Report of Radiological Survey of Beverly Hills High School and Venoco Oil Well Site

Prepared by

California Department of Health Services,
Radiologic Health Branch

Revised November 2003

There have been concerns expressed about the potential for elevated levels of radioactive materials at Beverly Hills High School (BHHS). Of specific concern was the potential for elevated levels of naturally occurring radioactive materials (NORM), and iodine-131 (I-131). To address these concerns, the Department of Health Services performed radiological surveys of the Venoco oil well site and BHHS during August through September 2003 (Figure 1.). Based on a review of the oil well site operational history, survey results, and laboratory results, there is no evidence that the Venoco site has caused an increase in radioactive materials on adjoining BHHS properties. This assessment is based on the following:

- The radioisotope, I-131 was not found during on-site surveys or identified in laboratory analyses. This is expected due to the nature of the use of I-131 at the Venoco site, the quantity used, and the short physical half-life of the radioisotope (8.04 days).

- There was no indication of elevated radium-226 (Ra-226) concentrations on the Venoco site. The background radiation dose values on the Venoco site are approximately 5 to 6 microrem per hour (µrem/hr). There was no elevated Ra-226 activity detected based on in-situ High Purity Germanium (HPGe) detector and laboratory analyses.

- On-site surveys and laboratory analyses are comparable to or lower than those of a similar background reference area, approximately one mile upwind of the BHHS site.

- Ra-226 and uranium-238 (U-238) concentrations are comparable indicating secular equilibrium. Oil well locations with elevated radiation levels are due to Ra-226, not U-238 and Ra-228.

- Sampling and analyses of for indoor and outdoor radon levels.

Background Location

Background measurements were obtained at an empty lot located at the corner of Olympic Avenue and Kerwood Avenue in Beverly Hills. The background location is upwind (southwest) and approximately one mile from the high school. It should be noted that the soil at the school might have been brought in from locations other than the immediate area. This is based on the appearance of dark soil beneath the grass of the softball field and athletic field, and the red clay soil used for the softball infield and areas adjacent to the outdoor basketball court. There were variations noted on the radiation data logging system and the HPGe, and they are discussed below.

On Site Radiological Surveys

The radiological surveys consisted of the following:

- A radiation mapping survey of 25% of all the areas accessible to the “buggy” at the Venoco oil well site (approximately 50% of the Venoco site was accessible to the “buggy”), BHHS softball field, outdoor basketball courts, and athletic field (Figure 2.) The radiation data logging system recorded 13,381 data points with each data point

containing latitude, longitude, date, time, and detector counts per second. Minor variations were identified during the radiation mapping surveys; however, these variations generally corresponded to the variations in the surfaces surveyed. I.e., differences were identified between the grassy areas and the baseball field soil (red dirt) areas (Figure 3.) This survey was limited to the surface (top 6 to 12 inches) of the areas surveyed.

- Eight in-situ HPGe detector gamma spectroscopy measurements and seven discreet soil samples were collected at BHHS. No soil samples were obtained in the outdoor basketball court because it was paved. See Figures 4 & 5 and Tables 1 through 3. As an example of HPGe measurement, see Figure 6.

- In-situ HPGe measurements were obtained at biased locations on the Venoco site (well head area, Figure 7) and at random locations at the site (Figure 8). In-situ HPGe measurements showed only naturally occurring radioactive materials consistent with normal background, see Table 1. No I-131 was identified during this survey.

Based on a mapping of the radiation data logging system measurements, there was no indication that "spotty" or localized elevated radiation levels were present on the school grounds. The HPGe measurements confirmed that no elevated thorium, uranium, or radium were present at the Venoco site or at BHHS. As a side note, radiation data logging counts show lower values for grassy areas and higher values for the red clay soil, see Table 2. HPGe measurements could not be analyzed at locations where concrete or asphalt covered the soil. However, the HPGe measurements for bismuth-214 (Bi-214) and actinium-228 (Ac-228) were compared to the background and all values are within background levels. The presence of elevated Bi-214 or Ac-228 would indicate the presence of elevated uranium and thorium respectively.

I-131 Evaluation

I-131 was used at the Venoco site to determine flow rates in the wells. The I-131 in a non-volatile form was injected into the wells thousands of feet below the surface. The quantity used was less than one millicurie in each logging procedure. Dose modeling was performed to determine potential off-site radiological doses using the Department of Energy's Hot Spot computer code (Figure 9). Assuming 10 millicuries (a factor of 10 times higher than normally used quantity) of I-131 was spilled in a one-meter square area at the surface, the resulting dose would be approximately one millirem immediately adjacent to the Venoco site and it would rapidly drop with distance (Figure 10). This model is also conservative in that there is a 20-foot wall separating the Venoco site from the school site acting as a barrier. Venoco usually performs this I-131 logging procedure once every two years.

Uranium/Thorium/Ra-226 Laboratory Results

Laboratory analyses of soil samples obtained at the high school indicate that the concentrations are less than or comparable to background and that the Ra-226 activity is relatively the same as that of U-238. Ra-226 is a progeny of U-238. Had the Ra-226

concentration been significantly higher than that of U-238, then there would have been a strong possibility that the Venoco site could be a source of NORM contamination. But since this was not found to be the case, the Venoco site is not a source of NORM contamination. Several comparison graphs of the laboratory alpha spectroscopic analysis results of the soil samples are depicted in Figures 11, 12 and 13. Figure 14 shows a comparison of the U-238 alpha spectroscopic analysis results to the Ra-226 gamma spectroscopic analysis results. In addition, see Table 1 for all spectroscopic analysis results used in these graphs.

Radon Evaluation

- Short term Radon sampling of BHHS buildings and outdoor areas.
- Short term Radon sampling of the Venoco Oil Well Site.
- Short term Radon sampling of a control site approximately one mile from BHHS, a vacant lot at the corner of W. Olympic and Kerwood.

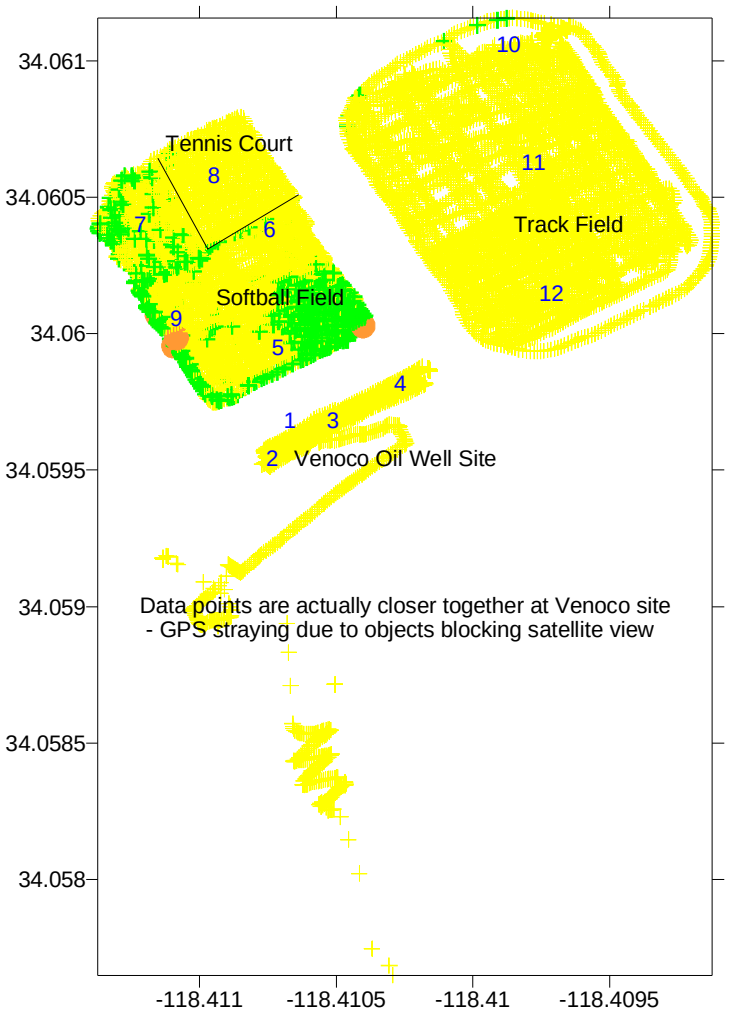
The California Department of Health Services, Division of Drinking Water & Environmental Management, Environmental Management Branch performed short term radon testing at the Beverly Hills High School using activated charcoal canisters. The canisters were placed both indoors (91 canisters) and outdoors (22 canisters) at multiple locations on the BHHS campus, the Venoco site and offsite at the control location. See Table 4 for indoor radon canister placement locations and analysis results. Also, see Figures 15,16, 17 and18 for outdoor radon canister placement locations and Table 5 for their analysis results. The analysis results showed the average indoor radon concentration to be 0.4 pCi/L with a high of 1.6 pCi/L, which is lower than the U.S. Environmental Protection Agency (EPA) action level for indoor radon concentrations of 4.0 pCi/L. No remedial actions are suggested for the radon concentration levels found inside the school buildings. All the outdoor radon concentration levels are reported to be less than 0.3 pCi/L, as compared to the national average outdoor radon concentration of 0.4pCi/L that is reported by the EPA in it's "Citizen's Guide to Radon" (4th edition) revised May 2002.

Figure 1: Beverly Hills High School and Venoco site

Figure 2: Radiation Data Logging System on Track Field

Figure 3:

VENOCO and BEVERLY HILLS HIGH SCHOOL RADIOLOGICAL SURVEY
AUGUST 6 - 8, 2003



Detector Counts per Second (CPS)
Bkg = 483 CPS
Bkg + 4 sigma = 573 CPS
Th-232, 1 pCi/g = 67.6 Counts per Second
Ra-226, 1 pCi/g = 42.4 Counts per Second

126 to 483
483 to 572
573 to 622.1

Survey Performed By
J. Hensley
R. Lupo
S. Pay

Figure 4:

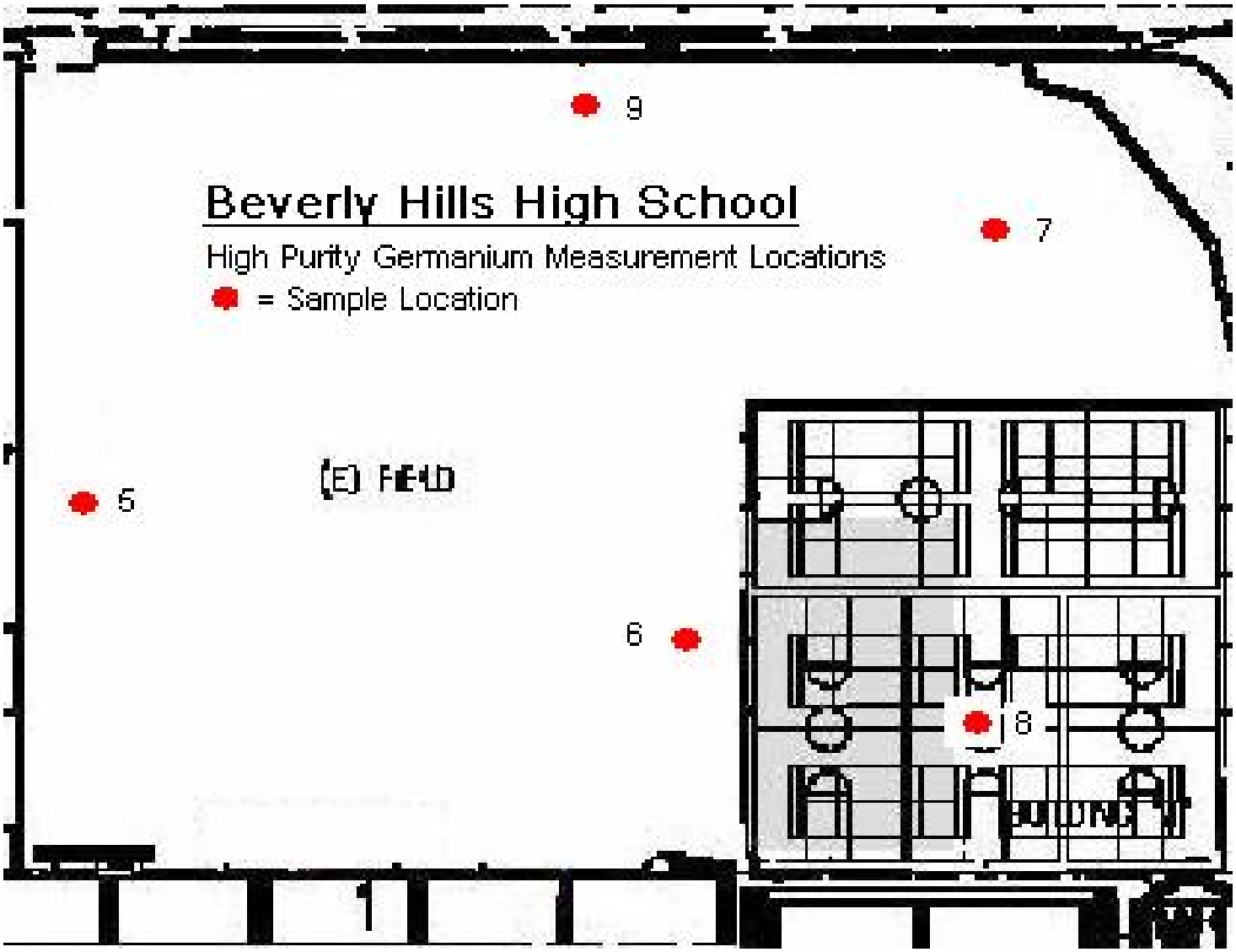

Beverly Hills High School
High Purity Germanium Measurement Locations
= Sample Location
9
7
5
6
8
1

Figure 5:

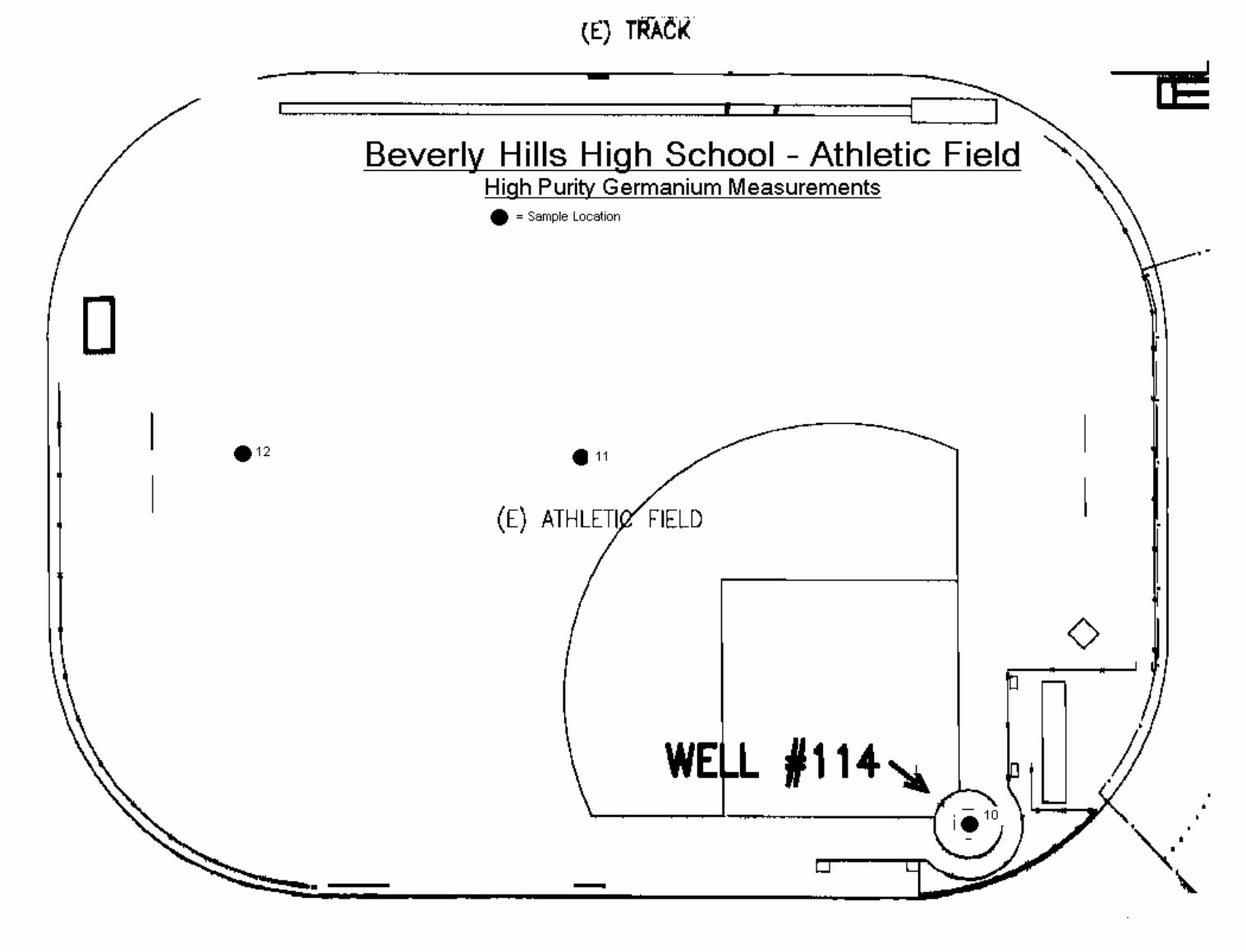

(E) TRACK
Beverly Hills High School - Athletic Field
High Purity Germanium Measurements
= Sample Location
12
11
(E) ATHLETIC FIELD
WELL #114
10

Table 1: High Purity Germanium Measurements

Location (On Map)	File Name	Matrix	InSitu Measurements			Laboratory Soil Analysis				Sample Number on Graphs
			K-40 (1640.8 keV)	U-238 (609.3 keV)	Th-232 (911.6 keV)	K-40 Gamma	U-238 Gamma (Alpha Spec)	Th-232 Gamma (Alpha Spec)	Ra-226 Gamma	
			Field pCi/g	Field pCi/g	Field pCi/g	Lab pCi/g	Lab pCi/g	Lab pCi/g	Lab pCi/g	
Deck Plate above Well Heads (1)	08-06-03-01.cnf	Air	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A
Middle of Well Heads (1)	08-06-03-02.cnf	Concrete walls	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A
West End of Venoco Site (2)	08-06-03-03.cnf	Concrete/Asphalt	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A
Center of Venoco Site (3)	08-06-03-04.cnf	Asphalt	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A
East End of Venoco Site (4)	08-06-03-05.cnf	Concrete	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A
Softball Field Next to Venoco Site (5)	08-07-03-01.cnf	Dirt	22.01	1.02	**1.24*** **	19.2	0.758 (0.634)	0.917 (0.835)	0.710	1
Softball Field Next to Tennis Court (6)	08-07-03-02.cnf	Grass	17.2	0.623	0.987	19.1	0.506 (0.474)	0.971 (0.795)	0.575	2
North of Tennis Court (7)	08-07-03-03.cnf	Dirt	23.81	0.89	1.15	18.3	0.288 (0.556)	0.981 (0.851)	0.684	3
Center of Tennis Court (8)	08-07-03-04.cnf	Asphalt	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	N/A
Highest Reading on Softball Field (9) see 08-08-03-01.cnf	08-07-03-05.cnf	Grass /Dirt	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**	N/A**	N/A
Track Field – North End Under Baseball Cage (10)	08-07-03-06.cnf	Dirt	17.96	0.791	1.079	19.7	0.788 (0.629)	0.939 (0.953)	0.697	6
Track Field – Center (11)	08-07-03-07.cnf	Grass	15.48	0.639	0.835	19.5	1.17 (0.644)	0.931 (0.986)	0.714	7
Track Field – South End (12)	08-07-03-08.cnf	Grass	15.94	0.659	0.844	18.5	0.862 (0.697)	0.912 (1.087)	0.629	8
Background – Olympic and Kerwood	08-08-03-bkg.cnf	Dirt	21.28 +/- 8%	1.064 +/- 14%	1.016 +/- 18%	19.9	1.03 (0.719)	0.878 (0.836)	0.991	Bkgd
Highest Reading on Softball Field – Recount (9)	08-08-03-01.cnf	Grass /Dirt	21.58	0.893	0.975	19.3	0.451 (0.523)	0.885 (0.823)	0.574	5

* Unable to quantify activity due to unique geometry or unknown depth of concrete or asphalt.
** HPGe measurement only 19 seconds instead of 1200 seconds – see 08-08-03-01.cnf for recount information
***High Th-232 reading may be due to the proximity (approximately 15 feet) to the concrete block wall separating the Venoco site and the BHHS softball field.

Table 2: High Purity Germanium Measurements

Location (On Map)	File Name	Matrix	K-40 (1640.8 keV) Net Counts	U-238 (609.3 keV) Net Counts	Th-232 (911.6 keV) Net Counts
Deck Plate above Well Heads (1)	08-06-03-01.cnf	Air	421	51	54
Middle of Well Heads (1)	08-06-03-02.cnf	Air	892	185	91
West End of Venoco Site (2)	08-06-03-03.cnf	Concrete/ Asphalt	1120	197	173
Center of Venoco Site (3)	08-06-03-04.cnf	Asphalt	1060	126	148
East End of Venoco Site (4)	08-06-03-05.cnf	Concrete	920	192	138
Softball Field Next to Venoco Site (5)	08-07-03-01.cnf	Dirt	1130	348	192
Softball Field Next to Tennis Court (6)	08-07-03-02.cnf	Grass	885	213	164
North of Tennis Court (7)	08-07-03-03.cnf	Dirt	1230	304	177
Center of Tennis Court (8)	08-07-03-04.cnf	Asphalt	1220	251	151
Highest Reading on Softball Field (9) see 08-08-03-01.cnf	08-07-03-05.cnf	Grass /Dirt	N/A**	N/A**	N/A**
Track Field – North End Under Baseball Cage (10)	08-07-03-06.cnf	Dirt	924	270	179
Track Field – Center (11)	08-07-03-07.cnf	Grass	797	218	139
Track Field – South End (12)	08-07-03-08.cnf	Grass	821	225	130
Background – Olympic and Kerwood	08-08-03-bkg.cnf	Dirt	1110	363	169
Highest Reading on Softball Field – Recount (9)	08-08-03-01.cnf	Grass /Dirt	1110	305	162

**N/A See recount file 08-08-03-01 for data

Table 3: Radiation Data Logging Values for the InSitu Measurements

Location	**Detector Counts per Second**	**GPS - Latitude**	**GPS - Longitude**
Softball Field Next to Venoco Site (5)	457.6	118.4106552 W	34.05999808 N
Softball Field Next to Tennis Court (6)	376.6	118.410711 W	34.06039122 N
North of Tennis Court (7)	446.1	118.4112195 W	34.06036698 N
Center of Tennis Court (8)	421.9	118.4109271 W	34.06056886 N
Highest Reading on Softball Field (9)	452.8	118.4111663 W	34.06009293 N
Track Field – North End Under Baseball Cage (10)	386.4	118.4097241 W	34.06109675 N
Track Field – Center (11)	348.2	118.4097121 W	34.06059198 N
Track Field – South End (12)	338.8	118.4096618 W	34.06017897 N
Background – Olympic and Kerwood	483.1	118.4191002 W	34.05147832 N
Highest Reading on Softball Field – Recount (9)	662, a single one-second value during scan	118.4111663 W	34.06009293 N

Bkgd = 483.1 Counts per Second
Bkgd + 2 sigma = 527.98 Counts per Second
Bkgd + 3 sigma = 550.42 Counts per Second
Bkgd + 4 sigma = 572.86 Counts per Second
Th-232, 1 pCi/g ~ 67.6 Counts per Second
Ra-226, 1 pCi/g ~ 42.4 Counts per Second

Figure 6: High Purity Germanium Detector In-Situ Measurement on Track Field

Figure 7: High Purity Germanium Detector In-Situ Measurement Between Well Heads

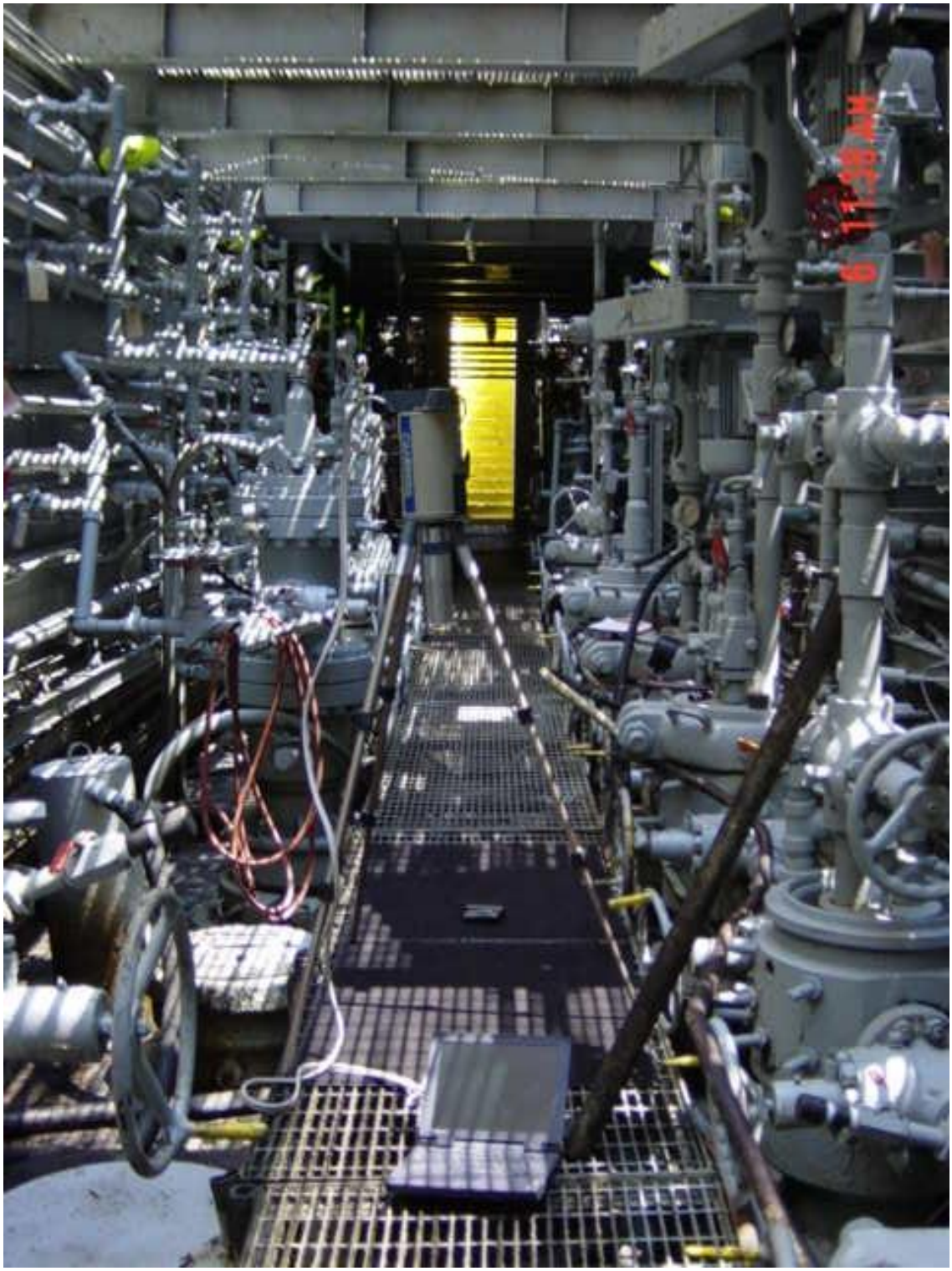


Figure 8:

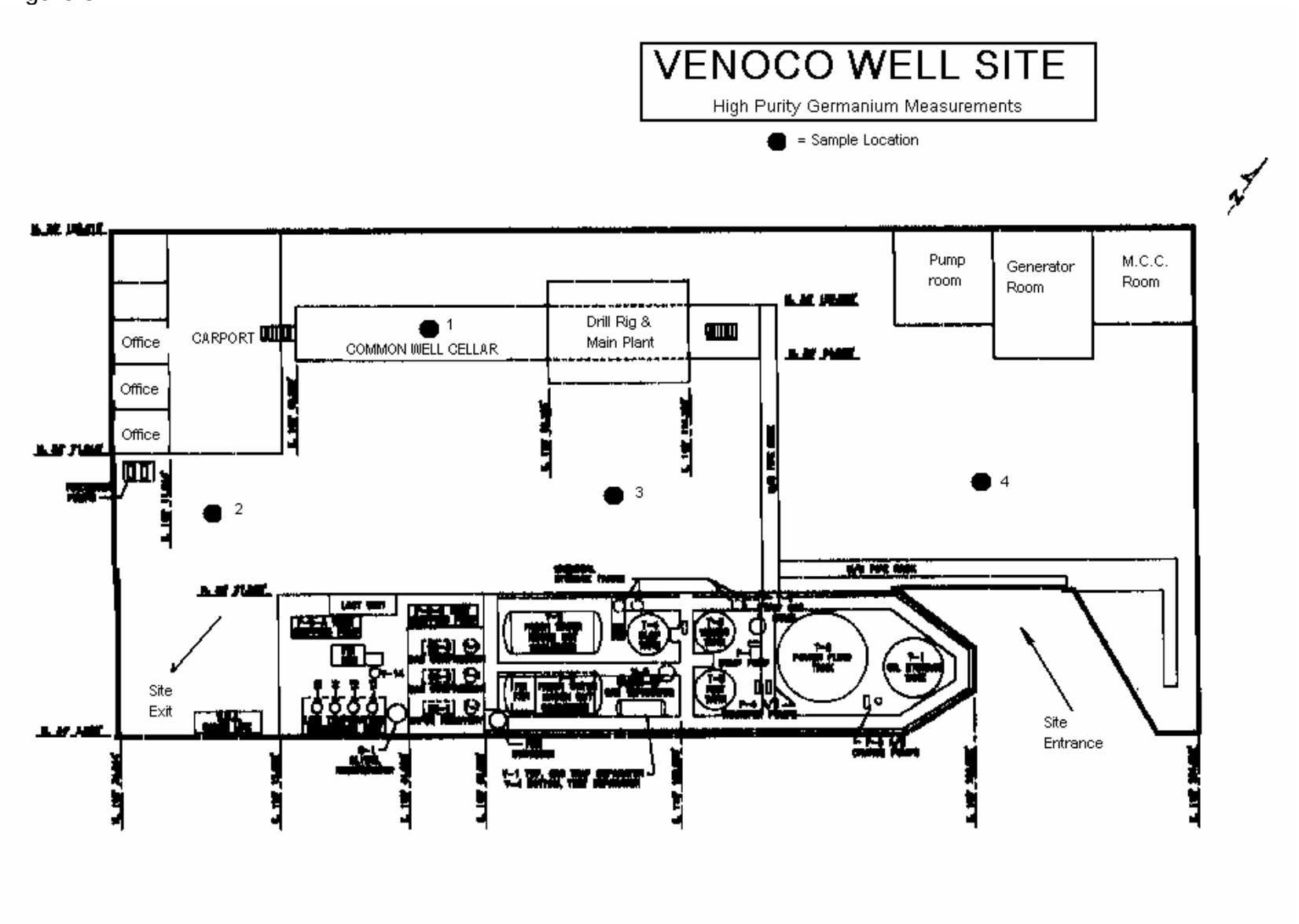

VENOCO WELL SITE
High Purity Germanium Measurements
= Sample Location
Office
Office
Office
CARPORT
1
COMMON WELL CELLAR
Drill Rig &
Main Plant
Pump
room
Generator
Room
M.C.C.
Room
2
3
4
Site
Exit
Site
Entrance

Figure 9: Output from DOE Hotspot Computer Code – Plume Contours

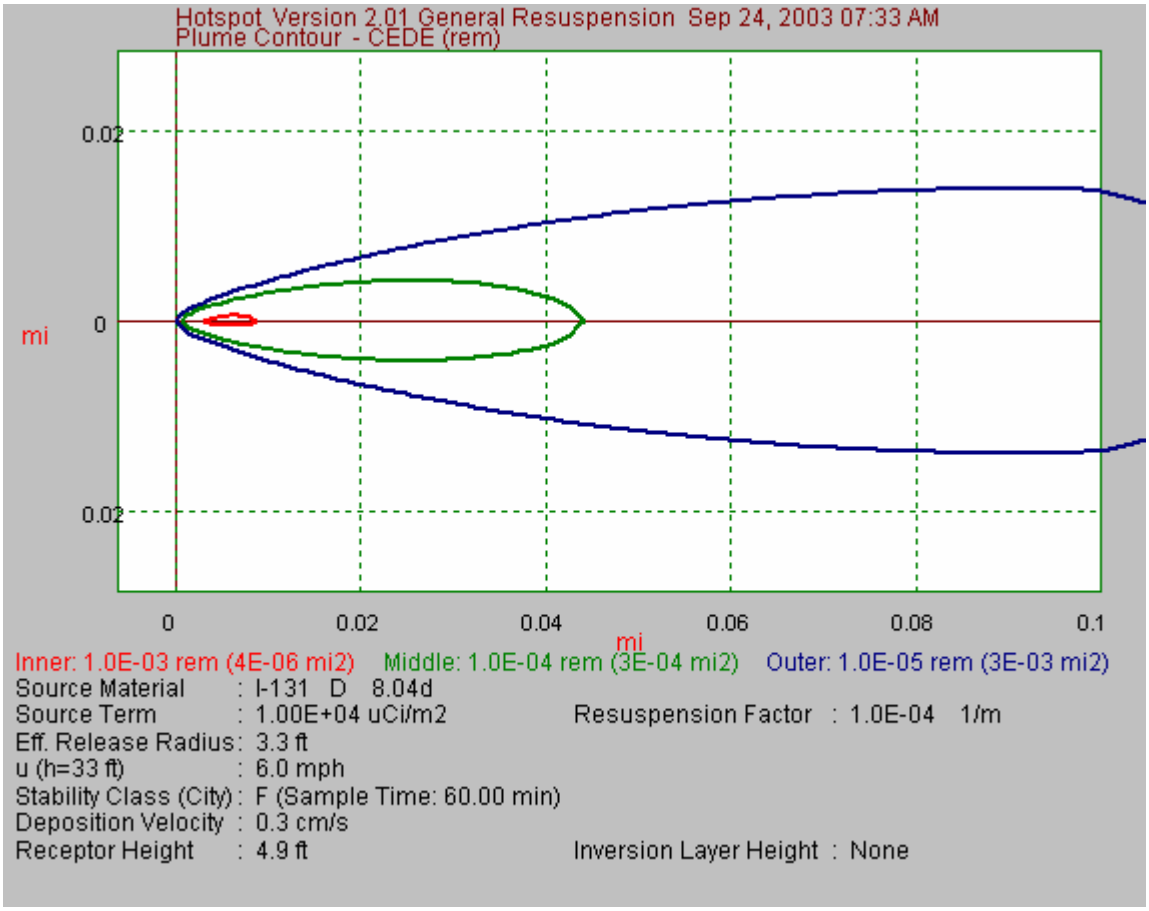


Figure 10: Output from DOE Hotspot Computer Code – Dose as a Function of Distance

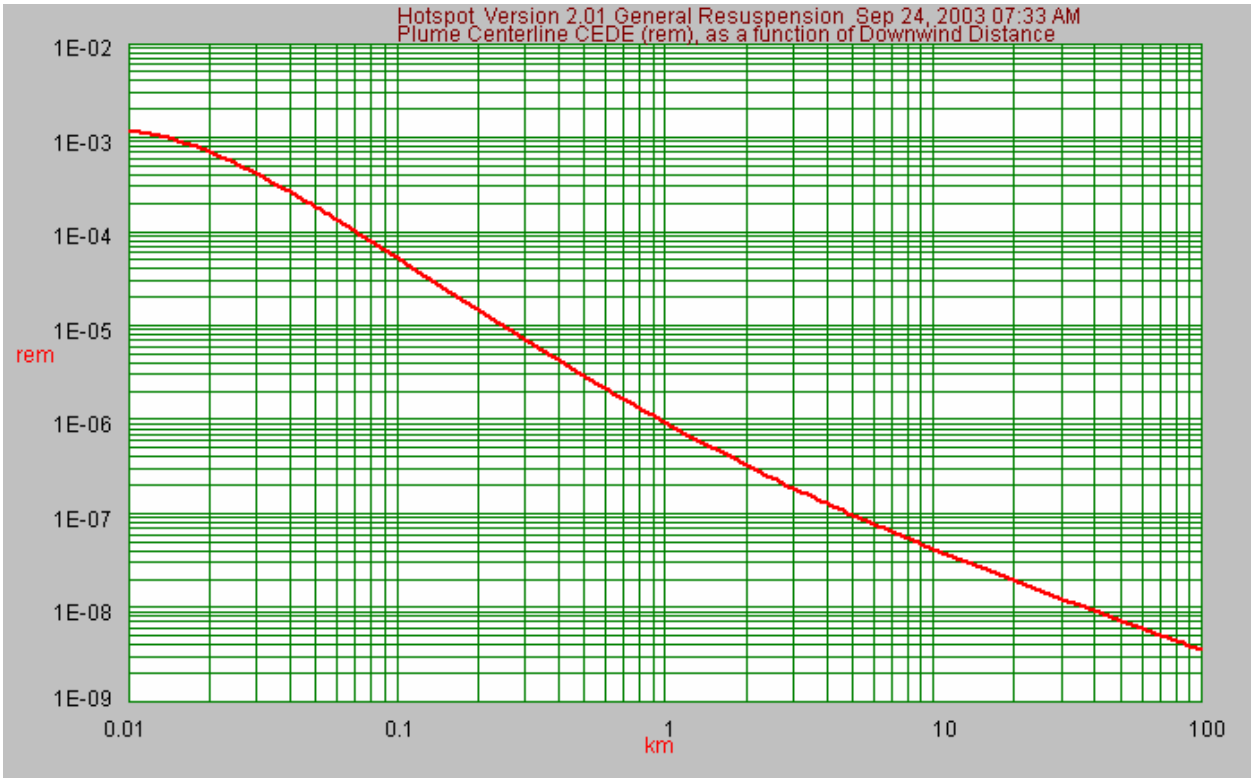


Figure 11: Comparison of U-238 and Th-232 concentrations.

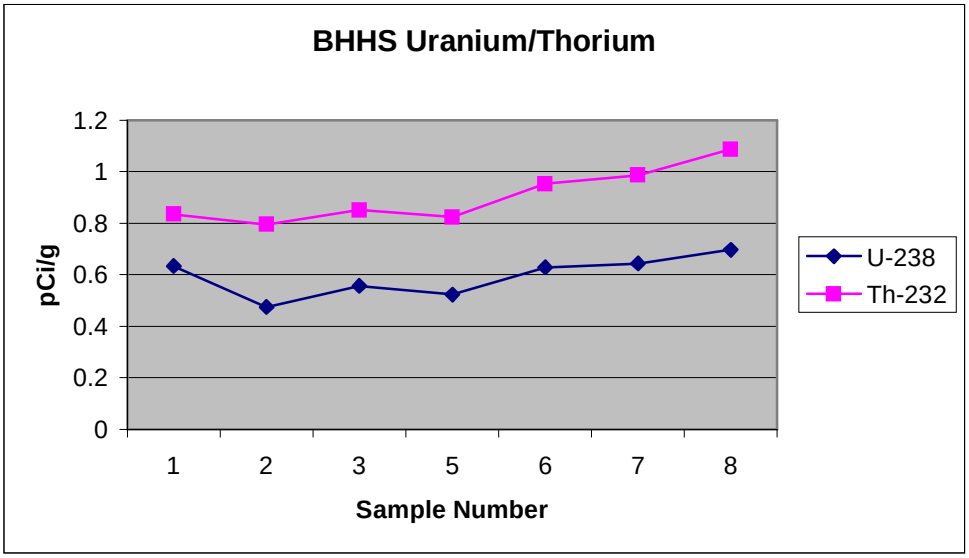


Figure 12: Comparison of U-238 from BHHS and U-238 from Background

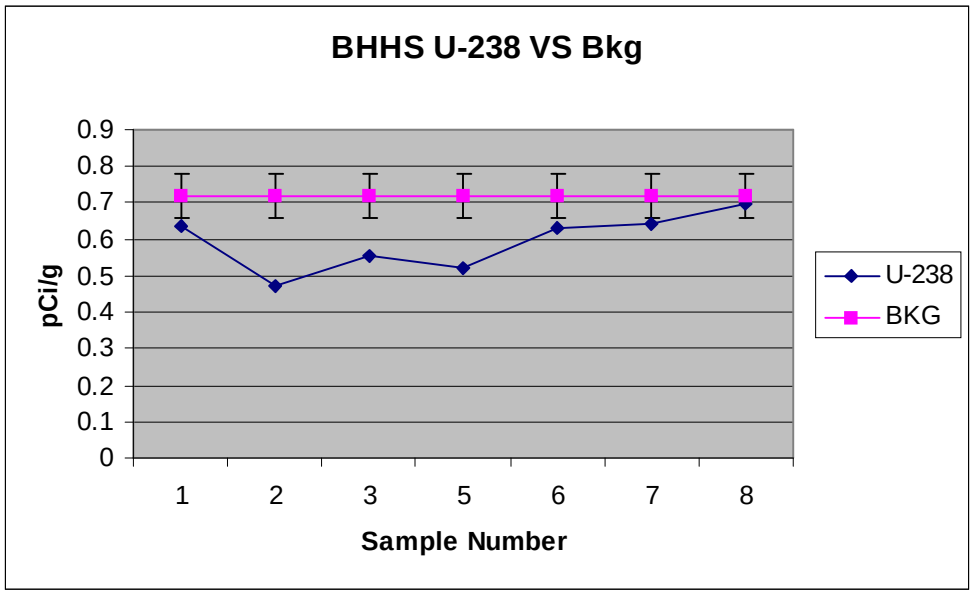


Figure 13: Comparison of Th-232 from BHHS and Th-232 from background

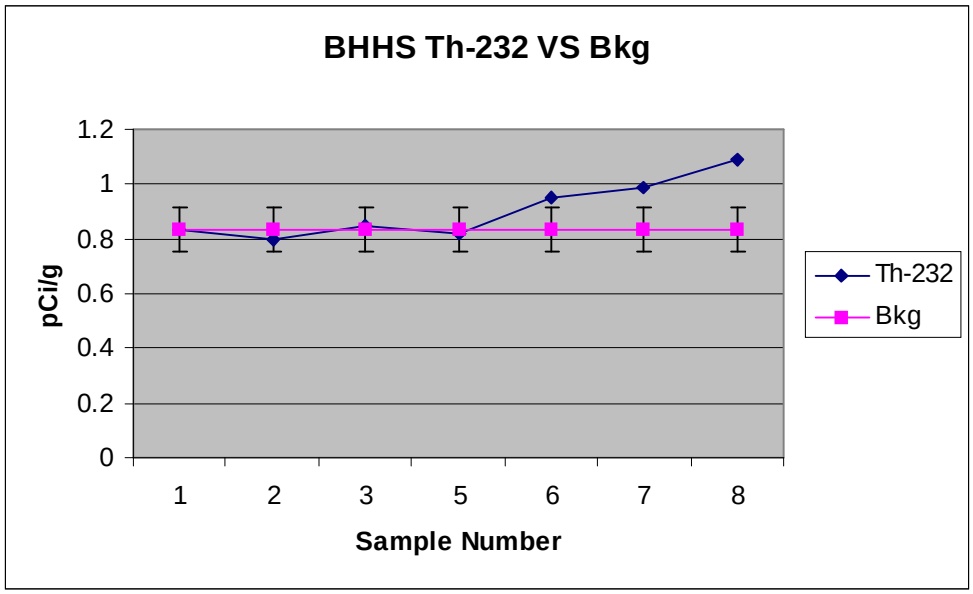


Figure 14: Comparison of U-238 and Ra-226 concentrations

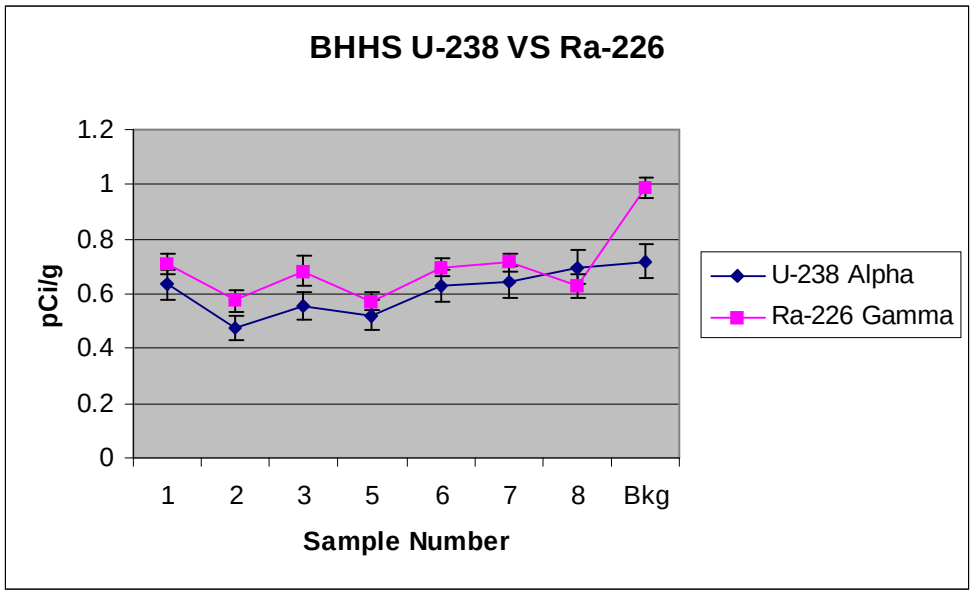


Table 4: Beverly Hills High School Analysis of Indoor Radon Samples.

DRHOMEAIR

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Carrollton, Texas 75006
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Client: County of Los Angeles, DHS
Los Angeles, CA 90010
Attn: Jeanne Crosby

Project: Beverly Hills High School

RADON RESULT SUMMARY

Kit ID	Room	Test Results pCi/L	Start Date	End Date	Comments
AE056172	B177	.6	8/22/2003	8/25/2003	
AE056180	B131	.5	8/22/2003	8/25/2003	
AE053241	C411	.2	8/22/2003	8/25/2003	
AE053232	B175	.2	8/22/2003	8/25/2003	
AE056175	B189	.4	8/22/2003	8/25/2003	
AE055396	B133	.4	8/22/2003	8/25/2003	
AE055354	B173	.2	8/22/2003	8/25/2003	
AE055353	B190	.2	8/22/2003	8/25/2003	
AE053203	B130	.3	8/22/2003	8/25/2003	
AE055382	B174	.2	8/22/2003	8/25/2003	
AE056160	B181	.2	8/22/2003	8/25/2003	Move to office in 179
AE055384	B182	.2	8/22/2003	8/25/2003	
AE058759	B188	.4	8/22/2003	8/25/2003	
AE058548	E601	.2	8/22/2003	8/25/2003	
AE055368	BELOW Stage green rm	.2	8/22/2003	8/25/2003	
AE055352	C413	.2	8/22/2003	8/25/2003	
AE055379	C415	.2	8/22/2003	8/25/2003	
AE053237	C404	.2	8/22/2003	8/25/2003	
AE056111	C409 (410)	.2	8/22/2003	8/25/2003	410 Boiler room, Test kit move to 409

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Los Angeles, CA 90010
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Project: Beverly Hills High School

RADON RESULT SUMMARY

Kit ID	Room	Test Results pCi/L	Start Date	End Date	Comments
AE055399	C401	.4	8/22/2003	8/25/2003	
AE053227	B180	.2	8/22/2003	8/25/2003	Test kits place in the Projection Room
AE056785	B125	.9	8/22/2003	8/25/2003	
AE053221	C405	.2	8/22/2003	8/25/2003	
AE053239	B172	.2	8/22/2003	8/25/2003	
AE053219	C404	.2	8/22/2003	8/25/2003	
AE056768	B119	.5	8/22/2003	8/25/2003	
AE053228	C400	.2	8/22/2003	8/25/2003	
AE056306	C403	.2	8/22/2003	8/25/2003	
AE056731	B117	.8	8/22/2003	8/25/2003	
AE055370	B170	.9	8/22/2003	8/25/2003	
AE055359	C412	.2	8/22/2003	8/25/2003	
AE056756	D519	.2	8/22/2003	8/25/2003	
AE056744	E653 (614)	.2	8/22/2003	8/25/2003	test kit moved to 653
AE055386	B170	.2	8/22/2003	8/25/2003	
AE055392	B180	.2	8/22/2003	8/25/2003	Test kits place in the Projection Room
AE056788	D502	.9	8/22/2003	8/25/2003	
AE056735	Vistor's Locker Room	.3	8/22/2003	8/25/2003	Room E619
AE056754	Vistor's Locker Room	.6	8/22/2003	8/25/2003	Room E619

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ALPHA ENERGY LABORATORIES
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RADON RESULT SUMMARY

Kit ID	Room	Test Results pCi/L	Start Date	End Date	Comments
AE056750	copying rm (602)	.7	8/22/2003	8/25/2003	No access placed in copying room
AE056734	B116	.7	8/22/2003	8/25/2003	
AE056747	Vistor's Locker Room	.7	8/22/2003	8/25/2003	Room E619
AE058554	B107	.2	8/22/2003	8/25/2003	
AE056760	D524	.7	8/22/2003	8/25/2003	Not Found
AE056777	E622	Error	8/22/2003	8/25/2003	not found kit used f 680 dup
AE058699	E633	.2	8/22/2003	8/25/2003	
AE056780	B109	.3	8/22/2003	8/25/2003	
AE056766	B124	.2	8/22/2003	8/25/2003	
AE058685	D519 (520)	.5	8/22/2003	8/25/2003	No access test kit place as duplicate in
AE058671	D522	.2	8/22/2003	8/25/2003	
AE058608	D514	.3	8/22/2003	8/25/2003	
AE058615	E613	.3	8/22/2003	8/25/2003	
AE056771	E600	.3	8/22/2003	8/25/2003	
AE056765	E658 (657)	.2	8/22/2003	8/25/2003	moved to 658
AE056774	E658 (657)	.2	8/22/2003	8/25/2003	moved to 658
AE056787	B123	.2	8/22/2003	8/25/2003	
AE058575	D504	.3	8/22/2003	8/25/2003	
AE058627	D510	1.6	8/22/2003	8/25/2003	

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RADON RESULT SUMMARY

Kit ID	Room	Test Results pCi/L	Start Date	End Date	Comments
AE058684	D512	.7	8/22/2003	8/25/2003	
AE056748	Team Locker Room	.6	8/22/2003	8/25/2003	Placed in towel E617
AE056792	B118	.5	8/22/2003	8/25/2003	
AE058638	D523	.3	8/22/2003	8/25/2003	
AE056791	E604	.2	8/22/2003	8/25/2003	
AE056789	Team Locker Room	.6	8/22/2003	8/25/2003	Placed in towel E617
AE056779	B118	.2	8/22/2003	8/25/2003	
AE056769	E656	.6	8/22/2003	8/25/2003	
AE058589	B111	.7	8/22/2003	8/25/2003	
AE056793	E606	.2	8/22/2003	8/25/2003	
AE056794	E650	.2	8/22/2003	8/25/2003	
AE058692	A005	Error	8/22/2003	8/25/2003	Room not found
AE058630	D521	.8	8/22/2003	8/25/2003	
AE058557	E651	.2	8/22/2003	8/25/2003	
AE058560	B113	.7	8/22/2003	8/25/2003	
AE058556	D500	.5	8/22/2003	8/25/2003	
AE058564	B115	.9	8/22/2003	8/25/2003	
AE058609	B121	.3	8/22/2003	8/25/2003	
AE059079	B179	.5	8/22/2003	8/25/2003	In the Office not mainroom

ALPHA ENERGY LABORATORIES
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Carrollton, Texas 75006
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Client: County of Los Angeles, DHS
Los Angeles, CA 90010
Attn: Jeanne Crosby

Project: Beverly Hills High School

RADON RESULT SUMMARY

Kit ID	Room	Test Results pCi/L	Start Date	End Date	Comments
AE058566	E661	.2	8/22/2003	8/25/2003	
AE058626	B126	.2	8/22/2003	8/25/2003	
AE056770	Weight Room	.6	8/22/2003	8/25/2003	Placed in weight room by boy's gym
AE058624	B122	.4	8/22/2003	8/25/2003	
AE058647	Team Locker Room	.7	8/22/2003	8/25/2003	Placed in towel E617
AE058544	E654	.2	8/22/2003	8/25/2003	
AE056775	Main Opps Area	.2	8/22/2003	8/25/2003	Placed in weight room by boy's gym
AE058579	D500	.9	8/22/2003	8/25/2003	
AE058568	E652	.2	8/22/2003	8/25/2003	
AE058633	B120	.8	8/22/2003	8/25/2003	
AE056767	Weight Room	.2	8/22/2003	8/25/2003	Placed in weight room by boy's gym
AE058550	E608	.5	8/22/2003	8/25/2003	
AE058648	B176	.2	8/22/2003	8/25/2003	
AE058573	Weight Room	.2	8/22/2003	8/25/2003	Placed in weight room by boy's gym
AE058588	E606	.5	8/22/2003	8/25/2003	

Figure 15:

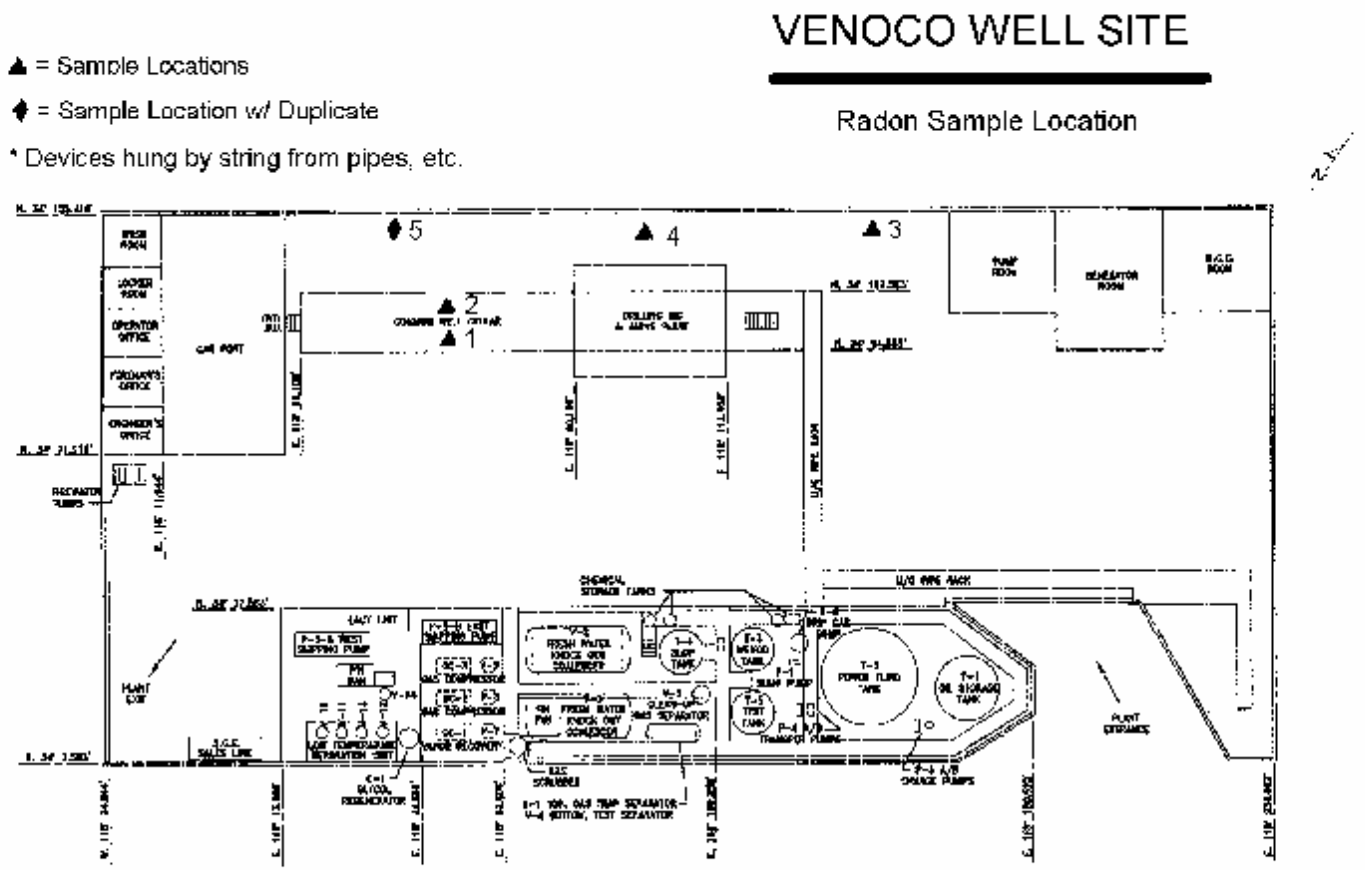
VENOCO WELL SITE
▲ = Sample Locations
♦ = Sample Location w/ Duplicate
* Devices hung by string from pipes, etc.
Radon Sample Location
♦5
▲4
▲3
▲2
▲1

Figure 16:

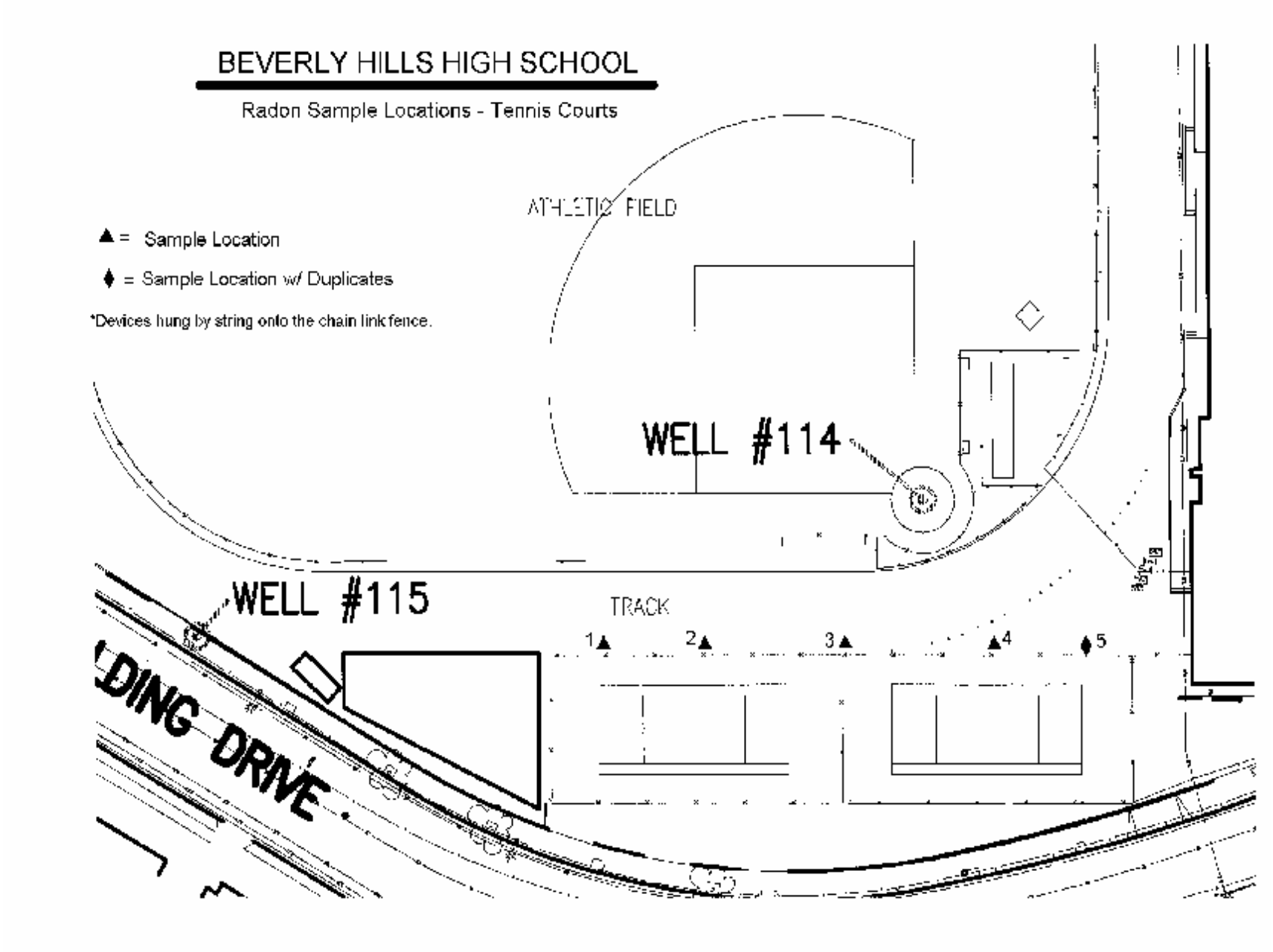
BEVERLY HILLS HIGH SCHOOL
Radon Sample Locations - Tennis Courts
▲ = Sample Location
♦ = Sample Location w/ Duplicates
*Devices hung by string onto the chain link fence.
ATHLETIC FIELD
WELL #114
WELL #115
TRACK
1▲
2▲
3▲
▲4
♦5
DING DRIVE

Figure 17:

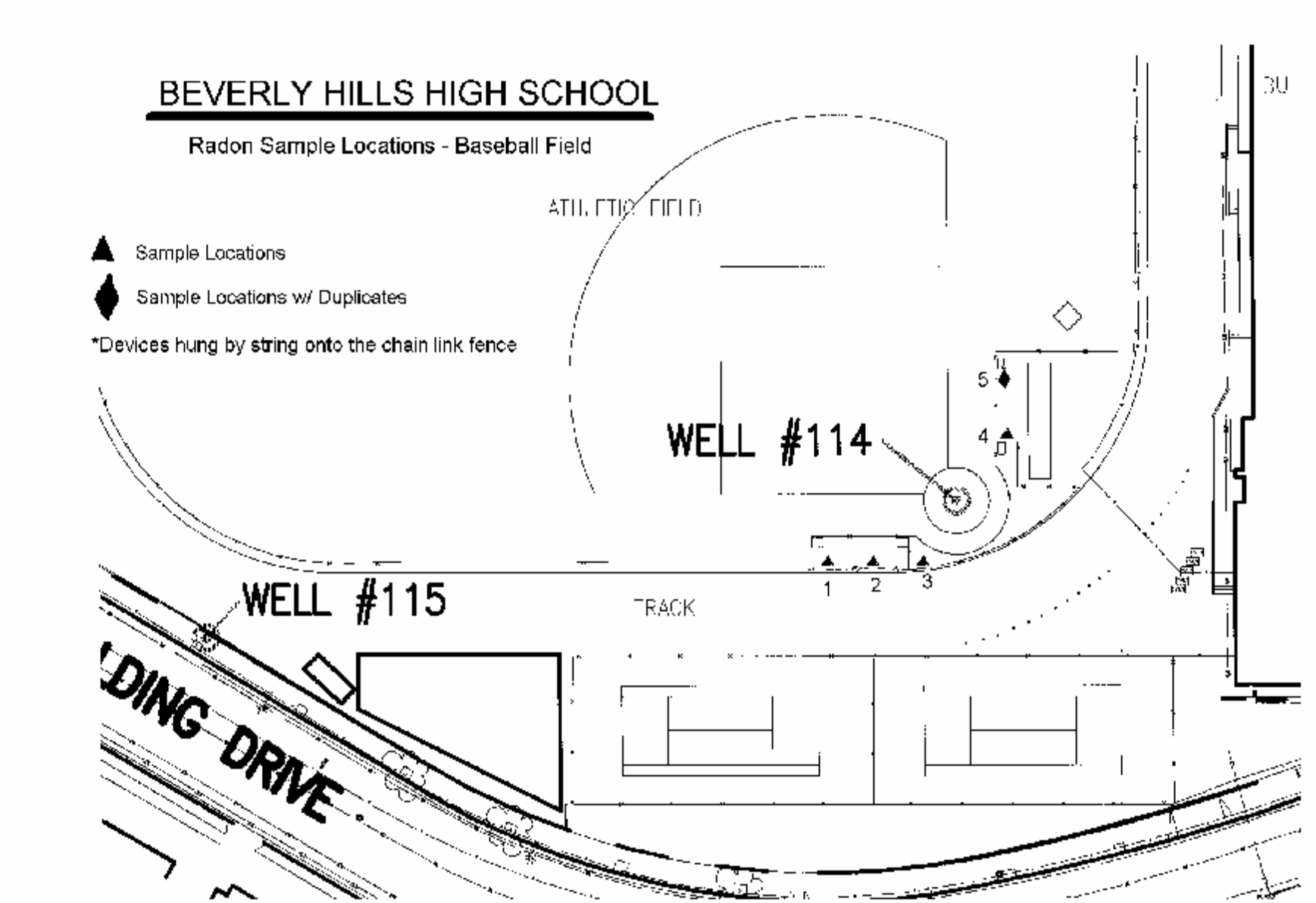
BEVERLY HILLS HIGH SCHOOL
Radon Sample Locations - Baseball Field
Sample Locations
Sample Locations w/ Duplicates
*Devices hung by string onto the chain link fence
WELL #114
WELL #115
TRACK
1
2
3
4
5
DING DRIVE

Figure 18:

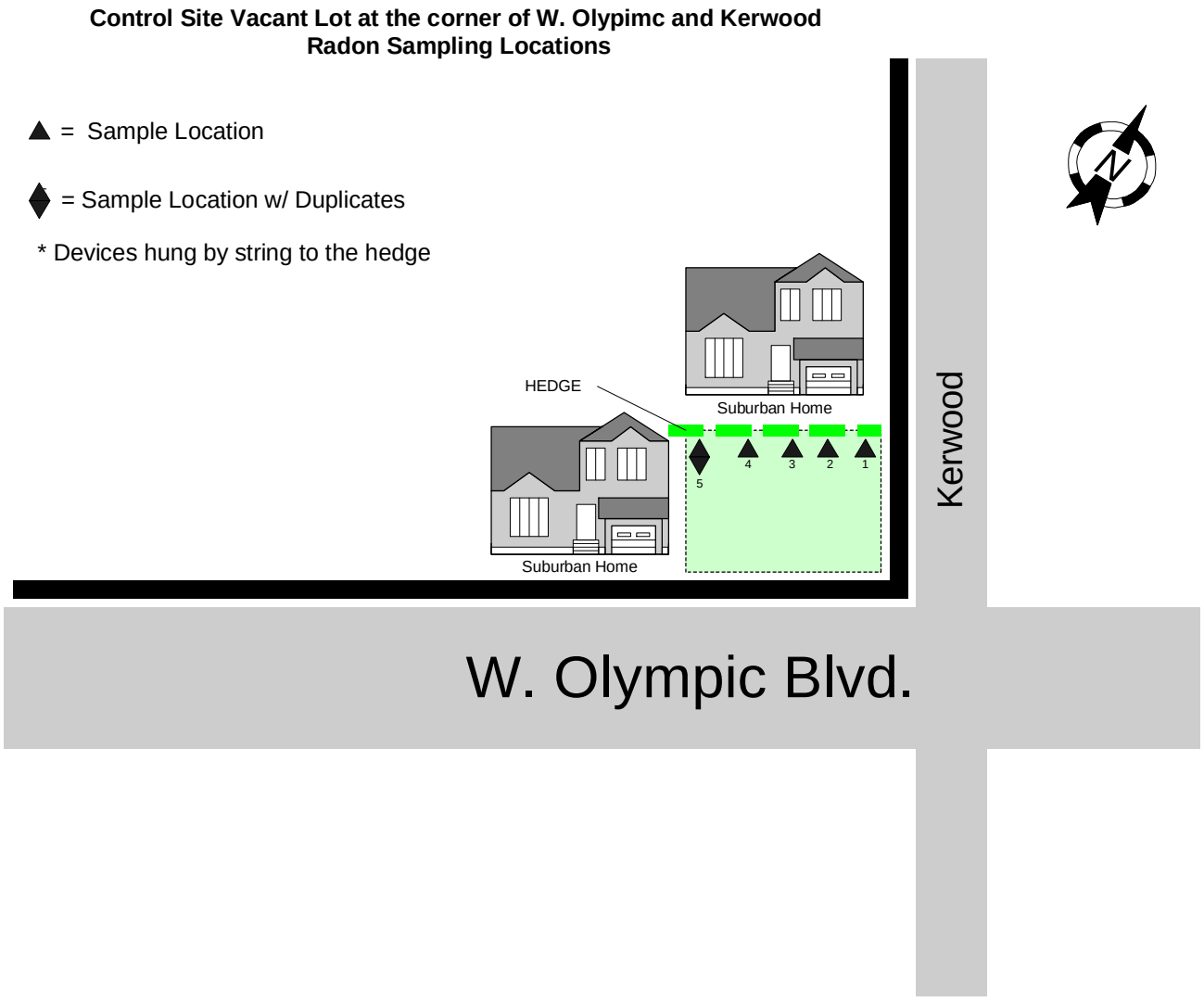
Control Site Vacant Lot at the corner of W. Olypimc and Kerwood
Radon Sampling Locations
▲ = Sample Location
◆ = Sample Location w/ Duplicates
* Devices hung by string to the hedge
HEDGE
Suburban Home
Suburban Home
1
2
3
4
5
Kerwood
W. Olympic Blvd.

Table 5: Analysis Results for the Outdoor Radon Samples:

September 25, 2003 **** LABORATORY ANALYSIS REPORT **** Pg 1 of 1

Beverly Hills H. S.

Kit Number	Location	Result	Notes
3098774	Tennis Court 3	< 0.3	
3098798	Vacant Lot 4	< 0.3	
3098800	Wellsite 3	< 0.3	
3098901	Vacant Lot 1	< 0.3	
3098902	Tennis Court 4	< 0.3	
3098903	Wellsite 5	< 0.3	
3098904	Wellsite 5	< 0.3	
3098905	Wellsite 4	< 0.3	
3098906	Baseball Field 3	< 0.3	
3098907	Wellsite 1	< 0.3	
3098908	Baseball Field 5	< 0.3	
3098911	Tennis Court 5	????	W,I
3098912	Vacant Lot 2	< 0.3	
3098914	Tennis Court 2	????	W,I
3098915	Wellsite 2	< 0.3	
3098916	Vacant Lot 3	< 0.3	
3098918	Tennis Court 1	< 0.3	
3098919	Baseball Field 5	????	W,I
3098920	Vacant Lot 5	< 0.3	
3098939	Baseball Field 1	????	W,I
3098941	Baseball Field 2	????	W,I
3098942	Vacant Lot 5	< 0.3	

Air Chek, Inc. 1936 Butler Bridge Rd, Fletcher, NC 28732-8792 Phone: (828) 684-0893 Fax: (828) 684-8496

Notes for the Analysis Report of the Outdoor Radon Samples.

Analysis Report Notations

M	**M**issing start or ending time or date. If the start or ending day or time is missing, analysis cannot be completed. If the missing data is provided after the fact, a reprocessing fee is charged.
L	**L**ong Exposure...exposed longer than recommended. Result represents the last 3 days of test period.
S	**S**hort Exposure...not exposed long enough. Estimated result only.
D	Long **D**ecay time...the sample arrived too late. (more than 192 hours) for valid analysis. Estimated result only.
E	**E**xcessive decay time...the sample arrived so late (more than 12 days) that NO result is available.
X	The temperature indicated was outside the acceptable range. (<35F – >90F) Estimated result only.
W	**W**et Sample...Test was exposed too long in a damp environment. Estimated result only
U	**U**nsealed...sampler was improperly sealed. Most of the radon may have escaped. NO result is available.
F	**F**aulty handling by user. NO result is available.
P	Foam **P**lug was left in sampler and may have caused radon leakage. NO result is available.
T	**T**orn in transit. NO result is available. Free replacement in most cases.
I	**I**nvalid Test.