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December 29, 2005

Mr. William Snell
Materials Licensing Branch
United States Nuclear Regulatory Commission, Region III
2443 Warrenville Road, Suite 210
Lisle, Illinois 60532-4452

Dear Mr. Snell:

Subject: License No. 22-04589-01, Amendment No. 37

Thank you for issuing Amendment No. 37 to our NRC Material License No. 22-04589-01, dated September 16, 2005. At that time, our license had been amended to reflect our transition to a new laboratory building. In fact, we have completed our move from our old location at 717 Delaware Street, Southeast, Minneapolis, Minnesota, to our new location at 601 North Robert Street, St. Paul, Minnesota.

As the Director of the Public Health Laboratory Division of the Minnesota Department of Health, I am the authorized applicant for our material license with the Nuclear Regulatory Commission.

I am hereby requesting a license amendment to remove the 717 Delaware Street site from our license. Mr. John Lorenz, our Radiation Safety Officer, has compiled the enclosed request.

If you have any questions or concerns, please feel free to contact Mr. Lorenz directly at (651) 201-5354. As always, we appreciate your care and attention to the changing scope of our radioactive materials license.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark A. Gendron", is located below the "Sincerely," text.

Director, Public Health Laboratory Division
Minnesota Department of Health
601 Robert Street North
P.O. Box 64899
St. Paul, Minnesota 55164-0899

NAC/cas
Enclosures

cc: John Lorenz, Radiation Safety Officer
Allen Broderius, Assistant Radiation Safety Officer

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Close-out Radiation Survey

717 Delaware St. SE

Minneapolis, Minnesota

November 14 – December 14, 2005

John Lorenz
Minnesota Public Health Laboratory Division
Minnesota Department of Public Health
January 12, 2006

Close-out survey
717 Delaware St.
Minneapolis, MN

Executive Summary

A close-out radiation survey was performed in November and December, 2005 for 717 Delaware St. SE, Minneapolis, Minnesota. The purpose of the survey was to determine whether areas where radioactive materials were used could be made available for unrestricted access in accordance with Nuclear Regulatory Commission (NRC) guidelines. Surveys were done in every room authorized for possession, use or storage of radioactive materials under The Public Health Laboratory's (PHL) NRC license.

Two primary survey methods were used. Wipe tests were done in each area where radioactive materials were used. At least one wipe was taken for every square meter of floor, lab bench, chemical hood, wall up to 6 feet, and furniture (desks, tables, etc.). In addition, hood ductwork, sinks, drains, hood duct plenums, fan motor housings and the main plumbing cleanout were wipe tested. Wipes were also done in cabinets, drawers, and on shelves, partitions and any other items that remained in the room or were sent to surplus after PHL vacated the building. Wipes were analyzed using methods appropriate for the type of radiation emitted by the radioactive material used or stored in the area – high purity germanium gamma detectors for gamma emitters, alpha/beta proportional counters for alpha and beta emitters, and liquid scintillation counting for low-energy beta emitters.

A surface scan of every square inch of lab benches, floors, furniture, open shelves and chemical hood work surfaces was done in the licensed rooms. Instruments used for the scan were appropriate for the type of radiation sources used in the room. Scans were done with an alpha scintillation probe or a flow-through gas proportional alpha detector in rooms where alpha emitters had been used. In rooms where beta emitters had been used, scans were done using a Geiger-Mueller counter with a thin window pancake detector. Areas where Carbon-14 was used were surveyed with a gas-proportional detector specifically designed for detection of Carbon-14. Gamma surface scans were not needed because all gamma-emitting radioactive material used at the Public Health Laboratory also emits alpha or beta radiation and would be found by scans for those types of radiation. Scans were done at 1/16" from the surface or closer, moving the detector at one inch per second.

Of approximately 900 wipe tests, 12 showed detectable radioactivity. None had levels exceeding the NRC guidelines for general release of the work area. Detectable radioactivity was found on wipe tests from Rooms B6, B7, 519E, from the hood plenum for the hoods in 519E, from the fan housing for the hoods in 441, and from the plumbing cleanout in the basement garage.

Surface scans revealed detectable levels in Rooms B7, 519E and 519F. Although levels were less than 10 percent of the guidelines in 519E and 519F, attempts were made to reduce concentrations of radioactive material. Removing tile in 519F reduced the concentrations, but efforts in 519E were unsuccessful. Alpha readings adjacent to the south wall of Room B7 were high enough that they could indicate levels above the

guidelines. However, testing of the room indicates that the elevated levels almost certainly result from radon decay products being deposited on surfaces in the room.

Results of the survey indicate that unrestricted access should be allowed for all former radioactive materials work areas.

Background

Minnesota Department of Health (MDH) facilities have been located at 717 Delaware St. SE, Minneapolis, Minnesota (717 Delaware St.) since the 1960's. The building originally housed most divisions of MDH, including the Division of Environmental Health and the Public Health Laboratory Division (PHL). License No. 22-04589-01, authorizing use of licensed material at 717 Delaware St. was originally administered by MDH's Division of Environmental Health, who provided the Radiation Safety Officer until 2000. In the late 1990's the Environmental Health Division moved from 717 Delaware St. to other locations. In 2000, responsibility for licensed activities was transferred to PHL. After 2000, PHL was the only MDH division in possession of licensable quantities of radioactive material at 717 Delaware St.

In November, 2005, PHL moved its entire operation to 601 N. Robert St., St. Paul, Minnesota. At that time, all use of radioactive materials at 717 Delaware St. ceased, and all radioactive materials were moved to the Robert St. location. The only radioactive material that remained at 717 Delaware St. were sources used for calibration and performance checks of instruments supporting the close-out survey described in this report.

This report will describe the survey done to show that all former radionuclide work areas at 717 Delaware St. are in compliance with Nuclear Regulatory Commission (NRC) guidelines for release for unrestricted use. The derived concentration levels used as guidelines for this survey are those listed in Table H.1 of NUREG-1757, Vol. 2 "Consolidated NMSS Decommissioning Guidance, Characterization, Survey and Determination of Radiological Criteria", and those listed in the P_{crit90} column of Table 5.19, NUREG/CR-5512, Vol. 3 "Residual Radioactive Contamination From Decommissioning (Parameter Analysis)." Because the Table H.1 values are derived from those in Table 5.19, the reference for the values will be identified as "Table 5.19".

Radionuclides used

Several of the radionuclides authorized on the PHL's NRC license do not represent a concern because they could not have been present in the laboratory at the time of the survey. The radionuclides added to the license in Amendment 34, issued in August, 2004, were never received, possessed or used at PHL.. These included Europium-152, Cadmium-109, Tellurium-123m, and Chromium-51.

The most recent receipt of Strontium 89 occurred in 1998. At that time, PHL received a stock solution of Sr-89 with a calibrated activity of $4.15\text{E}+05$ picocuries as of October 7, 1998. More than 40 half-lives of Sr-89 have passed since the material was received. PHL has not possessed Iodine-131 at least since April, 2004, and there is no record of PHL ever possessing I-131. Because of the short half-lives of Sr-89 and I-131, they could not be present in quantities exceeding NRC guidelines, so they were ignored during the survey, although survey procedures were sufficient to find them.

Licensed radionuclides that were possessed, used or stored at the facility include Hydrogen-3, Carbon-14, Nickel-63, Strontium-89, Strontium-90, Antimony-125, Cesium-137, Europium-154, Europium-155, Radium-226, Radium-228, Thorium-230, Natural Uranium and Americium-241. Iodine-125 had previously been included on the license, and was used more than 11 years ago in the form of RIA kits.

Of the radioactive materials that could be present, all emit either alpha or beta radiation. Some emit gamma radiation in addition to alpha and beta.

Locations of use

Radioactive materials use and storage at 717 Delaware St. SE was limited to rooms B-5, B-6, B-7, 122, 441, 448, 519D, 519E, 519F, 519G. and 611.

Rooms 447 and 449 had been used in the past. A final survey for Room 447 and a request to have it removed from our radioactive materials license had been included in an amendment submitted to NRC on March 11, 2004. A final survey and a request to remove Room 449 from the license were submitted on July 13, 2000. NRC's approval for removal of the rooms from the license was assumed because of NRC's reference in subsequent amendments to the aforementioned requests for removal of the rooms and by approval of our license renewal application, submitted October 4, 2004, which no longer included Rooms 447 and 449.

In an amendment request dated April 23, 1999, the Public Health Laboratory requested use of Room 608 for Ni-63 electron capture gas chromatograph detectors. No radioactive sources were ever used or stored in Room 608. All Ni-63 sources were used or stored in Room 611.

The only work done in rooms other than those listed above was done using I-125 RIA kits. The kits were used in Room 510A and wastes were stored in Room 622. Use of the RIA kits ended prior to April, 1994. Given the half-life of I-125 and the low activity typically found in RIA kits, we did not consider a final survey of those areas necessary or appropriate.

The following describes the radionuclide work done in each of the rooms.

Room 441

Prior to 2000, Room 441 housed two Ni-63 electron capture gas chromatograph detectors. Semi annual leak tests done on the sources consistently indicated no leakage of the Ni-63. Use of unsealed radioactive materials in Room 441 began in 2000.

Room 441 was the primary room where unsealed sources were used by PHL's radiochemistry group. Stock solutions of radioactive standards were stored in this room. Radionuclide procedures performed in the room included preparation of environmental and performance evaluation samples for analysis and dilution of standards to be used for calibration, spiking, and other quality control purposes.

Radionuclides used and stored in Room 441 are listed in Table 1 below. Carbon -14 was not used or stored by the radiochemistry group in Room 441. All use of C-14 by the radiochemistry group took place in Room 448.

Table 1. Radionuclides Used in Room 441

Radionuclide	Form	Total Activity (microcuries)
Ni-63	Two standard solutions	0.089252
Natural Uranium	Four standard solutions	0.087498
H-3	Two standard solutions	0.050716
Sr-90	Six standard solutions	0.4421668
Ra-226	Six standard solutions	0.056429.1
Sb-125, Eu-154, Eu-155	Two mixed standard solutions	2.76
Am-241	Two standard solutions	0.0702
Am-241	One planchet source	0.0328
Cs-137	Three standard solutions	1.0352419
Cs-137	One planchet source	0.0506
Sr-89	One standard solution	< 1E-15

Room 448

Use of radioactive materials in Room 448 began in 2004. From that time until the detection equipment was moved out in November, 2005, the room was used exclusively for counting and analysis of environmental samples by liquid scintillation counting and by analysis in alpha/beta proportional counters. At any given time, the room housed one to two instruments of each type.

Instrument calibration standards were used and stored in Room 448, as described below. Samples and standards were never prepared, and stock solutions were never stored, in Room 448. Samples and standards were prepared in a Room 441 and brought to Room 448 for counting, either in closed liquid scintillation vials or as solid samples in planchets for alpha/beta counting. As a laboratory certified by the Environmental Protection Agency, our Public Health Laboratory is required to store stock solutions and prepare samples in areas separate from counting facilities.

Analyses were conducted in Room 448 for a variety of sample matrices. Drinking water was analyzed for compliance with the U.S. EPA Safe Drinking Water Act. Analyses were also performed for environmental samples including milk, air filters, surface water, vegetation and river sediment from the vicinity of nuclear power plants. Sample activities were uniformly in the pCi range or less.

Laboratory control samples and matrix spikes were used in Room 448 - although prepared in a different room - for quality control purposes. Activities for the spikes and control samples present in the room at any given time were approximately as follows:

- Ra-226 – 50 to 150 pCi in a scintillation vial
- Between 10 and 40 dry alpha/beta planchets, prepared in our Public Health Laboratory from calibrated solutions obtained from federal agencies or commercial vendors: Natural uranium - 20 pCi – 800 pCi each.

Radioactive calibration standards used and stored in Room 448 included the following:

- Sealed standardization sources built into the liquid scintillation counters: Ba-133 – 18.8 μ Ci; and Ba-133 – 1 μ Ci.
- Sealed, commercially prepared LSC standards in ampoule-like scintillation vials: H-3 – 8 standard vials with a total of less than 1 μ Ci on their calibration dates; C-14 – 8 standard vials with a total of less than 0.5 μ Ci on their calibration dates.
- Two planchet sources, each with 1 mg. U-238 (approx. 260 pCi alpha activity and 240 pCi beta activity).
- Four dry Sr-90 planchet sources – 500 - 1000 pCi each.
- Four dry Cs-137 planchet sources – 1500 - 2000 pCi each.

No other radioactive materials were used or stored in Room 448 from 2004 to 2005.

Room B5

Radionuclide use in B5 began in the late 1960s or early 1970s. From that time until the detection equipment was moved out in November, 2005, the room was used exclusively for gamma analysis of environmental samples. The room housed four high purity germanium (HPGe) detectors.

Room B5 was strictly used for counting already prepared samples. Radioactive materials housed in the room included calibration standards; performance evaluation samples, analysis of which is required for maintaining EPA drinking water program certification; meter check sources; and a dosimeter calibrator source. The listed sources were used and stored in Room B5, as described below, but samples and standards were never prepared, and stock solutions were never stored, in Room B5. Samples and standards were prepared in Room 441 and brought to Room B5 for counting, either in Marinelli Beakers, in Petri dishes, or in double plastic bags. As a laboratory certified by the Environmental Protection Agency, our Public Health Laboratory is required to store stock solutions and prepare samples in areas separate from counting facilities.

Analyses were conducted in Room B5 for a variety of sample matrices. Drinking water was analyzed for compliance with the U.S. EPA Safe Drinking Water Act. Analyses were also performed for environmental samples including milk, air filters, surface water, vegetation and river sediment from the vicinity of nuclear power plants. Sample activities were uniformly in the pCi range or less.

Laboratory control samples and matrix spikes were used in Room B5 - although prepared in a different room - for quality control purposes. Activities for the spikes and control samples present in the room at any given time were approximately as follows:

- One 9 μCi Cs-137 sealed source in Victoreen Model 06-201 Multidosimeter Calibrator
- NBS mixed cartridge standard SRM 4275
 - 0.004620 μCi Sb-125
 - 0.318 μCi Eu-154
 - 0.031 μCi Eu-155
- Three mixed gamma point sources: Source ID SRM 4276-160
 - 0.031 μCi Sb-125
 - 0.14 μCi Eu-154
 - 0.026 μCi Eu-155
- Three mixed gamma Marinelli calibration standards with a total activity of
 - 0.031 μCi Sb-125
 - 0.14 μCi Eu-154
 - 0.026 μCi Eu-155
- One mixed performance evaluation sample
 - 0.000323 μCi Ba-133
 - 0.0001616318 μCi Cs-134
 - 0.000264 μCi Cs-137
 - 0.00013312 μCi Co-60
 - 0.00024064 μCi Zn-65
- Three Button type meter check sources – Cs-137 14.5 μCi
- One Disk type plated meter check source – Tc-99 0.01 μCi
- One Disk type plated meter check source – Th-230 0.01 μCi

No other radioactive materials were used or stored in Room B5 from 2000 to 2005.

Room B6

Radionuclide use in B6 began in the late 1960s or early 1970s. From that time until the detection equipment was moved out in November, 2005, the room was used exclusively for counting and analysis of environmental samples by alpha/beta counting. Two alpha/beta proportional counters were housed in the room.

Room B6 was strictly used for counting already prepared samples. Radioactive materials housed in the room included the following

- Up to 20 Sr-90 beta calibration standards on planchets, with an activity of 187 pCi/planchet.

- Up to 17 Th-230 alpha standards on planchets, with an activity of 169 pCi/planchet
- Four natural uranium planchet sources for instrument performance checks, 1,230 pCi per planchet.

The listed sources were used and stored in Room B6, but samples and standards were never prepared, and stock solutions were never stored, in Room B6. Laboratory control samples and matrix spikes were used in Room B6 for quality control purposes. Samples and standards were prepared in Room 441 and brought in planchets to Room B6 for counting. As a laboratory certified by the Environmental Protection Agency, our Public Health Laboratory is required to store stock solutions and prepare samples in areas separate from counting facilities.

Analyses were conducted in Room B6 for a variety of sample matrices. Drinking water was analyzed for compliance with the U.S. EPA Safe Drinking Water Act. Analyses were also performed for environmental samples including milk, air filters, surface water, vegetation and river sediment from the vicinity of nuclear power plants. Sample activities were uniformly in the pCi range or less.

No other radioactive materials were used or stored in Room B6 from 2000 to 2004.

Room B7

Prior to May, 2003, Room B7 was used for routine storage of solid standards and calibration sources. The following sources were stored in Room B7 during that period

- Three Mixed gamma point source: Source ID SRM 4276-160
 - 0.140 μ Ci Eu-154;
 - 0.026 μ Ci Eu-155;
 - 0.031 μ Ci Sb-125.
- One Cs-137 sealed source in Victoreen dosimeter calibrator – 9 μ Ci.
- One NBS mixed cartridge standard SRM 4275
 - 0.004620 μ Ci Sb-125
 - 0.318 μ Ci Eu-154
 - 0.031 μ Ci Eu-155

After May, 2003, sources were not routinely stored in Room B7. However, sealed and plated sources that were used for operational checks of radiation detection instruments were occasionally stored in the room. Radioactive materials stored in the room included:

- Two to three Cs-137 button sources - 5 microcuries or less per source,
- One Th-230 plated disk source, 0.01 μ Ci,
- One Tc-99 plated disk source, 0.01 μ Ci

Sources were used in other locations, never in Room B7.

Room 122

The only radiological function of Room 122, a walk-in cooler, was to serve as a place where arriving shipments of radioactive material could be stored temporarily if the

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packages were leaking, or if a radiation survey was required. There is no record of the room having been used for that purpose, and no current employee could recall ever using the room to store radioactive materials shipments. However, no one was certain that the room was never used for that purpose. Therefore, a close-out survey was done in the room.

Room 519

Room 519 is in reality a suite of rooms where Carbon-14 was used for in-vitro diagnostic testing and public health surveillance of tuberculosis specimens using the Bactec system. The C-14 work was limited to Rooms 519D, 519E, 519F and 519G. In October, 1993, PHL was approved to do the Bactec work under a general license under 10CFR31.11, as is customary for facilities using the Bactec system. However, over time the Bactec activities became part of PHL's specific license.

The Bactec instruments themselves were housed in Room 519F. Waste disposal and storage took place in Room 519E. On rare occasion, the labeled materials were handled in Room 519G. No Bactec work was done in 519D, but the room was a restricted area, and therefore surveyed.

Room 611

Room 611 housed the Organics Section of PHL's Environmental Laboratory. Three Ni-63 electron capture gas chromatograph detectors were used in the room until November, 2005. Semiannual leak tests of the sources consistently showed no leakage of the Ni-63.

Survey Method

The survey consisted of two measurement methods – wipe tests and surface scans.

Wipes

In areas where radioactive materials were used, one wipe test was done for every square meter of floor, lab bench, hood work surface and wall up to two meters. Every drawer, cabinet and shelf in radioactive materials laboratories was also wipe tested.

Wipes from floors, lab benches, hood work surfaces and tables covered a minimum area of 100 cm² within the targeted square meter. In hoods, the wipes also included the walls and back surface of the hood. A separate wipe was also done of the entrance to the ductwork in each hood. Duct wipes were done downstream in the plenum serving each group of hoods or in the fan housing just before the outflow on the roof of the building.

Multiple drawers, cabinets and shelves may have been wiped with a single smear, depending on the likelihood that contamination would be found in that location. The area wiped in drawers and cabinets included the handle, outside front surface, inside of front surface, floor and walls, and for cabinets, any shelves. Wipes on shelving covered at least 100 cm² of each shelf.

Wipes were also done in all sink drains in radionuclide laboratories. The drain strainer was removed, if possible, and the wipe covered the drain flange and the inside of the drain pipe to about seven centimeters depth. If the drain strainer was not removable, the wipe covered the drain flange and the inside of the drain pipe to the drain strainer.

Wipes were also taken in a plumbing cleanout in the basement garage of the building. Every laboratory drain in the building feeds into the drain pipe accessed from the cleanout. The wipes were taken inside the vertical pipe starting at the level where the horizontal pipe enters down to several centimeters below the horizontal pipe.

Filter papers moistened with alcohol were used for wiping. The filter papers were Whatman 42 mm filters or Schleicher and Schuell 55 mm filters.

All wipes were immediately placed into labeled Petri dishes or liquid scintillation counting (LSC) vials. In areas where low-energy beta emitters were used, a set of wipes was placed into LSC vials for liquid scintillation counting. In areas where gamma, alpha or higher energy beta emitters were used, a set of wipes was placed into Petri dishes for gamma and alpha/beta counting. In areas where both low-energy beta emitters and other radioactive materials were used, two sets of wipes were done.

Twelve milliliters (ml) of Perkin-Elmer Ultima Gold XR sewer-disposable scintillation cocktail and 10 ml of deionized water were added to each LSC vial prior to sample submission. Sample submission forms were completed for all wipes, and the wipes were submitted to Sample Accessioning at PHL's 601 N. Robert St. location. They were then delivered to the Radiochemistry Unit in the Robert St. facility, where analysis was carried out.

The wipes in Petri dishes were first analyzed with an EG&G Ortec high purity germanium (HPGE) gamma spectroscopy system with 92X electronics. Thirty to forty wipes were counted as a composite in a two-liter Marinelli beaker. Samples were counted for twenty minutes.

The calibration used was the calibration for an elevated sample - that is, a single sample placed on the top of a four-liter Marinelli. This calibration was used because the distance to the individual sample farthest from the detector (~ 10.5 cm.) in a full two-liter Marinelli is the same as the distance to an elevated sample in a Petri dish on top of a four-liter Marinelli. This calibration ensured that contamination at the NRC guideline could be detected even on the individual sample farthest from the detector.

Calibration and background determination for the detector are done each time liquid nitrogen is added (about once per week). Minimum detectable activities for gamma emitters used at PHL are listed in on the Wipe Sample Results sheets in Appendix A and in Table 2.. Minimum detectable activities are calculated using the "Traditional EG&G Ortec" method in the EG&G Gamma Vision software.

Wipes were then removed from the Petri dishes and counted in a Tennelec Model 5 alpha/beta proportional counter. Counting time for all samples was two minutes. The counter was calibrated using NIST traceable Cs-137 and Th-230 sources in December, 2005, after it was moved to 601 N. Robert St. Daily performance evaluation checks are run on the counter using a natural uranium planchet source. Minimum detectable activities for gross alpha and gross beta were 7.94 dpm and 7.38 dpm, respectively.

Minimum detectable activity for the alpha/beta counter is determined using the following formula

$$\text{MDA (dpm)} = \frac{(2.71/T_s) + 3.29 [(B_c/T_b) + (B_c/T_b)]^{1/2}}{E} \quad \text{Equation 1}$$

MDA = Minimum detectable activity in pCi

B_c = background counts per minute

T_s = sample count time

T_b = background count time

E = Counter efficiency

$3.29 = 1.645 * 2$

$2.71 = 1.645^2$

$1.645 = 95\%$ of the standard normal distribution

Analysis of wipes from areas where low energy beta emitters were used was done using a Packard Tri-Carb Model 2550 TR Liquid Scintillation Analyzer. Samples were counted for one minute. Counts were done using the C-14 window, which registers all counts from 0 keV to the maximum energy for C-14 betas.

Each set of samples counted included a C-14 calibration standard to provide efficiency and a blank containing a filter paper. A quench curve was programmed into the LSC and quench correction was done for each sample.

The lower limit of detection (LLD) for the wipe samples was determined using the following equation.

$$\text{LLD(dpm)} = \frac{4.66 (R_B/T_B)^{1/2}}{E} \quad \text{Equation 2}$$

LLD = Minimum detectable activity in pCi

R_B = background counts per minute

T_B = background count time

E = Counter efficiency

Surface scans

Surface scans were done on the entire surface area of all lab benches, floors, hood work surfaces and exposed shelves. Shelves inside cabinets were wipe tested but not scanned. Scans covered every square inch of the surface being scanned. Scanning was done for alpha emitters, beta/gamma emitters and for Carbon-14.

Alpha scans

Two different methods were used to scan for alpha emitters. The first used a Ludlum model 43-1 alpha scintillation detector and a Ludlum model 2220 scaler/ratemeter. Specifications for the instruments are included in Appendix B.

The instrument was calibrated using NIST traceable sources. Commercially prepared disk/planchet standards were used for Am-241 and Th-230. For each of the other alpha emitting radionuclides used at PHL, sources were prepared from NIST traceable liquid standards by pipetting a known volume of the standard solution into the planchet and allowing it to dry. Planchet sources were prepared for natural Uranium, Ra-226 and Ra-228. Results of the calibration may be found in Appendix C.

For calibration, the detector was placed in a Ludlum Model 180-16 Sample Holder. Each source was placed on the sample holder tray. The tray was inserted in the slot 1/4" below the detector window. The Am-241 and Th-230 sources were counted for one minute. The sources prepared at PHL, which are lower activity, were counted for five minutes. Efficiency was calculated for each source, and from each source's efficiency, the number of counts per minute that would indicate contamination at the P_{crit90} level identified in Table 5.19 of NUREG/CR-5512, Volume 3 (Table 5.19). The values were divided by 0.75 to adjust for the open area of the detector (75 cm²). The lowest calculated count rate indicating contamination at the guideline level was for Am-241 at 7.6 net counts per minute. The background count rate was 0.56 counts per minute.

Scans were done at a distance of 1/16" from the subject surface. Because calibration of the detector was done at a distance of approximately 7/32" (1/4" from the sample tray to the detector minus the thickness of the planchet's bottom, approximately 1/32"), the actual efficiency of the detector during the scans was higher than the efficiency calculated from this calibration.

The 1/16" distance was maintained by one of two methods. A jig, or template, was made from a 1/16" thick piece of acrylic. An opening was cut in the acrylic. The opening was approximately 30 inches long and 1/4" wider than the width of the detector's open area. Two acrylic strips were placed at the edges of the opening to guide the detector so its open area was always over the opening in the acrylic.

The detector was removed from the sample counter and moved along the opening in the acrylic at a rate not exceeding one inch per second. After the 30 inches had been traversed, the edges of the opening were marked on the surface being scanned, and the acrylic was moved into position to scan the next 30 inch section.

The second method was used when the surface being scanned had distinctive markings that could serve as guideposts where scanning had already been done – for example, on a patterned tile floor. Small pieces of acrylic were attached to three points on the frame of the detector. The detector was then placed on the floor and moved no faster than one inch per second. The design on the tiles was used to mark the location that had been surveyed. Successive paths that the probe followed overlapped slightly, to account for the fact that the detector's open area did not reach all the way to the edge of the probe.

While moving the probe, the surveyor watched the ratemeter and scaler for indication of a count. If the surveyor found a single count, the motion of the probe was stopped, and a one minute count was done to determine whether a contaminated location had been found. If the scaler registered five counts in one minute, the location was to be marked and the Radiation Safety Officer was to be notified. None of the one minute readings showed more than two counts.

Operational consistency of the monitoring system was checked each day before use. The check consisted of a five minute background count and a one-minute count of the Th-230 source, both with the detector in the sample holder and the sample tray in the slot ¼" from the detector. Background was expected to be between 0 and 1 counts per minute and counts from the Th-230 source were expected to be within ten percent of the count rate in the original calibration of the system.

The majority of the alpha surface scans were done using two Ludlum Model 239-1F Floor Monitors. Each cart-mounted unit consists of a Model 43-37 gas probe, a Ludlum Model 2221 scaler/ratemeter, and flow meters indicating flow rate into and out of the detector. The instruments were rented from Duratek Instrument Services in Kingston, Tennessee.

Copies of calibration reports done by Duratek on February 7, 2005 and December 5, 2005 are included in Appendix C. An instrument performance check was done using PHL's Th-230 source to determine that it substantially agreed with the Duratek calibration. Duratek's determination of the efficiency of the floor monitor for Th-230 alphas was 18.9 percent to 19.8 percent. Our check indicated efficiencies that were somewhat higher (22-27 percent), but we used the efficiency provided by Duratek, since their calibration was more rigorous and the lower efficiency provided a more conservative estimate of the activity present. Efficiency for other alpha emitters was also checked using the planchet sources prepared by PHL personnel. Results of confirmatory checks done by PHL personnel are included as Appendix C. During these checks, the only natural uranium source available to us was of too low an activity to give reliable results, but the results are included in the spreadsheet.

The number of counts per minute that would result from contamination at the Table 5.19 level was then determined. Adjustment was made for the 425 cm² open area of the 43-37 probe.

Spacers of 1/16" thickness were attached to the edges of the detectors and the spacers were allowed to drag on the floor or other surface being surveyed. This allowed the surveyors to keep the detectors consistently very close to the surface without concern about damaging or contaminating the detectors. Detectors were moved no faster than 1 inch per second across the surface being surveyed. Detectors could be detached from the cart for scanning surfaces other than floors.

The surveyor listened to the audio indicator and watched the analog display on the ratemeter. If there was any indication of a count rate higher than background, the surveyor would do a one minute count. If the scaler registered more than 15 counts in one minute, the location was marked and the count reported to the Radiation Safety Officer.

Beta/gamma scans

Beta/gamma scans were done using Ludlum Model 3 Geiger-Mueller (G-M) counters with Ludlum Model 44-9 thin window pancake probes. Three of the meters had been calibrated by the manufacturer on June 24, 2005. The other three had been calibrated by the manufacturer on October 17, 2005.

Prior to using the G-M's for this survey, they were calibrated with each of the beta/gamma emitters currently in use at the Public Health Laboratory. The calibration was performed using prepared planchet standards made from NIST traceable, calibrated solutions of the nuclides used at PHL. Three solutions were used: Sr-90 (with ingrown Y-90), Cs-137 and a mixture of Eu-154, Eu-155 and Sb-125. Readings were done with the aluminum housing of the meter in contact with the edge of the planchet. Depth of the planchets is 3/32". This calibration closely replicated the geometry to be used in the survey – meter housing 1/16" from the surface.

Backgrounds at the time of calibration varied from 20 cpm to 50 cpm. The 4 pi efficiency determined for Sr-90 during the calibration ranged from 24 percent to 27 percent for the six meters. This compares favorably with the 22 percent efficiency published in the manufacturer's specifications. Efficiencies for the Europium/Antimony mixture ranged from 13 percent to 16 percent and for Cs-137 they ranged from 22 to 26 percent.

The number of counts per minute that would indicate contamination at the Table 5.19 level was then determined. The count rates were multiplied by 0.12 to adjust for the 12 cm² open area of the probe. For the Eu/Sb mixture, the Table 5.19 value for Eu-154 was used because it is the most restrictive and at the present time, it represents 85 percent of the activity in the solution. The Eu/Sb mixture gave the most restrictive result. Contamination at the Table 5.19 level would result in 160 – 210 counts per minute.

In addition to the beta-gamma sources, a Th-230 source was read at the time of calibration. Subsequently, daily consistency checks were done using the Th-230 source to confirm consistency of meter operation. The readings on the daily checks were to be within ten percent of the reading at calibration. On one occasion, use of a meter was allowed, although the reading had deviated by 12 percent.

Before starting each scan, surveyors did a background measurement in an area where there had been no use of radioactive materials.

The survey method was similar to the method used for the 43-1 alpha detector. Scans were done at a distance of 1/16" from the subject surface. Because calibration of the detector was done at a distance of approximately 3/32", the actual efficiency of the detector during the scans may have been slightly better than the efficiency calculated from this calibration.

The 1/16" distance was maintained by one of two methods. A jig, or template was made from a 1/16" thick piece of acrylic. An opening was cut in the acrylic. The opening was approximately 30 inches long and 1/4" wider than the width of the detector's open area. To assure that the probe window remained above the opening in the acrylic, the surveyor moved the edge of the probe along a line parallel to the edge of the opening in the acrylic. Because the Ludlum Model 3 has an audio output, the surveyor did not need to constantly watch the meter and was able to watch the probe's path.

The detector was moved at a rate not exceeding one inch per second. After the 30 inches had been scanned, the edges of the opening were marked, and the acrylic was moved into position to scan the next 30 inch section.

The second method was used when the surface being scanned had distinctive markings that could be used to register where scanning had already been done – for example, on a patterned tile floor. Small pieces of acrylic were attached to three points around the probe window on the aluminum housing of the detector. The detector was then placed on the floor and moved no faster than one inch per second. The design on the tiles was used to mark the location that had been surveyed. Successive paths that the probe followed overlapped slightly, to account for the fact that the detector's open area did not reach all the way to the edge of the probe.

While moving the probe, the surveyor listened to the audio output for any slight increase in count rate. If there was any deviation from normal background counts, the surveyor held the probe over the suspect area for 30 seconds, then noted the reading. If the reading was significantly above background (15-20 net cpm or more), the surveyor was to mark the location and notify the Radiation Safety Officer.

Carbon-14 scans

In the 519 suite of rooms, the only radioactive material used was C-14. Surface scans in this area were done using a Ludlum Model 239-1F Floor Monitor. As described above, the cart-mounted monitor consists of a Model 43-37 gas probe, a Ludlum Model 2221 scaler/ratemeter, and flow meters indicating the flow rate into and out of the detector. The instrument was rented from Duratek Instrument Services in Kingston, Tennessee.

The window of the 43-37 detector used for the C-14 survey consisted of a single layer of mylar, rather than the two layers found in the detectors used for other radioactive materials. Copies of a C-14 calibration report done by Duratek on June 14, 2005 are

included in Appendix C. An operational check of the detector was done using an Isotope Laboratories Corporation C-14 source with an activity of 94.33 nCi on May 1, 1998. With the window setting used for the operational check, the efficiency of the detector was considerably lower than was found by Duratek. However, Duratek's calibration report did not specify the window setting used during the calibration. It was found in a later test (See Appendix C) that the efficiency (12.4 percent) found by PHL using the window "out" setting on the scaler was in substantial agreement with the efficiency (14.8 percent) found by Duratek in their calibration. The efficiency used for determining dpm in the survey is that found when using the window "in" setting, 6.31 percent

The number of counts per minute that would result from contamination at the Table 5.19 level was then determined. Adjustment was made for the 425 cm² open area of the 43-37 probe. Carbon-14 contamination at the Table 5.19 level would result in 9.8E+05 counts per minute on the floor monitor.

Spacers of less than 1/32" thickness were attached to the edges of the detector and the spacers were allowed to drag on the floor or other surface being surveyed. This allowed the surveyors to keep the detectors consistently very close to the surface without concern about damaging or contaminating the detectors. Detectors were moved no faster than 1 inch per second across the surface being surveyed. Design of the system allowed detectors to be detached from the cart for scanning surfaces other than floors.

The surveyor listened to the audio indicator and watched the analog display on the ratemeter. If there was any indication of a count rate higher than background, the surveyor did a half-minute or one minute count. If the scaler indicated a reading significantly higher than background, the location was marked and the count reported to the Radiation Safety Officer. Before starting each scan, surveyors did a background measurement in an area where there had been no use of radioactive materials. Background for the monitoring system was 900 – 1000 cpm.

Radon decay products

Several wipes were taken in Room B7 with the expectation of finding short-lived radon decay products. The wiping was done in the same manner as for all other wipes taken during the survey. Detection of the short-lived radionuclides requires that counting be done soon after the wipes are taken. Therefore, the wipes were counted at 717 Delaware St. rather than being transported to 601 N. Robert St.. They were counted in Room B6 in a Tennelec 3 gas flow alpha/beta proportional counter. The Tennelec 3 was calibrated on November 16, 2005 using NIST traceable Th-230 and Cs-137 standards. Calibration results are in Appendix C. Instrument performance checks were done using natural uranium planchet sources prior to each use of the

Results

Appendix A gives the results of all wipes analyzed at the new laboratory building at 601 N. Robert St. Results for the wipes taken in Room B7 and analyzed at 717 Delaware St.

are presented in Appendix D. Maps of each room are included with the room's wipe results in Appendix A.

Nearly 900 wipe tests were done in radionuclide use areas at 717 Delaware St. The wipes showed no contamination levels exceeding the Table 5.19 values. The minimum detectable activity for the wipes, listed in Table 2, was exceeded on only 12 wipes. Wipes exceeding MDA were found in rooms B6, B7, 519E, 519F, the plumbing cleanout in the basement, the hood duct plenum for Room 519E, and the rooftop hood fan housing for room 441.

Table 2. Minimum Detectable Activity (MDA) for Close-Out Survey Wipe Tests

Nuclide	Analysis Method	MDA	Table 5.19 value	Ratio MDA/ 5.19 value
Gross alpha	α/β proportional counter	7.94E+00	3.69E+01 (Th-230) 2.70E+01 (Am-241)	0.215 0.294
Gross beta	α/β proportional counter	7.38E+00	8.71E+03 (Sr-90) 7.05E+03 (Co-60)	0.001 0.001
C-14	LSC	3.36E+01	3.67E+06	0.000
Cs-134	HPGe	1.22E+03	1.27E+04	0.096
Cs-137	HPGe	1.40E+03	2.80E+04	0.050
Sb-125	HPGe	2.67E+03	4.43E+04	0.060
Eu-154	HPGe	5.73E+03	1.15E+04	0.498
Eu-155	HPGe	1.20E+03	1.57E+05	0.008
Mn-54	HPGe	1.46E+03	3.15E+04	0.046
Co-60	HPGe	2.12E+03	7.05E+03	0.301
Zn-65	HPGe	3.73E+03	4.81E+04	0.078
Ru-106	HPGe	1.12E+04	2.62E+04	0.427
Ce-144	HPGe	3.29E+03	4.27E+04	0.077
Co-57	HPGe	2.47E+02	2.11E+05	0.001

Table 3 summarizes pertinent information about the wipes that showed levels higher than MDA. Information in Table 2 includes locations where the wipes were taken, the type of analysis that showed above MDA results, and the activity found on the wipes. When the wipe from the sink drain in room 519E was analyzed, the report showed an "indeterminate" flag for that sample. The flag most likely resulted from quenching that was beyond the quench curve programmed into the counter. The sample was split between two LSC vials and the two resulting samples were recounted. The results were reported by the counter with no cautionary flags. The wipe result is the sum of the activity in the two vials.

Surface scan results are summarized in Table 4. Surface scans showed detectable activity in three rooms – B7, 519E and 519F.

In Room 519 F, a high reading of 5,214 gross cpm was found on the floor near the north wall of the room (location 20 on the 519F wipe map) using the C-14 floor monitor. Room

Table 3. - Wipe tests showing results above MDA

Wipe designation	Location description	Nuclides Used or Stored in Room*	Type of analysis	Activity on Wipe (dpm)
B6-15	Floor, Room B6	3, 4, 6, 7, 8, 9	α/β counter	1.45E+01 β
B6-24	Lower Wall, Rm. B6	3, 4, 6, 7, 8, 9	α/β counter	1.07E+01 α
B7-45	Lower Wall, Rm. B7	4, 8, 10	α/β counter	9.06E+00 β
519E-7	Floor, Rm. 519E	1	LSC	4.63E+01 C-14
519E-15	Floor, Rm. 519E	1	LSC	1.03E+02 C-14
519E-21	Chem Hood, 519E	1	LSC	1.00E+02 C-14
519E-22	Chem Hood, 519E	1	LSC	5.22E+01 C-14
519E-55	Sink Counter, 519E	1	LSC	1.47E+02 C-14
519E-56	Sink Drain, 519E	1	LSC	1.13E+04 C-14
441 Hood Fan Housing E-15	Rooftop Hood Duct Outlet	2, 3, 4, 5, 6, 7, 8, 9	α/β counter LSC	9.06E+00 β <MDA
519E Hood Duct Plenum	6 th Floor Mechanical Area	1	LSC	7.45E+01 C-14
Plumbing Cleanout	Basement Garage	1, 2, 3, 4, 5, 6, 7, 8, 9	α/β counter LSC	<MDA 4.51E+02 low-energy beta
*Radionuclides used at 717 Delaware St.: 1 = C-14; 2 = Ni-63; 3 = Sr-90; 4 = Cs-137; 5 = Eu/Sb mixed standard; 6 = natural Uranium; 7 = Ra-226/228; 8 = Th-230; 9 = Am-241; 10 = Tc-99				

519F has a tile floor. Subtracting the background of 892 cpm, using the 6.31 percent efficiency found for the C-14 detector and adjusting for its 425 cm² open area, the count rate translates to an activity concentration of 1.61E+04 dpm/100 cm². A reading was done with a Ludlum Model 3 Geiger counter with a 44-9 pancake probe to better refine the location of the contamination. An area just a few centimeters in diameter was found where the highest G-M reading was approximately 700 cpm (background = 35 cpm), confirming the readings found with the floor monitor, but showing that the activity was localized in a region of higher concentration. The readings fell off quickly as the detector was moved away from the small contaminated area, and were at background levels within about 50 cm. of the location where the highest reading was found..

Two attempts to decontaminate the floor did not reduce the readings significantly. The highest reading was found near the junction of four tiles. All four tiles were removed. After removing the tiles, the floor monitor reading on the adhesive was approximately 3000 cpm. Some of the adhesive was scraped off, and the reading was reduced to 2084 cpm. Readings at the outer edges of the area where the tile had been removed were 1680 to 1768 cpm. The 2084 cpm reading represents an activity concentration of $4.27\text{E}+03$ dpm/100 cm². The highest Geiger counter reading after scraping the adhesive was 240 gross counts per minute (background = 35 cpm), indicating that the activity concentration had been considerably reduced.

In Room 519E, two areas of elevated counts were found using the Ludlum floor monitor in its bench monitoring mode. The work surface of the chemical hood on the east wall of the room gave readings ranging from 1100 to 2450 gross cpm. Follow up checks with the pancake probe showed that the majority of the activity was on the area of the work surface nearest where a worker would stand. The count rates found with the floor monitor represent C-14 activity concentrations of $7.76\text{E}+02$ to $5.81\text{E}+03$ dpm/100 cm².

On the west wall in 519E, the small lab bench between the biological hoods showed similar levels of contamination, with the highest reading at 2200 gross cpm, or $4.88\text{E}+03$ dpm/100 cm².

Repeated attempts to reduce contamination on the hood working surface and the lab bench in Room 519E were unsuccessful.

In Room B7, initial measurements on 11/14/05 using the 43-1 alpha scintillation probe on the floor indicated high activity concentrations of alpha emitters. The detector could not be used according to the method described in the "Survey Method" section above. That method called for the probe to be moved at one inch per second, and, because of the very low background counts using the system, a one minute count would be done in any location where a single count was detected.

When the probe was first placed on the template along the south wall of Room B-7, counts accumulated very quickly, so a one-minute count was done. A reading of 72 counts was obtained in one minute. Based on Th-230, the most restrictive alpha emitter stored in Room B7, the reading would represent an activity concentration of $2.78\text{E}+02$ dpm/100 cm². The reading was not consistent with the fact that the room had been used only for storage of check sources.

A one minute count in a location near the center of the room's east wall gave a similar result – 58 counts. Temporarily stored in the room was a set of wooden shelves on wheels that was the property of PHL's moving contractor. A one-minute count on the top shelf gave a reading of 56 counts. The shelves had been moved into the room after the all radioactive material and all equipment used for storage and handling of the radioactive material had been moved out. The shelf could not have been contaminated by the licensed material in the room. Because the room is below grade and unventilated, and its door was always kept closed, decay products from natural radon plating out on the room

Table 4. Surface scans showing results above MDA

Location	Nuclides Used	Type of Detector	Indicated activity (dpm/ 100 cm ²)
B7 Floor, majority	4, 8, 10	α Floor monitor 43-1 scintillator	2.5E+01 α
B7 Floor, adjacent to south wall	4, 8, 10	α Floor monitor 43-1 scintillator	1.62E+02 α
519E Bench	1	C-14 Floor Monitor	4.88E+03 C-14
519E Chemical Hood	1	C-14 Floor Monitor	5.81E+03 C-14
519F Floor	1	C-14 Floor Monitor	1.61E+04 C-14
*Radionuclides used at 717 Delaware St.: 1 = C-14; 2 = Ni-63; 3 = Sr-90; 4 = Cs-137; 5 = Eu/Sb mixed standard; 6 = natural Uranium; 7 = Ra-226/228; 8 = Th-230; 9 = Am-241; 10 = Tc-99			

surfaces were considered the most likely source of the alpha readings.

To determine whether radon was responsible for the elevated readings in Room B7, the following actions were taken.

Ventilation

Based on suggestions from Bill Snell at NRC, the door of the room was left open to see whether the contamination levels were reduced. A fan was placed in the doorway of the room and another in the center of the room, blowing air into the room from the well-ventilated parking garage.

After one day, readings were considerably lower. The location along the south wall that had on the previous day yielded a reading of 72 counts in one minute, now showed only 36 counts in 5 minutes, or 7.2 cpm. The reading near the center of the east wall was reduced from 58 counts in one minute to 35 counts in 5 minutes, or 7 cpm. Readings were done at several other locations in and near the room. Figure 1 shows the locations where the readings were taken and Table 5 presents a description of the locations, the conditions (fan operation, etc.) and the results of readings done at those locations. Readings in Room B7 after ventilation indicated that levels of alpha contamination were generally below the Table 5.19 values, but some locations within the room were still near or slightly above the guidelines. However, the count rates were still high enough that surveying the floor with the Ludlum 43-1 detector was impractical. A full survey would require a five minute count for each 75 cm² of floor area. The area of the room's floor is more than 90,000 cm².

Wipe testing for short half-life nuclides

On November 18, wipes were taken in five locations on the floor of the room and counted promptly in a Tennelec 3 alpha/beta gas flow proportional counter at 717 Delaware St. A 50-minute count was done every one to two hours for the first several counts, then additional counts were done one day and three days after taking the wipes. The concrete floor of the room is somewhat rough, so the wipe likely did not remove all loose radioactive material from the surface.

The first 50-minute count was started approximately 40 minutes after the wipes were taken. Initial activities on the wipes ranged from <MDA (~0.6 dpm) to 3.58 dpm alpha and <MDA (~ 1 dpm) to 8.11 dpm beta. With one exception, all counts that began above MDA showed decreasing count rates over the first several counts – 4 to 24 hours, then leveled off. Some of the wipes remained above MDA when their count rates stabilized.

The exception was the location that had initially showed the highest reading, 72 cpm, on the alpha scintillator. Its initial count results were 3.4 dpm alpha and 8.11 dpm beta. After 24 hours, the beta reading had fallen off to 4.04 dpm, but 72 hours after sampling, the alpha reading remained at 3.57 dpm.

The initial decrease in activity indicated that there were short-lived alpha and beta emitters on the wipes, supporting the theory that the alpha scintillator readings resulted from plate-out of short-lived radon decay products. However, the persistent readings above MDA on some of the wipes indicated that some of the activity was due to longer-lived radioactive materials, possibly Pb-210/Po-210 descendants of radon.

Table 5. Alpha scintillator readings (net cpm) in Room B7, 717 Delaware St. SE

Date	Conditions	Location (See Figure 1)						
		1	2	3	4	5	6	7
11/14/05	Door closed			71.4		57.4		
11/15/05	2 Fans blowing in	5.4	4.0	6.8		6.6		2.0
11/16/05	2 Fans blowing in	3.4	10.2	7.6		3.6		
11/18/05	2 Fans blowing out	3.2	5.8	10.2		6.6		
11/19/05	Room swept & mopped							
11/30/05	1 fan blowing out	2.6	5.4	8.8		3.6		
12/10/05	No fans, door open				7.2			
12/14/05	No fans, door open				3.4		1.9	7.2
12/19/05	No fans, door open			10.4	5.2		4.4	

Sweeping and mopping, then rewiping

On November 29, the room was swept and mopped to remove residual long-lived radioactive material. Wipes were taken on December 2 in four of the five locations that had been wiped on November 18. Wipes were again counted on the Tennelec 3

Room B7 Survey Locations

Wipes from 12/2/05 and 11/18/05
and Alpha Scans

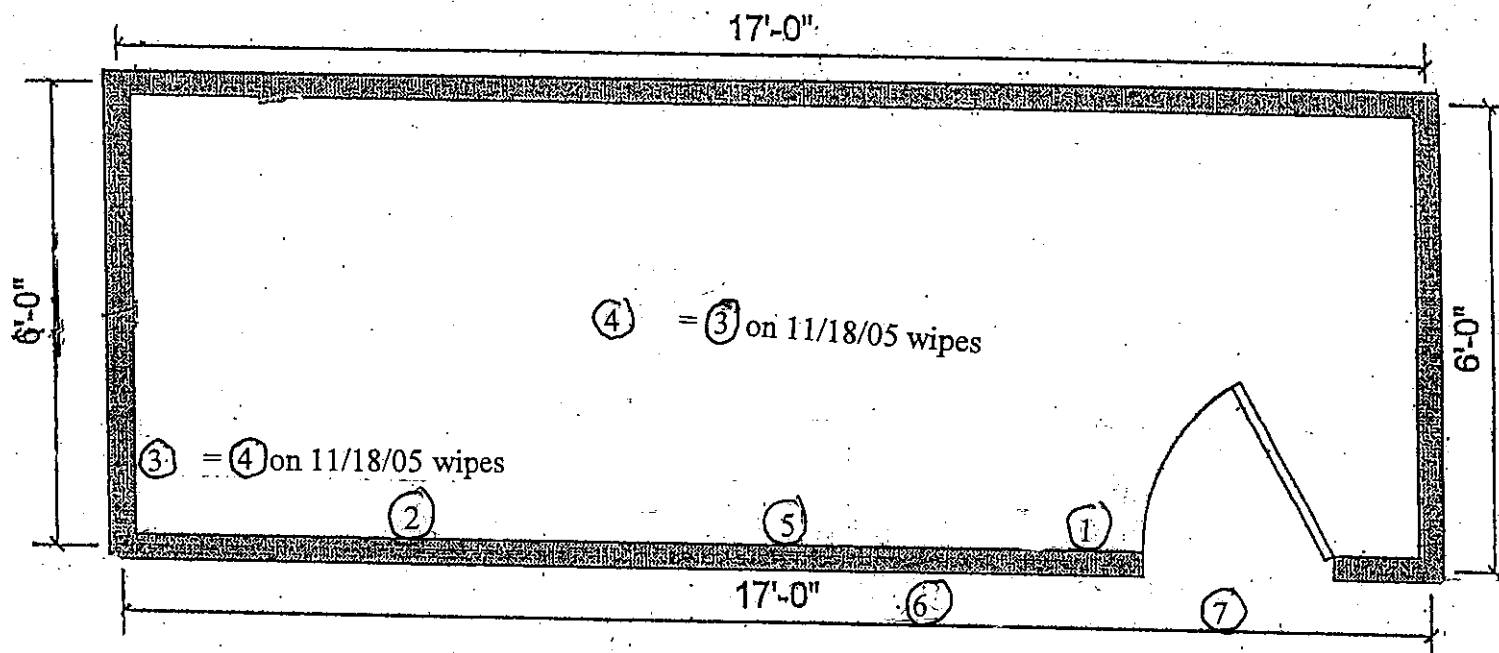
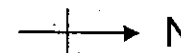


Figure 1



alpha/beta counter at 717 Delaware St. The first 50-minute count was started approximately 70 minutes after the wipes were taken.

Without exception, the activity on the second set of wipes was lower than that found on the first. All alpha results were lower than MDA. On three of the four wipes, beta results were initially above MDA, but decreased to less than MDA within four hours. On the fourth wipe, beta readings were initially below MDA.

Three facts are apparent from the results of the wipes: that there had been removable long-lived radioactive material in Room B7; that sweeping and mopping the room had removed virtually all of the removable long-lived alpha and beta emitters; and that there was a continuous source of short-lived alpha emitters that was contributing to the readings on the alpha scintillation detector.

Surveying a similar room not used for radionuclides

A reading was done with the Model 43-1 alpha scintillation detector on the concrete floor of Room B9, a maintenance room in the basement garage. No radioactive materials had ever been used or stored in Room B9. Because the maintenance room is also unventilated, it may also have elevated radon levels. There is one significant difference in the design of the rooms. Room B7 is at the outer wall of the building, meaning a floor-wall joint could be a significant radon entry route, whereas Room B9 is in the center of the basement.

A five minute count in Room B9 registered 18 counts, with a five minute background of 6 counts. Thus, the 2.4 net dpm reading in Room B9 was at approximately half the level found in most areas of Room B7.

Readings were made in both Room B7 and Room B9 using the Duratek gas flow alpha detector. A ten-minute reading in Room B9 yielded 110 counts. A similar reading in Room B7 yielded 175 counts. Background for the detector was 5.6 counts per minute.

The readings done in Room B9 indicate that there is a factor unrelated to use of licensed materials that results in elevated readings on the alpha detectors.

Concrete as a source of counts

The possibility was considered that the concrete floor in Room B7 was contributing to the elevated alpha reading. One possible reason why we had found readings higher than background in Room B9 may have been that the concrete in the rooms contains alpha emitting radionuclides. Room B7 is built on a slab of concrete that is newer than and separate from the remainder of the concrete in the basement garage. The concrete slab extends about 30 centimeters beyond the east wall of the room.

Several tests were done to determine whether the concrete in the floor slab could be contributing to the elevated readings. Readings were taken in two locations outside Room B7, using the 43-1 alpha scintillation probe. The first location was 15 centimeters outside the door of the room. The second was approximately 120 cm south of the doorway, and

20 cm. outside the east wall of the room. Readings were consistently higher than background at both locations. They are summarized in Table 4 along with all scintillation detector readings from Room B7.

A reading was also done at the base of an outdoor concrete stairway adjacent to the new laboratory building at 601 N. Robert St. The reading was done after dark with very subdued light, so there was no possible effect from light leaks. The area provided a reading that was truly free of any licensed material. A ten-minute reading yielded 25 counts, with a background of 0.5 cpm.

The results of the counts done on concrete demonstrate that the readings obtained in Room B7 are at least partly accounted for by the concrete slab on which the room is built.

Clean objects accumulating radioactive material in the room

On December 9, a metal sign and a low stool with a vinyl seat were placed in Room B7 overnight. Before the items were placed in the room, they were surveyed with the alpha scintillation probe to ensure they were contamination-free. Both were at background levels.

On December 10, a surface scan was done on each of the items to see whether they had accumulated detectable radioactive material on their surfaces. Five minute counts were done for both background and surface activity. The reading on the metal sign was 16 counts, with a background of 5 counts. The reading on the concrete adjacent to the sign was 35 counts. The reading on the concrete where the sign had been removed was 22 counts.

The sign was taken to a well-ventilated room to perform successive counts and observe the decay of the material on the sign's surface. A five minute background prior to the first follow-up count was 3 counts. The first five minute follow-up on the sign, done 31 minutes after the original count, read 7 counts. Another check 5 minutes later gave a result of 4 counts. The sign had gone from 12 net counts to background in 38 minutes.

Next, five minute readings were done on the vinyl seat of the low stool. Initially, the stool read 21 counts, with background at 4. The stool was then moved to a well-ventilated room for follow-up. The first follow-up, 35 minutes later, yielded 12 counts. The first follow-up was followed at approximately six-minute intervals by readings of 22, 18, 11, 9 and 12 counts, clearly showing a downward trend in count rate. After subtracting background, the counts were 17, 8, 18, 14, 7, 5, and 8.

These results clearly show that radioactive material is being deposited on the floor in room B7. The increase in the readings on the objects placed in the room from background to significant levels within one day, and the fact that the exposed area of the floor gave a higher reading than the area covered by the sign, strongly support the deposition theory. The results also indicate that the radioactive material deposited on the sign and stool has a half live in the range of minutes to hours. This fits the profile of radon decay products.

Scrubbing, mopping and rinsing

On December 13, the floor and the walls of the room up to seven feet were scrubbed with soap and water using a stiff brush. After the scrubbing, the floor and walls were mopped with clean water. Finally a lawn sprinkler was used to rinse the floor and walls for three hours. Water remaining in the room was removed with a squeegee and moved toward the garage drain.

Full floor scan

On December 14, a survey of the entire floor was done with the 43-37 gas flow detector. Readings were clearly above background, and ranged between ten and twenty counts per minute, including a background of five counts per minute. The detector was occasionally stopped and one minute readings were taken. The one minute readings confirmed the 10 – 20 cpm rate, with the exception of one location. Readings were considerably higher along the south wall of the room. The highest one minute reading found was 131 counts.

Given the 19 percent alpha efficiency of the detector and its 425 cm² area, a 20 cpm reading indicates an area concentration of 19 dpm/100 cm², which does not exceed the Table 5.19 levels for any of the radionuclides that had been stored in the room. However, the 131 cpm reading translates to 156 dpm/100 cm², which exceeds the guideline level for Th-230 and natural uranium.

The tests done in Room B7 that have been described thus far implicated radionuclides other than licensed materials as the source of the elevated alpha counts. However, other than the December 2 wipe survey, the testing failed to establish that no licensed material was present in quantities exceeding the Table 5.19 values.

Gamma count of concrete sample

Readings of small areas along the south wall, where the highest readings had been found, were done with the Ludlum 43-1 alpha scintillation detector. Several locations along the west wall and in the open floor space were also checked. Five minute readings showed that the highest levels were in the southeast corner of the room and against the south wall, 13 cm from the southwest corner of the room. The readings were 20 cpm and 12 cpm, respectively.

Concrete was then chipped from the surface of the floor. Most of the concrete was pulverized during the chipping process and was not identifiable as surface material. However, enough of the surface was collected to make up a one gram sample from each of the locations where the high readings had been found. The chips were several millimeters across and less than two millimeters thick. Assuming a mean thickness of 1 mm and a density of 2.3 g/cm³, one gram of sample is the equivalent of a 4.3 cm² surface area.

In addition, tape was used to collect dust and small particles that had been generated in the process of chipping the concrete. Approximately one gram of material was collected from each location on the tape. In addition, a four gram sample was collected from the edge of the concrete slab outside the room as a control.

The samples were carefully weighed and the weight of the tape subtracted from the total. The samples were combined for counting and reweighed. Total mass of the chips, clearly identified as surface material in the combined samples was 1.9268 grams. The samples collected on the tape consisted of a mix of surface and shallow subsurface material. We estimate that 50 percent of the material was shallow enough to be affected by contamination that may have been present on the floor. The total weight of sample collected on the tape was 2.6110 grams. Half of this material plus the surface chips gives a total effective surface sample weight of 3.2323 grams, or 14 cm² of surface material.

Samples were counted using the HPGe gamma counting system. The sample from outside Room B7 was counted for 22.3 hours. The combined sample from inside Room B7 was counted for 20.4 hours. In the sample from outside the room, all radioactive materials were below minimum detectable levels. Potassium-40 was detected in the samples from inside the room at a concentration of 25.3 dpm/g. All other radionuclides were below minimum detectable concentration. The K-40 that was detected is almost certainly an inherent ingredient of the concrete. Potassium-40 had never been used or stored at PHL.

Possible Ra-226 contamination was the primary concern of the future occupants of the building. The minimum detectable concentration for Ra-226 in the sample from inside Room B7 was 16.1 dpm/g. Adjusting for the fraction of surface material in the sample and for the surface area that one gram represents, the minimum detectable surface concentration is 540 dpm/100 cm², about half the Table 5.19 value.

The concrete chips from the area that showed the highest reading, the southeast corner of the room, were pulverized, and 0.1 gram of the pulverized material was analyzed in the Tennelec 5 alpha/beta proportional counter. The material was counted for 22 hours. The 0.1 gram weight corresponds to 0.43 cm² of surface area.

The analysis of the 0.1 g concrete sample showed an alpha activity of less than the MDA of 0.259 dpm (after correcting for self-absorption) and a beta activity of 2.30 dpm. The beta activity corresponds very closely to the 25.3 dpm/g K-40 concentration detected in the gamma analysis.

Beta/gamma surface scans of Room B7 with using Ludlum Model 3 Geiger counters with Model 44-9 pancake probes found no readings that could be distinguished from background.

Room B7 - summary

- Some readings in the room are high enough to indicate that there may be concentrations of some radionuclides higher than the Table 5.19 guidelines.
- Non-contaminated objects placed in the room become contaminated overnight. The contamination level is 50 percent or more of the levels found on the floor in most of the room.
- The contamination that accumulates has a short half-life.

- One set of wipes showed longer-lived radioactive materials in measurable quantities, some approaching ten percent of Table 5.19 levels for Th-230 (although Th-230 was not implicated as the radionuclide that was detected).
- Wipes taken after cleaning the room showed no detectable long-lived radioactive materials.
- Readings on the floor of a room similar to B7 (basement, unventilated, concrete floor) were also significantly above background.
- Readings done on concrete in several different locations were all significantly higher than background, generally at levels close to half the levels found on the floor in Room B7.
- A sample of concrete from the floor of Room B7 showed no detectable concentrations of Ra-226 or any materials that had been used in Room B7.
- Only the area along the floor-wall joint immediately adjacent to the south wall of the room gives readings exceeding the calculated values that would indicate alpha activity at or above the Table 5.19 values.

Conclusions

The survey showed that none of the radionuclide work areas at 717 Delaware St. SE, Minneapolis, MN, exceeds the guidelines in Table 5.19. There are several rooms where detectable levels of licensed material were found, but in all cases, the area concentrations of the radionuclides are well below the Table 5.19 values.

Testing showed that the elevated counts in Room B7 can be accounted for by a combination of increased readings found on concrete floors and deposition of short-lived radioactive materials on surfaces in the room. Tests also showed that after cleaning, there was no detectable long-lived, alpha-emitting radioactive material on wipes taken in the room or in concrete samples from the room.

We conclude concentrations of licensed materials do not need to be further reduced to make the building acceptable for unrestricted use.

Appendix A

Wipe Results

Radiation Wipe Sample Results							
Minnesota Dept. Health							
Public Health Laboratory							
717 Delaware St. S.E., Mpls. MN							
				Minimum Detectable Activity			
				α/β Counter		L.S.C.	Gamma
				α = 7.94 dpm		β = 33.6 dpm	Cs-137= 1426.6 dpm
				β = 7.38 dpm			Eu-154= 5734.3 dpm
							Eu-155= 1395.5 dpm
							Sb-125= 2573.0 dpm
Room B-5 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B5-1	200532321	11/30/2005	< MDA	< MDA			
B5-2	200532322	11/30/2005	< MDA	< MDA			
B5-3	200532323	11/30/2005	< MDA	< MDA			
B5-4	200532324	11/30/2005	< MDA	< MDA			
B5-5	200532325	11/30/2005	< MDA	< MDA			
B5-6	200532326	11/30/2005	< MDA	< MDA			
B5-7	200532327	11/30/2005	< MDA	< MDA			
B5-8	200532328	11/30/2005	< MDA	< MDA			
B5-9	200532329	11/30/2005	< MDA	< MDA			
B5-10	200532330	11/30/2005	< MDA	< MDA			
B5-11	200532331	11/30/2005	< MDA	< MDA			
B5-12	200532332	11/30/2005	< MDA	< MDA			
B5-13	200532333	11/30/2005	< MDA	< MDA			
B5-14	200532334	11/30/2005	< MDA	< MDA			
B5-15	200532335	11/30/2005	< MDA	< MDA			
B5-16	200532336	11/30/2005	< MDA	< MDA			
B5-17	200532337	11/30/2005	< MDA	< MDA			

Room B-5 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B5-18	200532338	11/30/2005	< MDA	< MDA			
B5-19	200532339	11/30/2005	< MDA	< MDA			
B5-20	200532340	11/30/2005	< MDA	< MDA			
B5-21	200532341	11/30/2005	< MDA	< MDA			
B5-22	200532342	11/30/2005	< MDA	< MDA			
B5-23	200532343	11/30/2005	< MDA	< MDA			
B5-24	200532344	11/30/2005	< MDA	< MDA			
B5-25	200532345	11/30/2005	< MDA	< MDA			
B5-26	200532346	11/30/2005	< MDA	< MDA			
B5-27	200532347	11/30/2005	< MDA	< MDA			
B5-28	200532348	11/30/2005	< MDA	< MDA			
B5-29	200532349	11/30/2005	< MDA	< MDA			
B5-30	200532350	11/30/2005	< MDA	< MDA			
B5-31	200532351	11/30/2005	< MDA	< MDA			
B5-32	200532352	11/30/2005	< MDA	< MDA			
B5-33	200532353	11/30/2005	< MDA	< MDA			
B5-34	200532354	11/30/2005	< MDA	< MDA			
B5-35	200532355	11/30/2005	< MDA	< MDA			
B5-36	200532356	11/30/2005	< MDA	< MDA			
B5-37	200532357	11/30/2005	< MDA	< MDA			
B5-38	200532358	11/30/2005	< MDA	< MDA			
B5-39	200532359	11/30/2005	< MDA	< MDA			
B5-40	200532360	11/30/2005	< MDA	< MDA			
B5-41	200532361	11/30/2005	< MDA	< MDA			
B5-42	200532362	11/30/2005	< MDA	< MDA			
B5-43	200532363	11/30/2005	< MDA	< MDA			
B5-44	200532364	11/30/2005	< MDA	< MDA			
B5-45	200532365	11/30/2005	< MDA	< MDA			
B5-46	200532366	11/30/2005	< MDA	< MDA			
B5-47	200532367	11/30/2005	< MDA	< MDA			
B5-48	200532368	11/30/2005	< MDA	< MDA			

Room B-5 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B5-49	200532369	11/30/2005	< MDA	< MDA			
B5-50	200532370	11/30/2005	< MDA	< MDA			
B5-51	200532371	11/30/2005	< MDA	< MDA			
B5-52	200532372	11/30/2005	< MDA	< MDA			
B5-53	200532373	11/30/2005	< MDA	< MDA			
B5-54	200532374	11/30/2005	< MDA	< MDA			
B5-55	200532375	11/30/2005	< MDA	< MDA			
B5-56	200532376	11/30/2005	< MDA	< MDA			
B5-57	200532377	11/30/2005	< MDA	< MDA			
B5-58	200532378	11/30/2005	< MDA	< MDA			
B5-59	200532379	11/30/2005	< MDA	< MDA			
B5-60	200532380	11/30/2005	< MDA	< MDA			
B5-61	200532381	11/30/2005	< MDA	< MDA			
B5-62	200532382	11/30/2005	< MDA	< MDA			
B5-63	200532383	11/30/2005	< MDA	< MDA			
B5-64	200532384	11/30/2005	< MDA	< MDA			
B5-65	200532385	11/30/2005	< MDA	< MDA			
B5-66	200532386	11/30/2005	< MDA	< MDA			
B5-67	200532387	11/30/2005	< MDA	< MDA			
B5-68	200532388	11/30/2005	< MDA	< MDA			
B5-69	200532389	11/30/2005	< MDA	< MDA			
B5-70	200532390	11/30/2005	< MDA	< MDA			
B5-71	200532391	11/30/2005	< MDA	< MDA			
B5-72	200532392	11/30/2005	< MDA	< MDA			
B5-73	200532393	11/30/2005	< MDA	< MDA			
B5-74	200532394	11/30/2005	< MDA	< MDA			
B5-75	200532395	11/30/2005	< MDA	< MDA			
B5-76	200532396	11/30/2005	< MDA	< MDA			
B5-77	200532397	11/30/2005	< MDA	< MDA			
B5-78	200532398	11/30/2005	< MDA	< MDA			
B5-79	200532399	11/30/2005	< MDA	< MDA			

Room B-5 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B5-80	200532400	11/30/2005	< MDA	< MDA			
B5-81	200532401	11/30/2005	< MDA	< MDA			
B5-82	200532402	11/30/2005	< MDA	< MDA			
B5-83	200532403	11/30/2005	< MDA	< MDA			
B5-84	200532404	11/30/2005	< MDA	< MDA			
B5-85	200532405	11/30/2005	< MDA	< MDA			
B5-86	200532406	11/30/2005	< MDA	< MDA			
B5-87	200532407	11/30/2005	< MDA	< MDA			
B5-88	200532408	11/30/2005	< MDA	< MDA			
B5-89	200532409	11/30/2005	< MDA	< MDA			
B5-90	200532410	11/30/2005	< MDA	< MDA			
B5-91	200532411	11/30/2005	< MDA	< MDA			
1-30 Composite		11/30/2005			200532412	N/A	<MDA
31-60 Composite		11/30/2005			200532413	N/A	<MDA
61-91-Composite		11/30/2005			200532414	N/A	<MDA
B5-92	200532705	12/5/2005	< MDA	< MDA			
B5-93	200532706	12/5/2005	< MDA	< MDA			
B5-94	200532707	12/5/2005	< MDA	< MDA			
B5-95	200532708	12/5/2005	< MDA	< MDA			
B5-96	200532709	12/5/2005	< MDA	< MDA			
B5-97	200532710	12/5/2005	< MDA	< MDA			
B5-98	200532711	12/5/2005	< MDA	< MDA			
B5-99	200532712	12/5/2005	< MDA	< MDA			
B5-100	200532713	12/5/2005	< MDA	< MDA			
B5-101	200532714	12/5/2005	< MDA	< MDA			
B5-102	200532715	12/5/2005	< MDA	< MDA			
B5-103	200532716	12/5/2005	< MDA	< MDA			
B5-104	200532717	12/5/2005	< MDA	< MDA			
B5-105	200532718	12/5/2005	< MDA	< MDA			
B5-106	200532719	12/5/2005	< MDA	< MDA			
B5-107	200532720	12/5/2005	< MDA	< MDA			

Room B-5 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B5-108	200532721	12/5/2005	< MDA	< MDA			
B5-109	200532722	12/5/2005	< MDA	< MDA			
B5-110	200532723	12/5/2005	< MDA	< MDA			
B5-111	200532724	12/5/2005	< MDA	< MDA			
B5-112	200532725	12/5/2005	< MDA	< MDA			
B5-113	200532726	12/5/2005	< MDA	< MDA			
B5-114	200532727	12/5/2005	< MDA	< MDA			
B5-115	200532728	12/5/2005	< MDA	< MDA			
B5-116	200532729	12/5/2005	< MDA	< MDA			
B5-117	200532730	12/5/2005	< MDA	< MDA			
B5-118	200532731	12/5/2005	< MDA	< MDA			
B5-119	200532732	12/5/2005	< MDA	< MDA			
B5-120	200532733	12/5/2005	< MDA	< MDA			
B5-121	200532734	12/5/2005	< MDA	< MDA			
B5-122	200532735	12/5/2005	< MDA	< MDA			
B5-123	200532736	12/5/2005	< MDA	< MDA			
B5-124	200532737	12/5/2005	< MDA	< MDA			
B5-125	200532738	12/5/2005	< MDA	< MDA			
B5-126	200532739	12/5/2005	< MDA	< MDA			
B5-127	200532740	12/5/2005	< MDA	< MDA			
92-127 Composite		12/5/2005			200532741	N/A	<MDA

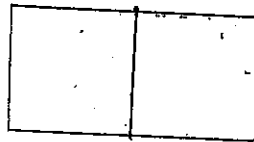
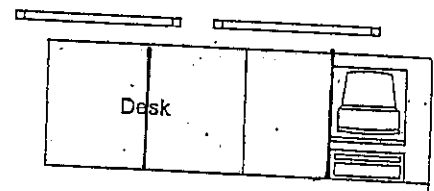
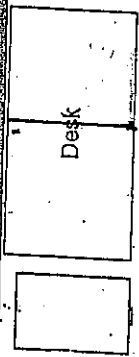
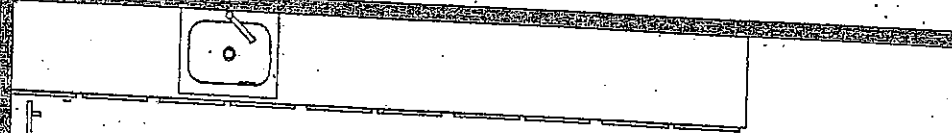


Ro(B5, B6
717 DE LAWARE ST SE
Mpls - MN
33'-0"

GENERAL LAYOUT

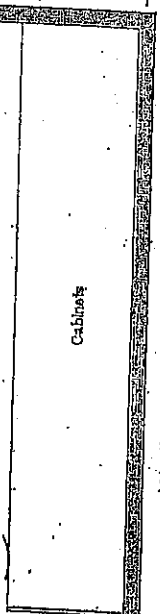
Room B-6

18'-0"



Desk

Room B-5



18'-0"

33'-0"

35, Wipe Locations

WALLS

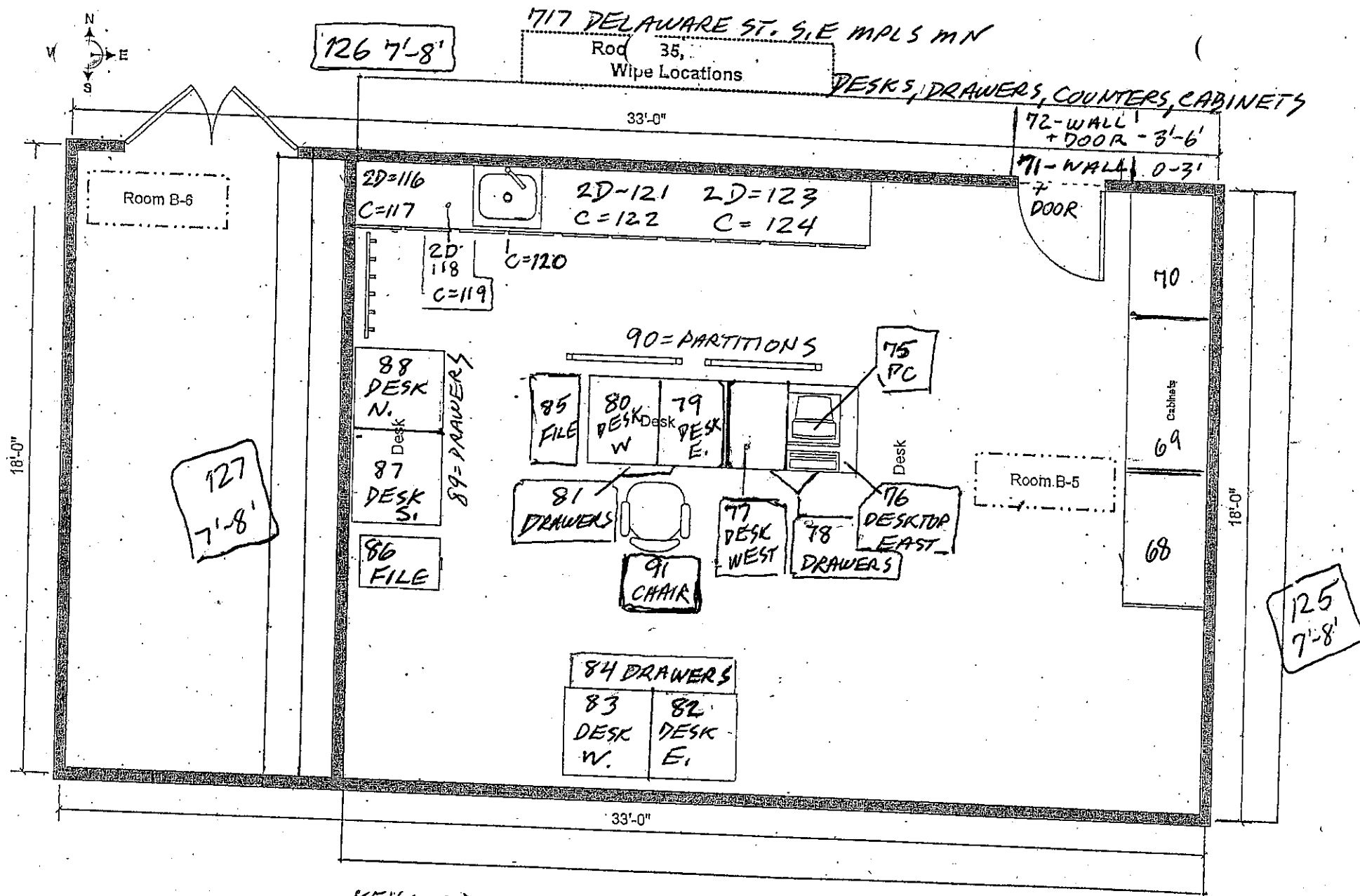
181-0

WALLS

Room.B-5

WALLS

HEIGHT
SAMPLE 17



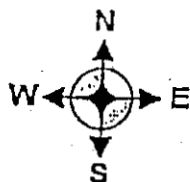
KEY: 2D = 2 DRAWERS
C = CABINET

	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
				Minimum Detectable Activity			
				α/β Counter		L.S.C.	Gamma
				α = 7.94 dpm		β = 33.6 dpm	Cs-137= 1408.1 dpm
				β = 7.38 dpm			Eu-154= 5728.3 dpm
							Eu-155= 1204.3 dpm
							Sb-125= 2671.8 dpm
Room B-6 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B6-1	200532602	12/5/2005	< MDA	< MDA			
B6-2	200532603	12/5/2005	< MDA	< MDA			
B6-3	200532604	12/5/2005	< MDA	< MDA			
B6-4	200532605	12/5/2005	< MDA	< MDA			
B6-5	200532606	12/5/2005	< MDA	< MDA			
B6-6	200532607	12/5/2005	< MDA	< MDA			
B6-7	200532608	12/5/2005	< MDA	< MDA			
B6-8	200532609	12/5/2005	< MDA	< MDA			
B6-9	200532610	12/5/2005	< MDA	< MDA			
B6-10	200532611	12/5/2005	< MDA	< MDA			
B6-11	200532612	12/5/2005	< MDA	< MDA			
B6-12	200532613	12/5/2005	< MDA	< MDA			
B6-13	200532614	12/5/2005	< MDA	< MDA			
B6-14	200532615	12/5/2005	< MDA	< MDA			

Room B-6 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B6-15	200532616	12/5/2005	< MDA	14.47			
B6-16	200532617	12/5/2005	< MDA	< MDA			
B6-17	200532618	12/5/2005	< MDA	< MDA			
B6-18	200532619	12/5/2005	< MDA	< MDA			
B6-19	200532620	12/5/2005	< MDA	< MDA			
B6-20	200532621	12/5/2005	< MDA	< MDA			
B6-21	200532622	12/5/2005	< MDA	< MDA			
B6-22	200532623	12/5/2005	< MDA	< MDA			
B6-23	200532624	12/5/2005	< MDA	< MDA			
B6-24	200532625	12/5/2005	< MDA	< MDA			
B6-25	200532626	12/5/2005	10.74	< MDA			
B6-26	200532627	12/5/2005	< MDA	< MDA			
B6-27	200532628	12/5/2005	< MDA	< MDA			
B6-28	200532629	12/5/2005	< MDA	< MDA			
B6-29	200532630	12/5/2005	< MDA	< MDA			
B6-30	200532631	12/5/2005	< MDA	< MDA			
B6-31	200532632	12/5/2005	< MDA	< MDA			
B6-32	200532633	12/5/2005	< MDA	< MDA			
B6-33	200532634	12/5/2005	< MDA	< MDA			
B6-34	200532635	12/5/2005	< MDA	< MDA			
B6-35	200532636	12/5/2005	< MDA	< MDA			
B6-36	200532637	12/5/2005	< MDA	< MDA			
B6-37	200532638	12/5/2005	< MDA	< MDA			
B6-38	200532639	12/5/2005	< MDA	< MDA			
B6-39	200532640	12/5/2005	< MDA	< MDA			
B6-40	200532641	12/5/2005	< MDA	< MDA			
B6-41	200532642	12/5/2005	< MDA	< MDA			
B6-42	200532643	12/5/2005	< MDA	< MDA			
B6-43	200532644	12/5/2005	< MDA	< MDA			

Room B-6 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B6-44	200532645	12/5/2005	< MDA	< MDA			
B6-45	200532646	12/5/2005	< MDA	< MDA			
B6-46	200532647	12/5/2005	< MDA	< MDA			
B6-47	200532648	12/5/2005	< MDA	< MDA			
B6-48	200532649	12/5/2005	< MDA	< MDA			
B6-49	200532650	12/5/2005	< MDA	< MDA			
B6-50	200532651	12/5/2005	< MDA	< MDA			
B6-51	200532652	12/5/2005	< MDA	< MDA			
B6-52	200532653	12/5/2005	< MDA	< MDA			
B6-53	200532654	12/5/2005	< MDA	< MDA			
B6-54	200532655	12/5/2005	< MDA	< MDA			
B6-55	200532656	12/5/2005	< MDA	< MDA			
B6-56	200532657	12/5/2005	< MDA	< MDA			
B6-57	200532658	12/5/2005	< MDA	< MDA			
B6-58	200532659	12/5/2005	< MDA	< MDA			
B6-59	200532660	12/5/2005	< MDA	< MDA			
B6-60	200532661	12/5/2005	< MDA	< MDA			
B6-61	200532662	12/5/2005	< MDA	< MDA			
B6-62	200532663	12/5/2005	< MDA	< MDA			
B6-63	200532664	12/5/2005	< MDA	< MDA			
B6-64	200532665	12/5/2005	< MDA	< MDA			
B6-65	200532666	12/5/2005	< MDA	< MDA			
B6-66	200532667	12/5/2005	< MDA	< MDA			
B6-67	200532668	12/5/2005	< MDA	< MDA			
B6-68	200532669	12/5/2005	< MDA	< MDA			
B6-69	200532670	12/5/2005	< MDA	< MDA			
B6-70	200532671	12/5/2005	< MDA	< MDA			
B6-71	200532672	12/5/2005	< MDA	< MDA			
B6-72	200532673	12/5/2005	< MDA	< MDA			

Room B-6 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B6-73	200532674	12/5/2005	< MDA	< MDA			
B6-74	200532675	12/5/2005	< MDA	< MDA			
B6-75	200532676	12/5/2005	< MDA	< MDA			
B6-76	200532677	12/5/2005	< MDA	< MDA			
B6-77	200532678	12/5/2005	< MDA	< MDA			
B6-78	200532679	12/5/2005	< MDA	< MDA			
1-39 Composite		12/5/2005			200532680	N/A	<MDA
40-78 Composite		12/5/2005			200532681	N/A	<MDA



78
WALL 7'

WIPE LOCATIONS

Room B-6

717 DELAWARE ST. S.E.
MPLS. MN

WIPE NOS. B6-55 TO B6-78

Room B-6

P-10 Gas
Cylinders

75

74

PHONE = 73

TOP SHELF = 70

MIDDLE " = 71

BOTTOM " = 72

TOP = 67

FRONT = 68

SIDES + BACK = 69

Tennelec
3

64 - OUTSIDE

65 - BOTTOM SHELF

66 - TOP SHELF

Cabinet
SHELVES

SHELVES

TOP - 58

SIDES - 59

TOP SHELF - 60

2nd " - 61

3rd " - 62

4th " - 63

WALL 7'-0"
77

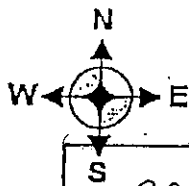
76
WALL
7'

135 sq. ft.

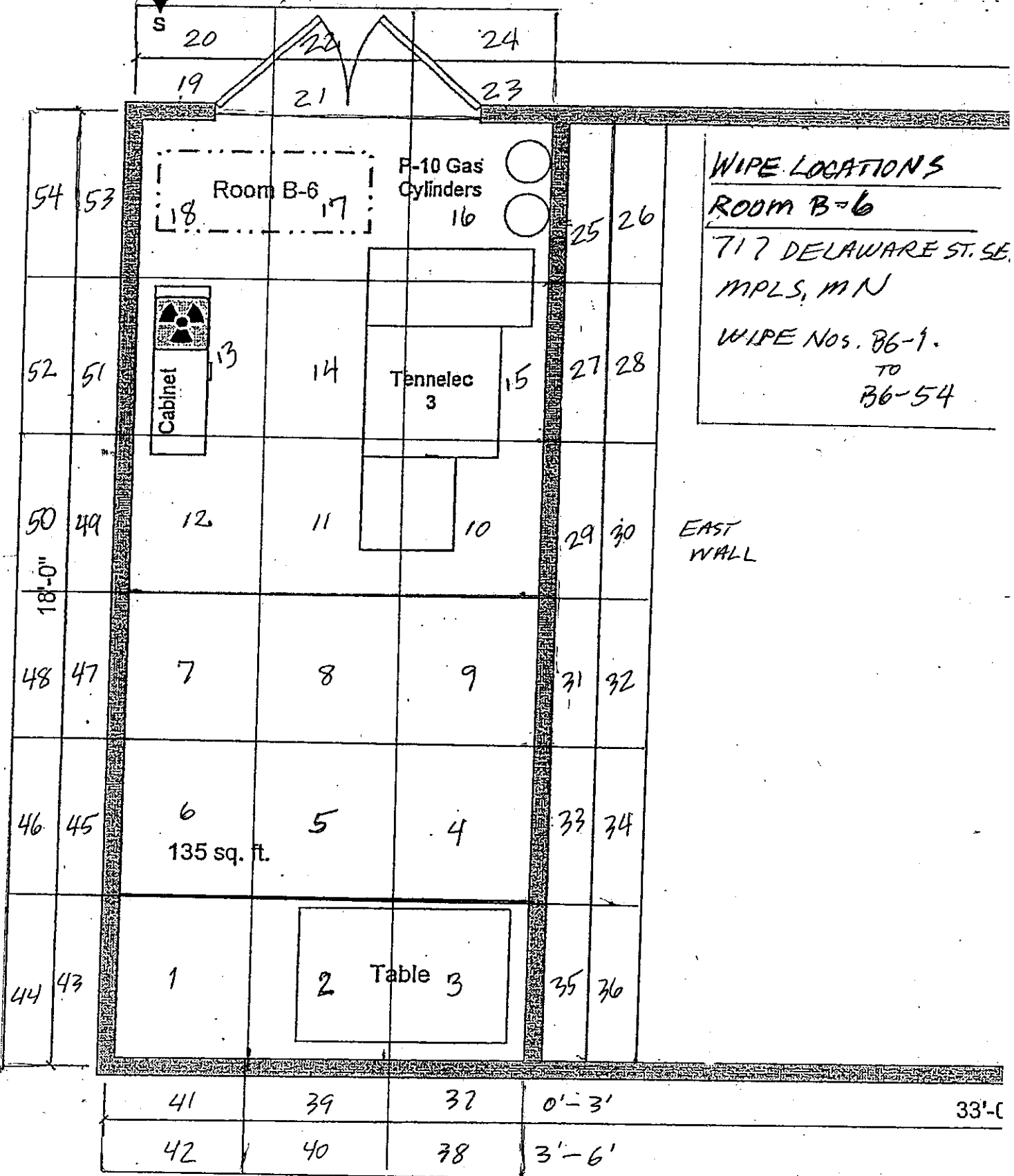
57-DRAWER

55 Table 56

33'-0"



NORTH WALL



WIPE LOCATIONS

ROOM B-6

717 DELAWARE ST. SE.
MPLS, MN

WIPE NOS. 86-1.
TO
B6-54

WEST WALL

EAST WALL

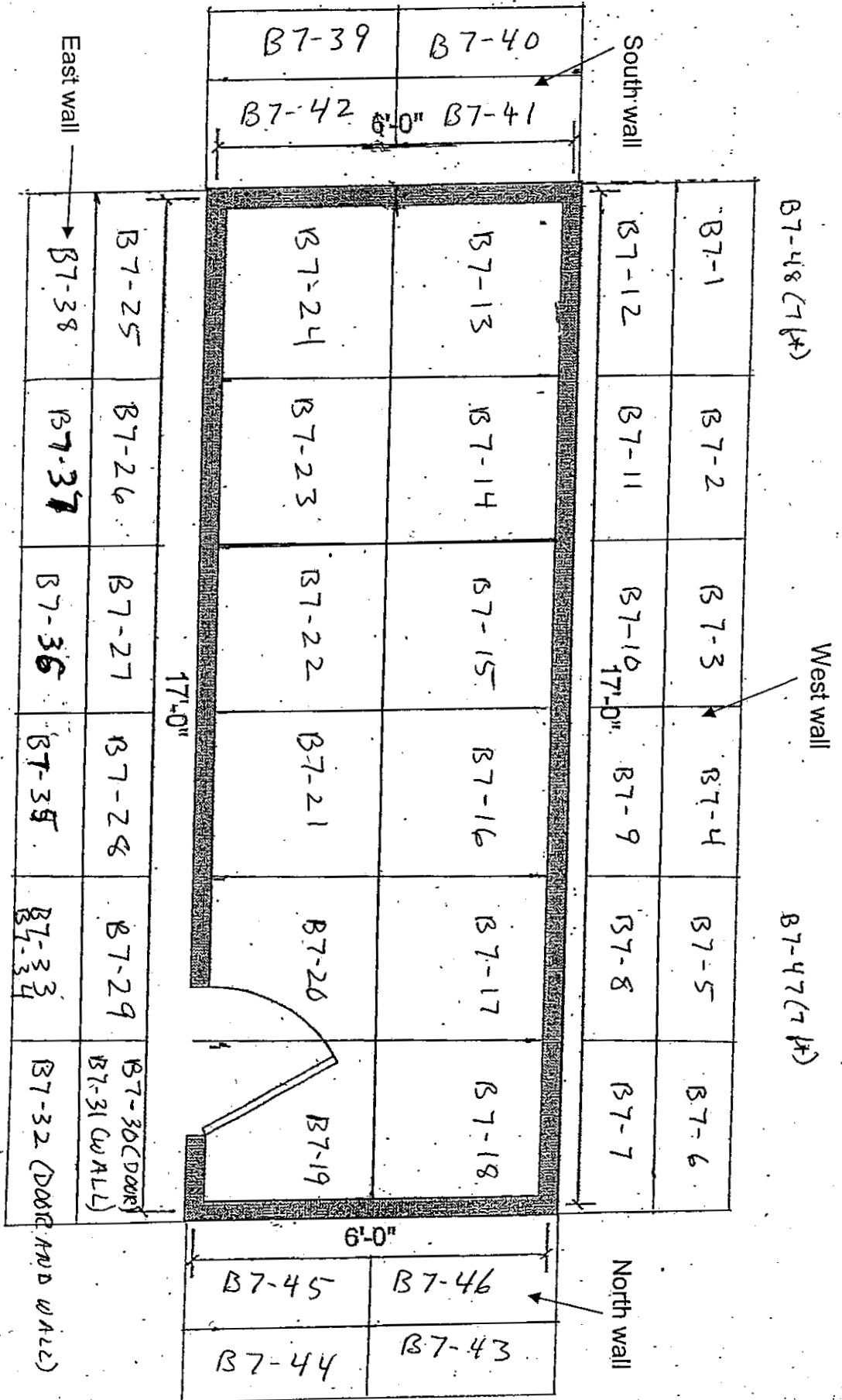
SOUTH WALL

Radiation Wipe Sample Results							
Minnesota Dept. Health							
Public Health Laboratory							
717 Delaware St., Mpls. MN							
				Minimum Detectable Activity			
				α/β Counter		L.S.C.	Gamma
				α = 7.94 dpm		β = 33.6 dpm	Cs-137= 1409.7 dpm
				β = 7.38 dpm			Eu-154= 5752.0 dpm
							Eu-155= 1136.8 dpm
							Sb-125= 2812.7 dpm
Room B-7 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B7-1	200530895	11/9/2005	< MDA	< MDA			
B7-2	200530896	11/9/2005	< MDA	< MDA			
B7-3	200530897	11/9/2005	< MDA	< MDA			
B7-4	200530898	11/9/2005	< MDA	< MDA			
B7-5	200530899	11/9/2005	< MDA	< MDA			
B7-6	200530900	11/9/2005	< MDA	< MDA			
B7-7	200530901	11/9/2005	< MDA	< MDA			
B7-8	200530902	11/9/2005	< MDA	< MDA			
B7-9	200530903	11/9/2005	< MDA	< MDA			
B7-10	200530904	11/9/2005	< MDA	< MDA			
B7-11	200530905	11/9/2005	< MDA	< MDA			
B7-12	200530906	11/9/2005	< MDA	< MDA			
B7-13	200530907	11/9/2005	< MDA	< MDA			
B7-14	200530908	11/9/2005	< MDA	< MDA			
B7-15	200530909	11/9/2005	< MDA	< MDA			
B7-16	200530910	11/9/2005	< MDA	< MDA			
B7-17	200530911	11/9/2005	< MDA	< MDA			

Room B-7 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B7-18	200530912	11/9/2005	< MDA	< MDA			
B7-19	200530913	11/9/2005	< MDA	< MDA			
B7-20	200530914	11/9/2005	< MDA	< MDA			
B7-21	200530915	11/9/2005	< MDA	< MDA			
B7-22	200530916	11/9/2005	< MDA	< MDA			
B7-23	200530917	11/9/2005	< MDA	< MDA			
B7-24	200530918	11/9/2005	< MDA	< MDA			
B7-25	200530919	11/9/2005	< MDA	< MDA			
B7-26	200530920	11/9/2005	< MDA	< MDA			
B7-27	200530921	11/9/2005	< MDA	< MDA			
B7-28	200530922	11/9/2005	< MDA	< MDA			
B7-29	200530923	11/9/2005	< MDA	< MDA			
B7-30	200530924	11/9/2005	< MDA	< MDA			
B7-31	200530925	11/9/2005	< MDA	< MDA			
B7-32	200530926	11/9/2005	< MDA	< MDA			
B7-33	200530927	11/9/2005	< MDA	< MDA			
B7-34	200530928	11/9/2005	< MDA	< MDA			
B7-35	200530929	11/9/2005	< MDA	< MDA			
B7-36	200530930	11/9/2005	< MDA	< MDA			
B7-37	200530931	11/9/2005	< MDA	< MDA			
B7-38	200530932	11/9/2005	< MDA	< MDA			
B7-39	200530933	11/9/2005	< MDA	< MDA			
B7-40	200530934	11/9/2005	< MDA	< MDA			
B7-41	200530935	11/9/2005	< MDA	< MDA			
B7-42	200530936	11/9/2005	< MDA	< MDA			
B7-43	200530937	11/9/2005	< MDA	< MDA			
B7-44	200530938	11/9/2005	< MDA	< MDA			
B7-45	200530939	11/9/2005	< MDA	9.06			
B7-46	200530940	11/9/2005	< MDA	< MDA			
B7-47	200530941	11/9/2005	< MDA	< MDA			
B7-48	200530942	11/9/2005	< MDA	< MDA			

Room B-7 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
B7-49	200530943	11/9/2005	< MDA	< MDA			
B7 Composite		11/9/2005			200530945	N/A	<MDA

B7-49 (7 ft.)



	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α= 7.94 dpm		β= 33.6 dpm	Cs-137= 1376.3 dpm
				β= 7.38 dpm			Eu-154= 5733.4 dpm
							Eu-155= 1241.2 dpm
							Sb-125= 2548.7 dpm
Room 122 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/γ Samp. No.	LSC Results dpm	γ Results dpm
122-1	200532682	12/1/2005	< MDA	< MDA	200532830	< MDA	
122-2	200532683	12/1/2005	< MDA	< MDA	200532831	< MDA	
122-3	200532684	12/1/2005	< MDA	< MDA	200532832	< MDA	
122-4	200532685	12/1/2005	< MDA	< MDA	200532833	< MDA	
122-5	200532686	12/1/2005	< MDA	< MDA	200532834	< MDA	
122-6	200532687	12/1/2005	< MDA	< MDA	200532835	< MDA	
122-7	200532688	12/1/2005	< MDA	< MDA	200532836	< MDA	
122-8	200532689	12/1/2005	< MDA	< MDA	200532837	< MDA	
122-9	200532690	12/1/2005	< MDA	< MDA	200532838	< MDA	
122-10	200532691	12/1/2005	< MDA	< MDA	200532839	< MDA	
122-11	200532692	12/1/2005	< MDA	< MDA	200532840	< MDA	
122-12	200532693	12/1/2005	< MDA	< MDA	200532841	< MDA	
122-13	200532694	12/1/2005	< MDA	< MDA	200532842	< MDA	
122-14	200532695	12/1/2005	< MDA	< MDA	200532843	< MDA	
122-15	200532696	12/1/2005	< MDA	< MDA	200532844	< MDA	
122-16	200532697	12/1/2005	< MDA	< MDA	200532845	< MDA	
122-17	200532698	12/1/2005	< MDA	< MDA	200532846	< MDA	

Room 122 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
122-18	200532699	12/1/2005	< MDA	< MDA	200532847	< MDA	
122-19	200532700	12/1/2005	< MDA	< MDA	200532848	< MDA	
122-20	200532701	12/1/2005	< MDA	< MDA	200532849	< MDA	
122-21	200532702	12/1/2005	< MDA	< MDA	200532850	< MDA	
122-22	200532703	12/1/2005	< MDA	< MDA	200532851	< MDA	
122 Composite		12/1/2005	N/A	N/A	200623704	N/A	< MDA
122-23 Filter Blank		12/1/2005	N/A	N/A	200532852	< MDA	
122-24 Reagent Blank		12/1/2005	N/A	N/A	200532853	< MDA	
122-25 Reagent Blank		12/1/2005	N/A	N/A	200532854	< MDA	
122-26 Reagent Blank		12/1/2005	N/A	N/A	200532855	< MDA	
122-27 Reagent Blank		12/1/2005	N/A	N/A	200532856	< MDA	
122-28 Reagent Blank		12/1/2005	N/A	N/A	200532857	< MDA	
122-29 Reagent Blank		12/1/2005	N/A	N/A	200532858	< MDA	
122-30 Reagent Blank		12/1/2005	N/A	N/A	200532859	< MDA	

WIPE LOCATIONS ROOM 122
917 DELAWARE ST SE
MPLS. MN

EAST WALL

NORTH WALL

SOUTH WALL

Cooler

122

2

1

3

4

CART
21
22 - BOX

11

9

12

10

40'-3" ↗
← 3'-6" ↗

WEST WALL

BLANK = 23

	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α= 7.94 dpm		β= 33.6 dpm	Cs-137= 1512.2 dpm
				β= 7.38dpm			Eu-154= 5740.9 dpm
							Eu-155= 1369.7 dpm
							Sb-125= 2887.8 dpm
Room 441 -- Results for wipe samples							
Location	α/βSample No.	Date Coll.	α Results dpm	β Results dpm	LSC/γ Samp. No.	LSC Results dpm	γ Results dpm
441-1	200531818	11/22/2005	< MDA	< MDA			
441-2	200531819	11/22/2005	< MDA	< MDA			
441-3	200531820	11/22/2005	< MDA	< MDA			
441-4	200531821	11/22/2005	< MDA	< MDA			
441-5	200531822	11/22/2005	< MDA	< MDA			
441-6	200531823	11/22/2005	< MDA	< MDA			
441-7	200531824	11/22/2005	< MDA	< MDA			
441-8	200531825	11/22/2005	< MDA	< MDA			
441-9	200531826	11/22/2005	< MDA	< MDA			
441-10	200531827	11/22/2005	< MDA	< MDA			
441-11	200531828	11/22/2005	< MDA	< MDA			
441-12	200531829	11/22/2005	< MDA	< MDA			
441-13	200531830	11/22/2005	< MDA	< MDA			
441-14	200531831	11/22/2005	< MDA	< MDA			
441-15	200531832	11/22/2005	< MDA	< MDA			
441-16	200531833	11/22/2005	< MDA	< MDA	200532874	<MDA	
441-17	200531834	11/22/2005	< MDA	< MDA	200532875	<MDA	

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-18	200531835	11/22/2005	< MDA	< MDA			
441-19	200531836	11/22/2005	< MDA	< MDA	200532881	<MDA	
441-20	200531837	11/22/2005	< MDA	< MDA			
441-21	200531838	11/22/2005	< MDA	< MDA	200532882	<MDA	
441-22	200531839	11/22/2005	< MDA	< MDA			
441-23	200531840	11/22/2005	< MDA	< MDA	200532883	<MDA	
441-24	200531841	11/22/2005	< MDA	< MDA			
441-25	200531842	11/22/2005	< MDA	< MDA			
441-26	200531843	11/22/2005	< MDA	< MDA			
441-27	200531844	11/22/2005	< MDA	< MDA			
441-28	200531845	11/22/2005	< MDA	< MDA			
441-29	200531846	11/22/2005	< MDA	< MDA			
441-30	200531847	11/22/2005	< MDA	< MDA	200532870	<MDA	
441-31	200531848	11/22/2005	< MDA	< MDA	200532871	<MDA	
441-32	200531849	11/22/2005	< MDA	< MDA	200532872	<MDA	
441-33	200531850	11/22/2005	< MDA	< MDA	200532873	<MDA	
441-34	200531851	11/22/2005	< MDA	< MDA			
441-35	200531852	11/22/2005	< MDA	< MDA			
441-36	200531853	11/22/2005	< MDA	< MDA	200532876	<MDA	
441-37	200531854	11/22/2005	< MDA	< MDA	200532877	<MDA	
441-38	200531855	11/22/2005	< MDA	< MDA			
441-39	200531856	11/22/2005	< MDA	< MDA			
441-40	200531857	11/22/2005	< MDA	< MDA			
441-41	200531858	11/22/2005	< MDA	< MDA			
441-42	200531859	11/22/2005	< MDA	< MDA			
441-43	200531860	11/22/2005	< MDA	< MDA			
441-44	200531861	11/22/2005	< MDA	< MDA			
441-45	200531862	11/22/2005	< MDA	< MDA			
441-46	200531863	11/22/2005	< MDA	< MDA			
441-47	200531864	11/22/2005	< MDA	< MDA			
441-48	200531865	11/22/2005	< MDA	< MDA			
441-49	200531866	11/22/2005	< MDA	< MDA			

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-50	200531867	11/22/2005	< MDA	< MDA			
441-51	200531868	11/22/2005	< MDA	< MDA			
441-52	200531869	11/22/2005	< MDA	< MDA			
441-53	200531870	11/22/2005	< MDA	< MDA			
441-54	200531871	11/22/2005	< MDA	< MDA			
441-55	200531872	11/22/2005	< MDA	< MDA			
441-56	200531873	11/22/2005	< MDA	< MDA			
441-57	200531874	11/22/2005	< MDA	< MDA			
441-58	200531875	11/22/2005	< MDA	< MDA			
441-59	200531876	11/22/2005	< MDA	< MDA			
441-60	200531877	11/22/2005	< MDA	< MDA			
441-61	200531878	11/22/2005	< MDA	< MDA			
441-62	200531879	11/22/2005	< MDA	< MDA			
441-63	200531880	11/22/2005	< MDA	< MDA			
441-64	200531881	11/22/2005	< MDA	< MDA			
441-65	200531882	11/22/2005	< MDA	< MDA			
441-66	200531883	11/22/2005	< MDA	< MDA			
441-67	200531884	11/22/2005	< MDA	< MDA			
441-68	200531885	11/22/2005	< MDA	< MDA			
441-69	200531886	11/22/2005	< MDA	< MDA			
441-70	200531887	11/22/2005	< MDA	< MDA			
441-71	200531888	11/22/2005	< MDA	< MDA			
441-72	200531889	11/22/2005	< MDA	< MDA			
441-73	200531890	11/22/2005	< MDA	< MDA			
441-74	200531891	11/22/2005	< MDA	< MDA			
441-75	200531892	11/22/2005	< MDA	< MDA			
441-76	200531893	11/22/2005	< MDA	< MDA			
441-77	200531894	11/22/2005	< MDA	< MDA			
441-78	200531895	11/22/2005	< MDA	< MDA			
441-79	200531896	11/22/2005	< MDA	< MDA			
441-80	200531897	11/22/2005	< MDA	< MDA			
441-81	200531898	11/22/2005	< MDA	< MDA			

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-82	200531899	11/22/2005	< MDA	< MDA			
441-83	200531900	11/22/2005	< MDA	< MDA			
441-84	200531901	11/22/2005	< MDA	< MDA			
441-85	200531902	11/22/2005	< MDA	< MDA			
441-86	200531903	11/22/2005	< MDA	< MDA			
441-87	200531904	11/22/2005	< MDA	< MDA			
441-88	200531905	11/22/2005	< MDA	< MDA			
441-89	200531906	11/22/2005	< MDA	< MDA			
441-90	200531907	11/22/2005	< MDA	< MDA			
441-91	200531908	11/22/2005	< MDA	< MDA			
441-92	200531909	11/22/2005	< MDA	< MDA			
441-93	200531910	11/22/2005	< MDA	< MDA			
441-94	200531911	11/22/2005	< MDA	< MDA			
441-95	200531912	11/22/2005	< MDA	< MDA			
441-96	200531913	11/22/2005	< MDA	< MDA			
441-97	200531914	11/22/2005	< MDA	< MDA			
441-98	200531915	11/22/2005	< MDA	< MDA			
441-99	200531916	11/22/2005	< MDA	< MDA			
441-100	200531917	11/22/2005	< MDA	< MDA			
441-101	200531918	11/22/2005	< MDA	< MDA			
441-102	200531919	11/22/2005	< MDA	< MDA			
441-103	200531920	11/22/2005	< MDA	< MDA			
441-104	200531921	11/22/2005	< MDA	< MDA			
441-105	200531922	11/22/2005	< MDA	< MDA			
441-106	200531923	11/22/2005	< MDA	< MDA			
441-107	200531924	11/22/2005	< MDA	< MDA			
441-108	200531925	11/22/2005	< MDA	< MDA			
441-109	200531926	11/22/2005	< MDA	< MDA			
441-110	200531927	11/22/2005	< MDA	< MDA			
441-111	200531928	11/22/2005	< MDA	< MDA			
441-112	200531929	11/22/2005	< MDA	< MDA			
441-113	200531930	11/22/2005	< MDA	< MDA			

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-114	200531931	11/22/2005	< MDA	< MDA			
441-115	200531932	11/22/2005	< MDA	< MDA			
441-116	200531933	11/22/2005	< MDA	< MDA			
441-117	200531934	11/22/2005	< MDA	< MDA			
441-118	200531935	11/22/2005	< MDA	< MDA			
441-119	200531936	11/22/2005	< MDA	< MDA			
441-120	200531937	11/22/2005	< MDA	< MDA			
1-40 composite		11/22/2005			200531938	N/A	<MDA
41-80 Composite		11/22/2005			200531939	N/A	<MDA
81-120 Composite		11/22/2005			200531940	N/A	<MDA
441-121	200531941	11/23/2005	< MDA	< MDA			
441-122	200531942	11/23/2005	< MDA	< MDA			
441-123	200531943	11/23/2005	< MDA	< MDA			
441-124	200531944	11/23/2005	< MDA	< MDA			
441-125	200531945	11/23/2005	< MDA	< MDA			
441-126	200531946	11/23/2005	< MDA	< MDA			
441-127	200531947	11/23/2005	< MDA	< MDA			
441-128	200531948	11/23/2005	< MDA	< MDA			
441-129	200531949	11/23/2005	< MDA	< MDA			
441-130	200531950	11/23/2005	< MDA	< MDA			
441-131	200531951	11/23/2005	< MDA	< MDA			
441-132	200531952	11/23/2005	< MDA	< MDA			
441-133	200531953	11/23/2005	< MDA	< MDA			
441-134	200531954	11/23/2005	< MDA	< MDA			
441-135	200531955	11/23/2005	< MDA	< MDA			
441-136	200531956	11/23/2005	< MDA	< MDA			
441-137	200531957	11/23/2005	< MDA	< MDA			
441-138	200531958	11/23/2005	< MDA	< MDA			
441-139	200531959	11/23/2005	< MDA	< MDA			
441-140	200531960	11/23/2005	< MDA	< MDA			
441-141	200531961	11/23/2005	< MDA	< MDA			
441-142	200531962	11/23/2005	< MDA	< MDA			

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-143	200531963	11/23/2005	< MDA	< MDA			
441-144	200531964	11/23/2005	< MDA	< MDA			
441-145	200531965	11/23/2005	< MDA	< MDA			
441-146	200531966	11/23/2005	< MDA	< MDA			
441-147	200531967	11/23/2005	< MDA	< MDA			
441-148	200531968	11/23/2005	< MDA	< MDA			
441-149	200531969	11/23/2005	< MDA	< MDA			
441-150	200531970	11/23/2005	< MDA	< MDA			
441-151	200531971	11/23/2005	< MDA	< MDA			
441-152	200531972	11/23/2005	< MDA	< MDA			
441-153	200531973	11/23/2005	< MDA	< MDA			
441-154	200531974	11/23/2005	< MDA	< MDA			
441-155	200531975	11/23/2005	< MDA	< MDA			
441-156	200531976	11/23/2005	< MDA	< MDA			
441-157	200531977	11/23/2005	< MDA	< MDA			
441-158	200531978	11/23/2005	< MDA	< MDA			
441-159	200531979	11/23/2005	< MDA	< MDA			
441-160	200531980	11/23/2005	< MDA	< MDA			
441-161	200531981	11/23/2005	< MDA	< MDA			
441-162	200531982	11/23/2005	< MDA	< MDA			
441-163	200531983	11/23/2005	< MDA	< MDA			
441-164	200531984	11/23/2005	< MDA	< MDA			
441-165	200531985	11/23/2005	< MDA	< MDA			
441-166	200531986	11/23/2005	< MDA	< MDA			
441-167	200531987	11/23/2005	< MDA	< MDA			
441-168	200531988	11/23/2005	< MDA	< MDA			
441-169	200531989	11/23/2005	< MDA	< MDA			
441-170	200531990	11/23/2005	< MDA	< MDA			
441-171	200531991	11/23/2005	< MDA	< MDA			
441-172	200531992	11/23/2005	< MDA	< MDA			
441-173	200531993	11/23/2005	< MDA	< MDA			
441-174	200531994	11/23/2005	< MDA	< MDA			

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-175	200531995	11/23/2005	< MDA	< MDA			
441-176	200531996	11/23/2005	< MDA	< MDA			
441-177	200531997	11/23/2005	< MDA	< MDA			
441-178	200531998	11/23/2005	< MDA	< MDA			
441-179	200531999	11/23/2005	< MDA	< MDA			
441-180	200532000	11/23/2005	< MDA	< MDA			
441-181	200532001	11/23/2005	< MDA	< MDA			
441-182	200532002	11/23/2005	< MDA	< MDA			
441-183	200532003	11/23/2005	< MDA	< MDA			
441-184	200532004	11/23/2005	< MDA	< MDA			
441-185	200532005	11/23/2005	< MDA	< MDA			
441-186	200532006	11/23/2005	< MDA	< MDA			
441-187	200532007	11/23/2005	< MDA	< MDA			
441-188	200532008	11/23/2005	< MDA	< MDA			
441-189	200532009	11/23/2005	< MDA	< MDA			
441-190	200532010	11/23/2005	< MDA	< MDA			
441-191	200532011	11/23/2005	< MDA	< MDA			
441-192	200532012	11/23/2005	< MDA	< MDA			
441-193	200532013	11/23/2005	< MDA	< MDA			
441-194	200532014	11/23/2005	< MDA	< MDA			
441-195	200532015	11/23/2005	< MDA	< MDA			
441-196	200532016	11/23/2005	< MDA	< MDA			
441-197	200532017	11/23/2005	< MDA	< MDA			
441-198	200532018	11/23/2005	< MDA	< MDA			
441-199	200532019	11/23/2005	< MDA	< MDA			
441-200	200532020	11/23/2005	< MDA	< MDA			
441-201	200532021	11/23/2005	< MDA	< MDA			
441-202	200532022	11/23/2005	< MDA	< MDA			
441-203	200532023	11/23/2005	< MDA	< MDA			
441-204	200532024	11/23/2005	< MDA	< MDA			
441-205	200532025	11/23/2005	< MDA	< MDA			
441-206	200532026	11/23/2005	< MDA	< MDA			

Room 441 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
441-207	200532027	11/23/2005	< MDA	< MDA			
441-208	200532028	11/23/2005	< MDA	< MDA			
441-209	200532029	11/23/2005	< MDA	< MDA			
441-210	200532030	11/23/2005	< MDA	< MDA			
441-211	200532031	11/23/2005	< MDA	< MDA			
441-212	200532032	11/23/2005	< MDA	< MDA			
441-213	200532033	11/23/2005	< MDA	< MDA	200532880	<MDA	
441-214	200532034	11/23/2005	< MDA	< MDA	200532878	<MDA	
441-215	200532035	11/23/2005	< MDA	< MDA	200532879	<MDA	
441-216	200532036	11/23/2005	< MDA	< MDA			
441-217	200532037	11/23/2005	< MDA	< MDA			
441-218	200532038	11/23/2005	< MDA	< MDA			
441-219	200532039	11/23/2005	< MDA	< MDA			
441-220	200532040	11/23/2005	< MDA	< MDA			
441-221	200532041	11/23/2005	< MDA	< MDA			
441-222	200532042	11/23/2005	< MDA	< MDA			
441-223	200532043	11/23/2005	< MDA	< MDA			
121-155 Composite					200532044	N/A	<MDA
156-190 Composite					200532045	N/A	<MDA
191-223 Composite					200532046	N/A	<MDA

GENERAL LAYOUT
Room 441
717 Delaware St. SE
Mpls MN

46'-0"

Sample Storage

Chemical Hood

Chemical Hood

Radiation Unit
Room 441

Authorized Sewer
Disposal Point

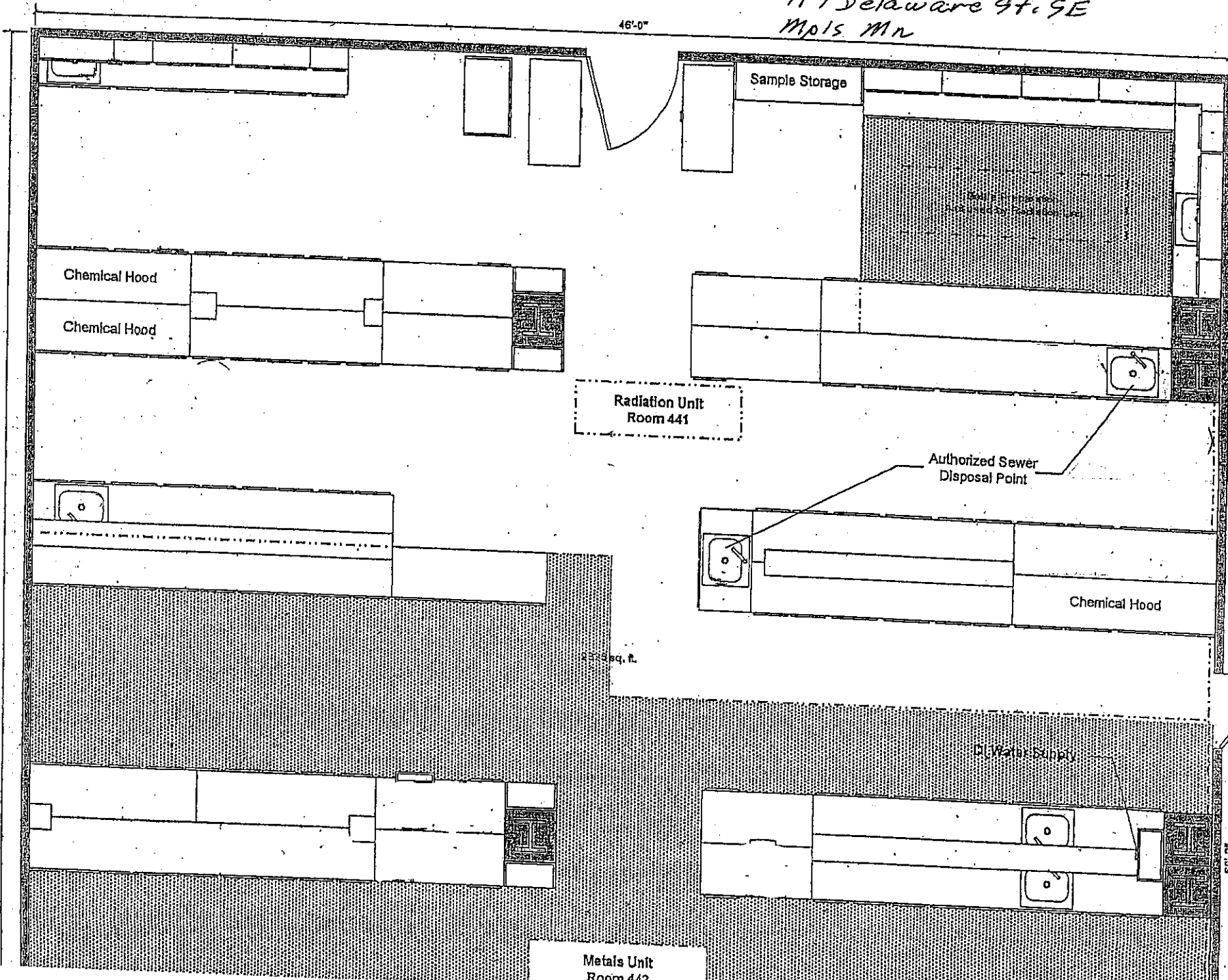
Chemical Hood

2335 sq. ft.

DI Water Supply

Metals Unit
Room 442

60'-0"



NORTH

WIPE LOCATIONS

FLOORS, COUNTERS, SINKS

Room 441 + 442
717 Delaware St. SE
Mpls. MN

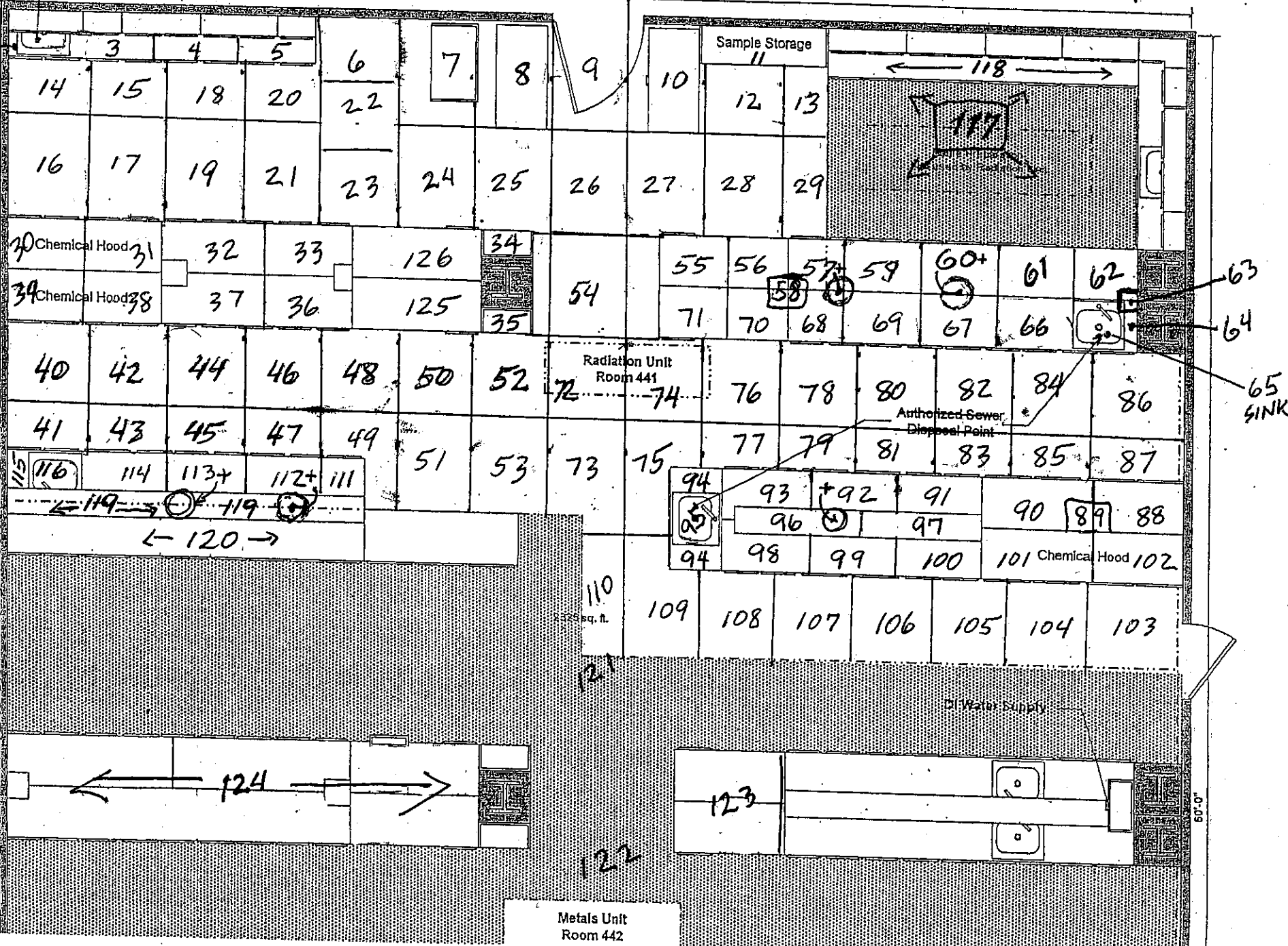
#2 SINK

#1 COUNTER

46'-0"

Sample Storage

118



CAB = CABINET DR = DRAWER

WIPK LOCATIONS

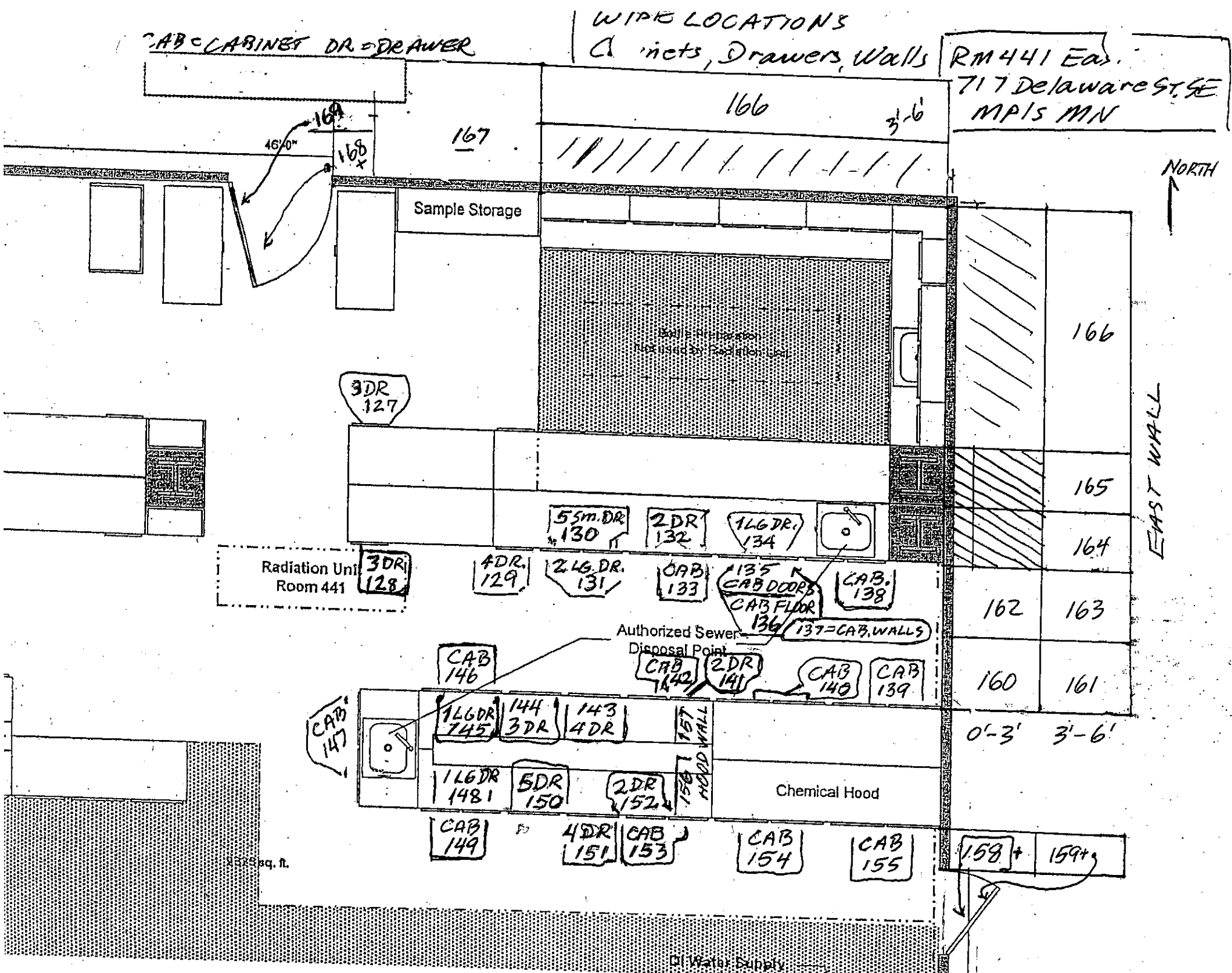
Cabinets, Drawers, Walls

RM 441 East

717 Delaware St. SE
Mpls MN

NORTH

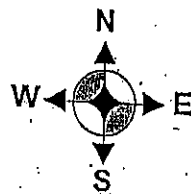
EAST WALL



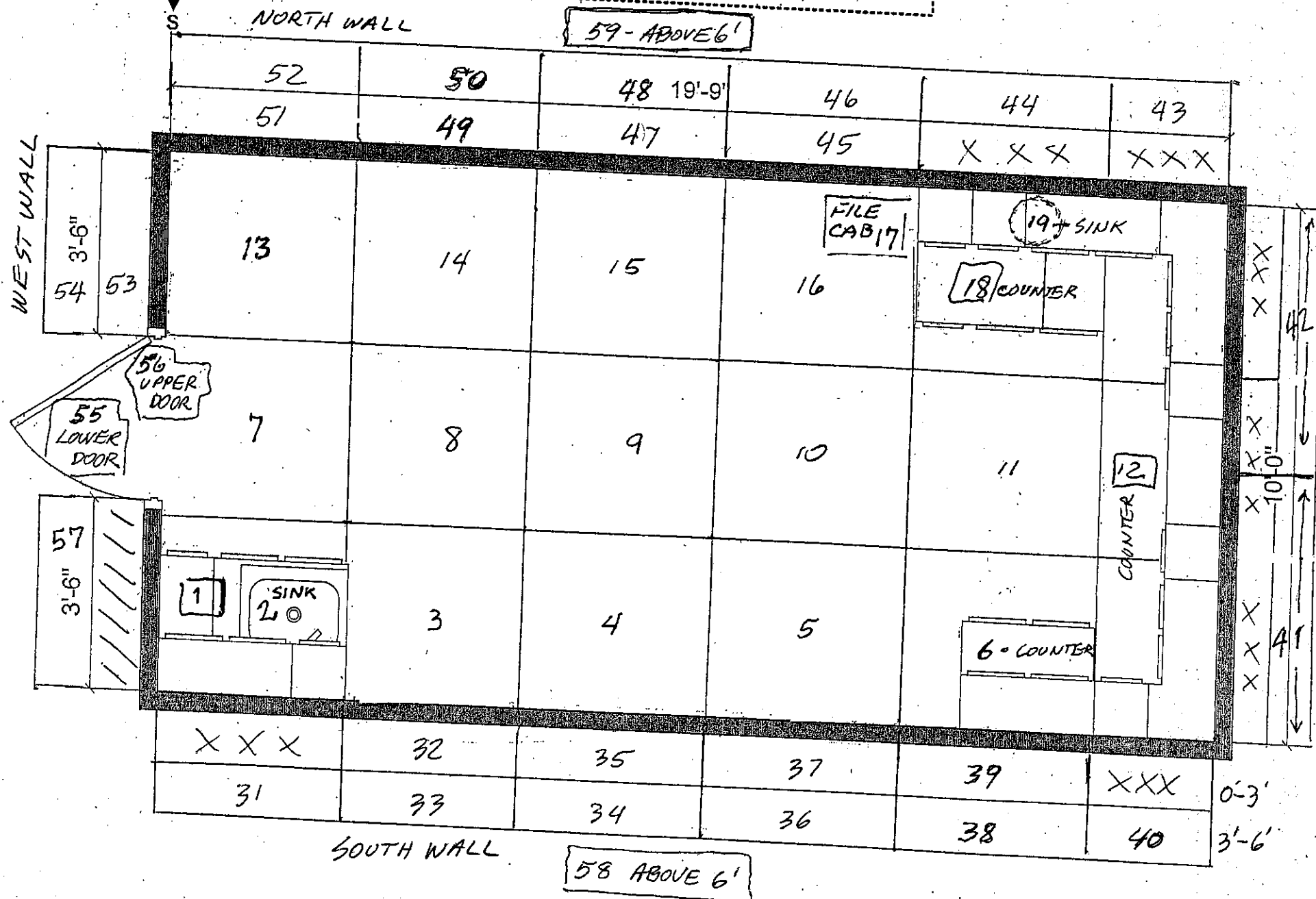
	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α = 7.94 dpm		β = 33.6 dpm	Cs-137= 1357.5 dpm
				β = 7.38 dpm			Eu-154= 5982.2 dpm
							Eu-155= 1130.9 dpm
							Sb-125= 2684.9 dpm
Room 448 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/γ Samp. No.	LSC Results dpm	γ Results dpm
448-1	200531756	11/23/2005	< MDA	< MDA			
448-2	200531757	11/24/2005	< MDA	< MDA			
448-3	200531758	11/25/2005	< MDA	< MDA			
448-4	200531759	11/26/2005	< MDA	< MDA			
448-5	200531760	11/27/2005	< MDA	< MDA			
448-6	200531761	11/28/2005	< MDA	< MDA			
448-7	200531762	11/29/2005	< MDA	< MDA			
448-8	200531763	11/30/2005	< MDA	< MDA			
448-9	200531764	12/1/2005	< MDA	< MDA			
448-10	200531765	12/2/2005	< MDA	< MDA			
448-11	200531766	12/3/2005	< MDA	< MDA			
448-12	200531767	12/4/2005	< MDA	< MDA			
448-13	200531768	12/5/2005	< MDA	< MDA			
448-14	200531769	12/6/2005	< MDA	< MDA			
448-15	200531770	12/7/2005	< MDA	< MDA			
448-16	200531771	12/8/2005	< MDA	< MDA			
448-17	200531772	12/9/2005	< MDA	< MDA			

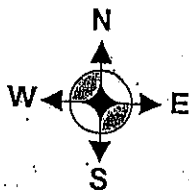
Room 448 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
448-18	200531773	12/10/2005	< MDA	< MDA			
448-19	200531774	12/11/2005	< MDA	< MDA			
448-20	200531775	12/12/2005	< MDA	< MDA			
448-21	200531776	12/13/2005	< MDA	< MDA			
448-22	200531777	12/14/2005	< MDA	< MDA			
448-23	200531778	12/15/2005	< MDA	< MDA			
448-24	200531779	12/16/2005	< MDA	< MDA			
448-25	200531780	12/17/2005	< MDA	< MDA			
448-26	200531781	12/18/2005	< MDA	< MDA			
448-27	200531782	12/19/2005	< MDA	< MDA			
448-28	200531783	12/20/2005	< MDA	< MDA			
448-29	200531784	12/21/2005	< MDA	< MDA			
448-30	200531785	12/22/2005	< MDA	< MDA			
448-31	200531786	12/23/2005	< MDA	< MDA			
448-32	200531787	12/24/2005	< MDA	< MDA			
448-33	200531788	12/25/2005	< MDA	< MDA			
448-34	200531789	12/26/2005	< MDA	< MDA			
448-35	200531790	12/27/2005	< MDA	< MDA			
448-36	200531791	12/28/2005	< MDA	< MDA			
448-37	200531792	12/29/2005	< MDA	< MDA			
448-38	200531793	12/30/2005	< MDA	< MDA			
448-39	200531794	12/31/2005	< MDA	< MDA			
448-40	200531795	1/1/2006	< MDA	< MDA			
448-41	200531796	1/2/2006	< MDA	< MDA			
448-42	200531797	1/3/2006	< MDA	< MDA			
448-43	200531798	1/4/2006	< MDA	< MDA			
448-44	200531799	1/5/2006	< MDA	< MDA			
448-45	200531800	1/6/2006	< MDA	< MDA			
448-46	200531801	1/7/2006	< MDA	< MDA			
448-47	200531802	1/8/2006	< MDA	< MDA			
448-48	200531803	1/9/2006	< MDA	< MDA			
448-49	200531804	1/10/2006	< MDA	< MDA			

Room 448 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
448-50	200531805	1/11/2006	< MDA	< MDA			
448-51	200531806	1/12/2006	< MDA	< MDA			
448-52	200531807	1/13/2006	< MDA	< MDA			
448-53	200531808	1/14/2006	< MDA	< MDA			
448-54	200531809	1/15/2006	< MDA	< MDA			
448-55	200531810	1/16/2006	< MDA	< MDA			
448-56	200531811	1/17/2006	< MDA	< MDA			
448-57	200531812	1/18/2006	< MDA	< MDA			
448-58	200531813	1/19/2006	< MDA	< MDA			
448-59	200531814	1/20/2006	< MDA	< MDA			
448-60	200531815	1/21/2006	< MDA	< MDA			
1-30 Composite		1/22/2006			200531816	N/A	<MDA
31-60 Composite		1/23/2006			200531817	N/A	<MDA

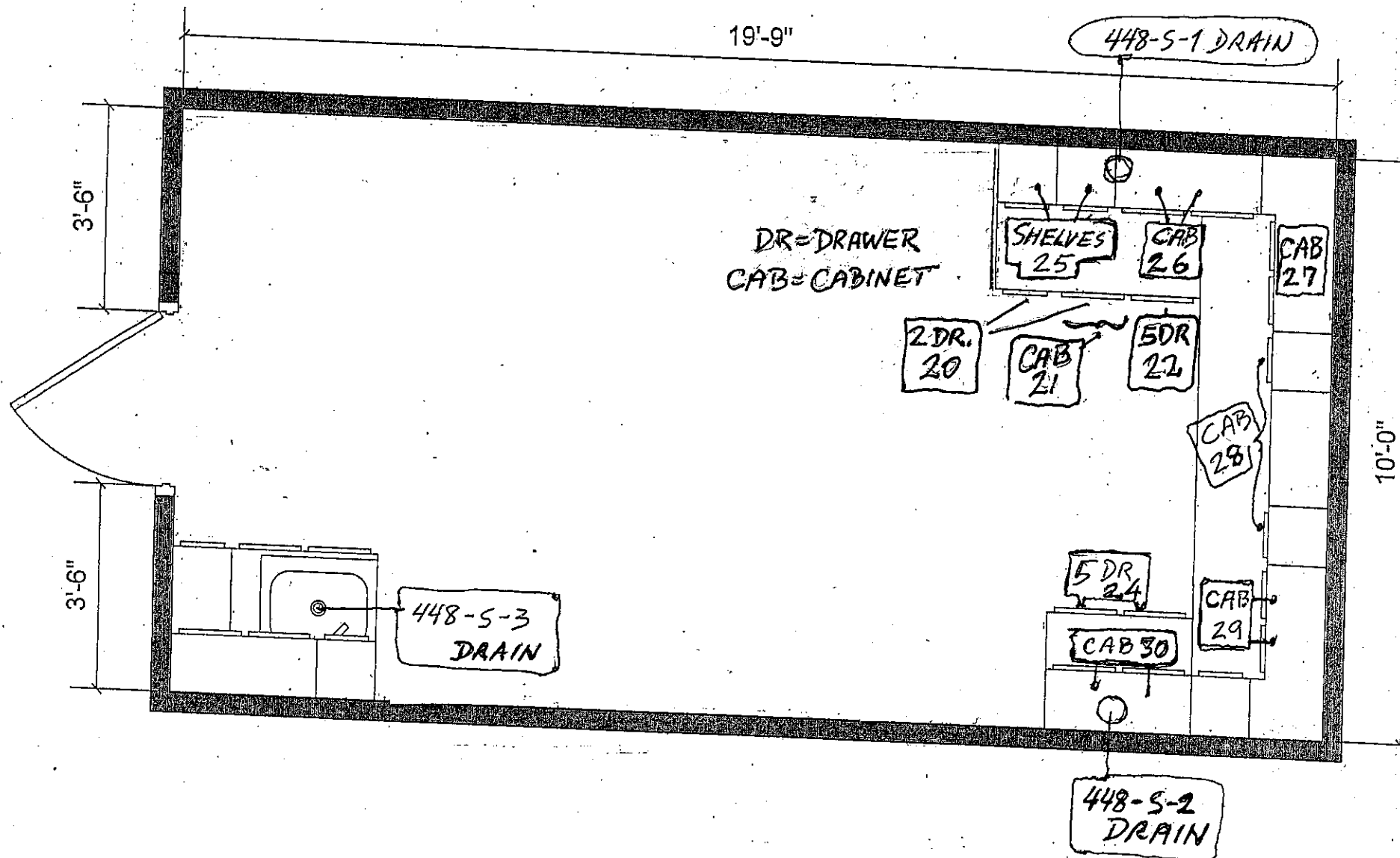


Room 448 Wipe Locations
717 DELAWARE ST. S.E.
MPLS. MN





Room 448 Wipe Locations
717 DELAWARE ST. SE.
MPLS. MN
SHELVES, CABINETS, DRAINS



Radiation Wipe Sample Results							
Minnesota Dept. Health							
Public Health Laboratory							
717 Delaware St. S.E., Mpls. MN							
				Minimum Detectable Activity			
				α/β Counter		L.S.C.	Gamma
				α = N/A		β = 33.6 dpm	Cs-137= N/A
				β = N/A			Eu-154= N/A
							Eu-155= N/A
							Sb-125= N/A
Room 519D -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519D-1		12/7/2005	N/A	N/A	200533231	<MDA	
519D-2		12/7/2005	N/A	N/A	200533232	<MDA	
519D-3		12/7/2005	N/A	N/A	200533233	<MDA	
519D-4		12/7/2005	N/A	N/A	200533234	<MDA	
519D-5		12/7/2005	N/A	N/A	200533235	<MDA	
519D-6		12/7/2005	N/A	N/A	200533236	<MDA	
519D-7		12/7/2005	N/A	N/A	200533237	<MDA	
519D-8		12/7/2005	N/A	N/A	200533238	<MDA	
519D-9		12/7/2005	N/A	N/A	200533239	<MDA	
519D-10		12/7/2005	N/A	N/A	200533240	<MDA	
519D-11		12/7/2005	N/A	N/A	200533241	<MDA	
519D-12		12/7/2005	N/A	N/A	200533242	<MDA	
519D-13		12/7/2005	N/A	N/A	200533243	<MDA	
519D-14		12/7/2005	N/A	N/A	200533244	<MDA	
519D-15		12/7/2005	N/A	N/A	200533245	<MDA	
519D-16		12/7/2005	N/A	N/A	200533246	<MDA	
519D-17		12/7/2005	N/A	N/A	200533247	<MDA	

Room 519D -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519D-18		12/7/2005	N/A	N/A	200533248	<MDA	
519D-19		12/7/2005	N/A	N/A	200533249	<MDA	
519D-20		12/7/2005	N/A	N/A	200533250	<MDA	
519D-21		12/7/2005	N/A	N/A	200533251	<MDA	
519D-22		12/7/2005	N/A	N/A	200533252	<MDA	
519D-23		12/7/2005	N/A	N/A	200533253	<MDA	
519D-24		12/7/2005	N/A	N/A	200533254	<MDA	
519D-25		12/7/2005	N/A	N/A	200533255	<MDA	
519D-26		12/7/2005	N/A	N/A	200533256	<MDA	
519D-27		12/7/2005	N/A	N/A	200533257	<MDA	
519D-28		12/7/2005	N/A	N/A	200533258	<MDA	
519D-29		12/7/2005	N/A	N/A	200533259	<MDA	
519D-30		12/7/2005	N/A	N/A	200533260	<MDA	
519D-31		12/7/2005	N/A	N/A	200533261	<MDA	
519D-32		12/7/2005	N/A	N/A	200533262	<MDA	
519D-33		12/7/2005	N/A	N/A	200533263	<MDA	
519D-34		12/7/2005	N/A	N/A	200533264	<MDA	
519D-35		12/7/2005	N/A	N/A	200533265	<MDA	
519D-36		12/7/2005	N/A	N/A	200533266	<MDA	
519D-37		12/7/2005	N/A	N/A	200533267	<MDA	
519D-38		12/7/2005	N/A	N/A	200533268	<MDA	
519D-39		12/7/2005	N/A	N/A	200533269	<MDA	
519D-40		12/7/2005	N/A	N/A	200533270	<MDA	
519D-41		12/7/2005	N/A	N/A	200533271	<MDA	
519D-42		12/7/2005	N/A	N/A	200533272	<MDA	
519D-43		12/7/2005	N/A	N/A	200533273	<MDA	
519D-44		12/7/2005	N/A	N/A	200533274	<MDA	
519D-45		12/7/2005	N/A	N/A	200533275	<MDA	
519D-46		12/7/2005	N/A	N/A	200533276	<MDA	
519D-47		12/7/2005	N/A	N/A	200533277	<MDA	
519D-48		12/7/2005	N/A	N/A	200533278	<MDA	

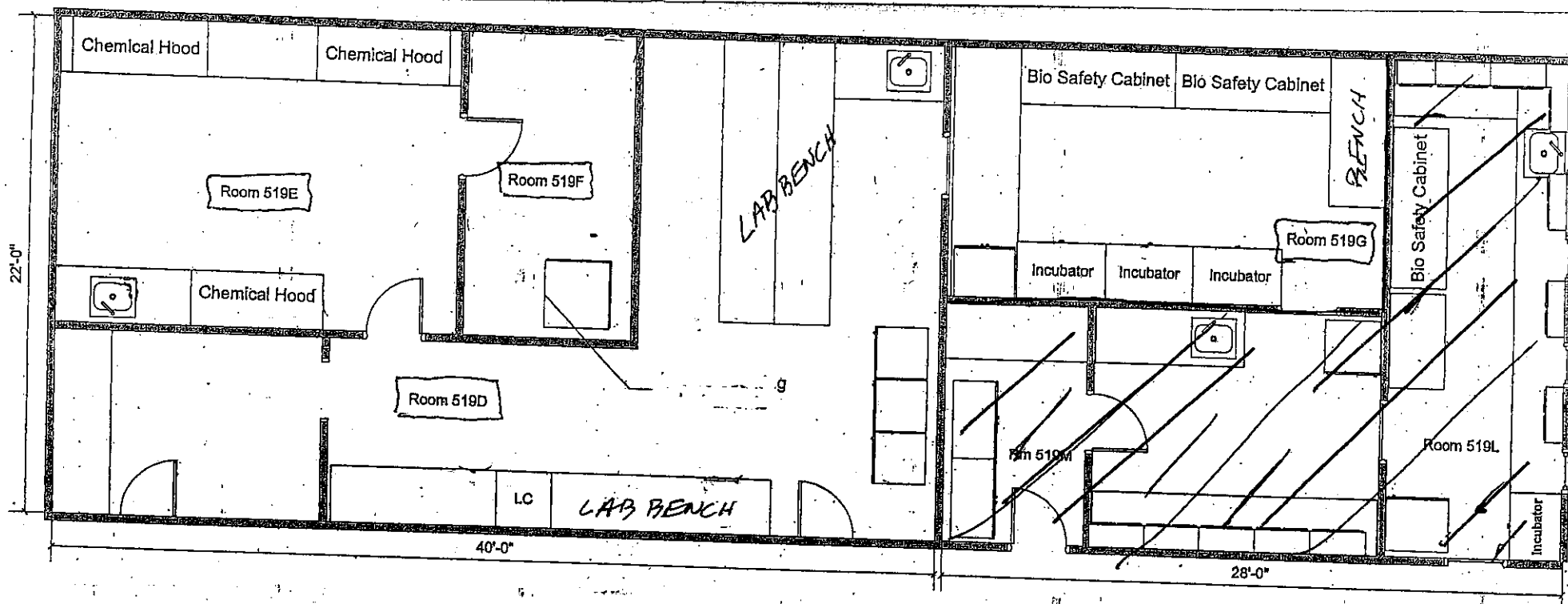
Room 519D -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519D-49		12/7/2005	N/A	N/A	200533279	<MDA	
519D-50		12/7/2005	N/A	N/A	200533280	<MDA	
519D-51		12/7/2005	N/A	N/A	200533281	<MDA	
519D-52		12/7/2005	N/A	N/A	200533282	<MDA	
519D-53		12/7/2005	N/A	N/A	200533283	<MDA	
519D-54		12/7/2005	N/A	N/A	200533284	<MDA	
519D-55		12/7/2005	N/A	N/A	200533285	<MDA	
519D-56		12/7/2005	N/A	N/A	200533286	<MDA	
519D-57		12/7/2005	N/A	N/A	200533287	<MDA	
519D-58		12/7/2005	N/A	N/A	200533288	<MDA	
519D-59		12/7/2005	N/A	N/A	200533289	<MDA	
519D-60		12/7/2005	N/A	N/A	200533290	<MDA	
519D-61		12/7/2005	N/A	N/A	200533291	<MDA	
519D-62		12/7/2005	N/A	N/A	200533292	<MDA	
519D-63		12/7/2005	N/A	N/A	200533293	<MDA	
519D-64		12/7/2005	N/A	N/A	200533294	<MDA	
519D-65		12/7/2005	N/A	N/A	200533295	<MDA	
519D-66		12/8/2005	N/A	N/A	200533296	<MDA	
519D-67		12/8/2005	N/A	N/A	200533297	<MDA	
519D-68		12/8/2005	N/A	N/A	200533298	<MDA	
519D-69		12/8/2005	N/A	N/A	200533299	<MDA	
519D-70		12/8/2005	N/A	N/A	200533300	<MDA	
519D-71		12/8/2005	N/A	N/A	200533301	<MDA	
519D-72		12/8/2005	N/A	N/A	200533302	<MDA	
519D-73		12/8/2005	N/A	N/A	200533303	<MDA	
519D-74		12/8/2005	N/A	N/A	200533304	<MDA	
519D-75		12/8/2005	N/A	N/A	200533305	<MDA	
519D-76		12/8/2005	N/A	N/A	200533306	<MDA	
519D-77		12/8/2005	N/A	N/A	200533307	<MDA	
519D-78		12/8/2005	N/A	N/A	200533308	<MDA	
519D-79		12/8/2005	N/A	N/A	200533309	<MDA	

Room 519D -- Results for wipe samples -- Analyzed for C-14

Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519D-80		12/8/2005	N/A	N/A	200533310	<MDA	
519D-81		12/8/2005	N/A	N/A	200533311	<MDA	
519D-82		12/8/2005	N/A	N/A	200533312	<MDA	
519D-83		12/8/2005	N/A	N/A	200533313	<MDA	
519D-84		12/8/2005	N/A	N/A	200533314	<MDA	
519D-85		12/8/2005	N/A	N/A	200533315	<MDA	
519D-86		12/8/2005	N/A	N/A	200533316	<MDA	
519D-87		12/8/2005	N/A	N/A	200533317	<MDA	
519D-88		12/8/2005	N/A	N/A	200533318	<MDA	
519D-89		12/8/2005	N/A	N/A	200533319	<MDA	
519D-90		12/8/2005	N/A	N/A	200533320	<MDA	
519D-91		12/8/2005	N/A	N/A	200533321	<MDA	
519D-92		12/8/2005	N/A	N/A	200533322	<MDA	
519D-93		12/8/2005	N/A	N/A	200533323	<MDA	
519D-94		12/8/2005	N/A	N/A	200533324	<MDA	
519D-95		12/8/2005	N/A	N/A	200533325	<MDA	
519D-96		12/8/2005	N/A	N/A	200533326	<MDA	
519D-97		12/8/2005	N/A	N/A	200533327	<MDA	
519D-98		12/8/2005	N/A	N/A	200533328	<MDA	
519D-99		12/8/2005	N/A	N/A	200533329	<MDA	
519D-100		12/8/2005	N/A	N/A	200533330	<MDA	
519D-101		12/8/2005	N/A	N/A	200533331	<MDA	
519D-102		12/8/2005	N/A	N/A	200533332	<MDA	
519D-103		12/8/2005	N/A	N/A	200533333	<MDA	
519D-104		12/8/2005	N/A	N/A	200533334	<MDA	
519D-105		12/8/2005	N/A	N/A	200533335	<MDA	
519D-106		12/8/2005	N/A	N/A	200533336	<MDA	
519D-107		12/8/2005	N/A	N/A	200533337	<MDA	
519D-108		12/8/2005	N/A	N/A	200533338	<MDA	
519D-109		12/8/2005	N/A	N/A	200533339	<MDA	
519D-110		12/8/2005	N/A	N/A	200533340	<MDA	

Room 519D -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519D-111		12/8/2005	N/A	N/A	200533341	<MDA	

GENERAL LAYOUT - ROOMS 519 D, E, F, G
717 DELAWARE ST SE
MPLS MN

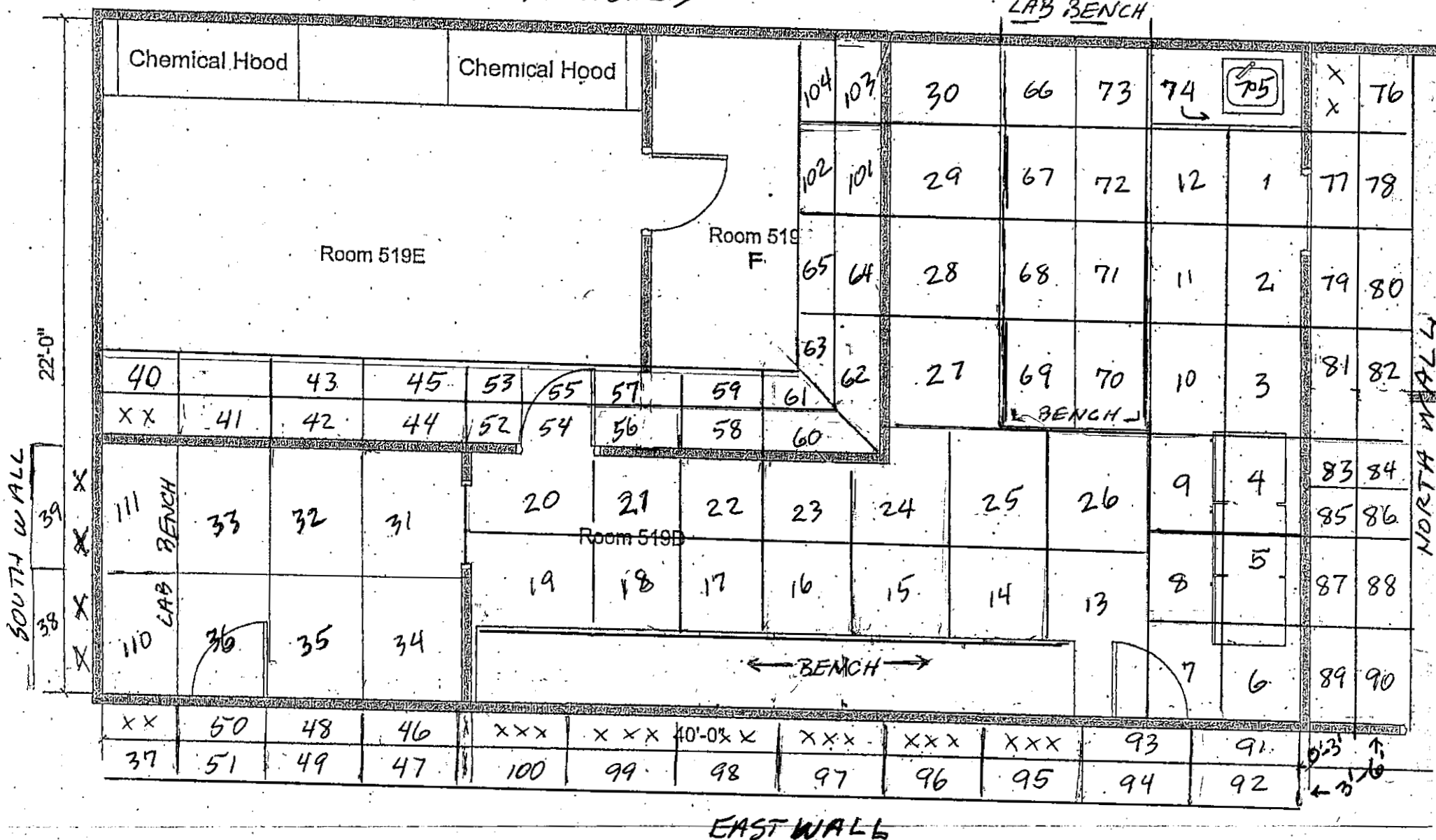


WIPE LOCATIONS

Room 519
717 Delaware St. S.E.
Mpls. Mn.

→ NORTH

FLOORS, WALLS, BENCHES



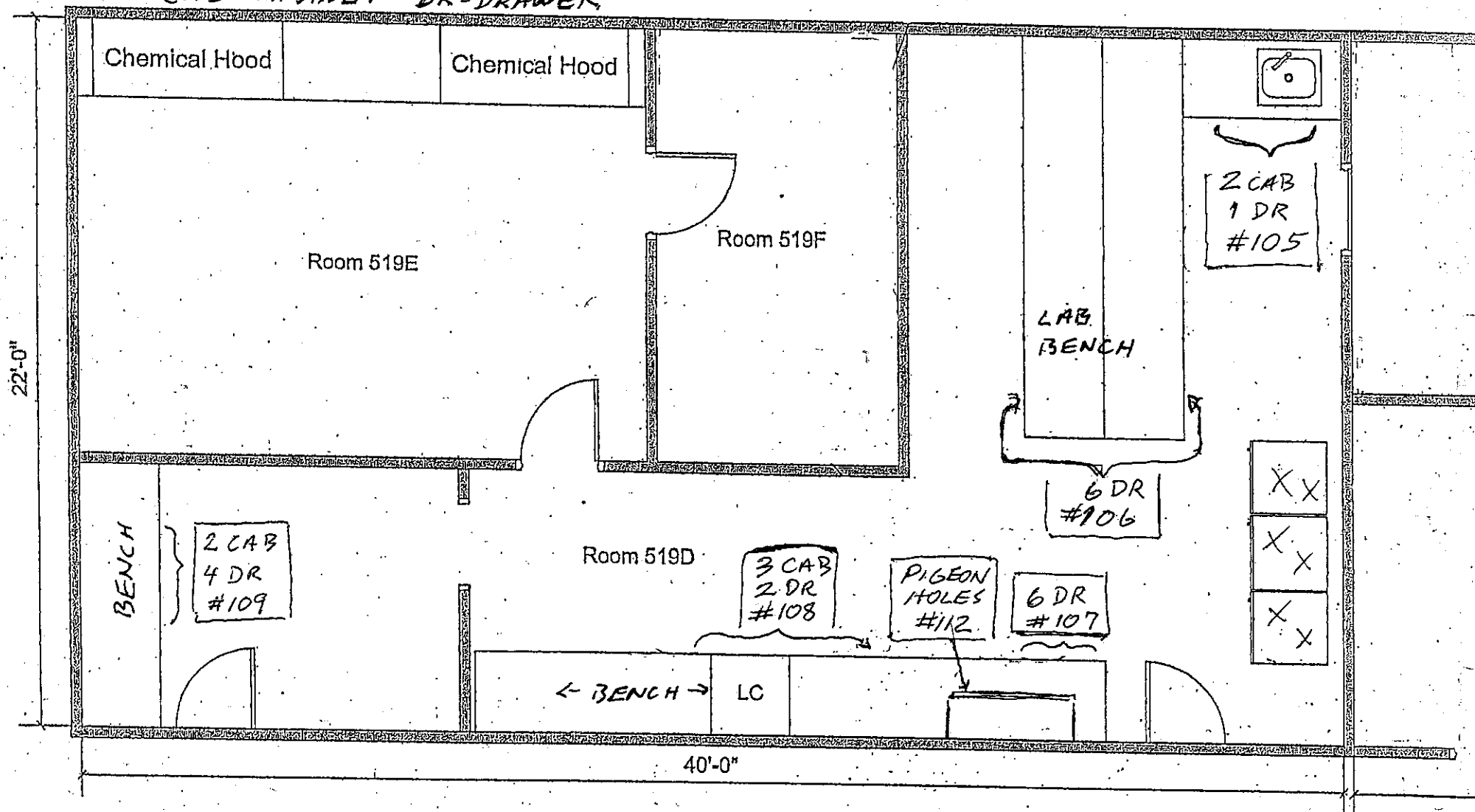
Room 519 D

717 Delaware St SE
Mpls. MN

WIPE
LOCATIONS

CAB = CABINET DR = DRAWER

→ NORTH



Wipe of Sink in 519E
Recount of Split Sample

Count #	Sample A dpm	Sample B dpm	Total dpm	NRC C-14 Guideline
1	7657	3659	11316	3.67E+06
2	7581	3707	11288	3.67E+06
3	7521	3618	11139	3.67E+06
4	7743	3658	11401	3.67E+06
5	7667	3605	11272	3.67E+06
Mean dpm			11283.2	

Close-out survey
717 Delaware St.
Minneapolis, MN

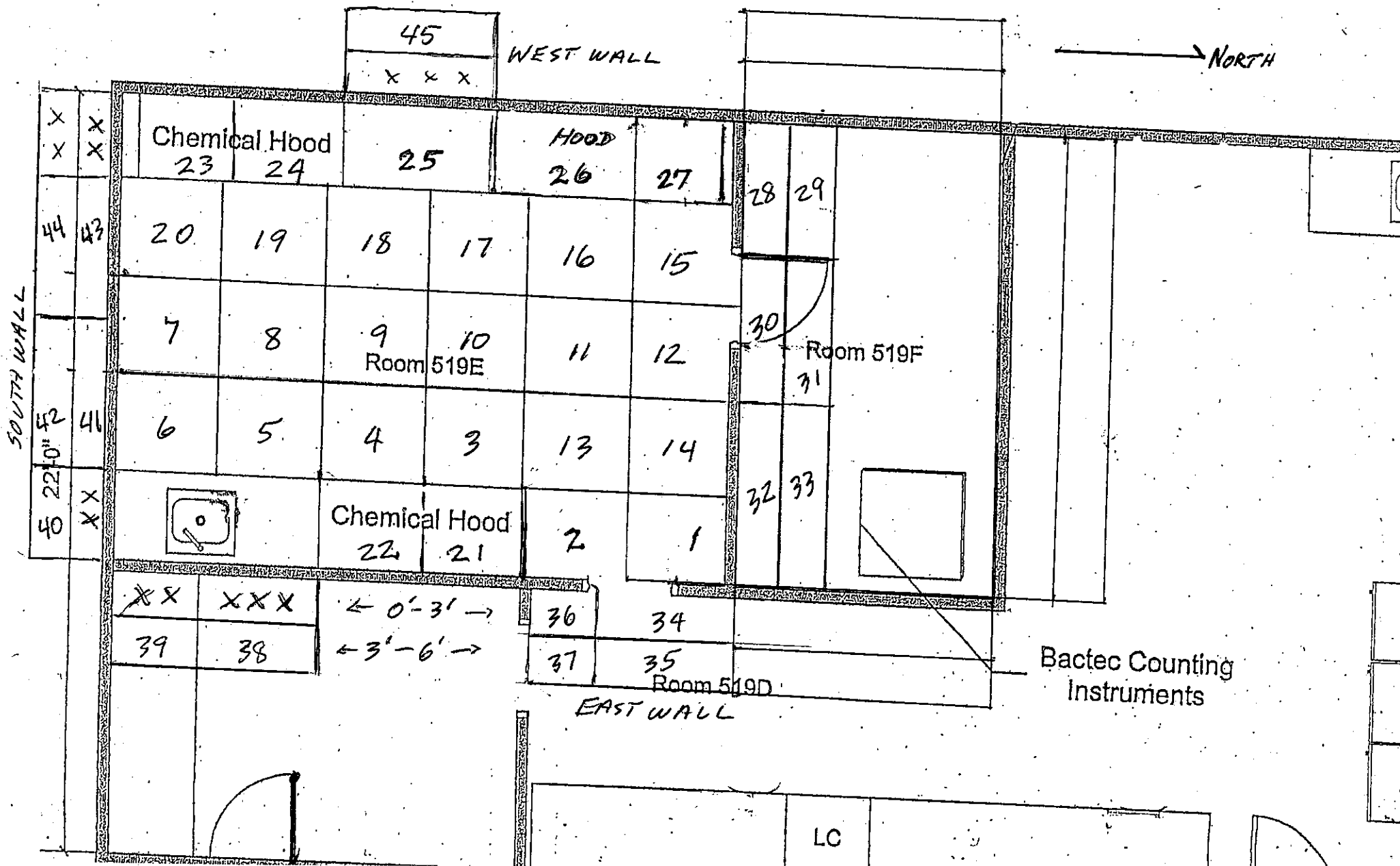
	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α= N/A		β= 33.6 dpm	Cs-137= N/A
				b= N/A			Eu-154= N/A
							Eu-155= N/A
							Sb-125= N/A
Room 519E -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519E-1		12/7/2005	N/A	N/A	200533345	<MDA	
519E-2		12/7/2005	N/A	N/A	200533346	<MDA	
519E-3		12/7/2005	N/A	N/A	200533347	<MDA	
519E-4		12/7/2005	N/A	N/A	200533348	<MDA	
519E-5		12/7/2005	N/A	N/A	200533349	<MDA	
519E-6		12/7/2005	N/A	N/A	200533350	<MDA	
519E-7		12/7/2005	N/A	N/A	200533351	46.30	
519E-8		12/7/2005	N/A	N/A	200533352	<MDA	
519E-9		12/7/2005	N/A	N/A	200533353	<MDA	
519E-10		12/7/2005	N/A	N/A	200533354	<MDA	
519E-11		12/7/2005	N/A	N/A	200533355	<MDA	
519E-12		12/7/2005	N/A	N/A	200533356	<MDA	
519E-13		12/7/2005	N/A	N/A	200533357	<MDA	
519E-14		12/7/2005	N/A	N/A	200533358	<MDA	
519E-15		12/7/2005	N/A	N/A	200533359	102.58	
519E-16		12/7/2005	N/A	N/A	200533360	<MDA	
519E-17		12/7/2005	N/A	N/A	200533361	<MDA	

Room 519E -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519E-18		12/7/2005	N/A	N/A	200533362	<MDA	
519E-19		12/7/2005	N/A	N/A	200533363	<MDA	
519E-20		12/7/2005	N/A	N/A	200533364	<MDA	
519E-21		12/7/2005	N/A	N/A	200533365	100.50	
519E-22		12/7/2005	N/A	N/A	200533366	52.22	
519E-23		12/7/2005	N/A	N/A	200533367	<MDA	
519E-24		12/7/2005	N/A	N/A	200533368	<MDA	
519E-25		12/7/2005	N/A	N/A	200533369	<MDA	
519E-26		12/7/2005	N/A	N/A	200533370	<MDA	
519E-27		12/7/2005	N/A	N/A	200533371	<MDA	
519E-28		12/7/2005	N/A	N/A	200533372	<MDA	
519E-29		12/7/2005	N/A	N/A	200533373	<MDA	
519E-30		12/7/2005	N/A	N/A	200533374	<MDA	
519E-31		12/7/2005	N/A	N/A	200533375	<MDA	
519E-32		12/7/2005	N/A	N/A	200533376	<MDA	
519E-33		12/7/2005	N/A	N/A	200533377	<MDA	
519E-34		12/7/2005	N/A	N/A	200533378	<MDA	
519E-35		12/7/2005	N/A	N/A	200533379	<MDA	
519E-36		12/7/2005	N/A	N/A	200533380	<MDA	
519E-37		12/7/2005	N/A	N/A	200533381	<MDA	
519E-38		12/7/2005	N/A	N/A	200533382	<MDA	
519E-39		12/7/2005	N/A	N/A	200533383	<MDA	
519E-40		12/7/2005	N/A	N/A	200533384	<MDA	
519E-41		12/7/2005	N/A	N/A	200533385	<MDA	
519E-42		12/7/2005	N/A	N/A	200533386	<MDA	
519E-43		12/7/2005	N/A	N/A	200533387	<MDA	
519E-44		12/7/2005	N/A	N/A	200533388	<MDA	
519E-45		12/7/2005	N/A	N/A	200533389	<MDA	
519E-46		12/8/2005	N/A	N/A	200533390	<MDA	
519E-47		12/8/2005	N/A	N/A	200533391	<MDA	
519E-48		12/8/2005	N/A	N/A	200533392	<MDA	

Room 519E -- Results for wipe samples -- Analyzed for C-14							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 LSC Results dpm	γ Results dpm
519E-49		12/8/2005	N/A	N/A	200533393	<MDA	
519E-50		12/8/2005	N/A	N/A	200533394	<MDA	
519E-51		12/8/2005	N/A	N/A	200533395	<MDA	
519E-52		12/8/2005	N/A	N/A	200533396	<MDA	
519E-53		12/8/2005	N/A	N/A	200533397	<MDA	
519E-54		12/8/2005	N/A	N/A	200533398	<MDA	
519E-55		12/8/2005	N/A	N/A	200533399	146.81	
519E-56 - Drain		12/8/2005	N/A	N/A	200533400	11348.50	
519E East Hood		12/13/2005	N/A	N/A	200533527	<MDA	

WIPE LOCATIONS
FLOORS, WALLS, HOODS

Room 519 E
717 Delaware St. S.E.
Mpls. MN

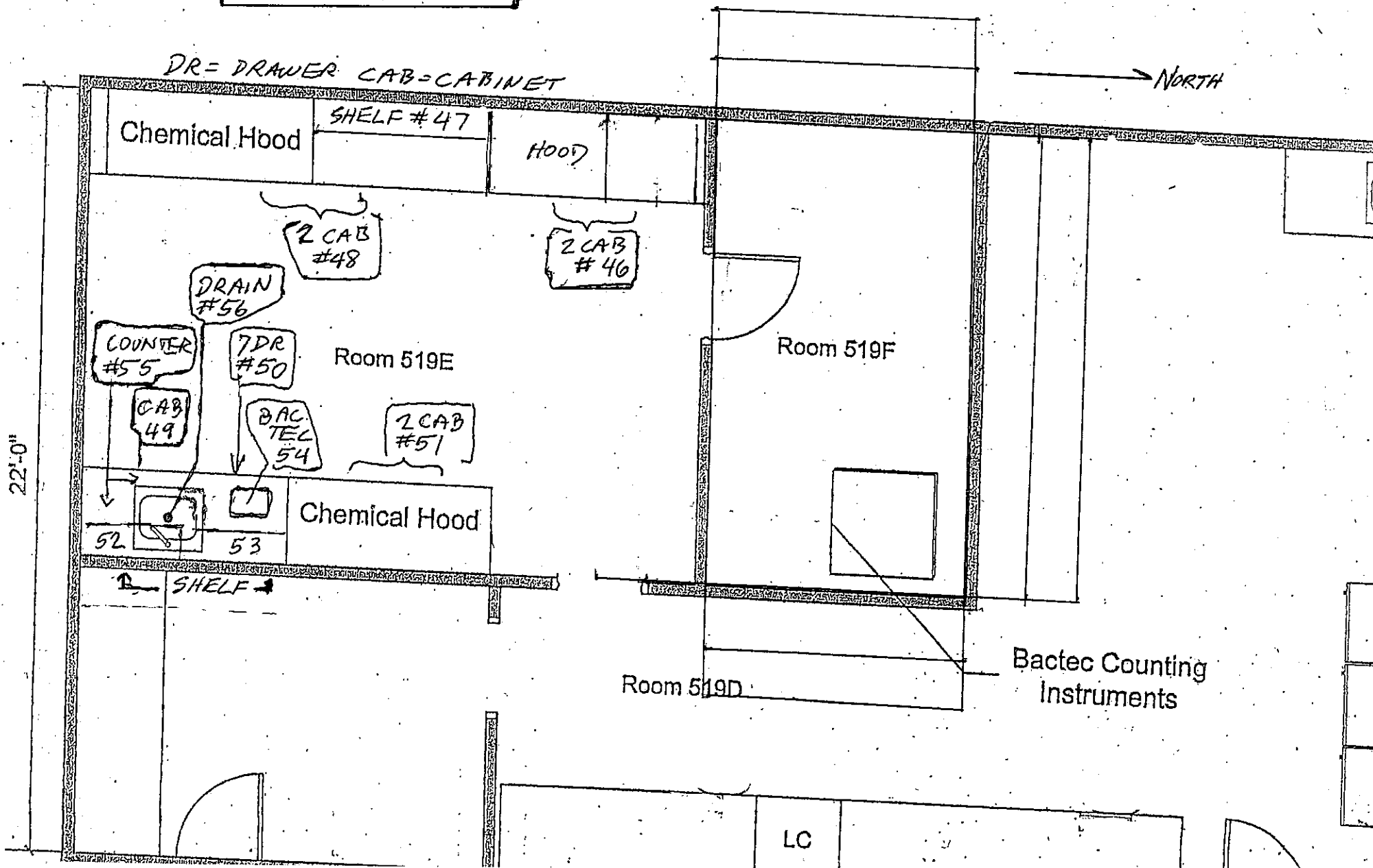


WIPE
LOCATIONS
DRAWERS
CABINETS

RM. 519E
717 DELAWARE ST SE
MPLS MN.

DR = DRAWER CAB = CABINET

NORTH



	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α = N/A		β = 33.6 dpm	Cs-137= N/A
				β = N/A			Eu-154= N/A
							Eu-155= N/A
							Sb-125= N/A
Room 519F -- Results for wipe samples - C-14 Analysis							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 Analysis LSC Results dpm	γ Results dpm
519F-1		12/8/2005	N/A	N/A	200533197	<MDA	
519F-2		12/8/2005	N/A	N/A	200533198	<MDA	
519F-3		12/8/2005	N/A	N/A	200533199	<MDA	
519F-4		12/8/2005	N/A	N/A	200533200	<MDA	
519F-5		12/8/2005	N/A	N/A	200533201	<MDA	
519F-6		12/8/2005	N/A	N/A	200533202	<MDA	
519F-7		12/8/2005	N/A	N/A	200533203	<MDA	
519F-8		12/8/2005	N/A	N/A	200533204	<MDA	
519F-9		12/8/2005	N/A	N/A	200533205	<MDA	
519F-10		12/8/2005	N/A	N/A	200533206	<MDA	
519F-11		12/8/2005	N/A	N/A	200533207	<MDA	
519F-12		12/8/2005	N/A	N/A	200533208	<MDA	
519F-13		12/8/2005	N/A	N/A	200533209	<MDA	
519F-14		12/8/2005	N/A	N/A	200533210	<MDA	
519F-15		12/8/2005	N/A	N/A	200533211	<MDA	
519F-16		12/8/2005	N/A	N/A	200533212	<MDA	
519F-17		12/8/2005	N/A	N/A	200533213	<MDA	

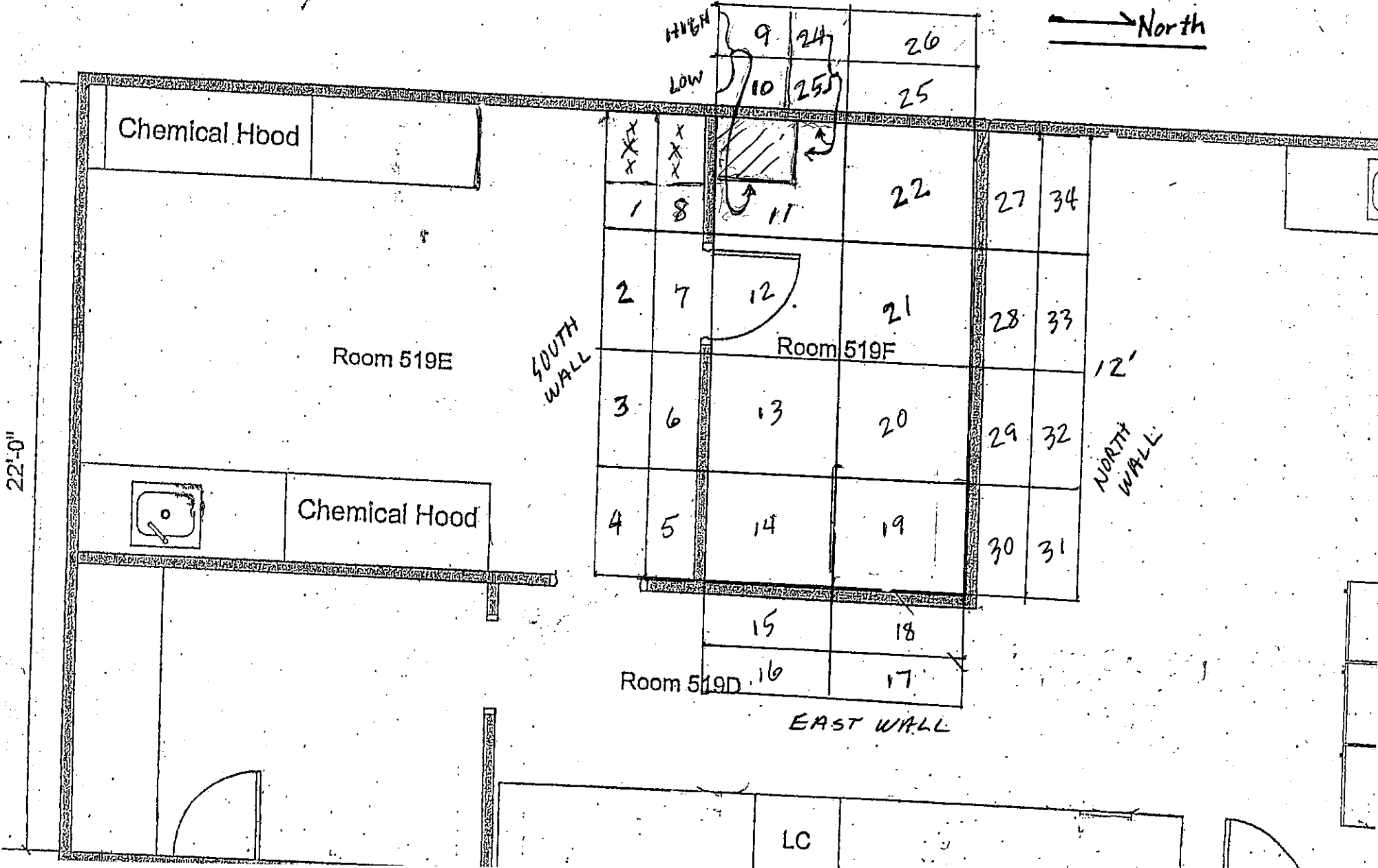
Room 519F -- Results for wipe samples - C-14 Analysis										
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 Analysis LSC Results dpm	γ Results dpm			
519F-18		12/8/2005	N/A	N/A	200533214	<MDA				
519F-19		12/8/2005	N/A	N/A	200533215	<MDA				
519F-20		12/8/2005	N/A	N/A	200533216	<MDA				
519F-21		12/8/2005	N/A	N/A	200533217	<MDA				
519F-22		12/8/2005	N/A	N/A	200533218	<MDA				
519F-23		12/8/2005	N/A	N/A	200533219	<MDA				
519F-24		12/8/2005	N/A	N/A	200533220	<MDA				
519F-25		12/8/2005	N/A	N/A	200533221	<MDA				
519F-26		12/8/2005	N/A	N/A	200533222	<MDA				
519F-27		12/8/2005	N/A	N/A	200533223	<MDA				
519F-28		12/8/2005	N/A	N/A	200533224	<MDA				
519F-29		12/8/2005	N/A	N/A	200533225	<MDA				
519F-30		12/8/2005	N/A	N/A	200533226	<MDA				
519F-31		12/8/2005	N/A	N/A	200533227	<MDA				
519F-32		12/14/2005	N/A	N/A	200533579	<MDA				
519F-33		12/14/2005	N/A	N/A	200533580	<MDA				
519F-34		12/14/2005	N/A	N/A	200533581	<MDA				

WIPE
LOCATIONS

Room 519F
717 Delaware St. S.E.
Mpls MN

6'10" WEST WALL

→ North



Radiation Wipe Sample Results							
Minnesota Dept. Health							
Public Health Laboratory							
717 Delaware St. S.E., Mpls. MN							
				Minimum Detectable Activity			
				α/β Counter		L.S.C.	Gamma
				α = N/A		β = 33.6 dpm	Cs-137= N/A
				β = N/A			Eu-154= N/A
							Eu-155= N/A
							Sb-125= N/A
Room 519G -- Results for wipe samples - C-14 Analysis							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 Analysis LSC Results dpm	γ Results dpm
519G-1		12/8/2005	N/A	N/A	200533128	< MDA	
519G-2		12/8/2005	N/A	N/A	200533129	< MDA	
519G-3		12/8/2005	N/A	N/A	200533130	< MDA	
519G-4		12/8/2005	N/A	N/A	200533131	< MDA	
519G-5		12/8/2005	N/A	N/A	200533132	< MDA	
519G-6		12/8/2005	N/A	N/A	200533133	< MDA	
519G-7		12/8/2005	N/A	N/A	200533134	< MDA	
519G-8		12/8/2005	N/A	N/A	200533135	< MDA	
519G-9		12/8/2005	N/A	N/A	200533136	< MDA	
519G-10		12/8/2005	N/A	N/A	200533137	< MDA	
519G-11		12/8/2005	N/A	N/A	200533138	< MDA	
519G-12		12/8/2005	N/A	N/A	200533139	< MDA	
519G-13		12/8/2005	N/A	N/A	200533140	< MDA	
519G-14		12/8/2005	N/A	N/A	200533141	< MDA	
519G-15		12/8/2005	N/A	N/A	200533142	< MDA	
519G-16		12/8/2005	N/A	N/A	200533143	< MDA	
519G-17		12/8/2005	N/A	N/A	200533144	< MDA	

Room 519G -- Results for wipe samples - C-14 Analysis							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 Analysis LSC Results dpm	γ Results dpm
519G-18		12/8/2005	N/A	N/A	200533145	< MDA	
519G-19		12/8/2005	N/A	N/A	200533146	< MDA	
519G-20		12/8/2005	N/A	N/A	200533147	< MDA	
519G-21		12/8/2005	N/A	N/A	200533148	< MDA	
519G-22		12/8/2005	N/A	N/A	200533149	< MDA	
519G-23		12/8/2005	N/A	N/A	200533150	< MDA	
519G-24		12/8/2005	N/A	N/A	200533151	< MDA	
519G-25		12/8/2005	N/A	N/A	200533152	< MDA	
519G-26		12/8/2005	N/A	N/A	200533153	< MDA	
519G-27		12/8/2005	N/A	N/A	200533154	< MDA	
519G-28		12/8/2005	N/A	N/A	200533155	< MDA	
519G-29		12/8/2005	N/A	N/A	200533156	< MDA	
519G-30		12/8/2005	N/A	N/A	200533157	< MDA	
519G-31		12/8/2005	N/A	N/A	200533158	< MDA	
519G-32		12/8/2005	N/A	N/A	200533159	< MDA	
519G-33		12/8/2005	N/A	N/A	200533160	< MDA	
519G-34		12/8/2005	N/A	N/A	200533161	< MDA	
519G-35		12/8/2005	N/A	N/A	200533162	< MDA	
519G-36		12/8/2005	N/A	N/A	200533163	< MDA	
519G-37		12/8/2005	N/A	N/A	200533164	< MDA	
519G-38		12/8/2005	N/A	N/A	200533165	< MDA	
519G-39		12/8/2005	N/A	N/A	200533166	< MDA	
519G-40		12/8/2005	N/A	N/A	200533167	< MDA	
519G-41		12/8/2005	N/A	N/A	200533168	< MDA	
519G-42		12/8/2005	N/A	N/A	200533169	< MDA	
519G-43		12/8/2005	N/A	N/A	200533170	< MDA	
519G-44		12/8/2005	N/A	N/A	200533171	< MDA	
519G-45		12/8/2005	N/A	N/A	200533172	< MDA	
519G-46		12/8/2005	N/A	N/A	200533173	< MDA	
519G-47		12/8/2005	N/A	N/A	200533174	< MDA	
519G-48		12/8/2005	N/A	N/A	200533175	< MDA	

Room 519G -- Results for wipe samples - C-14 Analysis						
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC Samp. No.	C-14 Analysis LSC Results dpm γ Results dpm
519G-49		12/8/2005	N/A	N/A	200533176	< MDA
519G-50		12/8/2005	N/A	N/A	200533177	< MDA
519G-51		12/8/2005	N/A	N/A	200533178	< MDA
519G-52		12/8/2005	N/A	N/A	200533179	< MDA
519G-53		12/8/2005	N/A	N/A	200533180	< MDA
519G-54		12/8/2005	N/A	N/A	200533181	< MDA
519G-55		12/8/2005	N/A	N/A	200533182	< MDA



WIPE LOCATIONS
Room 519G
717 DELAWARE ST. SE.
MPLS MN

WEST WALL

CAB=CABINET
DR=DRAWER
→ NORTH

SOUTH WALL

NORTH WALL

EAST WALL

Rm 519M

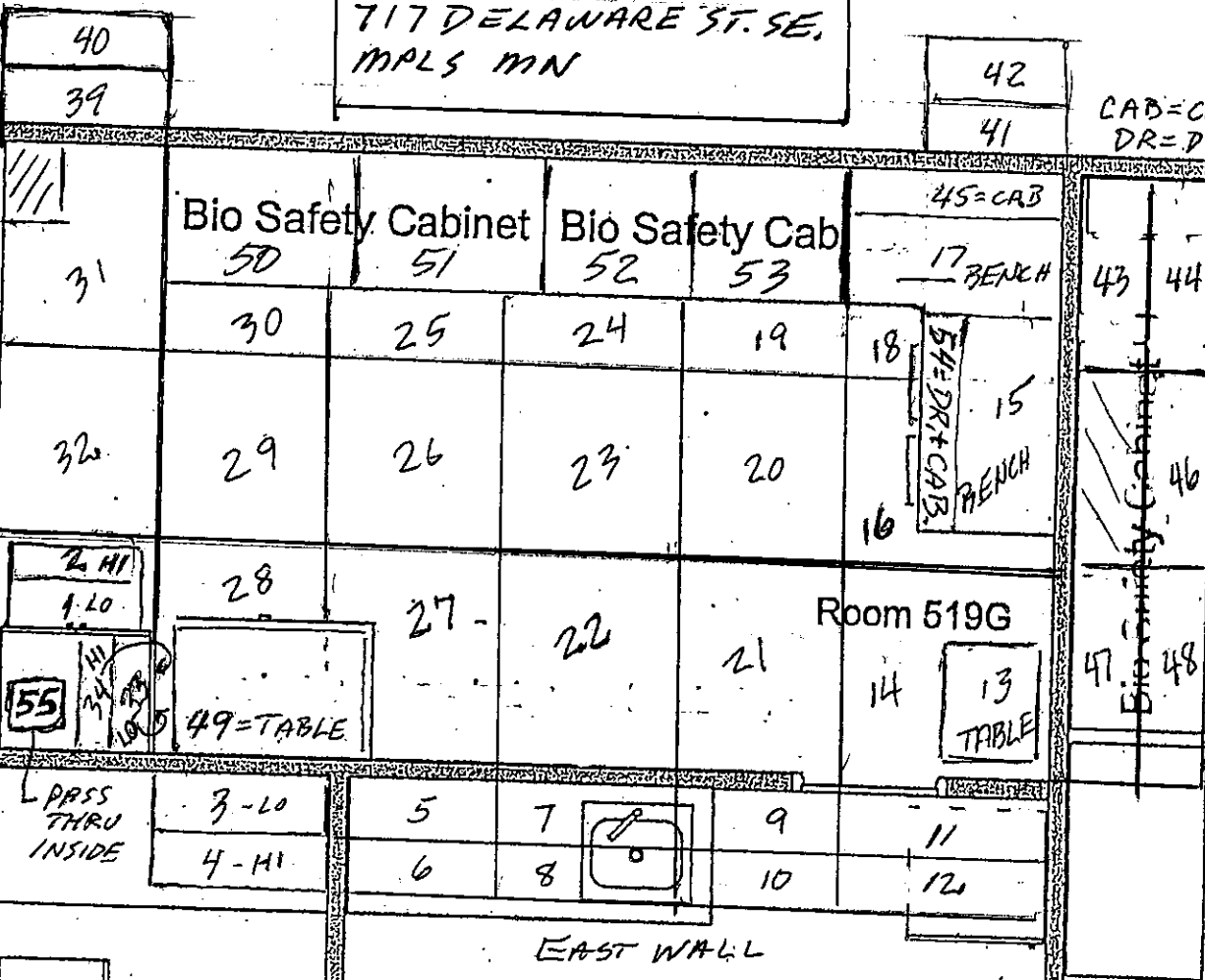
Room 519L

neubator

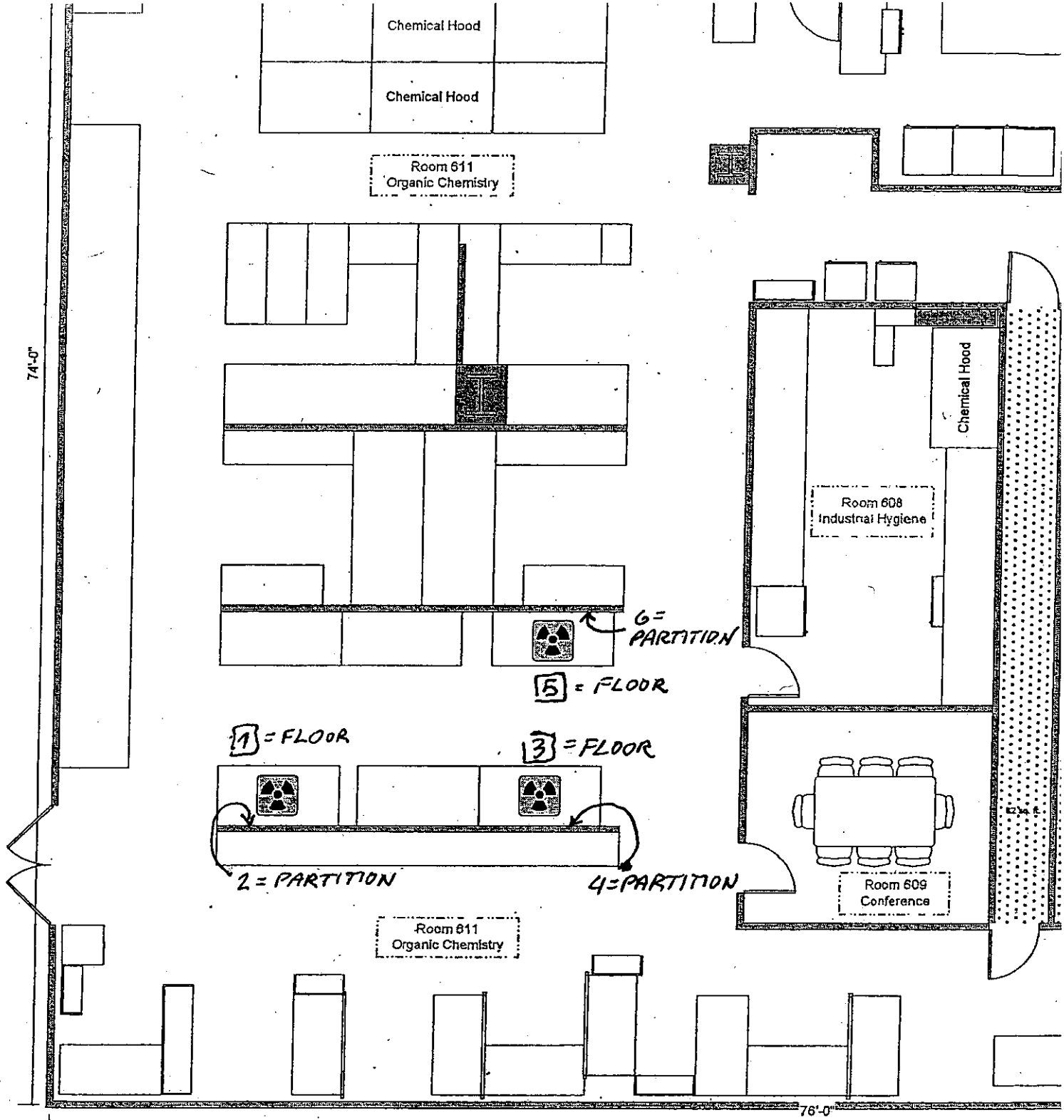
3'-6" →
0'-3"

PASS
THRU
FRONT

PASS
THRU
INSIDE



	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
				Minimum Detectable Activity			
			α/β Counter			L.S.C.	Gamma
			α = N/A			β = 33.6 dpm	Cs-137= N/A
			β = N/A				Eu-154= N/A
							Eu-155= N/A
							Sb-125= N/A
Room 611 -- Results for wipe samples -- Analyzed for Ni-63 by LSC							
Location	α/β Sample No.	α Results dpm	β Results dpm	LSC/γ Samp. No.	Date Coll.	Ni-63 LSC Results dpm	γ Results dpm
611-1		N/A	N/A	200532860	12/1/2005	<MDA	
611-2		N/A	N/A	200532861	12/1/2005	<MDA	
611-3		N/A	N/A	200532862	12/1/2005	<MDA	
611-4		N/A	N/A	200532863	12/1/2005	<MDA	
611-5		N/A	N/A	200532864	12/1/2005	<MDA	
611-6		N/A	N/A	200532865	12/1/2005	<MDA	



Wipe Locations

Room 611

717 Delaware St. S.E.

Mpls Mn.

	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α = 7.94 dpm		β = 33.6 dpm	Cs-137=
				β = 7.38 dpm			Eu-154
							Eu-155
							Sb-125
Room 703 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
703-1	200533053	12/7/2005	<MDA	<MDA			
703-2	200533054	12/7/2005	<MDA	<MDA			
703-3	200533055	12/7/2005	<MDA	<MDA			
703-4	200533056	12/7/2005	<MDA	<MDA			
703-5	200533057	12/7/2005	<MDA	<MDA			
703-6	200533058	12/7/2005	<MDA	<MDA			
703-7	200533059	12/7/2005	<MDA	<MDA			
703-8	200533060	12/7/2005	<MDA	<MDA			
703-9	200533061	12/7/2005	<MDA	<MDA			
703-10	200533062	12/7/2005	<MDA	<MDA			
703-11	200533063	12/7/2005	<MDA	<MDA			
703-12	200533064	12/7/2005	<MDA	<MDA			
703-13	200533065	12/7/2005	<MDA	<MDA			
703-14	200533066	12/7/2005	<MDA	<MDA			
703-15	200533067	12/7/2005	<MDA	<MDA			

Room 703 -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/ γ Samp. No.	LSC Results dpm	γ Results dpm
703-16	200533068	12/7/2005	<MDA	<MDA			
703-17	200533069	12/7/2005	<MDA	<MDA			
703-18	200533070	12/7/2005	<MDA	<MDA			
703-19	200533071	12/7/2005	<MDA	<MDA			
703-20	200533072	12/7/2005	<MDA	<MDA			
703-21	200533073	12/7/2005	<MDA	<MDA			
1-21 Composite		12/7/2005			200533074	N/A	

	Radiation Wipe Sample Results						
	Minnesota Dept. Health						
	Public Health Laboratory						
	717 Delaware St. S.E., Mpls. MN						
					Minimum Detectable Activity		
				α/β Counter		L.S.C.	Gamma
				α = 7.94 dpm		β = 33.6 dpm	Cs-137=1408. dpm
				β = 7.38 dpm			Eu-154= 5732. dpm
							Eu-155= 1206. dpm
							Sb-125= 2681. dpm
Sink Drains & Hoods -- Results for wipe samples							
Location	α/β Sample No.	Date Coll.	α Results dpm	β Results dpm	LSC/γ Samp. No.	LSC Results dpm	γ Results dpm
441S-1	200533401	12/6/2005	<MDA	<MDA	200533192	<MDA	
441S-2	200533402	12/6/2005	<MDA	<MDA	200533193	<MDA	
441S-3	200533403	12/6/2005	<MDA	<MDA	200533194	<MDA	
441S-4	200533404	12/6/2005	<MDA	<MDA	200533196	<MDA	
441S-5	200533405	12/6/2005	<MDA	<MDA	200533195	<MDA	
441S-6	200533406	12/6/2005	<MDA	<MDA			
441S-7	200533407	12/6/2005	<MDA	<MDA			
441S-8	200533408	12/6/2005	<MDA	<MDA			
441S-9	200533409	12/6/2005	<MDA	<MDA			
441S-10	200533410	12/6/2005	<MDA	<MDA			
441S-11	200533411	12/6/2005	<MDA	<MDA			
441S-12	200533412	12/6/2005	<MDA	<MDA			
441S-13	200533413	12/6/2005	<MDA	<MDA			
441S-14	200533414	12/6/2005	<MDA	<MDA			
441S-15	200533415	12/6/2005	<MDA	<MDA			
441S-16	200533416	12/6/2005	<MDA	<MDA			
441S-17	200533417	12/6/2005	<MDA	<MDA			

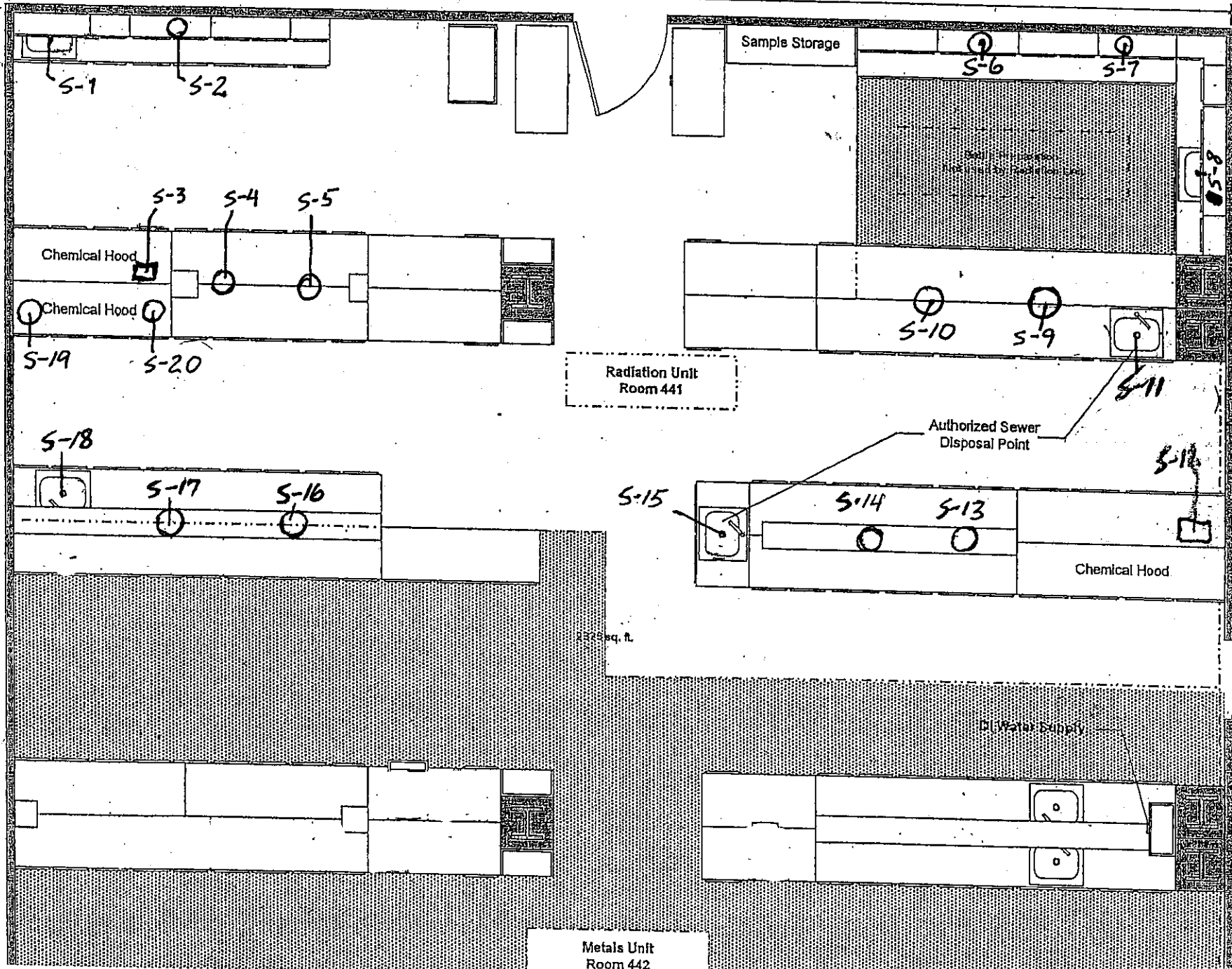
441S-18	200533418	12/6/2005	<MDA	<MDA			
441S-19	200533419	12/6/2005	<MDA	<MDA			
441S-20	200533420	12/6/2005	<MDA	<MDA			
448S-1	200533421	12/6/2005	<MDA	<MDA			
448S-2	200533422	12/6/2005	<MDA	<MDA			
448S-3	200533423	12/6/2005	<MDA	<MDA			
B5S-1	200533424	12/6/2005	<MDA	<MDA			
441S-21	200533425	12/6/2005	<MDA	<MDA			
441 Hood Fan Housing E-15	200533426	12/9/2005	<MDA	9.06			
441 Hood Fan Housing E-17	200533427	12/9/2005	<MDA	<MDA			
Garage Plumbing Cleanout	200533428	12/9/2005	<MDA	<MDA			
441 NE Hood Duct Entrance	200533429	12/9/2005	<MDA	<MDA			
441 SE Hood Duct Entrance	200533430	12/9/2005	<MDA	<MDA			
441 SW Hood Duct Entrance	200533431	12/9/2005	<MDA	<MDA			
441 NW Hood Duct Entrance	200533432	12/9/2005	<MDA	<MDA			
1-32 Composite Gamma Scan		12/9/2005			200533433	N/A	<MDA
Garage Plumbing Cleanout					200533183	451.15	
441 Hood Duct Fan Housing E-17					200533184	<MDA	
441 Hood Duct Fan Housing E-15					200533185	<MDA	
519E Hood Duct Plenum					200533186	74.47	
519G Hood Duct Plenum					200533187	<MDA	
519G South Hood Duct Entrance					200533188	<MDA	
519G North Hood Duct Entrance					200533189	<MDA	
519E South Hood Duct Entrance					200533190	<MDA	
519E North Hood Duct Entrance					200533191	<MDA	

NORTH
↑

WIPE LOCATIONS
SINK DRAINS
441S-1 → S-20

Room 441
717 Delaware St. S.E.
Mpls. MN

46'-0"



Appendix B

Survey Instrument Specifications

MODEL 3 Survey Meter

PART NUMBER:48-1605

- **4 Ranges**
- **Utilizes G-M, or Scintillation Detectors**
- **Typical Counting Range from 0 - 200 mR/hr, or 0 - 500,000 cpm**
- **Greater Than 2000 Hour Battery Life**



INDICATED USE: General purpose survey

COMPATIBLE DETECTORS: G-M, scintillation

METER DIAL: 0 - 2 mR/hr, or 0 - 5k cpm, BAT TEST (*others available*)

MULTIPLIERS: X0.1, X1, X10, X100

LINEARITY: Reading within $\pm 10\%$ of true value with detector connected

CONNECTOR: Series "C" (*others available*)

AUDIO: Built in unimorph speaker with ON/OFF switch (*greater than 60 dB at 2 feet*)

CALIBRATION CONTROLS: Accessible from front of instrument (*protective cover provided*)

HIGH VOLTAGE: Adjustable from 200 - 1500 volts

THRESHOLD: 30 mV \pm 10 mV

RESPONSE: Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
RESET: Push-button to zero meter

POWER: 2 each "D" cell batteries (*housed in sealed compartment that is externally accessible*)

BATTERY LIFE: Typically greater than 2000 hours with alkaline batteries (*battery condition can be checked on meter*)

METER: 2.5" (6.4 cm) arc, 1 mA analog type

CONSTRUCTION: Cast and drawn aluminum with beige polyurethane enamel paint

TEMPERATURE RANGE: -4°F(-20°C) to 122°F(50°C)

May be certified for operation from -40°F(-40°C) to 150°F(65°C)

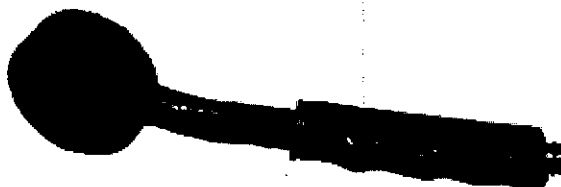
SIZE: 6.5" (16.5 cm)H X 3.5" (8.9 cm)W X 8.5" (21.6 cm)L

WEIGHT: 3.5 lbs. (1.6 kg) including batteries

MODEL 44-9 Pancake G-M Detector

PART NUMBER: 47-1539

The Model 44-9 is a pancake G-M that can be used with several different instruments including survey meters, scalars, ratemeters, and alarm ratemeters



INDICATED USE: Alpha beta gamma survey; Frisking

DETECTOR: Pancake type halogen quenched G-M

WINDOW: 1.7 plus or minus 0.3 mg/cm² mica

WINDOW AREA:

Active - 15 cm²

Open - 12 cm²

EFFICIENCY(4pi geometry): Typically 5%-C-14; 22%-Sr-90/Y-90; 19%-Tc-99; 32%-P-32; 15%-Pu-239

SENSITIVITY: Typically 3300 cpm/mR/hr (*Cs-137 gamma*)

ENERGY RESPONSE: Energy dependent

DEAD TIME: Typically 80 microseconds

COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalars

OPERATING VOLTAGE: 900 volts

CONNECTOR: Series "C" (*others available*)

CONSTRUCTION: Aluminum housing with beige polyurethane enamel paint

TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)

May be certified for operation from -40° F(-40° C) to 150° F(65° C)

SIZE: 1.8" (4.6 cm)H X 2.7" (6.9 cm)W X 10.7" (27.2 cm)L

WEIGHT: 1 lb (0.5kg)

Replacement Parts

Pancake G-M Tube
Protective Screen

Ordering Info.

Model 44-9 Response Curve



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Page last updated: December 2000

MODEL 43-1 Alpha Scintillator**PART NUMBER:47-1516**

The Model 43-1 Alpha Scintillator is a cylindrical large area scintillator that can be used with a several different instruments including survey meters, scalars, ratemeters, and alarm ratemeters

**INDICATED USE:** Alpha survey**SCINTILLATOR:** ZnS(Ag)**WINDOW:** Typically 0.8 mg/cm² aluminized mylar (*1.2 mg/cm² recommended for outdoor use*)**WINDOW AREA:**Active - 83 cm²Open - 75 cm²**EFFICIENCY (4pi geometry):** Typically 35% - Pu-239**NON-UNIFORMITY:** Less than 10%**COMPATIBLE INSTRUMENTS:** General purpose survey meters, ratemeters, and scalars**TUBE:** 1.5"(3.8cm) diameter magnetically shielded photomultiplier**OPERATING VOLTAGE:** Typically 500 - 1200 volts**DYNODE STRING RESISTANCE:** 100 megohm**CONNECTOR:** Series "C" (*others available*)**CONSTRUCTION:** Aluminum housing with beige polyurethane enamel paint**TEMPERATURE RANGE:** -4° F(-20° C) to 122° F(50° C)

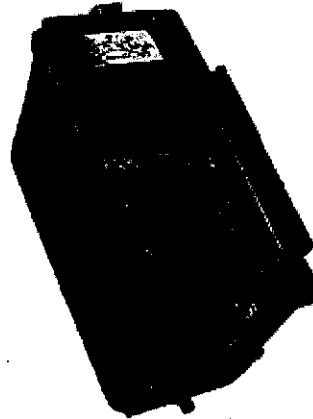
May be certified for operation from -40° F(-40° C) to 150° F(65° C)

SIZE: 4.8" (12.2cm) diameter X 9.8" (24.9cm)L**WEIGHT:** 2 lb (0.9 kg)

Replacement Parts**Mylar Window**

MODEL 2221 Scaler/Ratemeter SCA**PART NUMBER: 48-2065**

- *6 Decade LCD Scaler with backlight*
- *Logarithmic and Linear Ratemeter with a Total Counting Range from 0 - 500,000 cpm*
- *Headset Compatible*
- *Audio Divide*
- *Single Channel Analyzer*

**INDICATED USE:** Field analysis**COMPATIBLE DETECTORS:** G-M, proportional, scintillation**CONNECTOR:** Series "C" (*others available*)**AUDIO:** Built in unimorph speaker with volume control (*greater than 60 dB at 2 feet, full volume*)**AUDIO DIVIDE:** Thumb switch for 1, 10, or 100 events-per-click**AUDIO JACK:** For optional headset**METER DIAL:** 0 - 500 cpm; 50 - 500k cpm logarithmic scale (*others available*)**MULTIPLIERS:** X1, X10, X100, X1k, and LOG for logarithmic scale**LINEARITY:** Reading within plus or minus 10% of true value with detector connected**DIGITAL DISPLAY:** 6 digit LCD display with 0.5" (1.3cm) digits**LCD BACKLIGHT:** Activated by LAMP switch**DIGITAL RATEMETER:** Provides a digital display of count rate when selector switch is in Dig. Rate position**SCALER:** Used in conjunction with timer to allow for gross counting with range from 0 - 999999 counts when selector switch is in Scaler position (*controlled by COUNT and HOLD buttons*)**NOTE:** *Scaler and digital ratemeter are active when not selected, allowing for concurrent use***TIMER:** Switch selectable divisions of 0.1, 0.5, 1, 2, 5, 10 minutes or CONT (continuous) for manual timing**CALIBRATION CONTROLS:** Accessible from front of instrument (*protective cover provided*)**HIGH VOLTAGE:** Adjustable from 200 - 2400 volts (*can be checked on display*)**THRESHOLD:** Adjustable from 100 - 1000 (*can be checked on display*)**WINDOW:** Adjustable from 0 - 1000 above threshold setting (*can be turned on or off*)**GAIN:** Adjustable from 1.5 - 100 mV at threshold setting of 100**OVERLOAD:** Senses detector saturation. Indicated by "-----" on LCD display and meter going to full scale (*adjustable depending on detector selected*)**RESPONSE:** Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of

final reading

RESET: Push-button to zero meter

POWER: 4 each "D" cell batteries (*housed in sealed compartment that is externally accessible*)

BATTERY LIFE: Typically 250 hours with alkaline batteries (*battery condition can be checked on digital display*)

METER: 2.5"(6.4cm) arc, 1 mA analog type

CONSTRUCTION: Milled and drawn aluminum with beige polyurethane enamel paint

TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)

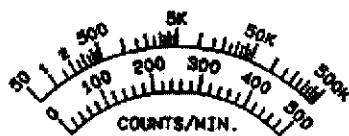
May be certified for operation from -40° F(-40° C) to 150° F(65° C)

SIZE: 9"(22.9cm)H X 4.3"(10.9cm)W X 10"(25cm)L including handle

WEIGHT: 5.5 lbs (2.5kg) including batteries

For Alpha Measurements	For Beta Measurements	For Gamma Measurements	For Alpha/beta/gamma Measurements
<u>Model 43-1*</u>	<u>Model 43-20</u>	<u>Model 44-2</u>	<u>Model 44-7</u>
<u>Model 43-2*</u>	<u>Model 43-68</u>	<u>Model 44-3</u>	<u>Model 44-9</u>
<u>Model 43-5*</u>	<u>Model 44-1*</u>	<u>Model 44-6</u>	<u>Model 44-88</u>
<u>Model 43-20</u>	<u>Model 44-6</u>	<u>Model 44-7</u>	<u>Model 44-89</u>
<u>Model 43-44</u>	<u>Model 44-7</u>	<u>Model 44-9</u>	<u>Model 44-94</u>
<u>Model 43-44-1</u>	<u>Model 44-9</u>	<u>Model 44-10</u>	
<u>Model 43-65*</u>	<u>Model 44-21</u>	<u>Model 44-17</u>	
<u>Model 43-68</u>	<u>Model 44-38</u>	<u>Model 44-20</u>	
<u>Model 43-90*</u>	<u>Model 44-88</u>	<u>Model 44-21</u>	
<u>Model 44-7</u>	<u>Model 44-89</u>	<u>Model 44-38</u>	
<u>Model 44-9</u>	<u>Model 44-92</u>	<u>Model 44-62</u>	
<u>Model 44-88</u>	<u>Model 44-94</u>	<u>Model 133 Series</u>	
<u>Model 44-89</u>	<u>Model 44-98*</u>		
<u>Model 44-94</u>	<u>Model 44-116*</u>		

Common Meter Dials



202-159

202-159

50-500 kcpm log; 0-500 cpm

Accessories

Replacement Parts

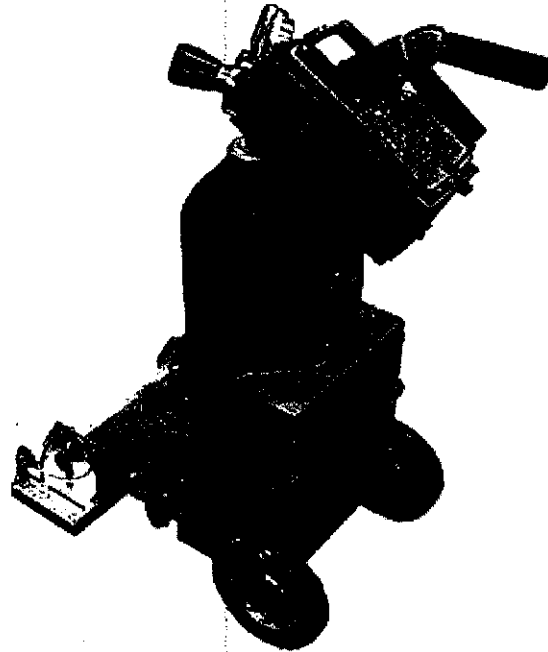
MODEL 239-1F Floor Monitor

PART NUMBERS

Model 239-1F w/Model 12 - 48-1702
Model 239-1F w/ Model 2221 - 48-2085
Model 239-1F w/Model 2350-1 - 48-2594
Model 239-1F w/Model 2224 - 48-2650
Model 239-1F w/Model 2360 - 48-2922

LINKS TO SURVEY METERS

Model 12 - Ratemeter
Model 2221 - Portable Scaler Ratemeter
Model 2350-1 - Data Logger
Model 2224 - Alpha/Beta Scaler/Ratemeter
Model 2360 - Alpha/Beta Data Logger



INDICATED USE: Floor monitoring for alpha, and beta-gamma

DETECTOR: Gas proportional

RECOMMENDED COUNTING GAS: P-10 (10% methane; 90% argon)

BOTTLE SIZE: Typically used with Matheson size 2 or Linde Q bottles (*provided by customer*)

DETECTOR WINDOW: 0.8 mg/square cm aluminized mylar (*window thickness of 0.4, 1.2, 3.9, or 7.9 mg/square cm available*)

WINDOW AREA:

ACTIVE - Approximately 582 square cm

OPEN - Approximately 425 square cm

EFFICIENCY(4pi geometry): Approximately 25% - Sr-90/Y-90; 17% - Pu-239; gamma - less than 1%

GAS RECHARGE: Will operate on static charge for over 2 hours

COMPATIBLE INSTRUMENTS: Typically used with Model 12, 2221, 2224, or 2350-1

DETECTOR HEIGHT: Adjustable from 0.125"(0.32cm) - 3"(7.6cm) from surface

DETECTOR OPERATING VOLTAGE:

ALPHA - Typically 1000 - 1200 volts

BETA-GAMMA: Typically 1600 - 1800 volts

THRESHOLD: Typically 2 - 4 mV

FLOW METER:

IN - Adjustable from 0 - 100 cc/min

OUT - Flow indicator from 0 - 100 cc/min

GAS CONNECTORS: Double end quick disconnect for 0.25"(0.6cm) OD tubing

GAS CONSUMPTION: Typically 50 cc/min

CONSTRUCTION:

DETECTOR - Anodized aluminum housing with stainless steel hex protective screen (79% open)

CART - 1" square tubular steel and aluminum with beige polyurethane enamel paint, 7.5"(19.1cm) diameter rear wheels, and 4"(10.2cm) diameter swivel casters

TEMPERATURE RANGE: -4° F(-20° C) to 122° F(50° C)

May be certified for operation from -40° F(-40° C) to 150° F(65° C)

SIZE:

DETECTOR - 0.8"(2cm)H X 6.3"(16cm)W X 18.3"(46.5cm)L

CART - 42"(106.7cm)H X 16"(40.6cm)W X 27.5"(69.9cm)L (*excluding detector*)

WEIGHT: 25 lbs (11.4kg) (*excluding gas bottle and counting instrument*)

Ordering Info.; Manual



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Page last updated: December 2000

Appendix C

Calibrations and Operational Checks

**CALIBRATION
CERTIFICATE**

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION				DETECTOR INFORMATION	
Customer Name: Duratek Instrument Services				Manufacturer: Ludlum	
Address: 628 Gallaher Rd Kingston, TN 37763				Detector Model: 43-37B	
Contact Name: Thomas Scott				Serial Number: 093965	
Customer Purchase Order Number: N/A		Work Order Number: 2005-02901		Evaluation Method: Source	
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: C ¹⁴		Serial Number: 010002		Activity (dpm): 259,740	
				Certification Date: 08/14/96	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	39,931	39,931	Count 1 (Heel)		39,985
Count 2	39,209	39,209	Count 2 (Center)		39,716
Count 3	39,515	39,515	Count 3 (Toe)		40,057
Count 4	39,076	39,076	Average		39,919
Count 5	39,702	39,702	Tolerance		±10%
Count 6	39,870	39,870	Pass/Fail		Pass
Average	39,551	39,551			
Background (CPM)	1,222	1,222			
Net Counts	38,329	38,329			
Efficiency	14.8%	14.8%			
Low Sample Activity: Source #: N/A		High Sample Activity: Source #: N/A		Dead Time (DT): N/A	Calibration Constant (CC): N/A
SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	197766	12/07/05	1,222	1800V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239.			One layer mylar (0.4mg/cm ²)		
10 minute background performed			Efficiency performed on contact with 6Ft. cable		
STATEMENT OF CERTIFICATION					
We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).					
Certified By: M. Pauli		Reviewed By: Thomas G. Scott		Date: 6-14-05	
Certification Date: 06/14/05			Certification Due: 06/14/06		

background plateau 43-37#093965 4/13/2005

900	0
950	0
1000	0
1050	0
1100	0
1150	1
1200	2
1250	0
1300	2
1350	4
1400	3
1450	4
1500	5
1550	35
1600	92
1650	194
1700	326
1750	733
1800	1028
1850	1118
1900	2380

alpha plateau th-230#099603 26,220dpm

900	303
950	0
1000	0
1050	3
1100	361
1150	3278
1200	4435
1250	4675
1300	4791
1350	4829
1400	4862
1450	4894
1500	4969

beta plateau c-14#010002 259,740dpm

1400	14
1450	7
1500	670
1550	6353
1600	16464
1650	25434
1700	32951
1750	37310
1800	39075
1850	39908
1900	41366
1950	43692

James F. Dault

1-11-05



Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

CALIBRATION CERTIFICATE

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION			DETECTOR INFORMATION		
Customer Name: Duratek Instrument Services			Manufacturer: Ludlum		
Address: 628 Gallaher Rd Kingston, TN 37763			Detector Model: 43-37A		
Contact Name: Thomas Scott			Serial Number: 190946		
Customer Purchase Order Number: N/A		Work Order Number: 2005-03391		Evaluation Method: Source	
DETECTOR EFFICIENCY RESPONSE CALIBRATION INFORMATION					
Source Nuclide: Th ²³⁰	Serial Number: 119708		Activity (dpm): 2,610		Certification Date: 10/14/97
Parameter	As Found	As Left	Precision Test		CPM
Count 1	544	544	Count 1 (Heel)		504
Count 2	526	526	Count 2 (Center)		465
Count 3	489	489	Count 3 (Toe)		518
Count 4	475	475	Average		496
Count 5	469	469	Tolerance		±10%
Count 6	481	481	Pass/Fail		Pass
Average	497	497			
Background (CPM)	3.6	3.6			
Net Counts	493	493			
Efficiency	18.9%	18.9%			
Low Sample Activity: Source #: N/A		High Sample Activity: Source #: N/A		Dead Time (DT): N/A	Calibration Constant (CC): N/A
SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	197766	12/05/06	3.6	1350V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
Calibrated in accordance with CP-IN-WI-239 10 minute background performed					
Efficiency performed on contact with 6Ft. cable					
We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for					
etector					
Certified By: M. Paul		Reviewed By: Thomas G. Scott		Date: 12-5-05	
Certification Date: 12/05/05			Certification Due: 12/05/06		

BACKGROUND PLATEAU 43-37#190946 6FT CABLE 12/5/05

900	0
950	0
1000	0
1050	0
1100	0
1150	0
1200	0
1250	0
1300	3
1350	3
1400	4
1450	4
1500	3
1550	7
1600	10
1650	20
1700	64
1750	131
1800	264
1850	540
1900	860
1950	1003

ALPHA PLATEAU TH-230#119709 2442DPM

900	0
950	0
1000	0
1050	0
1100	0
1150	17
1200	271
1250	407
1300	439
1350	494
1400	498
1450	526
1500	513

BETA PLATEAU TC-99#119718 20,520DPM

1400	7
1450	3
1500	4
1550	89
1600	567
1650	1418
1700	2395
1750	3640
1800	4946
1850	5424
1900	5511
1950	5978

James G. Smith

12-5-05

**CALIBRATION
CERTIFICATE**

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION			DETECTOR INFORMATION		
Customer Name: Duratek Instrument Services			Manufacturer: Ludlum		
Address: 628 Gallaher Rd Kingston, TN 37763			Detector Model: 43-37A		
Contact Name: Thomas Scott			Serial Number: 093965		
Customer Purchase Order Number: N/A		Work Order Number: 2005-02901		Evaluation Method: Source	
DETECTOR EFFICIENCY/RESPONSE/PRECISION INFORMATION					
Source Nuclide: Th ²³⁰		Serial Number: 099603		Activity (dpm): 26,220	
				Certification Date: 08/14/96	
Parameter	As Found	As Left	Precision Test		CPM
Count 1	5,167	5,167	Count 1 (Heel)		5,352
Count 2	5,291	5,291	Count 2 (Center)		5,191
Count 3	5,115	5,115	Count 3 (Toe)		5,326
Count 4	5,123	5,123	Average		5,290
Count 5	5,357	5,357	Tolerance		±10%
Count 6	5,024	5,024	Pass/Fail		Pass
Average	5,180	5,180			
Background (CPM)	5.0	5.0			
Net Counts	5,175	5,175			
Efficiency	19.7%	19.7%			
Low Sample Activity: Source #: N/A		High Sample Activity: Source #: N/A		Dead Time (DT): N/A	Calibration Constant (CC): N/A
SCALER INFORMATION			DETECTOR INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	197766	12/07/05	5.0	1350V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239.			One layer mylar (0.4mg/cm ²)		
10 minute background performed			Efficiency performed on contact with 6ft. cable		
STATEMENT OF CERTIFICATION					
We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this detector).					
Certified By: M. Paul		Reviewed By: Thomas O. Paul		Date: 6-14-05	
Certification Date: 06/14/05			Certification Due: 06/14/06		

background plateau 43-37#093965 4/13/2005

900	0
950	0
1000	0
1050	0
1100	0
1150	1
1200	2
1250	0
1300	2
1350	4
1400	3
1450	4
1500	5
1550	35
1600	92
1650	194
1700	326
1750	733
1800	1028
1850	1118
1900	2380

alpha plateau th-230#099603 26,220dpm

900	303
950	0
1000	0
1050	3
1100	361
1150	3278
1200	4435
1250	4675
1300	4791
1350	4829
1400	4862
1450	4894
1500	4969

beta plateau c-14#010002 259,740dpm

1400	14
1450	7
1500	670
1550	6353
1600	16464
1650	25434
1700	32951
1750	37310
1800	39075
1850	39908
1900	41366
1950	43692

Thomas Scott

6-14-05



**CALIBRATION
CERTIFICATE**
Page 1 of 2

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION		INSTRUMENT INFORMATION	
Customer Name: Duratek Instrument Services		Manufacturer: Ludlum	
Address: 628 Gallaher Road, Kingston, TN 37763		Model: 2221	Serial Number: 117651
Contact Name: Tom Scott		Probe: 44-10	Serial Number: 192589
Customer Purchase Order Number: N/A	Work Order Number: 2005-02515	Calibration Method: Electronic	

INSTRUMENT CALIBRATION INFORMATION								
Instrument Range	Calibration Standard Value CPM	Ratemeter Response		Calibration Standard Value CPM	Time Base (min)	Tolerances (cpm) ± 10%	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	1,000 CPM	.1	90 – 110	99	99
X 1	250	250	250	1,000 CPM	.2	180 – 220	194	194
X 1	400	400	400	1,000 CPM	.5	450 – 550	484	484
X 10	1,000	1,000	1,000	1,000 CPM	1	900 – 1,100	957	957
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K–2.2K	1,941	1,941
X 10	4,000	3,900	3,900	1,000 CPM	5	4.5K-5.5K	9,705	9,705
X 100	10,000	10,000	10,000					
X 100	25,000	25,000	25,000					
X 100	40,000	39,000	39,000					
X 1000	100,000	100,000	100,000					
X 1000	250,000	250,000	250,000					
X 1000	400,000	390,000	390,000					

STATEMENT OF CERTIFICATION		
We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).		
Instrument		
Calibrated By: M. Pauli	Reviewed By: <i>[Signature]</i>	Date: 2-7-05
Calibration Date: 02/07/05	Calibration Due: 02/07/06	

Model: 2221Serial Number: 117651

M&TE					Environmental Conditions				
Volt Meter	Due Date:	03/22/05	ID	TW12663	Barometer	Due Date:	11/11/05	ID:	100799
Pulser	Due Date:	09/24/05	ID	101500	Thermometer	Due Date:	04/15/05	ID:	2816
Timer	Due Date:	03/04/05	ID	0201806	Temp: 23.2 °C	Pressure: 748 mmHg	Humidity: 30%		
INSTRUMENT CALIBRATION INFORMATION									
Special Test									
Geotropism		Sat (✓) Unsat ()			Hold		Sat (✓) Unsat ()		
BAT > 4.5		Sat (✓) Unsat ()			Volume Test		Sat (✓) Unsat ()		
Mechanical Zero		Sat (✓) Unsat ()			Audio Divide		Sat (✓) Unsat ()		
Digital Zero		Sat (✓) Unsat ()			Window Switch		Sat (✓) Unsat ()		
Count		Sat (✓) Unsat ()			Lamp		Sat (✓) Unsat ()		
High Voltage Calibration					Timer Calibration				
Voltage	Tolerance	As Found	As Left	Time (sec.)	Tolerance	As Found	As Left		
400	392-408	400	400	300	290-310	300	300		
1,000	980-1,020	1,001	1,001						
1,500	1,470-1,530	1,499	1,499						
1,900	1,862-1,932	1,897	1,897						
Threshold/Gain Calibration (Desired Ratio 10 mV/100)									
Input	As Found Value		As Found Ratio (mV/100)		As Left Value		As Left Ratio (mV/100)		
10	100		10.0		93		10.8		
20	217		9.2		199		10.1		
30	337		8.9		300		10.0		
40	464		8.6		411		9.7		
Logmeter Scale Linearity Check									
Input		±20% Tolerance		As Found		As Left			
LOG		400		320-480		400		400	
LOG		4,000		3,200-4,800		4,000		4,000	
LOG		40,000		32,000-48,000		40,000		40,000	
LOG		400,000		320,000-480,000		375,000		375,000	
COMMENTS									
Calibrated in accordance with IN-WI-237.									
Calibrated using 5ft C to C cable.									
Instrument									
Calibrated By: <u>M. Pauli</u>					Reviewed By: <u>[Signature]</u> Date: <u>2-7-05</u>				
Calibration Date: 02/07/05					Calibration Due: 02/07/06				




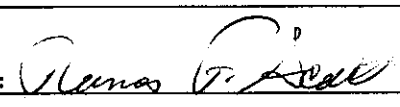
**CALIBRATION
CERTIFICATE**
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Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION				INSTRUMENT INFORMATION				
Customer Name: Duratek Instrument Services				Manufacturer: Ludlum				
Address: 628 Gallaher Road, Kingston, TN 37763				Model: 2221		Serial Number: 197766		
Contact Name: Tom Scott				Probe: N/A		Serial Number: N/A		
Customer Purchase Order Number: N/A		Work Order Number: 2005-03391		Calibration Method: Electronic				
INSTRUMENT CALIBRATION INFORMATION								
Instrument Range	Calibration Standard Value CPM	Ratemeter Response		Calibration Standard Value CPM	Time Base (min)	Tolerances (cpm) $\pm 10\%$	Scaler Response	
		As Found	As Left				As Found	As Left
X 1	100	100	100	1,000 CPM	.1	90 - 110	100	100
X 1	250	250	250	1,000 CPM	.2	180 - 220	201	201
X 1	400	400	400	1,000 CPM	.5	450 - 550	501	501
X 10	1,000	1,000	1,000	1,000 CPM	1	900 - 1,100	1001	1001
X 10	2,500	2,500	2,500	1,000 CPM	2	1.8K-2.2K	2004	2004
X 10	4,000	4,000	4,000	1,000 CPM	5	4.5K-5.5K	5007	5007
X 100	10,000	10,000	10,000					
X 100	25,000	25,000	25,000					
X 100	40,000	40,000	40,000					
X 1000	100,000	100,000	100,000					
X 1000	250,000	250,000	250,000					
X 1000	400,000	400,000	400,000					
STATEMENT OF CERTIFICATION								
We Certify that the instrument listed above was calibrated and inspected prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for damage incurred during shipment or use of this instrument).								
Instrument								
Calibrated By: <i>[Signature]</i>		Reviewed By: <i>[Signature]</i>		Date: 12-5-05				
Calibration Date: 12/5/2005				Calibration Due: 12/5/2006				

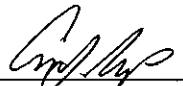

Model: 2221Serial Number: 197766

Instrument					Environmental Conditions				
Volt Meter	Due Date:	10/19/06	ID	6565015	Barometer	Due Date:	04/19/06	ID:	2816
Pulser	Due Date:	04/26/06	ID	92851	Thermometer	Due Date:	04/19/06	ID:	2816
Timer	Due Date:	02/16/06	ID	22226011	Humidity Pen	Due Date:	03/22/06	ID:	958670
Temp: 25.3 °C			Pressure: 740mmHg			Humidity: 27%			
INSTRUMENT CALIBRATION INFORMATION									
Special Test									
Geotropism	Sat (✓) Unsat ()			Hold			Sat (✓) Unsat ()		
BAT > 4.5	Sat (✓) Unsat ()			Volume Test			Sat (✓) Unsat ()		
Mechanical Zero	Sat (✓) Unsat ()			Audio Divide			Sat (✓) Unsat ()		
Digital Zero	Sat (✓) Unsat ()			Window Switch			Sat (✓) Unsat ()		
Count	Sat (✓) Unsat ()			Lamp			Sat (✓) Unsat ()		
High Voltage Calibration									
Voltage	Tolerance ± 2%			As Found			As Left		
400	392-408			404			404		
1,000	980-1,020			1,001			1,001		
1,500	1,470-1,530			1,501			1,501		
1,900	1,862-1,932			1,900			1,900		
Threshold/Gain Calibration (Desired Ratio = 10 ⁻³ mV/100)									
Input	As Found Value		As Found Ratio (mV/100)		As Left Value		As Left Ratio (mV/100)		
10	95		10.5		95		10.5		
20	200		10		200		10		
30	290		10.3		290		10.3		
40	380		10.5		380		10.5		
Logmeter Scale Linearity Check									
Input	±20% Tolerance		As Found		As Left				
LOG	400		320-480		400				
LOG	4,000		3,200-4,800		4,000				
LOG	40,000		32,000-48,000		40,000				
LOG	400,000		320,000-480,000		400,000				
COMMENTS									
Calibrated in accordance with OEM Technical Manual.									
Instrument									
Calibrated By: 					Reviewed By:  Date: 12-5-05				
Calibration Date: 12/5/2005					Calibration Due: 12/5/2006				

**CALIBRATION
CERTIFICATE**

Duratek Instrument Services
628 Gallaher Road
Kingston, TN 37763
Phone: (865) 376-8337
Fax: (865) 376-8331

This Certificate will be accompanied by Calibration Charts or Readings where applicable

CUSTOMER INFORMATION			DETECTOR INFORMATION		
Customer Name: Duratek Instrument Services			Manufacturer: Ludlum		
Address: 628 Gallaher Rd Kingston, TN 37763			Detector Model: 43-37A		
Contact Name: Thomas Scott			Serial Number: 190672		
Customer Purchase Order Number: N/A		Work Order Number: 2005-03391	Evaluation Method: Source		
DETECTOR EFFICIENCY RESPONSE/PRECISION INFORMATION					
Source Nuclide: Th ²³⁰	Serial Number: 119709		Activity (dpm): 2,442		Certification Date: 10/14/97
Parameter	As Found	As Left	Precision Test		CPM
Count 1	472	472	Count 1 (Heel)		482
Count 2	482	482	Count 2 (Center)		524
Count 3	518	518	Count 3 (Toe)		492
Count 4	524	524	Average		499.3
Count 5	448	448	Tolerance		±10%
Count 6	492	492	Pass/Fail		Pass
Average	489.3	489.3			
Background (CPM)	4.4	4.4			
Net Counts	484.9	484.9			
Efficiency	19.8%	19.8%			
Low Sample Activity: Source #: N/A		High Sample Activity: Source #: N/A		Dead Time (DT): N/A	Calibration Constant (CC): N/A
SCALER INFORMATION			UNIT INFORMATION		
Model	Serial Number	Due Date	Background (cpm)	Operating Voltage	Threshold
2221	117651	02/07/2006	4.4	1300V	40 = 4mV
Detector Setup Report		YES NO ✓	Barcode Report		YES NO ✓
					Voltage Plateau YES ✓ NO
COMMENTS					
Calibrated in accordance with CP-IN-WI-239 10 minute background performed					
Efficiency performed on contact with 6ft. cable					
STATEMENT OF CERTIFICATION					
We Certify that the detector listed above was evaluated for proper operation prior to shipment and that it met all the Manufacturers published operating specifications. We further certify that our Calibration Measurements are traceable to the National Institute of Standards and Technology. (We are not responsible for					
etector					
Certified By: 		Reviewed By: 		Date: 12-5-05	
Certification Date: 12/5/2005			Certification Due: 12/5/2006		

BACKGROUND PLATEAU 43-37#190672 6FT CABLE 12/5/2005

900	0
950	0
1000	0
1050	0
1100	0
1150	1
1200	0
1250	0
1300	6
1350	7
1400	8
1450	1
1500	3
1550	8
1600	16
1650	35
1700	93
1750	204
1800	441
1850	720
1900	989
1950	1100

ALPHA PLATEAU TH-230#119708 2610DPM

900	0
950	0
1000	0
1050	0
1100	1
1150	278
1200	423
1250	513
1300	539
1350	518
1400	525
1450	536
1500	540

BETA PLATEAU TC-99#099608 21,312DPM

1400	4
1450	3
1500	80
1550	583
1600	1581
1650	2689
1700	4000
1750	5004
1800	5811
1850	5894
1900	5822
1950	6605

James R. Aelt

12-5-05

Tennelec 3 Efficiency Calibration

11/16/2005

Alpha Efficiency

Detector	Background 1000 minutes	Background (cpm)	Cal Std gross c/50 minutes	Cal Std (cpm)	Cal Std Activity (pCi)	Efficiency (cpm/pCi)	Efficiency (cpm/dpm)
A1	44	0.044	19969	399.4	687.33	0.581	0.262
A2	56	0.056	20202	404.0	687.33	0.588	0.265
A3	49	0.049	19054	381.1	687.33	0.554	0.250
A4	54	0.054	18525	370.5	687.33	0.539	0.243
B1	64	0.064	20389	407.8	687.33	0.593	0.267
B2	37	0.037	20598	412.0	687.33	0.599	0.270
B3	48	0.048	18141	362.8	687.33	0.528	0.238
B4	53	0.053	18471	369.4	687.33	0.537	0.242

Beta Efficiency

Detector	Background 1000 minutes	Background (cpm)	Cal Std gross c/10 minutes	Cal Std (cpm)	Cal Std Activity (pCi)	Efficiency (cpm/pCi)	Efficiency (cpm/dpm)
A1	590	0.590	493830	49383	48764.9	1.013	0.456
A2	636	0.636	499882	49988	48764.9	1.025	0.462
A3	651	0.651	482920	48292	48764.9	0.990	0.446
A4	659	0.659	493921	49392	48764.9	1.013	0.456
B1	776	0.776	468290	46829	48764.9	0.960	0.433
B2	680	0.680	494416	49442	48764.9	1.014	0.457
B3	700	0.700	498133	49813	48764.9	1.021	0.460
B4	835	0.835	491269	49127	48764.9	1.007	0.454

Close-out survey
717 Delaware St.
Minneapolis, MN

Calibration - Model 43-1 Alpha Scintillation Detector

Ludlum Model 43-1 Alpha Scintillation Detector
 Ludlum Model 2200 Scaler/Ratemeter
 Ludlum Model 180-16 Sample Holder

Date: 11/9/2005
 Background: 0.56 cpm

Nuclide	Activity (pCi)	Cal. Date	Current Act'y (pCi)	T1/2 (y)	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency (cpm/pCi)	Efficiency (cpm/dpm)
U-Nat	688.6	6/5/1987	688.60	4.47E+09	417.8	417.24	0.6059	0.273
Th-230	1.00E+04	3/22/2004	9999.85	7.54E+04	7651	7650.44	0.7651	0.345
Ra-226	69.06	5/4/1997	68.81	1.60E+03	53.8	53.24	0.7738	0.349
Ra-228	105.1	8/10/1996	34.53	5.76E+00	111.2	110.64	3.2037	1.443
Am-241	32756.75676	3/22/2004	32671.10	4.33E+02	27230	27229.44	0.8334	0.375

Nuclide	Conc equiv to 25 mrem (dpm/100cm ²)	alpha scint (cpm/dpm)	Geometry correction	cpm equiv to 25 mrem
U-Nat	1.01E+02	0.273	0.75	2.07E+01
Th-230	3.70E+01	0.345	0.75	9.56E+00
Ra-226	1.10E+03	0.351	0.75	2.89E+02
Ra-228	2.00E+02	1.450	0.75	2.18E+02
Am-241	2.70E+01	0.375	0.75	7.60E+00

Performance Check - Model 43-37 Alpha Detector

Ludlum Model 43-37 Gas Probe Serial Number 190672

Ludlum Model 2221 Scaler/Ratemeter Serial Number 117651

Alpha detection efficiency

Date: 12/8/2005

Background: 5.80 cpm

Nuclide	Activity (pCi)	Cal. Date	Current Act'y (pCi)	T1/2 (y)	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency (cpm/pCi)	Efficiency (cpm/dpm)
U-Nat	34.43	6/5/1987	34.43	4.47E+09	10.6	4.80	0.1394	0.063
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	5974	5968.20	0.5968	0.269
Ra-226	69.06	5/4/1997	68.80	1.60E+03	57.6	51.80	0.7529	0.339
Ra-228	105.1	8/10/1996	34.21	5.76E+00	71	65.20	1.9061	0.859

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	alpha detector cpm/dpm	Geometry correction	cpm equiv to 25 mrem
U-Nat	1.01E+02	0.063	4.25	2.70E+01
Th-230	3.70E+01	0.269	4.25	4.23E+01
Ra-226	1.10E+03	0.339	4.25	1.59E+03
Ra-228	2.00E+02	0.859	4.25	7.30E+02

Assuming a 19 percent efficiency, per Duratek, the table would be as follows

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	alpha detector cpm/dpm	Geometry correction	cpm equiv to 25 mrem
U-Nat	1.01E+02	0.190	4.25	8.16E+01
Th-230	3.70E+01	0.190	4.25	2.99E+01
Ra-226	1.10E+03	0.190	4.25	8.88E+02
Ra-228	2.00E+02	0.190	4.25	1.62E+02

Close-out survey
717 Delaware St.
Minneapolis, MN

Performance Check - Model 43-37 Alpha Detector

Ludlum Model 43-37 Gas Probe Serial Number 190946

Ludlum Model 2221 Scaler/Ratemeter Serial Number 197766

Alpha detection efficiency

Date: 12/8/2005

Background: 2.90 cpm

Nuclide	Activity (pCi)	Cal. Date	Current Act'y (pCi)	T1/2 (y)	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency (cpm/pCi)	Efficiency (cpm/dpm)
U-Nat	34.43	6/5/1987	34.43	4.47E+09	18	15.10	0.4386	0.198
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	4903	4900.10	0.4900	0.221
Ra-226	69.06	5/4/1997	68.80	1.60E+03	62.8	59.90	0.8706	0.392
Ra-228	105.1	8/10/1996	34.21	5.76E+00	71.6	68.70	2.0084	0.905

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	alpha detector cpm/dpm	Geometry correction	cpm equiv to 25 mrem
U-Nat	1.01E+02	0.198	4.25	8.48E+01
Th-230	3.70E+01	0.221	4.25	3.47E+01
Ra-226	1.10E+03	0.392	4.25	1.83E+03
Ra-228	2.00E+02	0.905	4.25	7.69E+02

Assuming a 19 percent efficiency, per Duratek, the table would be as follows

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	alpha detector cpm/dpm	Geometry correction	cpm equiv to 25 mrem
U-Nat	1.01E+02	0.190	4.25	8.16E+01
Th-230	3.70E+01	0.190	4.25	2.99E+01
Ra-226	1.10E+03	0.190	4.25	8.88E+02
Ra-228	2.00E+02	0.190	4.25	1.62E+02

Close-out survey
717 Delaware St.
Minneapolis, MN

Efficiency/MDA determination for Ludlum Model 3 Geiger-Mueller Detector

Ludlum Model 3 Serial Number 208023 208023
 Model 44-9 Probe Serial Number 214613 214613
 Calibration Date 10/17/2005
 Check source reading (SRM 4275) 1400 cpm

Mean Background: 26.8 cpm

Calibration date = 10/31/2005

Nuclide	Activity pCi	Cal. Date	Current Act'y pCi	T1/2 y	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency cpm/pCi	Efficiency cpm/dpm
U-Nat	34.43	6/5/1987	34.43	4.47E+09	30	3.2	0.0920	0.041
U-Nat	688.6	6/5/1987	688.60	4.47E+09	390	363.2	0.5274	0.238
Th-230	1.00E+04	3/22/2004	9999.85	7.54E+04	4100	4073.2	0.4073	0.183
Ra-226	69.06	5/4/1997	68.81	1.60E+03	90	63.2	0.9180	0.414
Ra-228	105.1	8/10/1996	34.64	5.76E+00	90	63.2	1.8237	0.821
Am-241	32756.7568	3/22/2004	32672.39	4.33E+02	10100	10073.2	0.3083	0.139
Sr-90/Y-90	1010.8	7/1/1995	788.06	2.88E+01	500	473.2	0.6004	0.270
Eu/Sb	23904.84	5/15/1995	3384.285	Mixed	980	953.2	0.2816	0.127
Cs-137	2109.8	8/28/2003	2006.56	30.07	1010	983.2	0.4900	0.221

Calculated cpm equivalent to 25 mrem

Nuclide	Conc equiv to 25 mrem (dpm/100cm ²)	GM efficiency cpm/dpm	Geometry correction	cpm equiv to 25 mrem
U-Nat	1.00E+02	0.238	0.12	2.85E+00
Th-230	3.70E+01	0.183	0.12	8.13E-01
Ra-226	1.10E+03	0.414	0.12	5.46E+01
Ra-228	2.00E+02	0.821	0.12	1.97E+01
Am-241	2.70E+01	0.139	0.12	4.50E-01
Sr-90	8.70E+03	0.270	0.12	2.82E+02
Eu/Sb	1.10E+04	0.127	0.12	1.67E+02
Cs-137	2.80E+04	0.221	0.12	7.42E+02

Close-out survey
 717 Delaware St.
 Minneapolis, MN

Efficiency/MDA determination for Ludlum Model 3 Geiger-Mueller Detector

Ludlum Model 3 Serial Number 208190
 Model 44-9 Probe Serial Number 214600
 Calibrated by Ludlum 10/17/2005
 Check source reading (SRM 4275) 1400 cpm

Background: 30 cpm

Calibration date = 11/30/2005

Nuclide	Activity pCi	Cal. Date	Current Act'y pCi	T1/2 y	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency cpm/pCi	Efficiency cpm/dpm
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	3,700	3670.0	0.3670	0.165
Sr-90/Y-90	1010.8	7/1/1995	786.50	2.88E+01	450	420.0	0.5340	0.241
Eu/Sb	23904.84	5/15/1995	3358.725	Mixed	1050	1020.0	0.3037	0.137
Cs-137	2109.8	8/28/2003	2002.76	30.07	1000	970.0	0.4843	0.218

Calculated cpm equivalent to 25 mrem

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	GM efficiency cpm/dpm	Geometry correction	cpm equiv to 25 mrem
Th-230	3.70E+01	0.165	0.12	7.34E-01
Sr-90	8.70E+03	0.241	0.12	2.51E+02
Eu/Sb	1.10E+04	0.137	0.12	1.81E+02
Cs-137	2.80E+04	0.218	0.12	7.33E+02

Close-out survey
 717 Delaware St.
 Minneapolis, MN

Efficiency/MDA determination for Ludlum Model 3 Geiger-Mueller Detector

Ludlum Model 3 Serial Number 208240
 Model 44-9 Probe Serial Number 214602
 Calibrated by Ludlum 6/24/2005
 Check source reading (SRM 4275) 1450 cpm

Background: 35 cpm

Calibration date = 11/30/2005

Nuclide	Activity pCi	Cal. Date	Current Act'y pCi	T1/2 y	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency cpm/pCi	Efficiency cpm/dpm
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	3,800	3765.0	0.3765	0.170
Sr-90/Y-90	1010.8	7/1/1995	786.50	2.88E+01	500	465.0	0.5912	0.266
Eu/Sb	23904.84	5/15/1995	3358.725	Mixed	1100	1065.0	0.3171	0.143
Cs-137	2109.8	8/28/2003	2002.76	30.07	1100	1065.0	0.5318	0.240

Calculated cpm equivalent to 25 mrem

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	GM efficiency cpm/dpm	Geometry correction	cpm equiv to 25 mrem
Th-230	3.70E+01	0.170	0.12	7.53E-01
Sr-90	8.70E+03	0.266	0.12	2.78E+02
Eu/Sb	1.10E+04	0.143	0.12	1.89E+02
Cs-137	2.80E+04	0.240	0.12	8.05E+02

Close-out survey
 717 Delaware St.
 Minneapolis, MN

Efficiency/MDA determination for Ludlum Model 3 Geiger-Mueller Detector

Ludlum Model 3 Serial Number 208927
 Model 44-9 Probe Serial Number 214612
 Calibrated by Ludlum 6/24/2005
 Check source reading (SRM 4275) 1400 cpm

Background: 40 cpm

Calibration date = 12/5/2005

Nuclide	Activity pCi	Cal. Date	Current Act'y pCi	T1/2 y	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency cpm/pCi	Efficiency cpm/dpm
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	3,950	3910.0	0.3910	0.176
Sr-90/Y-90	1010.8	7/1/1995	786.25	2.88E+01	500	460.0	0.5851	0.264
Eu/Sb	23904.84	5/15/1995	3354.49	Mixed	1200	1160.0	0.3458	0.156
Cs-137	2109.8	8/28/2003	2002.13	30.07	1200	1160.0	0.5794	0.261

Calculated cpm equivalent to 25 mrem

Nuclide	Conc equiv to 25 mrem (dpm/100cm2)	GM efficiency cpm/dpm	Geometry correction	cpm equiv to 25 mrem
Th-230	3.70E+01	0.176	0.12	7.82E-01
Sr-90	8.70E+03	0.264	0.12	2.75E+02
Eu/Sb	1.10E+04	0.156	0.12	2.06E+02
Cs-137	2.80E+04	0.261	0.12	8.77E+02

Close-out survey
 717 Delaware St.
 Minneapolis, MN

Efficiency/MDA determination for Ludlum Model 3 Geiger-Mueller Detector

Ludlum Model 3 Serial Number 209057
 Model 44-9 Probe Serial Number 214603
 Calibrated by Ludlum 10/17/2005
 Check source reading (SRM 4275) 1400 cpm

Background: 40 cpm

Calibration date = 12/5/2005

Nuclide	Activity pCi	Cal. Date	Current Act'y pCi	T1/2 y	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency cpm/pCi	Efficiency cpm/dpm
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	4,150	4110.0	0.4110	0.185
Sr-90/Y-90	1010.8	7/1/1995	786.25	2.88E+01	500	460.0	0.5851	0.264
Eu/Sb	23904.84	5/15/1995	3354.49	Mixed	1100	1060.0	0.3160	0.142
Cs-137	2109.8	8/28/2003	2002.13	30.07	1100	1060.0	0.5294	0.238

Calculated cpm equivalent to 25 mrem

Nuclide	Conc equiv to 25 mrem (dpm/100cm ²)	GM efficiency cpm/dpm	Geometry correction	cpm equiv to 25 mrem
Th-230	3.70E+01	0.185	0.12	8.22E-01
Sr-90	8.70E+03	0.264	0.12	2.75E+02
Eu/Sb	1.10E+04	0.142	0.12	1.88E+02
Cs-137	2.80E+04	0.238	0.12	8.01E+02

Efficiency/MDA determination for Ludlum Model 3 Geiger-Mueller Detector

Ludlum Model 3 Serial Number 209104
 Model 44-9 Probe Serial Number 214599
 Calibrated by Ludlum 6/24/2005
 Check source reading (SRM 4275) 1450 cpm

Background: 50 cpm

Calibration date = 12/5/2005

Nuclide	Activity pCi	Cal. Date	Current Act'y pCi	T1/2 y	Gross Count Rate (cpm)	Net Count Rate (cpm)	Efficiency cpm/pCi	Efficiency cpm/dpm
Th-230	1.00E+04	3/22/2004	9999.84	7.54E+04	3,750	3700.0	0.3700	0.167
Sr-90/Y-90	1010.8	7/1/1995	786.25	2.88E+01	500	450.0	0.5723	0.258
Eu/Sb	23904.84	5/15/1995	3354.49	Mixed	1250	1200.0	0.3577	0.161
Cs-137	2109.8	8/28/2003	2002.13	30.07	1150	1100.0	0.5494	0.247

Calculated cpm equivalent to 25 mrem

Nuclide	Conc equiv to 25 mrem (dpm/100cm ²)	GM efficiency cpm/dpm	Geometry correction	cpm equiv to 25 mrem
Th-230	3.70E+01	0.167	0.12	7.40E-01
Sr-90	8.70E+03	0.258	0.12	2.69E+02
Eu/Sb	1.10E+04	0.161	0.12	2.13E+02
Cs-137	2.80E+04	0.247	0.12	8.32E+02

Operational Check - Model 43-37 C-14 Detector

Detector	Ludlum Model 43-37, Serial No.	093965	Scaler settings:	
Scaler	Ludlum Model 2221, Serial No.	197766	Voltage:	1800
C-14 Source	Isotope Products Laboratories	#488-27-7	Threshold	40
Activity on 5/1/1998		94.33 nCi	Window	200
Activity on 12/20/2005		94.24 nCi		

December 20 Results - Window In			December 20 Results - Window Out			December 12 Initial Operational Check - Window In		
Parameter	Count Time (min)	Counts	Parameter	Count Time (min)	Counts	Parameter	Count Time (min)	Counts
Background	1	990	Background	1	1204	Background	1	980
Background	1	988	Background	1	1181	C-14 Source	1	14100
Background	1	943	Background	1	1175	Efficiency - Window In		0.063
C-14 Source	1	14302	C-14 Source	1	27258	Detector open area		425 cm ²
C-14 Source	1	14335	C-14 Source	1	26857	Conc.to give 25 mrem/yr		3.67E+06
C-14 Source	1	13881	C-14 Source	1	27315	CPM to give 25 mrem/yr		9.78E+05
Mean Background Counts		974	Mean Background Counts		1187			
Mean Source Counts		14173	Mean Source Counts		27143			
Efficiency - Window In		0.0631	Efficiency - Window In		0.124			
Detector open area		425 cm ²	Detector open area		425 cm ²			
Table 5.19 value		3.67E+06	Table 5.19 value		3.67E+06			
CPM indicating 25 mrem/yr		9.84E+05	CPM indicating 25 mrem/yr		1.94E+06			

Close-out survey
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Minneapolis, MN

Operational check/C-14 Calibration

Ludlum Model 3 Geiger-Mueller Counters w/ Model 44-9 Pancake Probes
Dec. 27, 2005

C-14 Source Isotope Products Laboratories #488-27-7
Activity on 5/1/1998 94.33 nCi
Activity on 12/20/2005 94.24 nCi

Meter/Probe SN	Bkgd	SRM-4275 cpm	C-14 source cpm	Efficiency
208023 / 214613	40	1500	12000	0.05713
208240 / 214602	30	1450	10500	0.050013
208927 / 214612	30	1400	10000	0.047625
208190 / 214600	40	1400	11500	0.054742
209057 / 214603	30	1400	13000	0.061955
209104 / 214599	35	1450	11500	0.054766

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Appendix D

Room B7 Wipes Analyzed at 717 Delaware St.

Wipes collected from Room B7 - 11/18/05

Alpha Results

Wipe Location	Count Date/Time										
	18-Nov 1422	18-Nov 1537	18-Nov 1716	18-Nov 1842	19-Nov 1803	21-Nov 1523	2-Dec 1130	2-Dec 1321	2-Dec 1510	2-Dec 1732	2-Dec 1913
1- E Wall 6" from door	0.44	0.37	0.37	0.21	0.21	0.83	0.88	0.06	-0.01	-0.09	0.51
2 - E Wall 4' from S wall	2.66	2.13	2.13	1.68	1.68	1.75					
3- Center 7' from S wall	1.01	0.92	0.44	0.44	0.36	0.44	0.75	0.46	0.31	0.46	0.23
4- S Wall 12' from E wall	3.4	3.24	3.57	3.4	2.99	3.57	2.99	3.84	3.5	2.41	2.49
5- E Wall 8' from S wall	3.58	2.3	2.6	2.08	1.56	2.08	0.61	0.61	0.69	0.52	0.69

Beta Results

Wipe Location	Count Date/Time										
	18-Nov 1422	18-Nov 1537	18-Nov 1716	18-Nov 1842	19-Nov 1803	21-Nov 1523	2-Dec 1130	2-Dec 1321	2-Dec 1510	2-Dec 1732	2-Dec 1913
1- E Wall 6" from door	1.56	1.07	0.77	0.64	0.64	0.42	0.52	0.15	0.47	0.52	0.1
2 - E Wall 4' from S wall	5.21	3.99	2.91	3.21	3.78	3.56					
3- Center 7' from S wall	2.4	1.68	1.1	1.32	-0.02	0.96	0.53	0.48	0.53	0.66	1.27
4- S Wall 12' from E wall	8.11	5.83	5	5.48	4.04	4.47	4	5.22	4.48	4.22	3.69
5- E Wall 8' from S wall	6.34	5.33	4.77	4.63	3.62	3.52	1.25	0.98	1.07	0.32	0.32

Close-out survey
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Wipes collected from Room B7 - 12/2/05 and 11/18/05

Alpha results

Wipe Location	Count Date/Time				
	2-Dec 1130	2-Dec 1321	2-Dec 1510	2-Dec 1732	2-Dec 1913
1- E Wall 6" from door	0.37	0.14	0.21	0.06	0.44
2 - E Wall 4' from S wall	0.24	0.39	0.17	0.09	0.47
3- S Wall 12' from E wall	0.36	0.44	0.44	-0.12	0.28
4- Center 7' from S wall	0.6	0.02	0.11	0.27	0.02
1- E Wall 6" from door*	0.88	0.06	-0.01	-0.09	0.51
3- Center 7' from S wall*	0.75	0.46	0.31	0.46	0.23
4- S Wall 12' from E wall*	2.99	3.84	3.5	2.41	2.49
5- E Wall 8' from S wall*	0.61	0.61	0.69	0.52	0.69

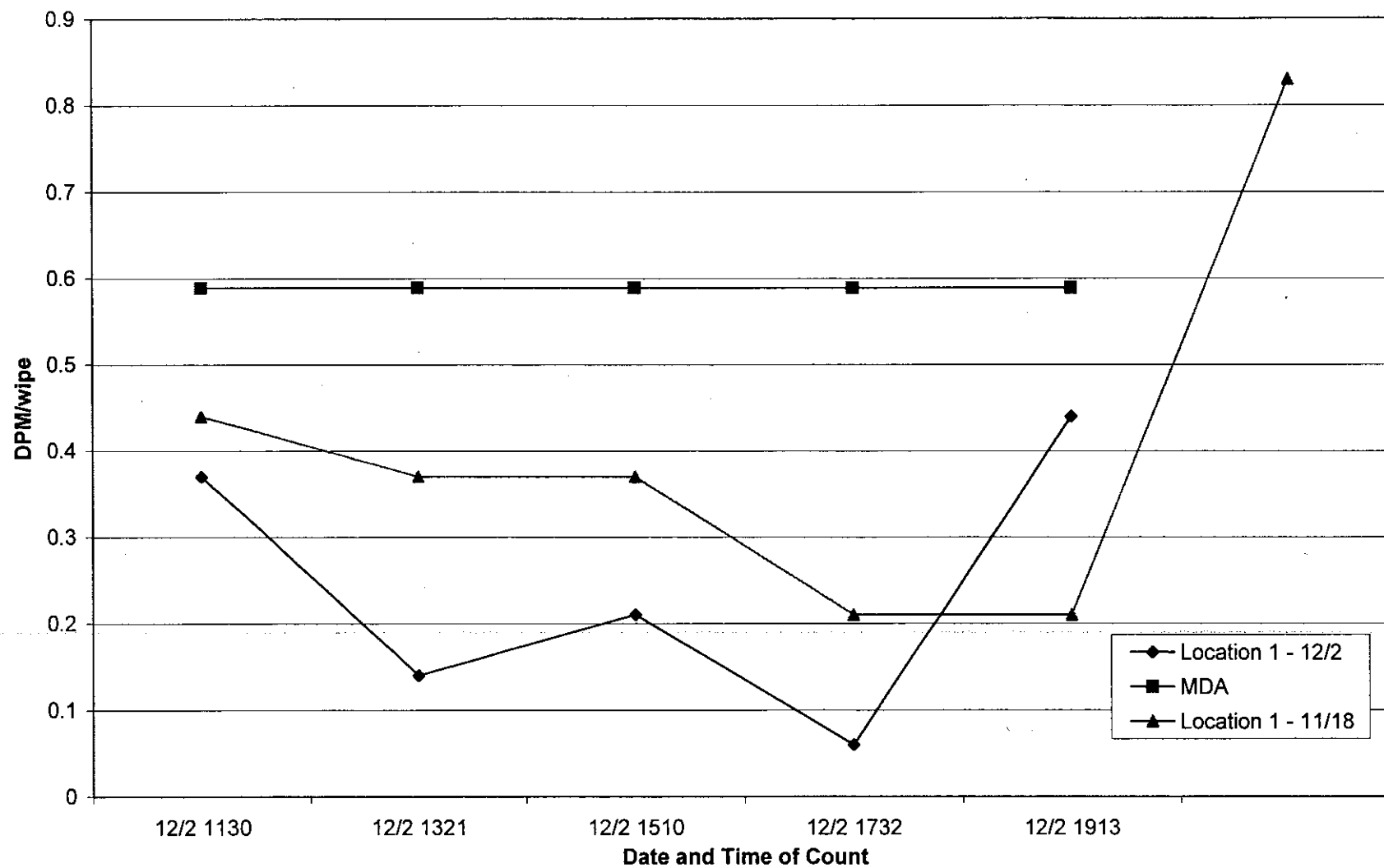
Beta results

Wipe Location	Count Date/Time				
	2-Dec 1130	2-Dec 1321	2-Dec 1510	2-Dec 1732	2-Dec 1913
1- E Wall 6" from door	1.51	0.72	0.55	0.5	0.33
2 - E Wall 4' from S wall	0.62	0.36	0.57	0.18	0.66
3- S Wall 12' from E wall	1.01	0.6	0.33	0.83	0.51
4- Center 7' from S wall	2.02	1.45	0.84	0.75	1.27
1- E Wall 6" from door*	0.52	0.15	0.47	0.52	0.1
3- Center 7' from S wall*	0.53	0.48	0.53	0.66	1.27
4- S Wall 12' from E wall*	4	5.22	4.48	4.22	3.69
5- E Wall 8' from S wall*	1.25	0.98	1.07	0.32	0.32

* Wipes collected 11/18/05

Location 1 - Alpha

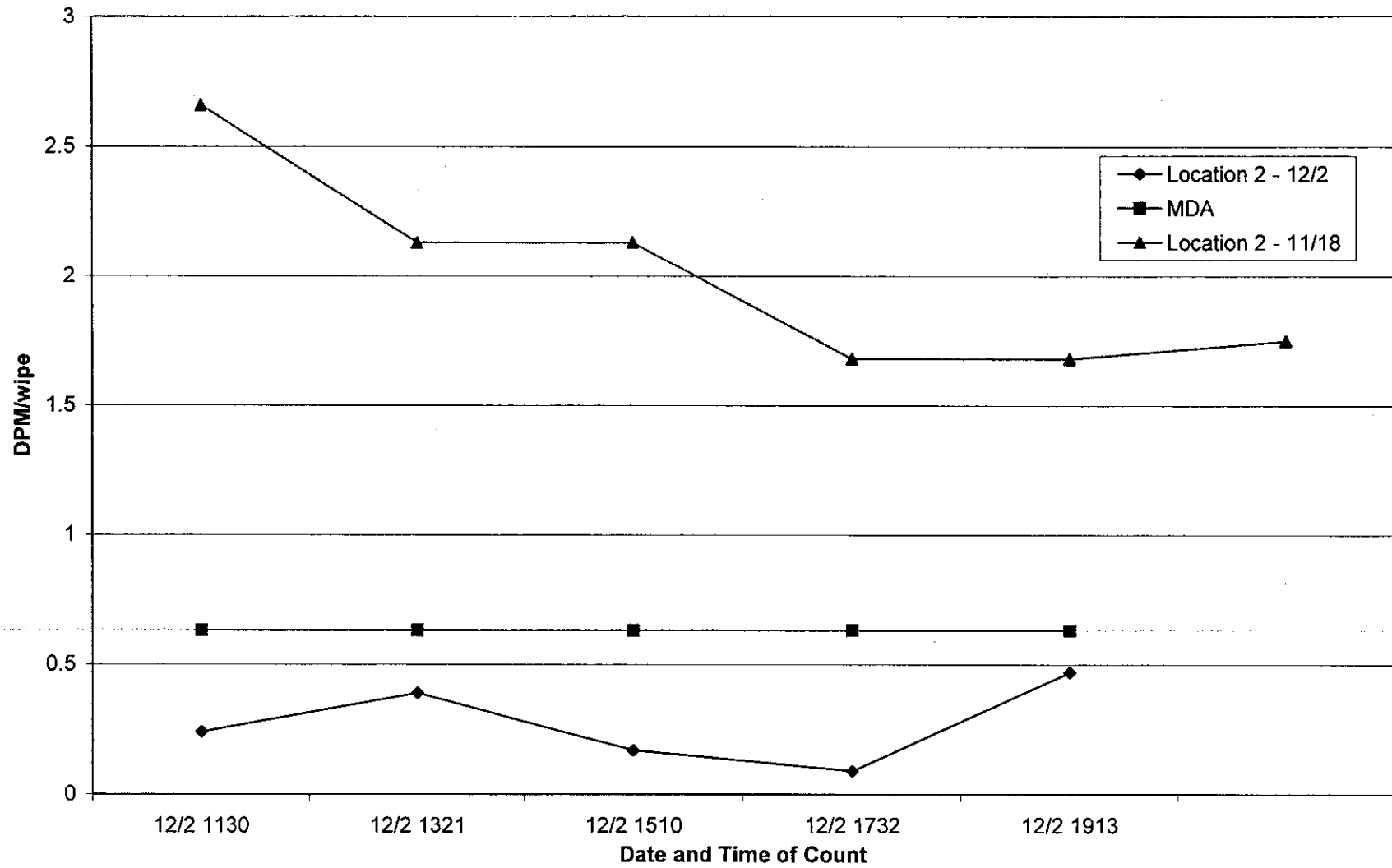
Wipes taken 11/18/05 and 12/2/05



(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

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Location 2 - Alpha
Wipes taken 11/18/05 and 12/2/05

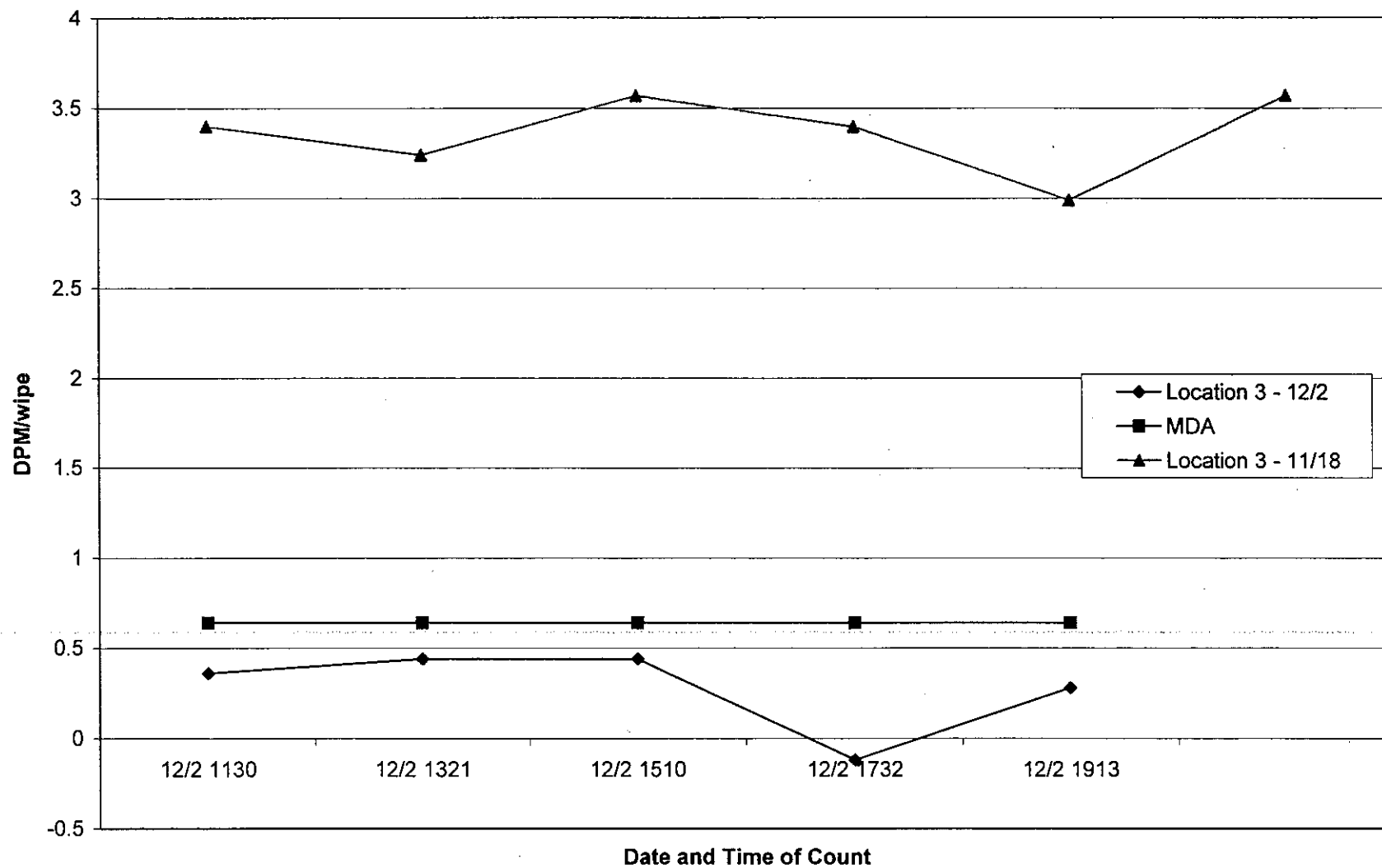


(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

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Location 3 - Alpha

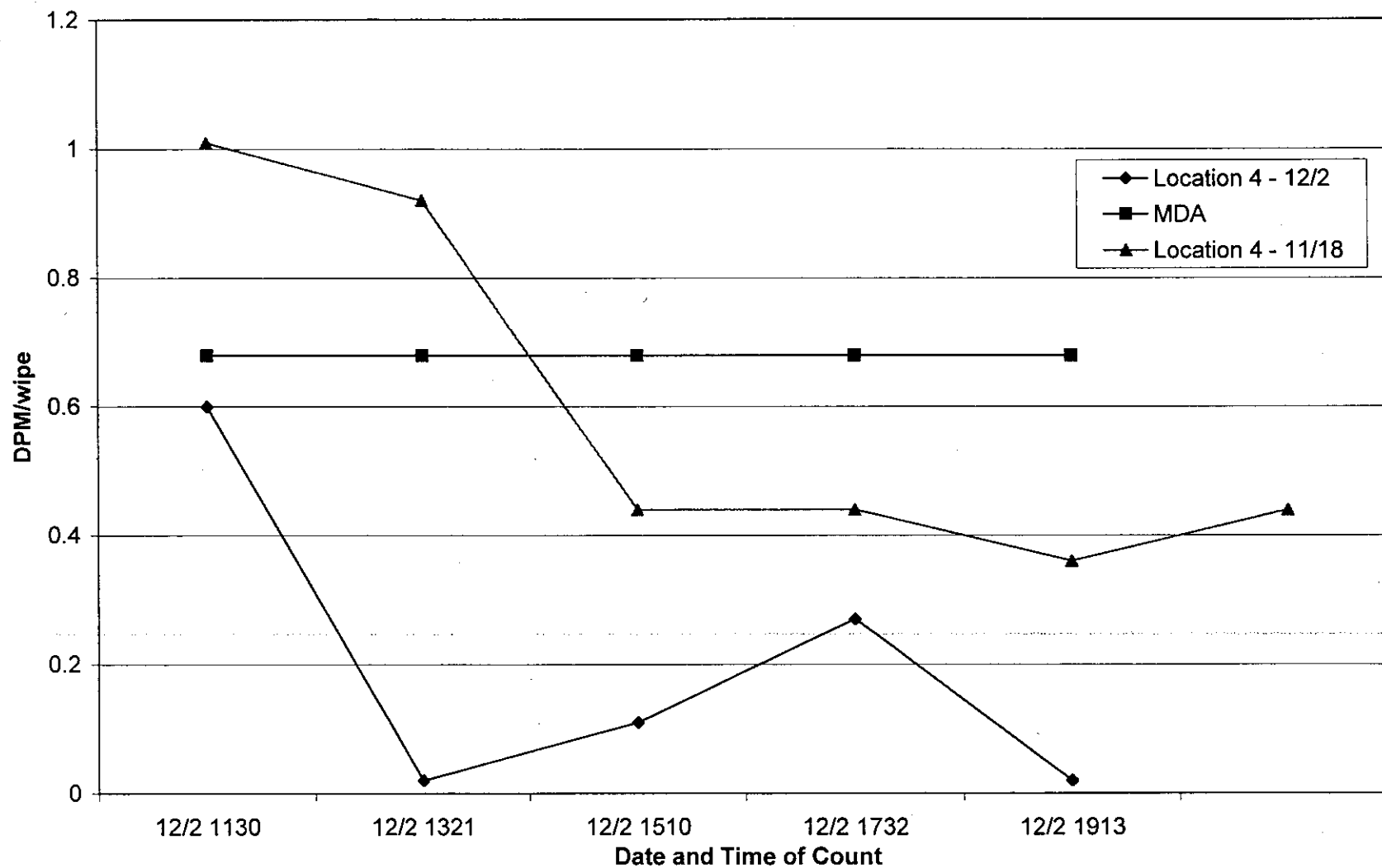
Wipes taken 11/18/05 and 12/2/05



(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

Close-out survey
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Minneapolis, MN

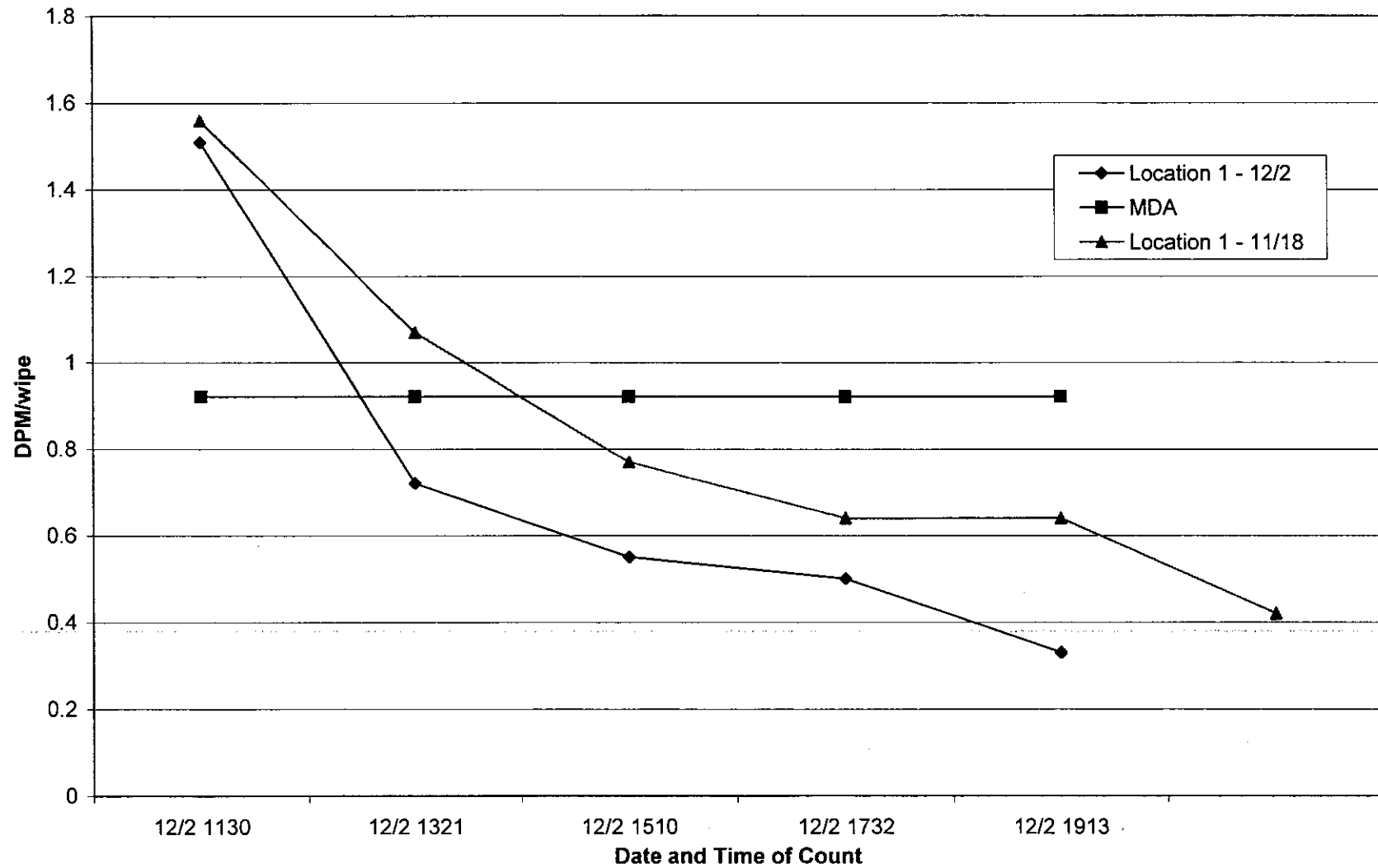
Location 4 - Alpha
Wipes taken 11/18/05 and 12/2/05



(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

Close-out survey
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Minneapolis, MN

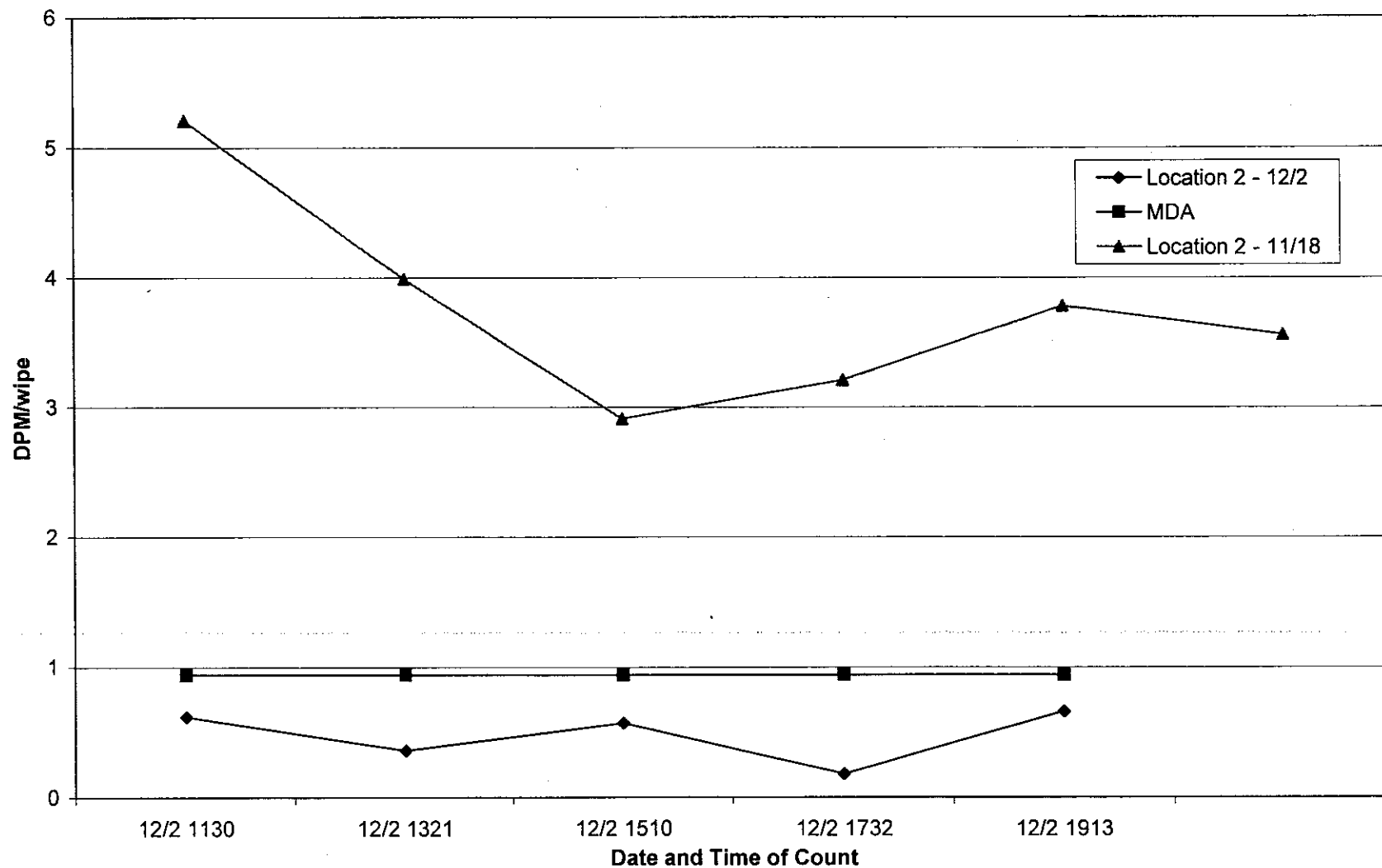
Location 1 - Beta
Wipes taken 11/18/05 and 12/2/05



(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

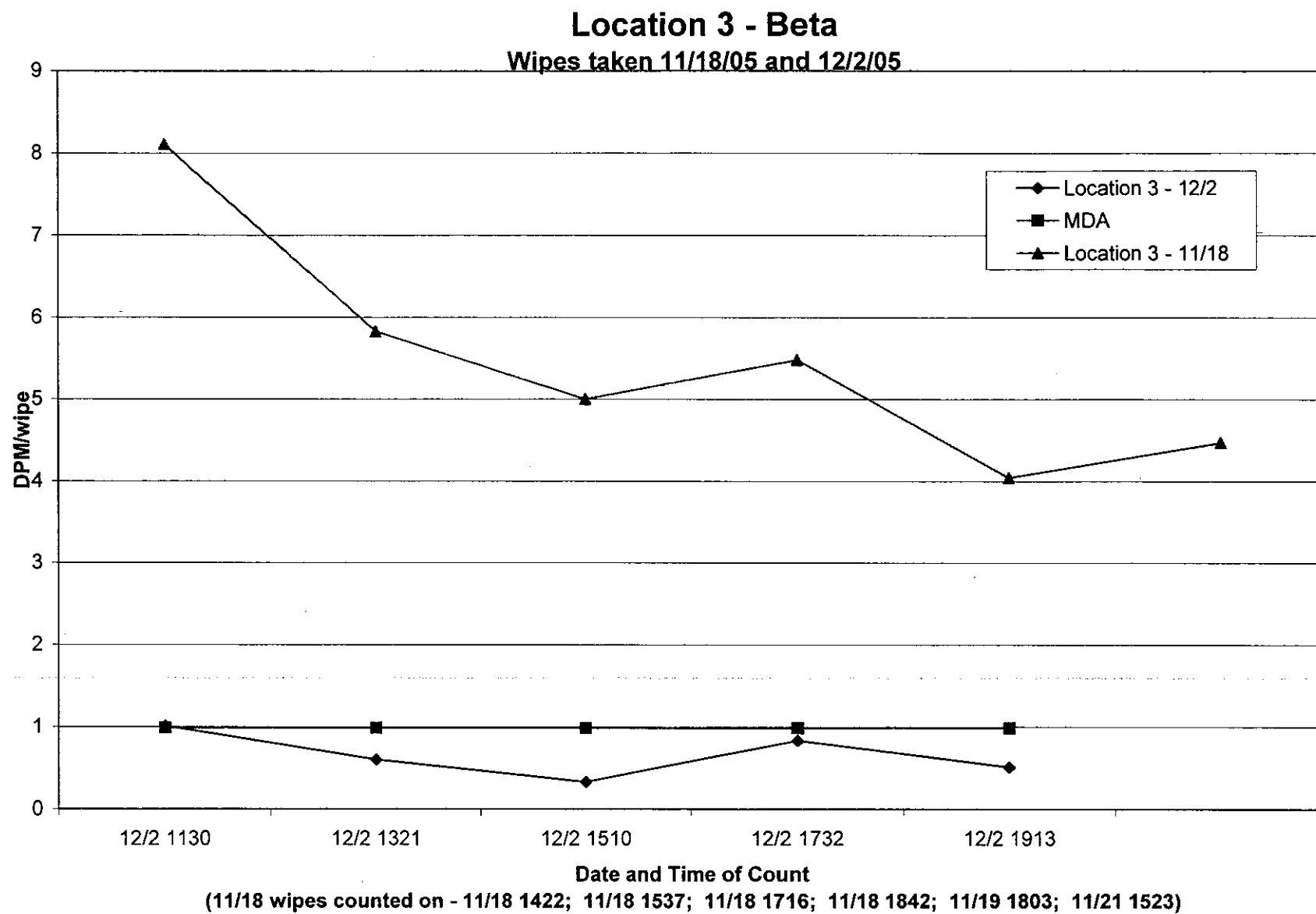
Close-out survey
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Location 2 - Beta
Wipes taken 11/18/05 and 12/2/05



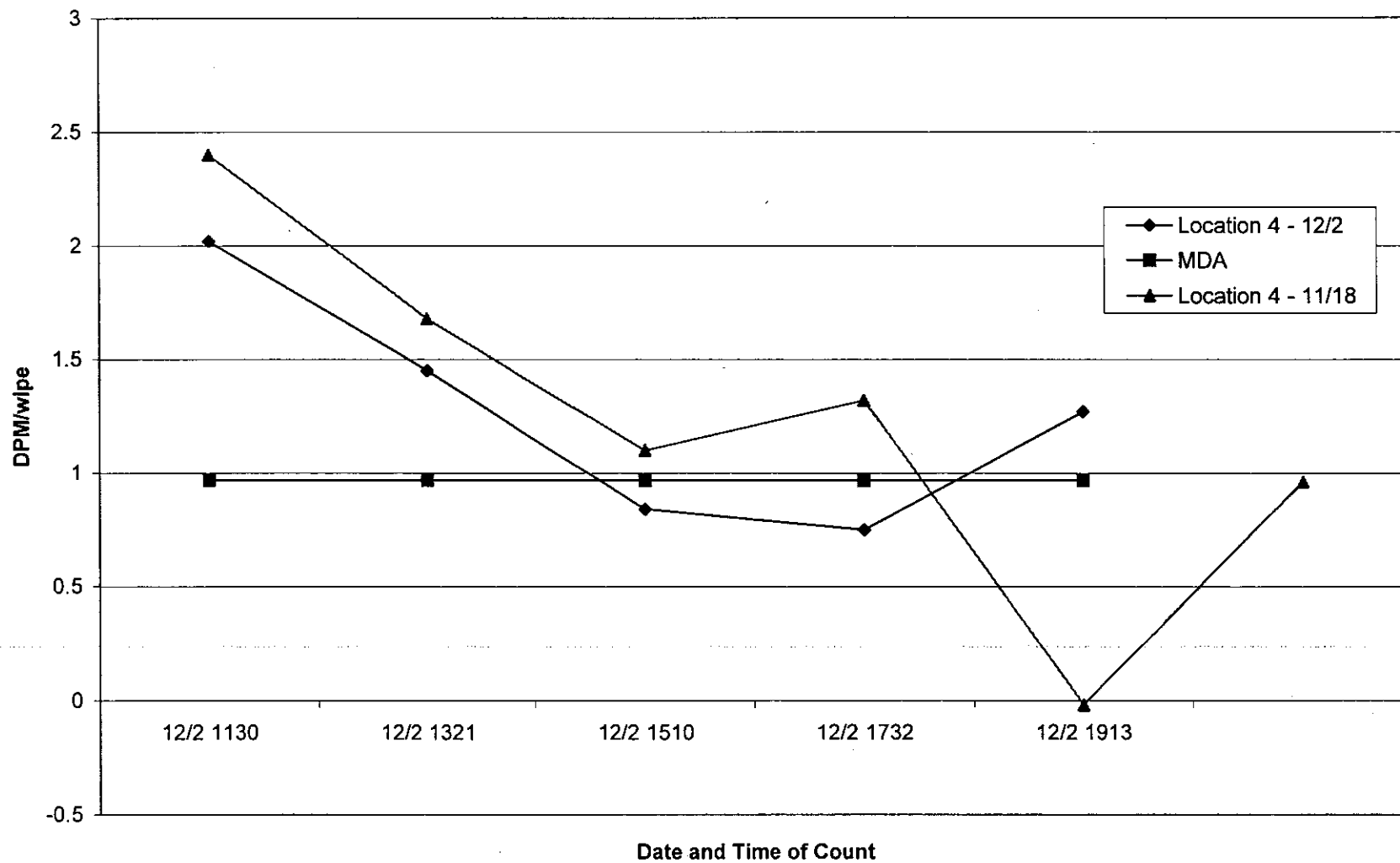
(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

Close-out survey
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Minneapolis, MN



Close-out survey
717 Delaware St.
Minneapolis, MN

Location 4 - Beta
Wipes taken 11/18/05 and 12/2/05



(11/18 wipes counted on - 11/18 1422; 11/18 1537; 11/18 1716; 11/18 1842; 11/19 1803; 11/21 1523)

Close-out survey
717 Delaware St.
Minneapolis, MN

EXPRESS



FedEx. USA Airbill
Express

FedEx Tracking Number **836812921880**

Sender **JOHN LORENZ**
Company **MINNESOTA PUBLIC HEALTH LAB**
City **ST. PAUL**
State **MN**
Zip **55114**

2. Your Internal Billing Code **4103**

3. Package Description **3**

4a Express Package Service
☒ FedEx Priority Overnight
☐ FedEx 2Day
☐ FedEx 3Day
☐ FedEx 4Day Freight*

4b Express Freight Service
☐ FedEx 4Day Freight*
☐ FedEx 5Day Freight*

5. Packaging
☒ FedEx Envelope*
☐ FedEx Box*
☐ FedEx Tube*

6. Special Handling
☐ SATURDAY Delivery
☐ Signature Required
☐ Signature Restricted
☐ Insured
☐ Fragile
☐ Restricted
☐ Hazardous
☐ Other

7. Release Signature
 Signature: _____
 Date: _____

8. Return Address
 Name: _____
 Address: _____
 City: _____
 State: _____
 Zip: _____

9. Recipient Address
 Name: _____
 Address: _____
 City: _____
 State: _____
 Zip: _____

10. Total Weight **3**

11. Total Value **000.00**

12. Insurance **000.00**

13. Total Charges **000.00**

14. Total Amount Due **000.00**

15. Payment Method **CASH**

16. Payment Date **01/16/06**

17. Payment Location **ST. PAUL, MN**

18. Payment Reference **836812921880**

19. Payment Status **PAID**

20. Payment Amount **000.00**

21. Payment Currency **USD**

22. Payment Type **CASH**

23. Payment Method **CASH**

24. Payment Date **01/16/06**

25. Payment Location **ST. PAUL, MN**

26. Payment Reference **836812921880**

27. Payment Status **PAID**

28. Payment Amount **000.00**

29. Payment Currency **USD**

30. Payment Type **CASH**

FedEx

PRIORITY OVERNIGHT

MON

EMP: 31175 13JAN06

TRK# **8368 1292 1880**

FORM 0200

Deliver By: **16JAN06**

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