

# National Health and Nutrition Examination Survey 2003-2004

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## Documentation, Codebook, and Frequencies

**Laboratory Component:**  
Polybrominated Diphenyl Ethers

**Survey Years:**  
**2003 to 2004**

**SAS Export File:**  
**L28PBE\_C.XPT**



First Release: June 2007  
Last Revised: August 2007

# NHANES 2003–2004 Data Documentation

## Laboratory Assessment: Lab 28 Polybrominated diphenyl ethers (PBDE)

Years of Coverage: 2003–2004

First Published: June 2007

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**Component Description** Polybrominated diphenyl ethers (PBDEs) included in the group of chemicals known as Brominated Flame Retardants (BFRs), have been and are still used as additive chemicals in polymers and textiles<sup>1,2</sup>. Hence humans may be exposed though food and/or through contact with flame retarded products.<sup>3,4,5</sup>

**Eligible Sample** Participants aged 12 years and older who met the subsample requirements.

**Description of Laboratory Methodology** The method described in this manual assesses human body burden of BFRs, specifically PBDEs in serum and/or plasma. This is done by measuring the concentration in serum/plasma through the use of solid-phase extraction (SPE) and subsequent sample clean-up. Final determination of target analytes is performed by isotope dilution gas chromatography high-resolution mass spectrometry GC/IDHRMS.

Concentrations of target analytes are reported on two different bases, i.e., (i) fresh weight basis (i.e., pg/g serum) and (ii) lipid weight basis (i.e., ng/g lipid). Lipid adjusted concentration values are preferable because (i) organohalogen compounds are lipophilic and hence distribute in the body mainly according to the tissues lipid content. Lipid adjusted concentrations correlates with the adipose tissue concentrations of the chemical. Normalization according to lipid content further reduces variability since differences in individuals serum lipid concentrations are cancelled out.

The samples are extracted using SPE, employing an automated SPE workstation (Rapid Trace®, Caliper Life Sciences). Required sample pretreatment prior to extraction is performed on the Gilson 215 liquid handler, including automated addition of (i) internal standards, (ii) formic acid (denaturant) and (iii) water (diluent) with mixing in-between each addition by rotation. Formic acid is added to denature proteins in the sample enabling extraction of target compounds. During the extraction step the target analytes are transferred from a water medium to an organic solvent.

Sample cleanup, i.e., removal of co-extracted lipids, is obtained by elution (hexane; 8 mL) of the extract through a column containing from

the top 0.1 g of silica and 1 g of silica/sulfuric acid (33% by weight). During this procedure serum lipids are degraded in the sulfuric acid layer while cholesterol is removed in the top layer consisting of activated silica gel. Without the activated silica gel layer cholesterol would eliminate water forming cholestene when coming in contact with the sulfuric acid. Cholestene would not be removed in the silica gel/sulfuric acid layer and interfere in the final HR-MS analyses, i.e., causing an ion suppression in the region of 2,2',4,4',5 pentabromodiphenyl ether (BDE-99) and 2,2',4,4',6-pentabromodiphenyl ether (BDE-100).

This sample cleanup is automated using the Rapid Trace® (Caliper Life Sciences) also used for sample extraction. The samples are evaporated and transferred to GC vials. Evaporization is performed on the RapidVap® (LabConco), using vacuum, increased temperature and vortex action to aid the evaporization.

Serum concentrations are determined using gas chromatography isotope dilution high resolution mass spectrometry (GC/IDHRMS), which minimizes or eliminates many interferences associated with low-resolution measurement of organohalogen compounds. Splitless injection is used employing a short GC column (DB-5HT; 15 m length, 0.1 µm film thickness, 0.25 mm ID) enabling the determination of high molecular weight compounds such as decabromodiphenyl ether (BDE-209) having a molecular weight close to 1000 amu. Electron impact ionization (EI) is used. The two most abundant ions in the isotopic cluster (fragment or molecular ion) are monitored for the target analyte as well as for the <sup>13</sup>C-labeled internal-surrogate standard.

Quantification is made against a calibration curve covering the full concentration range of the target analytes.

## **Laboratory Quality Control and Monitoring**

Serum specimens are processed, stored, and shipped to the Division of Environmental Health Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention for analysis.

Detailed specimen collection and processing instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Vials are stored under appropriate frozen (–20°C) conditions until they are shipped to National Center for Environmental Health for testing.

### **Mobile Examination Centers (MECs)**

Laboratory team performance is monitored using several techniques. NCHS and contract consultants use a structured quality assurance evaluation during unscheduled visits to evaluate both the quality of the

laboratory work and the quality-control procedures. Each laboratory staff person is observed for equipment operation, specimen collection and preparation; testing procedures and constructive feedback is given to each staff. Formal retraining sessions are conducted annually to ensure that required skill levels were maintained.

The NHANES QA/QC protocols meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed QA/QC instructions are discussed in the NHANES LPM.

### **Analytical Laboratories**

NHANES uses several methods to monitor the quality of the analyses performed by the contract laboratories. In the MEC, these methods include performing blind split samples collected on “dry run” sessions. In addition, contract laboratories randomly perform repeat testing on 2.0% of all specimens.

NCHS developed and distributed a quality control protocol for all the contract laboratories which outlined the Westgard rules used when running NHANES specimens. Progress reports containing any problems encountered during shipping or receipt of specimens, summary statistics for each control pool, QC graphs, instrument calibration, reagents, and any special considerations are submitted to NCHS and Westat quarterly. The reports are reviewed for trends or shifts in the data. The laboratories are required to explain any identified areas of concern.

All QC procedures recommended by the manufacturers were followed. Reported results for all assays meet the Division of Laboratory Science’s quality control and quality assurance performance criteria for accuracy and precision (similar to specifications outlined by Westgard (1981).

## **Analytic Notes**

### **Subsample weights**

Measures of serum polybrominated diphenyl ethers (PBDE) were measured in a one third subsample of persons 12 years and over. Special sample weights are required to analyze these data properly. Specific sample weights for this subsample are included in this data file and should be used when analyzing these data.

### **Variance estimation**

The analysis of NHANES 2003-2004 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2003-2004 Demographic Data File contains demographic

and sample design variables. The recommended procedure for variance estimation requires use of stratum and PSU variables (SDMVSTRA and SDMVPSU, respectively) in the demographic data file.

### **Links to NHANES Data Files**

This laboratory data file can be linked to the other NHANES 2003-2004 data files using the unique survey participant identifier SEQN.

### **Detection Limits**

The detection limits were variable for all of the analytes in the data set. Two variables are provided for each of these analytes. The variable named LBD\_\_\_LC indicates whether the result was below the limit of detection. There are two values: "0" and "1". "0" means that the result was at or above the limit of detection. "1" indicates that the result was below the limit of detection.

The other variable named LBX\_\_\_ provides the analytic result for that analyte.

Please refer to the Analytic Guidelines for further details on the use of sample weights and other analytic issues..

## **References**

1. A. Sjödin, L. Hagmar, E. Klasson-Wehler, J. Björk and Å. Bergman, Influence of the consumption of fatty Baltic Sea fish on plasma 1. WHO, Environmental Health Criteria 162. Brominated diphenyl ethers. International Program on Chemical Safety, WHO, Geneva, Switzerland (1994).
2. WHO, Environmental Health Criteria 192. Flame retardants: A general introduction. International Program on Chemical Safety, WHO, Geneva, Switzerland (1997).
3. A. Sjödin, L. Hagmar, E. Klasson-Wehler, K. Kronholm-Diab, E. Jakobsson and Å. Bergman, Flame retardant exposure: Polybrominated diphenyl ethers in blood from Swedish workers, Environ Health Perspect 107, pp. 643-648 (1999).
4. A. Sjödin, H. Carlsson, K. Thuresson, S. Sjölin, Å. Bergman and C. Östman, Flame retardants in indoor air at an electronics recycling plant and at other work environments, Environ Sci Technol 35, pp. 448-454 (2001).
5. A. Sjödin, L. Hagmar, E. Klasson-Wehler, J. Björk and Å. Bergman,

Influence of the consumption of fatty Baltic Sea fish on plasma levels of halogenated environmental contaminants in Latvian and Swedish men, *Environ Health Perspect* 108, pp. 1035-1041 (2000).

## Locator Fields

**Title:** Polybrominated diphenyl ethers

**Contact Number:** 1-866-441-NCHS

**Years of Content:** 2003–2004

**First Published:** June 2007

**Revised:** August 2007

**Access Constraints:** None

**Use Constraints:** None

**Geographic Coverage:** National

**Subject:** Polybrominated diphenyl ethers

**Record Source:** NHANES 2003–2004

**Survey Methodology:** NHANES 2003–2004 is a stratified multistage probability sample of the civilian non-institutionalized population of the U.S.

**Medium:** NHANES Web site; SAS transport files

**National Health and Nutrition Examination Survey  
Codebook for Data Production (2003-2004)**

**Polybrominated Diphenyl Ethers(PBDE) (L28PBE\_C)  
Person Level Data**

First Published: June 2007

Last Revised: August 2007





|  |                            |
|--|----------------------------|
| <b>SEQN</b>                                      | <b>Target</b>              |
|  | B(12 Yrs. to 150 Yrs.)     |
| <b>Hard Edits</b>                                | <b>SAS Label</b>           |
|  | Respondent sequence number |
| <b>English Text:</b> Respondent sequence number. |                            |
| <b>English Instructions:</b>                     |                            |

|  |                                     |
|--|-------------------------------------|
| <b>WTSB2YR</b>   | <b>Target</b>                       |
|  | B(12 Yrs. to 150 Yrs.)              |
| <b>Hard Edits</b>  | <b>SAS Label</b>                    |
|  | Two-year MEC weights of subsample B |
| <b>English Text:</b> Two-year MEC weights of subsample B |                                     |
| <b>English Instructions:</b>                             |                                     |

| Code or Value     | Description     | Count | Cumulative | Skip to Item |
|-------------------|-----------------|-------|------------|--------------|
| 0 to 435025.30254 | Range of Values | 2337  | 2337       |              |
| .                 | Missing         | 0     | 2337       |              |

|  |                                  |
|--|----------------------------------|
| <b>LBXBB1</b>  | <b>Target</b>                    |
|  | B(12 Yrs. to 150 Yrs.)           |
| <b>Hard Edits</b>  | <b>SAS Label</b>                 |
|  | 2,2',4,4',5,5'-hexabromobiphenyl |
| <b>English Text:</b> 2,2',4,4',5,5'-hexabromobiphenyl (pg/g) |                                  |
| <b>English Instructions:</b>                                 |                                  |

| Code or Value | Description     | Count | Cumulative | Skip to Item |
|---------------|-----------------|-------|------------|--------------|
| 1.2 to 2943.1 | Range of Values | 2032  | 2032       |              |
| .             | Missing         | 305   | 2337       |              |

|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBXBB1LA</b>   | <b>Target</b>                              |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                     |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                           |              |                   |                     |
|   | 2,2',4,4',5,5'-hexabromobiphenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,5'-hexabromobiphenyl lipid adjusted (ng/g) |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                         | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.1 to 225  | Range of Values                            | 2032         | 2032              |                     |
| .   | Missing                                    | 305          | 2337              |                     |

|  |  |              |                   |                     |
|--|--|--------------|-------------------|---------------------|
| <b>LBDBB1LC</b>  | <b>Target</b>                            |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                   |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                         |              |                   |                     |
|  | 2,2',4,4',5,5'-hexabromobiphenyl comment |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,5'-hexabromobiphenyl comment code |  |              |                   |                     |
| <b>English Instructions:</b>                                       |  |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                       | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit          | 1485         | 1485              |                     |
| 1  | Below lower detection limit              | 547          | 2032              |                     |
| .  | Missing                                  | 305          | 2337              |                     |

|   |                               |              |                   |                     |
|---|-------------------------------|--------------|-------------------|---------------------|
| <b>LBXBR1</b>   | <b>Target</b>                 |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)        |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>              |              |                   |                     |
|   | 2,2',4-tribromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,2',4-tribromodiphenyl ether (pg/g) |                               |              |                   |                     |
| <b>English Instructions:</b>                              |                               |              |                   |                     |
| <b>Code or Value</b>                                      | <b>Description</b>            | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 1.2 to 87.4   | Range of Values               | 1992         | 1992              |                     |
| .   | Missing                       | 345          | 2337              |                     |

|  |   |              |                   |                     |
|--|---|--------------|-------------------|---------------------|
| <b>LBXBR1LA</b>  | <b>Target</b>                           |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                  |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                        |              |                   |                     |
|  | 2,2',4-tribromodiphenyl ether lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',4-tribromodiphenyl ether lipid adjusted (ng/g) |   |              |                   |                     |
| <b>English Instructions:</b>   |   |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                      | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.1 to 20.6  | Range of Values                         | 1992         | 1992              |                     |
| .  | Missing                                 | 345          | 2337              |                     |

|   |                                       |              |                   |                     |
|---|---------------------------------------|--------------|-------------------|---------------------|
| <b>LBDBR1LC</b>   | <b>Target</b>                         |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                      |              |                   |                     |
|   | 2,2',4-tribromodiphenyl ether comment |              |                   |                     |
| <b>English Text:</b> 2,2',4-tribromodiphenyl ether comment code |                                       |              |                   |                     |
| <b>English Instructions:</b>                                    |                                       |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                    | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0   | At or above the detection limit       | 100          | 100               |                     |
| 1   | Below lower detection limit           | 1892         | 1992              |                     |
| .   | Missing                               | 345          | 2337              |                     |

|   |                               |              |                   |                     |
|---|-------------------------------|--------------|-------------------|---------------------|
| <b>LBXBR2</b>   | <b>Target</b>                 |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)        |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>              |              |                   |                     |
|   | 2,4,4'-tribromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,4,4'-tribromodiphenyl ether (pg/g) |                               |              |                   |                     |
| <b>English Instructions:</b>                              |                               |              |                   |                     |
| <b>Code or Value</b>                                      | <b>Description</b>            | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 1.2 to 465.8  | Range of Values               | 1987         | 1987              |                     |
| .   | Missing                       | 350          | 2337              |                     |

|  |   |              |                   |                     |
|--|---|--------------|-------------------|---------------------|
| <b>LBXBR2LA</b>  | <b>Target</b>                           |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                  |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                        |              |                   |                     |
|  | 2,4,4'-tribromodiphenyl ether lipid adj |              |                   |                     |
| <b>English Text:</b> 2,4,4'-tribromodiphenyl ether lipid adjusted (ng/g) |   |              |                   |                     |
| <b>English Instructions:</b>   |   |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                      | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.1 to 65.2  | Range of Values                         | 1987         | 1987              |                     |
| .  | Missing                                 | 350          | 2337              |                     |

|   |                                       |              |                   |                     |
|---|---------------------------------------|--------------|-------------------|---------------------|
| <b>LBDBR2LC</b>   | <b>Target</b>                         |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                      |              |                   |                     |
|   | 2,4,4'-tribromodiphenyl ether comment |              |                   |                     |
| <b>English Text:</b> 2,4,4'-tribromodiphenyl ether comment code |                                       |              |                   |                     |
| <b>English Instructions:</b>                                    |                                       |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                    | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0   | At or above the detection limit       | 1601         | 1601              |                     |
| 1   | Below lower detection limit           | 386          | 1987              |                     |
| .   | Missing                               | 350          | 2337              |                     |

|  |                                    |              |                   |                     |
|--|------------------------------------|--------------|-------------------|---------------------|
| <b>LBXBR3</b>  | <b>Target</b>                      |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)             |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                   |              |                   |                     |
|  | 2,2',4,4'-tetrabromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,2',4,4'-tetrabromodiphenyl ether (pg/g) |                                    |              |                   |                     |
| <b>English Instructions:</b>                                   |                                    |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                 | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 9.8 to 13346.5   | Range of Values                    | 2016         | 2016              |                     |
| .  | Missing                            | 321          | 2337              |                     |

|   |   |              |                   |                     |
|---|---|--------------|-------------------|---------------------|
| <b>LBXBR3LA</b>   | <b>Target</b>                             |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                    |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                          |              |                   |                     |
|   | 2,2',4,4'-tetrabromophenyl ether lipid ad |              |                   |                     |
| <b>English Text:</b> 2,2',4,4'-tetrabromodiphenyl ether lipid adjusted (ng/g) |   |              |                   |                     |
| <b>English Instructions:</b>  |   |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                        | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 1.1 to 2350   | Range of Values                           | 2016         | 2016              |                     |
| .   | Missing                                   | 321          | 2337              |                     |

| <b>LBDBR3LC</b>  |                                 | <b>Target</b>                            |                   |                     |
|--|---------------------------------|--|-------------------|---------------------|
|  |                                 | B(12 Yrs. to 150 Yrs.)                   |                   |                     |
| <b>Hard Edits</b>  |                                 | <b>SAS Label</b>                         |                   |                     |
|  |                                 | 2,2',4,4'-tetrabromophenyl ether comment |                   |                     |
| <b>English Text:</b> 2,2',4,4'-tetrabromodiphenyl ether comment code |                                 |  |                   |                     |
| <b>English Instructions:</b>   |                                 |  |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>              | <b>Count</b>                             | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit | 1975                                     | 1975              |                     |
| 1  | Below lower detection limit     | 41                                       | 2016              |                     |
| .  | Missing                         | 321                                      | 2337              |                     |

| <b>LBXBR4</b>  |                    | <b>Target</b>                        |                   |                     |
|--|--------------------|--------------------------------------|-------------------|---------------------|
|  |                    | B(12 Yrs. to 150 Yrs.)               |                   |                     |
| <b>Hard Edits</b>  |                    | <b>SAS Label</b>                     |                   |                     |
|  |                    | 2,2',3,4,4'-pentabromodiphenyl ether |                   |                     |
| <b>English Text:</b> 2,2',3,4,4'-pentabromodiphenyl ether (pg/g) |                    |                                      |                   |                     |
| <b>English Instructions:</b>                                     |                    |                                      |                   |                     |
| <b>Code or Value</b>   | <b>Description</b> | <b>Count</b>                         | <b>Cumulative</b> | <b>Skip to Item</b> |
| 3 to 450   | Range of Values    | 2000                                 | 2000              |                     |
| .  | Missing            | 337                                  | 2337              |                     |

|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBXBR4LA</b>   | <b>Target</b>                          |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                 |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                       |              |                   |                     |
|   | 2,2',3,4,4'-pentabromophenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',3,4,4'-pentabromodiphenyl ether lipid adjusted (ng/g) |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                     | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.2 to 66.9   | Range of Values                        | 2000         | 2000              |                     |
| .   | Missing                                | 337          | 2337              |                     |

|  |   |              |                   |                     |
|--|---|--------------|-------------------|---------------------|
| <b>LBDBR4LC</b>  | <b>Target</b>                           |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                  |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                        |              |                   |                     |
|  | 2,2',3,4,4'-pentabromophenyl ether comt |              |                   |                     |
| <b>English Text:</b> 2,2',3,4,4'-pentabromodiphenyl ether comment code |   |              |                   |                     |
| <b>English Instructions:</b>   |   |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                      | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit         | 512          | 512               |                     |
| 1  | Below lower detection limit             | 1488         | 2000              |                     |
| .  | Missing                                 | 337          | 2337              |                     |



|  |                                      |              |                   |                     |
|--|--------------------------------------|--------------|-------------------|---------------------|
| <b>LBXBR5</b>  | <b>Target</b>                        |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)               |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                     |              |                   |                     |
|  | 2,2',4,4',5-pentabromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,2'â€™,4,4'â€™,5-pentabromodiphenyl ether (pg/g) |                                      |              |                   |                     |
| <b>English Instructions:</b>   |                                      |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                   | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 7.3 to 5620.3  | Range of Values                      | 1985         | 1985              |                     |
| .  | Missing                              | 352          | 2337              |                     |

|   |                                       |              |                   |                     |
|---|---------------------------------------|--------------|-------------------|---------------------|
| <b>LBXBR5LA</b>   | <b>Target</b>                         |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                      |              |                   |                     |
|   | 2,2',4,4',5-pentabromphenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5-pentabromodiphenyl ether lipid adjusted (ng/g) |                                       |              |                   |                     |
| <b>English Instructions:</b>  |                                       |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                    | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.8 to 692  | Range of Values                       | 1985         | 1985              |                     |
| .   | Missing                               | 352          | 2337              |                     |

| <b>LBDBR5LC</b>  |                                 | <b>Target</b>                           |                   |                     |
|--|---------------------------------|---|-------------------|---------------------|
|  |                                 | B(12 Yrs. to 150 Yrs.)                  |                   |                     |
| <b>Hard Edits</b>  |                                 | <b>SAS Label</b>                        |                   |                     |
|  |                                 | 2,2',4,4',5-pentabromophenyl ether comt |                   |                     |
| <b>English Text:</b> 2,2',4,4',5-pentabromodiphenyl ether comment code |                                 |   |                   |                     |
| <b>English Instructions:</b>   |                                 |   |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>              | <b>Count</b>                            | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit | 1395                                    | 1395              |                     |
| 1  | Below lower detection limit     | 590                                     | 1985              |                     |
| .  | Missing                         | 352                                     | 2337              |                     |

| <b>LBXBR6</b>  |                    | <b>Target</b>                        |                   |                     |
|--|--------------------|--------------------------------------|-------------------|---------------------|
|  |                    | B(12 Yrs. to 150 Yrs.)               |                   |                     |
| <b>Hard Edits</b>  |                    | <b>SAS Label</b>                     |                   |                     |
|  |                    | 2,2',4,4',6-pentabromodiphenyl ether |                   |                     |
| <b>English Text:</b> 2,2',4,4',6-pentabromodiphenyl ether (pg/g) |                    |                                      |                   |                     |
| <b>English Instructions:</b>                                     |                    |                                      |                   |                     |
| <b>Code or Value</b>   | <b>Description</b> | <b>Count</b>                         | <b>Cumulative</b> | <b>Skip to Item</b> |
| 2.8 to 3185.8  | Range of Values    | 2040                                 | 2040              |                     |
| .  | Missing            | 297                                  | 2337              |                     |

|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBXBR6LA</b>   | <b>Target</b>                          |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                 |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                       |              |                   |                     |
|   | 2,2',4,4',6-pentabromdphenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',6-pentabromodiphenyl ether lipid adjusted (ng/g) |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                     | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.4 to 365  | Range of Values                        | 2040         | 2040              |                     |
| .   | Missing                                | 297          | 2337              |                     |

|  |   |              |                   |                     |
|--|---|--------------|-------------------|---------------------|
| <b>LBDBR6LC</b>  | <b>Target</b>                           |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                  |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                        |              |                   |                     |
|  | 2,2',4,4',6-pentabromdphenyl ether comt |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',6-pentabromodiphenyl ether comment code |   |              |                   |                     |
| <b>English Instructions:</b>   |   |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                      | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit         | 1918         | 1918              |                     |
| 1  | Below lower detection limit             | 122          | 2040              |                     |
| .  | Missing                                 | 297          | 2337              |                     |

|  |  |              |                   |                     |
|--|--|--------------|-------------------|---------------------|
| <b>LBXBR7</b>  | <b>Target</b>                          |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                 |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                       |              |                   |                     |
|  | 2,2',4,4',5,5'-hexabromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,5'-hexabromodiphenyl ether (pg/g) |  |              |                   |                     |
| <b>English Instructions:</b>                                       |  |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                     | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 4.2 to 5432.5  | Range of Values                        | 2039         | 2039              |                     |
| .  | Missing                                | 298          | 2337              |                     |

|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBXBR7LA</b>   | <b>Target</b>                            |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                   |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                         |              |                   |                     |
|   | 2,2',4,4',5,5'-hexabromophenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,5'-hexabromodiphenyl ether lipid adjusted (ng/g) |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                       | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.4 to 821  | Range of Values                          | 2039         | 2039              |                     |
| .   | Missing                                  | 298          | 2337              |                     |

|  |   |              |                   |                     |
|--|---|--------------|-------------------|---------------------|
| <b>LBDBR7LC</b>  | <b>Target</b>                             |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                    |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                          |              |                   |                     |
|  | 2,2',4,4',5,5'-hexabromophenyl ether comt |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,5'-hexabromodiphenyl ether comment code |   |              |                   |                     |
| <b>English Instructions:</b>   |   |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                        | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit           | 1915         | 1915              |                     |
| 1  | Below lower detection limit               | 124          | 2039              |                     |
| .  | Missing                                   | 298          | 2337              |                     |

|  |  |              |                   |                     |
|--|--|--------------|-------------------|---------------------|
| <b>LBXBR8</b>  | <b>Target</b>                          |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                 |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                       |              |                   |                     |
|  | 2,2',4,4',5,6'-hexabromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,6'-hexabromodiphenyl ether (pg/g) |  |              |                   |                     |
| <b>English Instructions:</b>                                       |  |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                     | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 1.2 to 428.6   | Range of Values                        | 2014         | 2014              |                     |
| .  | Missing                                | 323          | 2337              |                     |

|   |   |              |                   |                     |
|---|---|--------------|-------------------|---------------------|
| <b>LBXBR8LA</b>   | <b>Target</b>                           |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                  |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                        |              |                   |                     |
|   | 2,2',4,4',5,6'-hexabromphenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,6'-hexabromodiphenyl ether lipid adjusted (ng/g) |   |              |                   |                     |
| <b>English Instructions:</b>  |   |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                      | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.1 to 40.5   | Range of Values                         | 2014         | 2014              |                     |
| .   | Missing                                 | 323          | 2337              |                     |

|  |  |              |                   |                     |
|--|--|--------------|-------------------|---------------------|
| <b>LBDBR8LC</b>  | <b>Target</b>                            |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                   |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                         |              |                   |                     |
|  | 2,2',4,4',5,6'-hexabromphenyl ether comt |              |                   |                     |
| <b>English Text:</b> 2,2',4,4',5,6'-hexabromodiphenyl ether comment code |  |              |                   |                     |
| <b>English Instructions:</b>   |  |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                       | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit          | 1110         | 1110              |                     |
| 1  | Below lower detection limit              | 904          | 2014              |                     |
| .  | Missing                                  | 323          | 2337              |                     |

|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBXBR9</b>   | <b>Target</b>                            |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                   |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                         |              |                   |                     |
|   | 2,2',3,4,4',5',6-heptabromodiphenyl ethr |              |                   |                     |
| <b>English Text:</b> 2,2',3,4,4',5',6-heptabromodiphenyl ether (pg/g) |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                       | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 2.2 to 125  | Range of Values                          | 1993         | 1993              |                     |
| .   | Missing                                  | 344          | 2337              |                     |

|  |  |              |                   |                     |
|--|--|--------------|-------------------|---------------------|
| <b>LBXBR9LA</b>  | <b>Target</b>                            |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                   |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                         |              |                   |                     |
|  | 2,2',3,4,4',5',6-heptabrophenl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,2',3,4,4',5',6-heptabromodiphenyl lipid adjusted (ng/g) |  |              |                   |                     |
| <b>English Instructions:</b>   |  |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                       | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.1 to 21.1  | Range of Values                          | 1993         | 1993              |                     |
| .  | Missing                                  | 344          | 2337              |                     |

|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBDBR9LC</b>   | <b>Target</b>                            |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                   |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                         |              |                   |                     |
|   | 2,2',3,4,4',5',6-heptabrophenl ether cmt |              |                   |                     |
| <b>English Text:</b> 2,2',3,4,4',5',6-heptabromodiphenyl ether comment code |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                       | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0   | At or above the detection limit          | 319          | 319               |                     |
| 1   | Below lower detection limit              | 1674         | 1993              |                     |
| .   | Missing                                  | 344          | 2337              |                     |

|  |                                    |              |                   |                     |
|--|------------------------------------|--------------|-------------------|---------------------|
| <b>LBXBR66</b>   | <b>Target</b>                      |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)             |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                   |              |                   |                     |
|  | 2,3',4,4'-tetrabromodiphenyl ether |              |                   |                     |
| <b>English Text:</b> 2,3',4,4'-tetrabromodiphenyl ether (pg/g) |                                    |              |                   |                     |
| <b>English Instructions:</b>                                   |                                    |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                 | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 1.2 to 109.8   | Range of Values                    | 1999         | 1999              |                     |
| .  | Missing                            | 338          | 2337              |                     |



|   |  |              |                   |                     |
|---|--|--------------|-------------------|---------------------|
| <b>LBXBR66L</b>   | <b>Target</b>                          |              |                   |                     |
|   | B(12 Yrs. to 150 Yrs.)                 |              |                   |                     |
| <b>Hard Edits</b>   | <b>SAS Label</b>                       |              |                   |                     |
|   | 2,3',4,4'-tetrabromodiphenyl lipid adj |              |                   |                     |
| <b>English Text:</b> 2,3',4,4'-tetrabromodiphenyl ether lipid adjusted (ng/g) |  |              |                   |                     |
| <b>English Instructions:</b>  |  |              |                   |                     |
| <b>Code or Value</b>  | <b>Description</b>                     | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0.1 to 17.4   | Range of Values                        | 1999         | 1999              |                     |
| .   | Missing                                | 338          | 2337              |                     |

|  |   |              |                   |                     |
|--|---|--------------|-------------------|---------------------|
| <b>LBDBR66C</b>  | <b>Target</b>                           |              |                   |                     |
|  | B(12 Yrs. to 150 Yrs.)                  |              |                   |                     |
| <b>Hard Edits</b>  | <b>SAS Label</b>                        |              |                   |                     |
|  | 2,3',4,4'-tetrabromodiphenyl ether comt |              |                   |                     |
| <b>English Text:</b> 2,3',4,4'-tetrabromodiphenyl ether comment code |   |              |                   |                     |
| <b>English Instructions:</b>   |   |              |                   |                     |
| <b>Code or Value</b>   | <b>Description</b>                      | <b>Count</b> | <b>Cumulative</b> | <b>Skip to Item</b> |
| 0  | At or above the detection limit         | 449          | 449               |                     |
| 1  | Below lower detection limit             | 1550         | 1999              |                     |
| .  | Missing                                 | 338          | 2337              |                     |