Environmental Health and Safety
211 South Jarvis Street, Suite 102 | Mail Stop 207
East Carolina University | Greenville, NC 27858-4353
252-328-6166 office | 252-737-1458 fax | safety@ecu.edu | www.ecu.edu/oehs

September 3, 2019

Dr. Susan Pearce
Associate Professor and Interim Chair
Department of Sociology

Re: Indoor Environmental Assessment Report
Brewster Building Wing A

Executive Summary

An indoor environmental quality assessment was conducted in the Brewster Building (Wing A) within the period of June to August 2019. The assessment was conducted in response to reports of health concerns from faculty. The scope of assessment included visual assessment, facility inspection, air monitoring, water sampling and employee interviews. The assessment results, along with guidance from US Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), the American Industrial Hygiene Association (AIHA) among others, was used to formulate the conclusions and recommendations outlined in this report.

Regulatory Interpretations

There is no single test to find the cause of indoor air/environmental quality problem. The US Occupational Safety and Health Administration recommends a "building walkthrough, inspection and testing of the ventilation system, checks for odors and look for water damage, leaks, dirt, etc." It also recommends measurements of temperature, relative humidity, volatile organic compounds, airflow, etc. These recommendations form the basis of this assessment.

Brewster Building

The Brewster building is located on ECU Main Campus along East 10th Street. The building is situated between the Fletcher Music Building and Christenbury Gymnasium. It was constructed in 1970 and has approximately 80,000 square feet, with four separate wings, A-D. This assessment was performed at the A-wing of the building which has four floors that house offices for the departments of History, Geography, Philosophy, Political Science, Sociology, Economics, Religious Studies, the Testing Center and Women's Studies Program. The A-wing is the primary office wing for the facility and the central location for the health concerns.

Complaints

On Thursday, June 20, 2019, Environmental Health and Safety (EH&S) was notified about "building health issues from current and former faculty that seem unusual". The primary concern was that multiple faculty in the Brewster Building had pancreatic cancer and were wondering if there was a connection to the building. It was requested that a building health assessment be conducted to evaluate possible health issues that may be present in the building.

On Friday, June 21, 2019, Ogaga Tebehaevu, EH&S Industrial Hygiene Specialist, responded by scheduling an indoor environmental assessment to evaluate the quality of the building's environment in relation to the health and wellbeing of its occupants. The scope of assessment includes the following:

- Research on contaminants potentially associated with health concerns
- Walkthrough visual assessment
- Facilities Inspection: HVAC and Plumbing
- Air quality parameter survey (temperature, relative humidity, carbon dioxide, carbon monoxide, total volatile organic compounds and Gamma radiation emission)
- Water quality analysis (physical parameters) by Greenville Utilities Commission
- Water quality analysis – inorganic chemical and bacteriological chemical analysis
- EPA TO-15 Volatile organic compounds (VOCs) sampling
- Radon testing
- Employee Interviews

Walkthrough Visual Assessment

On Monday, June 24, 2019, Edward Johnson, ECU Assistant Director of Prospective Health, joined Ogaga Tebehaevu of EH&S to do a walkthrough visual assessment. The team inspected selected rooms (offices) on all four floors and the external part of the building for health and safety issues. Specifically, the visual assessment checked for roof leaks; leaks and/or damage of walls, floor and ceiling tiles; mold and mildew, carpet condition, lighting and visibility issues, office layout and ergonomics; HVAC equipment (supply and return); odor, substance off-gassing and the general office ambience. The ductwork, air handling units and plumbing facilities were not inspected, as those were left to Facilities Services teams. No major issue was found, except for surface dirt, cobwebs and dust on windows, crevices and bookshelves. Some of the offices, including A-123, A-132, A-409, have round electrical plates (see photos in appendix) which were once used as cable duct bank. The supply vents in some of the offices were dirty. The A/C units at some offices were running continuously which made them a lot cooler than others. The team did not find any visible signs of mold or conditions that could compromise the indoor environmental quality. Outside the building, the air intake was clear and clean with no chemical sources in close proximity that could be entrained into the building. Within the outside environment, no activity or construction work was going on that could compromise the air intake.

Air quality parameter survey (temperature, relative humidity, carbon dioxide, carbon monoxide, total volatile organic compounds and Gamma radiation)

On June 24, 2019 (same day), survey measurements were made for ventilation and comfort parameters (carbon dioxide, carbon monoxide, temperature, relative humidity and total volatile organic compounds). These were measured with direct-reading instruments which were calibrated before and after monitoring. The TSI IAQ-CALC (S/N T75251114001) indoor air quality monitor was used to measure temperature, relative humidity, and carbon dioxide in twelve (12) different rooms spread across the building (see appendix for data). The Rae Systems MultiRae pro (S/N M01FA06477) was used to measure carbon monoxide, total volatile organic compounds (TVOCs), and gamma radiation levels. Measurements were collected at approximately 5 feet from floor level to represent occupants'

breathing zone for sampling periods ranging from approximately 3-5 minutes per sample location. Results of the sampling indicated that air temperatures ranged between 71.7 – 75.4 °F indoor. This temperature range is acceptable according to the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) standard 55-2013, which recommends a summer temperature range of 73 to 79 °F in occupied areas.

The indoor relative humidity ranged between 53.0% - 61.0%. The ASHRAE 55-2013 standard recommends an indoor relative humidity range of 30 – 60%. Outdoor conditions were clear with an average recorded temperature of 85.9°F and slightly high relative humidity of 70%.

The maximum Carbon dioxide (CO_2) level measured was 544 parts per million (ppm). According to ASHRAE standard, carbon dioxide levels should not exceed a differential of 700 ppm with outdoor air. Simply put, an indoor carbon dioxide concentration should not exceed the sum of the outdoor concentration plus 700ppm. Since the outside CO_2 level was found to be 348 ppm, the acceptable maximum indoor concentration should not be greater than 1048ppm (348ppm plus 700ppm). Thus, the 544ppm maximum concentration measured was within ASHRAE recommendation.

Carbon monoxide and total volatile organic compounds (TVOCs) were negligible – concentration was less than zero ppm for the period measured. Gamma radiation was constantly at background levels of 10urem/h (microrem/hour). According to the National Council on Radiation Protection and Measurements (NCRP), the average annual radiation dose per person in the United States is 620 millirem.

Moisture content was checked for all rooms surveyed. Levels detected were normal – 2% on the scale of the protimeter surveymaster instrument (SMI). Thermal imaging on walls detected using the fluke infrared thermometer ranged between 68°F to 73°F, which is normal.

Real time aerosol dust levels were monitored using the TSI Dusttrak 8520. Real-time mass concentration readout indicated a maximum concentration of 0.04mg/m^3 (milligram of dust per cubic meter of air) which is negligible when compared to the Occupational Safety and Health Administration (OSHA) standard of 10mg/m^3 Time Weighted Average.

No mold sampling was done as no active moisture sources or visible growth was identified during the survey. We relied on visual assessment (discussed above) to identify moisture source and/or elevated levels of humidity. The North Carolina Department of Health and Human Services (Division of Public Health – Epidemiology Section) does not recommend mold sampling during mold investigations. Mold is always present to some degree indoors as a result of transport of spores from outdoors. Visual inspection is recommended to identify mold growth and moisture issues contributing to its growth. Furthermore, there is no consensus on qualitative limits for mold exposure, so sampling to characterize human exposure and risk can provide uncertain and often misleading results.

Facilities Inspection: HVAC and Plumbing

On Wednesday June 26, 2019, Facilities Services HVAC and Plumbing Supervisors were formally requested to conduct a detailed inspection of HVAC and Plumbing facility issues at the A-wing of the building. An excerpt of the email sent, and responses received are posted below.

From: Tebehaevu, Ogaga Jonathan
Sent: Wednesday, June 26, 2019 2:26 PM
To: Derrick Anderson (ANDERSOND@ecu.edu)
Subject: Plumbing Inspection in Brewster A-Wing
Importance: High

Good afternoon, Derrick!

Our office is conducting a building health assessment at the A-Wing of Brewster (all 4 floors) due to reports of health issues in the building. As part of this effort, we would like to request an inspection of the plumbing system in the building. We wanted to make sure there are no issues or leaks with its vents, pipes, fountains, fixtures, drainage, sewers or any other component that may be introducing unwanted materials into the building. We are conducting a portable water test, so you don't have to worry about this. But we will appreciate all other checks that you know are necessary as far as health and safety is concerned. Please let us know what you find in your inspection and/or what needs to be corrected (if any), so we can include those as part of our recommendations. Thank you for your attention to this.

From: Anderson, Derrick <ANDERSOND@ecu.edu>
Sent: Tuesday, July 23, 2019 9:31 AM
To: Tebehaevu, Ogaga Jonathan <TEBEHAEVUO15@ECU.EDU>
Subject: RE: Plumbing Inspection in Brewster A-Wing

Good Morning Ogaga, I was gone on vacation but before I left, we couldn't seem to find any problem with the plumbing on A-wing.

DERRICK ANDERSON
PLUMBING SUPERVISOR

From: Tebehaevu, Ogaga Jonathan
Sent: Wednesday, June 26, 2019 2:46 PM
To: Christopher L Phelps (PHELPSC@ecu.edu) <PHELPSC@ecu.edu>
Cc: Schmit, Wilhelm R, Jr <SCHMITW@ecu.edu>
Subject: HVAC Inspection in Brewster A-Wing

Good afternoon, Chris,

Our office is conducting a building health assessment at the A-Wing of Brewster (all 4 floors) due to reports of health issues in the building. As part of this effort, we would like to request an inspection of all HVAC components in the building. We would like to have a confirmation that components such as air ducts, air filters, air cleaner, coils, registers/grills, drain pans, air filters, air plenum, etc., are in good condition; including the mechanical rooms. Please let us know what you find in your inspection and whatever it is that needs to be fixed.
Thank you for your attention to this matter.

From: Phelps, Christopher L <PHELPSC@ecu.edu>
Sent: Tuesday, July 16, 2019 8:50 AM
To: Tebehaevu, Ogaga Jonathan <TEBEHAEVUO15@ECU.EDU>
Cc: Schmit, Wilhelm R, Jr <SCHMITW@ecu.edu>; Faulkner, Chad <FAULKNERC@ecu.edu>
Subject: RE: HVAC Inspection in Brewster A-Wing

My guys are changing filters again over at Brewster in all wings. Thus far I have not seen anything out of the ordinary with the HVAC system. Yes, when looking inside the air handlers you will see accumulated amount of dust and dirt that has developed over the many years but that is expected. As far as I know we have not had any complaints with mold blowing in the areas.

CHRISTOPHER L. PHELPS
HVAC SUPERVISOR

Water quality analysis: physical, inorganic chemical and bacteriological parameters

On Tuesday July 30, 2019, the building's water quality was sampled during normal business hours. Samples were collected from sink in the men's bathroom on the first and fourth floor. A control sample was collected from the men's bathroom in Fletcher Music building. The samples were collected from bathrooms instead of water fountains since sinks are a non-filtered source. The samples were analyzed by Environment 1 Incorporated, a lab certified by the N.C Division of Water Quality and the State Laboratory of Public Health. Results of lab analysis (see appendix below) indicated that physical parameters tested for were normal for both floors sampled. These parameters include pH, Total Chlorine Residual, Iron, Manganese, Alkalinity, Hardness, Chloride, Coliform bacteria and Fluoride. Heavy metals such as Arsenic, Cadmium, Chromium, Lead, Selenium, Nitrates and Nitrites sampled were not detectable. Trace concentration of copper (0.149mg/l) was found which is less than the allowable limit of 1.300mg/l. The bacteriological analysis shows that Total Coliform was absent.

Radon Test

On Monday, August 5, 2019, radon gas was tested for using the Air Check Inc., radon test kit. The kits were set up at three locations – A103, A311 and A402 – for a period of 72 hours. Only radon in the air was tested for as recommended by the North Carolina Radon Program. Radon in water test may be necessary when there are elevated levels in the air. The results from lab analysis show a range of less than 0.3 to 0.6pCi/L (Picocuries per liter). According to the [1]US EPA, the average indoor radon level is estimated to be about 1.3pCi/L; roughly 0.4pCi/L is normally found outside. The US EPA action level for indoor radon is 4pCi/L. See appendix below for complete test results.

Volatile Organic Compounds (VOCs) in Air

On Tuesday, August 6, 2019, volatile organic compounds in the air were sampled for using EPA TO-15 Method. This method measures a subset of 97 volatile organic compounds (VOCs) that are included in the 189 hazardous air pollutants (HAPs) listed in the Clean Air Act Amendment of 1990. Monitoring was done using the 1.4L 8-hour canister from EMSL Analytical Inc., a nationally accredited lab. The sample was taken for a period of 8 hours in closed doors. Results of lab analysis is presented in the appendix section below. Of the 161 compounds analyzed, 145 of them were not detected, which indicates an extremely low concentration below the sampling analytical limit. The other 16 compounds reported were indicative of background levels that are well below the OSHA and [2]NIOSH exposure limits.

Employee interviews

As part of the assessment effort, we informally interviewed a few employees to check for possible symptoms of indoor air quality issues. All employees interviewed have been occupying the building in the last three years. The majority of the employees claimed they were fine, but a few of them complained that their offices are sometimes too cold and that it triggers their allergies. One employee reported that dry throat and light headaches previously occurred but that it has stopped. The other issues reported could be characterized as housekeeping issues like dirty carpet, dusty furniture, etc.

[1] https://www.epa.gov/radon/health-risk-radon

[2] NIOSH: National Institute for Occupational Safety and Health

History of Indoor Environmental Issues in Brewster A-Wing

In the last seven years, Environmental Health and Safety (EH&S) has received two complaints of poor indoor air quality in Brewster A-Wing. In October 2012, an employee reported that air vents in the office were getting dirty quickly which was resulting in sneezing. Facilities Services resolved the issue by cleaning the affected vents. In addition, EH&S conducted an indoor air quality assessment and found no major health issues. In April 2019, another faculty member expressed concern of mold in the office. EH&S and Prospective Health investigated the issue through visual assessment and air quality testing but did not find visible signs of mold or issues with the air quality.

Conclusions and Recommendations

Environmental Health and Safety conducted an indoor environmental quality assessment in response to concerns of building health issues in Brewster A-wing. An indoor environmental assessment and facility inspections were conducted to establish a baseline indoor air quality profile. Visual inspection revealed no significant health issues at the time of the assessment. HVAC and Plumbing Supervisors in Facilities Services confirmed they did not find issues except for the air handling units that are dusty. Air sampling results were within normal recommended standards. There were some issues noted during informal interviews with employees which will be investigated.

Based on our observations, we have provided a few recommendations to improve conditions in the building:

1. Consider submitting a work order with the HVAC shop to clean debris from vents (supply and return).
2. Do not block air vents to divert cool air. Kindly contact HVAC shop to fix issues as necessary. HVAC may install air deflectors if necessary, instead of blocking the vents.
3. Report temperature fluctuation and extremely cold offices to HVAC shop.
4. Keep temperature setpoints within recommended limits.
5. Coordinate with Housekeeping to clean offices with dirt and cobwebs. Dusty carpets should also be vacuumed.
6. Report future indoor environmental issues to EH&S by contacting us directly at safety@ecu.edu or (252) 328-6166.
7. All facilities issues should be reported to Facilities Services through the work order system.
8. EH&S may reevaluate the area in the future if conditions change or suggest the need for a reassessment.

Qualifications and Limitations

This report summarizes EH&S evaluation of the conditions observed in Brewster Building Wing A. The findings are based upon our observations and results of sampling obtained at the time of the assessment. The report and its results are limited to the information available at the time it was prepared and investigated. Conditions may have been in effect prior to the sampling events that have changed over time and which cannot be predicted within the scope of this limited investigation. Any condition discovered in this report which deviates from the data obtained should be reported to Environmental Health and Safety.

This report is intended for the A wing of Brewster building. The findings and results should not be applied in part or whole to other buildings in Brewster or East Carolina University or elsewhere. The findings and results are relative to the dates of the investigation and should not be relied upon for substantially later dates.

For questions on this report, please contact Ogaga Tebehaevu, CIH, CSP, of Environmental Health and Safety at (252) 328-6166 or email safety@ecu.edu

Appendix A: Indoor Air Quality Measurements

Indoor Air Quality Measurements
Date of Survey: June 24, 2019

Sample Location	Temperature (Avg-°F)	Relative Humidity (Avg-%)	Carbon Dioxide (Avg-ppm)	Carbon Monoxide (ppm)	VOCs (ppm)	Gamma Radiation (urem/hr)	Comments
A-131	75.4	53.0	513	0	0	11	Vent stained
A-132	74.4	53.7	544	0	0	12	Cable duct bank 'manhole' found in room
A-123	74.0	53.9	508	0	0	13	
A-120	73.0	54.2	502	0	0	13	Tape on supply vent. Small duct bank found
Hallway on A-Wing	72.5	55.0	502	0	0	12	
A-115	72.9	56.4	505	0	0	10	Carpet buckled
A-422	73.9	54.4	489	0	0	10	Tape on supply vent
A-409	73.6	60.4	490	0	0	10	Small round cable duct bank found. Slightly high indoor humidity
A-417	72.9	60.0	500	0	0	11	Cable bank found. Vents taped
A-418	73.1	61.0	496	0	0	11	Supply vents blocked with cardboard paper; space heater found. Slightly high indoor humidity
A-336	73.1	59.7	509	0	0	10	
A-334	72.0	56.5	499	0	0	10	Room very cold. Air temperatures 68°F.
A-330	71.7	56.9	496	0	0	11	Debris, cobwebs and stains
Outside Conditions	85.9	70.4	348	0	0	11	
Acceptable ranges	73-79	30-60	<1000	<50	<1.0	≤5000 (mrem)/yr.	

Appendix B: Water Quality Analysis

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

NEW WELL INORGANIC CHEMICAL ANALYSIS

WATER SYSTEM ID#: COUNTY: PITT

Name of Water System: EAST CAROLINA UNIVERSITY

Sample Type: (x) Entry Point ( ) Special/Non-compliance

Location Where Collected: BREWSTER BUILDING (1ST FLOOR)

Facility ID No.:

Sample Point: 001

Collected By: OGAGA TEBEHAEVU

Collection Date	Collection Time
07/30/19	10:26 AM

Mail Results to (water system representative):

EAST CAROLINA UNIVERSITY
ATTN: PHILLIP LEWIS
211 SOUTH JARVIS STREET
SUITE 102
GREENVILLE, NC 27858

Phone #: (252) 238-6166

Fax #:

Responsible Person's Email:

LABORATORY ID#: 37715 ( ) SAMPLE UNSATISFACTORY ( ) RESAMPLE REQUESTED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LMIT (R.R.L.)	NOT DETECTED ABOVE R.R.L. (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT *
0100	Turbidity	2130B	0.100 ntu		ntu	N/A
1005	Arsenic	200.8	0.005 mg/l	X	mg/l	0.010 mg/l
1010	Barium	200.8	0.4 mg/l		mg/l	2.000 mg/l
1015	Cadmium	200.8	0.001 mg/l	X	mg/l	0.005 mg/l
1016	Calcium	200.7	1.0 mg/l		mg/l	N/A
1017	Chloride	4500CLDE-B	5.0 mg/l		mg/l	250.0 mg/l
1020	Chromium	200.8	0.020 mg/l	X	mg/l	0.100 mg/l
1022	Copper	200.8	0.050 mg/l		0.097 mg/l	1.300 mg/l
1024	Cyanide	4500CN-E	0.050 mg/l		mg/l	0.200 mg/l
1025	Fluoride	4500F-C	0.100 mg/l		mg/l	4.000 mg/l
1028	Iron	3111B	0.060 mg/l		mg/l	0.300 mg/l
1030	Lead	200.8	0.003 mg/l	X	mg/l	0.015 mg/l
1031	Magnesium	200.7	1.0 mg/l		mg/l	N/A
1032	Manganese	200.8	0.010 mg/l		mg/l	0.050 mg/l
1035	Mercury	200.8	0.0004 mg/l		mg/l	0.002 mg/l

* NOTE: Concentrations for Lead and Copper are action levels, not MCLs.

Continued on Page 2....

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114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

NEW WELL INORGANIC CHEMICAL ANALYSIS
(continued)

WATER SYSTEM ID#:
Name of Water System: EAST CAROLINA UNIVERSITY
Facility ID No.:
Sample Point: 001

Collection Date	Collection Time
07/30/19	10:26 AM

LABORATORY ID#: 37715

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED ABOVE R.R.L. (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT *
1036	Nickel	200.8	0.100 mg/l		mg/l	N/A
1040	Nitrate	353.2	1.00 mg/l	X	mg/l	10.00 mg/l
1041	Nitrite	353.2	0.10 mg/l	X	mg/l	1.00 mg/l
1045	Selenium	200.8	0.010 mg/l	X	mg/l	0.050 mg/l
1050	Silver	200.8	0.05 mg/l		mg/l	0.100 mg/l
1052	Sodium	200.8	1.0 mg/l		mg/l	N/A
1055	Sulfate	4500SO4-E	15.0 mg/l		mg/l	250.0 mg/l
1068	Acidity	2310B	1.0 mg/l		mg/l	N/A
1074	Antimony	200.8	0.003 mg/l		mg/l	0.006 mg/l
1075	Beryllium	200.8	0.002 mg/l		mg/l	0.004 mg/l
1085	Thallium	200.8	0.001 mg/l		mg/l	0.002 mg/l
1095	Zinc	200.8	1.0 mg/l		mg/l	5.0 mg/l
1905	Color	2120B	N/A		units	15 units
1915	Total Hardness	2340C	1.0 mg/l		mg/l	N/A
1925	PH	4500H-B	N/A		pH	6.5–8.5 units
1927	Alkalinity	2320B	1.0 mg/l		mg/l	N/A
1930	Total Dissolved Solids	2540C	10.0 mg/l		mg/l	500.0 mg/l

* NOTE: Concentrations for Lead and Copper are action levels, not MCLs.

	DATE:	TIME:
ANALYSES BEGUN:	07/30/19	12:18 PM
ANALYSES COMPLETED:	08/08/19	11:49 AM

Laboratory Log #: 9018-073019-001W

Certified By: MAO

COMMENTS:

9018

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

NEW WELL INORGANIC CHEMICAL ANALYSIS

WATER SYSTEM ID#: COUNTY: PITT

Name of Water System: EAST CAROLINA UNIVERSITY

Sample Type: (X) Entry Point ( ) Special/Non-compliance

Location Where Collected: BREWSTER BUILDING(4TH FLOOR)

Facility ID No.:

Sample Point: 002

Collected By: OGAGA TEBEHAEVU

Collection Date	Collection Time
07/30/19	10:36 AM

Mail Results to (water system representative):

EAST CAROLINA UNIVERSITY
ATTN: PHILLIP LEWIS
211 SOUTH JARVIS STREET
SUITE 102
GREENVILLE,NC 27858

Phone #: (252) 238-6166

Fax #:

Responsible Person's Email:

LABORATORY ID#: 37715 ( ) SAMPLE UNSATISFACTORY ( ) RESAMPLE REQUESTED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LMIT (R.R.L.)	NOT DETECTED ABOVE R.R.L. (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT *
0100	Turbidity	2130B	0.100 ntu		ntu	N/A
1005	Arsenic	200.8	0.005 mg/l	X	mg/l	0.010 mg/l
1010	Barium	200.8	0.4 mg/l		mg/l	2.000 mg/l
1015	Cadmium	200.8	0.001 mg/l	X	mg/l	0.005 mg/l
1016	Calcium	200.7	1.0 mg/l		mg/l	N/A
1017	Chloride	4500CLDE-B	5.0 mg/l		mg/l	250.0 mg/l
1020	Chromium	200.8	0.020 mg/l	X	mg/l	0.100 mg/l
1022	Copper	200.8	0.050 mg/l		0.150 mg/l	1.300 mg/l
1024	Cyanide	4500CN-E	0.050 mg/l		mg/l	0.200 mg/l
1025	Fluoride	4500F-C	0.100 mg/l		mg/l	4.000 mg/l
1028	Iron	3111B	0.060 mg/l		mg/l	0.300 mg/l
1030	Lead	200.8	0.003 mg/l	X	mg/l	0.015 mg/l
1031	Magnesium	200.7	1.0 mg/l		mg/l	N/A
1032	Manganese	200.8	0.010 mg/l		mg/l	0.050 mg/l
1035	Mercury	200.8	0.0004 mg/l		mg/l	0.002 mg/l

* NOTE: Concentrations for Lead and Copper are action levels, not MCLs.

Continued on Page 2....

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NEW WELL INORGANIC CHEMICAL ANALYSIS
(continued)

WATER SYSTEM ID#:

Name of Water System: EAST CAROLINA UNIVERSITY

Facility ID No.:

Sample Point: 002

Collection Date	Collection Time
07/30/19	10:36 AM

LABORATORY ID#: 37715

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED ABOVE R.R.L. (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT *
1036	Nickel	200.8	0.100 mg/l		mg/l	N/A
1040	Nitrate	353.2	1.00 mg/l	X	mg/l	10.00 mg/l
1041	Nitrite	353.2	0.10 mg/l	X	mg/l	1.00 mg/l
1045	Selenium	200.8	0.010 mg/l	X	mg/l	0.050 mg/l
1050	Silver	200.8	0.05 mg/l		mg/l	0.100 mg/l
1052	Sodium	200.8	1.0 mg/l		mg/l	N/A
1055	Sulfate	4500SO4-E	15.0 mg/l		mg/l	250.0 mg/l
1068	Acidity	2310B	1.0 mg/l		mg/l	N/A
1074	Antimony	200.8	0.003 mg/l		mg/l	0.006 mg/l
1075	Beryllium	200.8	0.002 mg/l		mg/l	0.004 mg/l
1085	Thallium	200.8	0.001 mg/l		mg/l	0.002 mg/l
1095	Zinc	200.8	1.0 mg/l		mg/l	5.0 mg/l
1905	Color	2120B	N/A		units	15 units
1915	Total Hardness	2340C	1.0 mg/l		mg/l	N/A
1925	PH	4500H-B	N/A		pH	6.5–8.5 units
1927	Alkalinity	2320B	1.0 mg/l		mg/l	N/A
1930	Total Dissolved Solids	2540C	10.0 mg/l		mg/l	500.0 mg/l

* NOTE: Concentrations for Lead and Copper are action levels, not MCLs.

	DATE:	TIME:
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ANALYSES COMPLETED:	08/08/19	11:49 AM

Laboratory Log #: 9018-073019-002W

Certified By: MAO

COMMENTS:

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

NEW WELL INORGANIC CHEMICAL ANALYSIS

WATER SYSTEM ID#: COUNTY: PITT

Name of Water System: EAST CAROLINA UNIVERSITY

Sample Type: (X) Entry Point ( ) Special/Non-compliance

Location Where Collected: FLETCHER MUSIC CENTER

Facility ID No.:

Sample Point: 003

Collected By: OGAGA TEBEHAEVU

Collection Date	Collection Time
07/30/19	10:47 AM

Mail Results to (water system representative):

EAST CAROLINA UNIVERSITY
ATTN: PHILLIP LEWIS
211 SOUTH JARVIS STREET
SUITE 102
GREENVILLE, NC 27858

Phone #: (252) 238-6166

Fax #:

Responsible Person's Email:

LABORATORY ID#: 37715 ( ) SAMPLE UNSATISFACTORY ( ) RESAMPLE REQUESTED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LMIT (R.R.L.)	NOT DETECTED ABOVE R.R.L. (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT *
0100	Turbidity	2130B	0.100 ntu		ntu	N/A
1005	Arsenic	200.8	0.005 mg/l	X	mg/l	0.010 mg/l
1010	Barium	200.8	0.4 mg/l		mg/l	2.000 mg/l
1015	Cadmium	200.8	0.001 mg/l	X	mg/l	0.005 mg/l
1016	Calcium	200.7	1.0 mg/l		mg/l	N/A
1017	Chloride	4500CLDE-B	5.0 mg/l		mg/l	250.0 mg/l
1020	Chromium	200.8	0.020 mg/l	X	mg/l	0.100 mg/l
1022	Copper	200.8	0.050 mg/l		0.149 mg/l	1.300 mg/l
1024	Cyanide	4500CN-E	0.050 mg/l		mg/l	0.200 mg/l
1025	Fluoride	4500F-C	0.100 mg/l		mg/l	4.000 mg/l
1028	Iron	3111B	0.060 mg/l		mg/l	0.300 mg/l
1030	Lead	200.8	0.003 mg/l	X	mg/l	0.015 mg/l
1031	Magnesium	200.7	1.0 mg/l		mg/l	N/A
1032	Manganese	200.8	0.010 mg/l		mg/l	0.050 mg/l
1035	Mercury	200.8	0.0004 mg/l		mg/l	0.002 mg/l

* NOTE: Concentrations for Lead and Copper are action levels, not MCLs.

Continued on Page 2....

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

NEW WELL INORGANIC CHEMICAL ANALYSIS

(continued)

WATER SYSTEM ID#:

Name of Water System: EAST CAROLINA UNIVERSITY

Facility ID No.:

Sample Point: 003

Collection Date	Collection Time
07/30/19	10:47 AM

LABORATORY ID#: 37715

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED ABOVE R.R.L. (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT *
1036	Nickel	200.8	0.100 mg/l		mg/l	N/A
1040	Nitrate	353.2	1.00 mg/l	X	mg/l	10.00 mg/l
1041	Nitrite	353.2	0.10 mg/l	X	mg/l	1.00 mg/l
1045	Selenium	200.8	0.010 mg/l	X	mg/l	0.050 mg/l
1050	Silver	200.8	0.05 mg/l		mg/l	0.100 mg/l
1052	Sodium	200.8	1.0 mg/l		mg/l	N/A
1055	Sulfate	4500SO4-E	15.0 mg/l		mg/l	250.0 mg/l
1068	Acidity	2310B	1.0 mg/l		mg/l	N/A
1074	Antimony	200.8	0.003 mg/l		mg/l	0.006 mg/l
1075	Beryllium	200.8	0.002 mg/l		mg/l	0.004 mg/l
1085	Thallium	200.8	0.001 mg/l		mg/l	0.002 mg/l
1095	Zinc	200.8	1.0 mg/l		mg/l	5.0 mg/l
1905	Color	2120B	N/A		units	15 units
1915	Total Hardness	2340C	1.0 mg/l		mg/l	N/A
1925	PH	4500H-B	N/A		pH	6.5–8.5 units
1927	Alkalinity	2320B	1.0 mg/l		mg/l	N/A
1930	Total Dissolved Solids	2540C	10.0 mg/l		mg/l	500.0 mg/l

* NOTE: Concentrations for Lead and Copper are action levels, not MCLs.

	DATE:	TIME:
ANALYSES BEGUN:	07/30/19	12:17 PM
ANALYSES COMPLETED:	08/08/19	11:49 AM

Laboratory Log #: 9018-073019-003W

Certified By: MAO

COMMENTS:

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

BACTERIOLOGICAL ANALYSIS

WATER SYSTEM ID#: NC - - County: PITT **CUSTOMER ID#: 8999 T**

Name of Water System: **EAST CAROLINA UNIVERSITY** System Type: Water Source: **GW**

[X] Distribution System – Revised Total Coliform Rule (RTCR)

Sample Type: [ ] Routine (RT) [ ] Repeat (RP) [X] Special/Non-compliance (SP)

Facility ID: D01 Location Code: **B01** Tap Location: **BREWSTER BUILDING(1ST FLOOR)**

Location Street Address: Location City:

Check if sample site is owned or controlled by water system. [ ]

Check if sample site is a daycare or a K-12 school. [ ]

Sample Point: [ ] Routine Original (RTOR) [ ] Repeat Original (RPOR) [ ] Repeat Upstream (RPUP) [ ] Repeat Down (RPDN)

[ ] Source Water – Ground Water Rule (GWR)

Sample Type: [ ] Triggered (TG) [ ] Additional/Confirmation (CO) [ ] Assessment (RT) [ ] Triggered/Dist Repeat (RP) *
* for systems with a population <= 1,000

Facility ID: Sample Point:

Collected By: **OGAGA TEBEHAEVU**

Mail Results to (water system representative):

OGAGA TEBEHAEVU
211 S JARVIS ST
SUITE 102
GREENVILLE, NC 27858

Phone #: **(252) 328-6166**
Fax #:
Responsible Person's email:

Collection Date	Collection Time
07/30/19	10:26 AM

Complete for Repeat, Triggered, or Additional/Confirmation Samples:
Previous Positive Lab ID Number:
Previous Positive Lab Log #:
Previous Positive Location Code:
Previous Positive Collection Date:

Disinfectant Used:
Total Chlorine Residual (Chloramines): mg/l
Free Chlorine Residual (Chlorine): mg/l

LABORATORY ID#: 37715 [ ] Repeat Samples Required From Client [ ] Resample Required From Client

CONTAM CODE	CONTAMINANT	METHOD CODE	RULE	RESULTS Present [1,2]	RESULTS Absent	Invalid Code	INVALID CODES
3100	Total Coliform	9223B	RTCR/GWR		X		1) Confluent Growth / No Coliform Growth Found
3014	*E. coli*		RTCR/GWR				2) TNTC/ No Coliform Growth Found 3) Turbid Culture / No Coliform Growth Found 4) Over 30 Hours Old
3001	Heterotrophic P.C. [3]			cfu/mL or MPN			5) Improper Sample or Analysis [4]

NOTES: [1] If *E. coli*, enterococci or coliphage is present, lab must report results to the State on day test completed.
[2] If total coliform bacteria is present, lab must report results to State within **48** hours.
[3] If HPC is absent, enter a "0" left of the "cfu/mL or MPN" units; if present, enter a whole number.
[4] Explain invalid code below in comments.

	DATE:	TIME:
ANALYSES BEGUN:	07/30/19	04:00 PM
ANALYSES COMPLETED:	07/31/19	04:00 PM

Laboratory Log #: **8999-073019-B01**

Certified by: **DAB**

Comments:

FORM 2016

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

BACTERIOLOGICAL ANALYSIS

WATER SYSTEM ID#: NC - - County: PITT CUSTOMER ID#: 8999 T

Name of Water System: EAST CAROLINA UNIVERSITY System Type: Water Source: GW

[X] Distribution System – Revised Total Coliform Rule (RTCR)

Sample Type: [ ] Routine (RT) [ ] Repeat (RP) [X] Special/Non-compliance (SP)

Facility ID: D01 Location Code: B02 Tap Location: BREWSTER BUILDING(4TH FLOOR)

Location Street Address: Location City:

Check if sample site is owned or controlled by water system. [ ]

Check if sample site is a daycare or a K-12 school. [ ]

Sample Point: [ ] Routine Original (RTOR) [ ] Repeat Original (RPOR) [ ] Repeat Upstream (RPUP) [ ] Repeat Down (RPDN)

[ ] Source Water – Ground Water Rule (GWR)

Sample Type: [ ] Triggered (TG) [ ] Additional/Confirmation (CO) [ ] Assessment (RT) [ ] Triggered/Dist Repeat (RP) *
* for systems with a population <= 1,000

Facility ID: Sample Point:

Collected By: OGAGA TEBEHAEVU

Mail Results to (water system representative):

OGAGA TEBEHAEVU
211 S JARVIS ST
SUITE 102
GREENVILLE, NC 27858

Phone #: (252) 328-6166
Fax #:
Responsible Person's email:

Collection Date	Collection Time
07/30/19	10:35 AM

Complete for Repeat, Triggered, or Additional/Confirmation Samples:
Previous Positive Lab ID Number:
Previous Positive Lab Log #:
Previous Positive Location Code:
Previous Positive Collection Date:

Disinfectant Used:
Total Chlorine Residual (Chloramines): mg/l
Free Chlorine Residual (Chlorine): mg/l

LABORATORY ID#: 37715 [ ] Repeat Samples Required From Client [ ] Resample Required From Client

CONTAM CODE	CONTAMINANT	METHOD CODE	RULE	RESULTS Present [1,2]	RESULTS Absent	Invalid Code	INVALID CODES
3100	Total Coliform	9223B	RTCR/GWR		X		1) Confluent Growth / No Coliform Growth Found 2) TNTC/ No Coliform Growth Found 3) Turbid Culture / No Coliform Growth Found 4) Over 30 Hours Old 5) Improper Sample or Analysis [4]
3014	*E. coli*		RTCR/GWR				
3001	Heterotrophic P.C. [3]			cfu/mL or MPN			

NOTES: [1] If *E. coli*, enterococci or coliphage is present, lab must report results to the State on day test completed.
[2] If total coliform bacteria is present, lab must report results to State within 48 hours.
[3] If HPC is absent, enter a "0" left of the "cfu/mL or MPN" units; if present, enter a whole number.
[4] Explain invalid code below in comments.

	DATE:	TIME:
ANALYSES BEGUN:	07/30/19	04:00 PM
ANALYSES COMPLETED:	07/31/19	04:00 PM

Laboratory Log #: 8999-073019-B02

Certified by: DAB

Comments:

FORM 2016

Environment 1, Incorporated

114 OAKMONT DRIVE
GREENVILLE, N.C. 27858

PHONE (252) 756-6208
FAX (252) 756-0633

BACTERIOLOGICAL ANALYSIS

WATER SYSTEM ID#: NC - - County: PITT CUSTOMER ID#: 8999 T

Name of Water System: EAST CAROLINA UNIVERSITY System Type: Water Source: GW

[X] Distribution System – Revised Total Coliform Rule (RTCR)

Sample Type: [ ] Routine (RT) [ ] Repeat (RP) [X] Special/Non-compliance (SP)

Facility ID: D01 Location Code: F03 Tap Location: FLETCHER MUSIC CENTER

Location Street Address: Location City:

Check if sample site is owned or controlled by water system. [ ]

Check if sample site is a daycare or a K-12 school. [ ]

Sample Point: [ ] Routine Original (RTOR) [ ] Repeat Original (RPOR) [ ] Repeat Upstream (RPUP) [ ] Repeat Down (RPDN)

[ ] Source Water – Ground Water Rule (GWR)

Sample Type: [ ] Triggered (TG) [ ] Additional/Confirmation (CO) [ ] Assessment (RT) [ ] Triggered/Dist Repeat (RP) *
* for systems with a population <= 1,000

Facility ID: Sample Point:

Collected By: OGAGA TEBEHAEVU

Mail Results to (water system representative):

OGAGA TEBEHAEVU
211 S JARVIS ST
SUITE 102
GREENVILLE, NC 27858

Phone #: (252) 328-6166
Fax #:
Responsible Person's email:

Collection Date	Collection Time
07/30/19	10:47 AM

Complete for Repeat, Triggered, or Additional/Confirmation Samples:
Previous Positive Lab ID Number:
Previous Positive Lab Log #:
Previous Positive Location Code:
Previous Positive Collection Date:

Disinfectant Used:
Total Chlorine Residual (Chloramines): mg/l
Free Chlorine Residual (Chlorine): mg/l

LABORATORY ID#: 37715 [ ] Repeat Samples Required From Client [ ] Resample Required From Client

CONTAM CODE	CONTAMINANT	METHOD CODE	RULE	RESULTS Present [1,2]	RESULTS Absent	Invalid Code	INVALID CODES
3100	Total Coliform	9223B	RTCR/GWR		X		1) Confluent Growth / No Coliform Growth Found
3014	*E. coli*		RTCR/GWR				2) TNTC/ No Coliform Growth Found 3) Turbid Culture / No Coliform Growth Found 4) Over 30 Hours Old
3001	Heterotrophic P.C. [3]			cfu/mL or MPN			5) Improper Sample or Analysis [4]

NOTES: [1] If *E. coli*, enterococci or coliphage is present, lab must report results to the State on day test completed.
[2] If total coliform bacteria is present, lab must report results to State within 48 hours.
[3] If HPC is absent, enter a "0" left of the "cfu/mL or MPN" units; if present, enter a whole number.
[4] Explain invalid code below in comments.

	DATE:	TIME:
ANALYSES BEGUN:	07/30/19	04:00 PM
ANALYSES COMPLETED:	07/31/19	04:00 PM

Laboratory Log #: 8999-073019-F03

Certified by: DAB

Comments:

FORM 3016

Appendix C: Volatile Organic Compounds Analysis

EMSL Analytical, Inc.
10801 Southern Loop Blvd, Pineville, NC 28134
Phone/Fax: (704)525-2205 / (704)525-2382
http://www.EMSL.com charlottelab@emsl.com

EMSL Order #: 411907932
EMSL Sample #: 411907932-1
Customer ID: EACU29
Customer PO: Not Available

Attn: Ogaga Tebehaevu, CSP
East Carolina University
211 South Jarvis Street
Suite 102
Greenville, NC 27858

Phone: 252-328-6166
Fax: Not Available
Date Collected: 8/6/2019
Date Received: 8/8/2019

Project: Brewster Building

Sample ID: **Brewster A131**

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	08/08/2019	DK	A2766.D	HD5526	250 cc	1

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
Propylene	NC	115-07-1	42.08	ND		ND	N.E.		N.E.	
Freon 12(Dichlorodifluoromethane)	NC	75-71-8	120.90	1.0		5.1	4900000		4900000	
Freon 114(1,2-Dichlorotetrafluoroethan	--	76-14-2	170.90	ND		ND	7000000		7000000	
Chloromethane	NC	74-87-3	50.49	0.59		1.2	LFC		210000	
n-Butane	--	106-97-8	58.12	ND		ND	1900000		1900000	
Vinyl chloride	C	75-01-4	62.50	ND		ND	LFC		2600	
1,3-Butadiene	C	106-99-0	54.09	ND		ND	LFC		2200	
Bromomethane	NC	74-83-9	94.94	ND		ND	LFC		78000	
Chloroethane	NC	75-00-3	64.52	ND		ND	LFC		2600000	
Ethanol	--	64-17-5	46.07	24		45	1900000		1900000	
Bromoethene(Vinyl bromide)	C	593-60-2	106.90	ND		ND	LFC		N.E.	
Freon 11(Trichlorofluoromethane)	--	75-69-4	137.40	ND		ND	5600000		5600000	
Isopropyl alcohol(2-Propanol)	NC	67-63-0	60.10	1.8		4.5	980000		980000	
Freon 113(1,1,2-Trichlorotrifluoroethan	NC	76-13-1	187.40	ND		ND	7700000		7700000	
Acetone	NC	67-64-1	58.08	7.3		17	590000		2400000	
1,1-Dichloroethene	NC	75-35-4	96.94	ND		ND	790000		790000	
Acetonitrile	NC	75-05-8	41.00	ND		ND	34000		67000	
Tertiary butyl alcohol(TBA)	--	75-65-0	74.12	2.3		6.9	300000		300000	
Bromoethane(Ethyl bromide)	--	74-96-4	108.00	ND		ND	880000		880000	
3-Chloropropene(Allyl chloride)	C	107-05-1	76.53	ND		ND	3100		3100	
Carbon disulfide	NC	75-15-0	76.14	ND		ND	3100		62000	
Methylene chloride	C	75-09-2	84.94	ND		ND	LFC		87000	
Acrylonitrile	C	107-13-1	53.00	ND		ND	2200		4300	
Methyl-tert-butyl ether(MTBE)	C	1634-04-4	88.15	ND		ND	N.E.		N.E.	
trans-1,2-Dichloroethene	--	156-60-5	96.94	ND		ND	790000		790000	
n-Hexane	NC	110-54-3	86.17	ND		ND	180000		1800000	
1,1-Dichloroethane	C	75-34-3	98.96	ND		ND	400000		400000	
Vinyl acetate	NC	108-05-4	86.00	ND		ND	14000		N.E.	
2-Butanone(MEK)	NC	78-93-3	72.10	0.60		1.8	590000		590000	
cis-1,2-Dichloroethene	--	156-59-2	96.94	ND		ND	790000		790000	
Ethyl acetate	NC	141-78-6	88.10	ND		ND	1400000		1400000	
Chloroform	C	67-66-3	119.40	ND		ND	9800		240000	
Tetrahydrofuran	NC	109-99-9	72.11	ND		ND	590000		590000	
1,1,1-Trichloroethane	NC	71-55-6	133.40	ND		ND	1900000		1900000	
Cyclohexane	NC	110-82-7	84.16	ND		ND	1000000		1000000	
2,2,4-Trimethylpentane(Isooctane)	--	540-84-1	114.20	ND		ND	N.E.		N.E.	
Carbon tetrachloride	C	56-23-5	153.80	ND		ND	13000		63000	
n-Heptane	NC	142-82-5	100.20	ND		ND	350000		2000000	
1,2-Dichloroethane	C	107-06-2	98.96	ND		ND	4000		200000	
Benzene	C	71-43-2	78.11	ND		ND	320		3200	
Trichloroethene	C	79-01-6	131.40	ND		ND	130000		540000	
1,2-Dichloropropane	C	78-87-5	113.00	ND		ND	LFC		350000	
Methyl Methacrylate	NC	80-62-6	100.12	ND		ND	410000		410000	
Bromodichloromethane	C	75-27-4	163.80	ND		ND	N.E.		N.E.	

EMSL Analytical, Inc.
10801 Southern Loop Blvd, Pineville, NC 28134
Phone/Fax: (704)525-2205 / (704)525-2382
http://www.EMSL.com charlottelab@emsl.com

EMSL Order #: 411907932
EMSL Sample #: 411907932-1
Customer ID: EACU29
Customer PO: Not Available

Attn: Ogaga Tebehaevu, CSP
East Carolina University
211 South Jarvis Street
Suite 102
Greenville, NC 27858

Phone: 252-328-6166
Fax: Not Available
Date Collected: 8/6/2019
Date Received: 8/8/2019

Project: Brewster Building
Sample ID: Brewster A131

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	08/08/2019	DK	A2766.D	HD5526	250 cc	1

NIOSH and OSHA Exposure Limit Comparisons

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	NIOSH REL ug/m3	>	OSHA PEL ug/m3	>
1,4-Dioxane	C	123-91-1	88.12	ND		ND	3600		360000	
4-Methyl-2-pentanone(MIBK)	NC	108-10-1	100.20	0.82		3.4	200000		410000	
cis-1,3-Dichloropropene**	C	10061-01-5	111.00	ND		ND	4500		N.E.	
Toluene	NC	108-88-3	92.14	ND		ND	380000		750000	
trans-1,3-Dichloropropene**	C	10061-02-6	111.00	ND		ND	4500		N.E.	
1,1,2-Trichloroethane	C	79-00-5	133.40	ND		ND	55000		55000	
2-Hexanone(MBK)	NC	591-78-6	100.10	ND		ND	4100		410000	
Tetrachloroethene	C	127-18-4	165.80	ND		ND	LFC		680000	
Dibromochloromethane	--	124-48-1	208.30	ND		ND	N.E.		N.E.	
1,2-Dibromoethane	C	106-93-4	187.80	ND		ND	350		150000	
Chlorobenzene	NC	108-90-7	112.60	ND		ND	N.E.		350000	
Ethylbenzene	C	100-41-4	106.20	ND		ND	430000		430000	
Xylene (p,m)	NC	1330-20-7	106.20	ND		ND	430000		430000	
Xylene (Ortho)	NC	95-47-6	106.20	ND		ND	430000		430000	
Styrene	NC	100-42-5	104.10	ND		ND	210000		430000	
Isopropylbenzene (cumene)	NC	98-82-8	120.19	ND		ND	250000		250000	
Bromoform	C	75-25-2	252.80	ND		ND	5200		5200	
1,1,2,2-Tetrachloroethane	C	79-34-5	167.90	ND		ND	6900		34000	
4-Ethyltoluene	--	622-96-8	120.20	ND		ND	N.E.		N.E.	
1,3,5-Trimethylbenzene	NC	108-67-8	120.20	ND		ND	120000		120000	
2-Chlorotoluene	--	95-49-8	126.60	ND		ND	260000		N.E.	
1,2,4-Trimethylbenzene	NC	95-63-6	120.20	ND		ND	120000		120000	
1,3-Dichlorobenzene	--	541-73-1	147.00	ND		ND	N.E.		N.E.	
1,4-Dichlorobenzene	C	106-46-7	147.00	ND		ND	LFC		450000	
Benzyl chloride	C	100-44-7	126.00	ND		ND	5200		5200	
1,2-Dichlorobenzene	NC	95-50-1	147.00	ND		ND	300000		300000	
1,2,4-Trichlorobenzene	NC	120-82-1	181.50	ND		ND	37000		N.E.	
Hexachloro-1,3-butadiene	C	87-68-3	260.80	ND		ND	210		N.E.	
Naphthalene	C	91-20-3	128.17	ND		ND	52000		52000	

**The concentrations of each isomer should be added if multiple isomers are present and compared to the total screening level.

The > column is used to flag exceedences as marked

Exposure Limit Definitions
REL= Recommended Exposure Limit, PEL= Permissable Exposure Limit

Agency Definitions
NIOSH= The National Institute for Occupational Safety and Health

Reference
Occupational Safety and Health Administration (OSHA) General Industry Air Contaminants Standard (29 CFR 1910.1000)

Toxicity Class (EPA Regionional Screening Levels (RSL) Table, Nov 2018)

Carcinogenic (C) Exceedence
Value exceeds the theoretical risk that 1 additional case of cancer will occur in a population of 1 million than statistically expected. Thus is a theoretical risk and not an actual epidemiological one.

NonCarcinogenic (NC) Exceedence
Value exceeds the theoretical risk that 1 in a population of 100,000 will experience deliterious health effects. Thus is a theoretical risk and not an actual epidemiological one.

Compound Exposure Definitions
NE= No Limit Established
LFC= Lowest Feasible Concentration
NS= No Sscreening Value

Qualifier Definitions
ND = Non Detect
B = Compound also found in method blank.
E= Estimated concentration exceeding upper calibration range.
D= Result reported from diluted analysis.

EMSL Analytical, Inc.
10801 Southern Loop Blvd, Pineville, NC 28134
Phone/Fax: (704)525-2205 / (704)525-2382
http://www.EMSL.com charlottelab@emsl.com

EMSL Order #: 411907932
EMSL Sample #: 411907932-1
Customer ID: EACU29
Customer PO: Not Available

Attn: Ogaga Tebehaevu, CSP
East Carolina University
211 South Jarvis Street
Suite 102
Greenville, NC 27858

Phone: 252-328-6166
Fax: Not Available
Date Collected: 8/6/2019
Date Received: 8/8/2019

Project: Brewster Building

Sample ID: Brewster A131

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	08/08/2019	DK	A2766.D	HD5526	250 cc	1

North Carolina DEQ DWM- Residential Vapor Intrusion Screening Concentrations

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	Sub Slab/ Ext. ug/m3	>	Indoor Air ug/m3	>
Propylene	NC	115-07-1	42.08	ND		ND	21000		630	
Freon 12(Dichlorodifluoromethane)	NC	75-71-8	120.90	1.0		5.1	700		21.0	
Freon 114(1,2-Dichlorotetrafluoroethan	--	76-14-2	170.90	ND		ND	N.E.		N.E.	
Chloromethane	NC	74-87-3	50.49	0.59		1.2	630		19.0	
n-Butane	--	106-97-8	58.12	ND		ND	N.E.		N.E.	
Vinyl chloride	C	75-01-4	62.50	ND		ND	56.0		0.170	
1,3-Butadiene	C	106-99-0	54.09	ND		ND	14.0		0.0940	
Bromomethane	NC	74-83-9	94.94	ND		ND	35.0		1.00	
Chloroethane	NC	75-00-3	64.52	ND		ND	70000		2100	
Ethanol	--	64-17-5	46.07	24		45	N.E.		N.E.	
Bromoethene(Vinyl bromide)	C	593-60-2	106.90	ND		ND	21.0		0.0880	
Freon 11(Trichlorofluoromethane)	--	75-69-4	137.40	ND		ND	N.E.		N.E.	
Isopropyl alcohol(2-Propanol)	NC	67-63-0	60.10	1.8		4.5	1400		42.0	
Freon 113(1,1,2-Trichlorotrifluoroethan	NC	76-13-1	187.40	ND		ND	35000		1000	
Acetone	NC	67-64-1	58.08	7.3		17	220000		6500	
1,1-Dichloroethene	NC	75-35-4	96.94	ND		ND	1400		42.0	
Acetonitrile	NC	75-05-8	41.00	ND		ND	420		13.0	
Tertiary butyl alcohol(TBA)	--	75-65-0	74.12	2.3		6.9	N.E.		N.E.	
Bromoethane(Ethyl bromide)	--	74-96-4	108.00	ND		ND	35.0		1.00	
3-Chloropropene(Allyl chloride)	C	107-05-1	76.53	ND		ND	7.00		0.210	
Carbon disulfide	NC	75-15-0	76.14	ND		ND	4900		150	
Methylene chloride	C	75-09-2	84.94	ND		ND	4200		100	
Acrylonitrile	C	107-13-1	53.00	ND		ND	14.0		0.0410	
Methyl-tert-butyl ether(MTBE)	C	1634-04-4	88.15	ND		ND	3600		11.0	
trans-1,2-Dichloroethene	--	156-60-5	96.94	ND		ND	N.E.		N.E.	
n-Hexane	NC	110-54-3	86.17	ND		ND	4900		150	
1,1-Dichloroethane	C	75-34-3	98.96	ND		ND	580		1.80	
Vinyl acetate	NC	108-05-4	86.00	ND		ND	1400		42.0	
2-Butanone(MEK)	NC	78-93-3	72.10	0.60		1.8	35000		1000	
cis-1,2-Dichloroethene	--	156-59-2	96.94	ND		ND	N.E.		N.E.	
Ethyl acetate	NC	141-78-6	88.10	ND		ND	490		15.0	
Chloroform	C	67-66-3	119.40	ND		ND	41.0		0.120	
Tetrahydrofuran	NC	109-99-9	72.11	ND		ND	14000		420	
1,1,1-Trichloroethane	NC	71-55-6	133.40	ND		ND	35000		1000	
Cyclohexane	NC	110-82-7	84.16	ND		ND	42000		1300	
2,2,4-Trimethylpentane(Isooctane)	--	540-84-1	114.20	ND		ND	N.E.		N.E.	
Carbon tetrachloride	C	56-23-5	153.80	ND		ND	160		0.470	
n-Heptane	NC	142-82-5	100.20	ND		ND	2800		83.0	
1,2-Dichloroethane	C	107-06-2	98.96	ND		ND	36.0		0.110	
Benzene	C	71-43-2	78.11	ND		ND	120		0.360	
Trichloroethene	C	79-01-6	131.40	ND		ND	14.0		0.420	
1,2-Dichloropropane	C	78-87-5	113.00	ND		ND	28.0		0.760	
Methyl Methacrylate	NC	80-62-6	100.12	ND		ND	4900		150	
Bromodichloromethane	C	75-27-4	163.80	ND		ND	25.0		0.0760	

EMSL Analytical, Inc.
10801 Southern Loop Blvd, Pineville, NC 28134
Phone/Fax: (704)525-2205 / (704)525-2382
http://www.EMSL.com charlottelab@emsl.com

EMSL Order #: 411907932
EMSL Sample #: 411907932-1
Customer ID: EACU29
Customer PO: Not Available

Attn: Ogaga Tebehaevu, CSP
East Carolina University
211 South Jarvis Street
Suite 102
Greenville, NC 27858

Phone: 252-328-6166
Fax: Not Available
Date Collected: 8/6/2019
Date Received: 8/8/2019

Project: Brewster Building
Sample ID: Brewster A131

Analysis	Analysis Date	Analyst Init.	Lab File ID	Canister ID	Sample Vol.	Dil. Factor
Initial	08/08/2019	DK	A2766.D	HD5526	250 cc	1

North Carolina DEQ DWM- Residential Vapor Intrusion Screening Concentrations

Target Compounds	Tox. Basis	CAS#	MW	Result ppbv	Q	Result ug/m3	Sub Slab/ Ext. ug/m3	>	Indoor Air ug/m3	>
1,4-Dioxane	C	123-91-1	88.12	ND		ND	190		0.560	
4-Methyl-2-pentanone(MIBK)	NC	108-10-1	100.20	0.82		3.4	21000		630	
cis-1,3-Dichloropropene**	C	10061-01-5	111.00	ND		ND	140		0.700	
Toluene	NC	108-88-3	92.14	ND		ND	35000		1000	
trans-1,3-Dichloropropene**	C	10061-02-6	111.00	ND		ND	140		0.700	
1,1,2-Trichloroethane	C	79-00-5	133.40	ND		ND	1.40		0.0420	
2-Hexanone(MBK)	NC	591-78-6	100.10	ND		ND	210		6.30	
Tetrachloroethene	C	127-18-4	165.80	ND		ND	280		8.30	
Dibromochloromethane	--	124-48-1	208.30	ND		ND	N.E.		N.E.	
1,2-Dibromoethane	C	106-93-4	187.80	ND		ND	1.60		0.00470	
Chlorobenzene	NC	108-90-7	112.60	ND		ND	350		10.0	
Ethylbenzene	C	100-41-4	106.20	ND		ND	370		1.10	
Xylene (p,m)	NC	1330-20-7	106.20	ND		ND	700		21.0	
Xylene (Ortho)	NC	95-47-6	106.20	ND		ND	700		21.0	
Styrene	NC	100-42-5	104.10	ND		ND	7000		210	
Isopropylbenzene (cumene)	NC	98-82-8	120.19	ND		ND	2800		83.0	
Bromoform	C	75-25-2	252.80	ND		ND	850		2.60	
1,1,2,2-Tetrachloroethane	C	79-34-5	167.90	ND		ND	16.0		0.0480	
4-Ethyltoluene	--	622-96-8	120.20	ND		ND	N.E.		N.E.	
1,3,5-Trimethylbenzene	NC	108-67-8	120.20	ND		ND	420		13.0	
2-Chlorotoluene	--	95-49-8	126.60	ND		ND	N.E.		N.E.	
1,2,4-Trimethylbenzene	NC	95-63-6	120.20	ND		ND	420		13.0	
1,3-Dichlorobenzene	--	541-73-1	147.00	ND		ND	N.E.		N.E.	
1,4-Dichlorobenzene	C	106-46-7	147.00	ND		ND	85.0		0.260	
Benzyl chloride	C	100-44-7	126.00	ND		ND	7.00		0.0570	
1,2-Dichlorobenzene	NC	95-50-1	147.00	ND		ND	1400		42.0	
1,2,4-Trichlorobenzene	NC	120-82-1	181.50	ND		ND	14.0		0.420	
Hexachloro-1,3-butadiene	C	87-68-3	260.80	ND		ND	43.0		0.130	
Naphthalene	C	91-20-3	128.17	ND		ND	21.0		0.0830	

**The concentrations of each isomer should be added if multiple isomers are present and compared to the total screening level.

The > column is used to flag exceedences as marked

Exposure Limit Definitions
PEL= Permissable Exposure Limit

Agency Definitions
North Carolina Department of Environmental Quality

Reference
NC DEQ, Division of Waste Management Vapor Intrusion Screening Concentrations (February, 2018)

Toxicity Class (EPA Regionional Screening Levels (RSL) Table, Nov 2018)

Carcinogenic (C) Exceedence
Value exceeds the theoretical risk that 1 additional case of cancer will occur in a population of 1 million than statistically expected. Thus is a theoretical risk and not an actual epidemiological one.

NonCarcinogenic (NC) Exceedence
Value exceeds the theoretical risk that 1 in a population of 100,000 will experience deliterious health effects. Thus is a theoretical risk and not an actual epidemiological one.

Compound Exposure Definitions
NE= No Limit Established
LFC= Lowest Feasible Concentration
NS= No Sscreening Value

Qualifier Definitions
ND = Non Detect
B = Compound also found in method blank.
E= Estimated concentration exceeding upper calibration range.
D= Result reported from diluted analysis.

Appendix D: Radon Test Report

08/09/19 ACTIVATED CHARCOAL RADON TEST #6883658

Radon Test Result: 0.6 ±0.3 pCi/L

Test Started 08/05/19 at 8:00 am
Test Ended 08/08/19 at 8:00 am
Closed house conditions maintained during test.

Location 1st Floor

OGAGA TEBEHAEVU
211 S JARVIS ST STE 102
GREENVILLE, NC 27858-2052

INTERPRETING YOUR TEST RESULT

The US EPA action level for indoor radon is 4.0 pCi/L. The EPA indicates that there is little short-term risk with test results in this range (0.6 to 1.9 pCi/L). However, because radon levels fluctuate daily, as well as seasonally, you may want to retest during another season. Additionally, if you make any structural changes or start to use a lower level of the building more frequently, you should test again.

You may be able to obtain additional information about radon related subjects by calling

Air Chek
PO Box 2000
Naples, NC 28760

www.radon.com

Your Test Result

This result has been rounded to one-tenth (0.1) of a pCi/L (picocurie per liter). This test result reflects the amount of radon measured in this sample AFTER it arrived at our laboratory. All analysis calculations are automatically adjusted to reflect the length of test, the amount of moisture in the sample, temperature, time from the end of test, and the amount of radiation measured. If your test kit was used prior to the Use By date, ALL the testing protocols and instructions were carefully followed, and the data recorded properly on the test packet, then it is reasonable to assume this is an accurate assessment of the average level of the radon this sample was exposed to during the test period.

Health Risks

The primary health risk from long-term exposure to radon is lung cancer. The risk of developing a lung cancer from radon exposure depends both on how much radon is present and how long you are exposed to radon. The higher the radon level or the longer the time of exposure, even if the levels are relatively low, the greater the risk. EPA has set an Action Level for radon at 4 pCi/L; however radon concentrations less than 4 pCi/L still pose some health risks. The Indoor Radon Abatement Act set a goal for indoor radon concentrations to equal the amount of radon found outdoors, which is estimated to be ~ 0.4 pCi/L.

Conducting Follow-up Measurements

USEPA protocol describes two general types of radon measurements: short-term tests conducted from 48 hours up to 90 days, and long-term tests that last from 91 to 365 days. Your first test (initial/screening) should be a short-term `worst-case' screening to see if there is a potential for high exposure to radon. Screening tests should be conducted under closed-building conditions, in the lowest lived-in area in the house, because the highest concentrations of radon will usually be found in a room closest to the underlying soil. Tests made under these conditions are less likely to miss a house with a potential for high concentrations. On the other hand, if the results of worst-case screening tests are very low, there is a high probability that the average annual concentrations in the house are also low.

(Continued on Back)

Most states have a radon office to assist citizens with general questions about radon and radon reduction techniques. Many states maintain a list of licensed or certified radon testing and mitigation professionals. You can visit www.state-radon.info to find the list of state radon contacts, as well as links to additional radon resources in your area.

08/09/19 ACTIVATED CHARCOAL RADON TEST #6883659

Radon Test Result: < 0.3 ±0.3 pCi/L

Test Started 08/05/19 at 9:00 am
Test Ended 08/08/19 at 9:00 am
Closed house conditions maintained during test.

3RDFL

OGAGA TEBEHAEVU
211 S JARVIS ST STE 102
GREENVILLE, NC 27858-2052

INTERPRETING YOUR TEST RESULT

The US EPA action level for indoor radon is 4.0 pCi/L. Test results in this range(0.5 pCi/L or less) are, for all practical purposes, equivalent to the radon levels found in fresh air. However, if you make any structural changes or start to use a lower level of the building more frequently you should test again.

You may be able to obtain additional information about radon related subjects by calling

Air Chek
PO Box 2000
Naples, NC 28760

www.radon.com

Your Test Result

This result has been rounded to one–tenth (0.1) of a pCi/L (picocurie per liter). This test result reflects the amount of radon measured in this sample AFTER it arrived at our laboratory. All analysis calculations are automatically adjusted to reflect the length of test, the amount of moisture in the sample, temperature, time from the end of test, and the amount of radiation measured. If your test kit was used prior to the Use By date, ALL the testing protocols and instructions were carefully followed, and the data recorded properly on the test packet, then it is reasonable to assume this is an accurate assessment of the average level of the radon this sample was exposed to during the test period.

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(Continued on Back)

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08/09/19 ACTIVATED CHARCOAL RADON TEST #6883660

Radon Test Result: < 0.3 ±0.3 pCi/L

Test Started 08/05/19 at 9:00 am
Test Ended 08/08/19 at 9:00 am
Closed house conditions maintained during test.

4TH

OGAGA TEBEHAEVU
211 S JARVIS ST STE 102
GREENVILLE, NC 27858-2052

Air Chek
PO Box 2000
Naples, NC 28760

www.radon.com

INTERPRETING YOUR TEST RESULT

The US EPA action level for indoor radon is 4.0 pCi/L. Test results in this range(0.5 pCi/L or less) are, for all practical purposes, equivalent to the radon levels found in fresh air. However, if you make any structural changes or start to use a lower level of the building more frequently you should test again.

You may be able to obtain additional information about radon related subjects by calling

Your Test Result

This result has been rounded to one–tenth (0.1) of a pCi/L (picocurie per liter). This test result reflects the amount of radon measured in this sample AFTER it arrived at our laboratory. All analysis calculations are automatically adjusted to reflect the length of test, the amount of moisture in the sample, temperature, time from the end of test, and the amount of radiation measured. If your test kit was used prior to the Use By date, ALL the testing protocols and instructions were carefully followed, and the data recorded properly on the test packet, then it is reasonable to assume this is an accurate assessment of the average level of the radon this sample was exposed to during the test period.

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(Continued on Back)

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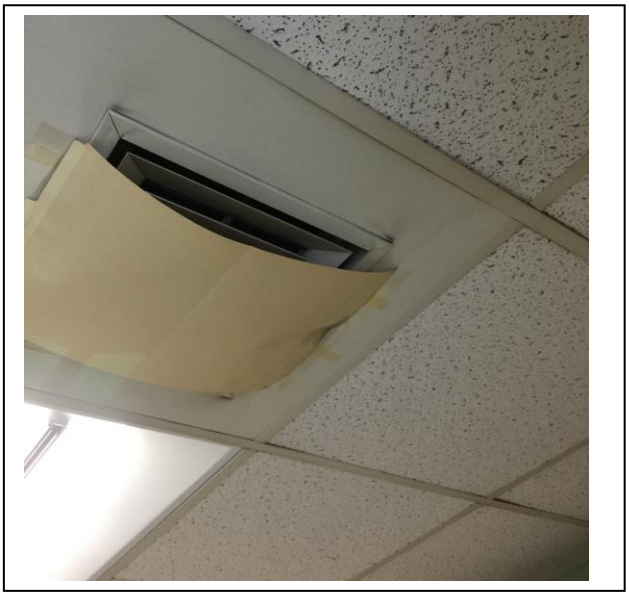
Appendix E: Photo Logs

Cable bank – for cable storage

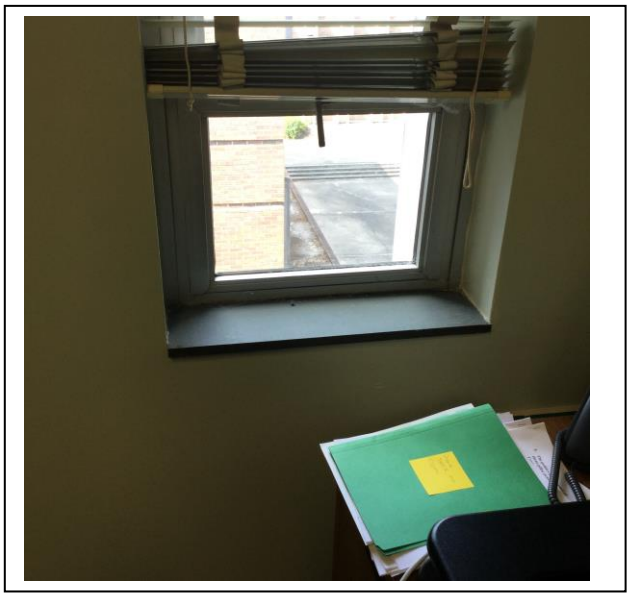
Closed cable outlet

Blocked Vents 1



Blocked Vents 2

Space heater



Stained window blind and window

Air intake louver (close view)

Air intake louver

Dirt on tile and stained wall

Debris and stain on window

Taped supply vents

Taped supply vents