

Kentucky Division of Environmental Program Support

Annual Report

Fiscal Year 2021

(July 2020 to June 2021)



September 3, 2021

Energy and Environment Cabinet
Department for Environmental Protection

502-564-6120 (Lab)
dep.ky.gov/deps



DIVISION OF ENVIRONMENTAL PROGRAM SUPPORT



Mission Statement:

It is the mission of the Division of Environmental Program Support (DEPS) to provide scientific data of known accuracy and precision in a timely manner to programs within the Department for Environmental Protection to enable those programs to make appropriate environmental decisions. The division maintains a technically skilled and properly trained staff and a fully equipped environmental chemistry laboratory to accomplish its mission.

Message from the Assistant Director:

On behalf of all of the staff in the Division of Environmental Program Support (DEPS), I am once again very pleased to present this year's Annual Report. This report includes divisional activities and accomplishments that took place during the Fiscal Year (FY) 2021 (July 1, 2020 to June 30, 2021) with some exceptions. Calendar year charts are present in some parts of the report.

Last year was a tough one for us all. The year began right in the midst of the Covid-19 pandemic and has been a rollercoaster ride for that reason ever since. Despite this fact, the DEPS lab was able to accomplish much this past 12-months. Keeping its doors open throughout the year and providing laboratory testing capabilities for all testing requests was a difficulty we overcame. There were constraints placed upon everyone and staff cooperation was needed in order for this to occur. Employees not only had to deal with their own personal needs but they had to work under a split shift schedule at times. Management had to schedule staff on different days to maintain low occupancy and redesign office and cubicle areas for a safer work environment. Staff had to provide detailed documentation of their work from home. They were required to fill out health assessments each day and if they were not feeling well they were asked to quarantine according to OAS and CDC guidelines. Staff were also asked to mask up when arriving at work and wear them at all times unless they were in their own office by themselves.

In summary the laboratory testing numbers were very similar to the total numbers from the previous year. If not for the misdirection due to the virus, the lab would have easily eclipsed last year's FY totals. Over 4100 samples were logged into our system in FY20 compared to over 4900 samples the previous year. The average turn-around-time (TAT) for samples this year has taken a little bit longer to complete. The lab averaged over 18 days per sample compared to around 16 the year before.

Besides the normal monitoring samples, the DEPS lab was able to provide priority testing for a Phase II PFAS project that involved sampling 40 surface water monitoring stations. This sampling took place between July–September and comprised of nearly 200 samples. This project was designed to help expand everyone's understanding of the concentration levels for PFAS. Monitoring station locations were selected to fill data gaps and represent each of the major river basins in the state. The lab was also tasked to develop a method to test fish tissue for these forever chemicals. Analyzing landfill and waste water samples for PFAS are soon to follow. This method is near completion and will be able to be launched in mid-September of 2021. With the addition of this method the Commonwealth will be in a prime position (analytically speaking) for any federal and state regulatory statutes in the future.

I feel very fortunate to have some high quality employees working in the centralized laboratory facility. Their skill level in their craft and their dedication toward their duties are outstanding. I continue to remain optimistic that the worst is behind us and pray for everyone's safety in the coming year.

Michael Goss





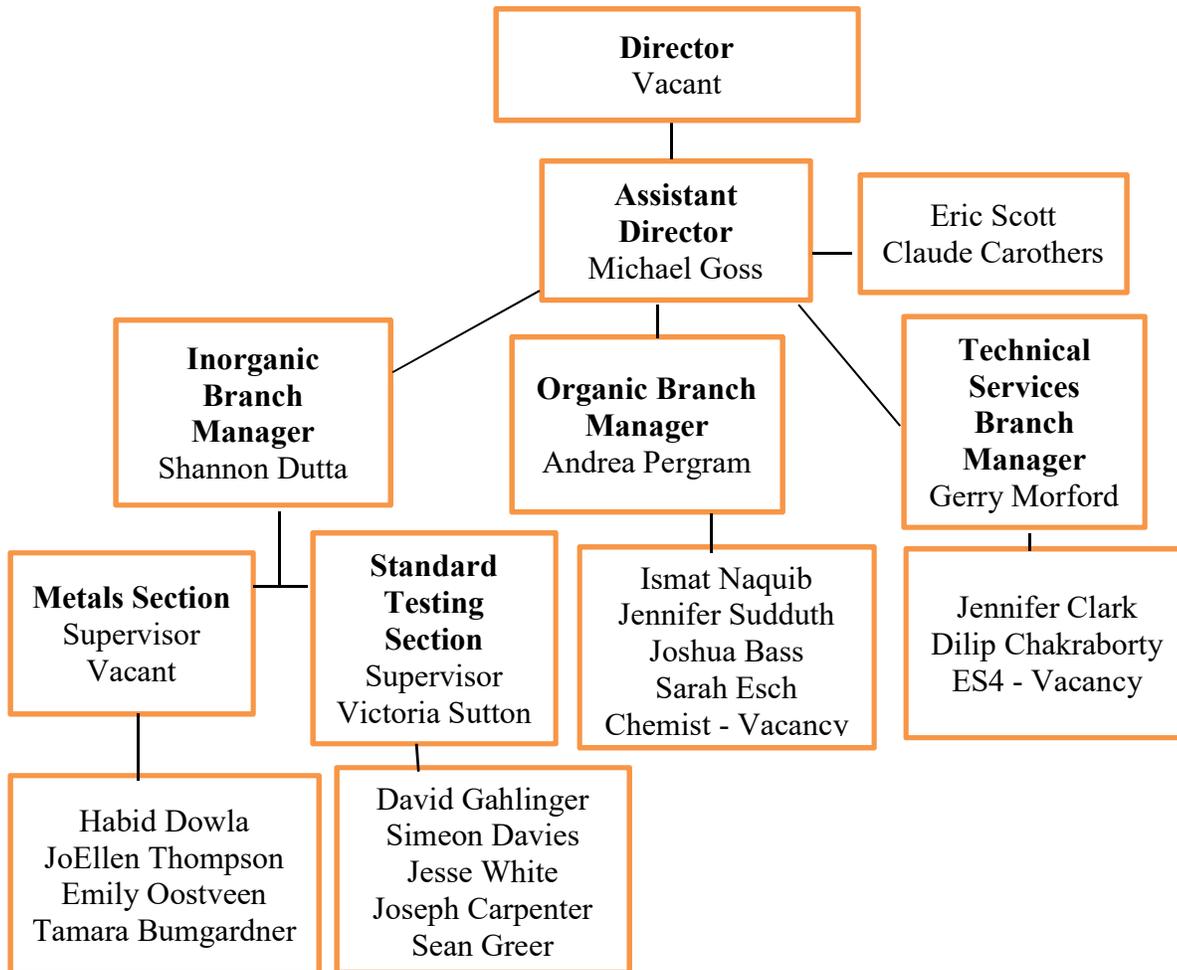
Divisional Background Introduction:

The Division of Environmental Program Support (DEPS) was organized in 2009 (Executive Order 2009-538). The department consolidated internal support functions for the department into the new division to create necessary efficiencies and redundancies. These functions included departmental administrative services, environmental laboratory services, and environmental response team (ERT) coordination. In fiscal years 2015 and early 2016, these functions expanded to include information/public records management, application development human resources management, and departmental budgeting.

In 2017 the Energy and Environment Cabinet underwent another reorganization. This reorganization resulted in the abolishment of GAPS and the transfer of those administrative functions to the newly created Office of Administrative Services (OAS) within EEC. Three branches previously located in the DEPS structure were reorganized into the newly formed OAS. This left the Division of Environmental Program Support with two branches. One being the Environmental Response Branch and the other the Environmental Services Branch. The Environmental Services Branch (ESB) is located at 100 Sower Boulevard in Frankfort in the Central Laboratory Complex. The ERT Branch is located in the 300 building on Sower Boulevard.

The Division of Environmental Program Support underwent its last reorganization November 16th, 2018. This reorganization resulted in the re-establishment of the chemistry laboratory located at 100 Sower Blvd as the Division of Environmental Program Support and the movement of the ERT Branch into the Division of Waste Management. The structure of the DEPS is represented below

Division of Environmental Program Support



Updated: 06/30/21

Chemical Analytical Services:

The Inorganic and Organic Branches are responsible for conducting analysis of all current Inorganic and Organic testing found in the LOQAM (Laboratory Operations Quality Assurance Manual). Matrix of samples can be in various forms of water, soil, sediment, solid and fish tissue. In addition the Branches are both responsible for the following as related to inorganic and organic testing, respectfully:

- Developing new methods as requested by the Department for Environmental Protection to meet current programmatic changes and environmental demands;
- Testifying and defending in court all sample results and analytical data originating and reported by the division;
- Conducting all testing related to Proficiency Test (PT) studies to maintain accreditation and certification with both National Environmental Laboratory Accreditation Program (NELAP) and US EPA drinking water certification programs;
- Reviewing and implementing both current and new state and federal laws and regulations that effect DEP programs, including the Clean Water Act, Resource Conservation and Recovery Act (RCRA), Safe Drinking Water Act (SDWA) and the Comprehensive Environmental Response Compensatory Liability Act (CERCLA);
- Yearly evaluation and maintenance of the analytical and quality control procedures as specified in the LOQAM and standard operating procedures;
- Reporting all data to respective clients within 14 days of sample receipt.





The Organic Branch Test List:

- Volatile Organic Compounds
- Semi-volatile Organic Compounds
- Pesticides Analysis
- Herbicides Analysis
- BTEX Analysis
- Trihalomethanes (THMs)
- Total Petroleum Hydrocarbons
- Oil and Grease
- Diesel Range Organics
- Technical Chlordane
- Haloacetic Acids (HAAs)
- Per & Poly Fluoroalkyl Substances (PFAS)
- Microcystins (HAB)
- Cylindrospermopsin (HAB)
- Anatoxin-A (HAB)
- PAH Analysis
- PCB Analysis
- Ethanol
- Glycols
- Caffeine
- MBAS
- Glyphosate

The Organic Branch also coordinates, plans and assigns a sample workload for all organic preparation, analysis, and reporting. Annual test requests numbers within the branch can vary from 4,000 to 5,000 individual tests.



The Inorganic Branch, Metals Section Test List:

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • Total Metals by ICPMS 1. Aluminum 2. Antimony 3. Arsenic 4. Barium 5. Beryllium 6. Cadmium 7. Chromium 8. Cobalt 9. Copper Lead 10. Manganese 11. Nickel 12. Selenium 13. Silver • Hexavalent Chromium Analysis • Mercury Analysis by CVAA • Low Level Mercury by CVAF • Toxicity Characteristic Leaching Procedure (TCLP) | <ul style="list-style-type: none"> 14. Strontium 15. Tin 16. Thallium 17. Vanadium 18. Zinc | <ul style="list-style-type: none"> Total Metals by ICP: 1. Calcium 2. Boron 3. Iron 4. Lithium 5. Magnesium 6. Potassium 7. Sodium |
|---|--|--|

The Metals Section also coordinates, plans and assigns a sample workload for all Metals preparation, analysis and reporting. Annual test request numbers within the Metals Section can vary from 9,000 to 10,000 individual tests.



The Inorganic Branch, Standard Testing Section Test List:

- Acidity
- Alkalinity
- Ammonia
- CBOD
- Chloride
- Color
- Conductivity
- Corrosivity
- Hardness
- Ion Chromatography
 - Fluoride
 - Chloride
 - Nitrite
 - Bromide
 - Nitrate
 - Phosphate
 - Sulfate
- Total Dissolved Solids (TDS)
- Total Organic Carbon (TOC)
- Total Kjeldahl Nitrogen (TKN)
- Total Phosphorus
- Total Suspended Solids (TSS)
- Turbidity
- Nitrate
- Nitrite
- Ortho Phosphate
- pH
- Phenolics
- Residual Chlorine
- Settleable Solids
- Sulfate

The Annual test request numbers within the Standard Testing Section can vary from 25,000, 30,000 individual tests.



Jennifer Clark (ES4 -Technical Services Branch) checks samples temperature and pH before logging them into the Laboratory Information Management System (LIMS).

The Technical Services Branch serves a different role from the other branches. This Branch is responsible for:

- Overseeing and providing technical support and advice for all testing sections and branches of the division by scheduled and unscheduled audits of methods and procedures within the laboratory;
- Overseeing all aspects(non-analytical) related to Proficiency Test (PT) studies, including placing orders for the tests, ensuring all personnel analyze their respective samples on time, combining results for electronic delivery and distributing the results once received with proper corrective action requests;
- Communicating PT related work with vendors, NELAP and USEPA in order to maintain accreditation and certification with both NELAP and the USEPA drinking water program;
- Communicating knowledge of the current state and federal laws or regulations that effect DEP programs, including the Clean Water Act, Resource Conservation and Recovery Act (RCRA), Safe Drinking Water Act (SDWA), and the Comprehensive Environmental Response Compensatory Liability Act (CERCLA);
- Distribution of Chain of Custody (COC) and copies of sample reports to all clients. All data deliverables are in the electronic form and are refined and suited to best meet the needs of the individual program requests;

- Ensuring all laboratory balances, ovens, refrigerators, freezers, walk-in coolers, incubators, desiccators, thermometers, pipettes and other fine measuring devices are properly maintained, calibrated and checked for inaccuracy as required for NELAP and USEPA guidelines.

DEPS– Activities and Accomplishments

The Division of Environmental Program Support (DEPS) provides laboratory-testing services essential for the identification and characterization of environmental pollutants in the Commonwealth. These services are required by KRS 224.10-100(7) “Secure necessary scientific, technical, administrative, and operations services including laboratory services by contract or otherwise”; and (16) “monitor the environment to afford more effective and efficient control practices to identify changes and conditions in ecological systems and to warn of emergency conditions”. Additionally, 40 CFR 123.26 - Requirements for Compliance Evaluation Programs states that “State programs shall have inspection and surveillance procedures to determine, independent of information supplied by regulated persons, compliance or non-compliance with applicable program requirements.”

The DEPS lab was audited remotely by the US EPA Drinking Water Certification group in the early months of 2021. This EPA Region 4 auditing team consisted of (3) three individuals from Athens, GA that would normally visit on-site for 3-4 full days. This was all performed via desktop/laptop computers and cellphones and was an introduction into what most EEC employees have now found the normal. Virtual meetings. Having three people needing to communicate to three different groups at the same times can be very stressful for some. Each assessor had to have video and audio working well throughout the weeklong process in order for this to be successful. Screen sharing of documents was also something that needed to be learned and demonstrated upon request. Internet connectivity was a problem at times but overall the audit went very well. The DEPS lab has responded to all of the findings and recommendations and is in good standing with USEPA. The certification is deemed “interim” until they have had an opportunity to visit in person once again.

The DEPS lab was also able to maintain its accreditation status with the National Environmental Laboratory Accreditation Program (NELAP). Like the aforementioned audit the DEPS lab was visited virtually by (2) two NELAP assessors from New Hampshire, between March 1st and March 9th of 2021. This audit took much longer than the other one due to the large number of methods and processes being reviewed, fewer assessors and not enough time to complete everything in one week. The lab is currently “Certified” and in good standing with NELAP accrediting authorities. There are still some responses to their findings that need to be finalized but from all accounts this shouldn’t be a problem to complete as requested.

Although the occupancy level was low during some portions of the year the DEPS lab was still able to maintain a high level of analytical services to the Department. The testing activities of the branch supported 15 individual programs managed by the Division of Water (DOW) along with 5 programs within the Division of Waste Management (DWM). DEPS was also the primary response laboratory for the Environmental Response Team (ERT). During this past fiscal year, 55 samples were brought in and analyzed by DEPS staff for ERT related occurrences. Besides the regular DEP monitoring programs, the DEPS lab provided analytical support for specific Department of Natural Resources (DNR) programs.

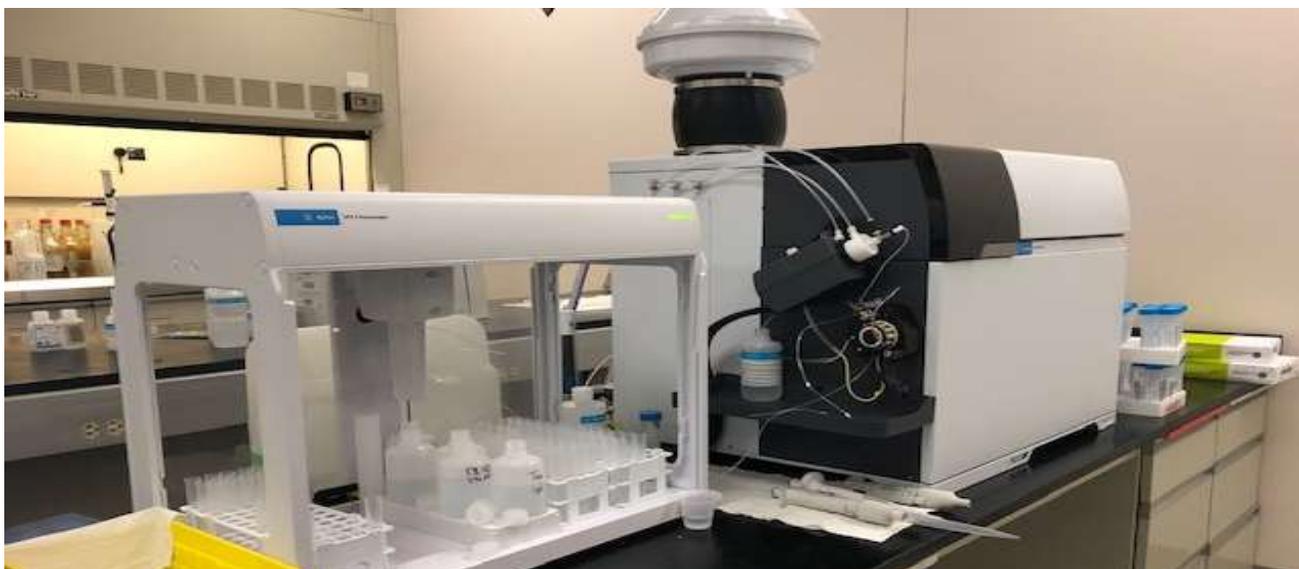
Through MOAs the lab provides work for both their Cumulative Hydrologic Impact Assessment (CHIA) project and the Abandoned Mine Lands (AML) programs. In FY19-20 the lab received 105 DNR related samples. This is much lower than previous years due primarily to the coronavirus pandemic. DNR placed sampling on hold for over a year due to COVID.



Updates on Analytical Instruments:

Replacing equipment with newer, more efficient instruments over time has always been critical to the lab's ability to maintain productivity without additional staff. For a laboratory this size a budget should allocate 10% of their budget for new instruments. Scientific equipment of this sophistication needs replaced every with some sort of schedule (10 years) due to vendors and service representatives not being able to find parts to fix them if they break. Technological advances over a 10 years period can be tremendous in the environmental testing sector. Keeping up with these advances allows the Commonwealth to benefit with lower detection levels, higher quality, reporting of new analytes of concern, higher throughput and better efficiency. Over the years the laboratory has been able to acquire funding through various means for the purchase of much needed instrumentation. Sometimes the budget has been able to account for these purchases and sometimes the lab benefits from grant offerings and awards. The laboratory was very fortunate to be afforded the ability to purchase several instruments this fiscal year.

One of the most notable and expensive purchases in the past year was the Agilent ICPMS (Inductively Coupled Plasma Mass Spectrometer). This instrument was purchased to replace an out of service instrument in the Metals Section. It has been installed and is nearing completion for its first batch rollout. Once in operation this instrument will be able to run over 4000 metal samples per year.



The lab was also able to acquire enough funding to purchase a new Discrete Analyzer (DA) in the Standard Testing Section. This is the fourth DA that the lab has purchased since 2010. This instrument has already taken over the duties of one that is not able to be serviced. This was perfect timing and much needed in order for the lab to continue providing Ammonia, Sulfate and Nitrate testing for the department.



The other big purchase for the lab was a new ultraviolet-visible spectroscopy instrument. This piece of equipment is used for a variety of analysis that cross over both organic and inorganic areas of the lab. The instrument that this replaced was over 25 years old and the lab was really starting to have problems with its dependability. It outlived its manufacturer it was so old. This type of instrument is used primarily for determining concentration levels of Hexavalent Chromium, Methylene Blue Active Substances (MBAS) and Color in aqueous samples.



The last purchase in Fiscal Year 2021 was purchased out of grant money for an Automated Solid Phase Extraction Unit. This piece of equipment is designed to help our Organic Branch prep area in the preparation of fish tissue samples for PFAS analysis. Method development work is currently being performed on this new purchase.



Testing Numbers:

DEPS continues to provide testing services for the department in accordance with the allocated budget monies. In FY2021, the total number of samples analyzed was (4122) and the average turn-around time (TAT) was 18.60 days. In FY2020, the number of samples analyzed was (4903), with an average TAT of 16.43 days. This is a substantial drop in the number of samples and is 100% attributable to the pandemic. The TAT went up due to staff not being in the lab full time.

Numbers were low due to field staff collection constraints. Chemist had to become innovative in making their areas of the laboratory more efficient. Keeping up with productivity with less days in the lab,

without risking the quality of service. They have been most diligent in researching new innovative techniques and recommend a number of purchase for more efficient testing apparatus.

Please see the worksheet below for a listing of all programs that the DEPS laboratory provided testing for in FY 2020

Fiscal Year 2021 Month by Month Sample Loading

FY2020-21	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	Total	
A02 - 106 Grant	25	72	41	11	10	4	3	3	18	9	20	33	249	6.04%
A16 - Lakes											6	7	13	0.32%
A17 - Probabilistic									9	3	19	10	41	0.99%
A18 - Drinking Water				6		4						11	21	0.51%
A19 - Ambient	94	83	102	75	68	96	86	91	81	103	99	92	1070	25.96%
A20 - Fish Tissue				71				29	40			69	209	5.07%
A21 - Groundwater	1	3	2						12		6	2	26	0.63%
A22 - Wild Rivers	7			7			7			7		2	30	0.73%
A25 - Reference Reach	11	9	9	7	6	12	10	9	21	17	31	18	160	3.88%
A39 - Groundwater Monitoring	13	6	26	23	6	35	17		40	13	12	25	216	5.24%
A44 - TMDL		1							2		2		5	0.12%
A46 - Success Monitoring	17	16	17	15				4	25	29	12	14	149	3.61%
A49 - Smock Creek and Green River	55												55	1.33%
A67 - 2020 NPS Glenns Creek									11	18	13	14	56	1.36%
A70 - PFAS	71	55	52		15			3			17		213	5.17%
B02 - HW RCRA			8								4	11	23	0.56%
B03 - HW Solid Waste	15	5	27	9	1	10	3	2	13	5	14	11	115	2.79%
B24 - UST	2					4		2	4				12	0.29%
B25 - HW State CERCLA		20	23	34	5	27			16	7	32	34	198	4.80%
B51 - PGDP	9	40	19	18	4	22	10		26	16	21	3	188	4.56%
D02 - Internal Lab QC (IDC, MDL)	4	8	24	8	3	22	1						70	1.70%
D20 - PT WS Study					1	1	17		1				20	0.49%
D21 - PT WP Study		33						33			1		67	1.63%
D22 - PT Other (Soil)				12						11		3	26	0.63%
E01 - ERT	7	6		7	7		3	3		8	6	8	55	1.33%
P01 - CHIA											32	73	105	2.55%
IDC - Initial Demonstration							1	2	2		3	2	10	0.24%
MDL - Method Detection Limit Study							87	6	2			2	97	2.35%
ODC - Ongoing Demonstration							581	14	14			14	623	15.11%
Totals	331	357	350	303	126	237	826	201	337	246	350	458	4122	100.0%

Certification, Quality Control and Proficiency Testing:

Note:

The DEPS QA Annual Report is included below in this year's Annual Report. Please note that it was written for the Calendar Year 2020 and not Fiscal Year 2021. Providing this information in a fiscal year format is being looked into for the next reporting cycle.

Department for Environmental Protection Quality Assurance Annual Report Calendar Year 2020

Division of Environmental Program Support

Certification:

In order to maintain certification by the National Environmental Laboratory Accreditation Program (NELAP), the Division of Environmental Support laboratory must pass each Non-Potable Water analyte twice each year. The USEPA Water Certification Program requires that the laboratory pass each Drinking Water analyte once each year. A number of Drinking Water and Non-Potable Water analytes submitted to the Performance Testing Provider are not part of either the NELAP Certification List or the EPA Drinking Water Certification list. These analytes are submitted for informational purposes. In 2020, the laboratory was accredited by NELAP for 437 Non-Potable Water analytes and 14 Tissue analytes, and was accredited by USEPA for 148 Drinking Water analytes, including the Unregulated Volatile Compounds.

During 2020, the laboratory analyzed Proficiency Testing samples as part of the laboratory's QA program and to maintain USEPA and NELAP accreditation. There were:

- Two Water Pollution (WP) studies: passed 898 out of 906 analytes reported (99.1% Acceptable).
- One Water Supply (WS) study: passed 130 out of 137 analytes reported (94.9% Acceptable).
- Two Soil studies: passed 336 out of 440 analytes reported (99.1% Acceptable)
- Out of 1483 analytes reported, 1464 were correct (98.7% Acceptable).

Study Name	Method	#Analytes	#Failed	%Passed
WS-0120	GC-Mass	98	7	92.9
	PCB/Pest	7	0	100.0
	Samp Prep	0	0	NA
	Metals	22	0	100.0
	Standard Testing	10	0	100.0
WS-total_2020		137	7	94.9
WP-0220	GC-Mass	310	0	100.0
	PCB/Pest	73	4	94.5
	Samp Prep	2	0	100.0
	Metals	33	1	97.0
	Standard Testing	35	1	97.1
WP-0220-Total		453	6	98.7
WP-0820	GC-Mass	310	0	100.0
	PCB/Pest	73	0	100.0
	Samp Prep	2	0	100.0
	Metals	33	1	97.0
	Standard Testing	35	1	97.1
WP-0820-Total		453	2	99.6
HW-0420	GC-Mass	155	1	99.4
	PCB/Pest	28	0	100.0
	Samp Prep	1	0	100.0
	Metals	34	0	100.0
	Standard Testing	2	0	100.0
HW-0420-Total		220	1	99.5
HW-1020	GC-Mass	155	0	100.0
	PCB/Pest	28	2	92.9
	Samp Prep	1	0	100.0
	Metals	34	1	97.1
	Standard Testing	2	0	100.0
HW-1020-Total		220	3	98.6
Grand Total: WS/WP/HW-2020		1483	19	98.7

Documentation:

- 20 Standard Operating Procedures (SOPs) were either written or revised in 2020. All SOPs are reviewed annually and either updated or documented as needing no changes.
- The Laboratory Operations and Quality Assurance Manual (LOQAM) and 15 Appendices were updated during 2020.
- In addition, documentation of MSDS sheets, standard and reagent tracking and preparation records, corrective action forms, NIST traceability of weights, certified thermometers and temperature devices were created and maintained. Calibration checks on the support

equipment, such as temperature data loggers, thermometers used for certification, weights, ovens and pipetting devices required for accurate laboratory results were also performed throughout the year. Since the majority of the samples and standards in the laboratory have specific temperature preservation requirements, temperature data files for the laboratory refrigerators, freezers and incubators were generated to track temperature changes. Initial Demonstrations of Capability for new methods, annual Ongoing Demonstrations of Capability and Method Detection Limits were performed by the analysts.

- The laboratory reported 199359 analytes from 3443 samples in 11305 containers during 2020.

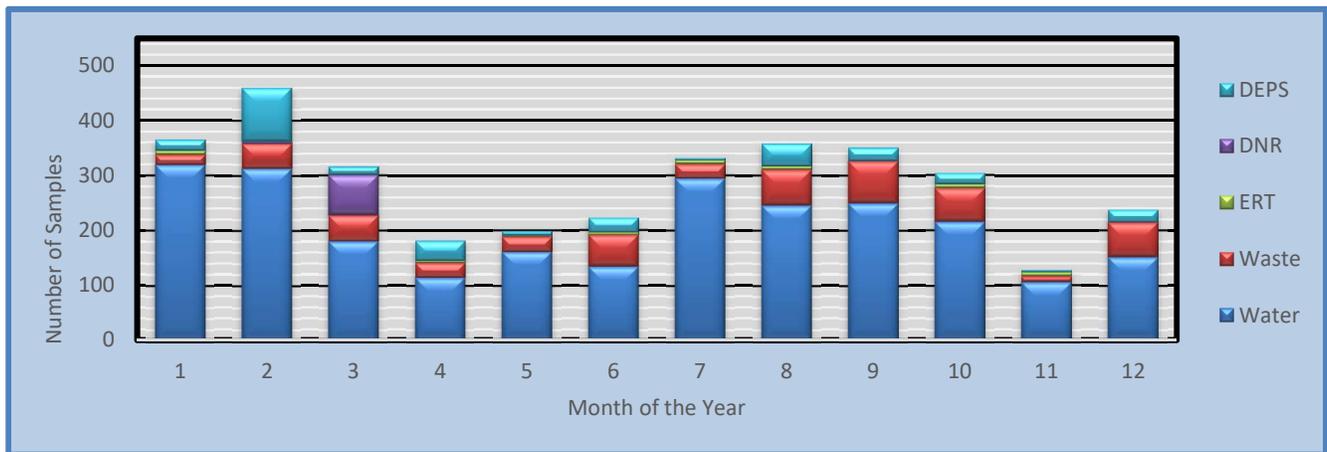
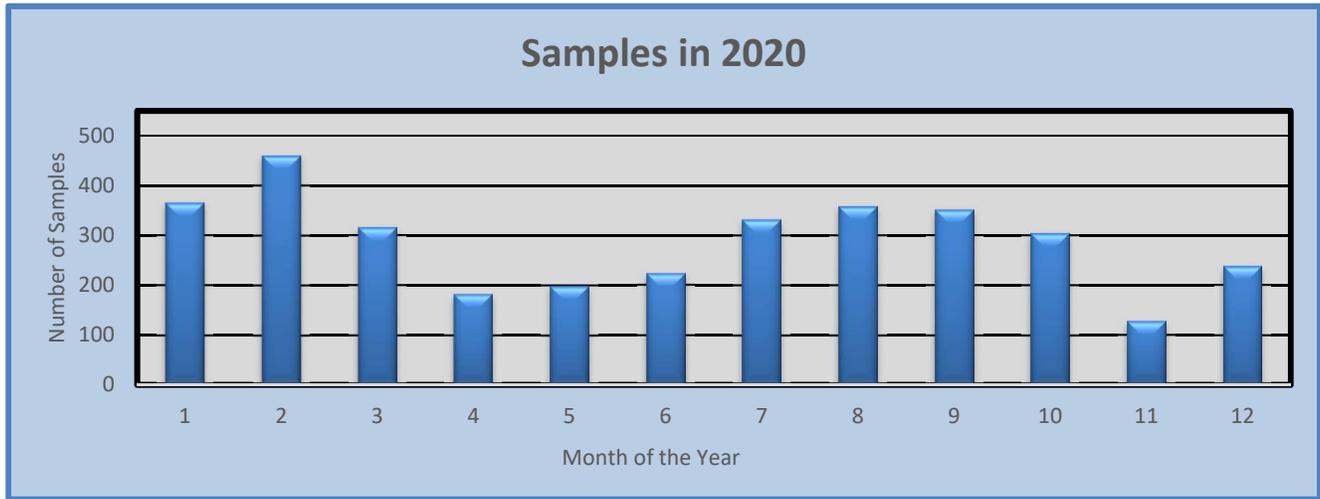
Additional QA Activities:

1. In 2020, a new Internal Audit procedure was introduced that greatly expanded the scope of internal audits, adding rigorous review of the SOP and the LIMS to an expanded review of the reference method.
2. In 2020, 132 Corrective Action Reports were generated, 90 as a result of the enhanced Internal Audit process.
3. In 2020, 41 technical methods were audited by the enhanced method.
4. Equipment checks were expanded to include reagent water quality.
5. Yearly data integrity training was performed as required by NELAP certification.

Other Notable Quality Control Activities:

- 58 Standard Operating Procedures (SOPs) were either written or revised in 2019. All SOPs are reviewed annually and either updated or documented as needing no changes.
- The Laboratory Operations and Quality Assurance Manual (LOQAM) and 15 Appendices were updated during 2019.
- In addition, documentation of MSDS sheets, standard and reagent tracking and preparation records, corrective action forms, NIST traceability of weights, certified thermometers and temperature devices were created and maintained. Calibration checks on the support equipment, such as temperature data loggers, thermometers used for certification, weights, and ovens and pipetting devices, required for accurate laboratory results were also performed throughout the year. Since the majority of the samples and standards in the laboratory have specific temperature preservation requirements, temperature data files for the laboratory refrigerators, freezers and incubators were generated to track temperature changes. Initial Demonstrations of Capability for new methods, annual Ongoing Demonstrations of Capability and Method Detection Limits were performed by the analysts.

Other Notable Calendar Year Charts and Spreadsheets:



The top 5 programs for the lab in CY2020 looked quite a bit different from years past. The Ambient Monitoring group is always our largest client but the other groups were much slower than usual. Much of that can be attributed to restrictions on treatment facilities and other businesses not allowing visitors during the most contagious and worrisome times. In 2019 Success Monitoring, Floyds Fork, CHIA and Drinking Water were all top program contenders.

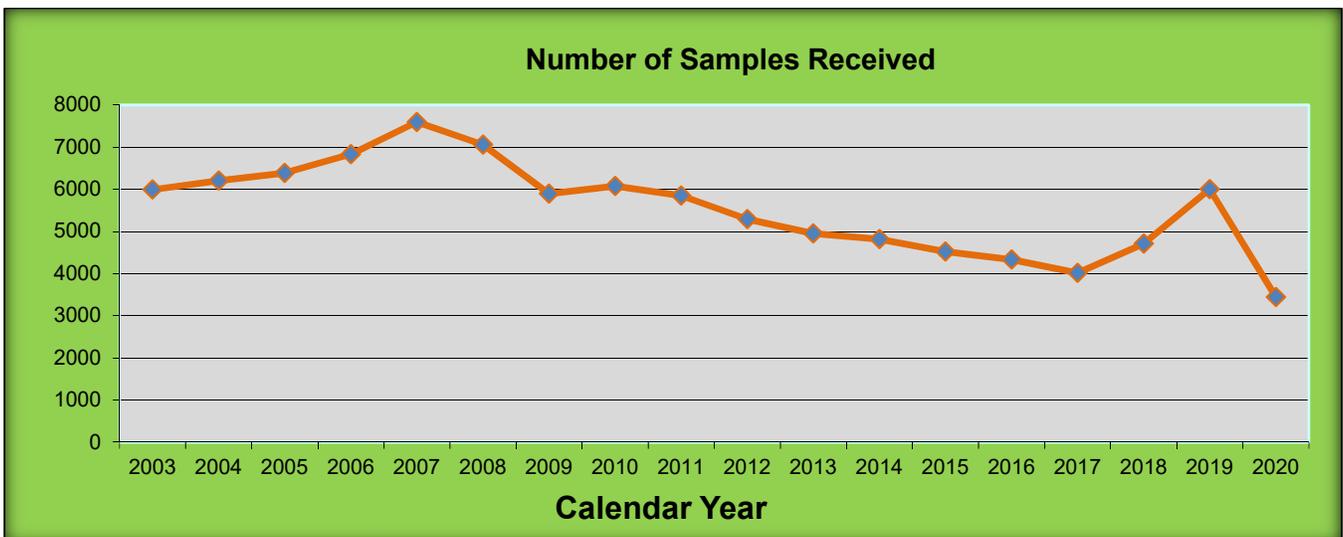
Top Programs	CY2020	% of Total
A19- Ambient		28.70%
A70 - PFAS Study		7.61%
A20 - Fish Tissue		7.09%
A02 - 106 Grant		7.03%
A39 - Groundwater		5.95%
		56.38%

In CY2020 a weekly number of samples received was tracked for weekly accomplishment reporting purposes. The graph below is a summary of that tracking.

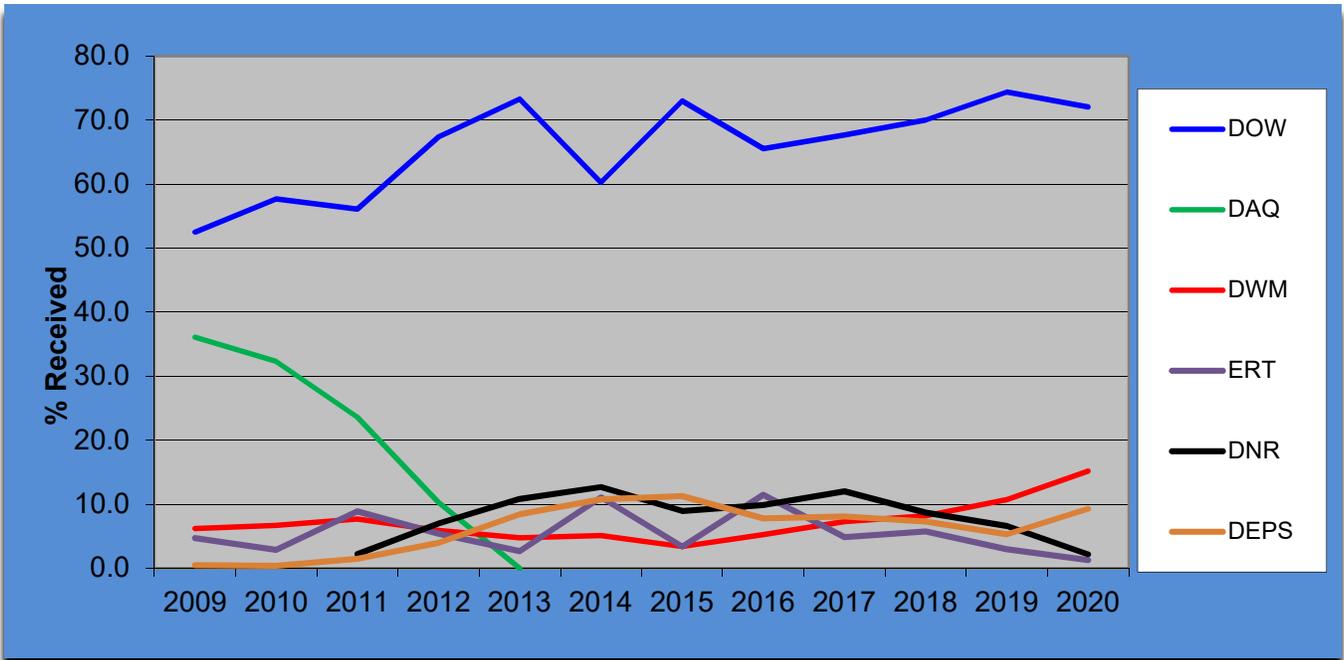
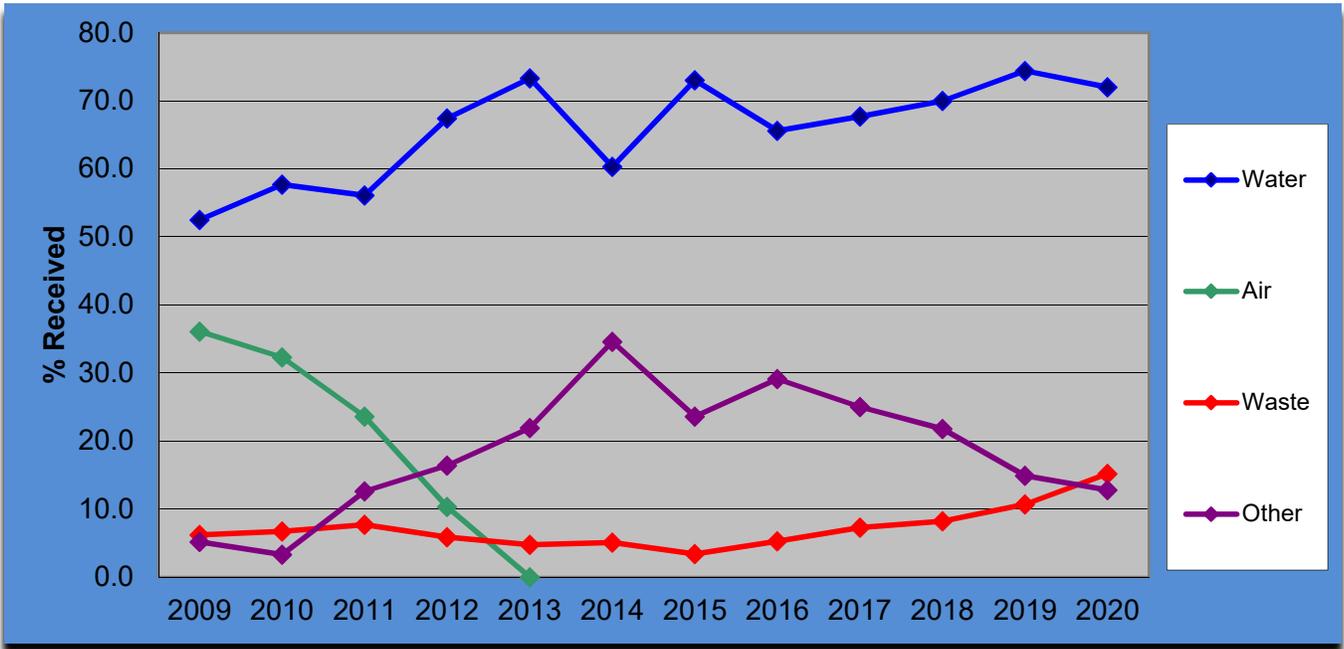


The yellow column is a benchmark for when the COVID-19 pandemic really began to have an effect on lab business and our lives at work. It was during this week that most programs went out and gathered up as many samples as they could before taking some time off from normal business. Sample numbers throughout the rest of the year were considerably lower in numbers as shown in this chart.

Division of Environmental Program Support – Samples Received from 1/01/03 to 12/31/20



The below graph shows the percentage of samples coming into the lab (past 12 years) from the different Divisions within the Department.



Other - Broken out for Clarity

