May 2, 2012

Mr. John Gates
Shakopee Public Schools
505 South Holmes Street
Shakopee, MN 55379

Creating Solutions for Healthy Indoor Environments℠

RE: Jackson Elementary School Long-Term Radon Sample Results
IEA Project #1104061

Dear Mr. Gates:

As requested by Shakopee Public Schools, IEA placed alpha track radon detectors for the purpose of evaluating radon levels in five specific areas of Jackson Elementary School. The radon detectors were deployed for a period of four months.

INTRODUCTION

Radon is a colorless, odorless, radioactive gas that occurs naturally in soil, rocks, underground water supplies, and in the ambient air. According to the U.S. Environmental Protection Agency (EPA) and other scientific organizations, naturally-occurring radon gas has been associated with an increased risk of developing lung cancer. The chances of developing lung cancer from radon exposure are dependent on several factors, including individual susceptibility and, perhaps more importantly, the dose and duration of exposure. The Minnesota Department of Health (MDH) and EPA recommend that schools test radon levels every five years.

IEA placed alpha track detectors in the selected frequently occupied areas at Jackson Elementary School for the purpose of sampling for radon in accordance with the EPA's *Radon Measurement in Schools (Revised Edition 1993)*. A total of five detectors were placed from December 1, 2011, to March 27, 2012, for a total long-term sampling period of 118 days. The detectors were analyzed by Landauer, Inc. The sampling and analysis methodologies are provided in Appendix A.

EVALUATION CRITERIA

The MDH and the EPA have established a recommended action level in frequently occupied schoolrooms of 4.0 picoCuries per liter (pCi/L) for an annual average. Samples were deployed for a period of approximately four months. Since sampling did not occur over three seasons, both "open" and "closed" building conditions were not present (this adds exposure from heating, ventilation, and air-conditioning systems (HVAC)). The conditions during the testing period must be considered when comparing the results to the action level. For example, a sampling conducted during the summer under "open" conditions may be lower than an actual annual average exposure. Conversely, a sampling conducted during the winter under "closed" conditions may represent a "worst case" condition, and therefore is considered a screening test. Consequently, sampling under these "closed" conditions should be considered "worst case." MDH recommends follow-up testing for sampling results at certain levels. Please refer to the following MDH chart for guidelines:

RESULTS (pCi/L)	RECOMMENDED ACTION
LESS THAN 2	Consider performing a sampling period such as a three season long-term test.
2 TO 10	Perform long-term test over three seasons.
GREATER THAN 10	Perform a three season long-term test.

RESULTS & DISCUSSION

The laboratory report, which includes sampling locations, is provided in Appendix B. The Chain of Custody is provided in Appendix C. Following are the summary results.

A total of five detectors were placed at Jackson Elementary School. The results indicated that radon levels were below the action level of 4 pCi/L. See the Table below for a summary of the results:

TABLE: RANGE OF RESULTS				
	0.0 – 1.9 pCi/L	2.0 – 2.9 pCi/L	3.0 – 3.9 pCi/L	≥ 4 pCi/L
Number of Tests	4	1*	0	0
*Room 102				

pCi/L: picocuries per liter

CONCLUSIONS & RECOMMENDATIONS

The radon levels in the sampled locations were below the EPA action level of 4 pCi/L. The EPA has established recommended guidelines for permissible radon concentrations in schools. Though these standards are unenforceable at this time, they do provide a reference point to decide what actions to take based on the radon level screened. The following are general recommendations for frequently-occupied areas of schools:

- If the results are less than 2 pCi/L, the area should be retested if major changes are made to the facility.
- If the results are 2-4 pCi/L, mitigation of the area should be considered.
- If the results are equal to or greater than 4 pCi/L, mitigation of the area is strongly recommended.

As directed by the MDH, IEA recommends adjusting the heating, ventilation, and air-conditioning (HVAC) system to allow for improved airflow to mitigate areas where radon levels are equal to or greater than 4 pCi/L. Additional testing may be warranted after HVAC systems are adjusted. A radon mitigation contractor may be contacted; however, IEA recommends using a contractor with experience specific to schools.

GENERAL COMMENTS

The analysis and opinions expressed in this report are based upon data obtained from radon sampling at Jackson Elementary School and are representative of the locations and time period sampled. This report does not reflect variations in conditions that may occur across the site, property, or facility. Actual conditions may vary and may not become evident without further assessment.

This report is prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted practices. No warranties are intended or made.

IEA appreciates the opportunity to submit this analysis to Shakopee Public Schools. Should you require additional radon testing or have any questions regarding radon or any other environmental, health, or safety-related concerns, please do not hesitate to contact our office.

Sincerely,
IEA, INC.

Dan Fitch
EHS Project Manager
EH&S Division

Leslie Cloonan, MPH, CIH, LEED AP O+M
Senior Project Manager
Indoor Environments Division

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Appendix A

Methodology

Sampling Methodology

IEA placed alpha track radon detectors designed specifically for the detection of alpha particle activity caused by the decay of Radon-222 and its daughter products. The detector is made of an electrically conductive material and contains an alpha-particle sensitive registration material or foil. The detector has a cylindrical shape and completely encloses the foil. Air and radon gas can diffuse into the detector chamber through a cellulose filter. Individual detectors are uniquely identified with a number and corresponding bar code.

Upon receipt at the analytical laboratory, detectors are logged in and unique numbers assigned to each detector foil. Sample preparation is by an etching process. The foils are chemically etched after being loaded into a multi-cell etching chamber.

All foils are checked for both background and sensitivity before being used, with rejected material being discarded to prevent it from being used accidentally. During processing, a blank is included with each run. Monitors exposed to known concentration are processed weekly. Blind tests, with monitors exposed to an unknown level, are run twice each month with six (6) replicates.

For each foil/monitor, the dose calculation program calculates the number of days the monitor was exposed in the field. The program calculates the average track density (tracks per square millimeter) subtracts a background track density and then multiplies by the calibration factor to give total integrated exposure. This number is divided by the number of days used to derive the average radon concentration. The minimum value reported is 0.1 pCi/L.

Any unusual conditions are noted on the processing form and shown on the exposure report. All exposure reports are reviewed by the QA vice-president before being mailed to IEA.

Results received by IEA are again reviewed for completeness by the Laboratory Quality Manager.

Appendix B

Analytical Results and Sampling Locations

Radon Monitoring Report

INSTITUE FOR ENVIR
ASSESSMENT
ATTN: DENICE CLIFF
9201 W. BROADWAY STE 600
BROOKLYN PARK, MN 55445

LANDAUER

Landauer, Inc. 2 Science Road Glenwood, Illinois 60425-1586
Telephone: (800) 528-8327 Facsimile: (708) 755-7048

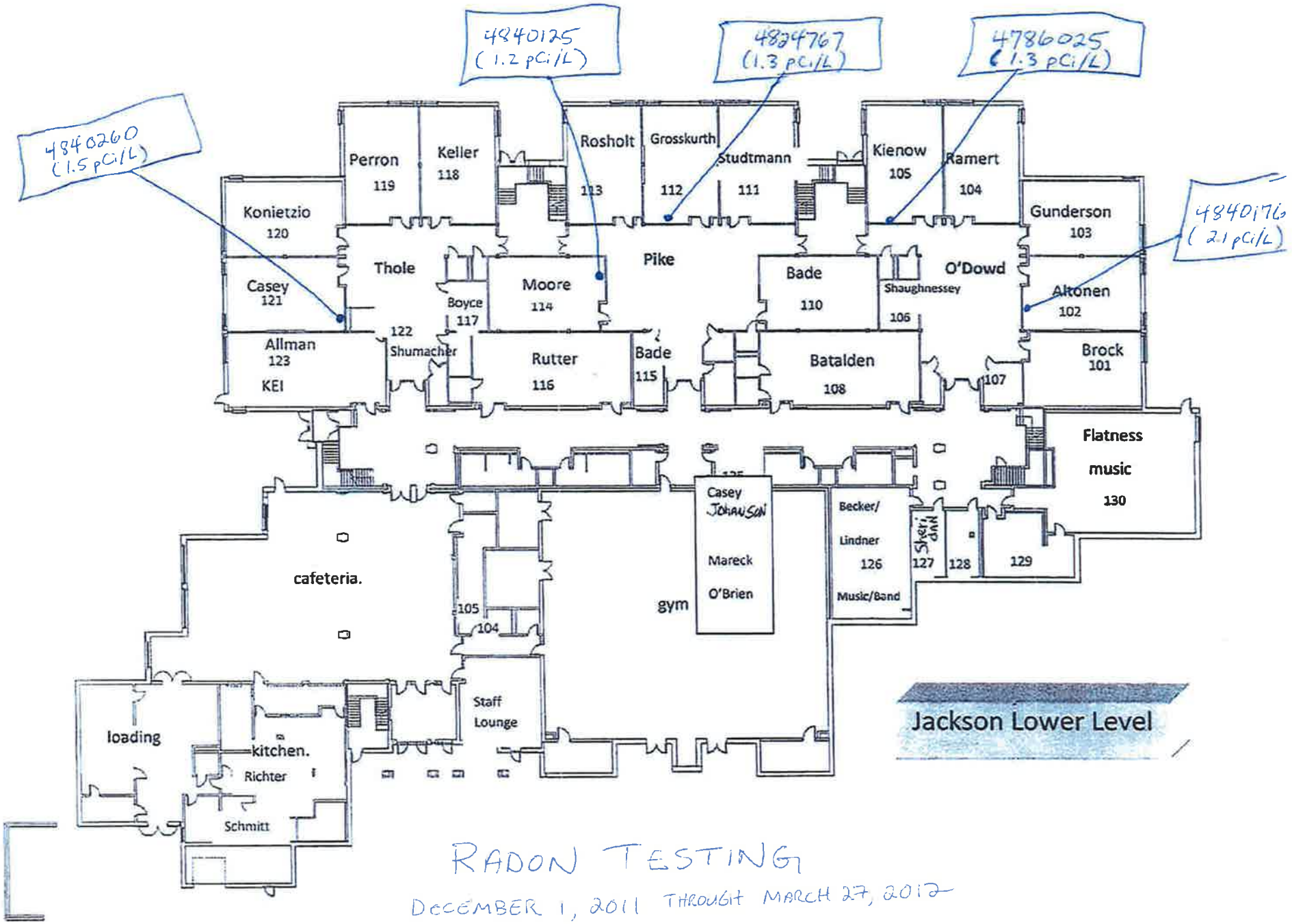
Acct. No. 0408080

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	
4786025	DRN	01-DEC-11	27-MAR-12	TACK BOARD JACKSON ELEMENTARY SCHOOL 105	151.8 ±9.5	1.3 ±0.08	
4824767	DRN	01-DEC-11	27-MAR-12	TACK BOARD JACKSON ELEMENTARY SCHOOL 112	148.1 ±9.8	1.3 ±0.08	
4840125	DRN	01-DEC-11	27-MAR-12	TACK BOARD JACKSON ELEMENTARY SCHOOL 114	143.2 ±10.1	1.2 ±0.09	
4840176	DRN	01-DEC-11	27-MAR-12	TACK BOARD JACKSON ELEMENTARY SCHOOL 102	244.0 ±13.9	2.1 ±0.12	
4840260	DRN	01-DEC-11	27-MAR-12	TACK BOARD JACKSON ELEMENTARY SCHOOL 121	174.5 ±11.4	1.5 ±0.10	

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

RESULTS RELATED ONLY TO MONITORS AS RECEIVED BY LANDAUER.

Q.C. Release	Process No.	Report Date	Date Received
LMR	A22426	04-APR-12	29-MAR-12



RADON TESTING

DECEMBER 1, 2011 THROUGH MARCH 27, 2012

● - RADON DETECTOR LOCATIONS

Appendix C

Chain of Custody

Radon Alpha Track Detector Log

IEA, Inc.
9201 West Broadway, Suite 600
Brooklyn Park, MN 55445
763-315-7900

District: Shakopee School District
Project Number: 2011-04061
Shipped By: Carole Nelson, IEA
Date of Shipment to Lab: 3/27/2012

Detector Number	Installation Date	Collection Date	Sampling Location			Notes (e.g. construction, maintenance)
			Building	Room Number	Position in Room	
4840260	12/01/11	03/27/12	Jackson Elementary School	121	Tack Board	
4840125	12/01/11	03/27/12	Jackson Elementary School	114	Tack Board	
4824767	12/01/11	03/27/12	Jackson Elementary School	112	Tack Board	
4786025	12/01/11	03/27/12	Jackson Elementary School	105	Tack Board	
4840176	12/01/11	03/27/12	Jackson Elementary School	102	Tack Board	

Detector Installed by: Noel Kepler Detector Removed By: Dan Fitch