

South River Science Team Human Exposure Pathways Evaluation

Activities Update
October 08, 2014



Human Exposure Evaluation

The key objectives:

- **better identify potential exposure,**
- **define potential risks and uncertainties,**
- **communicate information to the public.**

Human Exposure Evaluation

Exposure Team Members

DEQ: Don Kain, Calvin Jordan, Bill Hayden
DEQ: Jutta Schneider, Vince Maiden, Pat McMurray, Sonal Iyer

EPA: Betty Ann Quinn (back on the Team)

VDH: Allen Gutshall, Jonathan Falk, Dwight Flammia, Karen Gruszynski

DGIF: Paul Bugas

DACS: David Brown, Reddy Bommineni

FWS: Anne Condon

DuPont: Mike Liberati, Ralph Stahl, Annette Guiseppi-Elie,

3

Human Exposure Evaluation

Exposure scenarios evaluated

- √ Fish Consumption
- √ Recreational Use of River
- √ Potential Drinking Water exposures
- √ Contact with soils on the floodplain
- Potential dietary exposures
 - Domestic consumption, e.g., Garden crops, Beef, Poultry
 - √ Hunting consumption, e.g., waterfowl, small game

Communicating to public on these issues

4

Human Exposure Evaluation

Floodplain soils

- Potential exposure evaluated:
 - √ direct contact (soil sampling);
 - √ ingestion of garden crops (2-year garden study);
 - √ ambient air (2 rounds of ambient air sampling)
 - Communicating results
 - √ General conclusions included in fact sheet,
 - √ Letters to landowners sent, follow up phone calls
 - √ Some additional soil sampling at specific locations, including ponds
 - Additional letters provided to landowners
 - √ Peer Review publication of garden crop study (HERA)

5

Human Exposure Evaluation

Potential dietary exposures

- Hunting consumption, e.g., waterfowl, small game
 - √ Literature review of tissue levels completed
 - Includes domestic & game animals, total and methyl mercury
 - In general, results consistent with expectations
 - √ Results for waterfowl, deer, turtles, muskrats, squirrels samples available
 - √ Calculated consumption levels based on a number of scenarios
 - Meal size – 4, 6, 8 ounces
 - Exposure concentration estimates - 95 % UCL on mean or maximum
 - Preparation losses: No prep losses, pre-cooking losses, pre- & post-cooking losses

6

Human Exposure Evaluation

Potential dietary exposures

- Hunting consumption, e.g., waterfowl, small game
 - ✓ Platform presentation at SETAC 2012
 - ✓ Briefing Paper gives process and results for a conservative case (8-oz meal, “high-end” estimate of Hg, no prep losses)
 - Annual consumption levels ranges from 4 snapping turtles meals to unrestricted number (>1000) for deer
 - ✓ Fact sheet on wildlife consumption
 - Peer review publication

7

Human Exposure Evaluation

Potential dietary exposures

- ✓ For livestock evaluation, sampling plan for cattle that graze on the floodplain based on likely exposure scenarios was developed. Considerations for developing the plan include:
 - How cattle are used and consumed
 - How milk from cattle is used/consumed
 - Defining which cattle actually graze on the floodplain
 - Use of the VDACS post-mortem facilities for determining general background levels as well as potential floodplain animals
 - Incorporating background levels in supermarket beef products
 - Rationale for choosing cattle (versus goats, sheep, pigs, poultry)
- ✓ Sampling completed for beef (muscle, liver, kidney, heart) and milk
- ✓ Calculated consumption levels based on a number of scenarios (meal size primarily) for beef
- ✓ Non-detect for all milk samples, consumption calculations completed
- Fact Sheet, Peer Review Publication

8

Human Exposure Evaluation

Health survey at local clinics

- √ Local physicians (explicitly made aware of issue) have not reported any signs/symptoms
- √ Local health clinics have been provided literature (in both Spanish and English)
- √ Health survey to address effectiveness of consumption advisories

PIT Program

9

Poultry Study

Evaluate potential exposure to mercury in poultry raised in the South River floodplain and from background locations within the Shenandoah Valley that have not been impacted by mercury.

- Sample eggs and poultry (specifically chicken) muscle to determine the potential for chickens reared on the South River floodplain to accumulate mercury.
- The information will be used to inform decisions about exposure through potential food consumption of eggs and chickens reared on the floodplain.

10

Sample Summary Original Flock

Approximate Date Event #	June (1 st) T=1 (baseline)	July (15 th) T=2	Aug (31 st) T=3	Oct (15 th) T=4	Dec (1 st) T=5
Mercury-Impacted Area (Area 1) T = 0; animals (Barred Rocks and Red Star) are 5 months; Individual eggs will be collected from pool of eggs distinguished by breed, if possible.	6 – 12 Individual Eggs (from pool of eggs) 2 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood
Control Area (Area 3) T = 0; animals (Barred Rocks and Red Star) are 5 months; Individual eggs will be collected from pool of eggs distinguished by breed, if possible.	6 – 12 Individual Eggs (from pool of eggs) 2 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood
Background • Polyface Farm, • Two local area markets	6 – 12 Individual Eggs at each location 3 Birds at each location; For each bird: 2 Muscle (breast, leg); Liver and Gizzard (if available) This is a single event				
Supplemental Feed	<ul style="list-style-type: none"> Supplemental feed will be required. This will be obtained from local area suppliers consistent with methods in the area. Feed will be analyzed at the start and end of the study as well as if the source of the feed is changed during the study. 				

2014/10/08

11

Sample Summary New Flock

Approximate Date Event #	July (last week) T=1 (baseline)	Aug (31 st) T=2	Oct (15 th) T=3	Dec (1 st) T=4
Mercury-Impacted Area (Area 1) T = 0; new laying animals (White Leghorns) added; Individual eggs will be collected from pool of eggs distinguished by breed. Leghorns lay white eggs.	6 – 12 Individual Eggs (from pool of eggs) 2 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood	6 – 12 Individual Eggs (from pool of eggs) 3 Birds sacrificed Each bird: • 2 Muscle (breast, leg) • Liver and Gizzard • 2 Feathers • 2 Blood
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2014/10/08

12



13



14



Poultry Study

Status

- Results for initial (June) and 1st (mid-July) sample events now available
- Results for end of August event should be available later this wee.
- Mid-Oct sample event to be done next week.
- Completion by end of the year

Human Exposure Evaluation

Fact Sheets

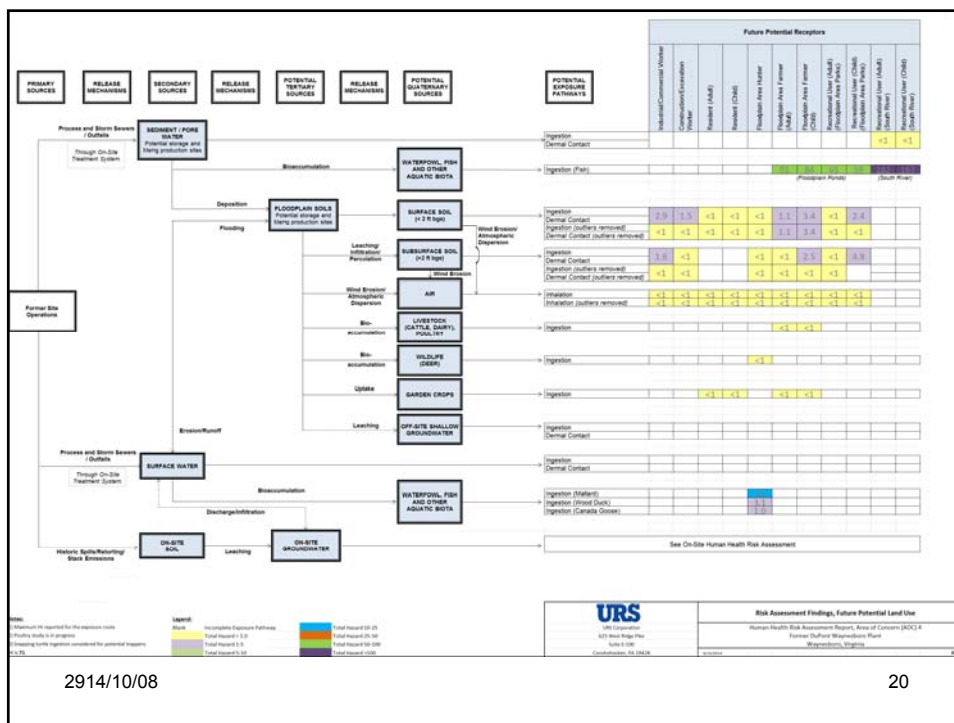
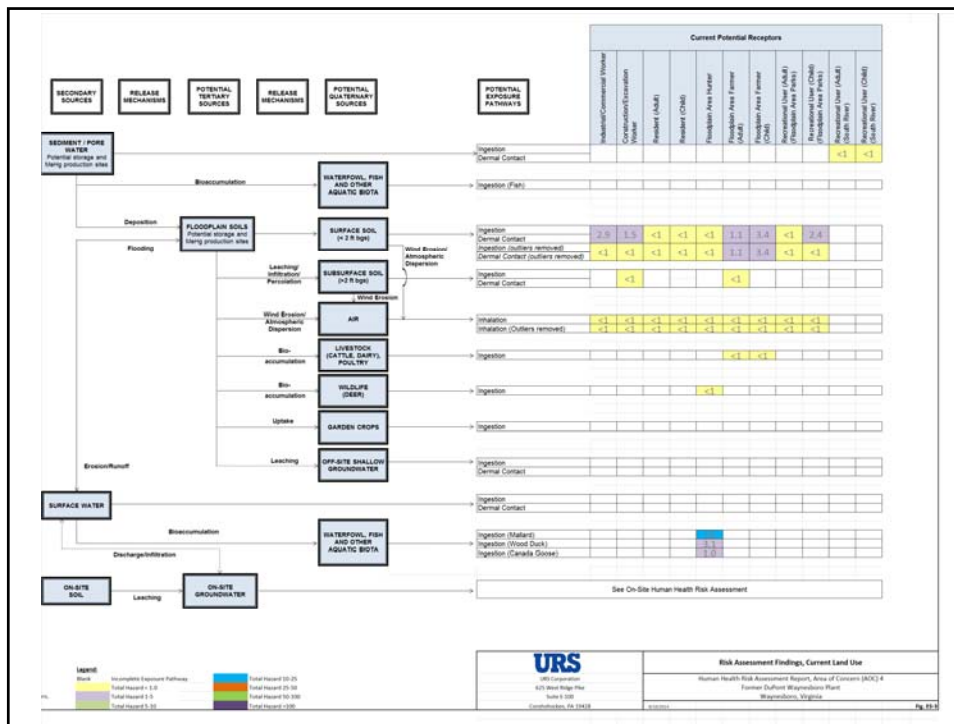
- √ Fact sheets completed
 - √ Fact Sheet 1: General Introduction
 - *About the South River Science Team*
 - √ Fact Sheet 2: Exposure Summary
 - *People, Mercury, and the River*
 - √ Fact Sheet 3: Soil Sampling Results
 - *Summary of South River Floodplain Soil Survey*
 - √ Fact Sheet 5: Garden Study
 - *Eating Vegetables Grown on the South River Floodplain*
 - √ Fact Sheet 6: Wildlife Consumption
 - *Eating Waterfowl, Game, and Other Animals from the South River Watershed*
- Other Fact Sheets, as warranted
 - Lifestock/Poultry

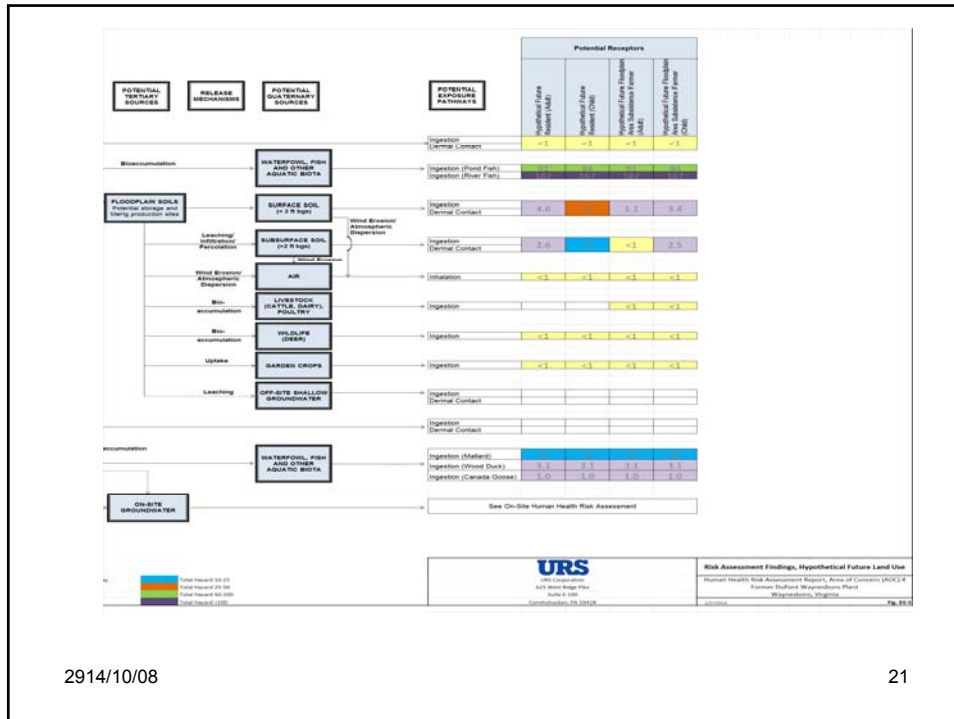
17

Other relevant activities

- Human Health Risk Assessment Former DuPont Waynesboro Facility (Onsite)
 - Completed, submitted to USEPA, conditional approval pending response to comments
- Human Health Risk Assessment Report Area of Concern (AOC) 4 (Offsite)
 - Completed, submitted to VADEQ
 - Briefing paper provided

18





2914/10/08

21

Other relevant activities

- Sponsored research activities
 - Wildlife human consumption rates
 - ENVIRON preparing a scoping evaluation to be completed by 12/2014; results in a peer review publication
 - Bioavailability of mercury: sediments and terrestrial sites; ecological and human receptors
 - Exponent commissioned; scoping evaluation to be completed 1st quarter 2015

22