

# Assessment of Toxic Chemicals in Children's Products, 2019



Environmental Assessment Program

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## Abstract

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The state Department of Ecology (Ecology) frequently conducts product studies to confirm compliance with Washington State's Children's Safe Products Act (CSPA). Previous studies showed both compliance and noncompliance with the reporting laws for Chemicals of High Concern to Children (CHCC). However, due to the complexities of the markets, we must continue to evaluate products for prohibited chemicals and reporting compliance.

In 2019, Ecology purchased 103 products for testing in order to study observed compliance gaps in both the presence and reporting of CHCCs in children's products. The goals of the study were to assess the presence of CHCCs and restricted chemicals in children's products and to determine if there are compliance gaps in manufacturer reporting. This report assesses the presence of CHCCs and restricted chemicals in tested children's products.

The products purchased for testing were broken down into individual components and prioritized for sampling based on the criteria set in the project plan. The prioritized components were then processed into samples for testing. Forty-six samples were tested for the presence of lead, cadmium, antimony, arsenic, cobalt, and mercury. Sixty samples were tested for the presence of nine phthalates, and eight additional samples were tested for five parabens.

The metal antimony was found at or above 100 ppm in 72% (33 of 46) samples tested. Cobalt was detected above 100 ppm in 9% (4 of 46) samples tested. Mercury and arsenic were not found above 100 ppm in any of the samples. Diethyl phthalate (DEP) and Di-2-ethylhexyl phthalate (DEHP) were found above 100 ppm in two separate samples. Additionally, multiple parabens were found in one of the samples sent for parabens testing.

Cadmium was detected above the CSPA restriction limit of 40 ppm in one sample. Other CSPA prohibited chemicals were detected below the CSPA restriction limits.

All results were submitted to Ecology's CSPA compliance officer.

## Publication Information

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This report is available on the Department of Ecology's website at:

<https://apps.ecology.wa.gov/publications/SummaryPages/2303016.html>.

Data for this project are available in Ecology's Product Testing Database at <https://apps.ecology.wa.gov/ptdbreporting/>. *Study*: Assessment of Toxic Chemicals in Children's Products - 2019

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## Background

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The Children's Safe Product Act (CSPA) Chapter 70A.430 Revised Code of Washington (RCW) requires manufacturers of children's products to report on the presence and use of chemicals of high concern for children (CHCC) in products sold or offered for sale in Washington state.

According to the Children's Safe Products Reporting Rule (Chapter 173-334) Washington Administrative Code (WAC) intentionally added CHCCs must be reported at any concentrations above the practical quantitation limit and, if present as a contaminant at concentrations above 100 ppm, unless the manufacturer has a manufacturing control program and exercised due diligence to reduce contamination (Chapter 173-334-80 WAC).

The state Department of Ecology (Ecology) maintains an online reporting database (Chapter 173-334-080 WAC) for manufacturers to file their required annual report for CHCC presence in children's products sold or offered for sale during the prior calendar year.

In addition to the reporting requirement of CSPA, RCW 70A.430.020 restricts the presence of lead and cadmium in children's products at 90 ppm and 40 ppm respectively. There are also six phthalates, defined in RCW 70A.430.010 (12), that are restricted to a concentration of 1000 ppm individually or in combination.

Ecology frequently conducts product studies to confirm compliance with the CSPA. Previous studies provided data to show both compliance and noncompliance with the reporting requirements. On-going monitoring is needed to (1) continually assess whether children's products contain restricted chemicals and CHCCs, and (2) determine if manufacturers are reporting CHCC presence regularly and appropriately.

In 2018, a project plan was designed to perform follow-up testing on children's products previously investigated by Ecology. The strategy for this plan was to conduct three follow-up sampling and testing events during late spring 2018 through summer 2019 (Sekerak, 2018). During each event, the scope-identified children's products would be purchased and submitted to the laboratory for analysis of one or more analyte groups: metals, phthalates, and parabens.

In 2019, under the product testing follow-up study 2018-2019 project plan (Sekerak 2018), a final follow-up sampling and testing event was designed to gather product testing data on observed compliance gaps in the reporting requirement for CHCCs in children's products.

Ecology's CSPA compliance lead reviewed the reporting database and generated a list of potential manufacturers that chose to register their company but had not submitted an annual report or reported only when notified of a violation. The study event then followed the project plan (Sekerak, 2018) to test children's products from identified manufacturers for CHCC and restricted metals, phthalates, and parabens listed in Table 1.

**Table 1. Analytes tested in the study.**

Analyte	Analyte Class	Abbreviation	CAS number
Butyl benzyl phthalate*	Phthalates	BBP	85-68-7
Di(2-ethylhexyl) phthalate*	Phthalates	DEHP	117-81-7
Di-n-butyl phthalate*	Phthalates	DBP	84-74-2
Diethyl phthalate	Phthalates	DEP	84-66-2
Di-n-hexyl phthalate	Phthalates	DnHP	84-75-3
Diisodecyl phthalate*	Phthalates	DIDP	26761-40-0
Diisononyl phthalate*	Phthalates	DINP	28553-12-0
Dimethyl phthalate**	Phthalates	DMP	131-11-3
Di-n-octyl phthalate*	Phthalates	DnOP	117-84-0
Antimony	Metals	Sb	7440-36-0
Arsenic	Metals	As	7440-38-2
Cadmium	Metals	Cd	7440-43-9
Cobalt	Metals	Co	7440-48-4
Lead***	Metals	Pb	7439-92-1
Mercury	Metals	Hg	7439-97-6
Butyl Paraben	Parabens	-	94-26-8
Ethyl paraben	Parabens	-	120-47-8
Isobutyl paraben**	Parabens	-	4247-02-3
Methyl Paraben	Parabens	-	99-76-3
Propyl Paraben	Parabens	-	94-13-3

\* The six phthalates are restricted by CSPA to a concentration of 1000 ppm individually or in combination.

\*\* Not a listed chemical of high concern to children (CHCC) under the reporting rule.

\*\*\* Restricted but not a reportable CHCC metal.

## Methods

The project plan for this study is Addendum to Quality Assurance Project Plan: Product Testing Program, Version 1.0 – Product Testing Follow-up Study 2018-2019 (Sekerak, 2018).

### Product Collection

In April 2019, Ecology purchased 93 products from multiple retailers to test for heavy metals and phthalates. Parabens testing was contracted with an external laboratory at a later date; 10 additional products were purchased in October 2019 for parabens testing. A total of 103 products were purchased from multiple retailers to represent a broad range of 44 companies.

The items purchased for metals and phthalates testing were predominately baby care products (30%) and toys and games (33%). Seven items purchased for parabens testing were cosmetics, personal care, or hygiene products. The remaining three items purchased for parabens testing were arts, crafts, or needlework products.

## Sample Processing

All products were separated into individual components prior to sample selection. Components were then prioritized and processed into samples for testing based on the following study design criteria:

- Children's products with an expected prolonged use that make direct skin contact, or those that are for use in the mouth or are designed to be mouthable.
- Component samples and products that were similar to what other manufacturers reported in the CSPA database for certain analytes.

In addition to the above criteria, an X-Ray Fluorescence (XRF) detector was used as an additional tool to select components for further lab testing.

Forty-six samples were sent to Ecology's Manchester Environmental Lab (MEL) to test for the presence of lead, cadmium, antimony, arsenic, cobalt, and mercury.

Fifty-five plastic matrix samples, three lotions, and two paint samples were sent to MEL for testing of nine different phthalates. Samples that were liquid or semi-liquid such as lotions and paints, were sent to the lab in their original containers.

Seven of the eight samples sent to the lab for parabens testing were sent in their original containers. One makeup sample was processed into a sample jar. For each of the eight products tested for parabens, there was only one sample per product.

Chain of custody (COC) was maintained throughout the product collection, sample processing, and transfer of samples to the laboratory for analysis.

## Laboratory Procedures

MEL received 45 component samples for metals analysis and 60 component samples for phthalates analysis on May 28, 2019. MEL used EPA method 6020B for analysis of metals.

Due to uncertainty in one of the component samples that was submitted for testing, a new sample was prepared and sent to the lab for metals analysis on November 11, 2019. This sample was analyzed as a separate batch using the same method.

Due to a change in Ecology's Environmental Assessment Program (EAP) requirements, MEL used EPA 8270E instead of EPA 8270D for the analysis of phthalates.

BSK Associates Laboratory Fresno (BSK Associates) received eight product samples for parabens analysis on August 28, 2020. Ecology obtained an accreditation waiver before sending the samples to the lab because parabens are not standard analytes tested using EPA 8321 method. BSK Associates used a modified method EPA 8321M to perform this analysis.

## Data Quality

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Quality control (QC) requirements and measurement quality objectives (MQOs) are outlined in the QAPP addendum (Sekerak, 2018).

All samples were received in good condition and analyzed within holding times set by MEL and the contract lab. MEL provided written case narratives for the metals and phthalates data with a description of the quality of the data. BSK Associates provided case narratives for the

parabens data with a description of the quality of the data. MEL's data validation team performed a Level 4 validation on the parabens data.

The results for all analyses are deemed useable for all purposes, as reported with qualifications. The following qualifiers were assigned to some results:

- “J” indicates that the associated result is an estimate.
- “U” indicates that the analyte was not detected at the quantitation limit.
- “UJ” signifying that the analyte was not detected at the quantitation limit and the quantitation limit is an estimate.
- “NJ” indicating the presence of an analyte has been tentatively identified, and the associated result is an estimate.
- “REJ” indicating the presence or absence of the analyte cannot be verified in the sample due to serious deficiencies in the ability to analyze the sample, meet QC criteria, or other technical reasons.

All QC tests were performed as described in the QAPP. MQOs were met, except as noted in the sections below.

## Metals

MEL met the target reporting limit for all metals set at 1 ppm. All acceptance criteria were met for metals analysis with the following exceptions.

One initial blank was found to be contaminated for antimony. The blank and the samples associated with it that were less than 10 times the contamination were re-prepared and reanalyzed. No qualifications were added due to blank detections.

Some samples did not completely digest during sample preparation for metals analysis. The samples that did not completely digest can be biased low, so all detections were reported as an estimate with a “J” qualifier. All target reporting limits for the method were also considered to be an estimate, and the qualifier “UJ” was added to all results below the target reporting limit. A list of all samples that did not completely digest is available in the Appendix.

The analytical batch QC duplicate samples for two samples did not fully digest. Since the relative percent difference (RPD) for these duplicate samples was within the acceptance limits of 20%, the original sample results were reported without qualification.

Two samples used for QC as the matrix spike (MS) and matrix spike duplicate (MSD) also had incomplete digestions, but the percent recoveries and the RPDs were within the acceptance limits of 75%-125% and <20%, respectively. The associated analytical results were reported without any qualifications.

The duplicate RPD for sample TG-43-3-4 (JoJo Siwa Shoe Design Handbag - Eyelets) for cobalt was greater than the acceptance limit. The sample and the duplicate were “J” qualified, indicating that the result is an estimate.

The duplicate MS sample recovery for antimony was outside the acceptance limit for AM-31-8-11 (Elf on the Shelf Dress-Up Set - White Fleece Liner). This sample result was reported as an estimate with a “J” qualifier.

One MS sample recovery for cobalt was outside the acceptance limit. The MSD result for the same sample was within the acceptance criteria. Also, the RPD between the MS/MSD samples was within the accepted criteria. This sample was reported without any qualifications.

## Phthalates

All acceptance criteria were met for phthalates analysis with the following exceptions.

The target reporting limits for all phthalates were set at 25-50 ppm. The target reporting limit ranging from 14.8 to 25 ppm was achieved for most of the samples. The target reporting limit was elevated for some analytes due to co-elution with interfering peaks and/or sample matrix.

- Sample TG-43-4-12 had the internal standard benzoyl benzoate present; therefore, the results were reported from a dilution due to the interference. The reporting limit for this sample was raised to 107 ppm.
- Samples TG 43-4-12 and WM-40-1-1 also had a large unresolved complex mixture of hydrocarbons in the chromatogram that made spectral matching and positive identification of target analytes problematic. The large hydrocarbon ions overwhelmed the target ions; therefore, the results were reported from a dilution raising the reporting limit of TG-43-4-12 to 107 ppm and WM-40-1-1 to 109 ppm.

The MS/MSD for WM-42-6-1 had recoveries that exceeded the upper limit for diisodecyl phthalate, and the MSD for diisononyl phthalate (unbranched). Since the sample used was a non-detect for both analytes, no qualifiers were added.

Samples AM-31-8-4, TG-43-2-8, and AM-31-8-14 contained a peak that appeared to be a single isomer within isomer mixtures of diisodecyl phthalate (DIDP). The NIST library search identified the peak as bis(8-methylnonyl) phthalate (CAS 89-16-7), which is a synonym and alternate CAS number for diisodecyl phthalate. It was noted that even though the ion ratios matched for DIDP, the patterns in the spectra did not match. MEL reported the results as tentatively identified with a “NJ” qualifier, but due to visible spectral differences, the samples were further qualified as “REJ,” suggesting that the presence of the analyte cannot be accurately verified.

Additionally, sample AM-31-8-14 had an interfering peak from DIDP that prevented quantitation of DINP at the target reporting limit. The target reporting limit was elevated to an estimated value of 335 mg/kg from the non-diluted run. The sample result was reported as undetected over the target reporting limit with a “UJ” qualification.

Samples AM-31-8-4, WM-40-3-1, and FM-38-2-4 appeared to contain both the unbranched and branched isomer mixtures of DINP. For AM-31-8-4 and FM-38-2-4, the non-target peak for bis(2-ethylhexyl) terephthalate interfered with the quantitation and qualifier ions. For WM-40-3-1, major interferences from tentatively identified compound 1,2-cyclohexane dicarboxylic acid diisononyl ester (DINCH) caused the qualifier ion ratio to be outside the criteria. MEL reported all results as tentatively identified with a “NJ” qualifier. Due to interferences from a non-target peak and tentatively identified compound, the samples were further qualified to “REJ,” suggesting that the presence of the analyte cannot be accurately verified.

FM-38-2-4 appeared to contain bis(2-ethylhexyl) phthalate, but due to the rising baseline caused by matrix interferences, the result was “J” qualified as an estimate.

The result for sample DT-25-3-2 for DINP (unbranched) had interferences that caused the qualifier ion ratios to be outside MEL’s established criteria. However, because of the pattern match of the quantifier ions, the sample was reported as positively identified with a qualifier “J,” suggesting the result is an estimate.

Results for component samples AM-32-9-10 and AM-32-9-11 had a non-target peak for 2-butanone, 4-(4-hydroxyphenyl) co-eluting with diethyl phthalate. Since the spectra for the co-eluting peak did not contain the quantifier and qualifier ions used for diethyl phthalate (DEP) and the qualifier ion ratio used for DEP was within acceptance, DEP was positively identified with a “J” qualifier suggesting that the reported analyte concentration is an estimate.

Information on all phthalate samples with qualifications is available in the appendix.

## Parabens

All analytes for MS/MSD recovered within the 60% to 140% control limits. All analyte duplicate RPDs fell within the 20% RPD limit. BSK Associates reported all results between the method detection limit and the target reporting limit as “J” qualified. All of these results that fell below the target reporting limit of 5 ppm were changed to not detected above the target reporting limit with a “U” qualifier, as stated in the original project plan (Sekerak, 2016).

One sample, PC-5-3-1, was reanalyzed separately at multiple dilutions. Propyl paraben and methyl paraben concentrations for this sample exceeded the linear range. The sample was diluted by a factor of 20 to get the propyl paraben results and by a factor of 50 to get the results for methyl paraben. It was noted that the recovery for surrogate ethyl-paraben-d4 was outside the acceptance criteria for both dilutions. However, the efficiency of the extractions was evaluated based on the initial surrogate recovery, which was within the specified limits, and the results were reported for all analytes without any qualifications.

## Results

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### Metals

A total of 46 samples were sent to MEL for analysis of antimony, arsenic, cadmium, cobalt, lead, and mercury. Only three of the 46 samples had no metals detected at concentrations above the target reporting limits. Table 2 provides the summary statistics for lab results of target metals detected in component samples of children’s products.

**Table 2. Summary statistics of detected metals.**

Analyte	Antimony	Arsenic	Cadmium	Cobalt	Lead	Mercury
Number of samples (n)	46	46	46	46	46	46
n > Target Reporting Limit	35	4	8	10	7	0
% > Target Reporting Limit	76%	8%	17%	22%	15%	0%
Minimum (ppm)*	3.2	2.54	1.47	2.56	2.82	-
Maximum (ppm)*	6240	90.9	327	337	23.9	-

\*Statistics includes only detected results.



Antimony was the most frequently detected CHCC metal found in the results, with 35 of 46 samples having antimony ranging from 3.2 to 6240 ppm. Thirty three of 35 samples with detections had results above 100 ppm. Table 3 provides information on all samples with antimony results above 100 ppm.

**Table 3. Antimony results above the 100 ppm.**

Component ID	Component Description	Product Company	Antimony (ppm)	Qualifier
AM-31-10-7	PackIt Spaceman Freezable Classic Lunch Box - Zipper Teeth	PackIt, LLC	249	
AM-31-11-1	PackIt Freezable Bento Box Set - Printed Outer Fabric	PackIt, LLC	206	
AM-31-9-1	PackIt Mermaids Freezable Snack Bag - Mermaid Printed Fabric	PackIt, LLC	208	
AM-32-2-4	Dexbaby Dura-Bib - Pink Colored Boundary Stitching	DEX Products Inc.	120	J
AM-32-4-10	Disney Junior Vampirina Costume - Dress Velcro Snaps	Disguise Inc.	151	J
AM-32-6-3	Disney Descendants 2 Child Wig - Beads on Hair	Disguise Inc.	6240	J
AM-32-8-3	Strawberry Shortcake Orange Blossom Classic Doll - Green Striped Leggings	The Bridge Direct, Inc.	163	
AM-32-9-9	Strawberry Shortcake Classic Doll - Green/White Striped Pants	The Bridge Direct, Inc.	155	
BH-1-2-2	Breyer Boomerang Plush Horse Bean - Gray Fur Around Hoof	Reeves International, Inc.	136	
BH-1-3-6	Breyer Luna Magical Color Change Bath Unicorn - Unicorn Back	Reeves International, Inc.	171	J
DT-25-1-1	Savvi Emoji Tattoos - Clear Film Tattoo Protector	TMI Acquisition, LLC	228	
FM-37-2-2	Fisher-Price Soothe & Glow Giraffe - Light Yellow Body Fabric with Spots	Mattel, Inc.	216	J
FM-37-4-1	Melissa & Doug Pet Vet Playset - Brown Dog Fabric	Melissa & Doug, LLC	159	
FM-37-4-3	Melissa & Doug Pet Vet Playset - White Belly Fabric of Cat	Melissa & Doug, LLC	215	
FM-38-1-9	Melissa & Doug Pull-Back Town Vehicles Variety Pack - Yellow Car Printed Fabric	Melissa & Doug, LLC	183	
FM-38-4-7	Happy Easter Hair Grooming Basket - Blue/Pink Hair for Hair Barrette	Wondertreats, Inc.	163	J
FM-38-6-10	Happy Easter Little Princess Basket - Silver Colored Beads on Necklace	Wondertreats, Inc.	1460	J
TG-42-2-5	Imagine Ink Mess Free Marker - External Marker Felt	Bendon Publishing International	161	
TG-43-1-1	Nickelodeon Nella the Princess Knight Backpack - Brown Hair	Accessory Innovations LLC	156	

Component ID	Component Description	Product Company	Antimony (ppm)	Qualifier
TG-43-1-14	Nickelodeon Nella the Princess Knight Backpack - Purse Liner	Accessory Innovations LLC	246	J
TG-43-2-2	L.O.L Surprise Fanny Pack - Zipper Teeth	Accessory Innovations LLC	205	J
TG-43-3-5	JoJo Siwa Shoe Design Handbag - Light Blue Ribbon	Accessory Innovations LLC	275	
WM-40-1-5	Infantino Tag Along Chime - Hanger Strap	Infantino, LLC.	285	J
WM-40-2-7	Infantino Squeeze and Stack Block Set - Zipper Teeth	Infantino, LLC.	215	
WM-41-2-1	Bright Starts Sit & See Safari Floor Mirror - Printed Fabric	Kids II, Inc.	201	J
WM-42-5-1	Bright Starts Tug Tunes Elephant - Green Elephant Fur	Kids II, Inc.	139	
AM-31-8-11	Elf on the Shelf Dress-Up Set - White Fleece Liner	CCA&B	235	J
AM-31-8-8	Elf on the Shelf Dress-Up Set - Green Glitter Belt	CCA&B	147	J
AM-31-8-9	Elf on the Shelf Dress-Up Set - Printed Fabric on Sleeping Bag	CCA&B	269	
AM-32-5-13	My Princess Academy Princess Shoe Set - Carrying Bag Zipper Teeth	Almar Sales Co. Inc.	193	J
FM-36-3-1	Ty Beanie Boo's Stuffed Lamb - Gray Fur	Ty Inc.	187	J
FM-36-3-5	Ty Beanie Boo's Stuffed Lamb - Beige Fur	Ty Inc.	229	
GG-4-1-1	World's Smallest Pound Puppies - Black Fur	Super Impulse USA, LLC	179	J

Cobalt was detected in 10 of 46 samples, with results ranging from 3.09 to 337 ppm. Four of these 10 samples had cobalt results above 100 ppm. Cadmium was detected in eight of 46 samples, with results ranging from 1.47 to 327 ppm. There was one sample with cadmium results above the restriction limit of 40 ppm.

Table 4 provides details on samples that had cobalt or cadmium levels above 100 ppm.

**Table 4. Samples with cobalt and cadmium results above 100 ppm.**

Component ID	Component Description	Product Company	Analyte	Result (ppm)
AM-31-10-8	PackIt Spaceman Freezable Classic Lunch Box - Zipper Pull Metal	PackIt, LLC	Cobalt	337
AM-31-11-5	PackIt Freezable Bento Box Set - Zipper Slider	PackIt, LLC	Cobalt	108
AM-31-9-4	PackIt Mermaids Freezable Snack Bag - Zipper Slider	PackIt, LLC	Cobalt	272
FM-38-4-12	Happy Easter Hair Grooming Basket - Black Hair Clip on Hair Barrette	Wondertreats, Inc.	Cobalt	191
AM-32-5-16	My Princess Academy Princess Shoe Set - Carrying Bag Clear Plastic - Bottom	Almar Sales Co. Inc.	Cadmium	327

There were no results above 100 ppm for mercury and arsenic in any of the samples. Lead was detected in seven of 46 samples ranging from 2.82 to 23.9 ppm. Arsenic was detected in four of 46 samples ranging from 2.54 to 90.9 ppm. Mercury was not detected above the target reporting limit of 1 ppm in any of the tested samples.

## Phthalates

One or more phthalates were detected above the target reporting limit in 22% (13 of 60) of the samples. There was one sample with multiple phthalates detected. Table 8 provides summary statistics for lab results of target phthalates detected in component samples of children's products.

**Table 5. Statistics summary of detected phthalates.**

Analyte	BBP	DEHP	DBP	DEP	DHP	DIDP	DINP	DMP	DnOP
Number of samples (n)	60	60	60	60	60	60	60	60	60
n > Target Reporting Limit	0	7	0	4	0	0	1	2	0
% > Target Reporting Limit	0%	12%	0%	7%	0%	0%	2%	3%	0%
Minimum (ppm)*	-	24.7 J	-	30 J	-	-	28.3	3050	-
Maximum (ppm)*	-	214	-	351	-	-	28.3	6120	-

\*Statistics includes only detected results.

DEHP was the most frequently detected phthalate, found in 12% (7 of 60) of the samples, with results ranging from 24.7 (J) to 214 ppm. DEP was found in 7% (4 of 60) of the samples, with results ranging from 30 (J) to 351 ppm. DINP was found in one sample at 28.3 ppm. DMP, a phthalate not on the CHCC list, was detected in two samples at 3050 and 6120 ppm. Two samples had phthalates DEP and DEHP with results over 100 ppm.

Table 6 provides information on all phthalate detections above the target reporting limits for the study.

**Table 6. Phthalates sample results for detections above the target reporting limit.**

Component ID	Component Description	Product Company	Analyte	Result (ppm)	Qualifier
AM-32-3-1	Spin Master Paw Patrol Insulated Lunch Kit - Front Paw Patrol Printed Material	Thermos L.L.C.	DEHP	48	
FM-37-6-12	Happy Easter Jump Rope Basket - White Badminton Shuttlecock	Wondertreats, Inc.	DEHP	214	
FM-37-6-2	Happy Easter Jump Rope Basket - Pink Jump Rope	Wondertreats, Inc.	DEHP	29	
FM-38-2-4	Melissa & Doug on the Farm Puffy Sticker Play Set - Brown Horse - Puffy Stickers	Melissa & Doug, LLC	DEHP	24.7	J
FM-38-6-2	Happy Easter Little Princess Basket - Clear Blue Plastic Strip on Shoe	Wondertreats, Inc.	DEHP	79.3	
SMV-1-2-2	Smith & Vandiver Green Dino-Fizz - Bath - Tyrannosaurus - Dinosaur Toy	Smith & Vandiver Corp.	DEHP	43.1	
SMV-1-2-2	Smith & Vandiver Green Dino-Fizz - Bath - Tyrannosaurus - Dinosaur Toy	Smith & Vandiver Corp.	DEP	351	
TG-43-2-8	L.O.L Surprise Fanny Pack - Front Character	Accessory Innovations	DEHP	32.9	
TG-43-3-1	JoJo Siwa Shoe Design Handbag - Silver Colored Bottom of Shoe	Accessory Innovations	DEP	78.6	
AM-32-9-10	Strawberry Shortcake Classic Doll - Doll Face	The Bridge Direct, Inc.	DEP	30	J
AM-32-9-11	Strawberry Shortcake Classic Doll - Doll Face 2	The Bridge Direct, Inc.	DEP	52.7	J
BH-1-1-3	Breyer Paint Spirit & Stable - Green Paint	Reeves International, Inc.	DMP*	3050	
BH-1-4-7	Breyer My Dream Horse Paint on Canvas - Pink Paint	Reeves International, Inc.	DMP*	6120	
DT-25-3-2	Savvi Dino Mite Tattoos - Blue Bird and Emoji Tattoos	Savvi	DINP	28.3	J

\*Not a CHCC under the reporting rule.

The following samples had phthalate levels above 100 ppm.

- DEHP was detected at 214 ppm in a white badminton shuttlecock from an easter basket (FM-37-6-12) purchased at Fred Meyer.
- DEP was detected at 351 ppm in a dinosaur toy inside a Smith and Vandiver Green Dino Fizz bath (SMV-1-2-2) purchased online from their platform. DEHP was also detected in the same sample at 43.1 ppm. This was the only sample with multiple phthalates detected.
- DMP, a phthalate not on the CHCC list, was detected in two separate products from the same company, Reeves International Inc. A green paint from their Breyer Paint and Spirit Stable product (BH-1-1-3) had DMP at 3050 ppm. Pink paint from their Breyer My Dream Horse paint on Canvas product (BH-1-4-7) had DMP at 6120 ppm.

CSPA restricted phthalates were not detected individually or in combination above the CSPA restriction limit of 1000 ppm in any of the samples tested.

## Parabens

Eight samples were sent to BSK Associates to be tested for methyl paraben, ethyl paraben, propyl paraben, butyl paraben, and isobutyl paraben. Three samples had one or more paraben levels above the target reporting limit of 5 ppm. Table 7 provides information on the samples with parabens detected in the study.

**Table 7. Paraben sample results for detections above the target reporting limit.**

Component ID	Component Description	Product Company	Analyte	Result (ppm)
GBA-1-1-1	Glitter Tattoo Kit - Glimmer Body Glue	Glimmer Body Art	Ethyl paraben	18
GBA-1-1-1	Glitter Tattoo Kit - Glimmer Body Glue	Glimmer Body Art	Methyl Paraben	36
GBA-1-1-1	Glitter Tattoo Kit - Glimmer Body Glue	Glimmer Body Art	Propyl paraben	8
HL-7-1-1	Water Washable Face Paint - Yellow Paint	Rubies II, LLC	Methyl paraben	7
PC-5-3-1	Zombie Infected Kit - Fake Blood	California Costumes Collections, Inc.	Ethyl paraben	40
PC-5-3-1	Zombie Infected Kit - Fake Blood	California Costumes Collections, Inc.	Methyl Paraben	2200
PC-5-3-1	Zombie Infected Kit - Fake Blood	California Costumes Collections, Inc.	Propyl paraben	500

One Zombie Infected kit (PC-5-3) bought at a Party City store had multiple parabens detected in the fake blood that was tested. Methyl paraben had results levels exceeding 2000 ppm. Ethyl paraben and propyl paraben were also detected in this sample at 40 ppm and 500 ppm, respectively.

Complete laboratory results for this study can be downloaded from Ecology's Product Testing Database (PTDB) website at <http://ecyapeem/ptdbpublicreporting>. Search Study: Assessment of Toxic Chemicals in Children's Products - 2019.

## Summary and Conclusions

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As part of the Product Testing Follow-up Study 2018-2019, Ecology conducted sampling and testing in 2019 to answer questions about observed gaps in both the presence and reporting of CHCCs in children's products. This study tested children's products for selected heavy metals, phthalates, and parabens. The goals of the study were to assess the presence of toxic chemicals in consumer products and also verify if there are compliance gaps in manufacturer reporting.

In all, components from 79 of the 103 products purchased for the study were prioritized and tested. Twenty products were tested for metals, 38 products for phthalates, and 8 products for parabens. Thirteen products had samples tested for both metals and phthalates. The products purchased and tested were from 39 companies representing different manufacturers.

A total of 114 components from 79 individual products were sampled and tested.

Table 8 lists the number of samples tested from each of the companies. In some cases, the same components were processed into two samples and submitted for testing of both metals and phthalates.

**Table 8. Number of samples tested from each of the product companies.**

Product Company	Phthalate samples	Metal samples	Paraben samples
Accessory Innovations	2	5	
Amazon Services Inc	1	1	
Bendon		1	
DEX Products Inc		1	
Disguise Inc.		2	
Earth Mama Angel Baby LLC	1		
Fisher-Price	1		
G.A. Gertmenian & Sons	1	1	
Hamco Inc.	3		
Infantino LLC	3	2	
Kids II, Inc.	3	2	
Laser Pegs Ventures LLC*	1	2	
Mattel, Inc.	1	1	
Mayborn USA Inc	6		
Melissa & Doug, LLC	3	4	
PackIt, LLC	1	7	
Reeves International, Inc.	4	2	
Regent Baby Products Corp	5		
Sarvi	1	1	
Smith & Vandiver Corp.	2		
The Bridge Direct, Inc.	4	2	
The Honest Company, Inc.	2		
The Village Company	1		
Thermos L.L.C.	2		
Wal-Mart Stores, Inc.	2		
Wondertreats, Inc.	3	3	
California Costumes Collections, Inc.			1
Forum Novelties Inc.			1
HearthSong, Moon Creations			1
Glimmer Body Art			1
Almar Sales Co. Inc.*	3	2	
CCA&B	2	3	
Fun-Time International, Inc.*	1	1	
Super Impulse		1	
Tri Coastal Designs	1		
Ty Inc.		2	
Rubies II, LLC			2
LaRose Industries, LLC,			1
Markwins Beauty Products, Inc			1

\*One component from this manufacturer was processed into two laboratory samples.

The following conclusions were made from this 2019 sampling and testing event:

## Metals

- Antimony was the most frequent CHCC metal detected, with 35 of 46 samples above the target reporting limit, with results ranging from 3.2 to 6240 ppm. A total of 33 of 35 samples had antimony levels over 100 ppm. The highest level of antimony was found in a sample (AM-32-6-3) composed of beads on a children's wig manufactured by Disguise Inc.
- Cobalt was detected in 10 of 46 samples, with results ranging from 3.09 to 337 ppm. Four of 10 samples had cobalt detected over 100 ppm. The highest level of cobalt was found in a sample (AM-31-10-8) composed of zipper pull metal found on a children's lunchbox manufactured by PackIt, LLC.
- Cadmium was detected above the restriction limit of 40 ppm in one sample: AM-32-5-16 had cadmium detected at 327 ppm. This sample was composed of clear plastic material from a carrying bag for "My Princess Academy Princess Shoe Set" manufactured by Almar Sales Co. Inc.
- Mercury and arsenic levels were not found above the contaminant reporting threshold of 100 ppm in any of the samples.

## Phthalates

- Phthalates DEHP and DEP were found above 100 ppm in two samples. DEHP was detected at 214 ppm in a white badminton shuttlecock from an easter basket (FM-36-6-12) purchased at Fred Meyer. DEP was detected at 351 ppm in a dinosaur toy inside a Smith and Vandiver Green Dino Fizz bath (SMV-1-2-2) purchased online from their platform.
- Complications in laboratory analysis of some samples may have hindered the identification of target phthalates due to interferences from non-target phthalates and high levels of hydrocarbons, making the isolation of individual phthalate peaks difficult.
- Phthalates were not detected individually or in combination above the CSPA restriction limit of 1000 ppm.

## Parabens

- A fake blood sample (PC-5-3-1) from the Zombie makeup kit bought at Party City had multiple parabens detected. Methyl paraben was detected at 2200 ppm, ethyl paraben at 40 ppm, and propyl paraben at 500 ppm. This product was manufactured by California Costumes Collections Inc.

The lab data for this project were submitted to Ecology's Children's Safe Products Act (CSPA) compliance lead for assessment of compliance with Washington State and Federal laws.



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## References

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Sekerak, S. 2016. Quality Assurance Project Plan: Product Testing Program Version 1.0. Washington State Department of Ecology, Olympia, WA. Publication 16-03-113.  
<https://apps.ecology.wa.gov/publications/documents/1603113.pdf>

Sekerak, S. 2018. Addendum to Quality Assurance Project Plan: Product Testing Program Version 1.0 — Product Testing Follow-up Study 2018-2019. Washington State Department of Ecology, Olympia, WA. Publication 18-03-113.  
<https://apps.ecology.wa.gov/publications/SummaryPages/1803113.html>

## Appendix

**Table A1. List of samples with incomplete digestion during sample preparation for metals analysis.**

Component/ Sample ID	Component Description	Product Matrix
AM-32-6-3	Disney Descendants 2 Child Wig - Beads on Hair	Metals
AM-32-5-13	My Princess Academy Princess Shoe Set - Carrying Bag Zipper Teeth	Plastic
FM-38-6-10	Happy Easter Little Princess Basket - Silver Colored Beads on Necklace	Plastic
KZS-1-1-1	Easter Bunny Crazy Straws - Yellow Straw	Plastic
TG-43-2-2	L.O.L Surprise Fanny Pack - Zipper Teeth	Plastic
MK-9-1-4	Laser Pegs Green Monster Rally Truck - Gray Peg	Plastic
AM-31-8-11	Elf on the Shelf Dress-Up Set - White Fleece Liner	Fabric
AM-31-8-8	Elf on the Shelf Dress-Up Set - Green Glitter Belt	Fabric
AM-32-2-4	Dexbaby Dura-Bib - Pink Colored Boundary Stitching	Fabric
AM-32-4-10	Disney Junior Vampirina Costume - Dress Velcro Snaps	Fabric
BH-1-3-6	Breyer Luna Magical Color Change Bath Unicorn - Unicorn Back	Plastic
FM-37-2-2	Fisher-Price Soothe & Glow Giraffe - Light Yellow Body Fabric with Spots	Fabric
FM-38-4-7	Happy Easter Hair Grooming Basket - Blue/Pink Hair for Hair Barrette	Plastic
TG-43-1-14	Nickelodeon Nella the Princess Knight Backpack - Purse Liner	Fabric
WM-40-1-5	Infantino Tag Along Chime - Hanger Strap	Fabric
WM-41-2-1	Bright Starts Sit & See Safari Floor Mirror - Printed Fabric	Fabric
FM-36-3-1	Ty Beanie Boo's Stuffed Lamb - Gray Fur	Fabric
GG-4-1-1	World's Smallest Pound Puppies - Black Fur	Fabric

**Table A2. List of phthalate samples with qualifications or raised target reporting limits.**

Component ID	Component Description	Data Qualifier	Analyte
TG-43-4-12	Sassy My First Rattles - White Mesh on Circle Rattle	U	All analytes
WM-40-1-1	Infantino Tag Along Chime - Teether	U	All analytes
WM-42-6-1	Bright Starts John Deere on the Cob Teether - Yellow Corn Teether	U	Diisodecyl phthalate/ Diisononyl phthalate (unbranched)
AM-31-8-4	Elf on the Shelf Dress-Up Set - Snow Tube	REJ	Diisodecyl phthalate
AM-31-8-4	Elf on the Shelf Dress-Up Set - Snow Tube	REJ	Diisononyl phthalate (unbranched)
TG-43-2-8	L.O.L Surprise Fanny Pack - Front Character	REJ	Diisodecyl phthalate

Component ID	Component Description	Data Qualifier	Analyte
AM-31-8-14	Elf on the Shelf Dress-Up Set - Snow Tube Air Intake Spout	REJ	Diisodecyl phthalate
AM-31-8-14	Elf on the Shelf Dress-Up Set - Snow Tube Air Intake Spout	UJ	Diisononyl phthalate (unbranched)
WM-40-3-1	Infantino Tub O' Toys - Green Ball	REJ	Diisononyl phthalate (unbranched)
FM-38-2-4	Melissa & Doug on the Farm Puffy Sticker Play Set - Brown Horse - Puffy Stickers	REJ	Diisononyl phthalate (unbranched)
FM-38-2-4	Melissa & Doug on the Farm Puffy Sticker Play Set - Brown Horse - Puffy Stickers	J	Bis(2-ethylhexyl) phthalate
DT-25-3-2	Savvi Dino Mite Tattoos - Blue Bird and Emoji Tattoos (composite)	J	Diisononyl phthalate (unbranched)
AM-32-9-10	Strawberry Shortcake Classic Doll - Doll Face	J	Diethyl phthalate
AM-32-9-11	Strawberry Shortcake Classic Doll - Doll Face 2	J	Diethyl phthalate

**Table A3. List of all samples with CHCCs and restricted chemicals detected over 100 ppm.**

Product ID	Sample Description	Product Company	Analyte	Value (ppm)	Qualifier
AM-31-10	PackIt Spaceman Freezable Classic Lunch Box - Zipper Teeth	PackIt, LLC	Antimony	249	
AM-31-10	PackIt Spaceman Freezable Classic Lunch Box - Zipper Pull Metal	PackIt, LLC	Cobalt	337	
AM-31-11	PackIt Freezable Bento Box Set - Printed Outer Fabric	PackIt, LLC	Antimony	206	
AM-31-11	PackIt Freezable Bento Box Set - Zipper Slider	PackIt, LLC	Cobalt	108	
AM-31-8	Elf on the Shelf Dress-Up Set - White Fleece Liner	CCA&B	Antimony	235	J
AM-31-8	Elf on the Shelf Dress-Up Set - Green Glitter Belt	CCA&B	Antimony	147	J
AM-31-8	Elf on the Shelf Dress-Up Set - Printed Fabric on Sleeping Bag	CCA&B	Antimony	269	
AM-31-9	PackIt Mermaids Freezable Snack Bag - Mermaid Printed Fabric	PackIt, LLC	Antimony	208	
AM-31-9	PackIt Mermaids Freezable Snack Bag- Zipper Slider	PackIt, LLC	Cobalt	272	
AM-32-2	Dexbaby Dura-Bib - Pink Colored Boundary Stitching	DEX Products Inc.	Antimony	120	J

Product ID	Sample Description	Product Company	Analyte	Value (ppm)	Qualifier
AM-32-4	Disney Junior Vampirina Costume - Dress Velcro Snaps	Disguise Inc.	Antimony	151	J
AM-32-5	My Princess Academy Princess Shoe Set - Carrying Bag Zipper Teeth	Almar Sales Co. Inc.	Antimony	193	J
AM-32-5	My Princess Academy Princess Shoe Set - Carrying Bag Clear Plastic - Bottom	Almar Sales Co. Inc.	Cadmium	327*	
AM-32-6	Disney Descendants 2 Child Wig - Beads on Hair	Disguise Inc.	Antimony	6240	J
AM-32-8	Strawberry Shortcake Orange Blossom Classic Doll - Green Striped Leggings	The Bridge Direct, Inc.	Antimony	163	
AM-32-9	Strawberry Shortcake Classic Doll - Green/White Striped Pants	The Bridge Direct, Inc.	Antimony	155	
BH-1-2	Breyer Boomerang Plush Horse Bean - Gray Fur Around Hoof	Reeves International, Inc.	Antimony	136	
BH-1-3	Breyer Luna Magical Color Change Bath Unicorn - Unicorn Back	Reeves International, Inc.	Antimony	171	J
DT-25-1	Savvi Emoji Tattoos - Clear Film Tattoo Protector	TMI Acquisition, LLC	Antimony	228	
FM-36-3	Ty Beanie Boo's Stuffed Lamb - Beige Fur	Ty Inc.	Antimony	229	
FM-36-3	Ty Beanie Boo's Stuffed Lamb - Gray Fur	Ty Inc.	Antimony	187	J
FM-37-2	Fisher-Price Soothe & Glow Giraffe - Light Yellow Body Fabric with Spots	Mattel, Inc.	Antimony	216	J
FM-37-4	Melissa & Doug Pet Vet Playset - Brown Dog Fabric	Melissa & Doug, LLC	Antimony	159	
FM-37-4	Melissa & Doug Pet Vet Playset - White Belly Fabric of Cat	Melissa & Doug, LLC	Antimony	215	
FM-37-6	Happy Easter Jump Rope Basket - White Badminton Shuttlecock	Wondertreats, Inc.	DEHP	214	
FM-38-1	Melissa & Doug Pull-Back Town Vehicles Variety Pack - Yellow Car Printed Fabric	Melissa & Doug, LLC	Antimony	183	
FM-38-4	Happy Easter Hair Grooming Basket - Blue/Pink Hair for Hair Barrette	Wondertreats, Inc.	Antimony	163	J
FM-38-4	Happy Easter Hair Grooming Basket - Black Hair Clip on Hair Barrette	Wondertreats, Inc.	Cobalt	191	
FM-38-6	Happy Easter Little Princess Basket - Silver Colored Beads on Necklace	Wondertreats, Inc.	Antimony	1460	J
PC-5-3	Zombie Infected Kit - Fake Blood	California Costumes Collections, Inc.	Methyl Paraben	2200	
PC-5-3	Zombie Infected Kit - Fake Blood	California Costumes Collections, Inc.	Propyl paraben	500	
SMV-1-2	Smith & Vandiver Green Dino-Fizz - Bath - Tyrannosaurus - Dinosaur Toy	Smith & Vandiver Corp.	DEP	351	
TG-42-2	Imagine Ink Mess Free Marker - External Marker Felt	Bendon Publishing International	Antimony	161	

Product ID	Sample Description	Product Company	Analyte	Value (ppm)	Qualifier
TG-43-1	Nickelodeon Nella the Princess Knight Backpack - Brown Hair	Accessory Innovations LLC	Antimony	156	
TG-43-1	Nickelodeon Nella the Princess Knight Backpack - Purse Liner	Accessory Innovations LLC	Antimony	246	J
TG-43-2	L.O.L Surprise Fanny Pack - Zipper Teeth	Accessory Innovations LLC	Antimony	205	J
TG-43-3	JoJo Siwa Shoe Design Handbag - Light Blue Ribbon	Accessory Innovations LLC	Antimony	275	
WM-40-1	Infantino Tag Along Chime - Hanger Strap	Infantino, LLC.	Antimony	285	J
WM-40-2	Infantino Squeeze and Stack Block Set - Zipper Teeth	Infantino, LLC.	Antimony	215	
WM-41-2	Bright Starts Sit & See Safari Floor Mirror - Printed Fabric	Kids II, Inc.	Antimony	201	J
WM-42-5	Bright Starts Tug Tunes Elephant - Green Elephant Fur	Kids II, Inc.	Antimony	139	

\*Cadmium detection of 327 ppm is over the CSPA restriction threshold of 40 ppm.