 sites. And by February 2005 the number rose to 174,000. Studies by the American Medical Association show the majority of Americans use the Internet to help them answer health questions.

Some harsh approaches are being taken when toxic chemicals are found in breast-milk. A woman in California, for example, was sentenced to life in prison in 2003 when methamphetamines in her breast-milk were found to be the cause of death for her three-month-old son. And other states have charged people for murder, too, for similar "toxic breast-milk" offenses.

EXERCISE 2

	QUESTION	YES	NO	?
1.	Do employees that breastfeed have a right to know if workplace chemicals may be in their breast-milk?			
2.	Will breast-milk be safe for infant consumption if an employer is in full compliance with OSHA chemical exposure standards?			
3.	Does an employer have a legal obligation to protect an employee's breast-milk from contamination caused by exposure to workplace chemicals?			
4.	Does an employer have a moral obligation to protect an employee's breast-milk from contamination caused by exposure to workplace chemicals?			
5.	Does OSHA prohibit the storage of breast-milk in a refrigerator, if the refrigerator is also used for storage of food for employee consumption?			
6.	Is an infant biologically equivalent to a small adult?			
7.	Has the U.S. Food and Drug Administration established safe limits of industrial/environmental chemicals in breast-milk?			
8.	Can the concentration of chemicals in breast-milk ever be higher than found in the mother's blood plasma?			
9.	Do you believe research, within the next two years, will discover infant health problems that result from breast-milk contaminated by a common industrial chemical?			
10.	Has the ACGIH recommended any Biological Exposure Indices for workplace chemicals in breast-milk?			
11.	Should an employer abide by all recommendations from an employee's pediatrician with regards to safeguarding breast-milk from contamination at work?			
12.	Is a recommendation, by a pediatrician, for an employee to avoid all workplace contact with lipid soluble chemicals practical?			
13.	Do supplier material safety data sheets (MSDS) provide sufficient information to determine if a chemical may concentrate in breast-milk?			
14.	Are infant health problems alleged to result from breast-milk contaminated with workplace chemicals handled through the employer's workers' compensation program?			
15.	Is it in an employer's best interest to address health concerns arising from information that the employee finds online?			
16.	The EU requires, when applicable, the following "risk" phrase on safety data sheets: <i>R64 May cause harm to breastfed babies</i> . Does EU safety data sheets impact MSDS for US employers?			
17.	If an employee is not satisfied with an employer's position on protecting breast-milk, is the employee's only option to quit work?			
18.	Are murder charges for toxic chemicals in breast-milk a reasonable legal action?			

EXERCISE 3

Instructions: Ask fellow classmates and other people to complete this 2-sided questionnaire (extra copies are available). Explain OSHA's definition of "reproductive toxin" to respondents, if necessary. Tally the results and then answer the questions at the end.

Who should establish workplace exposure limits to reproductive toxins?

(The list is in alphabetical order, no preference in order of listing).

Please mark the appropriate number for each of the following 14 choices.

1. American Conference of Governmental Industrial Hygienists.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

2. American Industrial Hygiene Association.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

3. Chemical manufacturer.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

4. Employee representative e.g. collective bargaining group, union, etc.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

5. Employer.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

6. Environmental Protection Agency.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

7. Insurance company.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

8. Local, state, or federal health department.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

EXERCISE 3

9. National Institute for Occupational Safety and Health.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

10. Occupational Safety and Health Administration.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

11. World Health Organization.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

12. Trade group e.g. American Chemistry Council.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

13. Exposure limits for workplace reproductive toxins are necessary.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

14. _____
(Include your suggestion, if any, on the above line.)

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

Questions:

1. Do most people believe that exposure limits are necessary?
2. Was there any clear preference for who should establish these limits?
3. Can OSHA establish exposure limits for non-employees (e.g. fetus)? Why or why not?
4. What are the pros and cons if an employer establishes their own limits?
5. Should "professional judgment" be permitted when interpreting an exposure limit for a reproductive toxin? Why or why not? Who is qualified to render professional judgment?

INTERNET RESOURCES

Before you check out Internet sites for reproductive & developmental health, read below to appreciate the significance of online resources.

Internet Growth

More than one-half of U.S. households are connected to the Internet. All public secondary schools have Web connection. And 80% the graduating college class of 2001 say they get their primary news and information online.

There are more than 2 billion searchable pages of text, graphics, video, voice and sound on the Internet. Within the last 24 hours the Net's information base grew by more than 3 million new pages. And the capacity of the Internet to hold information doubles every 100 days.

To put this data into perspective, consider that the Internet and 747 "Jumbo Jet" both became operational in 1969. If the 747 kept the same technology pace as the Internet technology by now the jet could carry more than 10,000,000 passengers, travel at greater than a million miles per hour, and you could circle the globe several times for a penny.

The Net is now an endless source of information. And broadband, wireless, and other evolving technologies are making the Internet pervasive and a constant fabric of our daily lives.

But the Internet is more than just an enormous library. It is also a dynamic, interactive-active global community that is extending the reach of people and ideas in ways never before imagined.

Impact on Business

Jack Welch, the legendary business icon and CEO (1981-2001) for America's most valuable company, General Electric, described the Internet "as the most important force to strike the global economy since the industrial revolution."

Michael Lewis, author of a best-selling business book in 2001: *Next: The Future Just Happened*, states we are in the midst of one of the "greatest status revolutions in the history of the world" and the "Internet turns out to be a weapon in the hands of revolutionaries." Lewis's book provides examples how the Internet is making the "amateur a king" and how the Net is clearly altering the practice of democracy.

While Welch tells us to embrace the Internet, Lewis warns us of its powers. Welch and Lewis understand the Internet's phenomenal capacity to influence the masses and empower the individual. And both of them realize that whether anyone prospers or perishes under the growing weight of the Internet will depend upon their ability and willingness to understand and respond to the ways the Internet may be used or misused.

Impact on Health

On average, doctors only spend 15 minutes with their patients. To address this problem, health consumers are seeking answers online. A study in the *Journal of the American Medical Association* (reported in the USA Today 5/23/01) found that "More than 60 million U.S. residents went online in search of health information in 2000 and more than 70% of them said what they found influenced their decisions."

Besides finding health information for themselves, Internet users are finding online information to help other people, too. A January 2002 survey by the Pew Internet & American Life Project found that 39% of Internet users – more than 45 million people – say they used the Internet to help another person deal with a major illness in the past two years. More than one in every four people (primarily ages 50 through 64) who used the Internet for this purpose said their use of the Internet "played a crucial or important role in their aid to the other person."

It's not just the older people that look for health information on the Internet. A study by the Kaiser Family Foundation (reported in the USA Today 12/12/01) found that 68% of people ages 15-24 (22 million of the USA's 32 million young people) have found health information online.

Don't think like Duell

Products are now hitting the marketplace that allows data transfer through common electrical wirings in buildings. This technology coupled with advances in computers is the foundation for the "smart home." Smart home technology will allow people to log onto their home Internet connection from a distant location and do simple things such as turn room lights on or off or go really high-tech and check the expiration date on a container of milk in their refrigerator.

There's an interesting point to this story. The patent for data transfer through common electrical wiring was issued in 1899 - the same year that Charles Duell, Director, U.S. Office of Patents, made the now ridiculous quote: "Everything that can be invented, has been invented."

Conclusion

Only a few of the many web sites on reproductive & developmental health are listed. The resources listed, however, should provide basic information for your company's reproductive & developmental health program. Undoubtedly, your workplace reproductive & developmental health team will find additional resources that are useful.

Good and bad data can be found online. The disclaimer for this training course applies here. The listing of a web site is not an endorsement of that organization and Markiewicz & Associates Ltd. provides no assurance of data accuracy at listed or mentioned web sites. Always check the date of Internet information and refer to the most current sources.

Reproductive & Developmental Health Resources on the Internet

If you're not sure where to look on the Internet, use a "search engine" such as www.google.com. And Like the rabbit hole in Alice in Wonderland, follow the links at the web sites and see where it takes you.

Reminder: The Internet grows. For example, a Google search for <toxic chemicals breast milk> yielded 21,000 sites in December 2002. By March 2004 the same search yielded over 63,000 sites. And by February 2005 the number rose to 174,000.

If you come across an excellent web site that you feel would be valuable for this course, please alert Dan Markiewicz to this site at E-mail address dmarkie69@aol.com. Thanks.

Note: The links below are not in priority order.

Articles & News (workplace related) – Just a small sample

1. <http://www.usatoday.com/money/general/2002/02/26/usatcov-birth-defects.htm>

Workers take employers to court over birth defects. Cover story USA TODAY (2/26/02). Includes link to video on birth defects. Dan Markiewicz was interviewed/quoted for story.

2. <http://www.nursingworld.org/AJN/2001/oct/Wrights.htm>

Reproductive Hazards: Pregnant workers need to be aware of their employment rights. Article in the American Journal of Nursing - October 2001 - Volume 101, Issue 11.

3. http://www.ishn.com/ishn/cda/articleinformation/features/bnp_features_item/0,2162,15217,00.html

Are you protecting fetal health? Feature article in Industrial Safety & Hygiene News (12/00) written by Dan Markiewicz. *Note: Underscores are in web address where there are gaps between words.*

NOTE: www.google.com link to Google "news" for articles in newspapers and magazines. This section is growing too large & fast to manage in paper format.

Books, Manuals & Programs

1. http://www.ini.wa.gov/sharp/repro_dev.pdf

Workplace Hazards to Reproduction and Development: A Resource for Workers, Employers, Health Care Providers, and Health & Safety Personnel (1999). The Safety & Health Assessment & Research for Prevention (SHARP) Program

developed this 124-page manual. Good overview of issue. Appendix A contains REPORTEXT® database. The Washington State Legislature created SHARP in 1990. *Note: There's an underscore at repro_dev in the above address.*

2. www-nehc.med.navy.mil/downloads/occmmed/Reprodev2001.pdf

Reproductive and Developmental Hazards: A Guide for Occupational Health Professionals (2001). Manual developed by the U.S. Navy. Excellent. Provides nearly 1000 references for provided data, many with direct web link. Provided in PDF (135 pages). This is an essential reference/guide for any workplace's reproductive and developmental health program library.

3. <http://books.nap.edu/books/0309073162/html/1.html>

Evaluating Chemical and Other Agent Exposures for Reproductive and Developmental Toxicity (2001). Online book in PDF format from the National Academies Press. Book written by the National Research Council at the request of the U.S. Navy. Note: National Research Council was organized in 1916 by the National Academy of Sciences. Describes methods that may be used to established calculate exposure limits for reproductive and developmental hazards. Essential reference for advanced programs.

4. <http://www.nap.edu/catalog/9871.html>

Scientific Frontiers in Developmental Toxicology and Risk Assessment (2000). Another online book from the National Academies Press. Written by the Committee on Developmental Toxicology, Board on Environmental Studies and Toxicology, National Research Council. "Reviews advances made during the last 10-15 years in fields such as developmental biology, molecular biology, and genetics." Book explains about "staggering" and "explosive" new information on the topic. Good read but at times it can be very technical. Note: As #3 above, book may be read free online but there are costs for hardcopy and printed PDF.

5. <http://www.osha.gov/SLTC/reproductivehazards/index.html>

Use the above address at the Occupational Safety & Health Administration's website to link to the booklets below:

- **The Effects of Workplace Hazards on Female Reproductive Health.** NIOSH Publication, No. 99-104, (1999, February), Address exposure, prevention and reproductive hazards for female workers and their unborn babies.
- **The Effects of Workplace Hazards On Male Reproductive Health.** NIOSH Publication No. 96-132 (1997, January 23), 5 pages. Identifies and describes workplace hazards on male reproductive health.

6. <http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk2/1985/8521/852113.PDF>

Reproductive Health Hazards in the Workplace (1985). Excellent but obviously dated reference. Report put together by the U.S. Office of Technology Assessment. Thorough examination of the topic (then) that covers biology, laws, ethics, etc. most of which is valid even 20 years since its writing. DO NOT use the above address to find this document. The above address is just an example for one of 21 sections. The report is about 500 pages of small font but generally an easy read. PDF. To gather the entire report I used the Google Web search and (with quotes) looked for "Reproductive Health Hazards in the Workplace (part 1 of 21)". Then repeat for (part 2 of 21) and so on. You may find an easier way to get the entire document, but this is how I had to do it.

7. <http://www.stanford.edu/dept/EHS/prod/mainrencon/occhealth/Reproductive/index.htm>

Stanford University's Reproductive & Developmental Health Protection Program. Site provides an example of an employer's written program. Short but effective information.

8. <http://www.itcilo.it/english/actrav/telearn/osh/rep/prod.htm>

Your health and safety at work: MALE AND FEMALE REPRODUCTIVE HEALTH HAZARDS IN THE WORKPLACE. Developed by the International Labour Organization. "This Module provides trainees with background information on how occupational hazards can affect the reproductive systems of both men and women. Topics discussed include: when and how reproductive damage occurs, what kinds of reproductive health problems can occur, how a worker can tell if a chemical or work situation is hazardous to his or her reproductive health, how workers are protected, and the role of the health and safety representative."

9. <http://www.ilo.org/public/english/protection/condtrav/pdf/wf-jp-04.pdf>

Healthy beginnings: Guidance on safe maternity at work. Written by Jane Paul for the International Labour Organization, 2004. Excellent, must read. PDF (121 pages). Book can be purchased for \$14.00. Main focus is on EU guidelines for Risk Assessments for Workers Who are Pregnant, Recently Given Birth, or Breastfeeding. Chapters: (1) Maternity matters; (2) International standards on maternity protection; (3) How life begins; (4) Reproductive hazards at work; (5) Occupational risks in different sectors; (6) Taking action preventing harm; and, (7) Promoting healthy maternity. There are 9 annexes that are very helpful such as "Checklists for identifying workplace risks" and "A sample risk assessment form."

10. <http://www.hse.gov.uk/pubns/indg373.pdf>

A Guide for: New and expectant mothers who work. UK Health and Safety Executive. Published March 2003. Summarizes requirements for conducting risk assessments for pregnant workers.

11. http://europa.eu.int/eur-lex/en/com/cnc/2000/com2000_0466en02.pdf

Guidelines on the assessment of the chemical, physical and biological agents and industrial process considered hazardous for the safety or health of pregnant workers and workers who have recently given birth or are breastfeeding (Council Directive 92/85/EEC). From the Commission of the European Communities, November 2000. PDF, 40 pages. Must read! Establishes how EU member states should conduct risk assessments for pregnant workers. For example, the UK guide above (link 10) and ILO book on Guidance on safe maternity at work (link 9) are based off of this document.

Research/Information (government)

1. <http://www.cdc.gov/ncbddd/default.htm>

National Center for Birth Defects and Developmental Disabilities. Operated by the U.S. Centers for Disease Control. Established by the Children's Health Act of 2000. Center accountable for researching causes for birth defects and developmental disabilities.

2. <http://cerhr.niehs.nih.gov/>

Center for the Evaluation of Risks to Human Reproduction. Operated by the National Toxicology Program and the National Institute for Environmental Health Sciences. Site provides the "latest information about potentially hazardous effects of chemicals on human reproduction and development." IMPORTANT! See links to "scientific and women's health web sites." About 50 links listed (at last count).

3. <http://www.nlm.nih.gov/medlineplus/reproductivehealthgeneral.html>

MEDLINEplus contains health information from the world's largest medical library, the National Library of Medicine. MEDLINEplus has extensive information from the National Institutes of Health and other sources on over 500 diseases and conditions. Includes lists of hospitals and physicians, a medical encyclopedia and dictionaries, health information in Spanish, extensive information on prescription and nonprescription drugs, health information from the media, and links to thousands of clinical trials.

3. <http://www.nationalchildrensstudy.gov/>

National Children's Study. "The National Children's Study will examine the effects of environmental influences on the health and development of more than 100,000 children across the United States, following them from before birth until age 21. The goal of the study is to improve the health and well-being of children." Study locations announced in November 2004. Environmental samples plan to be collected from worksites for pregnant women in the study. See Dan Markiewicz ISHN "Managing Best Practices" article 2/05 The National Children's Study: Is impact on EHS and the workforce (link below)

http://www.ishn.com/CDA/ArticleInformation/features/BNP_Features_Item/0,2162,142248,00.html

Databases

1. <http://www.icondata.com/health/pedbase/pedlynx.htm>

The **Pediatric Database (PEDBASE)** contains descriptions of over 550 childhood illnesses. Information on each disorder in this Database has been obtained from at least 3 sources including Nelson Textbook of Pediatrics (14th and 15th editions), the Birth Defects Encyclopedia (1990 and 1994 editions) and from at least one other source (journal articles, review articles, textbooks).

2. <http://wlu.tug-libraries.on.ca/indexes/descriptions/dart.html>

DART is a bibliographic database covering literature on teratology and other aspects of developmental toxicology. It is managed by NLM and funded by EPA, the National Institute of Environmental Health Sciences (NIEHS), and the National Center for Toxicological Research of the Food and Drug Administration. DART is a continuation of ETICBACK, which contains 49,000 citations to teratology literature published from 1965-1989.

3. <http://toxnet.nlm.nih.gov/>

TOXNET is a cluster of databases on toxicology, hazardous chemicals, and related areas. Maintained by the national library of Medicine. DART (above) is also found here.

4. <http://www.atsdr.cdc.gov/mrls.html>

Site provides toxicological profiles including **Minimum Risk Levels (MRLs)** for hazardous substances. Site is developed and maintained by the **Agency for Toxic Substances and Disease Registry (ATSDR)**. IMPORTANT! ATSDR uses the no-observed-adverse-effect-level/uncertainty factor (NOAEL/UF) approach to derive MRLs for hazardous substances. However, ATSDR does not use serious health effects (such as irreparable damage to the liver or kidneys, or birth defects) as a basis for establishing MRLs.

5. <http://www.reprotox.org/>

REPROTOX ® is an information system developed by the Reproductive Toxicology Center. It provides current assessments on the potentially harmful effects of environmental exposure to chemicals and physical agents on human pregnancy, reproduction, and development. The REPROTOX ® system was developed with the goal of making information readily available to laboratory scientists, practicing physicians, and government agencies on the potential hazards in the environment to human pregnancy and reproduction. IMPORTANT! Pay for use service.

6. <http://www.scorecard.org/>

Scorecard Searches at Scorecard can be made by state, county, zip code, and facility for facility release (EPA SARA 313, etc.) databases of reproductive and developmental toxins. List of reproductive and developmental toxins comes primarily from California Proposition 65 birth defect information but Scorecard uses over 200 federal and state databases. SEE ORGANIZATIONS.

7. <http://www.toxlaw.com/>

TOXLAW.com is a "toxic tort: resource for attorneys, epidemiologists, etc. "ChemTracker" is provided to search the Internet for regulations and information chemicals. Includes global search of regulations.

Organizations

1. <http://www.modimes.org/>

March of Dimes provides a variety of information on prevention of birth defects.

2. <http://www.scorecard.org/>

Scorecard is produced and maintained by Environmental Defense (ED). ED reports to have over 300,000 members and an annual budget of about \$40 million. Searches at Scorecard can be made by state, county, zip code, and facility for facility release (EPA SARA 313, etc.) databases of reproductive and developmental toxins. List of reproductive and developmental toxins comes primarily from California Proposition 65 birth defect information but Scorecard uses over 200 federal and state databases. Lists "dirtiest/Worst" polluters.

3. <http://www.cehn.org/>

The Children's Environmental Health Network is a national multi-disciplinary organization whose mission is to protect the fetus and the child from environmental health hazards and promote a healthy environment.

4. <http://www.icbd.org/>

The **International Clearinghouse for Birth Defects Monitoring Systems** (ICBDMS) is a non-governmental organization in official relations with the World Health Organization representing more than 30 malformation monitoring programs worldwide. Member programs are actively engaged in the systematic collection and analysis of the data for the comprehensive monitoring of congenital malformations.

5. <http://www.nbdpn.org/NBDPN/>

"The mission of the **National Birth Defects Prevention Network** is to establish and maintain a national network of state and population-based programs for birth defects surveillance and research to assess the impact of birth defects upon children, families, and health care; to identify factors that can be used to develop primary prevention strategies; and to assist families and their providers in secondary disabilities prevention."

6. <http://www.otispregnancy.org/>

Organization of Teratology Information Services. "Teratology is the study of the effects that drugs, medications, chemicals and other exposure may have on the fetus." Teratology Information Services (TIS) are comprehensive and multidisciplinary resources for medical consultation on prenatal exposures. TIS interpret information regarding known and potential reproductive risks into risk assessments that are communicated to individuals of reproductive age and health care providers.

Miscellaneous

1. <http://www.thefetus.net/>

Site dedicated to fetal medicine. Covers all aspects: genetics, fetal development, prenatal screening, ultrasonography, fetoscopy, fetal surgery and maternal diseases or conditions that may affect the fetus. Information is available online in text, images, and videos.

2. <http://www.motherisk.org/>

Site created in 1985 by the Hospital for Sick Children in Toronto to provide evidence-based information and guidance concerning the potential risks to the developing fetus or infant, from exposure to drugs, chemicals, diseases, radiation and environmental agents.

4. <http://www.psandman.com/>

Peter Sandman's website. Sandman, PhD is leading risk communicator. His online columns provide excellent view on current risk communication issues and strategies.

5. <http://www.atsdr.cdc.gov/HEC/primer.html>

Agency for Toxic Substances and Disease Registry: A Primer on Health Risk Communication Principles and Practices. A good general reference for developing risk communication strategies.

6. <http://healthyamericans.org/>

Trust for America's Health provides "health tracking" information including birth defects and developmental disabilities. IMPORTANT! Site is an example of trends in public health that will impact business.

EXERCISE 6

Reproductive Toxin

On March 30, 2004 OSHA issued the DRAFT GUIDANCE FOR HAZARD DETERMINATION FOR COMPLIANCE WITH THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200). The following is OSHA's definition/ explanation for "Reproductive Toxin." Please read then answer questions that follow.

Reproductive toxicity - includes sterility, abortion, birth defects, child mortality and childhood cancer

The HCS definition for **reproductive toxins** is "chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)." This definition is comprehensive and incorporates toxic effects on all elements of the process of reproduction, including damage to the germ cells (sperm and ova).

Thus, a wide variety of effects can occur, including sterility, decreased libido, impotence, interrupted pregnancy (abortion, fetal death, or premature delivery), birth defects in the offspring, altered sex ratio and multiple births, chromosome abnormalities, childhood morbidity, and childhood cancer. Examples of reproductive toxins are lead and 1,2-Dibromo-3-chloropropane (DBCP). Reproductive toxicity can involve toxicant damage to either the male or female reproductive system. Those substances that can cause birth defects are referred to as teratogens.

The term developmental toxicity refers to adverse effects observed in the embryo, fetus or newborn. In testing, these reproductive effects are usually considered separately from those effects on an adult animal's capacity to successfully mate (fertility) and deliver and nurture offspring (perinatal and postnatal development and maternal function). Developmental toxicity can result from toxicant exposure to either parent before conception or to the mother and her developing embryo-fetus. The three basic types of developmental toxicity are: *Embryolethality* which is the failure to conceive, spontaneous abortion or stillbirth; *embryotoxicity* which is the growth retardation or delayed growth of specific organ systems, and teratogenicity which pertains to irreversible conditions that leave permanent birth defects in live offspring (e.g. cleft palate, missing limbs).

Chemicals can cause developmental toxicity by two mechanisms. They can act directly on cells of the embryo causing cell death or cell damage that leads to abnormal organ development. A chemical might also induce a mutation in a parent's germ cell that is transmitted to the fertilized ovum. Some mutated fertilized ova develop into abnormal embryos.

Genetic toxicity has also been included in the HCS definition of reproductive toxins. Genetic effects result from damage to DNA and altered genetic expression. This process is known as *mutagenesis*. The genetic change is referred to as a mutation and the agent causing the change as a *mutagen*. There are three types of genetic change: *Gene mutation* is a change in DNA sequence within a gene. *Chromosome aberrations* are changes in the chromosome structure. *Aneuploidy/polyploidy* is an increase or decrease in number of chromosomes

If the mutation occurs in a germ cell (sperm and ova) the effect can be heritable. There is no effect on the exposed person; rather the effect is passed on to future generations. If the mutation occurs in a somatic cell (all body cells except sperm and ova), it can cause altered cell growth (e.g. cancer) or cell death (e.g. teratogenesis) in the exposed person.

EXERCISE 6

Questions

1. Do you believe that most employees will readily understand the definition/explanation if they hear or read it? If no, how would you communicate the issue of "reproductive toxins" to an employee?
2. Should you encourage employees to learn more about "reproductive toxins" by conducting an Internet search? What are some concerns if an employee learns about reproductive toxins online?
3. Should hazard communication on reproductive toxins be a stand-alone topic or should it be blended into communication with other target organ effects?
4. True or false. Women are better risk communicators on causes and prevention of reproductive and developmental defects than men.
5. What background or training should a person have to conduct effective hazard communication for reproductive toxins?
6. How may the rapid and sometimes dramatic advancements in genetic research affect this topic?
7. Explain the terms genomics, proteomics, toxicogenomics, DNA microarray, and bioinformatics.
8. The National Research Council states that about 25% of the major developmental defects among newborns are caused by a combination of genetics and environmental factors. What does "environmental factors" mean?
9. Assume that you know an employee is genetically predisposed to having a baby with major birth defect from a very low exposure to chemical X. Chemical X is essential for production and there is no suitable substitute for chemical X. Chemical X may also be found in trace amounts in beauty and personal care products. What recommendations do you provide your employer/client in this matter?
10. OSHA's definition for reproductive toxin includes outcomes such as childhood cancer, how could this occur?

QUESTIONNAIRE

Who should establish workplace exposure limits to reproductive toxins?
(The list is in alphabetical order, no preference in order of listing).

Please mark the appropriate number for each of the following selections.

1. American Conference of Governmental Industrial Hygienists.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

2. American Industrial Hygiene Association.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

3. Chemical manufacturer.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

4. Employee representative e.g. collective bargaining group, union, etc.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

5. Employer.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

6. Environmental Protection Agency.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

7. Insurance company.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

8. Local, state, or federal health department.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

Continue back of page.

QUESTIONNAIRE

9. National Institute for Occupational Safety and Health.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

10. Occupational Safety and Health Administration.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

11. World Health Organization.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

12. Trade group e.g. American Chemistry Council.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

13. Exposure limits for workplace reproductive toxins are necessary.

10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

14. _____
 (Include your suggestion, if any, on the above line.)

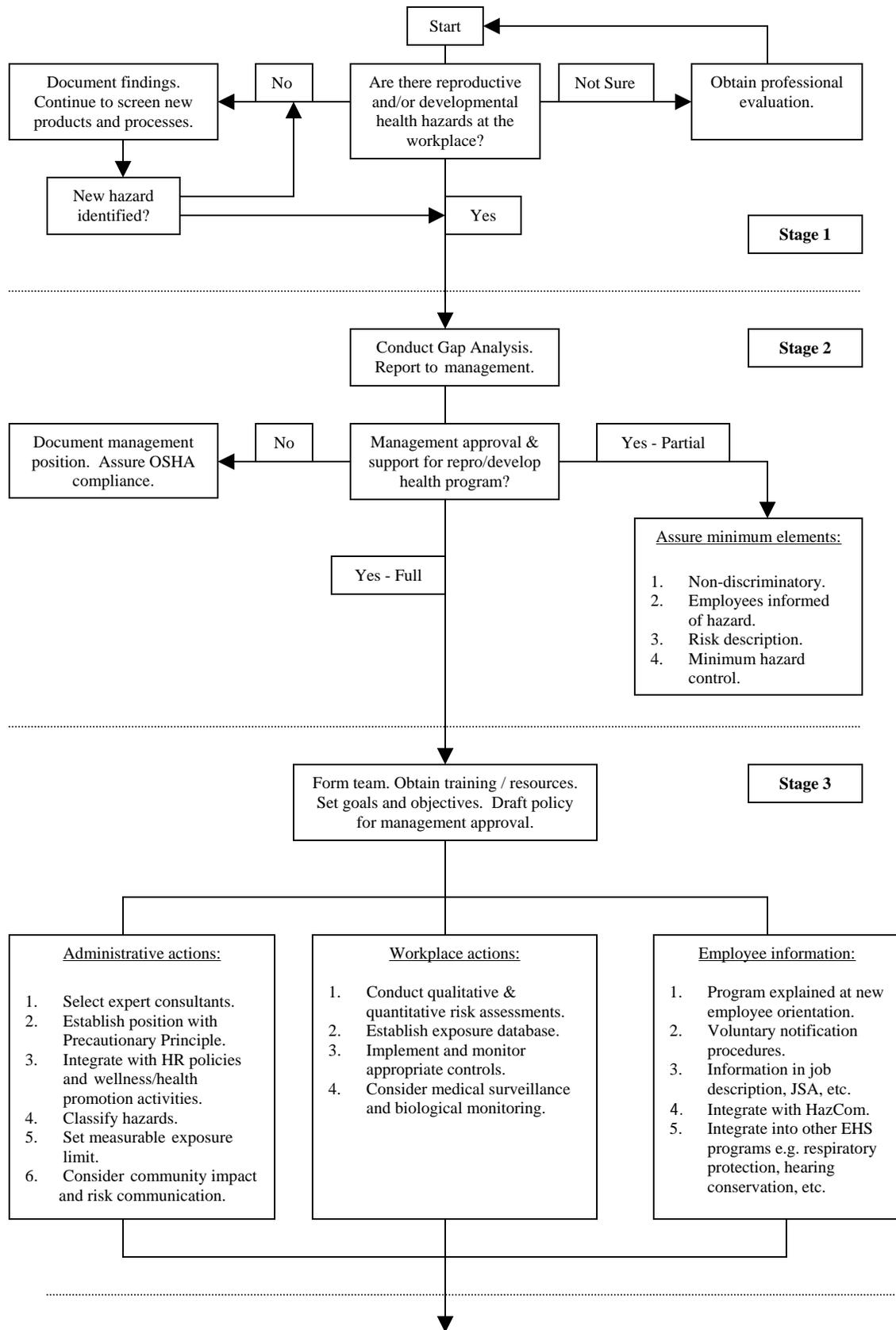
10	9	8	7	6	5	4	3	2	1
Strongly agree		Agree		Undecided		Disagree		Strongly disagree	

**Your comments are welcomed below. To maintain confidentiality of this survey,
 please do not include any personal or business identifiers.**

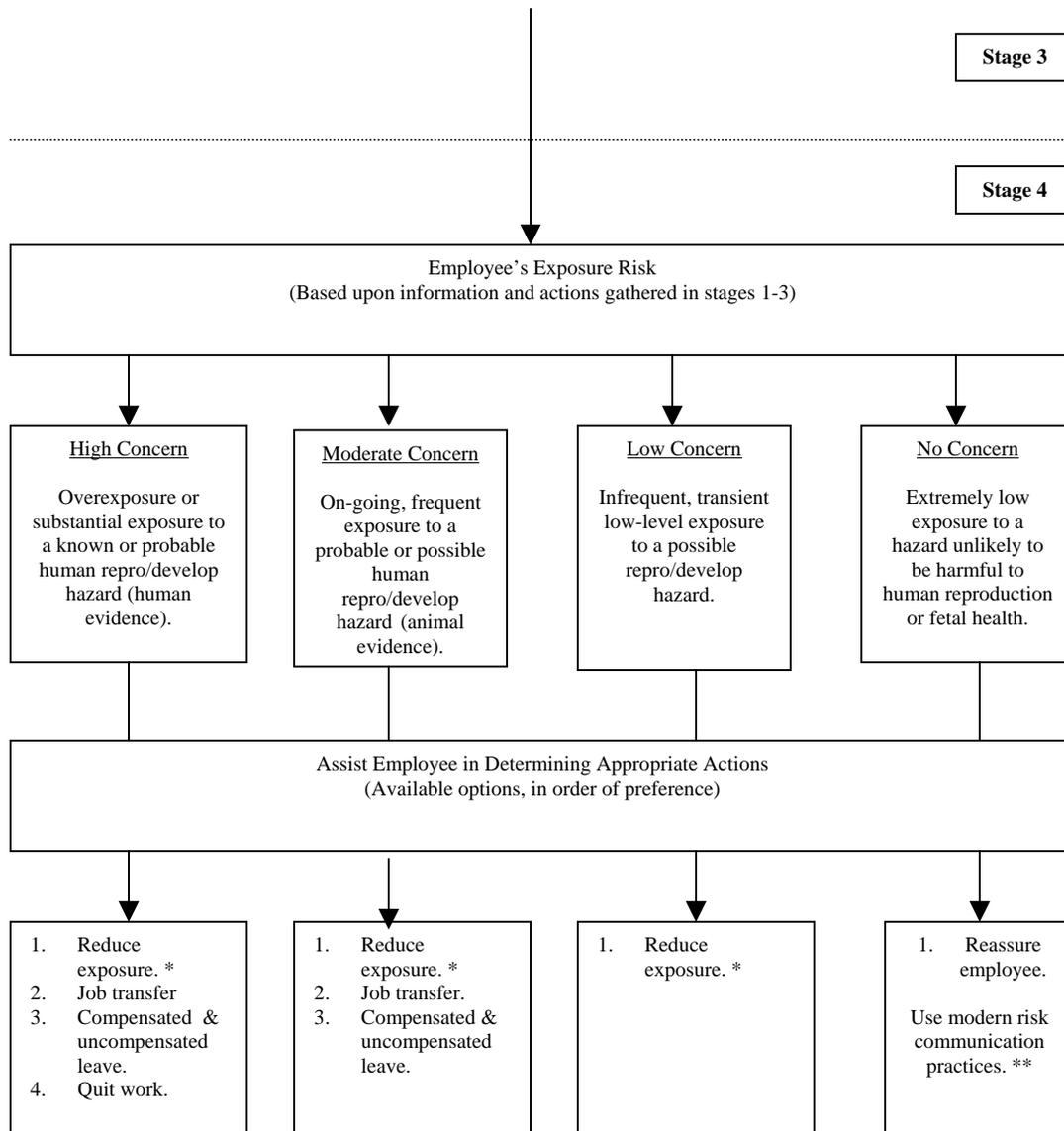
**RETURN QUESTIONNAIRE IN ENCLOSED SELF ADDRESSED STAMPED ENVELOP.
 RESEARCHER: GREG MASON, MS, CSP
 14875 PRAIRE LAKE, PERRYSBURG, OH 43551**

Thank you!

Workplace Reproductive & Developmental Health Program – Strategic Flow



Workplace Reproductive & Developmental Health Program – Strategic Flow



* Use hierarchy of controls e.g. engineering, administrative, work practice, and personal protective equipment.
 ** Modern risk communication practices are important at all stages of this flow diagram, but are emphasized here.

Stage 4 adapted from:

Chapter 4: Guidance for Health Care Providers
 Workplace Hazards to Reproduction and Development:
 A Resource for Workers, Employers, Health Care Providers, and Health & Safety Personnel
 Technical Report Number: 21-3-1999
 Safety and Health Assessment and Research for Prevention (SHARP)
 Washington State Department of Labor and Industries