12-17-2013
5-08-2014 Corrections

FACT SHEET
REISSUANCE OF A GENERAL VPDES PERMIT
FOR INDUSTRIAL ACTIVITY STORMWATER DISCHARGES

The Virginia State Water Control Board has under consideration the reissuance of a general VPDES permit for point source discharges of stormwater associated with industrial activity to surface waters.

Permit Number: VAR05

Name of Permittee: Any owner in the Commonwealth of Virginia agreeing to be regulated under the terms of this general permit.

Facility Location: Commonwealth of Virginia

Receiving Waters: Surface waters within the boundaries of the Commonwealth of Virginia, except waters specifically named in Board regulations or policies which prohibit such discharges.

On the basis of preliminary review and application of lawful standards and regulations, the State Water Control Board proposes to reissue the general permit subject to certain conditions and has prepared a draft permit. The category of discharges to be included involves stormwater discharges from subcategories of industrial facilities with the same or similar types of operations, and discharging the same or similar types of wastes. The Board has determined that this category of discharges is appropriately controlled under a general permit. The draft general permit requires that all covered facilities within a particular subcategory meet standardized permit conditions and monitoring requirements, and provides dates for submitting monitoring data. This permit will maintain the water quality standards adopted by the Board. This general permit will replace the general permit VAR05 which expires on June 30, 2014. Owners covered under the expiring general permit who wish to continue to discharge under a general permit must register for coverage under the new permit.

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Burt Tuxford at:

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Administrative

The general permit will have a fixed term of five (5) years effective, upon Board approval, July 1, 2014. Every authorization to discharge under this general permit will expire at the same time and all authorizations to discharge will be renewed on the same date. Discharges will be covered under the general permit upon approval of the Registration Statement and delivery of a copy of the general permit to the applicant.

This general permit does not apply to any new or increased discharge that will result in significant effects to the receiving waters. That determination is made in accordance with the State Water Control Board's Anti-degradation Policy contained in the Virginia Water Quality Standards, 9VAC25-260-30. Anti-backsliding will also be considered prior to granting coverage under this general permit to operations currently discharging stormwater under another VPDES permit.

If a discharge appears to qualify for this general permit, the operator must submit a general permit Registration Statement to apply for general permit coverage. The Department will either send a

copy of the general permit to those applicants that qualify, or send a copy of the VPDES individual permit application to those that do not qualify.

Activities Covered Under This General Permit

This permit covers point source discharges of stormwater associated with industrial activity to surface waters of the Commonwealth, including discharges through municipal or non-municipal separate storm sewer systems. This permit also covers stormwater discharges designated by the Board for permitting under the provisions of 9VAC25-31-120 A 1 c, or under 9VAC25-31-120 A 7 a (1) or (2) of the VPDES Permit Regulation.

To be eligible to discharge under the permit, an owner must (1) have a stormwater discharge associated with industrial activity from the facility's primary industrial activity, provided the primary industrial activity is included in Table 1 below, or (2) be notified that the stormwater discharges from the facility have been designated by the Board for permitting.

TABLE 1: SECTORS OF INDUSTRIAL ACTIVITY COVERED BY THIS PERMIT.

SIC Code or Activity Code	Activity Represented
Sector A: Timber Products	
2411	Log Storage and Handling (wet deck storage areas are only authorized if no chemical additives are used in the spray water or applied to the logs).
2421	General Sawmills and Planning Mills.
2426	Hardwood Dimension and Flooring Mills.
2429	Special Product Sawmills, Not Elsewhere Classified.
2431-2439 (except 2434 - see Sector W)	Millwork, Veneer, Plywood, and Structural Wood.
2441, 2448, 2449	Wood Containers.
2451, 2452	Wood Buildings and Mobile Homes.
2491	Wood Preserving.
2493	Reconstituted Wood Products.
2499	Wood Products, Not Elsewhere Classified (includes SIC Code 24991303 - Wood, Mulch and Bark facilities).
Sector B: Paper and Allied Products	
2611	Pulp Mills.
2621	Paper Mills.
2631	Paperboard Mills.
2652-2657	Paperboard Containers and Boxes.
2671-2679	Converted Paper and Paperboard Products, except Containers and Boxes.
Sector C: Chemical and Allied Products	
2812-2819	Industrial Inorganic Chemicals.
2821-2824	Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic and Other Manmade Fibers except Glass.
2833-2836	Medicinal Chemicals and Botanical Products; Pharmaceutical Preparations; In Vitro and In Vivo Diagnostic Substances; Biological Products, except Diagnostic Substances.
2841-2844	Soaps, Detergents, and Cleaning Preparations; Perfumes, Cosmetics, and Other Toilet Preparations.
2851	Paints, Varnishes, Lacquers, Enamels, and Allied Products.
2861-2869	Industrial Organic Chemicals.
2873-2879	Agricultural Chemicals (includes SIC Code 2875 - Composting facilities).

2891-2899	Miscellaneous Chemical Products.
3952 (limited to list)	Inks and Paints, Including China Painting Enamels, India Ink, Drawing Ink, Platinum Paints for Burnt Wood or Leather Work, Paints for China Painting, Artist's Paints and Artist's Watercolors.
Sector D: Asphalt Paving and Roofing Materials and Lubricants	
2951, 2952	Asphalt Paving and Roofing Materials.
2992, 2999	Miscellaneous Products of Petroleum and Coal.
Sector E: Glass Clay, Cement, Concrete, and Gypsum Products	
3211	Flat Glass.
3221, 3229	Glass and Glassware, Pressed or Blown.
3231	Glass Products Made of Purchased Glass.
3241	Hydraulic Cement.
3251-3259	Structural Clay Products.
3261-3269	Pottery and Related Products.
3274, 3275	Concrete, Gypsum and Plaster Products, except: Concrete Block and Brick; Concrete Products, except Block and Brick; and Ready-Mixed Concrete Facilities (SIC 3271-3273) (Concrete Block and Brick; Concrete Products, except Block and Brick; and Ready-Mixed Concrete Facilities (SIC 3271-3273) are covered under the Concrete Products General Permit (VAG11)).
3281	Cut Stone and Stone Products
3291-3299	Abrasive, Asbestos, and Miscellaneous Non-Metallic Mineral Products.
Sector F: Primary Metals	
3312-3317	Steel Works, Blast Furnaces, and Rolling and Finishing Mills.
3321-3325	Iron and Steel Foundries.
3331-3339	Primary Smelting and Refining of Nonferrous Metals.
3341	Secondary Smelting and Refining of Nonferrous Metals.
3351-3357	Rolling, Drawing, and Extruding of Nonferrous Metals.
3363-3369	Nonferrous Foundries (Castings).
3398, 3399	Miscellaneous Primary Metal Products.
Sector G: Metal Mining (Ore Mining and Dressing)	
1011	Iron Ores.
1021	Copper Ores.
1031	Lead and Zinc Ores.
1041, 1044	Gold and Silver Ores.
1061	Ferroalloy Ores, Except Vanadium.
1081	Metal Mining Services.
1094, 1099	Miscellaneous Metal Ores.
Sector H: Coal Mines and Coal Mining Related Facilities	
1221-1241	Coal Mines and Coal Mining-Related Facilities.
Sector I: Oil and Gas Extraction and Refining	
1311	Crude Petroleum and Natural Gas.
1321	Natural Gas Liquids.
1381-1389	Oil and Gas Field Services.
2911	Petroleum Refineries.
(Sector J: Mineral Mining and Dressing Facilities (SIC 1411-1499) are not authorized under this permit – see the Non-Metallic Mineral Mining General Permit (VAG84) for permit coverage.)	

Sector K: Hazardous Waste Treatment, Storage, or Disposal Facilities	
HZ	Hazardous Waste Treatment Storage or Disposal.
Sector L: Landfills and Land Application Sites	
LF	Landfills, Land Application Sites, and Open Dumps.
Sector M: Automobile Salvage Yards	
5015	Automobile Salvage Yards.
Sector N: Scrap Recycling Facilities	
5093	Scrap Recycling Facilities.
4499 (limited to list)	Dismantling Ships, Marine Salvaging, and Marine Wrecking - Ships for Scrap
Sector O: Steam Electric Generating Facilities	
SE	Steam Electric Generating Facilities.
Sector P: Land Transportation and Warehousing	
4011, 4013	Railroad Transportation.
4111-4173	Local and Highway Passenger Transportation.
4212-4231	Motor Freight Transportation and Warehousing.
4311	United States Postal Service.
5171	Petroleum Bulk Stations and Terminals.
Sector Q: Water Transportation	
4412-4499 (except 4499 facilities as specified in Sector N)	Water Transportation.
Sector R: Ship and Boat Building or Repairing Yards	
3731, 3732	Ship and Boat Building or Repairing Yards.
Sector S: Air Transportation	
4512-4581	Air Transportation Facilities.
Sector T: Treatment Works	
TW	Treatment Works.
Sector U: Food and Kindred Products	
2011-2015	Meat Products.
2021-2026	Dairy Products.
2032-2038	Canned, Frozen and Preserved Fruits, Vegetables and Food Specialties.
2041-2048	Grain Mill Products.
2051-2053	Bakery Products.
2061-2068	Sugar and Confectionery Products.
2074-2079	Fats and Oils.
2082-2087	Beverages.
2091-2099	Miscellaneous Food Preparations and Kindred Products.
2111-2141	Tobacco Products.
Sector V: Textile Mills, Apparel, and Other Fabric Product Manufacturing, Leather and Leather Products	
2211-2299	Textile Mill Products.
2311-2399	Apparel and Other Finished Products Made from Fabrics and Similar Materials.
3131-3199 (except 3111 - see Sector Z)	Leather and Leather Products, except Leather Tanning and Finishing.
Sector W: Furniture and Fixtures	
2434	Wood Kitchen Cabinets.

2511-2599	Furniture and Fixtures.
Sector X: Printing and Publishing	
2711-2796	Printing, Publishing, and Allied Industries.
Sector Y: Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries.	
3011	Tires and Inner Tubes.
3021	Rubber and Plastics Footwear.
3052, 3053	Gaskets, Packing, and Sealing Devices and Rubber and Plastics Hose and Belting.
3061, 3069	Fabricated Rubber Products, Not Elsewhere Classified.
3081-3089	Miscellaneous Plastics Products.
3931	Musical Instruments.
3942-3949	Dolls, Toys, Games and Sporting and Athletic Goods.
3951-3955 (except 3952 facilities as specified in Sector C)	Pens, Pencils, and Other Artists' Materials.
3961, 3965	Costume Jewelry, Costume Novelties, Buttons, and Miscellaneous Notions, Except Precious Metal.
3991-3999	Miscellaneous Manufacturing Industries.
Sector Z: Leather Tanning and Finishing	
3111	Leather Tanning, Currying and Finishing.
Sector AA: Fabricated Metal Products	
3411–3499	Fabricated Metal Products, except Machinery and Transportation Equipment.
3911–3915	Jewelry, Silverware, and Plated Ware
Sector AB: Transportation Equipment, Industrial or Commercial Machinery	
3511-3599 (except 3571-3579 - see Sector AC)	Industrial and Commercial Machinery (except Computer and Office Equipment).
3711-3799 (except 3731, 3732 - see Sector R)	Transportation Equipment (except Ship and Boat Building and Repairing).
Sector AC: Electronic, Electrical, Photographic, and Optical Goods	
3571-3579	Computer and Office Equipment.
3612-3699	Electronic and Other Electrical Equipment and Components, except Computer Equipment.
3812-3873	Measuring, Analyzing and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks.
Sector AD: Non-classified Facilities/Stormwater Discharges Designated By the Board As Requiring Permits	
N/A	Stormwater Discharges Designated by the Board for Permitting under the Provisions of 9VAC25-31-120 A 1 c, or Under 9VAC25-31-120 A 7 a (1) or (2) of the VPDES Permit Regulation. (Note: Facilities may not elect to be covered under Sector AD. Only the Board may assign a facility to Sector AD.)

Owners/operators of facilities currently covered under the 2009 Industrial Stormwater General Permit (ISWGP) who wish to continue coverage under this general permit must submit a new Registration Statement to the Department.

This permit covers stormwater discharges from a wide variety of industrial activities. Because the conditions which affect the presence of pollutants in stormwater discharges vary among industries, the permit contains both general stormwater pollution prevention plan requirements that apply to all facilities, and industry-specific sections (sector specific requirements) that describe any additional stormwater pollution prevention plan requirements, applicable numeric effluent limitation requirements, and any benchmark monitoring requirements for that industrial sector.

The volume and quality of stormwater discharges associated with industrial activity will depend on a number of factors, including the industrial activities occurring at the facility, the nature of precipitation, and the degree of surface imperviousness. Pollutants in stormwater discharges from industrial plants may be reduced using the following methods: eliminating pollution sources, implementing Best Management Practices (BMPs) to prevent pollution, using traditional stormwater management practices, and providing end-of-pipe treatment.

This VPDES general permit follows the basic framework of the U.S. EPA final 2008 Multi-Sector General Permit (MSGP) published in the Federal Register on September 29, 2008 (73 FR 56572). Readers are also referred to the September 29, 1995 Federal Register (60 FR 50803 - EPA's 1995 MSGP), and EPA's final 2008 MSGP Fact Sheet (available on EPA's web site) for details on the profiles of the various industrial sectors, reviews of pollutants found in stormwater, selection of analytical monitoring parameters, estimated costs for pollution prevention measures, and stormwater pollution control options for each industry type.

In the case where a facility has industrial activities occurring on-site which are described by any of the subsectors in the general permit, those industrial activities are considered to be co-located industrial activities. Stormwater discharges from co-located industrial activities are authorized by this permit, provided that the permittee complies with any and all additional pollution prevention plan and monitoring requirements applicable to the co-located industrial activity. Permittees are required to determine which additional pollution prevention plan and monitoring requirements are applicable to the co-located industrial activity by examining the narrative descriptions of each sector specific coverage section of the permit (Discharges Covered Under This Section).

Limitations on Coverage

Because of the broad scope of this permit, most industrial activities currently regulated under the VPDES stormwater program are eligible to be covered under the permit. There are, however, several types of stormwater discharges which are not covered under this permit. Discharges into a waterbody where a discharge is prohibited by another regulation of the State Water Control Board are not authorized by this general permit. If an owner has been required to obtain an individual VPDES permit for their stormwater discharges pursuant to 9VAC25-31-170 B 3 (VPDES Permit Regulation), they are not authorized for coverage under this permit. Discharges from VPDES permitted construction activities are also not eligible for coverage under this permit.

Other discharges of stormwater that are not authorized under the general permit are:

1. Discharges that are not within the industrial sectors identified in Table 1 (unless they are designated by the Board for coverage under sector AD);

2. Discharges that violate or would violate the antidegradation policy in the Water Quality Standards at 9VAC25-260-30;

3. Discharges that are not consistent with the assumptions and requirements of an approved TMDL; and

4. Discharges subject to stormwater effluent limitation guidelines not described in the permit.

Stormwater discharges from non-metallic mineral mining facilities (SIC Major Group 14), and concrete block and brick; concrete products, except block and brick; and ready-mixed concrete facilities (SIC codes 3271-3273) are not covered by this permit. Facilities in these SIC categories should seek coverage under separate VPDES general permits (VAG84 and VAG11) developed specifically for these industries.

Authorized non-stormwater discharges. The following non-stormwater discharges are authorized by this permit: discharges from fire fighting activities; fire hydrant flushings; potable water, including water line flushings; uncontaminated condensate from air conditioners, coolers, and other compressors and from the outside storage of refrigerated gases or liquids; irrigation drainage; landscape watering provided all pesticides, herbicides, and fertilizer have been applied in

accordance with the approved labeling; pavement wash waters where no detergents are used and no spills or leaks of toxic or hazardous materials have occurred (unless all spilled material has been removed); routine external building washdown which does not use detergents; uncontaminated ground water or spring water; foundation or footing drains where flows are not contaminated with process materials; and incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but NOT intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown or drains).

All other non-stormwater discharges are not authorized and shall either be eliminated or covered under a separate VPDES permit.

Summary of Significant Changes From the 2009 Industrial Stormwater General Permit

This general permit replaces the 2009 ISWGP which was issued for a five-year term on July 1, 2009. Following is a list of significant changes included in the permit as compared to the 2009 permit: *(NOTE: a complete list of the changes made to the regulation and general permit are shown in the Agency Background Document, TH09 available on-line at the Town Hall website. The complete list of changes start on p. 56 of that document.)*

Section 10 - Definitions. Modified the definitions of "best management practices", "co-located Industrial activity", "industrial stormwater", and "stormwater discharge associated with industrial activity" to conform with EPA's definitions.

Added definitions for "Board", "closed landfill", "Department", "Director", "measurable storm event", "minimize", "MS4", "primary industrial activity", "site", and "Virginia Environmental Excellence Program" to clarify these terms for this permit regulation.

Section 15 - Applicability of incorporated references based on the dates that they became effective. Added this section to define the applicable date of EPA 40 CFR references used in the regulation. This section is being added to all general permit regulations as they are reissued.

Section 50 - Authorization to Discharge. Reformatted this section to be consistent with the way this is now being included in other general permits.

Section 50 - Authorization to Discharge, Subsection A. Added an opening paragraph to clarify which facilities are eligible to discharge under the permit.

Section 50 - Authorization to Discharge, Subsection B. Added two reasons why a facility's discharge would not be eligible for coverage under the permit: (1) if the discharge violates or would violate the antidegradation policy in the Water Quality Standards at 9VAC25-260-30, and (2) if the discharge is not consistent with the assumptions and requirements of an approved TMDL. These restrictions on coverage are being added to all general permits as they are reissued. Noted in this section that Virginia's Phase I Chesapeake Bay TMDL Watershed Implementation Plan (November 29, 2010) states that wasteloads for future growth for new facilities in the Chesapeake Bay watershed with industrial stormwater discharges cannot exceed the nutrient and sediment loadings that were discharged prior to the land being developed for the new industrial activity. For purposes of this permit regulation, facilities that commence construction after June 30, 2014, must be consistent with this requirement to be eligible for coverage under this general permit.

Section 50 - Authorization to Discharge, Subsection F. Added language to allow for administrative continuance of coverage under the expiring general permit until the new permit is issued by the Board, and facility coverage is either granted or denied. The permittee must submit a timely and complete registration statement prior to the expiration date of the existing permit, and be in compliance with the terms of the expiring permit in order to qualify for continuance. This language is being added to all general permits as they are reissued so permittees can discharge legally and safely if the permit reissuance process is delayed.

Section 60 – Registration Statement (RS). Modified the RS to ask for a FAX number for the facility; the nature of the business; for new facilities, whether the SWPPP has been prepared; facility information on total facility area, area of industrial activity, the impervious area of the industrial activity, and the area draining to each industrial activity outfall. Added three questions from the 2009 RS form regarding a facility's discharges that were left off the 2009 permit. Also added new questions for scrap recycling/waste recycling facilities and primary airports. These questions help the Department to determine the monitoring requirements and appropriate DMRs to send with the permit to the owner. Changed the map submittal requirement to require just a general location map and a site map showing property boundaries, industrial activity areas, outfalls and all receiving waters.

Added a question for newly constructed facilities in the Chesapeake Bay watershed. To be eligible for permit coverage, new facilities that commence construction after June 30, 2014, must submit documentation that they have either installed measures and controls to meet the "no net increase" of nutrients and sediment from the site prior to their developing the land for the industrial activity, or alternatively, they may consider utilization of any pollutant trading or offset program in accordance with §§ 62.1-44.19:20 through 62.1-44.19:23 of the Code of Virginia, governing trading and offsetting, to meet the no net increase requirement. The submitted documentation has to include the supporting calculations, and the total phosphorus load can't exceed the greater of: (i) the total phosphorus load that was discharged from the industrial area of the property prior to the land being developed for the new industrial activity, or (ii) 0.41 pounds per acre per year (the Virginia Stormwater Management Program (VSMP) water quality design criteria). The owner may include additional non-industrial land on the site as part of any plan to comply with the no net increase requirement. Consistent with the definition of "site", this includes adjacent land used in connection with the facility.

Specified that the RS may be delivered to the Department by postal mail or electronically. Deleted the provision that a facility's RS be posted to the Department's public website for 30 days prior to the Board granting the facility general permit coverage. Of the 1360(+) registrations that the Department received and posted for the 2009 general permit reissuance, only one public comment was received. It was decided to remove the provision from the regulation itself and develop a web-based method to make the RS's available for public review.

Section 65 – Termination of Permit Coverage. Moved this whole section into the permit itself as a special condition (SC #13) so the permittee (who usually only has the permit itself) would have the requirements in the permit.

Section 70 - General Permit, Part I A (Effluent Limitations and Monitoring Requirements).

Benchmark Monitoring, Effluent Limitation Monitoring and Impaired Waters Monitoring. Increased the monitoring for these monitoring types from annual to semi-annual. This will allow the permittee to see more quickly when they have benchmark or effluent limitation exceedances, and will improve water quality by having SWPPP modifications, control measure adjustments and corrective actions taken sooner in the process. This will also allow the Department to better track compliance with the monitoring requirements, and to see more quickly which facilities are having stormwater quality issues so that inspections can be targeted to the facilities that need more attention. Having all the monitoring on the same semi-annual basis will also take the confusion out of the reporting requirements for the permittee.

Impaired Waters Monitoring (both with and without an approved TMDL). Specified that facilities that are a source of the specified pollutant of concern to waters for which a TMDL wasteload allocation has been approved prior to the term of this permit will be notified as such by the Department when they are approved for coverage under the general permit. Also specified that facilities that discharge to waters listed as impaired in the 2012 Final 305(b)/303(d) Water Quality Assessment Integrated Report, and for which a TMDL wasteload

allocation has not been approved prior to the term of this permit, will be notified as such by the Department when they are approved for coverage under the general permit.

For the proposed version of the regulation, we included a note in both the TMDL and in the Impaired Waters Monitoring sections indicating that facilities discharging to waters impaired for PCBs should follow the monitoring schedule and the pollutant minimization plan (PMP) requirements described in the written notification from the Department. We were proposing to add the note to clarify that PCB TMDLs/Impaired Waters have slightly different requirements than other TMDLs/Impaired Waters. Based on the comments we received, we decided that we were adding a layer of confusion to the permit that we didn't want or need. The Department will still explain the PCB PMP requirements to permittees when permit coverage is issued, and we inform them of the PCB TMDL/Impaired Water monitoring requirements.

Specified that the permittee may apply for a waiver from either the TMDL monitoring or the Impaired Waters monitoring if the DMR data shows that their discharges are below the "quantitation level". The laboratory certificate of analysis has to be submitted with their waiver request. This was done to eliminate the confusion as to what "not present" and "not detected" meant in the previous permit.

Specified that representative outfall sampling is allowed for these monitoring types, consistent with EPA's 2008 MSGP.

Inactive and Unstaffed Sites. Added that a waiver of the quarterly visual assessments, routine facility inspections, and monitoring requirements (including benchmark, effluent limitation, and impaired waters monitoring) may be granted by the Board at a facility that is both inactive and unstaffed, as long as the facility remains inactive and unstaffed and there are no industrial materials or activities exposed to stormwater. The owner of such a facility is still required to conduct an annual comprehensive site inspection. They must notify the Department within 30 days if the facility becomes either active or staffed, and all quarterly visual assessments, routine facility inspections, and monitoring requirements would then resume immediately.

Corrective Actions. Removed the follow-up monitoring required by the current permit for an exceedance of an effluent limit or a TMDL wasteload allocation. The follow-up monitoring in the existing permit was very difficult for the Department to track, and confusing for the permittees to implement. Often, the follow-up monitoring had to be conducted during the next monitoring period (because many permittees only do their sampling at the end of the monitoring period), which led to confusion as to whether the follow-up sampling qualified as the permittee's normal sampling for that monitoring period as well. The revised permit now requires the permittee to take corrective actions and submit a corrective action report to the Department whenever effluent limits or TMDL wasteload allocations are exceeded. This change will allow the Department to see quickly when a facility is having a stormwater quality issue, and what measures the permittee is taking to correct the problem. With the sampling periods now changed to semi-annual for all monitoring types, the permittee will know exactly when sampling is required, and the Department will be able to track compliance with the monitoring requirement. All DMRs are now due by January 10th and by July 10th each year.

Section 70 - General Permit, Part I B - Special Conditions. Added or modified the permit special conditions as follows:

(1) Modified SC #1 (allowable Non-stormwater Discharges) to make the list of these discharges consistent with EPA's 2008 MSGP.

(2) Replaced the existing SC #6 (which was "Salt storage piles") with: "Approval for coverage under this general permit does not relieve the permittee of the responsibility to comply with any other applicable federal, state, or local statute, ordinance, or regulation." This condition comes from the regulation Section 151-50 E, and is being added to the

special conditions section of general permits as they are reissued. It was felt that it needed to be in the permit itself, and not just in the regulation section. The "salt storage pile" section was moved to the stormwater pollution prevention plan (SWPPP) section of the permit.

(3) Added subsection "b" to SC #7 (Discharges subject to TMDL Wasteload Allocations) to require facilities in the Chesapeake Bay watershed to monitor their discharges for sediment and nutrients semi-annually for the first two years of permit coverage (four samples) to characterize the contributions from their facility's specific industrial sector for these parameters.

For Virginia's Phase I Chesapeake Bay TMDL Watershed Implementation Plan (WIP) (November 29, 2010), Virginia estimated the loadings from industrial stormwater facilities by using actual and estimated facility acreage information, and TP, TN, and TSS loading values from the Northern Virginia Planning District Commission (NVPDC) *Guidebook for Screening Urban Nonpoint Pollution Management Strategies,* prepared for the Metropolitan Washington Council of Governments. Annandale, VA. November, 1979. Estimates were necessary because very limited individual data on facility size, urban land use, and nutrient and sediment loadings was known. Because of this, no specific wasteload allocations were developed for industrial stormwater facilities. Industrial stormwater loads for the WIP were an aggregate, and the aggregate load was included as part of the local load allocation for regulated MS4s.

For this permit reissuance, facility area information, along with the TP, TN and TSS data will be collected from all permittees in the Chesapeake Bay watershed, and will be used by the Board to quantify the actual nutrient and sediment loads from the permitted industrial stormwater facilities and industrial sectors. This data will be submitted to EPA to aid them in further refinements to their Chesapeake Bay TMDL model. The loading information will also be used by the Board to determine any additional load reductions needed for industrial stormwater facilities for the next reissuance of this permit in 2019.

We added subsection b (2) to allow facilities that were covered under the 2009 industrial stormwater general permit that sampled for TSS, TN or TP to use the applicable sampling data from the last two monitoring periods of that permit to satisfy part of the four consecutive monitoring periods requirement for the Chesapeake Bay TMDL sampling.

We also added subsection b (3) that requires the permittees to analyze the collected nutrient and sediment data, and to develop TMDL action plans where load reductions are necessary. The permittee has to average the data collected at the facility for each of the pollutants of concern (POC) (i.e., TP, TN and TSS) and compare the results to the WIP loading values for TP, TN and TSS (i.e., TP - 1.5 lb/ac/yr; TN - 12.3 lb/ac/yr; TSS - 440 lb/ac/yr). To calculate the facility loadings, the permittee may use either: (i) actual annual average rainfall data for the facility location (in inches/year), or the Virginia annual average rainfall of 44.3 inches/year; or (ii) another method approved by the Board.

The ~~permittee may use~~ regulation contains the following formula to determine the loading value:

$$L = (0.2263 \times R \times C) / A$$

where:

L = the POC loading value (lb/acre/year)
R = the annual average rainfall (inches/year)
C = the POC average concentration of all samples at the facility (mg/L)
A = the facility industrial activity area (acres)

However, the above equation has an error. The numerator should NOT be divided by the facility area. The facility area, in conjunction with the rainfall, is used to calculate the flow

value for the equation. In addition, the equation assumes 100% of the rainfall runs off the site, which is not correct. The correct calculations should be:

$L\ (lb/yr) = 0.226 \times R\ (in/yr) \times C\ (mg/L) \times A\ (acres)$

When the load is divided by the Area to get L in (lb/acre/yr), it becomes:

$L\ (lb/acre/yr) = 0.226 \times R\ (in/yr) \times C\ (mg/L).$

where:

L = the POC loading value (lb/acre/year)
C = the POC average concentration of all facility samples (mg/L)
0.226 = unit conversion factor
R = annual runoff (in/yr), calculated as:

$R = P \times P_j \times R_v$

where:

P = annual rainfall (in/yr)
P_j = fraction of annual events that produce runoff (usually 0.9)
R_v = runoff coefficient, which can be expressed as:

$R_v = 0.05 + (0.9 \times I_a)$

where:

I_a = the impervious fraction (the ratio of facility impervious area to the total facility area)

Using I_a = 80%, R_v = 0.77. If facility specific impervious area data is available, that should be used in the calculation.

The correct formula that should be used to calculate the loading values is:

$L = 0.226 \times P \times P_j \times (0.05 + (0.9 \times I_a)) \times C$

If the calculated facility loading value for TP or TN or TSS is above the WIP loading values for TP or TN or TSS, then the permittee has to develop and submit to the Board for review and approval a Chesapeake Bay TMDL Action Plan. The plan must be submitted within 90 days from the end of the second year's monitoring period (by September 28, 2016). The permittee must implement the approved plan over the remaining term of the permit, and achieve all the necessary reductions by June 30, 2024. The EPA Chesapeake Bay TMDL requires that all nutrient and sediment reductions be done by 2025, so this schedule will meet that milestone.

The action plan has to include:

(1) A determination of the total pollutant load reductions for TP, TN and TSS (as appropriate) necessary to reduce the annual loads from industrial activities. This is to be determined by calculating the difference between the WIP loading values, and the average of the sampling data for TP, TN or TSS (as appropriate) for the entire facility. The reduction applies to the total difference calculated for each pollutant of concern.

(2) The means and methods, such as management practices and retrofit programs, that will be utilized to meet the required reductions determined in section (1), and a schedule to achieve those reductions by June 30, 2024. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions.

(3) The permittee may consider utilization of any pollutant trading or offset program in accordance with §§ 62.1-44.19:20 through 62.1-44.19:23 of the Code of Virginia, governing trading and offsetting, to meet the required reductions.

Permittees required to develop and implement a Chesapeake Bay TMDL Action Plan must submit an Annual Report to the Department by June 30th of each year describing the progress in meeting the required reductions.

(4) Added SC #8 which requires facilities discharging through a regulated municipal separate storm sewer system (MS4) to waters subject to the Chesapeake Bay TMDL to incorporate measures and controls into their stormwater pollution prevention plan (SWPPP) to comply with the local ordinances if the facility is notified by the MS4 operator that the locality has adopted ordinances to meet the Chesapeake Bay TMDL. Permittees are already required to comply with any other applicable federal, state, or local statute, ordinance, or regulation (see regulation section 151-50 E, and permit special condition #6), so this special condition just notifies them that their locality may adopt special Chesapeake Bay TMDL ordinances that would apply to them as well.

(5) Added SC #9. Virginia's Phase I Chesapeake Bay TMDL Watershed Implementation Plan (November 29, 2010), states that the wasteloads from any expansion of an existing permitted facility discharging stormwater in the Chesapeake Bay watershed cannot exceed the nutrient and sediment loadings that were discharged from the expanded portion of the land prior to the land being developed for the industrial activity.

For any industrial activity area expansions (i.e., construction activities, including clearing, grading and excavation activities) that commence on or after July 1, 2014 (the effective date of this permit), the permittee has to document in the SWPPP the information and calculations used to determine the nutrient and sediment loadings discharged from the expanded land area prior to the land being developed, and the measures and controls that were employed to meet the no net increase of stormwater nutrient and sediment load as a result of the expansion of the industrial activity. Any land disturbance that is exempt from permitting under the VPDES construction stormwater general permit regulation (9VAC25-880) is exempt from this requirement.

The permittee may use the VSMP water quality design criteria to meet these requirements. Under this criteria, the total phosphorus load can't exceed the greater of: (i) the total phosphorus load that was discharged from the expanded portion of the land prior to the land being developed for the industrial activity or (ii) 0.41 pounds per acre per year. Compliance with the water quality design criteria may be determined utilizing the Virginia Runoff Reduction Method or another equivalent methodology approved by the Board. Design specifications and pollutant removal efficiencies for specific best management practices (BMPs) can be found on the Virginia Stormwater BMP Clearinghouse website at http://www.vwrrc.vt.edu/swc.

Alternatively, the permittee may consider utilization of any pollutant trading or offset program in accordance with §§ 62.1-44.19:20 through 62.1-44.19:23 of the Code of Virginia, governing trading and offsetting, to meet the no net increase requirement.

(6) SC #10 – Water Quality Protection. Modified this special condition extensively. The language that was retained is consistent with EPA's Final 2008 MSGP. The language that was removed was not from EPA's MSGP, but was added per a suggestion by the 2009 ISWGP Technical Advisory Committee (TAC) that assisted us with that GP's development. For this reissuance, it was decided to remove this language because the 2014 ISWGP TAC felt it was not necessary for the Special Condition. The Corrective Action section of the permit tells the permittee what to do if they exceed an effluent limit, TMDL wasteload allocation concentration or a water quality standard, and the SWPPP describes what the permittee must do to document the selection, design, and installation of control measures, including BMPs, to eliminate or reduce the pollutants in all stormwater discharges from the facility.

(7) Added SC #13 requiring permittees that discharge to surface waters through an MS4 to notify the owner of the MS4 in writing of the existence of the discharge within 30 days of coverage under this general permit. The permittee has to provide the following information: the name of the facility, a contact person and phone number, the location of the discharge, the nature of the discharge, and the facility's VPDES general permit registration number, and has to copy the Department with the notification. This special condition is being added to all general permits as they are reissued.

(8) Moved the termination of permit coverage from the regulation itself to SC #14 so that the permittee will have the requirements in the permit itself, and not in the regulation. This was done because the permittee usually will not have a copy of the full regulation, only the permit.

Section 80 - General Permit, Part III (Stormwater Pollution Prevention Plan)

Part III B 4 b (5) (Salt Storage Piles) – moved this from the permit special conditions section to the SWPPP to be consistent with EPA's 2008 MSGP.

Part III B 4 b (9) (Dust Suppression) – added this subsection to specify the requirements for dust suppression/control on site. The permittee may use collected stormwater for dust suppression, but there can be no direct discharge to surface waters from dust suppression activities. Potable water, well water, and uncontaminated reuse water may also be used for this purpose.

Sections 90 to 370 - General Permit, Part IV (Sector Specific Permit Requirements)

Section 90 – Sector A (Timber Products Facilities). Specified that SIC 2499-1303 (Mulch, Wood and Bark Facilities) is covered under the permit in this sector. This SIC has been covered all along, but until recently the Department was not aware that mulch operations were classified under that SIC code. Added specific requirements for mulch operations and mulch dyeing operations, along with benchmark monitoring for both of these.

Section 110 – Sector C (Chemical and Allied Products). Specified that SIC 2875 (Composting Facilities) are covered under the permit in this sector. This SIC has been covered all along, but there was still some confusion over where exactly they belonged in the permit. Added benchmark monitoring requirements for these facilities.

Section 150 – Sector G (Metal Mining). Modified this sector extensively to bring it in line with the changes EPA made to their 2008 MSGP. There were no new requirements for these facilities, but EPA cleaned up the language and deleted a lot of requirements that were not necessary for this type of facility.

Section 150 – Sector G (Metal Mining) and Section 160 – Sector H (Coal Mines and Coal Mining Related Facilities). Added the "inactive and unstaffed sites" waiver condition from EPA's 2008 MSGP to these two sectors, which tells facilities how they can qualify for a waiver from the quarterly visual assessments and routine facility inspections for inactive and unstaffed sites.

Section 190 – Sector L (Landfills). Specified that landfills (including landfills in "post-closure care") that have been properly closed and capped in accordance with Virginia waste permitting requirements, and that have no significant materials exposed to stormwater, do not require this permit. This is different than EPA's permit which does not give landfills this option. The way the waste permitting requirements are written, once a landfill is in the Post-Closure Care phase, there is no need for further VPDES permitting of the landfill.

Also, iron was removed from the benchmark monitoring for this sector. This was based on a recommendation from the 2014 ISWGP TAC. High iron concentrations are prevalent in the soils throughout Virginia, and it was felt that having these facilities continue to monitor for it is no longer useful or necessary for this industrial sector. DEQ did an analysis of background

metals concentrations in Virginia soils, and compiled the data in the report "Background Metals Project", Adam Koling, DEQ, August 23, 2012 – DRAFT (see Attachment 1). This report consolidated more than 30 years of background data for metals in Virginia soils, and reported a statistical *upper prediction limit* (UPL) for each of 19 metals. Based on the high iron concentrations throughout Virginia, as verified by the report, it was decided to remove the iron benchmark monitoring for this sector.

Section 210 – Sector N (Scrap and Waste Recycling Facilities). Added benchmark monitoring for source-separated facilities. These facilities are very similar to the non-source separated facilities, and those already had benchmark monitoring requirements. Made the monitoring parameters the same for both.

Section 240 – Sector Q (Water Transportation) and Section 250 – Sector R (Ship and Boat Building and Repair Yards). These two sectors are very similar in their stormwater discharge characteristics. Made the benchmark monitoring requirements the same for both sectors (TSS, copper and zinc). Also for both sectors, defined pressure washing and hull washing activities as process wastewater that need separate VPDES permits (not authorized discharges under this permit).

Section 260 – Sector S (Air Transportation). Modified this sector to add the EPA effluent limitation guideline requirements for the airport deicing category to the permit (40 CFR Part 449). Effluent limits are included for primary airports using deicing products containing urea, and for new primary airports. We also included additional general permit specific monitoring, reporting and recordkeeping requirements from the EPA ELG.

Deleted the benchmark monitoring for deicing at major airports (EPA still has this). No major airports covered under the general permit in Virginia monitored for the deicing benchmark parameters during the current permit term, indicating that none of them exceeded the 100,000 gallons of glycol based deicing chemicals or the 100 tons of urea. With the relatively mild climate in Virginia, it is not anticipated that this will change in the future.

Added benchmark monitoring for TSS and TPH at all airports with maintenance activities (i.e., fueling, lubrication, mechanical repairs, washing, and deicing). These activities are common to all airports and represent much more of an environmental risk in Virginia than do the deicing activities. We made the benchmark monitoring parameters the same as those in Sector P (Land Transportation and Warehousing) because the industrial activities at airports are similar to those at land transportation facilities.

Section 340 – Sector AA (Fabricated Metal Products). Added copper to the benchmark monitoring for fabricated metal products facilities (except coating). Data for individual facilities shows this to be a problem at some of these facilities.

Section 350 – Sector AB (Transportation Equipment, Industrial, or Commercial Machinery). Added benchmark monitoring for TSS, TPH, copper and zinc. The Department has data that shows problems with this sector, and the data will help to get a better understanding of the specific facilities with issues.

Permit Effluent Limitations and Monitoring Requirements

1. Discharge Monitoring Requirements. The permit contains four general types of monitoring requirements: (a) quarterly visual monitoring; (b) benchmark monitoring for specific industrial activities; (c) compliance monitoring for facilities subject to numerical effluent limitations, and (d) impaired waters monitoring, both for those with and without an approved TMDL. These are minimum monitoring requirements and if a permittee so chooses, additional sampling may be conducted to acquire more data to improve the statistical validity of the results. Through increased analytical or visual monitoring the permittee may be able to better ascertain the effectiveness of their pollution prevention plan.

a. Quarterly visual examination of stormwater quality. Each industrial sector is required to conduct a quarterly visual examination of the stormwater discharges from the facility. These visual examinations will assist with the evaluation of the pollution prevention plan, and provides a simple, low cost means of assessing the quality of stormwater discharge with immediate feedback. Facilities covered under this permit are required to conduct a quarterly visual examination of stormwater discharges associated with industrial activity from each outfall, except discharges exempted under the representative discharge provision. The visual examination of stormwater outfalls should include any observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, or other obvious indicators of stormwater pollution. No analytical tests are required to be performed on these samples.

The examination of the sample must be made in well lit areas during normal working hours, where practicable, and when considerations for safety and feasibility allow. The visual examination is not required if there is insufficient rainfall or snow-melt to runoff, or if hazardous conditions prevent sampling. The 2009 permit required that, whenever practicable, the same individual should carry out the collection and examination of discharges throughout the life of the permit to ensure the greatest degree of consistency possible in recording observations. For the 2014 reissuance, this provision was removed based on public comment and to be consistent with EPA's 2008 Final MSGP, which no longer requires this. Grab samples for the examination shall be collected within the first 30 minutes (or as soon thereafter as practical, but not to exceed 3 hours) of when the runoff begins discharging. The "3 hours" is a change for this permit reissuance, and was requested by the TAC. Many facilities have trouble meeting the previous permit's one hour requirement. Three hours gives them more time to collect all the required samples, and is consistent with EPA's 2008 MSGP (EPA's MSGP only requires that the sample be collected "as soon as practicable after the first 30 minutes", and does not specify a maximum time.) Reports of the visual examination include: the examination date and time, examination personnel, visual quality of the stormwater discharge, and probable sources of any observed stormwater contamination. The visual examination reports must be maintained on site with the pollution prevention plan.

When conducting a stormwater visual examination, the pollution prevention team, or team member, should attempt to relate the results of the examination to potential sources of stormwater contamination on the site. For example, if the visual examination reveals an oil sheen, the facility personnel (preferably members of the pollution prevention team) should conduct an inspection of the area of the site draining to the examined discharge to look for obvious sources of spilled oil, leaks, etc. If a source can be located, then this information allows the facility operator to immediately conduct a clean-up of the pollutant source, and/or to design a change to the pollution prevention plan to eliminate or minimize the contaminant source in the future.

To be most effective, the personnel conducting the visual examination should be fully knowledgeable about the stormwater pollution prevention plan, the sources of contaminants on the site, the industrial activities conducted exposed to stormwater and the day to day operations that may cause unexpected pollutant releases.

If the visual examination results in an observation of floating solids, the personnel should carefully examine the solids to see if they are raw materials, waste materials or other known products stored or used at the site. If an unusual color or odor is sensed, the personnel should attempt to compare the color or odor to the colors or odors of known chemicals and other materials used at the facility. If the examination reveals a large amount of settled solids, the personnel may check for unpaved, unstabilized areas or areas of erosion. If the examination results in a cloudy sample that is very slow to settle-out, the personnel should

evaluate the site draining to the discharge point for fine particulate material, such as dust, ash, or other pulverized, ground, or powdered chemicals.

If the visual examination results in a clean and clear sample of the stormwater discharge, this may indicate that no visible pollutants are present. This would be a indication of a high quality result, however, the visual examination will not provide information about dissolved contamination. If the facility is in a sector or subsector required to conduct analytical (chemical) monitoring, the results of the chemical monitoring, if conducted on the same sample, would help to identify the presence of any dissolved pollutants and the ultimate effectiveness of the pollution prevention plan. If the facility is not required to conduct benchmark monitoring, it may do so if it chooses to confirm the cleanliness of the sample.

While conducting the visual examinations, personnel should constantly be attempting to relate any contamination that is observed in the samples to the sources of pollutants on site. When contamination is observed, the personnel should be evaluating whether or not additional BMPs should be implemented in the pollution prevention plan to address the observed contaminant, and if BMPs have already been implemented, evaluating whether or not these are working correctly or need maintenance. Permittees may also conduct more frequent visual examinations than the minimum quarterly requirement, if they so choose. By doing so, they may improve their ability to ascertain the effectiveness of their plan. Using this guidance, and employing a strong knowledge of the facility operations, permittees should be able to maximize the effectiveness of their stormwater pollution prevention efforts through conducting visual examinations which give direct, frequent feedback to the facility operator or pollution prevention team on the quality of the stormwater discharge.

b. Benchmark monitoring requirements. Certain industrial sectors are required to conduct monitoring of their stormwater discharges associated with industrial activity for pollutants of concern. In some cases, the monitoring is applicable only to a subsector rather than the entire industrial sector. Benchmark monitoring requirements involve laboratory chemical analyses of samples collected by the permittee. Table 2 lists the industrial sectors, or subsectors, required to perform benchmark monitoring and the associated parameters.

TABLE 2. INDUSTRIAL SECTORS SUBJECT TO BENCHMARK MONITORING.

Industry Sector [1]	Industry Sub-sector	Benchmark Monitoring Parameters
A	General Sawmills and Planing Mills	TSS.
	Wood Preserving Facilities	Arsenic, Chromium, Copper.
	Log Storage and Handling	TSS.
	Hardwood Dimension and Flooring Mills	TSS.
	Mulch, Wood and Bark Facilities	BOD, TSS.
	Mulching Dying Operations	BOD, TSS, COD, Aluminum, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Zinc, Total N, Total P.
B	Paperboard Mills	BOD.
C	Industrial Inorganic Chemicals	Aluminum, Iron, Total N.
	Plastics, Synthetic Resins, etc.	Zinc.
	Soaps, Detergents, Cosmetics, Perfumes	Total N, Zinc.
	Agricultural Chemicals	Total N, Iron, Zinc, Total P.

	Composting Facilities	TSS, BOD, COD, Ammonia, Total N, Total P.
D	Asphalt Paving and Roofing Materials	TSS.
E	Clay Products	Aluminum.
	Lime and Gypsum Products	TSS, pH, Iron.
F	Steel Works, Blast Furnaces, and Rolling and Finishing Mills	Aluminum, Zinc.
	Iron and Steel Foundries	Aluminum, TSS, Copper, Iron, Zinc.
	Nonferrous Rolling and Drawing	Copper, Zinc.
	Nonferrous Foundries (Castings)	Copper, Zinc.
G [2]	Copper Ore Mining and Dressing	TSS
H	Coal Mines and Coal-Mining Related Facilities	TSS, Aluminum, Iron
K	Hazardous Waste Treatment, Storage or Disposal	TKN, TSS, TOC, Arsenic, Cadmium, Cyanide, Lead, Magnesium, Mercury, Selenium, Silver.
L	Landfills, Land Application Sites, and Open Dumps	TSS.
M	Automobile Salvage Yards	TSS, Aluminum, Iron, Lead.
N	Scrap Recycling and Waste Recycling Facilities	Aluminum, Cadmium, Chromium, Copper, Iron, Lead, Zinc, TSS.
	Ship Dismantling, Marine Salvaging and Marine Wrecking	Aluminum, Cadmium, Chromium, Copper, Iron, Lead, Zinc, TSS.
O	Steam Electric Generating Facilities	Iron.
P	Land Transportation and Warehousing	TPH, TSS.
Q	Water Transportation Facilities	TSS, Copper, Zinc.
R	Ship and Boat Building or Repairing Yards	TSS, Copper, Zinc.
S	Airports	TSS, TPH.
U	Dairy Products.	BOD, TSS.
	Grain Mill Products	TSS, TKN.
	Fats and Oils	BOD, Total N, TSS.
Y	Rubber Products	Zinc.
Z	Leather Tanning and Finishing	TKN.
AA	Fabricated Metal Products Except Coating	Iron, Aluminum, Copper, Zinc.
	Fabricated Metal Coating and Engraving	Zinc.
AB	Transportation Equipment, Industrial, or Commercial Machinery	TSS, TPH, Copper, Zinc.
AD	Non-classified Facilities/Stormwater Discharges Designated By the Board As Requiring Permits	TSS.

[1] Table does not include parameters for compliance monitoring under effluent limitations guidelines.

[2] See Sector G (Part IV G) for additional monitoring discharges from waste rock and overburden piles from active ore mining or dressing facilities, inactive ore mining or dressing facilities, and sites undergoing reclamation.

Benchmark monitoring must be performed for all benchmark parameters specified for the industrial sector or sectors applicable to a facility's discharge. Benchmark monitoring samples must be taken at least during the first four, and potentially all, monitoring periods after permit coverage begins. All benchmark monitoring is semi-annual for this permit

reissuance (January through June, and July through December) and commences with the first full monitoring period after the owner is granted coverage under the permit.

Grab samples are to be collected from the discharge resulting from a storm event that results in an actual discharge from the site (defined as a "measurable" storm event), providing the interval from the preceding measurable storm event is at least 72 hours. The 72-hour storm interval is waived if the permittee can document that less than a 72-hour interval is representative for local storm events during the season when sampling is being conducted. The grab sample must be taken during the first 30 minutes of the discharge. If the collection of a grab sample during the first 30 minutes is impracticable, a grab sample can be taken during the first three (3) hours of the discharge, and the discharger must submit with the monitoring report a description of why a grab sample during the first 30 minutes was impracticable. A minimum of one grab is required. Again, the "3 hours" is a change for this permit reissuance, and was requested by the TAC. Many facilities have trouble meeting the previous permit's one hour requirement. Three hours gives them more time to collect all the required samples, and is consistent with EPA's 2008 MSGP (EPA's MSGP only requires that the sample be collected "as soon as practicable after the first 30 minutes", and does not specify a maximum time.) This provision applies to all benchmark, effluent limitation, and impaired waters monitoring in the permit.

Where the discharge to be sampled contains both stormwater and non-stormwater, the facility is required to sample the stormwater component of the discharge at a point upstream of the location where the non-stormwater mixes with the stormwater, if practicable. In addition to the analytical results, permittees are required to provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; and the duration between the storm event sampled and the end of the previous measurable storm event.

This permit requires benchmark analytical monitoring for discharges from certain classes of industrial facilities. Industries may reduce the level of pollutants in stormwater runoff from their sites through the development and proper implementation of a stormwater pollution prevention plan. Benchmark monitoring is a means by which to measure the concentration of a pollutant in a stormwater discharge. Because these pollutants have been reported at or above benchmark levels, DEQ is requiring monitoring after the pollution prevention plan has been implemented to assess the effectiveness of the pollution prevention plan and to help ensure that a reduction of pollutants is realized. Analytical results are quantitative and therefore can be used to compare results from discharge to discharge and to quantify the improvement in stormwater quality attributable to the stormwater pollution prevention plan, or to identify a pollutant that is not being successfully controlled by the plan. The results of the benchmark monitoring are not intended to be used to evaluate actual or potential exceedances of instream water quality criteria. This permit only requires benchmark monitoring for the industry sectors or subsectors that demonstrated a potential to discharge pollutants at concentrations of concern.

To determine the industry sectors and subsectors that would be subject to benchmark monitoring requirements contained in the general permit, DEQ relied primarily upon the fact sheet prepared for the 1995 EPA MSGP (60 FR 50804), and the fact sheet for EPA's final 2008 MSGP (available from EPA's at http://cfpub2.epa.gov/npdes/stormwater/msgp.cfm). In developing their 1995 MSGP, EPA reviewed the data submitted in accordance with the 1990 group stormwater permit application process. EPA established "benchmark" concentrations for the pollutant parameters on which monitoring results had been received. EPA continued those benchmark requirements for their 2000 MSGP. For the 2008 MSGP, EPA undertook an analysis of the monitoring requirements of the 2000 MSGP that included: how effective existing controls on these discharges have been based on the history of discharge monitoring data; Toxics Release Inventory (TRI) data; and results and

conclusions from the University of California Los Angeles Final Report, *Industrial Stormwater Monitoring Program Existing Statewide Permit Utility and Proposed Modifications*. One of the primary purposes of these analyses was to determine if elimination of, or modification or addition to, benchmark monitoring requirements was warranted. This information helped EPA identify potential pollutants that may be present in the stormwater discharges.

"Benchmarks" are the pollutant concentrations above which EPA determined represents a level of concern. The level of concern is a concentration at which a stormwater discharge could potentially impair, or contribute to impairing water quality or affect human health from ingestion of water or fish. The benchmarks are also viewed by EPA as a level below which there is little potential for water quality concern. As such, the benchmarks also provide an appropriate level to determine whether a facility's stormwater pollution prevention measures are successfully implemented. The benchmark concentrations are not effluent limitations and should not be interpreted as such. These values are merely levels which EPA has used to determine if a stormwater discharge from any given facility merits further monitoring to insure that the facility has been successful in implementing a stormwater pollution prevention plan. As such these levels represent a target concentration for a facility to achieve through implementation of pollution prevention measures at the facility. Based on an evaluation of the EPA fact sheet for the 1995, 2000 and 2008 MSGPs, and the industrial sector-specific analytical monitoring requirements, DEQ added benchmark values for three additional parameters: total organic carbon; total Kjeldahl nitrogen, and total petroleum hydrocarbons. DEQ also combined the parameter "total Kjeldahl nitrogen" with "nitrate plus nitrite as nitrogen" to form the "total nitrogen" parameter. Table 3 lists the EPA MSGP parameter benchmark values (and the DEQ additions).

TABLE 3. EPA MSGP PARAMETER BENCHMARK VALUES

Parameter Name	Benchmark Level	Source
Biochemical Oxygen Demand (5 day)	30 mg/L	5
Chemical Oxygen Demand	120 mg/L	6
Total Suspended Solids	100 mg/L	8
Turbidity	50 NTU	10
Nitrate + Nitrite Nitrogen	0.68 mg/L	8
Total Phosphorus	2.0 mg/L	7
pH	6.0-9.0 s.u.	5
Total Kjeldahl Nitrogen (added by DEQ)	1.5 mg/L	8
Total Nitrogen (added by DEQ)	2.2 mg/L	8
Total Organic Carbon (added by DEQ)	110 mg/L	12
Total Petroleum Hydrocarbons (added by DEQ)	15 mg/L	11
Aluminum, Total (pH 6.5-9)	0.75 mg/L	1
Ammonia	~~19~~ 2.14 mg/L	~~1~~ 13
Antimony, Total	0.64 mg/L	4
Arsenic, Total (c) (see Table 4)	0.15 mg/L #	2
Beryllium, Total (c)	0.13 mg/L	3
Cadmium, Total (H)	0.0021 mg/L	1
Chromium, Total (see Table 4)	1.8 mg/L #	1
Copper, Total (H) (see Table 4)	0.014 mg/L #	1

Cyanide	0.022 mg/L	1
Iron, Total	1.0 mg/L	2
Lead, Total (H) (see Table 4)	0.082 mg/L #	1
Magnesium. Total	0.064 mg/L	9
Manganese	~~0.064~~ 1.0 mg/L	~~9~~ 14
Mercury, Total	0.0014 mg/L	1
Nickel, Total (H)	0.47 mg/L	1
Phenols	0.016 mg/L	9
Selenium, Total (*)	0.005 mg/L	2
Silver, Total (H)	0.0038 mg/L	1
Zinc, Total (H)	0.12 mg/L	1

Sources

1. "EPA Recommended Ambient Water Quality Criteria." Acute Aquatic Life Freshwater (EPA-822-R-02-047 November 2002-CMC)
2. "EPA-Recommended Ambient Water Quality Criteria." Chronic Aquatic Life Freshwater (EPA-822-R-02-047 November 2002-CCC)
3. "EPA Recommended Ambient Water Quality Criteria for Beryllium." LOEL Acute Freshwater (EPA-440-5-80-024 October 1980)
4. "EPA Recommended Ambient Water Quality Criteria" Human Health For the Consumption of Organism Only (EPA-822-R-02-047 November 2002)
5. Secondary Treatment Regulations (40 CFR 133)
6. Factor of 4 times BOD_5 concentration - North Carolina benchmark
7. North Carolina stormwater benchmark derived from NC Water Quality Standards
8. National Urban Runoff Program (NURP) median concentration
9. Minimum Level (ML) based upon highest Method Detection Limit (MDL) times a factor of 3.18
10. Combination of simplified variations on *Stormwater Effects Handbook*, Burton and Pitt, 2001 and water quality standards in Idaho, in conjunction with review of DMR data.
11. Discharge limitations and compliance data
12. Median concentration of Stormwater Effluent Limitation Guideline (40 CFR Part 419)
13. "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses." USEPA Office of Water (PB85-227049 January 1985).
14. Colorado – Chronic Aquatic Life Freshwater – Water Quality Criteria.

Notes:

- See Table 4.
(*) Limit established for oil and gas exploration and production facilities only.
(c) carcinogen
(H) hardness dependent
(PAR) Polynuclear Aromatic Hydrocarbon
Assumptions:
Receiving water temperature - 20 C
Receiving water pH - 7.8
Receiving water hardness CaCO3 - 100 mg/L
Receiving water salinity - 20 g/kg
Acute to Chronic Ratio (ACR) - 10

As can be seen in Table 3, benchmark concentrations were determined based upon a number of existing standards or other sources to represent a level above which water quality concerns could arise. EPA also sought to develop values which can realistically be measured and achieved by industrial facilities. Moreover, stormwater discharges with pollutant concentrations occurring below these levels would not warrant further analytical monitoring due to their de minimis potential effect on water quality.

The primary source of benchmark concentrations is EPA's National Water Quality Criteria, published in 1986 (often referred to as the "Gold Book"). For the majority of the benchmarks, EPA chose to use the acute aquatic life, fresh water ambient water quality

criteria. These criteria represent maximum concentration values for a pollutant which, if exceeded, could cause acute effects on aquatic life such as mortality in a short period of time. Where acute criteria values were not available, EPA used the lowest observed effect level (LOEL) acute fresh water value. The LOEL values represent the lowest concentration of a pollutant that results in an adverse effect over a short period of time. These two acute freshwater values were selected as benchmark concentrations if the value was not below the approved method detection limit as listed in 40 CFR Part 136 and the value was not substantially above the concentration which EPA believes a facility can attain through the implementation of a stormwater pollution prevention plan. These acute freshwater values best represent, on a national basis, the highest concentrations at which typical fresh water species can survive exposures of pollutants for short durations (i.e., a storm discharge event).

Acute freshwater criteria do not exist for a number of parameters on which EPA received data. For these parameters, EPA selected benchmark values from several other references. The benchmark concentrations for five day biochemical oxygen demand (BOD_5) and for pH are determined based upon the secondary wastewater treatment regulations (40 CFR 133.102). EPA believes that the BOD_5 value of 30 mg/L is a reasonable concentration below which adverse effects in receiving waters under wet weather flow conditions should not occur. EPA also believes, that given group application data on BOD_5, this value should be readily achievable by industrial stormwater dischargers. The benchmark value for pH is a range of 6.0-9.0 standard units. EPA believes this level, given the group application data, is reasonably achievable by industrial stormwater dischargers and represents and acceptable range within which aquatic life impacts will not occur. The benchmark concentration for chemical oxygen demand (COD) is based upon the State of North Carolina benchmark values for stormwater discharges, and is a factor of four times the BOD_5 benchmark concentration. EPA has concluded that COD is generally discharged in domestic wastewater at four times the concentration of BOD_5 without causing adverse impacts on aquatic life. EPA selected the median concentration from the National Urban Runoff Program as the benchmark for total suspended solids (TSS), total Kjeldahl nitrogen (TKN) (DEQ) and for nitrate plus nitrite as nitrogen. DEQ combined the benchmarks for TKN and nitrate plus nitrite as nitrogen to come up with a benchmark for total nitrogen (DEQ). EPA believes the median concentration, which is the mid-point concentration (half the samples are above this level and half are below) represents concentration above which water quality concerns may result. For TSS a value of 100 mg/L is similar to the stormwater benchmark used by North Carolina for stormwater permits, and given the group application data, should be readily achievable by industry with implementation of BMPs, many of which are designed for the purpose of controlling TSS. EPA also believes, given the group application data, that there is a relationship between TSS and the amount of exposed industrial activity and that industrial activities even in arid western States should be able to implement BMPs that will accomplish this benchmark. EPA selected the stormwater effluent limitation guideline for petroleum refining facilities as the benchmark for oil and grease and total organic carbon, and DEQ also used the oil and grease value for the total petroleum hydrocarbon benchmark. Given the lack of an acute criteria, EPA selected the chronic fresh water quality criteria as the benchmark for iron. Water quality criteria for waterbodies in the State of North Carolina were used to determine benchmarks for total phosphorus and for fluoride. The concentration value for phosphorus was designed to prevent eutrophication of fresh waterbodies from stormwater runoff. The fluoride value was designed by North Carolina to be protective of water quality, as was the manganese value developed by Colorado. EPA believes that each of these benchmark values represents a reasonable level below which water quality impacts should not occur and they therefore represent a useful level to assess whether a pollution prevention plan is controlling pollution in stormwater discharges.

For several other parameters, EPA chose benchmark values based on numerical adjustments of the acute fresh water quality criteria. Where the acute water quality criterion was below the method detection level for a pollutant, EPA used the "minimum level" (ML) as the benchmark concentration to ensure that the benchmark levels could be measured by permittees. For a few pollutants minimum levels have been published and these were used. For other pollutants, minimum levels needed to be calculated. EPA calculated the minimum levels using the methodology described in the draft "National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-based Effluent Limitations Set Below Analytical Detection/Quantitation Levels" (Michael Cook, OWEC, March 18, 1994).

Additionally, several organic compounds (ethylbenzene, fluoranthene, toluene, and trichloroethylene) have acute fresh water quality criteria at concentrations much higher than criteria developed for the protection of human health when ingesting water or fish. In addition, trichloroethylene is a human carcinogen. Therefore, EPA selected the human health criteria as benchmarks for these parameters. For dimethyl phthalate and total phenols, EPA selected benchmark concentrations based upon existing discharge limitations and compliance data (no industry had median concentrations above the selected benchmark for these parameters and therefore no industry sector is required to monitor for these two pollutants).

EPA conducted statistical analyses of the group Part 2 data for each parameter within every industry sector or subsector listed in Table 3. EPA prepared a statistical analysis of the sampling data for each pollutant parameter reported within each sector or subsector. (Only where EPA did not subdivide an industry sector into subsectors was an analysis of the entire sector's data performed.) The statistical analysis was performed assuming a delta log normal distribution of the sampling data within each sector/subsector. The analyses calculated median, mean, maximum, minimum, 95th, and 99th percentile concentrations for each parameter. The results of the analyses may be found in the appropriate section of Part VIII of EPA's 1995 MSGP fact sheet. From this analysis, EPA was able to identify pollutants for further evaluation within each sector or subsector.

EPA next compared the median concentration for each pollutant for each sector or subsector to the benchmark concentrations listed in Table 3. EPA also compared the other statistical results to the benchmarks to better ascertain the magnitude and range of the discharge concentrations to help identify the pollutants of concern. EPA did not conduct this analysis if a sector had data for a pollutant from less than three individual facilities. Under these circumstances, the sector or subsector would not have this pollutant identified as a pollutant of concern. This was done to ensure that a reasonable number of facilities represented the industry sector or subsector as a whole and that the analysis did not rely on data from only one facility.

Further evaluation of the EPA fact sheet by DEQ has resulted in slight modifications to the benchmark monitoring requirements recommended by EPA. This is most notable in the inclusion of the total Kjeldahl nitrogen and total organic carbon parameters in certain industrial sectors which had median values above the benchmark set by ~~DEQ~~ EPA (Table 3).

In preparation of the 1999 ISWGP fact sheet, DEQ conducted a supplemental analysis of the information presented in the EPA 1995 MSGP fact sheet. For each industry sector or subsector, parameters with a median concentration higher than the EPA benchmark level were considered pollutants of concern for the industry and identified as potential pollutants for analytical monitoring under this permit. DEQ then established its own benchmark concentration values for the pollutants of concern. The levels are set at concentrations that are more specific to permits in Virginia than are those in the 1995 EPA fact sheet. Certain values for metals have been converted from mg/L to µg/L and rounded to two significant digits. The parameters, the benchmark concentration values and the sources from which

they are derived are listed in Table 4. The benchmark concentration values are all at or above levels of quantification that are attainable using EPA approved analytical methods.

TABLE 4. DEQ BENCHMARK MONITORING CONCENTRATION VALUES

Effluent Parameter	Benchmark Concentration	Source
Biochemical Oxygen Demand (5 day)	30 mg/L	1
pH	within the range 6.0-9.0 s.u.	1
Total Suspended Solids	100 mg/L	2
Total Kjeldahl Nitrogen	1.5 mg/L	2
Total Nitrogen	2.2 mg/L	2
Total Organic Carbon	110 mg/L	3
Total Phosphorus	2 mg/L	4
Aluminum	750 µg/L	5
Arsenic	50 µg/L	6
Chromium	16 µg/L	6
Copper	18 µg/L	6
Cyanide	22 µg/L	6
Iron	1.0 mg/L	5
Lead	120 µg/L	6
Zinc	120 µg/L	6

Note: Metals are to be analyzed as total recoverable.

Sources used by DEQ to establish analytical monitoring benchmark concentration values:

1. Secondary Treatment Regulations (40 CFR 133)
2. National Urban Runoff Program (NURP) median concentration
3. Median concentration of Stormwater Effluent Limitation Guideline (40 CFR Part 419)
4. Virginia policy for Nutrient Enriched Waters, 9VAC25-40-10 et seq.
5. "EPA Recommended Ambient Water Quality Criteria." Aquatic Life Freshwater
6. Virginia Water Quality Standards, 9VAC25-260-140

DEQ then analyzed the list of potential pollutants to be monitored against the lists of significant materials exposed and industrial activities which occur within each industry sector or subsector as described in the EPA fact sheet information. Where DEQ could identify a source of a potential pollutant which is directly related to industrial activities of the industry sector or subsector, the permit identifies that parameter for analytical monitoring. If DEQ could not identify a source of a potential pollutant which was associated with the sector/sub-sector's industrial activity, the permit does not require monitoring for the pollutant in that sector/subsector. Industries with no pollutants for which the median concentrations are higher than the benchmark levels are not required to perform analytical monitoring under this permit, with the exceptions explained below.

When the DEQ benchmark concentration values were used to screen the group application data in the EPA fact sheet, several changes were made. The median values for lead at agricultural chemical manufacturing facilities and at water transportation facilities were below the DEQ benchmark concentration value. Therefore, these industrial sectors will not be required to monitor for lead. Data from the scrap recycling and waste recycling facilities indicated that cadmium and chromium may be present in discharges at levels above the DEQ benchmark concentration values. These two parameters were added to the monitoring requirements for that industry. Monitoring for pH was added to the concrete and gypsum subsector due to the nature of the industrial activity and the potential for high pH stormwater discharges.

DEQ also dropped monitoring for chemical oxygen demand in all industrial sectors because it is not an effective indicator parameter for the oxygen demand that effluents exert on receiving waters. Where EPA had required COD monitoring, DEQ substituted BOD_5 (for paperboard mills) or TOC (at hazardous waste facilities), or deleted the requirement. However, for the 2014 reissuance both BOD_5 and COD were included among the benchmark monitoring parameters for sector A Mulch Dyeing Operations, and sector C Composting Facilities. These were included, together with the other parameters, based on DEQ monitoring data for these types of operations.

For the 2014 reissuance, additional changes were made to the benchmark monitoring based on recommendations from the Technical Advisory Committee.

- Sector A (Timber Products Facilities) - added benchmark monitoring for mulch operations and mulch dyeing operations (SIC 2499-1303).
- Sector C (Chemical and Allied Products) - added benchmark monitoring for composting facilities (SIC 2875).
- Sector L (Landfills) – removed the benchmark monitoring for iron. This was based on a recommendation from the 2014 ISWGP TAC. High iron concentrations are prevalent in the soils throughout Virginia, and it was felt that having these facilities continue to monitor for it is no longer useful or necessary for this industrial sector. DEQ did an analysis of background metals concentrations in Virginia soils, and compiled the data in the report "Background Metals Project", Adam Koling, DEQ, August 23, 2012 – DRAFT (see Attachment 1). This report consolidated more than 30 years of background data for metals in Virginia soils, and reported a statistical *upper prediction limit* (UPL) for each of 19 metals. Based on the high iron concentrations throughout Virginia, as verified by the report, it was decided to remove the iron benchmark monitoring for this sector.
- Sector N (Scrap and Waste Recycling Facilities) - added benchmark monitoring for source-separated facilities. These facilities are very similar to the non-source separated facilities, and those facilities already had benchmark monitoring requirements. Made the monitoring parameters the same for both.
- Sector Q (Water Transportation) and Sector R (Ship and Boat Building and Repair Yards) - these two sectors are very similar in their stormwater discharge characteristics. Made the benchmark monitoring requirements the same for both sectors (TSS, copper and zinc).
- Sector S (Air Transportation) - deleted the benchmark monitoring for deicing at major airports. No major airports covered under the general permit in Virginia monitored for the deicing benchmark parameters during the current permit term, indicating that none of them exceeded the 100,000 gallons of glycol based deicing chemicals or the 100 tons of urea. With the relatively mild climate in Virginia, it is not anticipated that this will change in the future. ~~A~~dded benchmark monitoring for TSS and TPH at all airports with maintenance activities (i.e., fueling, lubrication, mechanical repairs, washing, and deicing). These activities are common to all airports and represent much more of an environmental risk in Virginia than do the deicing activities. The benchmark monitoring parameters were made the same as those in Sector P (Land Transportation and Warehousing) because the industrial activities at airports are similar to those at land transportation facilities.
- Sector AA (Fabricated Metal Products) - added copper to the benchmark monitoring for fabricated metal products facilities (except coating). Data for individual facilities shows this to be a problem at some of these facilities.

- Sector AB (Transportation Equipment, Industrial, or Commercial Machinery) - added benchmark monitoring for TSS, TPH, copper and zinc. The Department has data that shows problems with this sector, and the data will help to get a better understanding of the specific facilities with issues.

c. Compliance Monitoring for Facilities Subject to Numeric Effluent Limitations. Two types of effluent limitation compliance monitoring have been identified in the permit: (1) facilities subject to stormwater effluent limitation guidelines; and (2) coal pile runoff monitoring.

(1) Facilities Subject to Stormwater Effluent Limitation Guidelines. Compliance monitoring requirements are imposed under this permit to ensure that discharges subject to numerical effluent limitations under the stormwater effluent limitations guidelines are in compliance with those limitations. Eight types of stormwater discharges subject to effluent limitation guidelines may be covered under this general permit. These discharges include contaminated stormwater runoff from timber products facilities, phosphate fertilizer manufacturing facilities, runoff associated with asphalt paving or roofing emulsion production, runoff from material storage piles at cement manufacturing facilities, contaminated runoff from hazardous waste landfills, contaminated runoff from municipal solid waste landfills, airport deicing at primary airports, and coal pile runoff at steam electric generating facilities. Effluent limitations are listed in the Sector-Specific Permit Requirements section of the permit (Part IV). These limitations are required under the VPDES permit regulation, 9VAC25-31-220 A, and EPA's stormwater effluent limitation guidelines in the Code of Federal Regulations at 40 CFR Part 429, Part 418, Part 443, Part 411, Part 445 Subparts A and B, Part 449, and Part 423. The effluent limitations for the eight discharge categories are listed in Table 5.

TABLE 5. NUMERIC EFFLUENT LIMITATIONS

Industrial Sector	Parameter	Effluent Limitation	
Coal Pile Runoff Coal pile runoff at any covered facility (40 CFR Part 423).	Total Suspended Solids (TSS)	50 mg/l, max	
	pH	6.0 - 9.0 min. and max.	
Sector A - Timber Products Wet Decking Discharges at Log Storage and Handling Areas (40 CFR Part 429 Subpart I) (SIC 2411).	pH	6.0 - 9.0 s.u.	
	Debris (woody material such as bark, twigs, branches, heartwood, or sapwood)	No discharge of debris that will not pass through a 2.54 cm (1") diameter round opening.	
Sector C - Chemical and Allied Products Manufacturing Phosphate Subcategory of the Fertilizer Manufacturing Point Source Category (40 CFR 418.10) (SIC 2874).	Total Phosphorus (as P)	105 mg/L, Daily Maximum	35 mg/L, 30-day Average
	Fluoride	75 mg/L, Daily Maximum	25 mg/L, 30-day Average
Sector D - Asphalt Paving and Roofing Materials Discharges from areas where production of asphalt paving and roofing emulsions occurs (40 CFR Part 443 Subpart A) (SIC 2951, 2952).	Total Suspended Solids (TSS)	23 mg/L, Daily Maximum	15 mg/L, 30-day Average
	Oil and Grease	15 mg/L, Daily Maximum	10 mg/L, 30-day Average
	pH	6.0 - 9.0 s.u.	
Sector E - Glass, Clay, Cement, Concrete and Gypsum Products Cement Manufacturing Facility, Material Storage Run-off (40 CFR Part 411 Subpart C).	Total Suspended Solids (TSS)	50 mg/L, Daily Maximum	
	pH	6.0 - 9.0 s.u.	
Sector K - Hazardous Waste TSD Facilities		Maximum Daily	Max. Monthly Ave.

Hazardous Waste Treatment, Storage, or Disposal Facilities (Industrial Activity Code "HZ") Subject to the Provisions of 40 CFR Part 445 Subpart A.	Biochemical Oxygen Demand (BOD_5)	220 mg/L	56 mg/L
	Total Suspended Solids (TSS)	88 mg/L	27 mg/L
	Ammonia	10 mg/L	4.9 mg/L
	Alpha Terpineol	0.042 mg/L	0.019 mg/L
	Aniline	0.024 mg/L	0.015 mg/L
	Benzoic Acid	0.119 mg/L	0.073 mg/L
	Naphthalene	0.059 mg/L	0.022 mg/L
	p-Cresol	0.024 mg/L	0.015 mg/L
	Phenol	0.048 mg/L	0.029 mg/L
	Pyridine	0.072 mg/L	0.025 mg/L
	Arsenic (Total)	1.1 mg/L	0.54 mg/L
	Chromium (Total)	1.1 mg/L	0.46 mg/L
	Zinc (Total)	0.535 mg/L	0.296 mg/L
	pH	Within the range of 6.0 - 9.0 s.u.	
Sector L - Landfills Landfills (Industrial Activity Code "LF") Which Are Subject to the Requirements of 40 CFR Part 445 Subpart B.		Maximum Daily	Max. Monthly Ave.
	Biochemical Oxygen Demand (BOD_5)	140 mg/L	37 mg/L
	Total Suspended Solids (TSS)	88 mg/L	27 mg/L
	Ammonia	10 mg/L	4.9 mg/L
	Alpha Terpineol	0.033 mg/L	0.016 mg/L
	Benzoic Acid	0.12 mg/L	0.071 mg/L
	p-Cresol	0.025 mg/L	0.014 mg/L
	Phenol	0.026 mg/L	0.015 mg/L
	Zinc (Total)	0.20 mg/L	0.11 mg/L
	pH	Within the range of 6.0 - 9.0 s.u.	
Sector S – Air Transportation Discharges from deicing operations at primary airports, (40 CFR Part 449)	Airfield Pavement Deicing	Daily Maximum	
	Ammonia as Nitrogen	14.7 mg/L	
	Aircraft Deicing	Daily Maximum	Weekly Average
	Chemical Oxygen Demand (COD)	271 mg/L	154 mg/L

Compliance monitoring must be performed at least once during each of the monitoring periods after permit coverage begins. All compliance monitoring is semi-annual for this permit reissuance (January through June, and July through December) and commences with the first full monitoring period after the owner is granted coverage under the permit.

All samples are to be grab samples taken within the first 30 minutes of discharge where practicable, but in no case later than the first three (3) hours of discharge. The samples are to be taken from the discharges subject to the numeric effluent limitations prior to mixing with other discharges. Discharges subject to numeric effluent limitations are not eligible for the representative discharge (substantially identical outfalls) sampling waiver provisions of the permit.

In addition to the analytical results, permittees are required to provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; and the duration between the storm event sampled and the end of the previous measurable storm event.

(2) Coal Pile Runoff Monitoring. This permit establishes effluent limitations of 50 mg/L total suspended solids and a pH range of 6.0-9.0 for coal pile runoff. Any untreated overflow from facilities designed, constructed, and operated to treat the volume of coal pile runoff associated with a 10-year, 24-hour rainfall event is not subject to the 50 mg/L limitation for total suspended solids. The permit extends these effluent limitations to all industrial operations that discharge coal pile runoff, where the coal pile runoff can be defined as a stormwater discharge associated with industrial activity (i.e., at a plant in one of the industrial sectors listed in Table 1). DEQ has adopted these technology-based pH limitations in this general permit in accordance with setting limits on a case-by-case basis as allowed under 9VAC25-31-220 A. These case-by-case limits are derived by transferring the known achievable technology from an effluent guideline to a similar type of discharge. When developing these technology-based limitations, variables such as rainfall pH, sizes of coal piles, pollutant characteristics, and runoff volume were considered. Therefore, these variables need not be considered again. As discussed above, these pH limitations are technology-based and are not based on water quality. Facilities must comply with these limitations upon submittal of the registration statement. Facilities with treatment works for coal pile runoff are expected to meet the limitations.

Monitoring must be performed at least once during each of the monitoring periods after permit coverage begins. The coal pile monitoring is semi-annual for this permit reissuance (January through June, and July through December) and commences with the first full monitoring period after the owner is granted coverage under the permit.

All samples are to be grab samples taken within the first 30 minutes of discharge where practicable, but in no case later than the first three (3) hours of discharge. The samples are to be taken from the discharges subject to the numeric effluent limitations prior to mixing with other discharges. Discharges subject to numeric effluent limitations are not eligible for the representative discharge (substantially identical outfalls) sampling waiver provisions of the permit.

In addition to the analytical results, permittees are required to provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; and the duration between the storm event sampled and the end of the previous measurable storm event.

d. Impaired Waters Monitoring, For Both Facilities With and Without an Approved TMDL. Two types of impaired waters monitoring have been identified in the permit: (1) facilities discharging to impaired waters with an approved TMDL wasteload allocation; and (2) facilities discharging to impaired waters without an approved TMDL wasteload allocation.

(1) Facilities Discharging to Impaired Waters with an Approved TMDL Wasteload Allocation. Monitoring requirements for facilities subject to TMDL wasteload allocations are included in permit to ensure that discharges are in compliance with those allocations. DEQ will notify facilities in writing that they are subject to a TMDL wasteload allocation and that they are required to monitor their discharges for the pollutant of concern to evaluate compliance with the TMDL allocation. Monitoring must be performed at least semiannually (twice per year), and the monitoring periods are January through June, and July through December. Monitoring commences with the first full monitoring period after the owner is granted coverage under the permit.

All samples are to be grab samples taken within the first 30 minutes of discharge where practicable, but in no case later than the first three (3) hours of discharge. The samples are to be taken from the discharges subject to the wasteload allocation prior to mixing with other discharges. In addition to the analytical results, permittees are required to provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; and the duration between the storm event sampled and the end of the previous measurable storm event.

If the pollutant subject to the TMDL wasteload allocation is below the quantitation level in all of the samples from the first four monitoring periods (i.e., the first two years of coverage under the permit), the permittee may request to the Department in writing that further sampling be discontinued, unless the TMDL has specific instructions to the contrary (in which case those instructions shall be followed).

If the pollutant subject to the TMDL wasteload allocation is above the quantitation level in any of the samples from the first four monitoring periods, the permittee must continue the scheduled TMDL monitoring throughout the term of the permit.

Facilities in the Chesapeake Bay watershed. EPA established the Chesapeake Bay TMDL in December of 2010. Virginia's Phase 1 Watershed Implementation Plan (November 29, 2010) describes how dischargers in the Chesapeake Bay watershed are to comply with the TMDL. For this permit reissuance, a special condition has been added requiring owners of facilities in the Chesapeake Bay watershed to monitor their discharges for total suspended solids (TSS), total nitrogen (TN), and total phosphorus (TP) to characterize the contributions from their facility's specific industrial sector for these parameters. After the facility is granted coverage under the permit, samples are to be collected during each of the first four monitoring periods (i.e., the first two years of permit coverage). The monitoring periods are January through June, and July through December. Monitoring commences with the first full monitoring period after the owner is granted coverage under the permit. Additional Chesapeake Bay TMDL requirements can be found later in this fact sheet.

(4) Facilities Discharging to Impaired Waters without an Approved TMDL Wasteload Allocation. Monitoring requirements for facilities discharging to impaired waters without an approved TMDL wasteload allocation are included in this permit to ensure that the facility is not causing or contributing to the water quality impairment. DEQ will notify facilities in writing that they are subject to the impaired waters monitoring, and that they are required to monitor their discharges for the pollutants that are causing the impairment. Monitoring must be performed at least semiannually (twice per year), and the monitoring periods are January through June, and July through December. Monitoring commences with the first full monitoring period after the owner is granted coverage under the permit.

All samples are to be grab samples taken within the first 30 minutes of discharge where practicable, but in no case later than the first three (3) hours of discharge. The samples are to be taken from the facility's stormwater discharges prior to mixing with other discharges. In addition to the analytical results, permittees are required to provide the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; and the duration between the storm event sampled and the end of the previous measurable storm event.

If the pollutant for which the waterbody is impaired is suspended solids, turbidity or sediment/sedimentation, the permittee must monitor for Total Suspended Solids (TSS). If the pollutant for which the waterbody is impaired is expressed in the form of an

indicator or surrogate pollutant, the permittee must monitor for that indicator or surrogate pollutant. No monitoring is required when a waterbody's biological communities are impaired but no pollutant, including indicator or surrogate pollutants, is specified as causing the impairment, or when a waterbody's impairment is related to hydrologic modifications, impaired hydrology, or temperature.

If the pollutant for which the water is impaired is below the quantitation level in the discharges from the facility, or it is above the quantitation level but its presence is caused solely by natural background sources, the permittee may request to the Board that the impaired water monitoring be discontinued. To support a determination that the pollutant's presence is caused solely by natural background sources, the permittee must submit the following documentation with the request and keep a copy with the SWPPP: (i) an explanation of why the permittee believed that the presence of the impairment pollutant in the facility's discharge is not related to the activities at the facility; and (ii) data or studies that tie the presence of the impairment pollutant in the facility's discharge to natural background sources in the watershed. Natural background pollutants include those substances that are naturally occurring in soils or groundwater. Natural background pollutants do not include legacy pollutants from earlier activity at the facility's site, or pollutants in run-on from neighboring sources which are not naturally occurring.

2. Monitoring Waivers/Inactive and Unstaffed Sites/Reporting Monitoring Results/Record Keeping:

a. Monitoring Waivers: The general permit allows permittees to request a waiver of the benchmark monitoring requirements under certain circumstances. Permittees may request a waiver of the benchmark monitoring requirements on a outfall-by-outfall basis if they can demonstrate that the average of the samples at the outfall for four consecutive monitoring periods are all below the pollutant-specific benchmark concentration values. If so, then monitoring during the remaining permit monitoring periods may be waived. The waiver is conditional on the facility maintaining industrial operations and best management practices that will ensure a quality of stormwater discharges consistent with the average concentrations recorded during the earlier monitoring period. The waiver request must be submitted to the Department, along with the supporting monitoring data, and a certification that there has not been a significant change in industrial activity or the pollution prevention measures in area of the facility that drains to the outfall for which the sampling waiver is requested. Waiver requests are evaluated by the Board based upon: (i) benchmark monitoring results below the benchmark concentration values; (ii) a favorable compliance history (including inspection results); and (iii) no outstanding enforcement actions. The monitoring waiver may be revoked by the Board for just cause. The permittee will be notified in writing that the monitoring waiver is revoked, and that the benchmark monitoring requirements are again in force and will remain in effect until the permit's expiration date.

Permittees may take a substitute sample during the next qualifying storm event if adverse weather conditions make it unsafe or impossible to collect the sample.

b. Inactive and unstaffed sites (including temporarily inactive sites). A waiver of the quarterly visual assessments, routine facility inspections, and monitoring requirements (including benchmark, effluent limitation, and impaired waters monitoring) may be granted by the Board at a facility that is both inactive and unstaffed, as long as the facility remains inactive and unstaffed and there are no industrial materials or activities exposed to stormwater. The owner is only required to conduct an annual comprehensive site inspection. An inactive and unstaffed sites waiver request has to be submitted to the Board for approval. If circumstances change and industrial materials or activities become exposed to stormwater, or the facility becomes either active or staffed, the permittee has to

notify the Department within 30 days, and all quarterly visual assessments, routine facility inspections, and monitoring requirements must resume immediately.

Inactive and unstaffed facilities covered under Sector G (Metal Mining) and Sector H (Coal Mines and Coal Mining-Related Facilities) are not required to meet the "no industrial materials or activities exposed to stormwater" standard to be eligible for this waiver, consistent with the conditional exemption requirements established in Part IV Sector G and Part IV Sector H of the permit.

c. Reporting Monitoring Results: Permittees must send discharge monitoring reports (DMRs) to the DEQ regional office by January 10th and July 10th of each year of permit coverage. For this reissuance, follow-up monitoring for corrective actions is not required. This is because all monitoring is now semi-annual. Monitoring results are to be submitted on a DMR form. For each outfall, one DMR form must be submitted per storm event sampled. The permittee must include a measurement or estimate of the total precipitation, and peak flow rate of runoff for each storm event sampled. All reports are to be submitted to the DEQ regional office that issued the general permit coverage.

Permittees are not required to submit records of the quarterly visual examinations of stormwater discharges unless specifically asked to do so by DEQ. Records of the visual examinations must be maintained at the facility. Records of visual examination of stormwater discharge need not be lengthy. Permittees may prepare typed or hand written reports using forms or tables which they may develop for their facility. The report need only document: the date and time of the examination; the name of the individual making the examination; and any observations of color, odor, clarity, floating solids, suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollution.

d. Representative Outfalls - Substantially Identical Discharges. If a facility has two or more outfalls that discharge substantially identical effluents, based on similarities of the industrial activities, significant materials, size of drainage areas, and stormwater management practices occurring within the drainage areas of the outfalls, the permittee may conduct monitoring on the effluent of just one of the outfalls and report that the observations also apply to the substantially identical outfall or outfalls. The substantially identical outfall monitoring provisions apply to quarterly visual monitoring, benchmark monitoring, and impaired waters monitoring (both those with and without an approved TMDL). The substantially identical outfall monitoring provisions are not available for numeric effluent limits monitoring.

The permittee has to include the following information in the SWPPP:

(1) The locations of the outfalls;

(2) Why the outfalls are expected to discharge substantially identical effluents, including evaluation of monitoring data where available; and

(3) Estimates of the size of the drainage area (in square feet) for each of the outfalls.

For this reissuance we have dropped the requirement that the permittee include an estimate of the runoff coefficient of the drainage areas.

e. Record Keeping: This permit requires permittees to retain all permit related records for a minimum of 3 years from the date that coverage under this permit expires or is terminated.

3. Corrective Actions. A corrective action requirement is included in the permit for actions the permittee must take if benchmark monitoring concentration values are exceeded, if inspections turn up a deficiency at the facility, or if there is an exceedance of effluent limitations, TMDL wasteload allocations, or a water quality standard. The corrective action section stipulates time limits for implementing actions to remedy deficiencies. It should be emphasized that these time frames are not grace periods within which an operator is relieved of any liability for a permit

violation. If the original inadequacy constitutes a permit violation, then that violation is not deferred by the time frame the permit has allotted for corrective action. The time limits are those that DEQ considers reasonable for making the necessary repairs or modifications, and are included specifically so that inadequacies are not allowed to persist indefinitely. Failure to take the necessary corrective action within the stipulated time limit could constitute an additional and independent permit violation.

a. Data exceeding benchmarks concentration values. If benchmark monitoring results exceed the benchmark concentration value for a parameter, the permittee must review the SWPPP and modify it to address any deficiencies which caused the exceedance. The permittee must make revisions to the SWPPP within 30 days after an exceedance is discovered, and when BMPs need to be modified or added, the permittee must implement the changes before the next anticipated storm event if possible, but no later than 60 days after the exceedance is discovered.

If the concentration of a pollutant exceeds a benchmark concentration value, and the permittee determines that exceedance of the benchmark is attributable solely to the presence of that pollutant in the natural background, corrective action is not required provided that: (a) the concentration of the benchmark monitoring result is less than or equal to the concentration of that pollutant in the natural background; (b) the permittee documents and maintains with the SWPPP the supporting rationale for concluding that benchmark exceedances are in fact attributable solely to natural background pollutant levels. The supporting rationale shall include any data previously collected by the facility or others (including literature studies) that describe the levels of natural background pollutants in the facility's stormwater discharges; and (c) the permittee notifies the Department on the benchmark monitoring DMR that the benchmark exceedances are attributable solely to natural background pollutant levels. Natural background pollutants include those substances that are naturally occurring in soils or groundwater. Natural background pollutants do not include legacy pollutants from earlier activity on the facility's site, or pollutants in run-on from neighboring sources which are not naturally occurring.

b. Corrective actions. The permittee must take corrective action whenever: (1) routine facility inspections, comprehensive site compliance evaluations, inspections by local, state or federal officials, or any other process, observation or event result in discovery of any deficiency; or (2) there is any exceedance of an effluent limitation (including coal pile runoff), TMDL wasteload allocation, or water quality standard.

The permittee must review the SWPPP and modify it as necessary to address any deficiencies. Revisions to the SWPPP must be completed within 30 days following the discovery of the deficiency. When BMPs need to be modified or added, implementation must be completed before the next anticipated storm event if possible, but no later than 60 days after the deficiency is discovered. All corrective actions taken must be documented and retained with the SWPPP.

c. Follow-up Reporting.

If at any time monitoring results indicate that discharges from the facility exceed an effluent limitation or a TMDL wasteload allocation, or that discharges from the facility are causing or contributing to an exceedance of a water quality standard, the permittee must take immediate steps to eliminate the exceedances. For this permit reissuance, an Exceedance Report must be submitted to the Department within 30 calendar days of implementing the relevant corrective actions. The report has to include an explanation of the situation, and a description of what has been done to further reduce pollutants in the discharge.

Permit Special Conditions

1. Allowable Non-stormwater Discharges. This general permit does not authorize non-stormwater discharges that are mixed with stormwater except as provided below. The only non-stormwater discharges that are intended to be authorized under this permit include discharges from fire fighting activities; fire hydrant flushings; potable water including water line flushings; uncontaminated air conditioning or compressor condensate (excluding air compressors); irrigation drainage; landscape watering provided all pesticides, herbicides, and fertilizer have been applied in accordance with manufacturer's instructions; pavement wash waters where no detergents are used and no spills or leaks of toxic or hazardous materials have occurred (unless all spilled material has been removed); routine external building wash down which does not use detergents; uncontaminated ground water or spring water; foundation or footing drains where flows are not contaminated with process materials such as solvents; incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but NOT intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown or drains).

This permit does not require pollution prevention measures to be identified and implemented for non-stormwater flows from fire-fighting activities because these flows will generally be unplanned emergency situations where it is necessary to take immediate action to protect the public.

Where a stormwater discharge is mixed with non-stormwater that is not authorized by this general permit or another VPDES permit, the discharger should submit the appropriate application forms (Forms 1, 2C, and/or 2E) to obtain separate VPDES permit coverage of the non-stormwater portion of the discharge.

2. Releases of Hazardous Substances or Oil. The permit prohibits discharges of oil and-hazardous substances from spills. The discharge of hazardous substances or oil from a facility must be eliminated or minimized in accordance with the stormwater pollution prevention plan developed for the facility. If there is a discharge of a material in excess of a reportable quantity established under 40 CFR Parts 110, 117, or 302 the permittee must make a report to DEQ within 24 hours. The permittee must also notify the MS4 operator if the release enters an MS4. The pollution prevention plan for the facility must be reviewed and revised as necessary to prevent a reoccurrence of the spill. This does not relieve the permittee from any reporting to federal or state authorities required under 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302 or § 62.1-44.34:19 of the Code of Virginia.

3. Co-located Industrial Activity. Where more than one regulated industrial activity occurs at the site, the permittee is required to implement the industry specific monitoring and pollution prevention requirements for all applicable industrial categories. Co-located industrial activities occur when activities being conducted onsite meet more than one of the industrial sector descriptions in the permit (e.g., a landfill at a wood treatment facility or a vehicle maintenance garage at an asphalt batching plant). Determination of which co-located activities require action is the responsibility of the permittee.

Authorizing co-located discharges allows industrial facilities to develop pollution prevention plans that fully address all industrial activities at the site. For example, if a wood treatment facility has a landfill, the pollution prevention plan requirements for the wood treatment facility will differ greatly from those needed for a landfill. Therefore, by authorizing co-located industrial activities, the wood treatment facility will develop a pollution prevention plan to meet the requirements addressing the stormwater discharges from the wood treatment facility and the landfill. The facility is also subject to applicable monitoring requirements for each type of industrial activity as described in the applicable sections of the permit. By monitoring the discharges from the different industrial activities, the facility can better determine the effectiveness of the pollution prevention plan requirements for controlling stormwater discharges from all activities.

4. Combined Discharges. The stormwater discharges regulated by the permit may be combined with unregulated stormwater provided that the combined effluent meets the requirements of the general permit.

5. Floating Solids or Visible Foam. The permit prohibits discharges of waste, garbage, or floating debris in other than trace amounts. This requirement is from EPA's 2008 Final MSGP.

6. Responsibility to Comply With Any Other Applicable Federal, State, or Local Statute, Ordinance, or Regulation. Approval for coverage under this general permit does not relieve the permittee of the responsibility to comply with any other applicable federal, state, or local statute, ordinance, or regulation. This condition comes from the regulation section 151-50 E, and is being added to the special conditions section of general permits as they are reissued. It was felt that it needed to be in the permit itself, and not just in the regulation section.

7. Discharges to Waters Subject to TMDL Wasteload Allocations.

a. The permit requires facilities that are a source of the specified pollutant of concern to waters for which a TMDL wasteload allocation has been established by the Board and approved by EPA prior to the term of this permit to incorporate measures and controls into the SWPPP that are consistent with the assumptions and requirements of the TMDL. DEQ will notification the owner in writing that the facility is subject to the TMDL requirements. The facility's SWPPP needs to specifically address any conditions or requirements included in the TMDL that are applicable to discharges from the facility. If there is a specific numeric wasteload allocation established in the TMDL that applies to discharges from the facility, the owner has to perform any required monitoring in accordance with the permit requirements, and implement BMPs designed to meet that allocation.

b. Facilities in the Chesapeake Bay watershed. Owners of facilities in the Chesapeake Bay watershed have to monitor their discharges for total suspended solids (TSS), total nitrogen (TN), and total phosphorus (TP) to characterize the contributions from their facility's specific industrial sector for these parameters. After the facility is granted coverage under the permit, samples must be collected during each of the first four monitoring periods (i.e., the first two years of permit coverage).

EPA's Chesapeake Bay TMDL (December 29, 2010) includes wasteload allocations for VPDES permitted industrial stormwater facilities as part of the regulated stormwater aggregate load. EPA used data submitted by Virginia with the Phase I Chesapeake Bay TMDL Watershed Implementation Plan, including the number of industrial stormwater permits per county and the number of urban acres regulated by industrial stormwater permits, as part of their development of the aggregate load. Aggregate loads for industrial stormwater facilities were appropriate because actual facility loading data were not available to develop individual facility wasteload allocations.

Virginia estimated the loadings from industrial stormwater facilities using actual and estimated facility acreage information, and TP, TN, and TSS loading values from the Northern Virginia Planning District Commission (NVPDC) *Guidebook for Screening Urban Nonpoint Pollution Management Strategies,* prepared for the Metropolitan Washington Council of Governments. Annandale, VA. November, 1979. The loading values used were as follows:

TP - High (80%) imperviousness industrial; 1.5 lb/ac/yr
TN - High (80%) imperviousness industrial; 12.3 lb/ac/yr
TSS - High (80%) imperviousness industrial; 440 lb/ac/yr

The actual facility area information, and the TP, TN and TSS data collected for this permit will be used by the Board to quantify the nutrient and sediment loads from VPDES permitted industrial stormwater facilities, and will be submitted to EPA to aid them in further refinements to their Chesapeake Bay TMDL model. The loading information will also be

used by the Board to determine any additional load reductions needed for industrial stormwater facilities for the next reissuance of this permit.

Data analysis and Chesapeake Bay TMDL action plans. The permittee has to analyze the nutrient and sediment data collected to determine if additional action is needed for this permit term. The permittee has to average the data collected at the facility for each of the pollutants of concern (e.g., TP, TN and TSS) and compare the results to the loading values for TP, TN and TSS presented above. To calculate the facility loadings, the permittee may use either: (i) actual annual average rainfall data for the facility location (in inches/year), or the Virginia annual average rainfall of 44.3 inches/year; or (ii) another method approved by the Board.

The regulation contains the following formula ~~may~~ to be used to determine the loading value:

$$L = (0.2263 \times R \times C) / A$$

where:

L = the POC loading value (lb/acre/year)
R = the annual average rainfall (inches/year)
C = the POC average concentration of all facility samples (mg/L)
A = the facility industrial activity area (acres)

However, the above equation has an error. The numerator should NOT be divided by the facility area. The facility area, in conjunction with the rainfall, is used to calculate the flow value for the equation. In addition, the equation assumes 100% of the rainfall runs off the site, which is not correct. The correct calculations should be:

$$L \text{ (lb/yr)} = 0.226 \times R \text{ (in/yr)} \times C \text{ (mg/L)} \times A \text{ (acres)}$$

When the load is divided by the Area to get L in (lb/acre/yr), it becomes:

$$L \text{ (lb/acre/yr)} = 0.226 \times R \text{ (in/yr)} \times C \text{ (mg/L).}$$

where:

L = the POC loading value (lb/acre/year)
C = the POC average concentration of all facility samples (mg/L)
0.226 = unit conversion factor
R = annual runoff (in/yr), calculated as:

$$R = P \times P_j \times R_v$$

where:

P = annual rainfall (in/yr)
P_j = fraction of annual events that produce runoff (usually 0.9)
R_v = runoff coefficient, which can be expressed as:

$$R_v = 0.05 + (0.9 \times I_a)$$

where:

I_a = the impervious fraction (the ratio of facility impervious area to the total facility area)

Using I_a = 80%, R_v = 0.77. If facility specific impervious area data is available, that should be used in the calculation.

The correct formula that should be used to calculate the loading values is:

$$L = 0.226 \times P \times P_j \times (0.05 + (0.9 \times I_a)) \times C$$

If the calculated facility loading value for TP or TN or TSS is above the standard loading values for TP or TN or TSS listed above, then the permittee has to develop and submit to the Board for review and approval a Chesapeake Bay TMDL Action Plan. The plan must be submitted within 90 days from the end of the second year's monitoring period (by September 28, 2016). The permittee has to implement the approved plan over the remaining term of this permit to achieve all the necessary reductions by June 30, 2024. The action plan must include:

(1) A determination of the total pollutant load reductions for TP, TN and TSS (as appropriate) necessary to reduce the annual loads from industrial activities. This is to be determined by calculating the difference between the standard loading values listed above, and the average of the sampling data for TP, TN or TSS (as appropriate) for the entire facility. The reduction applies to the total difference calculated for each pollutant of concern;

(2) The means and methods, such as management practices and retrofit programs, that the permittee will use to meet the required reductions determined in subpart (1), and a schedule to achieve those reductions by June 30, 2024. The schedule should include annual benchmarks to demonstrate the ongoing progress in meeting those reductions;

(3) The permittee may consider utilization of any pollutant trading or offset program in accordance with §§ 62.1-44.19:20 through 62.1-44.19:23 of the Code of Virginia, governing trading and offsetting, to meet the required reductions.

Permittees required to develop and implement a Chesapeake Bay TMDL Action Plan have to submit an annual report to the Department by June 30th of each year describing the progress in meeting the required reductions.

8. Discharges through a regulated MS4 to waters subject to the Chesapeake Bay TMDL. In addition to the requirements of this permit, any facility with industrial activity discharges through a regulated MS4 that is notified by the MS4 operator that the locality has adopted ordinances to meet the Chesapeake Bay TMDL has to incorporate measures and controls into their SWPPP to comply with applicable local TMDL ordinance requirements.

9. Expansion of facilities that discharge to waters subject to the Chesapeake Bay TMDL.

Virginia's Phase I Chesapeake Bay TMDL Watershed Implementation Plan (November 29, 2010), states that the wasteloads from any expansion of an existing permitted facility discharging stormwater in the Chesapeake Bay watershed cannot exceed the nutrient and sediment loadings that were discharged from the expanded portion of the land prior to the land being developed for the expanded industrial activity.

For any industrial activity area expansions (i.e., construction activities, including clearing, grading and excavation activities) that commence on or after July 1, 2014 (the effective date of this permit), the permittee has to document in the SWPPP the information and calculations used to determine the nutrient and sediment loadings discharged from the expanded land area prior to the land being developed, and the measures and controls that were employed to meet the no net increase of stormwater nutrient and sediment load as a result of the expansion of the industrial activity. Any land disturbance that is exempt from permitting under the VPDES construction stormwater general permit regulation (9VAC25-880) is exempt from this requirement.

The permittee may use the VSMP water quality design criteria to meet the above requirements. Under this criteria, the total phosphorus load can't exceed the greater of: (i) the total phosphorus load that was discharged from the expanded portion of the land prior to the land being developed for the industrial activity or (ii) 0.41 pounds per acre per year. Compliance with the water quality design criteria may be determined utilizing the Virginia Runoff Reduction Method or another equivalent methodology approved by the board. Design specifications and

pollutant removal efficiencies for specific BMPs can be found on the Virginia Stormwater BMP Clearinghouse website.

The permittee may consider utilization of any pollutant trading or offset program in accordance with §§ 62.1-44.19:20 through 62.1-44.19:23 of the Code of Virginia, governing trading and offsetting, to meet the no net increase requirement.

10. Water Quality Protection. The permit requires that discharges authorized by the permit be controlled as necessary to meet applicable water quality standards. The Board expects that compliance with the conditions in this permit will control discharges as necessary to meet applicable water quality standards. If there is evidence indicating that the stormwater discharges authorized by the permit are causing, have the reasonable potential to cause, or are contributing to an excursion above an applicable water quality standard, an excursion above a TMDL wasteload allocation, or are causing downstream pollution (as defined in § 62.1-44.3 of the Code of Virginia), the Board may require the permittee to take corrective action in accordance with the permit, and include and implement appropriate controls in the SWPPP to correct the problem, or may require the permittee to obtain an individual permit.

11. Adding/Deleting Stormwater Outfalls. The permit allows the permittee to add new and/or delete existing stormwater outfalls at the facility as necessary or appropriate. The permittee has to update the SWPPP and notify DEQ of all outfall changes within 30 days of the change, and submit a copy of the updated SWPPP site map with their notification.

12. Antidegradation Requirements for New or Increased Discharges to High Quality Waters. Facilities that add new outfalls, or increase their discharges from existing outfalls that discharge directly to high quality waters designated under Virginia's water quality standards antidegradation policy may be notified by the Department that additional control measures, or other permit conditions are necessary to comply with the applicable antidegradation requirements, or may be notified that an individual permit is required.

13. Discharges Through an MS4. If the permittee discharges to surface waters through a municipal separate storm sewer system (MS4), within 30 days of coverage under the permit, the permittee must notify the owner of the MS4 in writing of the existence of the discharge and provide the following information: the name of the facility, a contact person and phone number, the location of the discharge, the nature of the discharge, and the facility's VPDES general permit registration number. A copy of such notification has to be provided to the Department.

14. Termination of permit coverage. For this permit reissuance, the termination of permit coverage section has been moved from the regulation (section 151-65) to the permit special conditions section. This was done so the permittee (who usually only has a copy of the permit) would have the requirements in the permit itself.

a. The owner may terminate coverage under this general permit by filing a complete notice of termination. The notice of termination may be filed after one or more of the following conditions have been met:

(1) Operations have ceased at the facility and there are no longer discharges of stormwater associated with industrial activity from the facility;

(2) A new owner has assumed responsibility for the facility (Note: A notice of termination does not have to be submitted if a VPDES Change of Ownership Agreement Form has been submitted);

(3) All stormwater discharges associated with industrial activity have been covered by an individual VPDES permit; or

(4) Termination of coverage is being requested for another reason, provided the board agrees that coverage under this general permit is no longer needed.

b. The notice of termination has to contain the following information:

(1) Owner's name, mailing address, telephone number, and email address (if available);

(2) Facility name and location;

(3) VPDES industrial stormwater general permit registration number;

(4) The basis for submitting the notice of termination, including:

(a) A statement indicating that a new owner has assumed responsibility for the facility;

(b) A statement indicating that operations have ceased at the facility, and there are no longer discharges of stormwater associated with industrial activity from the facility;

(c) A statement indicating that all stormwater discharges associated with industrial activity have been covered by an individual VPDES permit; or

(d) A statement indicating that termination of coverage is being requested for another reason (state the reason); and

(5) The following certification: "I certify under penalty of law that all stormwater discharges associated with industrial activity from the identified facility that are authorized by this VPDES general permit have been eliminated, or covered under a VPDES individual permit, or that I am no longer the owner of the industrial activity, or permit coverage should be terminated for another reason listed above. I understand that by submitting this notice of termination, that I am no longer authorized to discharge stormwater associated with industrial activity in accordance with the general permit, and that discharging pollutants in stormwater associated with industrial activity to surface waters is unlawful where the discharge is not authorized by a VPDES permit. I also understand that the submittal of this notice of termination does not release an owner from liability for any violations of this permit or the Clean Water Act."

Conditions Applicable to All VPDES Permits

This general permit is a VPDES permit. As such, it is necessary to include certain conditions required by the VPDES Permit Regulation, 9VAC25-31. These conditions are included in all VPDES permits. With a few minor exceptions, the language is not modified to reflect their use in the general permit. Conditions in this section of the permit may not have direct application at all covered facilities.

Stormwater Pollution Prevention Plans

The conditions of this permit have been designed to comply with the technology-based standards of the CWA (BAT/BCT). Based on a consideration of the appropriate factors for BAT and BCT requirements, the general permit lists a set of tailored requirements for developing and implementing stormwater pollution prevention plans.

For discharges covered by the permit, other than those regulated by numeric effluent limitations, the permit conditions reflect DEQ's decision to identify a number of best management practices and traditional stormwater management practices which prevent pollution in stormwater discharges as the BAT/BCT level of control for the majority of stormwater discharges covered by this permit. The permit conditions applicable to these discharges are not numeric effluent limitations, but rather are flexible requirements for developing and implementing site specific plans to minimize and control pollutants in stormwater discharges associated with industrial activity. This approach is consistent with the approach used in the ISWGP issued on July 1, 2004. In addition, this general permit reflects information provided in the EPA MSGP issued October 30, 2000, and modified in the EPA final 2008 MSGP.

DEQ is authorized under 9VAC25-31-220 K (the VPDES Permit Regulation) to impose BMPs in lieu of numeric effluent limitations in VPDES permits when the agency finds numeric effluent

limitations to be infeasible. DEQ may also impose BMPs which are "reasonably necessary ... to carry out the purposes of the Law and the CWA" under 9VAC25-31-220 K 3. The conditions in the permit are issued under the authority of both of these regulatory provisions. The pollution prevention or BMP requirements in this permit operate as limitations on effluent discharges that reflect the application of BAT/BCT. This is because the BMPs identified require the use of source control technologies which, in the context of this general permit, are the best available of the technologies economically achievable (or the equivalent BCT finding).

All facilities intending to be covered by this general permit must prepare and implement a stormwater pollution prevention plan. Existing general permit holders that are renewing coverage under the permit must update and implement any changes to their SWPPP within 90 days of the Board granting coverage under the permit. Facilities that are seeking new coverage under the general permit must develop and implement the SWPPP prior to submittal of the Registration Statement. Facilities are not required to submit the pollution prevention plans for review unless they are requested by the Department. When a plan is reviewed by DEQ, the Director can require the permittee to amend the plan if it does not meet the minimum permit requirements.

The permit addresses general stormwater pollution prevention plan (SWPPP) requirements that apply to all facilities that are covered under the permit, and sector-specific SWPPP requirements that apply to specific categories of industries. The following is a discussion of the common SWPPP requirements for all industries. These are the permit requirements which apply to discharges associated with any of the industrial activities covered by this permit. These common requirements may be amended or further clarified in the industry sector-specific pollution prevention plan requirements of the permit.

Both the general SWPPP and the industry sector-specific requirements are derived from the 2000 EPA MSGP, and were modified for this permit reissuance based on changes EPA made in their final 2008 MSGP. The requirements are based on an evaluation of the nature of the industrial activity, the pollutants in that activity's stormwater and applicable pollution control options. This framework provides the necessary flexibility to address the variable risk for pollutants in stormwater discharges associated with the different types of industrial activity addressed by this permit. This approach also assures that facilities have the opportunity to identify procedures to prevent stormwater pollution at a particular site that are appropriate, given processes employed, engineering aspects, functions, costs of controls, location, and age of the facility. The approach taken also allows the flexibility to establish controls that can appropriately address different sources of pollutants at different facilities. These industry sector-specific requirements are additive for facilities where co-located industrial activities occur. For example, if a facility has both a primary metals operation and a scrap recycling operation, then that facility is subject to the pollution prevention plan requirements of both of those sectors in the permit.

The pollution prevention approach in this general permit focuses on two major objectives: (1) to identify sources of pollution potentially affecting the quality of discharges from the facility; and (2) to describe and ensure implementation of practices to minimize and control pollutants in discharges from the facility and to ensure compliance with the terms and conditions of this permit.

The stormwater pollution prevention plan requirements in the general permit are intended to facilitate a process whereby the operator of the industrial facility thoroughly evaluates potential pollution sources at the site and selects and implements appropriate measures designed to prevent or control the discharge of pollutants in stormwater runoff. The process involves the following four steps: (1) formation of a team of qualified plant personnel who will be responsible for preparing the plan and assisting the plant manager in its implementation; (2) site description and assessment of potential stormwater pollution sources; (3) selection and implementation of appropriate management practices and controls; and (4) periodic evaluation of the effectiveness of the plan to prevent stormwater contamination and comply with the terms and conditions of this permit.

Stormwater pollution prevention plans may reference the existence of other plans such as those for erosion and sediment control (ESC), Spill Prevention Control and Countermeasure (SPCC) plans developed for the facility under Section 31.1 of the CWA, or Best Management Practices (BMP) programs otherwise required for the facility as long as the other plan meets the minimum requirements of the permit and it is incorporated into the stormwater pollution prevention plan. Any other plans so referenced become enforceable parts of the permit.

The pollution prevention approach is the most environmentally sound and cost-effective way to control the discharge of pollutants in stormwater runoff from industrial facilities. Two classes of management practices are generally employed at industries to control the non-routine discharge of pollutants from sources such as stormwater runoff, drainage from raw material storage and waste disposal areas, and discharges from places where spills or leaks have occurred. The first class of management practices includes those that are low in cost, applicable to a broad class of industries and substances, and widely considered essential to a good pollution control program. Some examples of practices in this class are good housekeeping, employee training, and spill response and prevention procedures. The second class includes management practices that provide a second line of defense against the release of pollutants. This class addresses containment, mitigation, and cleanup. Experience with these practices and controls has shown that they can be used in permits to reduce pollutants in stormwater discharges in a cost-effective manner. Pollution prevention has been and continues to be the cornerstone of the VPDES permitting program for stormwater. EPA has developed guidance entitled " Developing Your Stormwater Pollution Prevention Plan: A Guide for Industrial Operators ", 02/18/2009, (PDF) (46 pp, 2.53MB), to assist permittees in developing and implementing pollution prevention measures. This publication is available on EPA's web page.

1. Contents of the Plan. The stormwater pollution prevention plans generally must describe the following elements:

a. Pollution Prevention Team. As a first step in the process of developing and implementing a stormwater pollution prevention plan, permittees are required to identify a qualified individual or team of individuals to be responsible for developing the plan and assisting the facility or plant manager in its implementation. When selecting members of the team, the plant manager should draw on the expertise of all relevant departments within the plant to ensure that all aspects of plant operations are considered when the plan is developed. The plan must clearly describe the responsibilities of each team member as they relate to specific components of the plan. In addition to enhancing the quality of communication between team members and other personnel, clear delineation of responsibilities will ensure that every aspect of the plan is addressed by a specified individual or group of individuals. Pollution Prevention Teams may consist of one individual where appropriate (e.g., in certain small businesses with limited stormwater pollution potential).

b. Site Description. Each stormwater pollution prevention plan must describe activities, materials, and physical features of the facility that may contribute significant amounts of pollutants to stormwater runoff or, during periods of dry weather, result in pollutant discharges through the separate storm sewers or stormwater drainage systems that drain the facility. This assessment of stormwater pollution risk will support subsequent efforts to identify and set priorities for necessary changes in materials, materials management practices, or site features, as well as aid in the selection of appropriate structural and nonstructural control techniques. Some operators may find that significant amounts of pollutants are running onto the facility property. Such operators should identify and address the contaminated run-on in the stormwater pollution prevention plan. If the run-on cannot be addressed or diverted by the permittee, the Department should be notified. If necessary, the DEQ may require the operator of the adjacent facility to obtain a permit.

Activities At the Facility, General Location Map and Site Map. The plan must contain a map of the site that shows the location of outfalls covered by the permit (or by other VPDES permits), the pattern of stormwater drainage, an indication of the types of discharges contained in the drainage areas of the outfalls, structural features that control pollutants in runoff, surface water bodies (including wetlands), places where significant materials are exposed to rainfall and runoff, and locations of major spills and leaks that occurred in the 3 years prior to the date of the submission of a registration statement to be covered under this permit. The map also must show areas where the following activities are exposed to precipitation: fueling stations; vehicle and equipment maintenance and/or cleaning areas; loading/unloading areas; locations used for the treatment, storage or disposal of wastes; liquid storage tanks; processing and storage areas; access roads, rail cars and tracks; the location of transfer of substance in bulk; and machinery. The map must also show the location and description of non-stormwater discharges, and the location and source of run-off from adjacent property containing significant quantities of pollutants of concern to the facility (the permittee may include an evaluation of how the quality of the stormwater running onto the facility impacts the facility's stormwater discharges). The name of the nearest receiving waters, including intermittent streams, dry sloughs, arroyos and the areal extent and description of wetland sites that may receive discharges from the facility must also be included.

c. Summary of Potential Pollutant Sources. The description of potential pollution sources culminates in a narrative assessment of the risk potential that sources of pollution pose to stormwater quality. This assessment should clearly point to activities, materials, and physical features of the facility that have a reasonable potential to contribute significant amounts of pollutants to stormwater. Any such activities, materials, or features must be addressed by the measures and controls subsequently described in the plan. In conducting the assessment, the facility operator must consider the following activities: loading and unloading operations; outdoor storage activities; outdoor manufacturing or processing activities; significant dust or particulate generating processes; and onsite waste disposal practices. The assessment must list any significant pollution sources at the site and identify the pollutant parameter or parameters (i.e., biochemical oxygen demand, suspended solids, etc.) associated with each source.

d. Spills and Leaks. The plan must include a list of any significant spills and leaks of toxic or hazardous pollutants that occurred in the 3 years prior to the date the SWPPP was prepared or amended. Significant spills include, but are not limited to, releases of oil or hazardous substances in excess of quantities that are reportable under Section 311 of CWA (see 40 CFR 110.10 and 40 CFR 117.21) or Section 102 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (see 40 CFR 302.4). Significant spills may also include releases of oil or hazardous substances that are not in excess of reporting requirements and releases of materials that are not classified as oil or a hazardous substance.

The listing should include a description of the causes of each spill or leak, the actions taken to respond to each release, and the actions taken to prevent similar such spills or leaks in the future. This effort will aid the facility operator as she or he examines existing spill prevention and response procedures and develops any additional procedures necessary to fulfill the requirements of the permit.

e. Sampling Data. Any existing data on the quality or quantity of stormwater discharges from the facility must be summarized in the plan. These data may be useful for locating areas that have contributed pollutants to stormwater. The description should include a discussion of the methods used to collect and analyze the data. Sample collection points should be identified in the plan and shown on the site map.

f. Stormwater Controls. Following completion of the source identification and assessment phase, the permit requires the permittee to evaluate, select, and describe the pollution prevention measures, best management practices (BMPs), and other controls that will be implemented at the facility. BMPs include processes, procedures, schedules of activities, prohibitions on practices, and other management practices that prevent or reduce the discharge of pollutants in stormwater runoff.

Source reduction measures include, among others, preventive maintenance, chemical substitution, spill prevention, good housekeeping, training, and proper materials management. Where such practices are not appropriate to a particular source or do not effectively reduce pollutant discharges, DEQ supports the use of source control measures and BMPs such as material segregation or covering, water diversion, and dust control. Like source reduction measures, source control measures and BMPs are intended to keep pollutants out of stormwater. The remaining classes of BMPs, which involve recycling or treatment of stormwater, allow the reuse of stormwater or attempt to lower pollutant concentrations prior to discharge.

The pollution prevention plan must discuss the reasons each selected control or practice is appropriate for the facility and how each will address one or more of the potential pollution sources identified in the plan. The plan also must include a schedule specifying the time or times during which each control or practice will be implemented. In addition, the plan should discuss ways in which the controls and practices relate to one another and, when taken as a whole, produce an integrated and consistent approach for preventing or controlling potential stormwater contamination problems. The permit requirements included for the various industry sectors in the permit generally require that the portion of the plan that describes the measures and controls address the following minimum components.

When "minimize/reduce" is used relative to pollution prevention plan measures, it means to consider and implement best management practices that will result in an improvement over the baseline conditions as it relates to the levels of pollutants identified in stormwater discharges with due consideration to economic feasibility and effectiveness.

(1) Good Housekeeping. Good housekeeping involves using practical, cost-effective methods to identify ways to maintain a clean and orderly facility and keep contaminants out of separate storm sewers. It includes establishing protocols to reduce the possibility of mishandling chemicals or equipment and training employees in good housekeeping techniques. These protocols must be described in the plan and communicated to appropriate plant personnel.

(2) Eliminating and Minimizing Exposure. Eliminating exposure of all industrial activities to precipitation may make the facility eligible for the "Conditional Exclusion for No Exposure" provision of 9VAC25-31-120 E, thereby eliminating the need to have a permit. Where practicable, industrial materials and activities should be protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, or run-off.

(3) Preventive Maintenance. Permittees must develop a preventive maintenance program that involves regular inspection and maintenance of stormwater management devices and other equipment and systems. The program description should identify the devices, equipment, and systems that will be inspected; provide a schedule for inspections and tests; and address appropriate adjustment, cleaning, repair, or replacement of devices, equipment, and systems. For stormwater management devices such as catch basins and oil/water separators, the preventive maintenance program should provide for periodic removal of debris to ensure that the devices are operating efficiently. For other equipment and systems, the program should reveal and enable the correction of conditions that could cause breakdowns or failures that may result in the release of pollutants.

(4) Spill Prevention and Response Procedures. Based on an assessment of possible spill scenarios, permittees must specify appropriate material handling procedures, storage requirements, containment or diversion equipment, and spill cleanup procedures that will minimize the potential for spills and in the event of a spill enable proper and timely response. Areas and activities that typically pose a high risk for spills include loading and unloading areas, storage areas, process activities, and waste disposal activities. These activities and areas, and their accompanying drainage points, must be described in the plan. For a spill prevention and response program to be effective, employees should clearly understand the proper procedures and requirements and have the equipment necessary to respond to spills.

(5) Salt Storage Piles or Piles Containing Salt. Storage piles of salt or piles containing salt used for deicing or other commercial or industrial purposes must be enclosed or covered to prevent exposure to precipitation. The permittee has to implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. All salt storage piles are to be located on an impervious surface. All runoff from the pile, and runoff that comes in contact with salt, including under drain systems, must be collected and contained within a bermed basin lined with concrete or other impermeable materials, or within an underground storage tank or tanks, or within an above ground storage tank or tanks, or disposed of through a sanitary sewer (with the permission of the owner of the treatment facility). A combination of any or all of these methods may be used. In no case shall salt contaminated stormwater be allowed to discharge directly to the ground or to surface waters.

(6) Employee Training. The pollution prevention plan must describe a program for informing personnel at all levels of responsibility of the components and goals of the stormwater pollution prevention plan. The training program should address topics such as good housekeeping, materials management, and spill response procedures. Where appropriate, contractor personnel also must be trained in relevant aspects of stormwater pollution prevention. A schedule for conducting training must be provided in the plan. DEQ recommends that facilities conduct training annually at a minimum. However, more frequent training may be necessary at facilities with high turnover of employees or where employee participation is essential to the stormwater pollution prevention plan.

(7) Sediment and Erosion Control. The pollution prevention plan must identify areas that, due to topography, activities, soils, cover materials, or other factors have a high potential for significant soil erosion. The plan must identify measures that will be implemented to limit erosion in these areas.

(8) Management of Runoff. The plan must contain a narrative evaluation of the appropriateness of traditional stormwater management practices (i.e., practices other than those that control pollutant sources) that divert, infiltrate, reuse, or otherwise manage stormwater runoff so as to reduce the discharge of pollutants. Appropriate measures may include, among others, vegetative swales, collection and reuse of stormwater, inlet controls, snow management, infiltration devices, and wet detention/retention basins.

Based on the results of the evaluation, the plan must identify practices that the permittee determines are reasonable and appropriate for the facility. The plan also should describe the particular pollutant source area or activity to be controlled by each stormwater management practice. Reasonable and appropriate practices must be implemented and maintained according to the provisions prescribed in the plan.

In selecting stormwater management measures, it is important to consider the potential effects of each method on other water resources, such as ground water. Although stormwater pollution prevention plans primarily focus on stormwater management, facilities must also consider potential ground water pollution problems and take appropriate steps to avoid adversely impacting ground water quality. For example, if the water table is unusually high in an area, an infiltration pond may contaminate a ground water source unless special preventive measures are taken.

g. Routine Facility Inspections. In addition to the comprehensive site evaluation, facilities are required to conduct quarterly inspections of designated equipment and areas of the facility. Industry-specific requirements for such inspections, if any, are presented in the permit. For the 2009 reissuance, the sector-specific routine facility inspection frequencies from EPA's 2006 Draft MSGP were used. For the 2014 reissuance, the sector-specific frequencies were compared to those in EPA's 2008 Final MSGP, and where they differed, the 2008 frequencies were used.

When required, qualified personnel must be identified to conduct inspections. A set of tracking or follow-up procedures must be used to ensure that appropriate actions are taken in response to the inspections. Records of inspections must be maintained. These periodic inspections are different from the comprehensive site evaluation. Equipment, area, or other inspections are typically visual and are normally conducted on a regular basis (e.g., daily inspections of loading areas). Requirements for such periodic inspections are specific to each industrial sector in this permit, whereas the comprehensive site compliance evaluation is required of all industrial sectors. Area inspections help ensure that stormwater pollution prevention measures (e.g., BMPs) are operating and properly maintained on a regular basis. The comprehensive site evaluation is intended to provide an overview of the entire facility's pollution prevention activities. See below for more information on the comprehensive site evaluation.

2. Maintenance. The permittee must maintain all BMPs identified in the plan in effective operating condition. If the facility site inspections identify BMPs that are not operating effectively, the permittee must perform maintenance before the next anticipated storm event, or as necessary to maintain the continued effectiveness of stormwater controls. In the case of non-structural BMPs, the effectiveness of the BMP must be maintained by appropriate means, such as spill response supplies available and personnel trained, etc.

3. Allowable Non-stormwater Discharges.

a. Discharges of certain sources of non-stormwater are allowable discharges under this permit. All other non-stormwater discharges are not authorized and must be either eliminated or covered under a separate VPDES permit.

b. Annual outfall evaluation for unauthorized discharges. In the 2009 ISWGP, the certification of non-stormwater discharges was moved to the Comprehensive Site Compliance Evaluation subsection of the SWPPP. For this permit reissuance, the certification has been moved back to the Non-stormwater Discharges subsection of the permit. The permit requires that discharges from the site be tested or evaluated annually for the presence of non-stormwater discharges. The evaluation documentation must describe possible significant sources of non-stormwater, the results of any test and/or evaluation conducted to detect such discharges, the test method or evaluation criteria used, the dates on which tests or evaluations were performed, and the onsite drainage points directly observed during the test or evaluation. Acceptable test or evaluation techniques include dye tests, television surveillance, observation of outfalls or other appropriate locations during dry weather, water balance calculations, and analysis of piping and drainage schematics. The permit also allows the permittee to request in writing to the Department that the facility be allowed to conduct annual outfall evaluations at 20% of the

outfalls. If approved, the permittee must evaluate at least 20% of the facility outfalls each year on a rotating basis such that all facility outfalls will be evaluated during the period of coverage under this permit.

4. Comprehensive Site Compliance Evaluation. The permit requires that the stormwater pollution prevention plan describe the scope and content of the comprehensive site compliance evaluations that qualified personnel will conduct to (1) confirm the accuracy of the description of potential pollution sources contained in the plan, (2) determine the effectiveness of the plan, and (3) assess compliance with the terms and conditions of the permit. Note that the comprehensive site compliance evaluations are not the same as routine facility inspections or other inspections. The plan must indicate the frequency of comprehensive evaluations which must be at least once a year, except where evaluations are shown in the plan to be impractical for inactive mining sites due to remote location and inaccessibility. The individual or individuals who will conduct the comprehensive site compliance evaluation must be identified in the plan and should, ideally, be members of the pollution prevention team. Material handling and storage areas and other potential sources of pollution must be visually inspected for evidence of actual or potential pollutant discharges to the drainage system. Evaluators also must observe erosion controls and structural stormwater management devices to ensure that each is operating correctly. Equipment needed to implement the pollution prevention plan, such as that used during spill response activities, must be evaluated to confirm that it is in proper working order. Evaluators should also look for evidence of pollutants discharging to surface waters at all facility outfalls, and the condition of and around the outfall, including flow dissipation measures to prevent scouring. The compliance evaluation must also include a review of training performed, inspections completed, maintenance performed, quarterly visual examinations, and effective operation of BMPs.

The results of each comprehensive site compliance evaluation must be documented in a report signed by an authorized facility official. The report must describe the scope of the comprehensive site evaluation, the personnel making the comprehensive site evaluation, the date(s) of the comprehensive site evaluation, and any major observations relating to implementation of the stormwater pollution prevention plan. Comprehensive site evaluation reports must be maintained with the SWPPP. Based on the results of the comprehensive evaluation, the permittee must modify the SWPPP as necessary to correct any deficiencies that were discovered. Revisions to the SWPPP must be completed within 30 days following the evaluation. An extension may be requested from DEQ. If existing BMPs need to be modified or if additional BMPs are necessary, the permittee must complete the implementation before the next anticipated storm event, if practicable, but not more than 60 days after completion of the comprehensive evaluation. Again, an extension may be requested from DEQ.

Attachment:

1. BACKGROUND METALS PROJECT, Adam Koling, DEQ, August 23, 2012 - DRAFT

BACKGROUND METALS PROJECT

Virginia Department of Environmental Quality

Adam Koling
August 23, 2012

INTRODUCTION

OVERVIEW

Before cleaning up polluted property, those responsible must know (1) what chemicals to remove and (2) how much they can still expect to remain after cleanup. To that end, site assessment teams first learn the *background* levels (amounts before contamination) for certain chemicals. This helps them sort out which substances came from the site in question and which might have come from other sources. Over the last few decades, hundreds of field investigators have spent time and money collecting and reporting background concentrations themselves. To absolve future site assessors from this task, Virginia Department of Environmental Quality (DEQ) staff consolidated more than 30 years of background data for metals in soil and reported a statistical *upper prediction limit* (UPL) for each of 19 metals. Site assessors now have a choice. They may still choose to produce their own background samples but may instead use the values DEQ establishes in this report.

HISTORICAL OVERVIEW

Virginia boasts a population of approximately eight million, distributed across five geologic provinces and about 40 thousand square miles. While geologists may not designate any particular date as the beginning of Virginia's land history, those five distinct provinces (from west to east: Appalachian Plateau, Valley and Ridge, Blue Ridge, Piedmont, and Coastal Plain—see Fig. 1 on page 4) emerged following gentle uplift over the last 65 million years[1]. While some interaction between people and land took place 10 thousand years ago in Virginia's earliest Algonquian settlements, clearly, human impact on Virginia soil has since increased in both magnitude and complexity[2]. By the end of the 20th century, hundreds of sites in Virginia had reached levels of pollution deemed unacceptable for the environment and human health. Today, according to the federal Toxics Release Inventory, Virginia industries continue to inject thousands of tons per year of at least 149 different toxins—liquid and solid, inorganic and organic, natural and synthetic—into soil and groundwater.[3] The statistical analyses in this report focus only on 19 inorganic soil pollutants (specifically, the following metals in alphabetical order: aluminum, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc).

SITE ASSESSMENT

Both federal and state governments administer cleanup programs at contaminated sites. Virginia's programs include the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund) and the state's own Voluntary Remediation Program (VRP). Under these programs, DEQ, EPA, and contractors work together in two phases, first identifying and measuring the pollution (*site assessment*) and then cleaning it up (*site remediation*). This report is concerned with only one step of the first phase: collection and analysis of soil for concentrations of the metals mentioned earlier.

Most site assessment teams print soil screening results, arranged by location and chemical, in documents with titles like "Preliminary Assessment" or "Site Investigation" (some of which have been scanned and are now available in both state and federal electronic databases). These results always include raw screening (laboratory) data and sometimes tables of summary (validation) data.

BACKGROUND CONCENTRATIONS

DEQ's Office of Remediation Programs (ORP) aims to "ensure that the cleanup of contaminated sites in Virginia achieve a satisfactory level of human health and environmental protection." What constitutes a "satisfactory level" depends in part on how much of each chemical was already present in the soil before contamination of any one site. Such amounts are called *background concentrations* and vary by location (this analysis groups them by geologic province). A background soil concentration (usually measured in milligrams of metal per kilogram of soil, or *parts per million*) represents the total amount of any one metal from two sources: (1) nature and (2) ambient pollution. Knowledge of background concentrations makes it easier to determine whether past activities caused site-specific releases of metals of concern or whether one could expect to find similar amounts in all local soil. Those numbers can help remediation teams formulate

realistic cleanup goals. Instead of hoping for prehistorically low levels (or even those of the 19th century), they can simply attempt to reach concentrations roughly the same as in surrounding soil.

SAMPLING

The easiest way to determine pre-contamination levels would be to analyze soil collected pre-contamination. Unfortunately, except at a small number of federal facility sites, no one took such samples (let alone stored them for later screening). Site assessors must analyze current soil and determine previous concentrations retroactively. They need to find unaffected soil. In some cases, this is as simple as collecting an offsite sample, or a deep enough onsite sample. If pollutants have migrated in a certain direction, the background samples often come from the opposite side of the site. At some sites, particularly those surrounded by industry, it is nearly impossible to collect a sample representative of background levels.

The difference between background and site-specific soil, and the occasional difficulties in finding a true background sample, are best explained through an example.

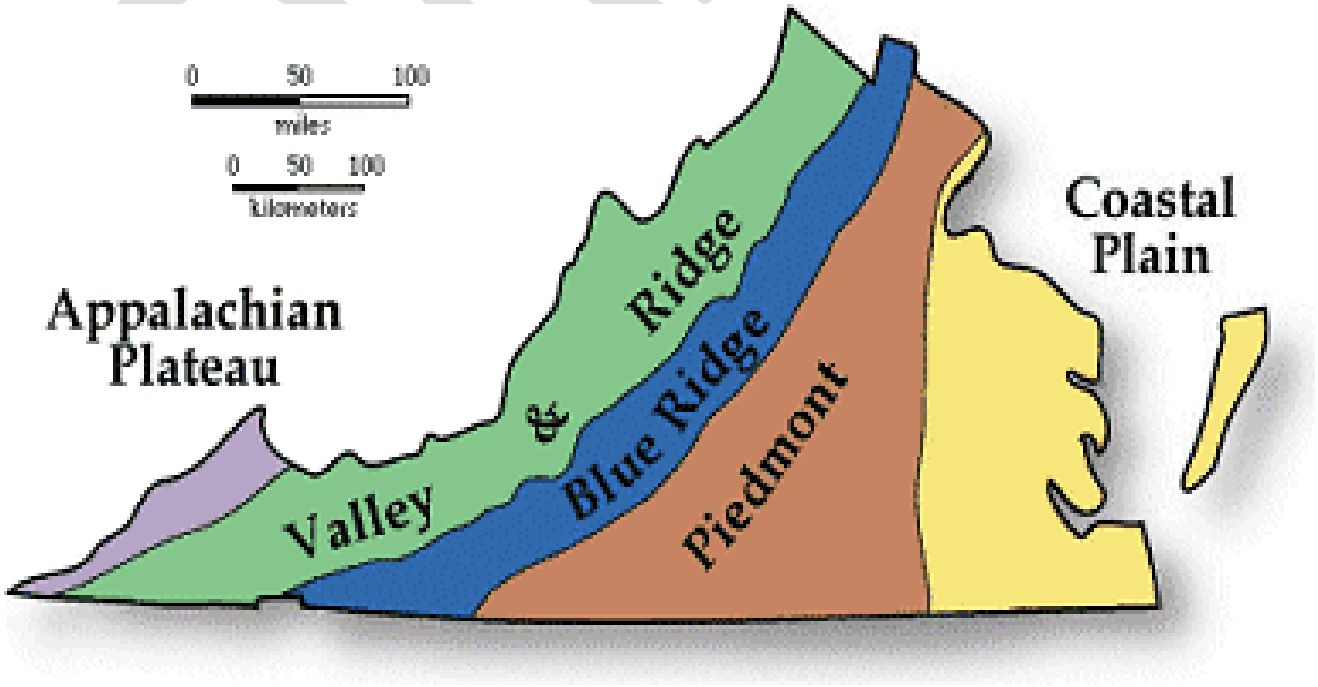
EXAMPLE: ABEX CORPORATION SUPERFUND SITE, PORTSMOUTH

Lead occurs in all soil worldwide, and the sandy loam underneath central Portsmouth is no exception.[4] Virginia's Coastal Plain province (whose soil already contained natural traces) gathered additional lead during the 20th century as underground lead pipes corroded, flakes of lead paint blew around with the wind and dissolved with the rain, and blankets of exhaust from 75 years of leaded gasoline settled onto the region's soil. Such were some sources of background lead when Abex, Inc opened a bronze foundry on the corner of Randolph and Green Streets in 1928. For 50 years, a series of owners dumped contaminated sand in open areas of the two-acre property.[5]

EPA sampled soil in and around the abandoned foundry in 1983, and three years later field investigators issued a site assessment report.[6] Knowing the plume of pollutants had migrated westward, site assessors designated a background soil location due east of the disposal area.[7] Still, the supposed "background" concentration of 2,750 mg/kg (elevated orders of magnitude above all other recorded background samples for sites in that province) is suspect.

The apparently tainted background value from the Abex site is an exception. Reports for most other sites do include *accurate* background samples, but obtained at a logistic and financial cost that is no longer necessary. From now on site investigators need only use the UPLs listed in the *Results* pages.

Fig. 1: Virginia's Geologic Provinces.



PROCEDURE

DATA COMPILATION AND STATISTICAL ANALYSIS

DEQ staff reviewed site assessment files from four databases, the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), Brownfields, Federal Facilities Restoration, and VRP. Since not all site files contained a background sample labeled "background," they had to determine which numerical values to report by reading the text of each publication and referring to the corresponding appendices. Most separately-printed appendices presented the same data in both laboratory and validation tables. The only input of laboratory data for this report was for the few sites in which there were discrepancies. Generally, the sites' data thoroughness fell into four broad categories.

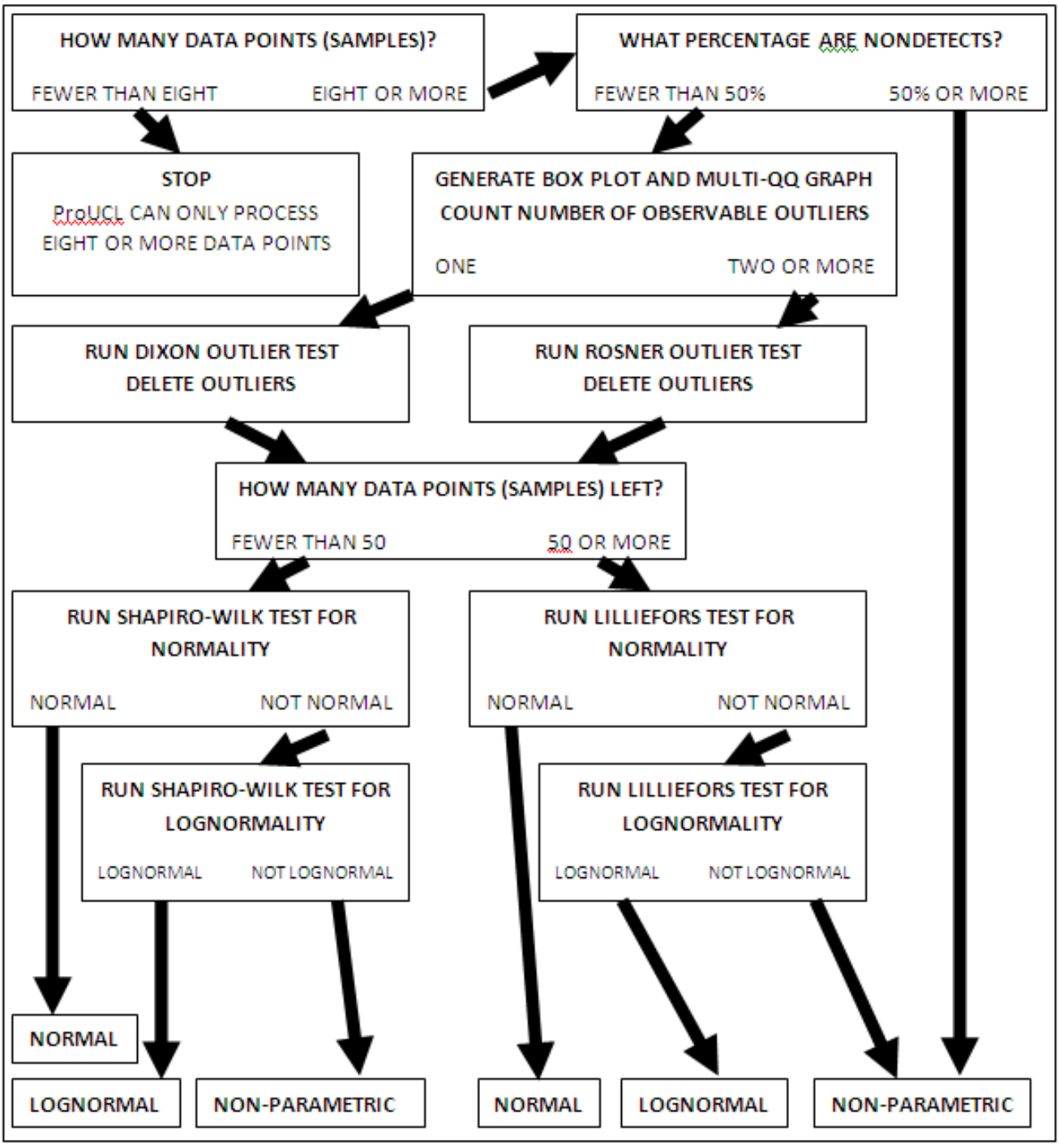
1. Site investigators had detected the metals in question and reported concentrations.
2. Instruments didn't detect a certain chemical but the site assessors did include instrument detection limits in the data tables. Screeners marked those samples with qualifiers or printed the numbers as inequalities.
3. Investigators reported neither data nor detection limits
4. No one analyzed the site for background metals at all.

Most sites fell under category (1), for which transcription of data simply involved copying values into an Excel spreadsheet. Samples under category (2) led to a slightly more involved process. DEQ staff selectively included these *nondetects* (values which site assessment screening teams had either expressed as inequalities or flagged with the qualifiers U, UL, UJ, A, or R, to indicate that data was not present at or above a devices' quantitation limit) in accordance with the EPA's Risk Assessment Guidance Manual, which outlines a two-column approach.[8] One column represents the concentration, and the second contains either the digits 0 or 1, for undetected and detected metals, respectively. The spreadsheet substitutes an adjacent 0 for the five qualifiers mentioned above and a 1 for all others. Spreadsheet cells for data of categories (3) and (4) are blank.

In addition to the sites' names, the spreadsheet includes, when available, six more pieces of information for each site: (1) absolute and relative locations, (2) background soil sample identification numbers, (3) types of soil, (4) DEQ regions, (5) site identification numbers and (6) geologic provinces. A second Excel spreadsheet contains all data, grouped first by metal, then by geologic province, in ascending order by concentrations. This spreadsheet served as the basis for statistical analysis of all 19 metals using EPA software called ProUCL.

After converting 19 Excel (.xls) spreadsheets to ProUCL (.wst) worksheets, DEQ staff used ProUCL's statistical tools to eliminate outliers before calculating UPLs, UTLs, means, and standard deviations. The flowchart on the following page shows the process by which they identified which distribution (normal, lognormal, or non-parametric) best matched the data. The apparent distribution determined the formulae to use in background analysis.

Fig. 2: Determination of Data Distribution



RESULTS

SUMMARY STATISTICS TABLES

The following 20 tables illustrate application of the process described in the flowchart above, beneath which are the computed UPLs for all metals in each province with eight or more samples. The first 19 tables include details for each chemical and the last table shows 90% upper tolerance limits (UTLs) with 90% coverage.

Table 1: Aluminum Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
ALUMINUM (mg/kg)	Number of Data Points	2	10	306	63	37
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	10	1	2
	Outlier Test		Dixon	Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis		97,300	38,200 26,700 25,600 24,000	72,094	
	Normality Test		Shapiro-Wilk		Lilliefors	
	Lognormal Test			Lilliefors		Lilliefors
	Distribution		Normal	Lognormal	Normal	Lognormal
	95% Upper Prediction Limit (UPL)		17,482	16,352	24,204	27,709
	Mean		9,704	7,294	12,323	12,597
	Standard Deviation		3,968	4,212	7,057	5,726

Table 2: Antimony Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
ANTIMONY (mg/kg)	Number of Data Points	1	4	262	38	15
	Fewer than Half are Nondetects?			Yes	No	Yes
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected Outliers			10	4	5
	Outlier Test			Rosner	Rosner	Dixon
	Potential Outlier(s) Removed from Analysis			77.1 38 37.1 25 19.6 15.45 8.8	142 30 28 27.5	

				8.1 7.63 6.98		
	Normality Test					
	Lognormal Test					
	Distribution			Non-Parametric	Non-Parametric	Non-Parametric
	95% Upper Prediction Limit (UPL)			2.535	12.33	16.3
	Mean			0.907	7.3	5.324
	Standard Deviation			0.751	4.906	5.76

Table 3: Arsenic Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
ARSENIC (mg/kg)	Number of Data Points	2	8	520	101	65
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	10	4	8
	Outlier Test		Dixon	Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis			66.7 63.2 52.4 42 32.5 23.6 23.6 22.4 20.1 18.6	78 46 30 30	48 36.3
	Normality Test		Shapiro-Wilk			
	Lognormal Test				Lilliefors	Lilliefors
	Distribution		Normal	Non-Parametric	Lognormal	Lognormal
	95% Upper Prediction Limit (UPL)		12.13	11.5	12.41	26.05
	Mean		4.35	3.167	4.008	9.443
	Standard		3.87	3.285	5.034	6.451

	Deviation					

Table 4: Barium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
BARIUM (mg/kg)	Number of Data Points	2	10	308	73	41
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	4	4	2
	Outlier Test		Dixon	Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis			136 130 115	239	374
	Normality Test		Shapiro-Wilk			Shapiro-Wilk
	Lognormal Test					
	Distribution		Normal	Non-Parametric	Non-Parametric	Normal
	95% Upper Prediction Limit (UPL)		142.2	75.67	167.4	195.9
	Mean		70.81	34.96	67.93	113.8
	Standard Deviation		37.14	20.24	47.08	48.14

Table 5: Beryllium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
BERYLLIUM (mg/kg)	Number of Data Points	2	9	276	65	39
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	5	5	2
	Outlier Test		Dixon	Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis		24.2	3.4 2.4 2.14 1.8	3.6 2.4	17.07 6.3
	Normality		Shapiro-Wilk		Lilliefors	Shapiro-Wilk

	Test					
	Lognormal Test			Lilliefors		
	Distribution		Normal	Lognormal	Normal	Normal
	95% Upper Prediction Limit (UPL)		1.583	1.245	1.345	1.955
	Mean		0.821	0.409	0.711	1.082
	Standard Deviation		0.379	0.332	0.377	0.51

Table 6: Cadmium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
CADMIUM (mg/kg)	Number of Data Points	1	4	267	52	39
	Fewer than Half are Nondetects?			Yes	Yes	Yes
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected Outliers			16	1	0
	Outlier Test			Rosner	Dixon	
	Potential Outlier(s) Removed from Analysis			19,100 17,700 17,500 17,000 14,800 8,930 2,950 2,270 2,120 1,540 1,360 1,020 1,000 910 327 219	9.3	
	Normality Test					
	Lognormal Test					
	Distribution			Non-Parametric	Non-Parametric	Non-Parametric
	95% Upper Prediction Limit (UPL)			1.1	3.52	4.34
	Mean			0.463	1.091	1.248

	Standard Deviation			0.543	0.986	1.203

Table 7: Total Chromium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
TOTAL CHROMIUM (mg/kg)	Number of Data Points	2	10	535	106	49
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		0	1	5	1
	Outlier Test			Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis			224	94.9 82 81.9	1
	Normality Test		Lilliefors			
	Lognormal Test					Shapiro-Wilk
	Distribution		Normal	Non-Parametric	Non-Parametric	Lognormal
	95% Upper Prediction Limit (UPL)		48.52	31	52.8	63.95
	Mean		20.18	11.22	22.81	25.58
	Standard Deviation		14.74	9.236	15.92	15.55

Table 8: Cobalt Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
COBALT (mg/kg)	Number of Data Points	2	9	281	69	38
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	3	0	0
	Outlier Test		Dixon	Rosner		
	Potential Outlier(s) Removed from Analysis		34.7	43.9 20.7 1.64		

	Normality Test		Lilliefors			
	Lognormal Test				Lilliefors	Lilliefors
	Distribution		Normal	Non-Parametric	Lognormal	Lognormal
	95% Upper Prediction Limit (UPL)		25.15	9.705	39.67	42.79
	Mean		11.29	2.819	11.07	16.77
	Standard Deviation		6.9	2.828	12.55	11.09

Table 9: Copper Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
COPPER (mg/kg)	Number of Data Points	2	8	305	73	40
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		0	3	3	1
	Outlier Test			Rosner	Rosner	Dixon
	Potential Outlier(s) Removed from Analysis			168 149 149	225 126	1,010
	Normality Test		Shapiro-Wilk			
	Lognormal Test			Lilliefors		
	Distribution		Normal	Lognormal	Non-Parametric	Non-Parametric
	95% Upper Prediction Limit (UPL)		83.72	34.3	82.32	139
	Mean		26.84	9.383	25.05	26.05
	Standard Deviation		28.31	14.18	23.39	30.7

Table 10: Iron Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
IRON (mg/kg)	Number of Data Points	2	10	517	88	44
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes

	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	6	3	2
	Outlier Test		Dixon	Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis		129,000	134,000 81,500 74,600 58,300 58,300 49,200	100,000	130,000 70,100
	Normality Test		Shapiro-Wilk			Lilliefors
	Lognormal Test					
	Distribution		Normal	Non-Parametric	Non-Parametric	Normal
	95% Upper Prediction Limit (UPL)		55,540	29,080	64,580	44,495
	Mean		25,729	8,926	25,756	25,263
	Standard Deviation		15,209	8,572	18,799	11,294

Table 11: Lead Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
LEAD (mg/kg)	Number of Data Points	2	10	534	101	51
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		0	6	2	3
	Outlier Test			Rosner	Rosner	
	Potential Outlier(s) Removed from Analysis			653 377 337 255 254 254	990 306	1,080 643 457
	Normality Test		Lilliefors			
	Lognormal Test				Lilliefors	
	Distribution		Normal	Non-Parametric	Lognormal	Non-Parametric

	95% Upper Prediction Limit (UPL)		53.6	91.43	104	302.9
	Mean		23.51	20.75	24.59	60.94
	Standard Deviation		15.65	29.08	26.17	80.75

Table 12: Manganese Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
MANGANESE (mg/kg)	Number of Data Points	2	10	514	89	44
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		0	10	3	1
	Outlier Test			Rosner	Rosner	Dixon
	Potential Outlier(s) Removed from Analysis			2,540 2,330 1,840 1,630 1,320 1,160 1,100 935 718 480	3,882 2,300 1,680	7,260
	Normality Test		Shapiro- Wilk			
	Lognormal Test				Lognormal	
	Distribution		Normal	Non-Parametric	Lilliefors	Non-Parametric
	95% Upper Prediction Limit (UPL)		785.6	219.5	1,449	2,968
	Mean		299	65.56	327.1	1,148
	Standard Deviation		253.1	71.6	374.4	930.6

Table 13: Mercury Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
MERCURY (mg/kg)	Number of Data Points	1	5	262	42	32
	Fewer than Half are			Yes	Yes	Yes

	Nondetects?					
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected Outliers			2	3	5
	Outlier Test			Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis			2 1.4	0.52 0.47 0.46	3.5 1.33 1.1 0.84 0.36
	Normality Test					Shapiro-Wilk
	Lognormal Test					
	Distribution			Non-Parametric	Non-Parametric	Normal
	95% Upper Prediction Limit (UPL)			0.529	0.12	0.205
	Mean			0.133	0.0812	0.101
	Standard Deviation			0.189	0.029	0.0598

Table 14: Nickel Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
NICKEL (mg/kg)	Number of Data Points	2	7	290	68	41
	Fewer than Half are Nondetects?			Yes	Yes	Yes
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected Outliers			4	0	1
	Outlier Test			Rosner		Dixon
	Potential Outlier(s) Removed from Analysis			635 405 336 140		1,345
	Normality Test					
	Lognormal Test				Lilliefors	Lilliefors
	Distribution				Lognormal	Lognormal
	95% Upper Prediction			20.37	32.81	35.06

	Limit (UPL)					
	Mean			6.057	11.21	15.71
	Standard Deviation			8.039	11.48	11.12

Table 15: Selenium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
SELENIUM (mg/kg)	Number of Data Points	1	6	263	39	25
	Fewer than Half are Nondetects?			Yes	Yes	Yes
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected Outliers			0	7	0
	Outlier Test				Rosner	
	Potential Outlier(s) Removed from Analysis				13 13 13 13 13 13 3.1	
	Normality Test				Shapiro-Wilk	Shapiro-Wilk
	Lognormal Test					
	Distribution			Non-Parametric	Normal	Lognormal
	95% Upper Prediction Limit (UPL)			1.7	1.892	2.676
	Mean			0.75	1.067	1.278
	Standard Deviation			0.441	0.479	0.705

Table 16: Silver Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
SILVER (mg/kg)	Number of Data Points	4	269	43	17	0
	Fewer than Half are Nondetects?			Yes	Yes	Yes
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected			5	0	2

	Outliers					
	Outlier Test			Rosner		Rosner
	Potential Outlier(s) Removed from Analysis			57 23 10.9 6 3.2		
	Normality Test					
	Lognormal Test					
	Distribution			Non-Parametric	Non-Parametric	Non-Parametric
	95% Upper Prediction Limit (UPL)			1.124	7.497	3.7
	Mean			0.396	1.643	1.335
	Standard Deviation			0.349	1.061	0.996

Table 17: Thallium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
THALLIUM (mg/kg)	Number of Data Points	4	256	46	16	0
	Fewer than Half are Nondetects?			Yes	Yes	Yes
	Box Plot and Multi-QQ generated?			Yes	Yes	Yes
	Number of Suspected Outliers			4	2	0
	Outlier Test			Rosner	Rosner	
	Potential Outlier(s) Removed from Analysis			16.2 13.3 9.45 7.16	149 144	
	Normality Test					Shapiro-Wilk
	Lognormal Test					
	Distribution			Non-Parametric	Non-Parametric	Normal
	95% Upper Prediction Limit (UPL)			2.519	2.375	4.081
	Mean			1.08	1.216	1.866
	Standard Deviation			0.815	0.847	1.226

Table 18: Vanadium Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
VANADIUM (mg/kg)	Number of Data Points	2	10	512	108	46
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		1	6	5	0
	Outlier Test		Dixon	Rosner	Rosner	
	Potential Outlier(s) Removed from Analysis		343	130 101 95.3 72.5 68.3 65.6	209 208	
	Normality Test		Shapiro-Wilk			
	Lognormal Test					Lilliefors
	Distribution		Normal	Non-Parametric	Non-Parametric	Lognormal
	95% Upper Prediction Limit (UPL)		140.4	46.26	121.7	88.81
	Mean		51.64	17	46.03	40.27
	Standard Deviation		45.26	12.01	35.29	21.77

Table 19: Zinc Data by Geologic Province

Parameter		APPALACHIAN PLATEAU	BLUE RIDGE	COASTAL PLAIN	PIEDMONT	VALLEY AND RIDGE
ZINC (mg/kg)	Number of Data Points	2	10	305	74	45
	Fewer than Half are Nondetects?		Yes	Yes	Yes	Yes
	Box Plot and Multi-QQ generated?		Yes	Yes	Yes	Yes
	Number of Suspected Outliers		0	1	3	3
	Outlier Test			Rosner	Rosner	Rosner
	Potential Outlier(s) Removed from Analysis			749	694 467 125	1,090 854 526

	Normality Test		Shapiro-Wilk			
	Lognormal Test					
	Distribution		Normal	Non-Parametric	Non-Parametric	Non-Parametric
	95% Upper Prediction Limit (UPL)		101.5	116	79.76	370.4
	Mean		46.2	34.01	35.02	99.82
	Standard Deviation		28.74	50.23	22.96	104.2

Table 20: 95%UTLs with 90% Coverage

Parameter	Appalachian Plateau	Blue Ridge	Coastal Plain	Piedmont	Valley and Ridge
Aluminum (mg/kg)	N/A	19,441	14,226	23,602	27,684
Antimony (mg/kg)	N/A	N/A	2.3	12	16.3
Arsenic (mg/kg)	N/A	14.34	8.3	10.81	24.43
Barium (mg/kg)	N/A	158.3	67	152	195.1
Beryllium (mg/kg)	N/A	1.8	1.016	1.312	1.954
Cadmium (mg/kg)	N/A	N/A	0.98	3.2	4.2
Total Chromium (mg/kg)	N/A	54.89	26.4	50.33	62.02
Cobalt (mg/kg)	N/A	29.1	7.9	35.66	42.4
Copper (mg/kg)	N/A	99.93	25.43	77.1	139
Iron (mg/kg)	N/A	63,051	22,800	63,500	44,218
Lead (mg/kg)	N/A	60.37	57.6	64	260
Manganese (mg/kg)	N/A	895	180	1,230	2,960
Mercury (mg/kg)	N/A	N/A	0.39	0.12	0.21
Nickel (mg/kg)	N/A	N/A	14	30.16	34.74
Selenium (mg/kg)	N/A	N/A	1.4	1.904	2.802
Silver (mg/kg)	N/A	N/A	0.78	7.261	3.7
Thallium (mg/kg)	N/A	N/A	2.1	2	4.358
Vanadium (mg/kg)	N/A	162.7	38.1	102	86.88
Zinc (mg/kg)	N/A	113.9	90.7	72	333

UPPER PREDICTION LIMITS

The next table contains the upper prediction limits (UPLs) mentioned in the introduction and procedure. The 19 graphs that follow show the UPLs for each metal.

Table 21: 95% Upper Prediction Limits

Parameter	95% Upper Prediction Limits (UPLs), in mg/kg				
	Appalachian Plateau	Blue Ridge	Coastal Plain	Piedmont	Valley and Ridge
Aluminum	N/A	17,482	16,352	24,204	27,709
Antimony	N/A	N/A	2.535	12.33	16.3
Arsenic	N/A	12.13	11.5	12.41	26.05
Barium	N/A	142.2	75.67	167.4	195.9
Beryllium	N/A	1.583	1.245	1.345	1.955
Cadmium	N/A	N/A	1.1	3.52	4.34
Total Chromium	N/A	48.52	31	52.8	63.95
Cobalt	N/A	25.15	9.705	39.67	42.79
Copper	N/A	83.72	34.3	82.32	139
Iron	N/A	55,540	29,080	64,580	44,495
Lead	N/A	53.6	91.43	104	302.9
Manganese	N/A	785.6	219.5	1,449	2,968
Mercury	N/A	N/A	0.529	0.12	0.205
Nickel	N/A	N/A	20.37	32.81	35.06
Selenium	N/A	N/A	1.7	1.892	2.676
Silver	N/A	N/A	1.124	7.497	3.7
Thallium	N/A	N/A	2.519	2.375	4.081
Vanadium	N/A	140.4	46.26	121.7	88.81
Zinc	N/A	101.5	116	79.76	370.4

Fig. 3: Aluminum Upper Prediction Limits (UPLs) by Geologic Province

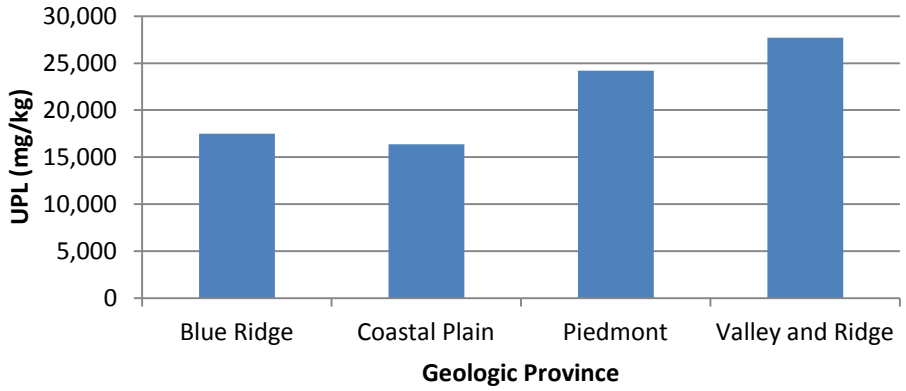


Fig. 4: Antimony Upper Prediction Limits (UPLs) by Geologic Province

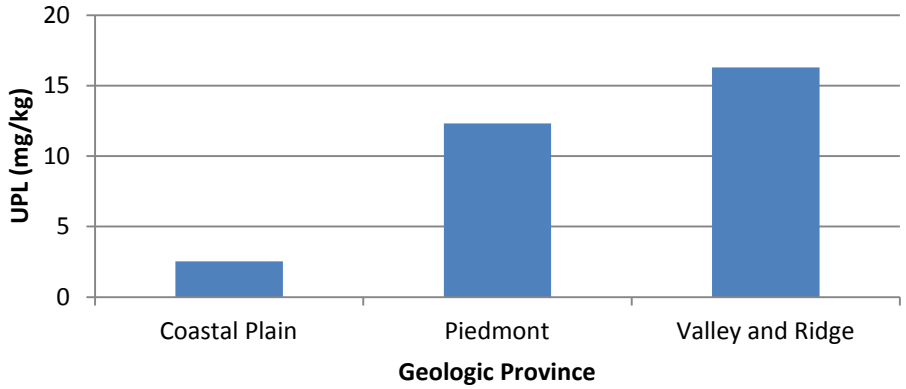


Fig. 5: Arsenic Upper Prediction Limits (UPLs) by Geologic Province

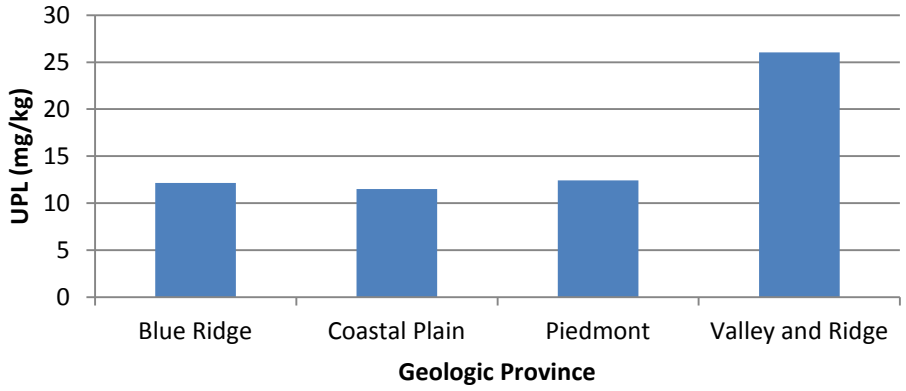


Fig. 6: Barium Upper Prediction Limits (UPLs) by Geologic Province

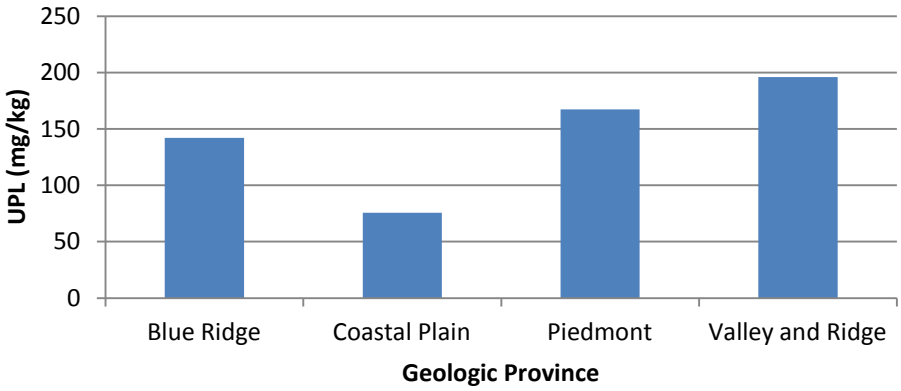


Fig. 7: Beryllium Upper Prediction Limits (UPLs) by Geologic Province

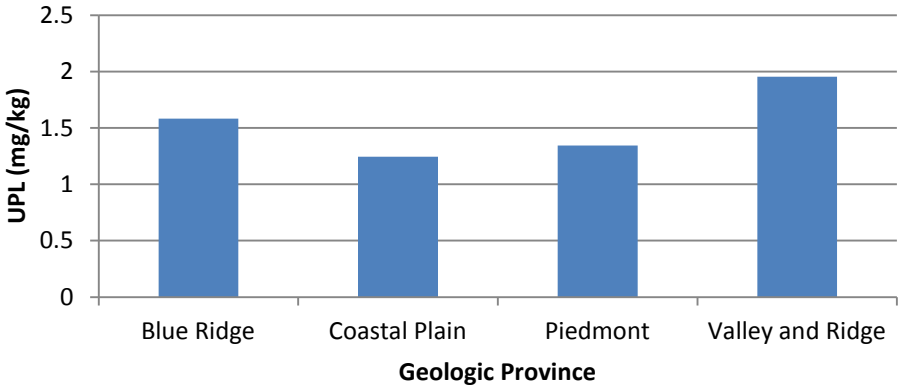


Fig. 8: Cadmium Upper Prediction Limits (UPLs) by Geologic Province

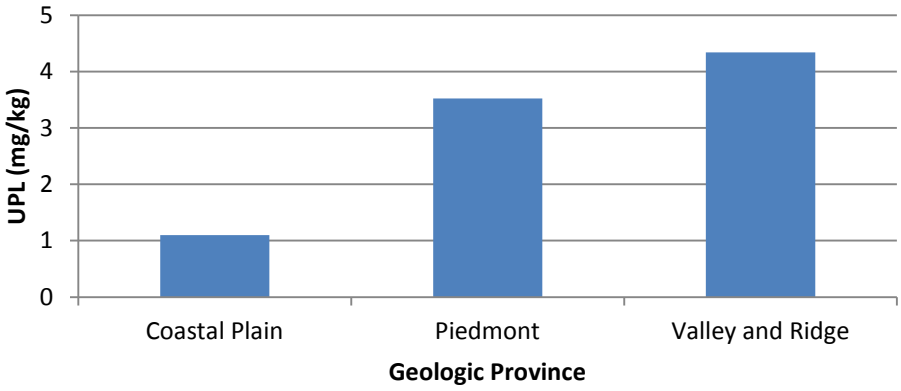


Fig. 9: Total Chromium Upper Prediction Limits (UPLs) by Geologic Province

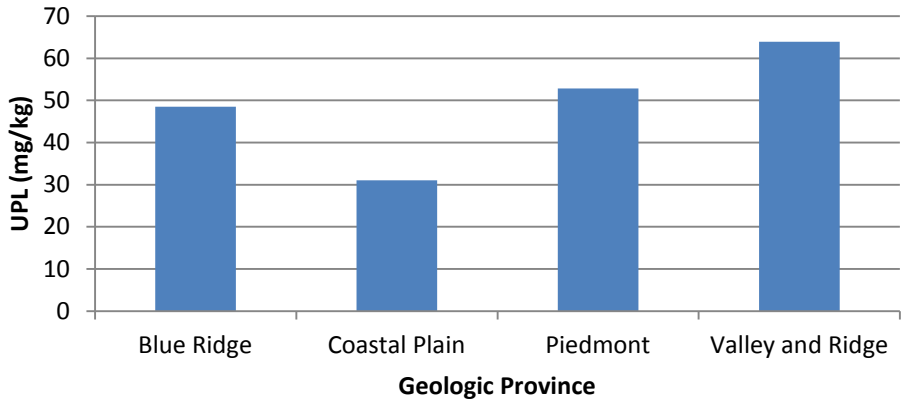


Fig. 10: Cobalt Upper Prediction Limits (UPLs) by Geologic Province

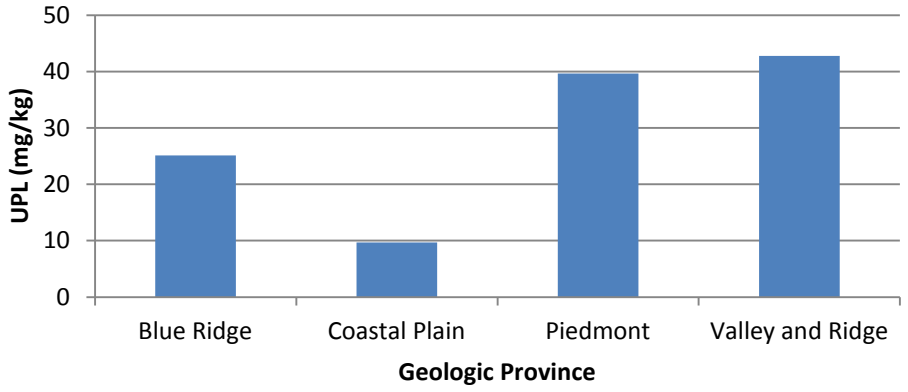


Fig. 11: Copper Upper Prediction Limits (UPLs) by Geologic Province

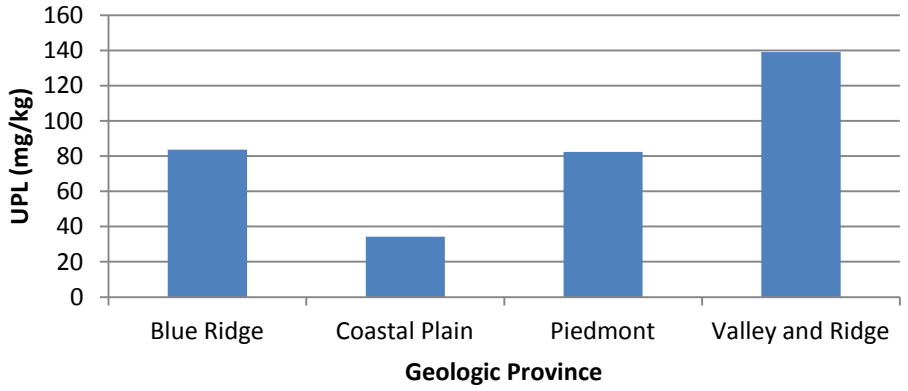


Fig. 12: Iron Upper Prediction Limits (UPLs) by Geologic Province

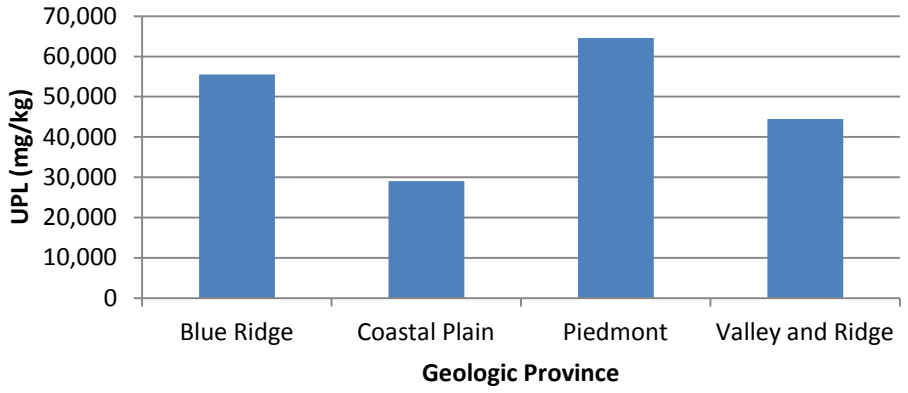


Fig. 13: Lead Upper Prediction Limits (UPLs) by Geologic Province

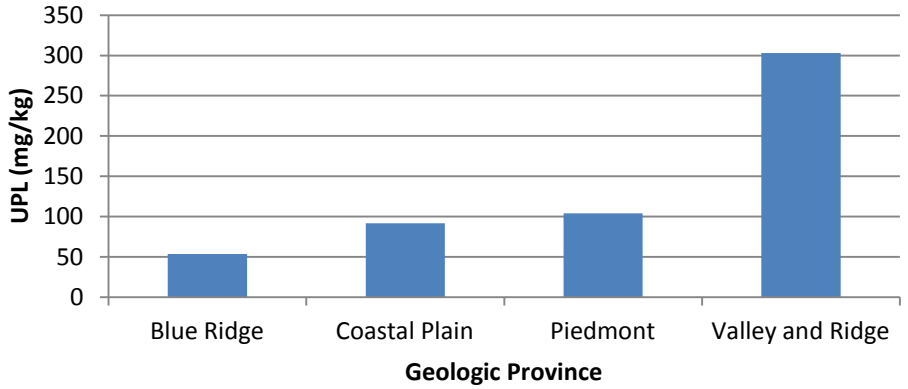


Fig. 14: Manganese Upper Prediction Limits (UPLs) by Geologic Province

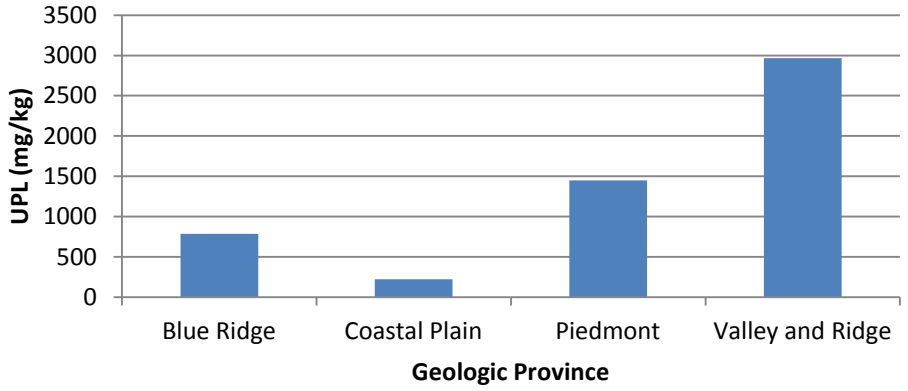


Fig. 15: Mercury Upper Prediction Limits (UPLs) by Geologic Province

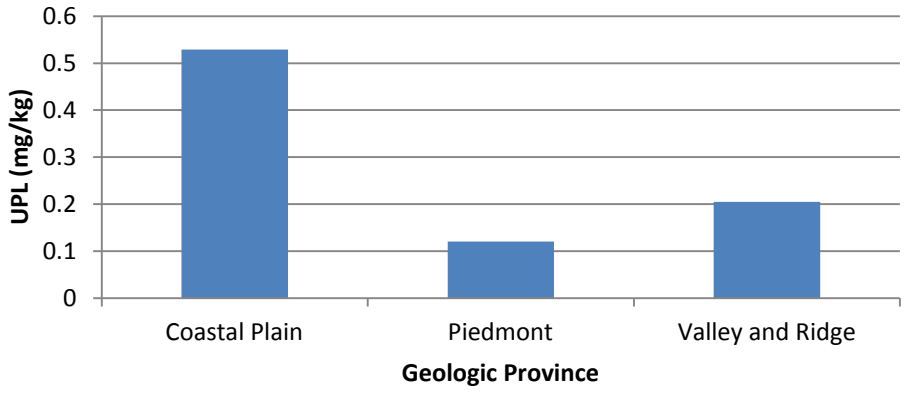


Fig. 16: Nickel Upper Prediction Limits (UPLs) by Geologic Province

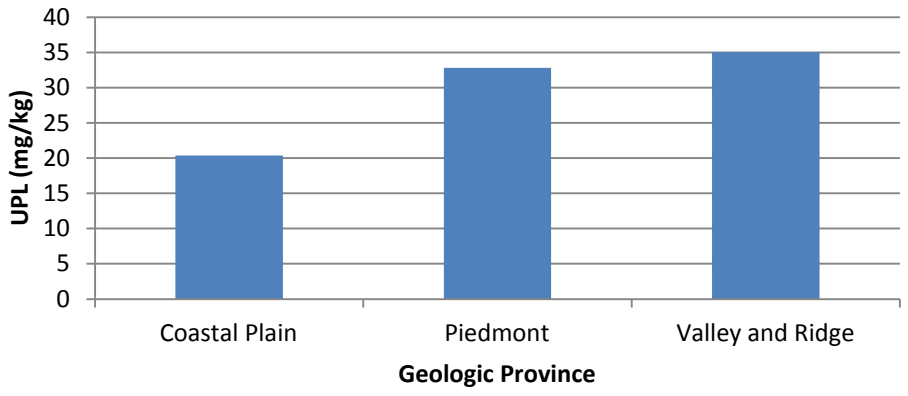


Fig. 17: Selenium Upper Prediction Limits (UPLs) by Geologic Province

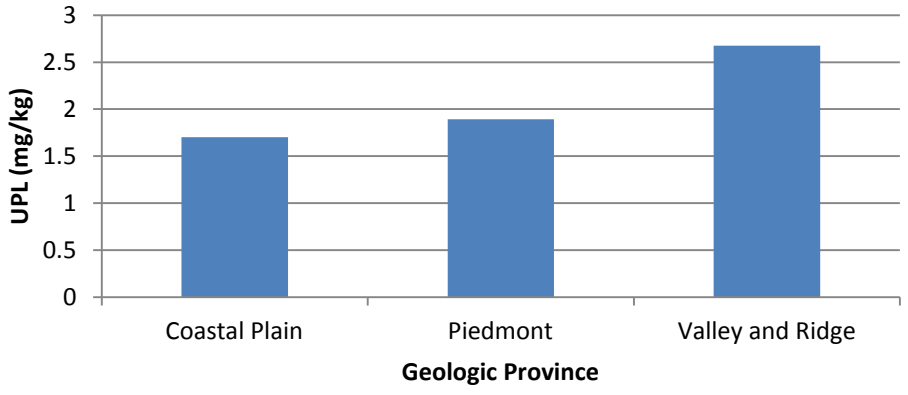


Fig. 18: Silver Upper Prediction Limits (UPLs) by Geologic Province

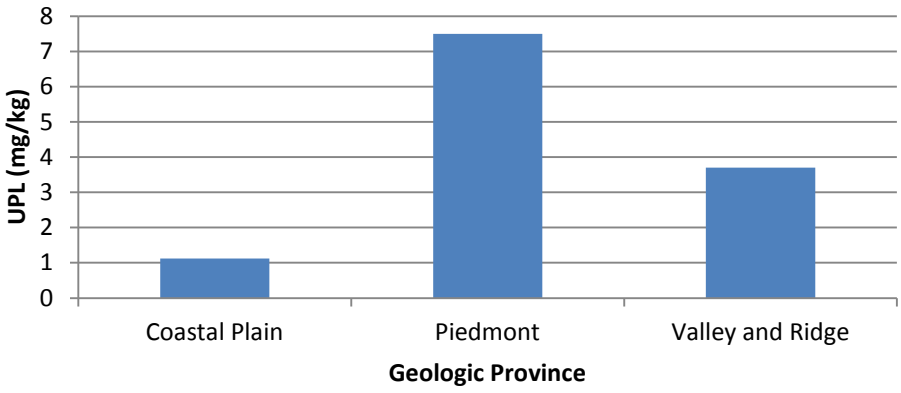


Fig. 19: Thallium Upper Prediction Limits (UPLs) by Geologic Province

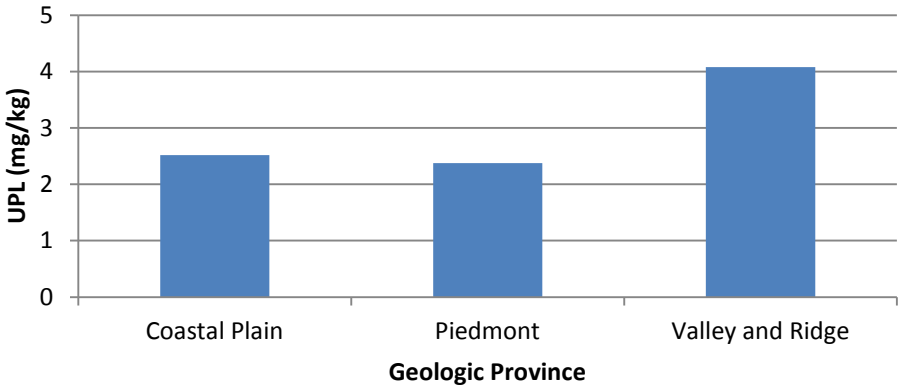
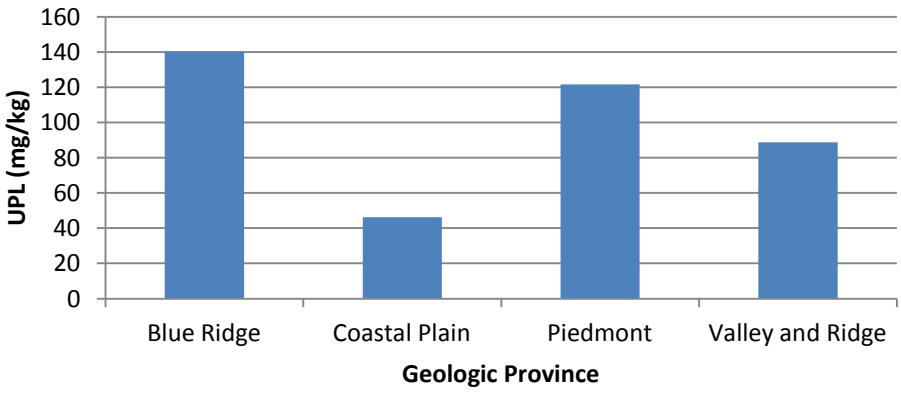
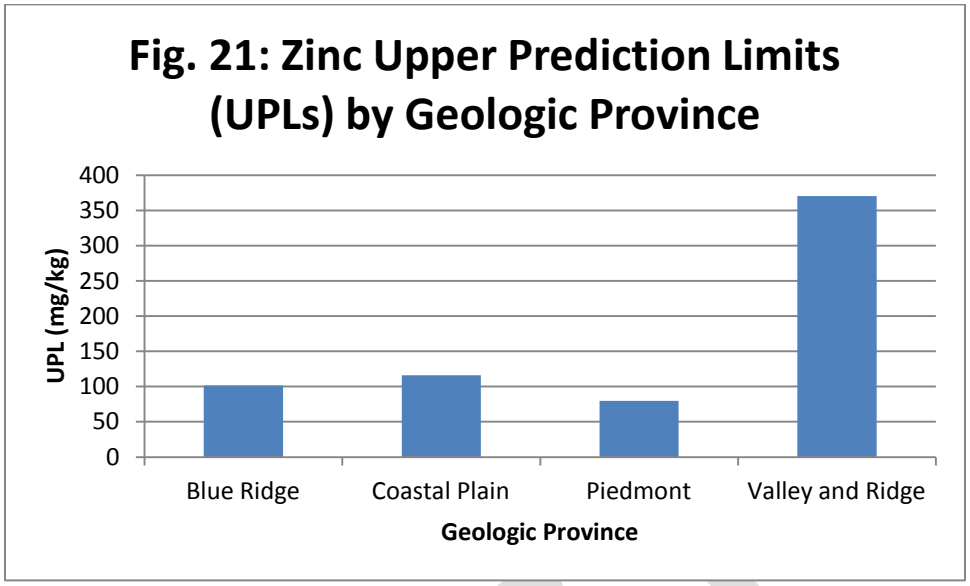


Fig. 20: Vanadium Upper Prediction Limits (UPLs) by Geologic Province





DISCUSSION

DATA INTERPRETATION

The 19 graphs in the *Results* section allow comparison of geologic provinces *with one another*. The Valley and Ridge province exhibits the highest concentrations for most metals, and Coastal Plain the lowest. The table on the following page introduces risk-based concentrations, or RBCs, published by the EPA. These values, which occupy the leftmost data column, pertain to residential soil and provide some context for the calculated UPLs. Three of the RBCs—arsenic, chromium, and lead—represent the exact same orders of magnitude as posted in the EPA's online table. The other sixteen values are one-tenth of the EPA RBCs. Furthermore, the site assessment samples indicated total chromium, while the RBC listed corresponds to hexavalent chromium, denoted *Chromium (VI)*. Most UPLs exceed the predetermined RBCs.

Table 22: EPA RBCs and 95% UPLs

Parameter	EPA Risk-Based Concentrations	95% Upper Prediction Limits (UPLs)				
		Appalachian Plateau	Blue Ridge	Coastal Plain	Piedmont	Valley and Ridge
Aluminum (mg/kg)	7700	N/A	17,482	16,352	24,204	27,709
Antimony (mg/kg)	3.1	N/A	N/A	2.535	12.33	16.3
Arsenic (mg/kg)	0.39	N/A	12.13	11.5	12.41	26.05
Barium (mg/kg)	1500	N/A	142.2	75.67	167.4	195.9
Beryllium (mg/kg)	16	N/A	1.583	1.245	1.345	1.955
Cadmium (mg/kg)	7	N/A	N/A	1.1	3.52	4.34
Chromium (mg/kg)	0.29	N/A	48.52	31	52.8	63.95
Cobalt (mg/kg)	2.3	N/A	25.15	9.705	39.67	42.79

Copper (mg/kg)	310	N/A	83.72	34.3	82.32	139
Iron (mg/kg)	5500	N/A	55,540	29,080	64,580	44,495
Lead (mg/kg)	400	N/A	53.6	91.43	104	302.9
Manganese (mg/kg)	180	N/A	785.6	219.5	1,449	2,968
Mercury (mg/kg)	1	N/A	N/A	0.529	0.12	0.205
Nickel (mg/kg)	150	N/A	N/A	20.37	32.81	35.06
Selenium (mg/kg)	39	N/A	N/A	1.7	1.892	2.676
Silver (mg/kg)	39	N/A	N/A	1.124	7.497	3.7
Thallium (mg/kg)	0.078	N/A	N/A	2.519	2.375	4.081
Vanadium (mg/kg)	39	N/A	140.4	46.26	121.7	88.81
Zinc (mg/kg)	2300	N/A	101.5	116	79.76	370.4

POTENTIAL ERROR

Possible error stems from an inherent lack of consistency in data collection. Site assessment took place over a period of more than 30 years. Different contractors sampled soil with different instruments, and screened for metals using different procedures. Different consultants prepared reports using different formats. While it's possible that background metal concentrations did not undergo significant change over these years, but technology and protocol did. Also, the compilation of concentrations doesn't differentiate between surface soil and deeper soil. While the vast majority of site assessment files contained only a single surface soil sample, those displaying more than one background sample may contain values obtained at different depths. Distinct chemical and physical properties of both soils and metals could combine to create differences in concentration depending on the depth at which site assessors collected samples. While the statistical analysis in this report doesn't capture this difference, any such sites are marked with a note in the rightmost column of the original Excel spreadsheet. Beyond that, the table below shows how sites weren't distributed by geologic province and screening didn't take place for every chemical at every site. The two graphs that follow confirm the large variance in sites per province and the slightly smaller variance in types of metals samples per site. The Coastal Plain province contained more samples than the other four combined. Similarly, while over 90 percent of site files contained a concentration value for six key chemicals (arsenic, chromium, iron, lead, manganese, and vanadium), some metal concentrations appeared in fewer than half of the site records.

Table 23: Number of Samples

Parameter	Appalachian Plateau	Blue Ridge	Coastal Plain	Piedmont	Valley & Ridge
Aluminum	2	10	306	63	37
Antimony	1	4	262	38	15
Arsenic	2	8	520	101	65
Barium	2	10	308	73	41
Beryllium	2	9	276	65	39
Cadmium	1	4	267	52	39

Chromium	2	10	535	106	49
Cobalt	2	9	281	69	38
Copper	2	8	305	73	40
Iron	2	10	517	88	44
Lead	2	10	534	101	51
Manganese	2	10	514	89	44
Mercury	1	5	262	42	32
Nickel	2	7	290	68	41
Selenium	1	6	263	39	25
Silver	4	269	43	17	0
Thallium	4	256	46	16	0
Vanadium	2	10	512	108	46
Zinc	2	10	305	74	45

Fig. 22: Total Number of Samples by Metal

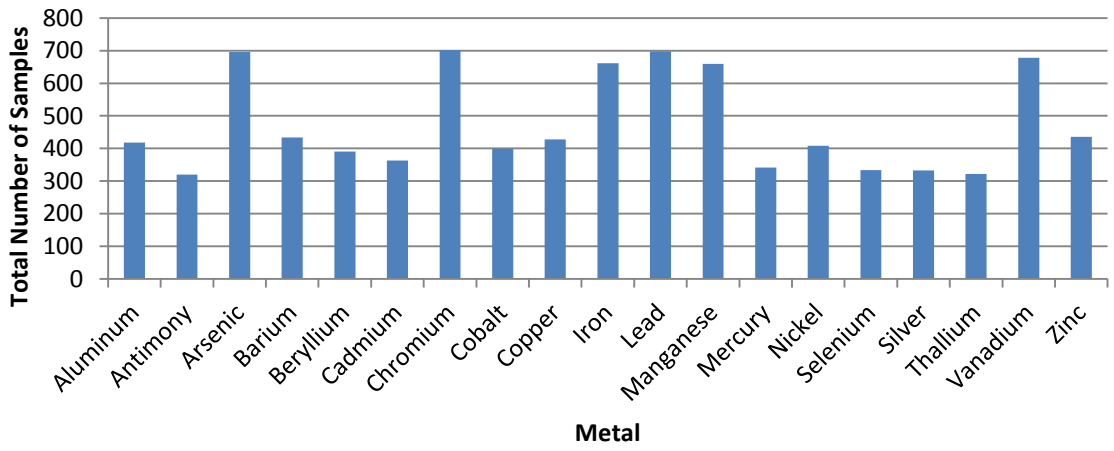
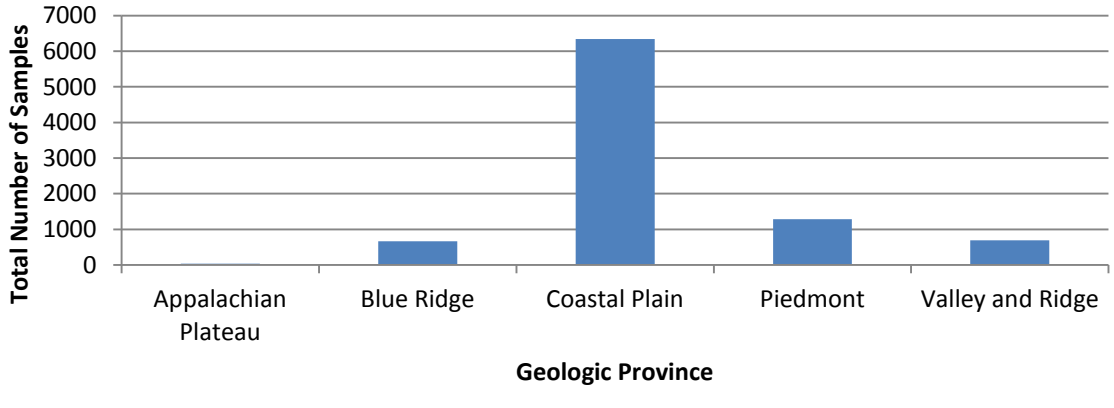


Fig. 23: Total Number of Samples by Geologic Province



IMPLICATIONS

Once subjected to thorough quality control (QC), then internal review at DEQ's Central Office and all regional offices, and finally external review, this report might be eligible for publication. At that point, both public and private sector entities responsible for soil cleanup may benefit, both practically and financially, from the information within. Until then, it may serve as reference material, providing actual figures to supplement what was once primarily anecdotal knowledge. Increasing awareness of background metal concentrations can be a contribution to "the health and well-being of the citizens of the Commonwealth," and a step towards at least this one component of DEQ's mission.

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ENDNOTES

[1] Fichter & Baedke, 2000
[2] The Virginia Indian, 2007
[3] Thornton, 2007
[4] Kinder, 1997
[5] "Mid-Atlantic Superfund: Virginia," 2012
[6] "Remedial Investigation Report," 1991
[7] Ibid
[8] "Risk Assessment Guidance," 1991