

4 Douglas County High School

4.1 Summary



Short-term radon measurements were conducted in this school from March 16-19, 2009. The results obtained from these tests reflect the conditions that existed within this school and within these dates.

Tests were conducted in accordance with the US EPA's Guidance Document Radon Measurements in Schools, Revised Edition, EPA 402-R-92-014, July 1993.

These tests included all frequently occupied ground floor rooms within all structures on the campus, including portable classrooms. Additional details on the methodology of these tests as well as room selection can be found in Section 1.2 of this report.

Locations tested:	160
Locations where devices retrieved:	160
Locations with short-term results at or above 4.0 pCi/L:	0
Rooms at or above 4.0 pCi/L:	Not applicable
Survey anomalies:	One device was not present upon retrieval within a half-court gymnasium, but a second device was present in this same room

Quality control and quality assurance measures that were taken for this school, which are detailed in Section 13, indicate that confidence can be placed in the survey results for this facility.

4.2 Results

The results provided below in both tabular and pictorial form represent the radon levels within these locations that were present at the time of the survey and under the condition in which the building was being operated, including its HVAC system. There are no locations that were at or above the 4.0 pCi/L action level.

All times indicated are Eastern Daylight Savings Time. Results indicated as <0.3 pCi/L are at the lower level of detection for the devices.

Table 5: Douglas County High School Radon Survey Results

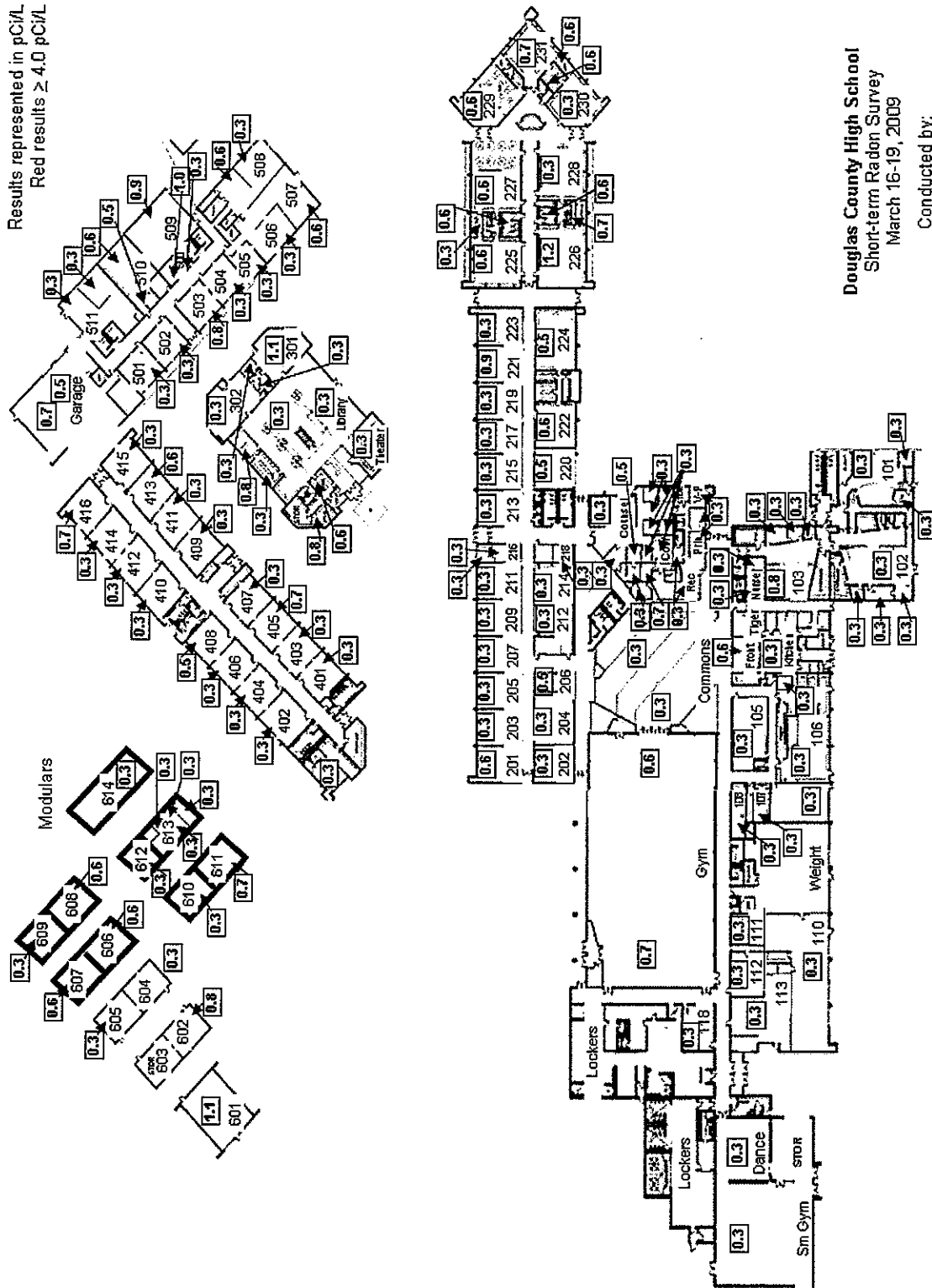
Room	Device	Start Date	Start Time	End Date	End Time	Result (pCi/L)
101	4328855	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
101 Office	4328863	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
101 - Sound	4328868	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
102	4328853	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
103	4328828	2009-03-16	6:00 pm	2009-03-19	5:00 pm	0.8
103 Office	4328827	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
105	4328841	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
106	4328842	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
106 Class	4328837	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
106 Office	4328834	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
107	4328844	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
108	4328840	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
110	4328845	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
111	4328846	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
112	4328851	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
113	4328849	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
118	4328838	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
201	4328881	2009-03-16	7:00 pm	2009-03-19	6:00 pm	0.6
202	4328864	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
203	4328880	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
205	4328873	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
206	4328875	2009-03-16	7:00 pm	2009-03-19	6:00 pm	0.5
207	4328890	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
208	4328871	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
209	4328884	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
210	4328874	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
211	4328883	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
212	4328879	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
213	4328893	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
214	4328876	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
215	4328900	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
204	4328870	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
216	4328892	2009-03-16	8:00 pm	2009-03-19	7:00 pm	< 0.3
217	4328886	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
218	4328899	2009-03-16	8:00 pm	2009-03-19	7:00 pm	< 0.3
219	4328894	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
220	4328891	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.5
221	4328887	2009-03-16	8:00 pm	2009-03-19	7:00 pm	0.9
222	4328895	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
223	4328889	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
224	4328888	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.5
225	4328897	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
225 Office	4328898	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
225 Prep	4328896	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
226	4328872	2009-03-16	8:00 pm	2009-03-19	6:00 pm	1.2
226 Office	4328862	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.7

Room	Device	Start Date	Start Time	End Date	End Time	Result (pCi/L)
226 Prep	4328516	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
227	4328517	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
228	4328518	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
229	4328515	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
230	4328510	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
230 Office	4328521	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
230 Prep	4328509	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
231	4328505	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.7
301	4328501	2009-03-16	8:00 pm	2009-03-19	6:00 pm	1.1
302	4328514	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
302 Ofc	4328502	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
302 Prep	4328508	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
401	4328512	2009-03-16	8:00 pm	2009-03-19	7:00 pm	< 0.3
402	4328539	2009-03-16	8:00 pm	2009-03-19	7:00 pm	< 0.3
403	4328527	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
404	4328528	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
405	4328529	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.7
406	4328519	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
407	4328536	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
408	4328540	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.5
409	4328526	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
410	4328534	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
411	4328545	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
412	4328548	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
413	4328549	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.6
414	4328550	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
415	4328543	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
416	4328544	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.7
500	4328561	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
500 Office	4328552	2009-03-16	9:00 pm	2009-03-19	8:00 pm	1.0
501	4328555	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
502	4328556	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
503	4328560	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.8
504	4328810	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
504	4328568	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.6
504 Office	4328811	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
505	4328567	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
506	4328566	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
507	4328563	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.6
508	4328572	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
508-2	4328569	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.6
509	4328570	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.9
510	4328565	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.6
510 Lounge	4328562	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.5
511	4328542	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
511 Kiln	4328551	2009-03-16	9:00 pm	2009-03-19	7:00 pm	< 0.3
601	4328571	2009-03-16	9:00 pm	2009-03-19	7:00 pm	1.1
602	4328583	2009-03-16	10:00 pm	2009-03-19	7:00 pm	0.8

Room	Device	Start Date	Start Time	End Date	End Time	Result (pCi/L)
604	4328576	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
605	4328573	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
606	4328577	2009-03-16	10:00 pm	2009-03-19	7:00 pm	0.6
607	4328585	2009-03-16	10:00 pm	2009-03-19	7:00 pm	0.6
608	4328574	2009-03-16	10:00 pm	2009-03-19	7:00 pm	0.6
609	4328575	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
610	4328579	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
611	4328581	2009-03-16	10:00 pm	2009-03-19	7:00 pm	0.7
612	4328580	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
613	4328578	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
613A	4328590	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
613B	4328595	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
613C	4328596	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
614	4328587	2009-03-16	10:00 pm	2009-03-19	7:00 pm	< 0.3
Band Office 1	4328867	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Band Office 2	4328860	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Band Prac 1	4328861	2009-03-16	7:00 pm	2009-03-19	7:00 pm	0.6
Band Prac 2	4328832	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Band Prac 3	4328854	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Band Prac 4	4328848	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Band Prac 5	4328847	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Band Workroom	4328856	2009-03-16	7:00 pm	2009-03-19	7:00 pm	< 0.3
Bldg 400 - Lounge	4328532	2009-03-16	8:00 pm	2009-03-19	7:00 pm	< 0.3
Commons 1	4328814	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Commons 2	4328806	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Conference Room	4328823	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Dance	4328857	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
Garage 1	4328559	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.7
Garage 2	4328558	2009-03-16	9:00 pm	2009-03-19	7:00 pm	0.5
Gym 1	4328866	2009-03-16	7:00 pm	2009-03-19	6:00 pm	0.7
Gym 2	4328865	2009-03-16	7:00 pm	2009-03-19	6:00 pm	0.6
Kitchen	4328836	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Kitchen - Cook Ofc	4328829	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Kitchen - Front	4328835	2009-03-16	6:00 pm	2009-03-19	6:00 pm	0.6
Lib - Side Lab	4328524	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
Lib - Theater	4328523	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
Lib -Lecture	4328513	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.8
Library 1	4328503	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
Library 2	4328522	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
Library Office 1	4328531	2009-03-16	8:00 pm	2009-03-19	6:00 pm	0.6
Library Office 2	4328511	2009-03-16	8:00 pm	2009-03-19	7:00 pm	0.8
Maintenance	4328882	2009-03-16	8:00 pm	2009-03-19	6:00 pm	< 0.3
Nurse	4328833	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Nurse -2	4328803	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - John	4328818	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Morgan	4328816	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Ovard	4328831	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Ovard Stor	4328817	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3

Room	Device	Start Date	Start Time	End Date	End Time	Result (pCi/L)
Ofc - Ozolins	4328825	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Principal	4328801	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Reception	4328815	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Robison	4328812	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Rugger	4328805	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Security	4328824	2009-03-16	5:00 pm	2009-03-19	5:00 pm	0.7
Ofc - Swisher	4328808	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Vice Principal	4328822	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc - Ward	4328809	2009-03-16	6:00 pm	2009-03-19	5:00 pm	0.5
Ofc -Coughlin	4328802	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc -Counselor	4328830	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc -Counselor 2	4328819	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc -Martin	4328813	2009-03-16	6:00 pm	2009-03-19	5:00 pm	< 0.3
Ofc Workroom	4328821	2009-03-16	5:00 pm	2009-03-19	5:00 pm	< 0.3
Small Gym	4328859	2009-03-16	7:00 pm	2009-03-19	6:00 pm	< 0.3
Tiger Cage	4328826	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3
Weight	4328839	2009-03-16	6:00 pm	2009-03-19	6:00 pm	0.5
Weight Ofc	4328843	2009-03-16	6:00 pm	2009-03-19	6:00 pm	< 0.3

Figure 4: Douglas County High School Radon Survey Results



Douglas County High School
Short-term Radon Survey
March 16-19, 2009
Conducted by:
Colorado Vintage Companies, Inc.

4.3 Discussion

It would appear that the potential for radon in this facility, based upon its current operation, is very low. The highest reading observed in this building was 1.2 pCi/L with several locations being at or near the lower level of detection for the devices utilized.

With respect to the one device that was not retrieved within the half-court gymnasium, since it was one of the parameters to deploy two devices within a gymnasium (even though the size of this gymnasium would only have required one device), one device was retrieved and a result was able to be obtained for this room. Furthermore, given the low radon levels throughout this structure as well as in the same wing as the small gym, retesting is not warranted for this specific location.

4.4 Recommendations

Due to the acceptable measurements obtained throughout this structure, no specific recommendations are being made, other than to maintain the HVAC system in such a manner as it is currently operating and to insure that adequate fresh air make-up is provided during occupied hours.

Maintenance

The following recommendations are made as a best practice approach for continuing to maintain low radon exposures in this campus.

1. Retest rooms after renovations, which would affect air flow and air supply, occur. This would include but not be limited to situations when:
 - HVAC system is modified, (Retest rooms affected by HVAC that is modified)
 - Partition walls are added within a room,
 - Insure that renovations include provisions for balanced air supply and return from newly created room.
 - Additions occur at this campus, whether they are new buildings or portable classrooms.
2. Maintain fresh air make-up in conformance with ASHRAE standards and state codes for schools and to insure an interior positive building pressure during occupied hours.
3. Develop a database either specifically for this school or district wide for all schools that allows for the retention of future test results that clearly delineate:
 - Location
 - Date of test
 - Purpose of test (routine, post-mitigation or post renovation, etc.)
 - Method by which room nomenclature is maintained or a clear means of determining when names are changed or rooms added.