VERDANT HEALTH COMMISSION
PUBLIC HOSPITAL DISTRICT NO. 2 OF SNOHOMISH COUNTY, WASHINGTON
BOARD OF COMMISSIONERS
Regular Meeting
A G E N D A
May 27, 2015
8:00 a.m. to 10:00 a.m.

	ACTION	TIME	PAGE
A. Call to Order	---	8:00	---
B. Approval of the Minutes			
a) April 22, 2015 Board Meeting	Action	8:01	1-5
C. Executive Committee Report	Information	8:04	---
D. Finance Committee Report			
a) Moss Adams audit presentation	Information	8:05	---
b) Review financial statements and cash activity	Information	8:15	6-10
c) Authorization for payment of vouchers and payroll	Action	8:18	11
d) Resolution 2015:04 – Surplus property	Action	8:19	12-20
E. Program Committee Report & Recommendations			
a) Conflicts of Interest	---	8:21	---
b) Program investment recommendations	Action	8:22	21-27
c) Verdant Community Wellness Center activities update	Information	8:35	28-29
F. Marketing Report	Information	8:40	30
G. Synthetic Turf Review by Gradient	Information	8:45	---
H. Superintendent's Report	Information	9:15	---
I. Public Comments (please limit to three minutes per speaker)	---	9:20	---
J. Commissioner Comments	---	9:40	---
K. Executive Session			
a) To consider the legal risks of a proposed action of the district	---	9:45	---
L. Open Session	---	9:55	---
M. Adjournment	---	10:00	---

PUBLIC HOSPITAL DISTRICT NO. 2 OF SNOHOMISH COUNTY, WASHINGTON
VERDANT HEALTH COMMISSION

BOARD OF COMMISSIONERS
Regular Meeting
Verdant Community Wellness Center
May 27, 2015

Commissioners Present	Fred Langer, President Deana Knutsen, Secretary J. Bruce Williams, M.D., Commissioner Bob Knowles, Commissioner Karianna Wilson, Commissioner
Others Present	Carl Zapora, Superintendent George Kosovich, Assistant Superintendent/Program Director Lisa King, Finance Director (via telephone) Jennifer Piplic, Marketing Director Sue Waldin, Community Wellness Program Manager Karen Goto, Executive Assistant Tanya Andersen, Accounting Consultant Members of the community
Guests	Mary Wright, Moss Adams Christopher Schmidt, Moss Adams Michael Peterson, MEM, DABT Gradient Corporation Thomas Lewandowski, Ph.D., DABT, ERT, ATS Gradient Corporation
Call to Order	The Regular Meeting of the Board of Commissioners of Public Hospital District No. 2, Snohomish County, was called to order at 8:02 a.m. by President Langer. President Langer stated that this is a public meeting; not a public hearing.
Approval of Minutes	***Motion was made, seconded and passed unanimously to approve*** the minutes of the regular meeting on April 22, 2015.
Executive Committee	Commissioner Knutsen reported that the Executive Committee met on May 15, 2015 to review and approve the May 27, 2015 board meeting agenda. No action was taken.

Moss Adams Audit Presentation

Mary Wright & Christopher Schmidt of Moss Adams presented the 2014 financial audit results (E:30:15). President Langer inquired about the capital assets and depreciation of the Kruger Clinic and the acquisition of the Verdant Community Wellness Center. Commissioner Williams asked Mary Wright if Moss Adams audits for contractual compliance, including the Swedish 25% reinvestment fund obligation. Ms. Wright stated that all financial obligations were being met from an accounting standpoint. He suggested that Moss Adams include this information in next year's audit report to improve transparency.
Motion was made, seconded and passed unanimously to approve the 2014 audit results.
Commissioner Knutsen thanked Moss Adams for their work.

Board Finance Committee

The committee met on May 20, 2015. Ms. Andersen reviewed the financial statements and cash activity for April 2015 (E:31:15).

Authorization for Payment of Vouchers & Payroll

Warrant Numbers 11087 through 11134 for April 2015 for payment in the amount of $185,450.26 were presented for approval (E:32:15). ***Motion was made, seconded and passed unanimously to approve.***

Resolution 2015:04 Surplus Property

Motion was made, seconded and passed unanimously to approve Resolution 2015:04 determining certain personal property to be surplus and no longer required for public hospital district purposes and authorizing the Superintendent or his designee to sell all or any part of such property. Exhibit A lists the inventory Audit Surplus and Exhibit B lists the Swedish Edmonds fire (in November 2013) asset surplus. Ms. Andersen explained that specific assets damaged by the fire could not be identified so a methodology was applied to determine the value of the burned assets, based on insurance proceeds.

Program Oversight Committee Update

Commissioner Wilson reported that the Program Oversight Committee met on May 21, 2015 and reviewed seven application requests; five new and two renewal requests (E:33:15).

No conflicts of interest were reported by any of the commissioners.

New Funding Applications:
Motion was made, seconded and passed unanimously to approve the Mountlake Terrace Senior Center AED purchase in the amount of $2,500 on a one-time basis.

Motion was made, seconded and passed unanimously to approve Turning Point Back to School Health Fair at Cedar Valley Elementary in the partial funding amount of $12,000 on a one-time basis.

Not recommended for funding:
Citrine Health Bra Shop – a one-time request of $18,000 to support a non-profit's bra shop in Everett that serves women recovering from breast cancer.

Edmonds Senior Center Senior & Community Center – a $2 million request to support the construction of a new 25,000 sq ft community and senior center in Edmonds. The Request is being tabled for now as it fits in Verdant's Building Healthy Communities Fund (BHCF). The commission will revisit this request when it reopens requests for proposals through the BHCF in 2016.

DPS Health Diabesity Self-Management proposal – a proposal to provide virtual wellness programming.

Program Renewal Requests:
Domestic Violence Services of Snohomish County – Teen Violence Dating Program. Funds are used for a part-time educator who conducts outreach in South Snohomish County. The program met its goals and reaches approximately 6,000 teens each year. ***Motion was made, seconded and passed unanimously*** to approve the $22,266 for three years, a 10% increase from the current level.

Community Health Center of Snohomish County Dental Program – a renewal request for a dental program for uninsured adults. ***Motion was made, seconded and***

passed unanimously to fund the request in full at $125,000 for one year.

Marketing Report

Ms. Piplic presented the Marketing report (E:35:15) which includes a report on The Canopy newsletter delivered between May 14 and May 20 to 77,685 residences and businesses; two awards that Verdant received in the past month: one for Edmonds Community College Foundation's Vision Award accepted by President Langer on May 21, 2015 and the other from the Washington Recreation & Park Association's Citation of Merit accepted by Superintendent Zapora on April 30, 2015. The next event for Verdant is the Celebrating our People Latino Festival on June 6, 2015, from 1 to 5 p.m. at Trinity Lutheran Church in Lynnwood.

Synthetic Turf Review by Gradient

Michael Peterson & Thomas Lewandowski presented their report (E:36:15). The entire report will be on Verdant's website later today.

Superintendent's Report

Superintendent Zapora provided an update on two items:

1. The Fall board retreat dates have been set for the evening of Friday, December 4 and all day Saturday, December 5, 2015. Location will be determined.
2. The board mini-retreat is scheduled for Friday, June 12, 2015 at the Verdant Community Wellness Center.

Public Comments

1. Mr. Alvin Rudtledge from Edmonds commented on his attendance at the Edmonds School District meeting, the Edmonds City Council meeting, and Verdant's board meeting on the synthetic turf issue.
2. Ms. Christi Davis from Brier attempted to answer the commissioner's questions on chemical leaching. She will forward the study that she referenced to Superintendent Zapora.
3. Ms. Maggie Pinson from Edmonds expressed her concerns with Gradient's presentation and was interested in a community dialogue on the issue.
4. Ms. April Osborne from Edmonds shared her experience with having to clean off crumb

rubber from her two children who are athletes after they have played on the field at Edmonds-Woodway High School. She expressed her appreciation to the board for taking the time to study this issue and she also appreciates the transparency of Verdant.

5. Ms. Laura Johnson from Edmonds expressed her appreciation to the board for the open dialogue but would like to see safer alternatives for our children.
6. Ms. Barbara Peterson from Edmonds thanked the board for their curiosity about the subject of synthetic turf.

President Langer thanked the public and encouraged them to continue participation in this topic.

Commissioner Comments

None

Executive Session

President Langer recessed the regular meeting at 9:44 a.m. into Executive Session to consider the legal risks of a proposed action of the district not related to the synthetic turf issue.
President Langer stated that the board would reconvene in 15 minutes and no action would be taken in Executive Session.
President Langer extended the executive session by five minutes and Superintendent Zapora announced this to the public.

Open Session

The board reconvened into Open Session at 10:05 a.m.

Adjourn

There being no further business to discuss, the meeting was adjourned at 10:05 a.m.

ATTEST BY:

Fred Langer
President

Deana Knutsen
Secretary

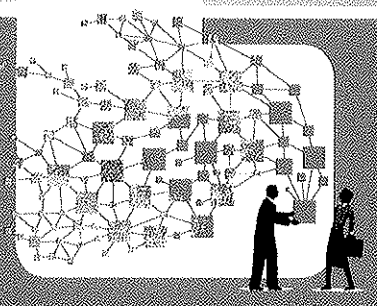
E: 30:15
5.27.2015

Verdant Health Commission

2014 Audit Results

MOSS-ADAMS LLP

BOARD COMMUNICATIONS

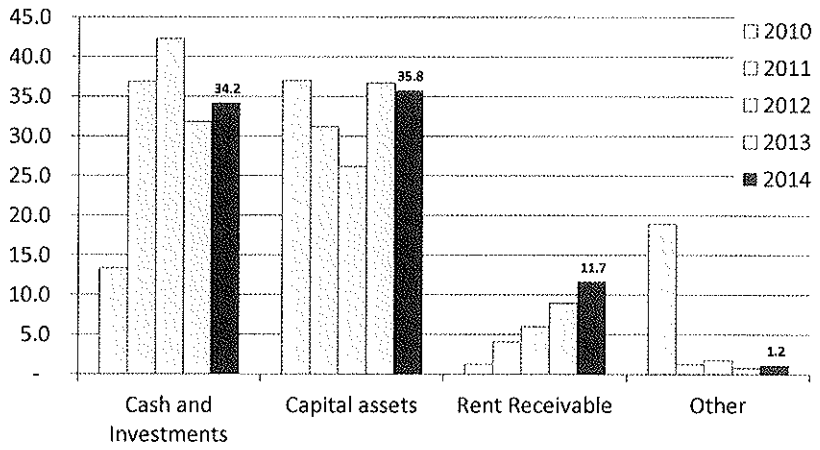


MOSS-ADAMS LLP

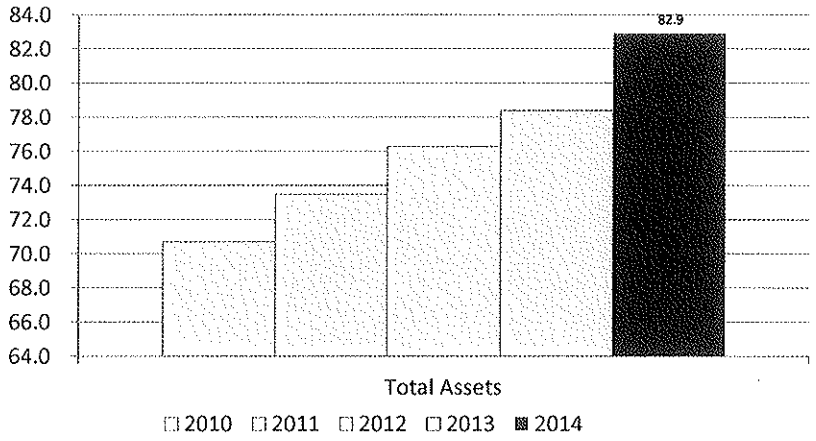
REQUIRED BOARD COMMUNICATIONS

- Draft report
- Unmodified opinion
- Significant estimates/new accounting policies and standards
  - Estimates include: useful lives of assets, worker's compensation claims, estimated professional liability and estimated third party settlements
- One audit adjustment, no negative impact to net position
  - New type of agreements in 2014
  - Adjustment resulted in increase in assets and decrease in expenses of $935,000
  - Best practice considerations – monitoring of progress and interim accounting updates for payments versus obligation

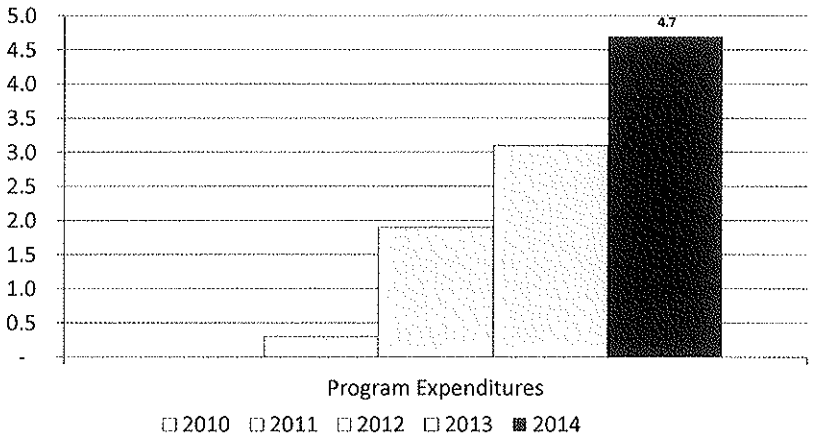
ASSET BREAKDOWN (IN MILLIONS)



ASSET TOTALS (IN MILLIONS)



PROGRAM EXPENDITURES (IN MILLIONS)



THANK YOU!

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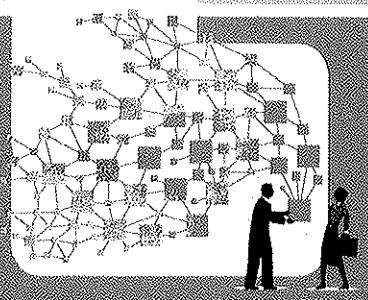

MOSS ADAMS LLP

Report of Independent Auditors
and Financial Statements for

Public Hospital District No. 2, Snohomish County, Washington dba Verdant Health Commission

December 31, 2014 and 2013

CONTENTS

REPORT OF INDEPENDENT AUDITORS

To the Board of Commissioners
Public Hospital District No. 2,
Snohomish County, Washington dba
Verdant Health Commission

Report on Financial Statements

We have audited the accompanying financial statements of Public Hospital District No. 2, Snohomish County, Washington dba Verdant Health Commission (the District), which comprise the statements of net position as of December 31, 2014 and 2013, and the related statements of revenues, expenses, and changes in net position and cash flows for the years then ended, and the related notes to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Public Hospital District No. 2, Snohomish County, Washington dba Verdant Health Commission as of December 31, 2014 and 2013, and the results of its operations and its cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the accompanying management's discussion and analysis on pages 3 through 9 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, which considers it to be an essential part of financial reporting for placing the basic financial statements in the appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Everett, Washington
_____, 2015

The following discussion and analysis for Public Hospital District No. 2, Snohomish County, Washington dba Verdant Health Commission (the District) provides an overview of the District's financial activities for the years ended December 31, 2014 and 2013. Please read it in conjunction with the District's financial statements, which follow this analysis.

Using These Basic Financial Statements

The District's financial statements consist of three statements: a statement of net position; a statement of revenues, expenses, and changes in net position; and a statement of cash flows. These financial statements and related notes provide information about the financial activities of the District.

The Statement of Net Position and Statement of Revenues, Expenses, and Changes in Net Position

These two statements include all restricted and unrestricted assets and all liabilities using the accrual basis of accounting. All of the current year's revenues and expenses are taken into account when the underlying transactions occur, regardless of when cash is received or paid. These statements report the District's net position and the changes therein. When assessing the overall health of the District, other nonfinancial factors also need to be considered, such as changes in programs offered, measures of the quality of service offered, and local economic factors.

The Statement of Cash Flows

This statement reports cash receipts, cash payments, and net changes in cash resulting from operations, investing, and capital and noncapital financing activities. It provides information about sources and uses of cash and the change in cash balances during the reporting periods.

The Transition of Operations, Effective September 1, 2010

Until September 1, 2010, Public Hospital District No. 2, Snohomish County, Washington, owned and operated Stevens Hospital. Through a lease and operating agreement, on September 1, 2010, Swedish Health Services, a nonprofit corporation, took over operation of the hospital and renamed it Swedish Edmonds. This transition significantly changed the role of the District. The District retained ownership of the hospital but no longer manages its operations and instead is a landlord to Swedish Health Services. As of December 31, 2014, Swedish Health Services had paid $32.8 million in total lease payments to the District for the use of real property and personal assets owned by the District.

The negotiated agreement terms for use of the hospital by Swedish Health Services are for 30 years, with options to renew, wherein the District will receive monthly lease payments that increase 3.0% per year for the first 15 years, after which time the monthly payments will be steady for the remainder of the agreement. Additionally, Swedish Health Services agrees to invest a minimum of $90.0 million into hospital capital improvements over the course of the first 10 years, with no less than $6.0 million per year in each of those 10 years.

The Transition of Operations, Effective September 1, 2010 (continued)

The District will maintain investments sufficient to take back the operation of the hospital in the event of default by Swedish Health Services or some other extraordinary event. This transition significantly impacted many of the statement of net position accounts for the year ending December 31, 2010, and along with the long-term agreement with Swedish Health Services, significantly improves the short- and long-term financial viability of the District.

The Verdant Health Commission

As of September 1, 2010, the District began doing business as South Snohomish County Commission for Health (SSCCFH). The SSCCFH name was changed in 2011 to the Verdant Health Commission (Verdant) by a vote of the commissioners of the District. Verdant is governed by a board of five commissioners elected at large. The mission of Verdant is to improve the health and well-being of our community. This mission will be completed by contracting for services with local organizations, businesses, and government agencies, and the establishment of Verdant-operated initiatives. Long-term financial stability will be established by investing available revenues received from Swedish Health Services, as well as ongoing tax levy revenues, into allowable government funds, thus building adequate reserves in the years to come.

Verdant began accepting funding proposals in June 2011 in four health priority areas: Education and Empowerment, Prevention, Access to Healthcare Services, and Policy and Advocacy. Funds are available for one-time uses like events and short-term needs in the community, as well as for ongoing health and wellness programs. Verdant paid out approximately $4.7 million in community program investments during 2014. Each program is managed through a cooperative agreement with partners and is being monitored for performance and compliance by Verdant staff.

Verdant completed a comprehensive needs assessment in 2013 to better understand the health and wellness issues impacting residents of South Snohomish County. The assessment included an analysis of quantitative health and socioeconomic data, input from front-line service providers, a survey of 400 residents, and 12 different focus groups. The results of the needs assessment were compiled into a formal written assessment and appendices that are available on Verdant's website. The needs assessment highlighted two key community issues for the District: adult dental care and behavioral health needs. In 2014, Verdant approved funding for programs and projects in these areas, including a new mobile dental clinic through Medical Teams International, and a fixed-site dental clinic in Lynnwood through the Puget Sound Christian Clinic. Verdant also released a targeted request for proposal (RFP) for preventative behavioral health programs—two projects were selected for a total annual budget of $500,000, with payouts beginning in 2015. Other significant investments in this area made by Verdant in 2014 include a program through the Center for Human Services that provides onsite counseling at middle and high schools, and a new program through the Edmonds School District that provides student support advocates at each of the middle and high schools.

The Verdant Health Commission (continued)

For the third year in a row, Verdant organized the 6 Weeks to a Healthier You program, which was a community health and wellness program that provided information, motivation, community resources, and biometric screenings designed to help participants improve their health. The event ran for 6 consecutive weeks, attracted 259 participants, and led to measurable improvements in participants' health such as reduced total cholesterol, triglycerides, and overall weight.

As part of its planning and needs assessment work, Verdant determined that there are challenges that keep South Snohomish County residents from being active. In 2013, the Commissioners of the District voted to add a new program funding opportunity referred to as the Building Healthy Communities Fund (BHCF). The purpose of the BHCF is to support projects in South Snohomish County that increase opportunities for residents to live active and healthy lives. The District is addressing these gaps by funding projects with key community partners, such as local governments, which sustain long-term community health improvements. In 2014, Verdant began funding two larger projects under the BHCF: a recreation project at the former Woodway High School, and a project called BikeLink that will complete critical missing links in the community's bicycle network, with the goal of increasing ridership and decreasing collisions and injuries. The Woodway recreation project is being managed by the Edmonds School District and will be paid out over four years, whereas the City of Lynnwood is in the lead for the BikeLink project, which will be funded by Verdant over the next three years. Both projects will collect and deliver program results over the next several years.

In September 2013, Verdant purchased a building in Lynnwood for the purpose of redeveloping it into a community wellness center. The new Verdant Community Wellness Center opened in January 2015 and offers the residents of the District a resource for accessing health and wellness classes, programs, and information. The center will also serve as the Verdant headquarters and house all administrative staff.

Verdant plans to continue funding effective and sustainable community health programs, as well as convening stakeholders to develop new initiatives that address key community health and wellness needs. Partnerships and support for community providers and employers will also remain a focus for Verdant to improve the lives of South Snohomish County residents.

Statement of Net Position

The District's net position is the difference between its assets and liabilities as reported in the statement of net position (in thousands).

	2014	2013	2012
Assets			
Current assets	$ 35,459	$ 32,610	$ 44,093
Capital assets, net	35,776	36,766	26,154
Other noncurrent assets	11,702	8,990	5,993
Total assets	$ 82,937	$ 78,366	$ 76,240
Liabilities			
Current liabilities	$ 2,582	$ 2,039	$ 1,198
Long-term debt, net	4,757	5,590	6,396
Other long-term liabilities	100	100	203
Total liabilities	7,439	7,729	7,797
Net position			
Net investment in capital assets	30,249	30,431	19,038
Restricted for debt service	54	58	95
Unrestricted	45,195	40,148	49,310
Total net position	75,498	70,637	68,443
Total liabilities and net position	$ 82,937	$ 78,366	$ 76,240

Current Assets

Total current assets of $35.4 million at year-end 2014 reflect an increase of $2.8 million (8.7%), compared to the balance of $32.6 million at the end of 2013. Cash and short-term investments increased by $2.3 million (7.3%) in 2014, compared to a decrease of $10.4 million (24.5%) in 2013.

Capital Assets

The District's net capital assets decreased $1 million (2.7%) in 2014, compared to a net increase of $10.6 million (40.6%) in 2013. In 2013, the District purchased two buildings totaling $15.4 million: the Kruger Clinic, a medical office building near the campus of the hospital, and a community wellness center, which was opened in 2015.

Statement of Net Position (continued)

Other Noncurrent Assets

Other noncurrent assets consist of rent receivable totaling $11.7 million at year-end 2014, an increase of $2.7 million (30.2%) from $9.0 million in 2013. The rent receivable results from straight-line recognition of the 30-year lease of the hospital to Swedish Health Services.

Current Liabilities

Current liabilities increased $0.5 million (26.6%) from $2.0 million in 2013 to $2.6 million in 2014. The increase in 2014 is the result of Swedish Health Services paying rent in advance.

Long-Term Debt

As of December 31, 2014, the District had $4.8 million in long-term debt and obligations under capital leases, net of current portion, which is a $0.8 million (14.9%) decrease from 2013. Principal payments during 2014 totaled $0.8 million. In 2012, outstanding 1999 LTGO refunding bonds were paid in full by the issuance of $6.6 million of 2012 LTGO refunding bonds. Principal payments during 2012, in excess of the 1999 LTGO refunding bond payments, totaled $1.0 million.

Other Long-Term Liabilities

Other noncurrent liabilities remained the same at $0.1 million for 2014 and 2013. These are made up of reserves for self-insured workers' compensation claims.

Operating Results and Changes in the District's Net Position

In 2014, the District's net position increased $4.9 million (6.9%), compared to an increase of $2.2 million (3.2%) in 2013.

	2014	2013	2012
Operating revenues			
Lease revenue	$ 11,712	$ 10,437	$ 10,398
Other operating revenues	9	12	17
Total operating revenues	11,721	10,449	10,415
Operating expenses			
Salaries and benefits	752	675	714
Program expenditures	4,690	3,124	1,866
Other	925	478	481
Depreciation	3,367	4,199	5,004
Total operating expenses	9,734	8,476	8,065
Operating income	1,987	1,973	2,350
Nonoperating revenues (expenses)			
Tax levies	2,113	2,033	2,037
Investment income (loss)	564	(914)	1,126
Interest expense and amortization	(106)	(120)	(284)
Loss on disposal of capital assets	19	(595)	(60)
Other income	284	(183)	2,788
Net nonoperating revenues	2,874	221	5,607
Increase in net position	4,861	2,194	7,957
Net position, beginning of year	70,637	68,443	60,486
Net position, end of year	$ 75,498	$ 70,637	$ 68,443

Operating Results and Changes in the District's Net Position (continued)

Operating revenues in 2014 totaling $11.7 million were attributed to lease payments. Of that, $10.1 million was attributable to the Swedish Health Services lease. Additional lease revenues were received from other lease agreements including Value Village, Healthcare Realty, and the Kruger Clinic.

Overall operating costs of $9.7 million at year-end 2014 reflect an increase of $1.3 million (14.8%), compared to the balance of $8.5 million at the end of 2013. Salaries and benefits did not significantly change, totaling $0.8 million in 2014 and $0.7 million in 2013. Program expenditures totaled $4.7 million in 2014, compared to only $3.1 million in 2013. Increased program investment expenditures of $1.6 million made the largest impact on operating expenses in 2014. This was offset by an annual decrease in depreciation expense of $0.8 million (19.8%).

Net nonoperating revenues for 2014 are $2.9 million, compared to only $0.2 million in 2013, an increase of $2.7 million (1,201.0%). Investment gains at year-end 2014 are $0.6 million, an increase of $1.5 million (161.8%) over a 2013 loss of $0.9 million.

Contacting the District's Financial Management

This financial report is designed to provide our taxpayers, suppliers, and creditors with a general overview of the District's finances and to show the District's accountability for the money it receives. If you have any questions about this report or need additional financial information, contact the District's finance office at 4710 196th Street SW, Lynnwood, Washington 98036.

PUBLIC HOSPITAL DISTRICT NO. 2, SNOHOMISH COUNTY, WASHINGTON dba VERDANT HEALTH COMMISSION
STATEMENTS OF NET POSITION

ASSETS

	December 31, 2014	December 31, 2013
CURRENT ASSETS		
Cash and cash equivalents	$ 3,189,901	$ 3,218,690
Investments	30,988,240	28,633,976
Receivables	262,234	265,559
Estimated third-party payor settlements	-	370,281
Prepaid expenses and other	963,479	63,207
Assets whose use is limited	54,692	57,942
Total current assets	35,458,546	32,609,655
CAPITAL ASSETS		
Nondepreciable capital assets	11,477,614	9,113,752
Depreciable capital assets, net of accumulated depreciation	24,298,008	27,651,823
Capital assets, net of accumulated depreciation	35,775,622	36,765,575
RENT RECEIVABLE	11,702,643	8,990,731
Total assets	$ 82,936,811	$ 78,365,961

LIABILITIES AND NET POSITION

CURRENT LIABILITIES		
Current portion of long-term debt	$ 770,000	$ 745,000
Accounts and warrants payable	304,613	233,376
Prepaid lease income	734,028	708,134
Accrued interest	12,900	14,142
Accrued salaries and benefits	53,308	34,839
Tenant improvements	101,460	-
Estimated self-insured liabilities	605,514	303,992
Total current liabilities	2,581,823	2,039,483
LONG-TERM DEBT, net of current portion	4,757,008	5,589,038
OTHER LONG-TERM LIABILITIES	100,000	100,000
Total liabilities	7,438,831	7,728,521
NET POSITION		
Net investment in capital assets	30,248,614	30,431,537
Restricted for debt service	54,692	57,942
Unrestricted	45,194,674	40,147,961
Total net position	75,497,980	70,637,440
Total liabilities and net position	$ 82,936,811	$ 78,365,961

See accompanying notes.

PUBLIC HOSPITAL DISTRICT NO. 2, SNOHOMISH COUNTY, WASHINGTON dba VERDANT HEALTH COMMISSION

STATEMENTS OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

	Years Ended December 31,	
	2014	2013
OPERATING REVENUES		
Lease revenue	$ 11,712,097	$ 10,437,565
Other operating revenue	8,875	11,752
Total operating revenues	11,720,972	10,449,317
OPERATING EXPENSES		
Salaries and wages	598,993	567,308
Employee benefits	153,306	107,397
Program expenditures	4,690,105	3,123,647
Professional services	261,983	267,311
Other	662,878	210,991
Depreciation	3,367,091	4,199,458
Total operating expenses	9,734,356	8,476,112
Operating income	1,986,616	1,973,205
NONOPERATING REVENUES (EXPENSES)		
Maintenance and operations tax levy	2,112,763	2,033,221
Investment income and unrealized gain (loss)	564,584	(913,854)
Other interest expense and amortization	(106,428)	(119,764)
Gain (loss) on disposal of capital assets, net	18,577	(595,280)
Other revenues (expenses)	284,428	(183,423)
Net nonoperating revenues	2,873,924	220,900
Increase in net position	4,860,540	2,194,105
NET POSITION, beginning of year	70,637,440	68,443,335
NET POSITION, end of year	$ 75,497,980	$ 70,637,440

See accompanying notes.

PUBLIC HOSPITAL DISTRICT NO. 2, SNOHOMISH COUNTY, WASHINGTON dba VERDANT HEALTH COMMISSION
STATEMENTS OF CASH FLOWS

Increase (Decrease) in Cash and Cash Equivalents

	Years Ended December 31,	
	2014	2013
CASH FLOWS FROM OPERATING ACTIVITIES		
Cash received for leasing and other operations	$ 9,034,954	$ 8,159,210
Cash paid to employees	(733,830)	(674,081)
Cash paid on community programs	(4,690,105)	(3,123,647)
Cash paid to suppliers for goods and services	(956,369)	(612,327)
Net cash from operating activities	2,654,650	3,749,155
CASH FLOWS FROM NONCAPITAL FINANCING ACTIVITIES		
Cash received from maintenance and operations tax levy for noncapital purposes	2,116,013	2,070,097
Cash received from Swedish Health Services	262,802	1,102,692
Other, net	687	(63,407)
Net cash from noncapital financing activities	2,379,502	3,109,382
CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES		
Principal payments on long-term debt	(745,000)	(720,000)
Interest paid on long-term debt	(169,700)	(182,652)
Proceeds from sale of capital assets	40,286	-
Acquisition and construction of capital assets	(2,398,847)	(15,405,909)
Net cash from capital and related financing activities	(3,273,261)	(16,308,561)
CASH FLOWS FROM INVESTING ACTIVITIES		
Sale (purchase) of investments, net	(2,197,645)	9,549,818
Investment income	407,965	1,030,727
Net cash from investing activities	(1,789,680)	10,580,545
NET INCREASE IN CASH AND CASH EQUIVALENTS	(28,789)	1,130,521
CASH AND CASH EQUIVALENTS, beginning of year	3,218,690	2,088,169
CASH AND CASH EQUIVALENTS, end of year	$ 3,189,901	$ 3,218,690

PUBLIC HOSPITAL DISTRICT NO. 2, SNOHOMISH COUNTY, WASHINGTON dba VERDANT HEALTH COMMISSION
STATEMENTS OF CASH FLOWS

Increase (Decrease) in Cash and Cash Equivalents

	Years Ended December 31, 2014	2013
RECONCILIATION OF OPERATING INCOME TO NET CASH FROM OPERATING ACTIVITIES		
Operating income	$ 1,986,616	$ 1,973,205
Adjustments to reconcile operating income to net cash from operating activities		
Depreciation	3,367,091	4,199,458
Changes in operating assets and liabilities		
Receivables	(259,477)	(591,438)
Estimated third-party payor settlements	840,034	679,634
Prepaid expenses and other	(900,272)	(33,925)
Rent receivable	(2,711,912)	(2,998,241)
Accounts and warrants payable	71,237	49,309
Prepaid lease income	25,894	708,134
Tenant improvements	101,460	-
Accrued salaries and benefits	18,469	624
Self-insured liabilities	115,510	(237,605)
Net cash from operating activities	$ 2,654,650	$ 3,749,155

See accompanying notes.

Note 1 - Organization and Summary of Accounting Policies

Organization - Until September 1, 2010, Public Hospital District No. 2 of Snohomish County, Washington dba Verdant Health Commission (the District), a Washington municipal corporation, owned and operated Stevens Hospital (the Hospital), located in Edmonds, Washington. The Hospital is an acute care community hospital with 156 set-up beds. On September 1, 2010, the District entered into an agreement (the Agreement) to lease and operate the Hospital with Swedish Health Services (SHS), a nonprofit corporation. The Agreement included transfer of control of Stevens Foundation (the Foundation), which was organized and formally incorporated as a 501(c)(3) tax-exempt organization. The District is now doing business as Verdant Health Commission.

The District is governed by a board of five elected commissioners. The mission of the District is to improve the health and well-being of the community. This mission will be completed by contracting for services with local organizations, businesses, and government agencies and the establishment of Verdant-operated initiatives. Long-term financial stability will be established by investing available revenues received from Swedish Health Services, as well as ongoing tax levy revenues, into allowable government funds, thus building adequate reserves in the years to come.

The District began accepting funding proposal in June 2011 in four health priority areas: Education and Empowerment, Prevent, Access to Healthcare Services, and Policy and Advocacy. Funds are available for one-time uses like events and short-term needs in the community, as well as for ongoing health and wellness programs.

The terms of the Lease specify an initial 30-year term, with two 10-year renewal options. Rental payments to be made by SHS will be $600,000 per month, with annual escalation of 3% per year on each anniversary date for the first 15 years. The rent is on an absolute net basis, with SHS being responsible for all operating costs associated with the facilities. The Lease calls for certain approvals by the District that affect the operation of the facility for the following: change in license, major service line changes, union contract representation, and maintenance of an independent medical staff. SHS has committed to an initial capital investment of $90 million over the first 10 years of the Lease, including the installation of the Epic electronic medical record system at the facility. An additional capital investment by SHS is committed each year based on 25% of the defined profitability of the facility. In addition, a potential commitment of a major expansion project of up to $60 million will be undertaken, provided there is adequate return on investment and demand criteria are met, and the SHS board of trustees approves such a project. The District and SHS will form a strategic collaboration committee to provide oversight for the Lease and strategic planning activities for the facility.

The County Treasurer acts as an agent to collect property taxes levied in the county for all taxing authorities. Taxes are levied annually on assessed values as established by the County Assessor. Tax collections are distributed monthly to the District by the County Treasurer. Property taxes are recorded as receivables and revenue when levied. Because state law allows for the sale of property for failure to pay taxes, no estimate of uncollectible taxes is made.

Note 1 - Organization and Summary of Accounting Policies (continued)

In September 1997, the voters of the District approved a maintenance and operations (M&O) tax levy upon the taxable property within the District; the M&O tax provided approximately $2,105,000 of funding in 2014 and $2,033,000 of funding in 2013. The levy is ongoing in future years. The M&O tax levy funds are reported in the accompanying statements of revenues, expenses, and changes in net position as nonoperating revenues.

Basis of presentation - The financial statements reflect the operations of the District using enterprise fund accounting. Revenues and expenses are recognized on the accrual basis using the economic resources measurement focus.

The District reports its financial information in a form that complies with the pronouncements of the Governmental Accounting Standards Board (GASB) and the Audit and Accounting Guide for Health Care Organizations of the American Institute of Certified Public Accountants.

Use of estimates - The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates. Key estimates include useful lives of capital assets, third-party cost report settlements, and self-insured liabilities. Changes in estimates resulted in a decrease to other nonoperating income of $284,000 and a decrease of $120,000 for the years ended December 31, 2014 and 2013, respectively.

Cash and cash equivalents - For purposes of the statements of cash flows, the District considers all highly liquid investments (excluding cash and short-term investments included in restricted assets) with a maturity of three months or less when purchased to be cash equivalents.

Restricted assets - As described further in Note 7, the District receives tax levy funds that are used solely for debt service associated with the general obligation bonds. Taxes and interest receivable and scheduled debt service payments temporarily invested prior to becoming due are recorded as restricted assets. All receipts and earnings generated on such investments are reported as nonoperating revenues and expenses.

Prepaid expenses and other - Related assets include future expenses that have been paid in advance. The District entered into new agreements in 2014 with scheduled payments. For each agreement, the amount of District payments in excess of the costs incurred were recorded as project advances and included in prepaid expenses and other. As of December 31, 2014, project advances was $935,000.

Capital assets - Capital assets are stated at cost. Improvements and replacement of capital assets are capitalized. The District's capitalization threshold is $5,000 per item and a useful life of at least two years. Maintenance and repairs are expensed. The cost of capital assets sold or retired and the related accumulated depreciation are removed from the accounts, and any resulting gain or loss is recorded.

Note 1 - Organization and Summary of Accounting Policies (continued)

Depreciation is computed using the straight-line method over the estimated useful lives of the related assets. Assets under capital leases are amortized over the shorter of the lease term or useful life. Amortization attributable to assets acquired under capital leases is included with depreciation as shown in the statements of revenues, expenses, and changes in net position.

The following is a summary of asset lives used:

Buildings and building improvements	2 - 50 years
Equipment	2 - 50 years
Land improvements	2 - 25 years

Rent receivable - Rent receivable represents lease revenue on a straight-line basis in excess of lease payments received for applicable lease agreements in accordance with applicable accounting standards.

Self-insurance liabilities - The District accrues an estimate of losses and related expenses for its self-insured workers' compensation claims. The District maintains stop-loss insurance for workers' compensation claims in excess of specified amounts. This estimated liability is recorded in the accompanying statements of net position within accrued salaries and benefits. The amount is approximately $706,000 and $347,000 as of December 31, 2014 and 2013, respectively. The District also records a liability for estimated professional liabilities (Note 6).

Estimated third-party payor settlements - Under a contractual agreement with Medicare, the Hospital is paid at an interim rate during the year for certain services and programs. The difference between interim payments and estimated final reimbursement for the cost report year results in a settlement receivable or payable, which may be adjusted in future periods as final settlements are determined. The Medicare program's administrative procedures preclude final determination of settlement amounts until after the annual cost reports have been audited or otherwise reviewed and settled by Medicare. The District's cost reports have been audited by the Medicare fiscal intermediary through December 31, 2009. The estimated settlement amount for the 2010 cost report is included in the accompanying financial statements.

While operating Stevens Hospital, the District participated in the Medicaid Certified Public Expenditures (CPE) program for inpatient reimbursement, which provides for interim payments for certain services and programs. The difference between interim payments and estimated final reimbursement for the Washington State fiscal year results in a settlement receivable or payable, which may be adjusted in future periods as final settlements are determined.

Note 1 - Organization and Summary of Accounting Policies (continued)

Net position - Net position of the District is classified into three components. The net investment in capital assets component of net position consists of capital assets, net of accumulated depreciation, reduced by the outstanding balances of related debt that is attributable to the acquisition, construction, or improvement of those assets. The restricted component of net position represents noncapital assets that must be used for a specific purpose. The unrestricted component of net position is the remaining net amount of the assets and liabilities that are not included in the determination of net investment in capital assets or the restricted component of net position.

Statements of revenues, expenses, and changes in net assets - For purposes of presentation, transactions deemed by management to be ongoing, major, or central to the provision of District services are reported as operating revenues and expenses. All levy income, interest expense, investment income, and other peripheral or incidental transactions are reported as nonoperating revenues and expenses.

Income taxes - As a political subdivision of the state of Washington, the District is not subject to federal income tax, because its income is excluded from gross income for federal income tax purposes under Section 115 of the Internal Revenue Code.

Reclassifications - Certain reclassifications have been made to prior-year amounts to conform to the current-year presentation to more consistently present financial information between years.

Subsequent events - Subsequent events are events or transactions that occur after the statements of net position date but before financial statements are available to be issued. The District recognizes in the financial statements the effects of all subsequent events that provide additional evidence about conditions that existed at the date of the statements of net position, including the estimates inherent in the process of preparing the financial statements. The District's financial statements do not recognize subsequent events that provide evidence about conditions that did not exist at the date of the statements of net position but arose after the statements of net position date and before the financial statements are available to be issued.

The District has evaluated subsequent events through _____, 2015, which is the date the financial statements are available to be issued.

Note 2 - Cash, Cash Equivalents, Investments, and Deposits

The composition of cash, cash equivalents, investments, and deposits at December 31 is as follows:

	2014	2013
Assets whose use is not restricted		
Cash in banks - interest-bearing	$ 3,189,901	$ 3,218,690
Governmental mutual fund	30,988,240	28,633,976
Total cash, cash equivalents, investments, and deposits	$ 34,178,141	$ 31,852,666

The District makes investments in accordance with Washington State law. Eligible investments include obligations secured by the U.S. Treasury, other obligations of the United States or its agencies, certificates of deposit with approved institutions, eligible bankers' acceptances, and repurchase agreements (up to 30 days).

Because the District is a political subdivision of the state, deposits and investments are categorized to give an indication of the risk assumed at year-end. Category 1 includes deposits and investments that are insured, registered, or held in the District's name. Category 2 includes uninsured and unregistered investments that are held by a broker's or dealer's trust department or agent in the District's name. Category 3 includes uninsured and unregistered deposits and investments for which the securities are held by the broker or dealer, or its trust department or agent, but not in the District's name. At December 31, 2014 and 2013, all deposits and investments of the District are categorized as Category 1.

Credit risk - Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations. The District's investment policy limits the types of securities to those authorized by statute; therefore, credit risk is very limited.

Deposits - All of the District's deposits are either insured or collateralized. The District's insured deposits are covered by the Federal Deposit Insurance Corporation. Collateral protection is provided by the Washington Public Deposit Protection Commission.

Custodial credit risk - Custodial credit risk is the risk that, in the event of a failure of the counterparty, the District will not be able to recover the value of the investment or collateral securities that are in the possession of an outside party. The District is not exposed to custodial credit risk.

Concentration of credit risk - Concentration of credit risk is the risk of loss attributed to the magnitude of the District's investment in a single issuer. The District is not exposed to concentration of credit risk because all deposits and investments are insured or collateralized.

Interest rate risk - Interest rate risk is the risk that changes in interest rates of debt instruments will adversely affect the fair value of an investment. The District is not exposed to interest rate risk because all deposits and investments are extremely liquid.

Note 3 - Capital Assets

Capital asset additions, retirements, and balances for the years ended December 31, 2014 and 2013, were as follows:

	Beginning Balance January 1, 2014	Additions	Retirements	Account Transfers	Ending Balance December 31, 2014
NONDEPRECIABLE CAPITAL ASSETS					
Land	$ 7,723,706	$ -	$ -	$ -	$ 7,723,706
Construction in progress	1,390,046	2,363,862	-	-	3,753,908
	9,113,752	2,363,862	-	-	11,477,614
DEPRECIABLE CAPITAL ASSETS					
Land improvements	2,285,382	-	-	-	2,285,382
Buildings and building improvements	49,754,268	-	(38,135)	-	49,716,133
Equipment	46,692,201	34,985	(367,148)	-	46,360,038
LESS ACCUMULATED DEPRECIATION					
Land improvements	1,976,179	81,010	-	-	2,057,189
Buildings and building improvements	28,399,904	1,555,640	(21,460)	-	29,934,084
Equipment	40,703,945	1,730,441	(362,114)	-	42,072,272
DEPRECIABLE CAPITAL ASSETS, net	27,651,823	(3,332,106)	(21,709)	-	24,298,008
CAPITAL ASSETS, net	$ 36,765,575	$ (968,244)	$ (21,709)	$ -	$ 35,775,622

	Beginning Balance January 1, 2013	Additions	Retirements	Account Transfers	Ending Balance December 31, 2013
NONDEPRECIABLE CAPITAL ASSETS					
Land	$ 3,996,406	$ 3,727,300	$ -	$ -	$ 7,723,706
Construction in progress	-	1,390,046	-	-	1,390,046
	3,996,406	5,117,346	-	-	9,113,752
DEPRECIABLE CAPITAL ASSETS					
Land improvements	2,285,382	-	-	-	2,285,382
Buildings and building improvements	39,487,921	10,266,347	-	-	49,754,268
Equipment	48,091,076	19,488	(1,418,363)	-	46,692,201
LESS ACCUMULATED DEPRECIATION					
Land improvements	1,894,589	81,590	-	-	1,976,179
Buildings and building improvements	27,162,358	1,237,546	-	-	28,399,904
Equipment	38,649,434	2,877,594	(823,083)	-	40,703,945
DEPRECIABLE CAPITAL ASSETS, net	22,157,998	6,089,105	(595,280)	-	27,651,823
CAPITAL ASSETS, net	$ 26,154,404	$ 11,206,451	$ (595,280)	$ -	$ 36,765,575

Note 4 - Lessor Agreements

As referenced in Note 1, the District entered into a lease and operating agreement (the Lease) with SHS that was dated and effective September 1, 2010. The terms of the Lease specify an initial 30-year term, with two 10-year renewal options. Rental payments to be made by SHS will be $600,000 per month, with annual escalation of 3% per year on each anniversary date for the first 15 years. The rental payments will freeze at the rate set during year 15 for the duration of the Lease. The revenue related to this lease is recorded on a straight-line basis by the District in accordance with applicable accounting standards.

Note 4 - Lessor Agreements (continued)

The District also has other lease agreements to lease space to various tenants. In accordance with applicable accounting standards, the revenue from some of these lease agreements is recognized on a straight-line basis and some are recognized in an amount equal to their required lease payments.

Rental payments to be received under these agreements are as follows:

	Straight-Line Recognition		Leases Recognized Based on Required	
	Lease of Hospital	Other Leases	Lease Payments	Total
2015	$ 8,185,000	$ 498,000	$ 688,000	$ 9,371,000
2016	8,430,000	485,000	706,000	9,621,000
2017	8,683,000	514,000	346,000	9,543,000
2018	8,944,000	529,000	360,000	9,833,000
2019	9,212,000	548,000	30,000	9,790,000
2020 - 2024	50,375,000	2,126,000	36,000	52,537,000
2025 - 2029	55,869,000	-	-	55,869,000
2030 - 2034	56,087,000	-	-	56,087,000
2035 - 2039	56,087,000	-	-	56,087,000
2040	7,478,000	-	-	7,478,000
	$ 269,350,000	$ 4,700,000	$ 2,166,000	$ 276,216,000

Note 5 - Long-Term Debt

The balances of the District's long-term debt at December 31 are set forth below:

	2014	2013
LTGO Refunding Bonds, 2012, 2.00% to 3.00%, principal due serially on December 1 in amounts from $745,000 in 2014 to $955,000 in 2020, including unamortized premium of $367,008 in 2014 and $429,038 in 2013.	$ 5,527,008	$ 6,334,038
Less current portion	(770,000)	(745,000)
Long-term debt and obligations under capital leases, net of current portion	$ 4,757,008	$ 5,589,038

Note 5 - Long-Term Debt (continued)

Long-term debt and capital lease obligations' activity summary for 2014 and 2013 is as follows:

	January 1, 2014	Additions	Reductions	December 31, 2014	Amounts Due Within One Year
LONG-TERM DEBT					
2012 LTGO Bond	$ 6,334,038	$ -	$ (807,030)	$ 5,527,008	$ (770,000)
OTHER LONG-TERM LIABILITIES	100,000	-	-	100,000	-
	$ 6,434,038	$ -	$ (807,030)	$ 5,627,008	$ (770,000)

	January 1, 2013	Additions	Reductions	December 31, 2013	Amounts Due Within One Year
LONG-TERM DEBT					
2012 LTGO Bond	$ 7,116,067	$ -	$ (782,029)	$ 6,334,038	$ (745,000)
OTHER LONG-TERM LIABILITIES	202,870	-	(102,870)	100,000	-
	$ 7,318,937	$ -	$ (884,899)	$ 6,434,038	$ (745,000)

Scheduled principal and interest repayments on long-term debt are as follows as of December 31, 2014:

	Long-Term Debt	
	Principal	Interest
2015	$ 770,000	$ 154,800
2016	805,000	131,700
2017	840,000	107,550
2018	875,000	82,350
2019	915,000	56,100
2020	955,000	28,650
	5,160,000	$ 561,150
Amounts representing net unamortized premium and deferred loss	367,008	
	$ 5,527,008	

Note 5 - Long-Term Debt (continued)

On November 2012, the District issued the Limited Tax General Obligation Refunding Bonds, 2012 (2012 LTGO Refunding Bonds) for a par value of $6,625,000 with a premium of $496,236. The District has designated its M&O tax levy, approved by the voters of the District in September 1997, to the payment of principal and interest on the 2012 LTGO Refunding Bonds. The proceeds from the bonds were used to refund the remaining balance of the 1999 Series LTGO Bonds, which totaled approximately $7,000,000. The refunding decreased the District's aggregate debt service payments by $358,000 over the next eight years and resulted in an economic gain (difference between the present values of the old and new debt service payments) of $440,000.

Note 6 - Professional Liability Insurance

Prior to September 1, 2010, the District maintained a claims-made professional liability insurance policy through a commercial carrier with a self-insured retention per claim. Effective September 1, 2010, the District purchased a tail policy to cover all claims incurred prior to that date. Under this policy, there is a deductible amount of $100,000 per claim. The policy was purchased to provide maximum coverage for the exposure to the deductible for all claims. At December 31, 2010, the District had estimated a liability for amounts to be paid under the deductible of this policy. This liability is included in the accompanying statements of net position at $0 and $57,000 at December 31, 2014 and 2013.

Note 7 - Property Taxes

The County Treasurer acts as an agent to collect property taxes levied in the county for all taxing authorities. Taxes are levied annually on January 1 on property values listed as of the prior May 31. Assessed values are established by the County Assessor at 100% of fair market value. A revaluation of all property is required every four years.

Taxes are due in two equal installments on April 30 and October 31. Collections are distributed monthly to the District by the County Treasurer. The District is permitted by law to levy up to $0.75 per $1,000 of assessed valuation for general District purposes. Washington State Constitution and Washington State Law, RCW 84.55.010, limit the rate. The District may also levy taxes at a lower rate. Further amounts of tax need to be authorized by the vote of the people.

For 2014 and 2013, the District's regular tax levy was $0.10 and $0.11 per $1,000 on a total assessed valuation of $19,859,116,132 and $18,066,449,142, for a total regular levy of $2,105,000 and $2,033,000, respectively.

Property taxes are recorded as receivables when levied. Because state law allows for sale of property for failure to pay taxes, no estimate of uncollectible taxes is made.

Note 8 - Retirement Plan

Effective July 1, 2010, the District sponsored a 401(a) plan and a 457 plan that are available to all benefit eligible employees working over 20 hours per week. Employees are eligible to contribute at their hire date. Employees contribute to the 457 plan at their discretion. Employee contributions were approximately $22,000 and $19,000 during the years ended December 31, 2014 and 2013, respectively. The District contributes to the 401(a) plan at 3% of employee wages with an additional matching contribution of up to 3% of the amount contributed by the employee to the 457 plan. The District's policy is to fully fund the contributions. The District contributed approximately $32,000 and $30,000 during the years ended December 31, 2014 and 2013, respectively.

Note 9 - Commitments and Contingencies

Litigation and compliance with laws and regulations - The District is involved in litigation arising in the course of business. After consultation with legal counsel, management estimates that these matters will be resolved without material adverse effect on the District's future financial position or results from operations.

The hospital industry is subject to numerous laws and regulations of federal, state, and local governments. These laws and regulations include, but are not necessarily limited to, matters such as licensure, accreditation, government hospital program participation requirements, reimbursement for patient services, and Medicare and Medicaid fraud and abuse. Government agencies are actively conducting investigations concerning possible violations of fraud and abuse statutes and regulations by hospital providers. Violations of these laws and regulations could result in expulsion from government hospital programs, together with the imposition of significant fines and penalties, as well as significant repayments for patient services previously billed. Management believes that the District is in compliance with the fraud and abuse regulations, as well as other applicable government laws and regulations. Compliance with such laws and regulations can be subject to future government review and interpretation, as well as regulatory actions unknown or unasserted at this time.

Program commitments - The District has a commitment to fund a program recipient's future expenditures in the amount of approximately $47,000 per month through August 2018. The District has also committed to fund two additional programs, with a remaining commitment of $3,305,000 as of December 31, 2014. Payments of $1,331,000, $1,349,000, and $625,000 are due in 2015, 2016, and 2017, respectively.

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Accrual Basis

DRAFT

Public Hospital District #2, Snohomish County

Balance Sheet

As of April 30, 2015

		A	B	C	D
		Dec 31, 2014	Apr 30, 2015	$ Change	Comments:
1	ASSETS				
2	Current Assets				
3	Cash Balance	2,840,919	307,899	(2,533,020)	
4	Other Current Assets	32,617,628	35,152,794	2,535,166	Includes Investments
5	Total Current Assets	35,458,547	35,460,693	2,146	
6	Total Long-term & Fixed Assets	47,374,208	46,708,641	(665,568)	Depreciation
7	TOTAL ASSETS	**82,832,755**	**82,169,333**	**(663,422)**	
8	LIABILITIES & EQUITY				
9	Liabilities				
10	Current Liabilities	2,480,364	1,410,548	(1,069,816)	
11	Long-term Liabilities	4,857,008	4,836,331	(20,677)	2012 LTGO Bonds
12	Total Liabilities	7,337,372	6,246,880	(1,090,493)	
13	Total Equity	75,495,383	75,922,454	**427,071**	Annual Net Income
14	TOTAL LIABILITIES & EQUITY	**82,832,755**	**82,169,333**	**(663,422)**	

Profit & Loss

April 2015

		A	B	C	D	E	F
		Apr Actual	Apr Budget	Fav/(Unfav)	YTD Actual	YTD Budget	Fav/(Unfav)
1	INCOME						
2	Ordinary Income	812,478	805,963	6,515	3,284,550	3,223,853	60,697
3	EXPENSES						
4	Operating Expenses	160,814	178,227	17,414	581,998	698,628	116,630
5	Depreciation Expense	212,565	223,492	10,927	898,506	942,213	43,707
6	Program Expenses	375,099	474,917	99,818	2,331,172	2,524,661	193,490
7	Total Expenses	748,477	876,637	128,159	3,811,676	4,165,502	353,827
8	OTHER INCOME/(EXPENSE)						
9	Total Other Income/(Expense)	187,834	212,096	(24,262)	954,196	848,384	105,812
10	NET INCOME	**251,834**	**141,423**	**110,411**	**427,071**	**(93,265)**	**520,336**

Monthly Highlights

April 2015

Verdant received dividends payments of $37,555 and an unrealized loss of $29,152 on our investment portfolio in April. The District also transferred $2,000,000 in excess cash into our portfolio which closed with an ending market value of $33,607,828.

Annual program commitments total $6,144,339 and $4,693,065 for 2015 and 2016, respectively. $955,661 remains available to spend in 2015, of which $280,847 is earmarked as Superintendent Discretionary.

Additional income of $108,060 and expenses of $49,906 from the Kruger Clinic were incurred, netting to an additional operating income of $58,153 in April.

Public Hospital District #2

Warrant Number	Transaction Date	Payee	Amount	Purpose
Warrant Activity:				
11087	04/01/2015	Beth Rodriguez, LLC	1,269.18	March 2015 Interim Marketing Director (33 hours)
11088	04/01/2015	Dataworks	1,210.37	IT Support
11089	04/01/2015	Moss Adams - Cost Report	3,188.00	CPE reports for 2005 & 2006 & year end 3rd party estimates for Stevens Hospit
11090	04/01/2015	Puget Sound Energy	62.29	Natural Gas
11091	04/01/2015	Snohomish County PUD	2,365.97	1/23 - 3/24/15 Electricity
11092	04/01/2015	Waste Management	273.56	Garbage / Recycling
11093	04/01/2015	Shirley Sutton	300.00	Refund for Damage Deposit
11094	04/08/2015	Consolidated Landscape Maintenance, Inc.	3,011.26	VCWC Landscaping Updates
11095	04/08/2015	Sound Dietitians	300.00	VCWC 3/3 Life Style Change Workshop & 3/17 Lifestyle Change Check-in
11096	04/08/2015	Ash Consulting	2,548.00	Mar 2015 Accounting Consulting
11097	04/08/2015	Armstrong Services	1,086.12	Janitorial & Supplies
11098	04/08/2015	Comcast	262.70	Telephone & Internet
11099	04/08/2015	WA Department of Revenue	21,016.26	Q1 2015 Leasehold Excise tax return
11100	04/08/2015	Comcast	552.98	Telephone & Internet
11101	04/08/2015	Hamilton Printing Solutions, Inc	1,095.00	100 Verdant T-shirts for Couch to 8k, staff, other future programs
11102	04/08/2015	Lowe Graham Jones PLLC	514.65	Annual watch fee for monitoring use of trademark
11103	04/08/2015	My Neighborhood News Network	3,217.50	Advertising of Lifestyle Change Check-in classes at VCWC 4/15-12/15
11104	04/08/2015	MJ Takisaki, Inc.	100,869.67	Construction of VCWC February & March 2015
11105	04/08/2015	Moss Adams - Audit	1,828.75	2014 Financial Audit
11106	04/08/2015	Lile International Companies	425.00	Mar 2015 Storage plus storage inspection
11114	04/22/2015	Berry Sign Systems	328.50	HASP & Software for Electric Readerboard Sign
11115	04/22/2015	Dataworks	407.48	Includes IT support and Vipre Antivirus Business with 1 Year Maint and Support
11116	04/22/2015	Healthcare Realty	5,465.34	March Property Management
11107	04/22/2015	Archbright	129.00	KG attend Active Shooter Preparedness
11108	04/22/2015	Staples	316.88	Supplies
11109	04/22/2015	Aukema & Associates	493.50	Mar 2015 Website Updates, trademark logo replacements, developer modifica
11110	04/22/2015	Krystyna Simm	-	VOID
11111	04/22/2015	City of Lynnwood	990.13	Staff Support for VCWC after hours
11112	04/22/2015	Snohomish County.	2,800.00	Award 214 - Health Fair
11113	04/22/2015	Premera Blue Cross	3,782.54	EE Medical and Dental Insurance
11117	04/22/2015	Krystyna Simm	300.00	VCWC Instructor for 3/19, 3/24, 4/2 relaxation classes
11118	04/29/2015	Ankrom Moisan	1,812.10	Architectural Services February 2015
11119	04/29/2015	Benefit Solutions Inc	17.25	May 2015 Monthly Billing
11120	04/29/2015	Foster Pepper	429.00	Legal
11121	04/29/2015	Principal Financial Group	904.69	EE Life Insurance
11122	04/29/2015	Wells Fargo	2,531.28	Misc.
11123	04/29/2015	Sound Publishing, Inc.	39.20	4/22 Board Meeting Notice
11124	04/29/2015	Puget Sound Energy	61.02	Natural Gas
11125	04/29/2015	Consolidated Landscape Maintenance, Inc.	436.91	May Landscaping Maintenance
11126	04/29/2015	Department of Labor and Industries	958.85	1Q15 Self Insurance Fund
11128	04/29/2015	Lexington Insurance Company	148.87	Lalu claim AIG policy # 6791234
11129	04/29/2015	Center for Advanced Recovery Solutions	900.00	VCWC Classses April 13, 20, 27, 2015
11130	04/29/2015	Sound Dietitians	420.00	VCWC 4/7, 4/21 Life Style Change Check-in 4/18 Eating on a budget
11131	04/29/2015	Tube Art Group	1,635.50	Down payment for VCWC welcome/directional sign

Warrant Number	Transaction Date	Payee	Amount	Purpose
Warrant Activity:				
11132	04/29/2015	Aukema & Associates	493.50	Feb 2015 Web development support
11133	04/29/2015	Dataworks	1,278.06	Vipre Antivirus install & Carl IT support
11134	04/29/2015	US Postal Service	12,973.40	Postage for summer 2015 Canopy
		Total Warrants	185,450.26	
Kruger Clinic Activity:				
239-254	Mar 2015	Various Claimants/Vendors	50,904.43	Administered by Healthcare Realty
Workers Compensation Claims Activity:				
305214-224	Mar 2015	Various Claimants/Vendors	3,159.92	Administered by Eberle Vivian

Warrant Number	Transaction Date	Payee	Amount	Purpose
Wire/ACH Activity:				
	4/3/2015	Payroll	18,325.88	ACH payroll transfer
	4/3/2015	Paychex	86.84	Fee for payroll processing
	4/3/2015	Department of Treasury	7,478.34	Payroll taxes for 3/28/15 pay period ending
	4/3/2015	Valic	2,696.20	Payroll 401(a)/457 Deposit
	4/17/2015	Payroll	15,913.69	ACH payroll transfer
	4/17/2015	Paychex	97.38	Fee for payroll processing
	4/17/2015	Department of Treasury	6,859.35	Payroll taxes for 4/11/15 pay period ending
	4/17/2015	Valic	2,670.20	Payroll 401(a)/457 Deposit
	4/10/2015	Wells Fargo	4.44	March 2015 Client Analysis Bank Fee
	4/15/2015	Bank of America - Fees	0.00	Bank Service Fee
	4/15/2015	Alzheimer's Association Western & Central	7,209.16	Program Payment
	4/15/2015	American Diabetes Association	4,166.67	Program Payment
	4/15/2015	American Red Cross	2,500.00	Program Payment
	4/15/2015	Boys & Girls Club of Snohomish County	12,833.33	Program Payment
	4/15/2015	CampFire	4,166.67	Program Payment
	4/15/2015	Cascade Bicycle Club Education Foundation	2,666.67	Program Payment
	4/15/2015	Center for Human Services	13,523.67	Program Payment
	4/15/2015	ChildStrive	23,113.25	Program Payment
	4/15/2015	City of Edmonds Parks & Recreation	2,000.00	Program Payment
	4/15/2015	City of Lynnwood	15,165.66	Program Payment
	4/15/2015	Community Health Center of Snohomish Co	27,083.33	Program Payment
	4/15/2015	Cornerstone Medical Services Foundation	5,000.00	Program Payment
	4/15/2015	Domestic Violence Services Snohomish Co	1,621.08	Program Payment
	4/15/2015	Edmonds Community College	10,990.58	Program Payment
	4/15/2015	Edmonds Community College Foundation	4,396.33	Program Payment
	4/15/2015	Edmonds School District No. 15	66,892.84	Program Payment
	4/15/2015	Edmonds Senior Center	10,166.67	Program Payment
	4/15/2015	Kindering	7,500.00	Program Payment

Warrant Number	Transaction Date	Payee	Amount	Purpose
Wire/ACH Activity:				
	4/15/2015	Medical Teams International	4,000.00	Program Payment
	4/15/2015	Prescription Drug Assistance Foundation	4,166.67	Program Payment
	4/15/2015	Program for Early Parent Support	2,987.50	Program Payment
	4/15/2015	Providence Hospice & Home Care Foundation	12,916.67	Program Payment
	4/15/2015	Puget Sound Christian Clinic	9,166.67	Program Payment
	4/15/2015	Puget Sound Kidney Centers Foundation	5,833.33	Program Payment
	4/15/2015	Senior Services of Snohomish County	46,686.67	Program Payment
	4/15/2015	Smithwright Services	5,416.67	Program Payment
	4/15/2015	Snohomish County Fire District 1	12,035.50	Program Payment
	4/15/2015	Snohomish County Music Project	2,416.67	Program Payment
	4/15/2015	Washington CAN! Education & Research Fund	15,714.29	Program Payment
	4/15/2015	Wonderland Development Center	11,250.00	Program Payment
	4/15/2015	YWCA of Seattle, King and Snohomish Co	4,166.66	Program Payment
	4/15/2015	Center for Advanced Recovery Solutions	1,300.00	Program Payment
	4/15/2015	Mary Porter, RDN	150.00	Program Payment
	4/15/2015	Volunteers of America Western WA	6,362.92	Program Payment
	4/3/2015	Benefit Solutions Inc	10.87	FSA Payments
	4/4/2015	Benefit Solutions Inc	348.99	FSA Payments
	4/6/2015	Benefit Solutions Inc	20.00	FSA Payments
	4/8/2015	Benefit Solutions Inc	396.00	FSA Payments
	4/17/2015	Benefit Solutions Inc	396.00	FSA Payments
	4/21/2015	Benefit Solutions Inc	800.00	FSA Payments
	4/30/2015	Benefit Solutions Inc	239.68	FSA Payments
	4/23/2015	Benefit Solutions Inc	396.00	FSA Payments
	4/20/2015	Department of Labor and Industries	293.71	1Q15 L&I - State Fund
	4/24/2015	WA Department of Revenue	752.97	B&O tax
		Total Wires/ACH Transactions	423,352.67	
		Total Disbursements	**$ 662,867.28**	

	Transaction Date	Payer	Amount	Purpose
Deposits:				
	4/1/2015	Swedish/Edmonds	734,176.21	Monthly lease
	4/1/2015	Value Village	24,428.45	Monthly lease
	4/3/2015	Ankrom Moisan	13,557.50	Reimbursement for contruction costs
	4/6/2015	Department of Labor and Industries	12,054.32	Work Comp Self Insurance reimbursment 2003-2009
	4/1/2015	Raymond Liu, D.D.S.	3,320.83	Kruger Clinic monthly lease
	4/1/2015	John Headley MD PS	18,949.07	Kruger Clinic monthly lease
	4/1/2015	Brian Tagaki, MD	75.00	Kruger Clinic monthly lease
	4/10/2015	Snohomish County	88,073.00	Levy
	4/13/2015	Edmonds School District 15	200.00	Deposit for VCWC
	4/13/2015	EvergreenHealth Medical Center	200.00	Deposit for VCWC
	4/16/2015	Cocoon House	100.00	Deposit for VCWC
	4/17/2015	Sara T Needleman-Carlton	200.00	Deposit for VCWC
	4/17/2015	Puget Sound Gastro	26,843.75	Kruger Clinic monthly lease
	4/20/2015	Healthcare Realty Services, Inc.	4,663.72	Monthly ground Lease
	4/21/2015	Sound Health Physicians, PS	200.00	Deposit for VCWC
	4/24/2015	Washington Cease Fire	200.00	Deposit for VCWC
		Total Deposits	$ 927,241.85	

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5.27.2015

VERDANT HEALTH COMMISSION
PUBLIC HOSPITAL DISTRICT #2
SNOHOMISH COUNTY, WASHINGTON

WARRANT APPROVAL

We, the undersigned Board of Commissioners of Public Hospital District #2 of Snohomish County, Washington, do hereby certify that the merchandise or services hereinafter specified have been received and that Warrant Numbers 11087 through 11134 have been issued for payment in the amount of $185,450.26. These warrants are hereby approved.

Attest:
Lisa M. King

Commissioner
Commissioner
Commissioner
Commissioner
Commissioner

Warrants Processed:	4-1-15 – 4-30-15		$185,450.26
Work Comp Claims Pd:	4-1-15 – 4-30-15		3,159.92
Kruger Clinic Processed:	4-1-15 – 4-30-15		50,904.43
Payroll:	3-15-15 – 3-28-15	18,325.88	
	3-29-15 – 4-11-15	15,913.69	
			34,239.57
Electronic Payments:	Payroll Taxes	14,631.40	
	Paychex	184.22	
	Valic Retirement	5,366.40	
	Benefit Solutions	2,607.54	
	Bank Fees	4.44	
	WA State Dept Revenue	752.97	
	Program Expenditures	365,566.13	
			389,113.10
	Grand Total		$662,867.28

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5.27.2015

May 2015 Program Committee Summary

Program Summary

- Seven application requests up for discussion:
  - Five new funding requests
  - Two renewal requests

Applications Recommended for Funding

- **Mountlake Terrace Senior Center – AED Purchase:** a one-time request to fund an AED to be placed in the Mountlake Terrace Senior Center. The Senior Center would also plan to provide CPR training and instruction on AED use, with the goal of always having a trained person on site. **The program committee is recommending funding the program in full at $2,500 on a one-time basis.**

- **Turning Point - Back to School Health Fair:** a $15,000 request for the 4th annual school resource & health fair in August at Cedar Valley Elementary. The health fair provides health exams, vision checks, immunizations and dental services. More than 600 children and 300 adults have been served each year. Verdant provided $10,000 in funding in 2014 and $8,000 in 2013. Turning Point is a new non-profit fiscal agent for the project, which continues to receive support from CHC of Snohomish County and the Edmonds School District. **The program committee is recommending partially funding the request at $12,000 on a one-time basis.**

Not Recommended for Funding at this time

- **Citrine Health – Bra Shop**: a one-time request of $18,000 to support a non-profit's bra shop in Everett that serves women recovering from breast cancer. Funds would be used to help the organization become accredited to bill Medicaid, Medicare and other insurance companies for prosthesis and bras. **The program committee is not recommending the program for funding—services would be provided out of Everett and the committee noted that start-up funding for program accreditation did not fit Verdant's funding priorities.**

- **Edmonds Senior Center – Senior & Community Center:** a $2 million request to support the construction of a new 25,000 sq ft community and senior center in Edmonds, part of a $10 million capital campaign. The center would host expanded health and wellness programs including Enhance Wellness, PEARLS, Bastyr programs, health screenings, dental, foot and others. The applicant is seeking a funding commitment now, but funds would not be needed until 2017 when construction is scheduled to begin.

  The program committee is recommending tabling the request for now because it fits in Verdant's Building Healthy Communities Fund. Committee members also noted that Verdant would need to think through how a general building capital grant would fit with our funding policies.

- **DPS Health – Diabesity Self-Management proposal:** a concept proposal from a disease management company to provide virtual wellness programming. The project would provide online diabetes or weight loss self-management programs. The concept is that the program could be Verdant branded with DPS Health providing operational and logistical support, and the goal would be to reach 2,500 individuals in the community.

  The program committee is not recommending pursuing the program at this time. The committee members felt that if Verdant were to implement this type of program, it should be targeted at uninsured individuals rather than more broadly in the community, because this is something that payers and providers have an incentive to pursue. The committee members also wanted to have more discussion about population-level health priorities and where these types of online programs could fit in Verdant's strategic plan. The committee suggested that this should be a topic for discussion at the June board mini-retreat.

Renewal Requests

- **Domestic Violence Services of Snohomish County - Teen Violence Dating Program:** a renewal request for a teen dating violence prevention program for teens. Funds are used for a part-time educator who conducts outreach in South Snohomish County and makes presentations through schools and other community groups. The program has met its goals and reaches approximately 6,000 teens each year. **The program committee is recommending fully funding the request at $22,266 for three years, which is a 10% increase from the current level.**

- **Community Health Center of Snohomish County – Dental Program:** a renewal request for a dental program for uninsured adults. Verdant previously funded the project for one year with the option to renew. The program serves uninsured patients that have a co-occurring medical condition. For example, 28% have been diabetic, 21% hypertensive, and 19% have mental health issues.

  Part of the funding ($25,000) would support a dental care coordinator to ensure care treatment plans are in place and that patients get appropriate follow-up care. The remaining grant ($100,000) would fund direct patient care for CHC at the approved Medicaid rate, currently around $200 per visit. **The program committee is recommending funding the request in full at $125,000 for one year.**

Verdant Health Commission Proposal Summary May 2015

	A	B	C	D	E	F	G	H	I
New Funding Requests			Request for funding			Priority Area			
#	Name		Year 1	Year 2	Year 3	Education & Empowerment	Prevention	Access to Healthcare	Policy & Advocacy
1	Citrine Health - Bra Shop	A one-time request to support a non-profit's bra shop in Everett that serves women recovering from breast cancer. Funds would be used to help the organization become accredited to bill Medicaid, Medicare and other insurance companies for prosthesis and bras.	$18,000					X	
2	Mountlake Terrace Senior Center - AED Purchase	A one-time request to fund an AED to be placed in the Mountlake Terrace Senior Center. The Senior Center would also plan to provide CPR training and instruction on AED use.	$2,500			X	X	X	
3	Edmond Senior Center - Senior & Community Center Capital Project	A one-time request to support the construction of a new 25,000 sq ft community and senior center in Edmonds, part of a $10 million capital campaign. The center would host expanded health and wellness programs including Enhance Wellness, PEARLS, Bastyr programs, health screenings, dental, foot and other programming. The goal would be to increase program participation from 4,000 to 9,000 individuals per year. The applicant is seeking a funding commitment now, but funds would not be needed until 2017 when construction is scheduled to begin.	$2,000,000			X	X	X	
4	Turning Point - Back to School Health Fair	A funding request for the 4th annual school resource & health fair in August at Cedar Valley Elementary. The health fair provides health exams, vision checks, immunizations and oral exams/fluoride varnish. More than 600 children and 300 adults have been served each year. In 2014 Verdant provided $10,000 in funding and in 2013 Verdant provided $8,000. Turning Point is a new non-profit fiscal agent for the project, which continues to receive support from CHC of Snohomish County and the Edmonds School District.	$15,000				X	X	
5	DPS Health - Diabesity Self Management Program	A concept proposal from a for-profit disease management company to provide virtual wellness programming. The project would provide online diabetes or weight loss self-management programs that includes an online group course followed by ongoing peer-support. The concept is that the program could be Verdant branded with DPS Health providing operational and logistical support.	~$300 per person, with goal of 2,500 enrollees = $750,000 per year			X	X		

Verdant Health Commission Proposal Summary May 2015

#	Name		Year 1	Year 2	Year 3	Education & Empowerment	Prevention	Access to Healthcare	Policy & Advocacy
Renewal Requests									
6	Domestic Violence Services of Snohomish County - Teen Healthy Relationships Program	A renewal request for a teen dating violence prevention program. Funds are used for a part-time educator who conducts outreach in South Snohomish County and makes presentations through schools and other community groups.	$22,266	$22,266	$22,266	X	X		
7	CHC of Snohomish County - Dental Program	A renewal request for a dental program for uninsured adults. Part of the funding ($25,000) would support a dental care coordinator to ensure care treatment plans are in place and that patients get appropriate follow-up care. The remaining grant ($100,000) would fund direct patient care for CHC at the approved Medicaid rate, currently around $200 per visit. So far the program has seen 132 patients, all of whom are uninsured and have a co-occurring medical condition.	$125,000					X	

Program Payout Schedule
as of May 2015

A	B	C
	2015	Budget 2016
7100 . Grants		
Committed		
Domestic Violence Services Teen Prevention	$ 9,726	$ -
Providence Hospice & Home Care Foundation	$ 64,583	$ -
YWCA Children's Domestic Violence	$ 8,333	$ -
Medical Teams International Mobile Dental Program	$ 28,000	$ -
Perscription Drug Assistance Program	$ 50,000	$ 20,833
YWCA Mental Health Counseling	$ 20,833	$ -
EdCC Student Health & Wellness Program	$ 95,790	$ 29,847
Center for Human Services Counseling	$ 162,284	$ -
Cascade Bicycling Club Advanced Basics	$ 32,000	$ -
American Diabetes Association Stop Diabetes	$ 50,000	$ -
Senior Services Center for Healthy Living	$ 560,240	$ 560,240
Wonderland Development Center	$ 135,000	$ 90,000
PSCC Mental Health Counseling Program	$ 21,667	$ 16,668
Community Paramedic	$ 144,426	$ -
Smithwright	$ 65,000	$ 54,167
Edmonds School District No. 15 Student Support Advocate	$ 310,586	$ 310,586
PSCC Mobile Medical Clinic	$ 90,000	$ -
ChildStrive Nurse Family Partnership	$ 277,359	$ -
Edmonds Community College Veteran's Support	$ 52,756	$ 52,756
City of Lynnwood Fire Departement Mobile Integrated Care	$ 108,259	$ 45,108
CHC of Snohomish County Dental Program	$ 77,215	$ -
Edmonds School District Move 60!	$ 498,690	$ 518,637
Puget Sound Kidney Center	$ 68,333	$ 45,833
Seattle Visiting Nurses Flu Shots Renewal	$ 16,275	$ -
Kindering Early Intervention	$ 90,000	$ 67,500
Boys & Girls Club Healthy Habits Renewal	$ 154,000	$ 102,667
American Red Cross CPR Training	$ 10,000	$ 7,500
Edmonds Senior Center Enhanced Wellness	$ 110,000	$ 110,000
Washington CAN! Insurance Enrollment	$ 78,571	$ -
3rd Grade Swim Lessons Renewal	$ 50,000	$ 50,000
Snohomish County Music Project	$ 29,000	$ 26,583
Cornerstone Medical Services	$ 60,000	$ 60,000
PEPS	$ 35,850	$ 35,850
Campfire	$ 50,000	$ -
Alzheimer's Association	$ 86,510	$ 86,510
City of Lynnwood Move 60: Teens!	$ 73,729	$ 73,729
CHC Behavioral Health Integration	$ 275,000	$ 300,000
Therapeutic Health Services Youth Behavioral	$ 125,000	$ 200,000
PSCC Dental Clinic	$ 216,667	$ 200,000
Snohmish County Health Leadership Coalition	$ 52,000	$ 50,000
LCSNW Health Access for Underserved	$ 54,863	$ 94,051
Senior Services of Snohomish County Care Coordination	$ 146,250	$ 135,000
Total Committed	**$ 4,644,797**	**$ 3,344,065**
Not Committed (Available to Spend)	**$ 470,753**	**$ -**
Total Grants	**$ 5,115,550**	**$ 3,344,065**

Program Payout Schedule
as of May 2015

7300 . Internal Programs		
Committed		
Total Committed	**$ 129,939**	$ -
Not Committed (Available to Spend)	**$ 160,061**	**$ -**
Total Internal Programs	**$ 290,000**	
7200 . Discretionary		
Committed		
Edmonds Health & Fitness Expo	$ 2,000	
Clothes for Kids Breakfast	$ 500	
Serve our Sisters Health Fair	$ 2,800	
Edmonds Senior Center Health Fair	$ 1,000	
Snoh Co Health Leadership Coalition	$ 1,303	
Total Committed	**$ 7,603**	**$ -**
Not Committed (Available to Spend)	**$ 280,847**	**$ -**
Total Discretionary Programs	**$ 288,450**	**$ -**
7500 . Building Healthy Communities Fund		
Committed		
Woodway Recreation Campus Renovation	$ 625,000	$ 625,000
Bike Link	$ 706,000	$ 724,000
Total Committed	**$ 1,331,000**	**$ 1,349,000**
Not Committed (Available to Spend)	**$ -**	**$ -**
Total BHCF Programs	**$ 1,331,000**	**$ 1,349,000**
7400 . One time Events		
Committed		
EdCC Celebration of Food	$ 5,000	
City of Lynnwood - Fire Camp	$ 6,000	$ -
Dance for Parkinsons	$ 20,000	$ -
Total Committed	**$ 31,000**	**$ -**
Not Committed (Available to Spend)	**$ 44,000**	**$ -**
Total One Time Events Programs	**$ 75,000**	**$ -**
TOTAL	**$ 7,100,000**	**$ 4,693,065**

Updated May 2015

Verdant Program Financial Forecasting

Scenario 1: 100% renewal

	2015
Existing multi-year commitments	$4,644,797
New Grants (plug)	$143,682
Expected Renewals (100%)	$327,071
One-time events	$75,000
Building Healthy Communities Fund	$1,331,000
Community Programs Internal	$290,000
Superintendent Discretionary	$288,450
Total	**$7,100,000**

Note: includes $50k/year for swim lessons, and $150k start up for PSCC Lynnwood Dental clinic, w/ongoing payments beginning in Sept.

Scenario B: 80% renewal

	2015
Existing multi-year commitments	$4,644,797
New Grants (plug)	$209,096
Expected Renewals (80%)	$261,657
One-time events	$75,000
Building Healthy Communities Fund	$1,331,000
Community Programs Internal	$290,000
Superintendent Discretionary	$288,450
Total	**$7,100,000**

Programs up for Renewal in 2015

Organization Name	Program Name	Funding Ends	2015 $ amount at current funding level
Project Access Northwest	Project Access Northwest	Nov-14	$80,000
Domestic Violence Services of Snohomish County	Teen Dating Violence Prevention	Jul-15	$9,726
Providence Hospice & Home Care Foundation	Hospice Outreach and Education	Jun-15	$90,417
YWCA of Seattle, King, and Snohomish County	Children's Domestic Violence Program	May-15	$16,667
Medical Teams International	Mobile Dental Program	Jul-15	$20,000
YWCA of Seattle, King, and Snohomish County	Mental Health Counseling Program	Nov-15	$4,167
Community Health Center of Snohomish County	Dental Program	Jul-15	$41,667
Within Reach	Insurance Enrollment	Jun-15	$33,000
Washington CAN	Insurance Outreach	Nov-15	$31,428
		Total	$327,071

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Verdant Community Wellness Center Summary

Completed Programs

General Community and Provider Events	Attendance
• Verdant Partner Roundtable Quarterly Meeting (April 24)	35
• Snohomish Health Leadership Coalition Quarterly Meeting (April 28)*	25
• Second Time Around - PEPS Support Group for Moms (4/30 – 7/11)*	6-8
• Lutheran Community Services - Promotora Training (5/1)	12
• Mothers of Children with Disabilities Monthly Support Network (5/2)	19
• Washington Ceasefire - Asking Saves Kids Program (5/5)	5
• DSHS/Children's Administration Training for new Social Workers (5/6 & 20)	22
• Coordinated Care – Snohomish County Community Advisory Meeting (5/7)	18
• Evergreen Home Health - Home Visiting Clinical Team Meeting (5/13)	25
• Advanced Care Planning Facilitator Training (5/16)	10
• Chronic Disease Self-Management - Facilitator Training (5/26 & 27)	15

Nutrition and Healthy Behaviors	Attendance
• Chronic Kidney Disease Prevention Workshops (ongoing)*	8-18
• Stop Diabetes Initiative Workshop 3/28 and 5/16*	24 &28
• Multicultural Everyday Cancer Prevention in Vietnamese 5/9*	20
• Healthy Easy Weeknight Cooking – Sound Health Physicians (5/5)	12
• Getting to Goal Community Program (5/5)*	7-8
• E-Cigarettes and Vaping (5/6)*	8
• Stress Management and Relaxation (5/12)*	10
• AHA Healthy Brain Healthy You – Stroke Prevention (5/28)*	tbd
• Eating on a Budget Series (4/18 – 5/20)*	6-8
• Couch to 8K Workshops and Supervised Saturday Walk/Jog Sessions*	20-30
• Lifestyle Change Check-Ins (drop- in 1st and 3rd Tuesdays of each month)*	4-6
• Getting to Goal Program (Weight Management Consultations)*	8 clients

Behavioral Health & Substance Use	Attendance
• Reflective Parenting + Childcare (weekly sessions 4/21-6/8)*	14-16
• Journey of Grief Support (weekly Swedish Bereavement Program 4/15-5/20)	6-8
• AA Weekly Support Group	6
• Adult Children of Alcoholics Weekly Support Group	6-8
• Grief and Loss Support Group (weekly sessions 4/28-6/16)*	6
• Parent of Teens Using Drugs/Alcohol (8 Week Support Grp 3/16- 5/11)*	4-5
• Snohomish County Music Therapy (weekly sessions)*	1-3

Other Programs	Attendance
• Play and Learn Group, Wonderland Development Center (2X / month)*	Varies

*** = Grant/Program Funded Partner**

Verdant Community Wellness Center Summary

Upcoming Programs

General Community and Provider Events

- Commission on Asia Pacific Islander Affairs – Statewide Community/Board Meeting (June 20)
- Verdant Resource Connector Quarterly Meeting (June 23)

Nutrition and Healthy Behaviors

- Raising Healthy Eaters in a Fast Food World (June 1)*
- Korean Women's Association: hosting Korean and Vietnamese language workshops about Medicare, nutrition, cancer prevention and physical activity and fall prevention.
  Next event - Multicultural Everyday Nutrition II in Korean (June 4)*
- Feet First Walking Ambassador Training (June 11)*
- Senior Services: Living Well Workshop leader trainings (June 15 & 16)
- Parents as Role Models in Helping Kids Develop Healthy Eating Habits (June 15)*
- Summertime Cooking Demos Featuring Local, Fresh Fruits and Vegetables
  (June 8 /July 13 /August 10 / Sept 14)*
- American Heart Association 6 Week Cooking Series for Teens (July10-Aug 14)
- Diabetes Prevention Workshop in Spanish – in partnership with National Institute for Coordinated Healthcare and Lutheran Community Services (June 27)*
- Stop Diabetes Initiative – Continued Workshops*
- Ongoing - Lifestyle Change Check-Ins (drop-in support 2x/month)*
- Ongoing – Getting to Goal: Individual Weight Management Consulting with a Dietitian*

Behavioral Health & Substance Use Focus

- Managing Difficult Emotions (starting July 23 for 8 weeks)*
- Cocoon House Parenting Series (June 8, 15, 22)
- Building Family Strengths Parenting (starting July 22 for 8 weeks)*
- For the Kids Sake – Snohomish County Monthly Seminars for Parents Going Through Divorce (starting July 8)

Other Programs in Development

- Developing Walking Groups – working with Feet First and the City of Lynnwood to launch a Summer Walking Ambassador Program
- Spanish Language Cooking Classes (AHA and others)
- Cooking Series with Swedish Edmonds new Chef/Dietitian (Monthly Classes in the Fall)
- Health Education Series in partnership with PacMed
- Nutrition Workshops:
  - Fact or Fiction about Trendy Diets
  - The 50 Something Diet - How to Age Well & Feel Great

*** = Grant/Program Funded Partner**

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May 2015 Marketing Report

The Canopy Newsletter

- Delivered between May 14 and 20
- Reach 77,685 residences and businesses

Awards & Recognitions

- Edmonds Community College Foundation's Vision Award, accepted by Commissioner Langer at an event May 21. The Edmonds Community College Vision Award is given to a large business or organization that has extended its resources in support of the college and/or its foundation in significant ways over a considerable period, strengthening the institution's ability to provide access and excellence in education for the benefit of its students.
- The Washington Recreation & Park Association's Citation of Merit – Organization, accepted by Superintendent Zapora at an event April 30. The Citation of Merit - Organization Award honors an organization that has demonstrated commitment to the field of parks and recreation and helped to address unique, critical or other unmet parks and recreation needs.

Coming Events

- Celebrating Our People Latino Festival (Celebrando a Nuestra Gente) **Saturday, June 6** from 1-5 p.m. at Trinity Lutheran Church in Lynnwood. This bilingual Spanish family-friendly festival will provide info about community resources, health topics and Latino and diverse cultures.
- Edmonds Kind of 4th 5K Fun Run/Walk Saturday, **July 4** at 10 a.m. at Edmonds City Park.
- Edge of Amazing Health Summit and launch of LiveHealthy2020 **Thursday, July 23** from 8 a.m. - 4:30 p.m. at Xfinity Arena in Everett.
- Back-to-School Health & Resource Fair **Thursday, August 27** from 6-9 p.m. at Cedar Valley Community School.

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Risks from Chemicals in Artificial Turf: State of the Science

Michael Peterson, MEM, DABT
Thomas A. Lewandowski, Ph.D., DABT, ERT, ATS
Sara Pacheco-Shubin, Ph.D.

Verdant Health Commission Board Meeting
Lynnwood, WA
May 27, 2015

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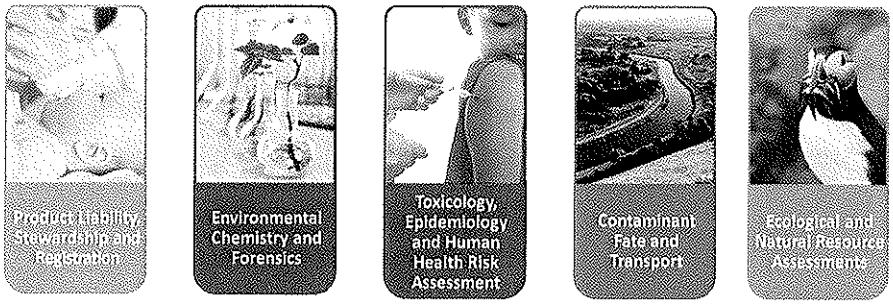
Gradient Overview

Gradient is known for our scientific specialties and abilities to communicate complex solutions to diverse stakeholders.



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Outline

- Previous Artificial Turf Experience
- Toxicology/Exposure/Risk Assessment Basics
- Artificial Turf Screening Risk Assessment
- Summary of Regulatory Conclusions
- Discussion/Questions

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Dose - THE KEY CONCEPT in Toxicology

Father of Modern Toxicology
Paracelsus—1564

"All things are poisonous, only the dose makes it non-poisonous."

Dose alone determines toxicity

All chemicals—synthetic or natural—have the capacity to be toxic

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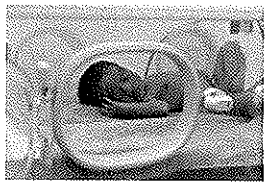
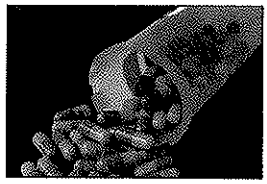
Dose

Determines Whether a Chemical Will Be Beneficial or Poisonous

	Beneficial Dose	Toxic Dose
Aspirin	300 – 1,000 mg	1,000 – 30,000 mg
Vitamin A	5000 units/day	50,000 units/day
Oxygen	20% (Air)	50 – 80% (Air)





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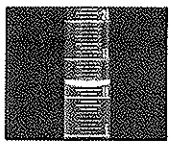
Exposure

- In order for a chemical to produce a biological effect, it must first reach a target individual
- Then the chemical must reach a target site within the body (bioavailability)
- Toxicity is a function of the effective **dose (how much)** of a chemical **at** its target site, integrated over **time (how long).**
- Individual factors such as body weight will influence the dose at the target site



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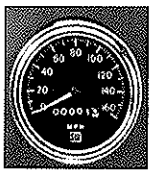

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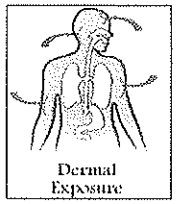
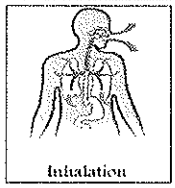
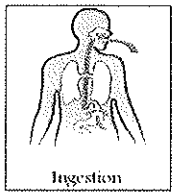
Exposure

Route of Exposure

- The **route** (site) of exposure is an important determinant of the ultimate **dose**—different routes may result in different rates of absorption.
  - Dermal (skin)
  - Inhalation (lung)
  - Oral ingestion (Gastrointestinal)
  - Injection
- The route of exposure may be important if there are tissue-specific toxic responses.
- Toxic effects may be local or systemic







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Screening Risk Assessments

- Compare media (e.g., product chemistry, air samples, etc.) concentrations to toxicity screening levels
- Screening levels designed to be conservative (health protective, even for sensitive populations)
  - Soil screening levels
    - Assume exposure 365 days/yr
    - Assume ingestion of ~ 2 teaspoons each day
    - Also incorporate inhalation of soil dust and dermal contact
    - Assume 100% bioavailability
  - Calculated using data from tox studies adjusted for uncertainty
- Set at "de minimus" levels (1 in a million risk, HQ = 0.1)

Hazard Quotient

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Artificial Turf Screening Risk Assessment

- Evaluate the literature for analytical data on chemicals in artificial turf products Nike / Greenturf / FieldTurf
- Use those data to evaluate possible exposure for people using the surface (dermal, ingestion, inhalation)
- Compare those exposure data to toxicity screening levels developed by US EPA
  - Air concentrations to inhalation screening values
  - Product composition concentrations to soil screening values
  - Leaching concentrations to regulatory standards
- State of the Science evaluation of literature and regulatory evaluations

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Show Excel Table

See Appendix A in Report

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Soil Screening Comparison

Also did not screen out

	US EPA RSL (mg/kg)	Seattle/ Puget Sound Background	Infill-Pro Geo (mg/kg)	Turf-Max-S (mg/kg)	FieldTurf Crumb Rubber (mg/kg)	FieldTurf Crumb Rubber (mg/kg)
			1 sample		4 samples	
Metals						
Antimony	3.1	NI	ND	ND	3.7	3.4
Cobalt	2.3	NA	ND	ND	130	120
Thallium	0.078	NA	0.9	ND	< 0.74	< 0.8
Zinc	2300	85	11	45	16,000	13,000
SVOCs and VOCs						
B(a)A	0.15	0.0016-6.0			< 9.7	< 62
B(a)P	0.015	0.0017-6.7			< 9.7	< 62
B(b)F	0.15	0.0032-7.3			< 9.7	< 62
B(k)F	1.5	0.0013-2.0			< 9.7	< 62
B(2-EH)P	38				90	160

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Everything (metal) is below screening level

Leaching Guidelines Comparison

	Regulatory Guidelines (ug/L)	Infill-Pro Geo (µg/L)	Turf-Max-S (µg/L)	FieldTurf-SPLP Crumb Rubber (µg/L)	FieldTurf-SPLP Crumb Rubber (µg/L)	FieldTurf-SPLP Crumb Rubber (µg/L)	FieldTurf-WET SBR (µg/L)	FieldTurf-WET SBR (µg/L)
Metals								
Aluminum	4,000							
Antimony	120	ND	ND	NA	< 1	< 1	< 200	< 200
Arsenic	3	ND	ND	< 3.0	< 1.2	< 1.2	< 200	< 200
Barium	120,000	430	ND	13	2.8	< 1	220	< 200
Beryllium	20	ND	ND	NA	< 4.3	< 4.3	< 80	< 80
Cadmium	80	ND	ND	< 1	< 1.3	< 1.3	< 100	< 100
Cobalt	2,000	ND	ND	NA	1.1	2.4	< 200	< 200
Copper	26,000	ND	ND	0.69	< 1	9.7	880	310
Lead	100	ND	ND	0.19	< 1	< 1	< 100	< 100
Manganese	1,000							
Mercury	40	ND	ND	NA	< 0.2	< 0.2	< 2	< 2
Nickel	2000 (soluble salts)	ND	ND	0.65	< 3.0	< 3.0	< 200	< 200
Selenium	800	ND	ND	NA	< 1	< 1	< 200	< 200
Silver	800	ND	ND	NA	< 1	< 1	< 200	< 200
Thallium	10	ND	ND	NA	< 1	< 1	< 200	< 200
Vanadium	2	ND	ND	NA	< 1.1	< 1.1	< 200	< 200
Zinc	40,000	ND	ND	2,450	240	870	15,000	5,900

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Screening Risk Conclusions

- Based on the available data, neither FieldTurf SBR or GeoTurf present a risk from chemical exposures
- PAH exposures from using the turf are similar to those observed from playing in Seattle/Puget Sound area soils
- Uncertainty Analysis
  - NikeGrind: late data, but preliminary analysis appears okay
  - Data Quality: GeoTurf missing data; organic?
  - Inhalation Data: Similar SBR products support low emissions
  - Carbon nanotubes/carbon black: no data for FieldTurf, but wear products likely different
  - Allergens: no data for GeoTurf, but unlikely to reach occupational levels

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Regulatory/Public Health Organization Documents

- Artificial turf reports from 17 different organizations were reviewed
  - US EPA, Connecticut DPH, Massachusetts DPH, CalOEHHA, CPSC, New Jersey DEP, New York City, New York State
  - Some early (~2007/2008) reviews advised re: lead; a 2011 study submitted to NJDEP also discussed lead
  - Organizations that performed actual risk assessments universally found risks below levels of concern (SBR only)
  - Some expressed concern related to data gaps or limitations

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What does CPSC Say?

- CPSC 2008 study only looked at lead; no risks from lead exposure
  - 2008 study explicitly detailed limitations
- In 2013, denied an appeal to retract 2008 study and issue warnings (added limitations to press release)
- In 2015, spokesperson indicates director believes small 2008 sample size did not support conclusions either way; no changes to CPSC website
- Due to funding issues, no plans to do reanalysis

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Other Topics: Injuries/Heat

- Injuries
  - Older studies note issues with abrasion/turf burn
  - Epidemiology studies of newer surfaces (including systematic review) generally find either lower or comparable injury rates when compared to natural turf
- Heat
  - Artificial fields exhibit higher temperatures than natural turf
  - No epidemiology studies of heat stress were located
  - Regulatory agencies generally recommend having water available or increasing breaks

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Summary

- Chemical levels found in FieldTurf SBR and GeoTurf infill do not present a risk to people playing on or using the fields with these products
- Conclusions are consistent with those of multiple regulatory agencies that have evaluated the risk from SBR
- There are limitations; however, the remarkable consistency of the available reviews is comforting

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Questions?

May 27, 2015
Lynnwood, WA

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May 26, 2015

George Kosovich
Assistant Superintendent, Programs & Community Investments
Verdant Health Commission
Public Hospital District No. 2, Snohomish County
4710 196th St. S.W.
Lynnwood, WA 98036

Re: Evaluation of Human Health Risks for Synthetic Field Turf

Dear Mr. Kosovich:

We are pleased to provide you with a screening level risk assessment and literature review related to the use of artificial turf fields at the former Woodway High School fields. As discussed in our proposed scope of work provided on May 13, 2015 this is a limited assessment that has focused on publically available data, supplemented in some cases by additional data provided by manufacturers. Our proposed scope of work originally specified that three different turf infills (FieldTurf SBR, GeoTurf, and NikeGrind) would be evaluated (in addition to our general review). Unfortunately, data from only the first two of the specific products were provided in time for inclusion in this report. However, we have evaluated some preliminary data for the NikeGrind product and its risk profile does not appear to be substantially different from the other products.

This evaluation is only intended to address potential risks from chemical exposures related to artificial turf products, and does not address ecological concerns, physical injuries, or heat stress. Our evaluation is intended to illustrate the current "state of the science" related to artificial turf infills. Where information was lacking we used the best information available to address data gaps and uncertainties.

In addition to providing the results of our risk assessment, we have provided an introduction to many of the concepts of toxicology, exposure evaluation, and risk assessment to help provide context for our work. Those sections, the results, and conclusions of our evaluation are provided below.

Based on the data publically available for this analysis, the chemical levels found in FieldTurf SBR and GeoTurf infill do not present a risk to people playing on or using the fields with these products. These conclusions are consistent with those of multiple regulatory agencies that have evaluated the risk from artificial turf products in general (*e.g.*, CalOEHHA, 2007; New York City Department of Health and Mental Hygiene, 2009; US EPA, 2009; Connecticut Dept. of Public Health, 2010; CalOEHHA, 2010), including evaluations that are more complex than this screening level assessment. Although there are limitations with a screening level risk assessment such as this one, the consistent conclusions from other evaluations that the data do not indicate an increased risk of health effects from chemical exposure lends additional support to our conclusion.

Introduction to Toxicology

Paracelsus, a founder of modern toxicology, was one of the first to understand that specific chemicals cause the toxic effects of a poison (EC, 2003). As such, toxicology is defined as "the study of how natural or man-made poisons cause undesirable effects in living organisms" (ATSDR, 2011). The

degree to which a substance can cause damage is described as it's "toxicity", and the toxicity of a substance depends on several factors, including the amount (dose) entering the body, the route of entry into the body, and biological characteristics of the exposed individual (ATSDR, 2011; EC, 2003). These factors are critical to the study of toxicology, and are discussed in more detail below.

Dose

- The dose is the actual amount of a chemical that enters the body.
- Paracelsus postulated that the body's response to a poison was directly related to the dose received. He is best known for coining the phrase that is the fundamental assumption in toxicology, "All substances are poisons: there is none which is not a poison. The right dose differentiates a poison and a remedy." (Society of Toxicology, 2015).
  - Essentially, this means that all chemicals can be toxic and it is the amount taken into the body that determines whether or not they will cause poisonous effects. Therefore, toxicity is not caused solely by any exposure to a particular chemical, but by exposure to too much of it.
  - This concept is now referred to as the dose-response relationship, which correlates exposure and the spectrum of observable effects (EC, 2003).
- The amount of a substance that is necessary to elicit an effect can be established by measuring the response relative to an increasing dose using experimental animal, human clinical, or cellular studies (EC, 2003).
  - The dose level at which a toxic effect is first encountered is known as the threshold dose (ATSDR, 2011; EC, 2003). At doses below the threshold, the body can negate the substance's effects by detoxifying or repairing any injury. However, once these protective mechanisms are overwhelmed, the injury can no longer be prevented and the severity of the damage increases. Some regulatory agencies assume for substances that cause cancer there is no threshold (ATSDR, 2011); however, research has shown that thresholds may be dependent on how the carcinogen functions.
  - When looking at experimental data, the threshold is referred to as the lowest observable adverse effect level (LOAEL) and the dose below it in which there was no effect is referred to as the no observable adverse effect level (NOAEL) (EC, 2003). The NOAEL and the LOAEL are important doses used in risk assessment to develop health guideline levels.
  - The dose-response relationship can be visualized in Figure 1 below.

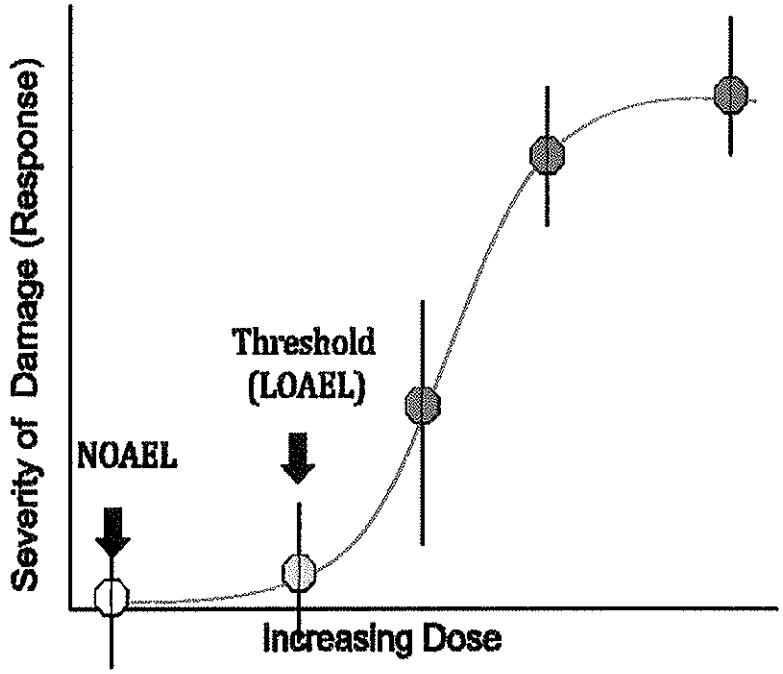

Figure 1 Dose-response Relationship. Circles indicate experimental observations, with the yellow circle indicating the dose at which no adverse effect was observed (NOAEL) and the orange circle indicating the threshold dose, also known as the lowest observable adverse effect level (LOAEL). Adapted from Lewandowski and Norman (2015).

- A real-world example of a substance that has an obvious dose-response relationship is aspirin. As shown in Figure 2, low doses of aspirin (~1-2 tablets) are recommended as a therapeutic dose as a prophylactic against heart disease and to alleviate headaches. However, once this threshold has been met, adverse effects occur, and the severity of effect increases with dose. For instance, ingesting 10 tablets may cause nausea while ingesting 100 tablets will cause death.

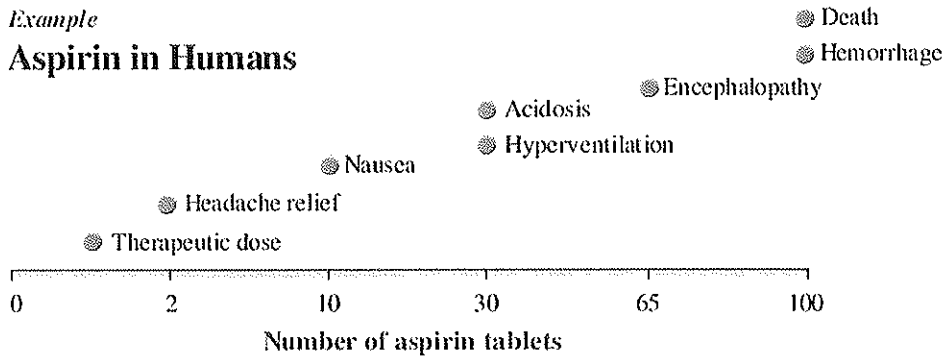

Figure 2. The Dose-Dependent Effects of Aspirin (based on information in Hardman *et al.*, 2001)

Exposure

- Chemicals need to first come into contact with the body before they can cause adverse effects (CCOHS, 2015). They then must reach the target site within the body (EC, 2003).
- There are two main factors that affect an individual's exposure to a substance: (1) the route of exposure; and (2) the frequency and duration of exposure (ATSDR, 2011, EC, 2003).
- Routes of exposure include oral (ingesting the substance), dermal (skin contact with the substance), or inhalation (breathing in the substance) (EC, 2003 215-4854).

Biological Characteristics

- Biological characteristics are factors specific to the individual exposed to the chemical. They include age, sex, diet, co-existence of infectious disease, and other genetic determinants (EC, 2003).
- These factors affect exposure and dose through modifying uptake, absorption, distribution and metabolism of the chemical, and in doing so, alter the response to the insult (EC, 2003). Susceptible populations may include babies, pregnant women, and the chronically ill, and the elderly.

Introduction to Risk Assessment

Risk assessment is the systematic evaluation of the likelihood of an adverse effect arising from exposure in a defined population. In the context of the risk assessment, risk is defined as the "probability of an adverse outcome based upon the exposure and potency of the hazardous agent(s)." (Faustman & Omenn, 2008). What this ultimately means is that without exposure and toxicity, there is no risk.

The risk assessment process contains both qualitative and quantitative components, as qualitative information (*i.e.*, the nature of the endpoints and hazards) is incorporated with a quantitative analysis (*i.e.*, assessment of the exposures, individual susceptibility factors, and the magnitude of the hazard) (Faustman & Omenn, 2008). The results of the risk assessment are used to facilitate risk management and guide the decision making process.

Standard Regulatory Risk Assessment

- The standard risk assessment framework has four key steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization (Faustman & Omenn, 2008).
  - Hazard identification involves assessing the toxicity of chemicals and examines whether a stressor has the potential to cause harm to humans systems, and if so, under what circumstances (US EPA, 2012a).
    - It ultimately answers the question: *Does the agent cause adverse health effects?*
  - Toxicity or dose-response assessment examines the numerical relationship between exposure and effects (US EPA, 2012a).
    - It answers the question: *What is the relationship between dose and response?*

- This step has two components: (1) an assessment of all of the available data and the selection of the critical adverse effect (*i.e.*, the significant adverse biological effect that occurs at the lowest exposure level, which depending on the data, is usually the LOAEL or the NOAEL) and (2) extrapolation to estimate the risk beyond the lower range of available observed data taking into account uncertainties in the data (such as variability, susceptibility, and quality of the data) (US EPA, 2012b).
    - The critical adverse effect is also known as the point of departure and the extrapolation to human-relevant doses is also known as calculating the reference dose (RfD). Mathematically:
        - RfD = point of departure / uncertainty factors
    - US EPA defines the RfD as, "An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime."

- Exposure assessment examines what is known about the frequency, timing, and levels of contact with a hazard (US EPA, 2012a).
    - It answers the question: *What types, levels, and duration of exposure are experienced or anticipated?*
    - This step involves determining the sources of exposure, route, and nature of the exposure followed by an estimation of exposure to the population of interest using standard calculations. For example, to determine if the artificial turf fields pose a health hazard, one would have to know the frequency, timing, and level of contact with the field. In addition, the concentration of potential contaminants in the field would have to be known, either *via* measured data or modeling estimations.
- Risk characterization evaluates how the data support the conclusions and the nature of the risk from the exposure at issue (US EPA, 2012a).
    - It answers the question: *What is the extra risk of health problems in the exposed population?*
    - The primary quantitative steps in the risk characterization are the calculation of the hazard index (HI) and cancer risk. These values are compared to "acceptable" risk levels published by regulatory agencies (in general, for non-carcinogens, an HI < 1 is acceptable, and for carcinogens a cancer risk less than 1 in a million is acceptable).
    - Depending on the results of the quantitative assessment, the risk characterization may provide additional detail on the toxicity of the chemicals involved, including comparison of exposure to health effects levels (as opposed to RfDs or guideline levels).
    - In addition, the risk characterization usually contains a discussion of uncertainty and the overall conclusions of the assessment.

Screening Risk Assessment

In some cases, a screening level risk assessment is conducted prior to a standard risk assessment as a means of determining whether a standard risk assessment is necessary. Screening risk assessments use a variety of conservative (*i.e.*, health protective) assumptions in an attempt to insure that health risks are not underestimated. In other words, risks calculated in screening risk assessment are most likely

overestimated. The result of this practice is that if the calculated risks in a screening risk assessment are within acceptable parameters, the risk assessor can be fairly certain that exposure to the chemical in question does not pose a health risk.

- In a screening level risk assessment, hazard identification usually is already completed to some extent, and analytical data is available for the evaluation
- The toxicity assessment is simplified by using screening guideline values that have already been published by various governmental or regulatory agencies. These health effect guideline values are not in units of dose (as is typical for a standard risk assessment), but are in units of the exposure medium (*e.g.*, soil, water, air) to allow for simple comparisons to environmental sampling data.
- Instead of conducting a detailed exposure assessment, simplified assumptions are used in the calculation of the screening guideline values described in the toxicity assessment. For instance, US EPA uses a standard body weight of 70 kg (154 lbs) and a water consumption rate of 2 L (0.53 gallons) to convert a US EPA RfD into a screening level that can be compared to a chemical's concentration in water.
- The risk characterization portion of a screening risk assessment contains many of the similar components as a standard risk assessment. Concentrations that exceed health guideline values are discussed and evaluated, and sources of uncertainty and/or variability in the evaluation are detailed.
- Example: Screening Risk Assessment for Chlorine Gas At a Public Pool
  - Users of a local pool have been concerned about the chlorine odor at the pool, and wonder if their exposure might put them at risk for health effects.
  - A local environmental consulting company has been to the pool, and collected several air samples and sent them to a laboratory for analysis. The maximum air concentration reported by the laboratory was 0.003 $\mu g/m^3$.
  - The US EPA residential screening level (RSL) for chlorine gas is 0.015 $\mu g/m^3$.
  - As the maximum concentration at the pool is significantly less (5-fold) than the screening level, there is no expectation of risk to the pool users.
  - If the maximum concentration had instead been 0.018 $\mu g/m^3$ (above the RSL), that does not necessarily indicate there is a health risk due to the conservative nature of the RSL. In this situation, a risk assessor would evaluate how the RSL was derived, the uncertainty factors involved, the critical effect, the population exposed, and any number of other factors and determine if further investigation (*e.g.*, a standard risk assessment) was warranted.

Artificial Turf Risk Assessment

In order to evaluate the possible risk from exposure to chemicals in the two types of artificial turf products (as well as to artificial turf products in general), a screening risk assessment was conducted in addition to a review of the literature relevant to these products. This review was extensive, but should not be considered exhaustive due to the voluminous database and limited time available.

The exposure scenarios of interest include children, adolescents, or adults playing on the surface or watching from nearby. Thus several different screening guidelines that are protective of ingestion, inhalation, and dermal contact were selected for this evaluation. Chemical concentrations in samples of

artificial turf products were compared to US EPA RSL residential soil guidelines (US EPA, 2015), concentrations of chemicals detected in ambient air above artificial turf products were compared to US EPA RSL residential air guidelines, and concentrations detected using product leaching protocols were compared to health based groundwater protection standards (NJDEP, 2013).

These guidelines should be considered to be conservative (*e.g.*, health protective) for assessment of a product such as artificial turf. For example, the soil and air RSL guidelines are intended to be protective of people (including sensitive subpopulations and children) exposed to chemicals 365 days per year for a lifetime. For soil, these guidelines assume dermal contact with the soil, inhalation of soil dust, and ingestion of soil particles.

Considerations

Screening level risk assessments are intended to be simplified exercises to determine if the possible risks related to an exposure are significant enough to warrant further investigation. In many cases, as mentioned above, exceeding a screening guideline does not necessarily indicate that a risk is likely. This is particularly true for a product based risk assessment, such as for artificial turf products. Several important considerations are detailed below.

- A significant volume of literature was evaluated to identify metal and organic chemical concentrations in artificial turf products, in the ambient air above those products, and in leachate from those products. The data collected can be found in Appendix A. However, the limited time frame for compilation of these data indicate that this literature search should be considered extensive, but not exhaustive.
- The data collected range in date from 2008 to 2014. There are many different types of products involved, from multiple manufacturers. As two of the products of considerable interest to the Verdant Health Commission were FieldTurf SBR and GeoTurf, we have limited our summary tables in this report to data from those two products. In addition, due to the reformulation of many products due to issues related to lead in 2008, we have focused on data that have been produced since 2010. The other data evaluated are in the appendices, and will be discussed qualitatively.
- As discussed briefly above, the soil and air RSL guidelines are intended for use at residential sites where exposure occurs from a variety of pathways over a lifetime. In addition, these guidelines assume that exposure is through the media of interest—namely, soil or air. The bioavailability[1] of these chemicals from artificial turf products appears to be substantially different than from soil and possibly air. Studies that have evaluated the bioavailability of chemicals from artificial turf have noted that there is likely to be limited availability from this substance (Pavilonis *et al.*, 2014; van Rooij and Jongeneelen, 2010; CalOEEHA 2007; US EPA, 2009).

[1] The bioavailability of a substance is a measure of how much is absorbed *via* a particular route of exposure. For instance, when arsenic is ingested in soil, only about 60% of the total ingested is absorbed.

Table 1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Residential Screening Level, HQ = 0.1 (mg/kg)	Washington State/ Seattle Area Background Levels (90th Percentile or Range)	Curtis & Tompkins (2011) for Limonta Sport USA[1]		Teter Engineering (2015) for Sprinturf[2]					
			Limonta Infill-Pro Geo (mg/kg)	Limonta Turf-Max-S (mg/kg)	FieldTurf Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (mg/kg)	FieldTurf Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (mg/kg)	FieldTurf Crumb Rubber (2 Years of Age) (Lioy and Weisel, 2011) (mg/kg)	FieldTurf Crumb Rubber (2 Years of Age) (Lioy and Weisel, 2012) (mg/kg)	FieldTurf SBR (TestAmerica, 2011a) (mg/kg)	FieldTurf SBR (TestAmerica, 2011b) (mg/kg)
Metals										
Antimony	3.1	NI	ND	ND	3.7	3.4	NA	NA		
Cobalt	2.3	NA	ND	ND	130	120	NA	NA		
Thallium	0.078	NA	0.9	ND	< 0.74	< 0.8	NA	NA		
Zinc	2,300	85	11	45	16,000	13,000	NA	NA		
SVOCs and VOCs										
Benzo(a)anthracene	0.15	0.0016-6.0							< 9.7	< 62
Benzo(a)pyrene	0.015	0.0017-6.7							< 9.7	< 62
Benzo(b)fluoranthene	0.15	0.0032-7.3							< 9.7	< 62
Benzo(k)fluoranthene	1.5	0.0013-2.0							< 9.7	< 62
Bis(2-ethylhexyl)phthalate	38								90	160

Notes:
HQ = Hazard Quotient; SBR = Styrene butadiene rubber; SVOC = Semivolatile Organic Compound; VOC = Volatile Organic Compound.
(1) Data from Curtis & Tompkins (2011, pp. 5-6).
(2) Data from Teter Engineering (2015, Appendix Table A-1, A-3). Note that the values from Table A-3 were converted to mg/kg for comparison across studies.
NA = Not Analyzed; ND = Not detected; NI = Not identified.
Highlighted cells are those with values above their respective Residential Screening Levels.
Data was not reported for blank cells.

Table 2 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Guideline Level (µg/L)	Curtis & Tompkins (2011) for Limonta Sport USA[1]		Teter Engineering (2015) for Sprinturf[2]				
		Limonta Infill-Pro Geo (µg/L)	Limonta Turf-Max-S (µg/L)	FieldTurf-SPLP Cryogenic Crumb Rubber (A-1007/T12) (Li *et al.*, 2010a) (µg/L)	FieldTurf-SPLP Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf-SPLP Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf-WET SBR (TestAmerica, 2011a) (µg/L)	FieldTurf-WET SBR (TestAmerica, 2011b) (µg/L)
Metals								
Aluminum	4,000							
Antimony	120	ND	ND	NA	< 1	< 1	< 200	< 200
Arsenic	3	ND	ND	< 3.0	< 1.2	< 1.2	< 200	< 200
Barium	120,000	430	ND	13	2.8	< 1	220	< 200
Beryllium	20	ND	ND	NA	< 4.3	< 4.3	< 80	< 80
Cadmium	80	ND	ND	< 1	< 1.3	< 1.3	< 100	< 100
Cobalt	2,000	ND	ND	NA	1.1	2.4	< 200	< 200
Copper	26,000	ND	ND	0.69	< 1	9.7	880	310
Lead	100	ND	ND	0.19	< 1	< 1	< 100	< 100
Manganese	1,000							
Mercury	40	ND	ND	NA	< 0.2	< 0.2	< 2	< 2
Nickel	2,000 (soluble salts)	ND	ND	0.65	< 3.0	< 3.0	< 200	< 200
Selenium	800	ND	ND	NA	< 1	< 1	< 200	< 200
Silver	800	ND	ND	NA	< 1	< 1	< 200	< 200
Thallium	10	ND	ND	NA	< 1	< 1	< 200	< 200
Vanadium	2	ND	ND	NA	< 1.1	< 1.1	< 200	< 200
Zinc	40,000	ND	ND	2,450	240	870	15,000	5,900

Notes:
NA = Not analyzed; ND = Not detected; SBR = Styrene butadiene rubber; SPLP = Synthetic precipitation leachate procedure.
(1) Data from Curtis & Tompkins (2011, pp. 13-14).
(2) Data from Table A-2 and A-4.
Data was not reported for blank cells.

Chemical Characteristics of SBR Infill

The substances that exceeded a screening guideline in at least one artificial turf product sample (using the selection criteria discussed above) are presented in Tables 1 and 2. In addition, the Washington State soil background concentrations of these substances are also presented. The implications of these exceedances are discussed below.

- Of the 55 chemicals tested in the soil analyses, 51 (93%) were below their respective screening guidelines.
- In every case except one, the exceedances are less than an order of magnitude (10-fold). Given the conservative nature of these RSL guidelines, it is unlikely that these exceedances are significant in terms of excess risk.
- In addition to the less than 10-fold exceedances, as mentioned above these chemicals are all embedded in a matrix that multiple studies (Pavilonis *et al.*, 2014; van Rooij and Jongeneelen, 2010; CalOEEHA, 2007; US EPA, 2009) have deemed renders them less bioavailable when ingested or exposed dermally.
- The one exceedance that is greater than an order of magnitude is for cobalt. As noted previously, the use of conservative screening guidelines as well as the lack of bioavailability of this metal from the SBR make any adverse health effects unlikely. In addition, the toxicity value used to derive the cobalt RSL is called a "Provisional Peer-Reviewed Toxicity Value" (PPRTV). These are secondary toxicity values used when US EPA has not derived a value using the standard process. The PPRTV for cobalt is based on a 2 week human study that saw decreased iodine uptake in the thyroid, which was then reduced by a factor of 3,000 to address limited data. The US EPA rates the confidence in this value as "low." Based on this evaluation, the likelihood of cobalt exposure from artificial turf products constituting a health threat is low.
- Data from the recent studies of FieldTurf SBR do not show detectable levels of PAHs (see Table 1); however, the limit of detection in these samples is higher than the RSL guidelines. Samples from older studies of FieldTurf SBR have detected PAHs in the product (see Appendix A). The levels detected are similar to those seen in normal Seattle residential area soils (see Table 1; WDOE, 2011).
- Leaching data (Table 2) from FieldTurf SBR indicate that no applicable screening guidelines were exceeded (60 of 60 passed).

Chemical Characteristics of GeoTurf Infill

As with the FieldTurf SBR results, the levels of compounds found in GeoTurf are presented in Tables 1 and 2. Several important considerations are detailed below.

- Of the 17 chemicals tested in the soil analyses, 16 (94%) were below their respective screening guidelines.
- Only one compound in GeoTurf exceeded a US EPA RSL—thallium. This compound exceeded its RSL by over an order of magnitude. As with cobalt, the toxicity value used to derive thallium's RSL is a PPRTV. The basis for the RSL is hair follicle atrophy observed in a rat study, which was considered to be similar to effects observed in humans. The observed dose was

adjusted by a 3,000 fold to address limited data. Based on this evaluation, the likelihood of thallium exposure from artificial turf products constituting a health threat is low.

- There is a significant uncertainty in the evaluation of GeoTurf infill due to the lack of analytical data comparable to SBR studies. No literature data were found that evaluated any organic compounds or pesticides which might be applied to natural products. Additional data related to this was requested from the manufacturer.
- Leaching data (Table 2) from GeoTurf indicate that no applicable screening guidelines were exceeded (18 of 18 passed).

Overall Evaluation of Two Types of Infills

Based on the data publically available for this analysis, the chemical levels found in FieldTurf SBR and GeoTurf infill do not present a risk to people playing on or using the fields with these products. In addition, for the PAH data available for SBR products, these products do not present a substantially different risk profile than playing in soil in the Seattle area.

Some concern has been expressed regarding the possible carcinogenicity of SBR, either from the PAH and metal content (which do not appear to be substantially elevated or bioavailable), or from other unknown chemicals. Several studies have evaluated the *in vitro* genotoxicity or mutagenicity[2] of actual SBR and have uniformly found that the substance tested negative or the results were comparable with urban sites in general (Birkholz *et al.*, 2003; Schiliro *et al.*, 2013).

Uncertainty Analysis

As with any scientific endeavor, there are a variety of sources of uncertainty in this analysis. Most of that uncertainty is related to the quality of the data that were identified for our screening risk assessment. Those issues are addressed specifically below.

Data Quality

- The air data available for this evaluation were inadequate to conduct an appropriate analysis of the risk from inhaling possible VOCs off-gassing from turf material or particulates associated with the FieldTurf SBR or GeoTurf infills. The studies of other SBR products that did conduct appropriate analyses found similar concentrations of chemicals upwind and downwind, however, which is supportive of minimal emissions from the turf surfaces. Thus, although a product specific analysis was not possible, a number of studies of other SBR surfaces indicate that chemical and particulate concentration above the fields are unlikely to pose a health risk.
- The available data support that over time and across brands there is variability in the chemical composition of SBR. Data were not available related to multiple batches of GeoTurf. As noted in previous reviews, this variability adds a source of uncertainty into the analysis. However, in general, even with this uncertainty the levels of chemicals found in SBR over the years have not been found to present an unacceptable risk by multiple regulatory agencies.
- There was a lack of data from GeoTurf for many of the chemicals evaluated for SBR. These include standard VOCs and SVOCs, as well as pesticides, which could be significant depending

[2] In toxicology, *in vitro* (test tube) tests are often used to screen chemicals to determine if they might have cancer-causing potential.

on where the coconut and cork components of the GeoTurf products are sourced. The impact of this uncertainty on the analysis cannot be determined without additional analytical data.

- For each of the products, much of the composition data available has been determined by standard analytical methods. In some cases, there may be chemicals inherent in the base materials that have not been disclosed, or of which manufacturers are unaware. The impact of this uncertainty on the analysis cannot be determined without additional data on the source and composition of the base materials. However, in general it appears that the analytical methods chosen in each study are reasonable considering the origin of the product (*i.e.*, it is reasonable to assume that recycled tires would contain metals, VOCs, SVOCs, *etc.*).

Carbon Nanotubes

- Carbon nanotubes are nanoparticles that may be used in tires, as well as many other products. There are many different types of nanotubes, with different physical and chemical characteristics. The toxicity of carbon nanotubes has been the subject of intense research over the last decade, with hundreds of studies being published on many different types of these materials (*e.g.*, Manke *et al.*, 2013; Kuempel *et al.*, 2012).
- Toxicity studies of carbon nanotubes have reported a wide range of toxicity depending on the structure of the nanotube, the nature of the test system (*e.g.*, *in vitro*, animal), and type of effect (for example, see Grosse *et al.*, 2014; Manke *et al.*, 2013; Kuempel *et al.*, 2012). The International Agency for Research on Cancer (IARC) has reviewed the toxicity of three different types of nanotubes; they found possible evidence of carcinogenicity for one specific type, but the data were not sufficient to classify the other two types they evaluated (Grosse *et al.*, 2014).
- Evaluating the risk from exposure to carbon nanotubes that may be present in artificial turf products is complicated by a number of factors. These include the lack of any information about concentration or type of nanotube in the source material, the lack of information on any transformation that may occur during manufacture of the tires, and the lack of information about the rate of release of the native nanotube *versus* an aggregated or agglomerated nanotube from the artificial turf product.
- Even if the nature of the native nanotubes used to manufacture the tires used for SBR was known, it is likely that these nanotubes would undergo agglomeration or aggregation during the manufacturing process. In addition, they are embedded or encapsulated within the tire rubber. Thus, it is uncertain if the material that would be released from an artificial turf product such as SBR would resemble the original material or not. Studies of nanoparticle release from composites (Nowack *et al.*, 2013; Froggett *et al.*, 2014) and other products generally have found that most of the material released from the product is larger particles, with any nanomaterials imbedded within a matrix which would presumably limit their bioreactivity.
- For the reasons discussed above, the impact of the uncertainties surrounding the possible addition of carbon nanotubes to tires on our analysis cannot be determined. However, based on the research conducted to date, it appears that nanotubes would not be released in their "original" chemical state, and would be weathered/eroded into chemically and/or physically different structures.

Carbon Black

- Carbon black is a powdered form of elemental carbon, which has a number of uses in consumer products. One of its most common uses is as reinforcing agent in rubber, including tires, but it is also used in pigments for inks, paints, plastics, and coatings. Depending on the manufacturing process, carbon black may have particle sizes ranging from nanometers to micrometers.
- As with carbon nanotubes, the chemical characteristics of carbon black particles that are used to manufacture tires may not be the same characteristics as particles that may be produced as tire particles wear. Carbon black particles are expected to agglomerate and aggregate, and are embedded in the rubber matrix of tire crumb until there are released by wear and abrasion.
- The toxicity of carbon black has primarily been informed by studies of carbon black workers, with high exposure levels unlikely to be relevant to artificial turf users. In relation to non-cancer effects, carbon black workers exposed to these high levels generally were subject to relatively minor respiratory tract symptoms such as cough, and bronchitis. These effects were similar to effects seen in workers exposed to other relatively inert dusts.
- Given that the levels of particulate matter (which would include levels of carbon black) detected above artificial turf fields has been found to be low and consistently below general particulate matter guideline levels, it is relatively certain that carbon black exposures at artificial turf fields would be substantially lower than in worker populations.
- The International Agency for Research on Cancer has labeled carbon black as a possible human carcinogen (Group 2B), based primarily on epidemiology data from the worker populations discussed above. While this is a source of some uncertainty in our analysis, it is unlikely that the type of carbon black released from artificial turf products is similar to that which workers were exposed to, and the exposure levels would be expected to be much lower.

Potential Allergic Reactions

- Most reviews of possible health effects from exposure to artificial turf projects focus on systemic or organ-specific effects of exposure to chemicals. However, there is also the possibility for allergic responses to the chemicals in these substances. These include possible sensitization to metals, as well possible reactions to organic chemicals or biological proteins. Two organizations (Norwegian Institute of Public Health, 2006, CalOEHHA, 2010) did evaluate exposure to components of SBR and found no evidence that exposure to SBR (either metals or latex) resulted in allergic reactions. In the case of GeoTurf, some portion of the population may have an allergic response to coconut and/or cork; cases of occupational sensitization to coconut fibers and occupational asthma from cork dust have also been documented (Deschamps *et al.*, 2003; Stutius *et al.*, 2010; Winck *et al.*, 2002 ; Winck *et al.*, 2004; Wittczak *et al.*, 2005). As noted with carbon black, it is unlikely that the levels of coconut fibers and/or cork dust about GeoTurf fields would approach those found in occupational settings. However, there are no sampling data available to determine if this is actually the case (as opposed to data with FieldTurf infills). This is not likely a source of significant uncertainty in our evaluation, but as no rigorous allergy testing or environmental sampling of GeoTurf has been conducted it should be considered.

Review of Regulatory Agency (and Other) Evaluations of Artificial Turf

Over the last eight years, numerous US regulatory and other governmental agencies have evaluated the potential health risks involved with exposure to chemicals associated with artificial turf fields. The focus of almost all of these evaluations has been the potential toxicity of chemicals associated with SBR. Each of these reports have limitations based on the methodology used and data available for their analysis. However, in cases where these reports conducted quantitative risk assessments, they without exception concluded that the data support that use of these fields is safe. A summary of these analyses can be found in Appendix B.

Conclusions

Based on the data publically available for this analysis, the chemical levels found in FieldTurf SBR and GeoTurf infill do not present a risk to people playing on or using the fields with these products. These conclusions are consistent with those of multiple regulatory agencies that have evaluated the risk from artificial turf products in general (*e.g.*, CalOEHHA, 2007; New York City Department of Health and Mental Hygiene, 2009; US EPA, 2009; Connecticut Dept. of Public Health, 2010; CalOEHHA, 2010), including evaluations that are more complex than this screening level assessment. Although there are limitations with a screening level risk assessment such as this one, the consistent conclusion that the data do not indicate an increased risk of health effects from chemical exposure lends additional support to our conclusion.

We appreciate the opportunity to work with Verdant Health Commission on this project. If you have any questions or comments on our evaluation, please do not hesitate to contact us.

Sincerely,

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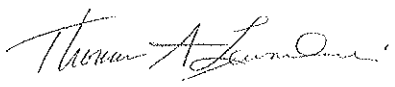

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Appendix A

Data Tables

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Residential Screening Level (mg/kg)	Washington State/Seattle Area Background Levels (90th Percentile)	Curtis & Tompkins (2011 215-4632) for Limonta Sport USA[1]		Teter Engineering (2015 215-4633) for Sprinturf[2]		US EPA (2009 210-1256)[3]					
			Limonta Infill-Pro Geo (mg/kg)	Limonta Turf - Max-S (mg/kg)	Green Crumb Rubber (mg/kg)	Black Crumb Rubber (mg/kg)	Turf Field Infill Crumb Rubber - F1D1 (Range, mg/kg)	Turf Field Infill Crumb Rubber - F2, F3 (Range, mg/kg)	Turf Field Infill Crumb Rubber - F4, F5, F6 (Range, mg/kg)	Turf Field Blades- F1D1 (Range, mg/kg)	Turf Field Blades - F2, F3 (Range, mg/kg)	Turf Field Blades - F4, F5, F6 (Range, mg/kg)
Metals												
Antimony	3.1	NI	ND	ND	4.6	4.1						
Arsenic	0.67	7	0.48	ND	<0.24	<0.23						
Barium	1500	NI	10	0.48	4.5	5.8						
Beryllium	16	0.6	ND	ND	<0.097	<0.093						
Cadmium	7	1	ND	ND	0.54	0.53						
Chromium	12000	48	ND	ND	<0.41/2.7[1]	<0.41/1.7[1]	0.3-1.0	0.4-0.9	0.3-1.0	1.0-73.1	1.2-1.9	3.7-177
Cobalt	2.3	NI	ND	ND	120	120						
Copper	310	36	4.3	4.2	30	27						
Lead	400	24	ND	ND	21	26	13.1-34.7	20.6-61.2	10.7-47.7	2.8-389	2.4-2.8	2.1-701
Magnesium	NI	NI										
Mercury	2.3	0.07	ND	ND	<0.017	<0.015						
Molybdenum	39	NI	0.29	0.25	0.63	0.72						
Nickel	150	48	0.38	0.95	2.2	1.9						
Selenium	39	NI	ND	ND	<0.49	<0.46						
Silver	39	NI	ND	ND	<0.24	<0.23						
Thallium	0.078	NI	0.9	ND	<0.49	<0.46						
Titanium	14000	NI										
Vandium	NI	NI	0.77	ND	1.3	0.84						
Zinc	2300	85	11	45	14000	14000	5050-19200	3120-12300	2660-11400	316-730	199-255	131-206
SVOCs and VOCs												
1,2-Dichlorobenzene	180											
1,2,4-Trichlorobenzene	5.8											
1,3-Dichlorobenzene	NI											
1,4-Dichlorobenzene	2.6											
2-Chlorophenol	39											
2,4-Dichlorophenol	18											
2,4-Dimethylphenol	120											
2,4-Dinitrophenol	12											
2,4-Dinitrotoluene	1.7											
2,4,5-Trichlorophenol	620											
2,4,6-Trichlorophenol	6.2											
3,3'-Dichlorobenzidine	1.2											
Acenaphthene	350				<0.25	<0.49						
Acenapthylene	NI				<0.25	<0.49						
Aniline	43											
Anthracene	1700				<0.25	<0.49						
Azobenzene	5.6											
Benzo(a)anthracene	0.15				0.85	1.7						
Benzo(a)pyrene	0.015				0.95	2.1						
Benzo(b)fluoranthene	0.15				0.99	2						
Benzo(g, h, i)perylene	NI				3.6	10						
Benzo(k)fluoranthene	1.5				<0.25	0.54						
Benzoic acid	25000											
Bis(2-chloroethyl)ether	0.23											

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Residential Screening Level (mg/kg)	Washington State/Seattle Area Background Levels (90th Percentile)	Curtis & Tompkins (2011 215-4632) for Limonta Sport USA[1]		Teter Engineering (2015 215-4633) for Sprinturf[2]		US EPA (2009 210-1256)[3]					
			Limonta Infill-Pro Geo (mg/kg)	Limonta Turf - Max-S (mg/kg)	Green Crumb Rubber (mg/kg)	Black Crumb Rubber (mg/kg)	Turf Field Infill Crumb Rubber - F1D1 (Range, mg/kg)	Turf Field Infill Crumb Rubber - F2, F3 (Range, mg/kg)	Turf Field Infill Crumb Rubber - F4, F5, F6 (Range, mg/kg)	Turf Field Blades- F1D1 (Range, mg/kg)	Turf Field Blades - F2, F3 (Range, mg/kg)	Turf Field Blades - F4, F5, F6 (Range, mg/kg)
Bis(2-chloroisopropyl)ether	NI											
Bis(2-ethylhexyl)phthalate	38											
Butylbenzyl phthalate	280											
Carbazole	NI											
Chrysene	15				2.3	4.9						
Di-n-butylphthalate	620											
Di-n-octylphthalate	62											
Dibenz(a,h)anthracene	0.015				<0.25	0.52						
Diethyl phthalate	4900											
Dimethylphthalate	NI											
Diphenylamine	150											
Fluoranthene	230				3	60						
Fluorene	230				<0.25	<0.49						
Hexachlorobenzene	0.33											
Hexachlorobutadiene	6.2											
Indeno(1,2,3-cd)pyrene	0.15				0.47	1.3						
Isophorone	560											
N-Nitrosodiphenylamine	110											
Naphthalene	3.8				0.77	1.6						
Nitrobenzene	5.1											
Pentachlorophenol	0.99											
Phenanthrene	NI				1.2	2.5						
Phenol	1800											
Pyrene	170				9.3	19						

Notes:

NA = Not Analyzed; ND = Not Detected; NI = Not Identified; SVOC = Semivolatile Organic Compound; VOC = Volatile Organic Compound.

(1) Data from Curtis & Tompkins (2011, pp. 5-6).

(2) Data from Teter Engineering (2015, Tables 1 and 3).

(3) Data from US EPA (2009, Table 7, p .32). Note, more chemicals were analyzed but they were not reported in summary tables.

(4) Data from Zhang *et al.* (2008, Tables 4 and 5). Note that the values were converted to mg/kg for comparison across studies.

(5) Data from Pavilonis *et al.* (2013, Tables 2 and 3, pp. 5, 6).

(6) Data from Teter Engineering (2015, Appendix Tables A-1 and A-3). Note that the values from Table A-3 were converted to mg/kg for comparison across studies.

Highlighted cells are those with values above their respective Residential Screening Level.

Data was not reported for blank cells.

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Zhang *et al*. (2008 208-5919)[4]								
	Sample 1 A-Turf Rubber Crumb from Riverside Park (mg/kg)	Sample 2 A-Turf Rubber Crumb from Riverside Park (mg/kg)	Sample 3 A-Turf Rubber Crumb from Riverside Park (mg/kg)	Sample 4 A-Turf Fibers from Riverside Park (mg/kg)	Sample 5 FieldTurf Rubber Crumb from Parade Grounds (mg/kg)	Sample 6 FieldTurf Rubber Crumb from Parade Grounds (mg/kg)	Sample7 FieldTurf Rubber Crumb from Sara Roosevelt Park (mg/kg)	Sample 8 Astroplay Rubber Crumb from E. Rochester HS (mg/kg)	New Crumb Infill - Sweat (Range, mg/kg)
Metals									
Antimony									<0.50
Arsenic	3.55	1.57	ND	0.28				0.28	<0.20
Barium									<0.090–0.11
Beryllium								0.22	0.70–1.2
Cadmium	0.21	0.41	0.37	ND				0.93	
Chromium	0.87	1.68	0.69	3.93					<0.080–0.54
Cobalt									0.090–1.6
Copper								3.12	<7.0–980
Lead	5.76	53.5	4.63	2.8					
Magnesium									
Mercury									
Molybdenum									<1.9
Nickel									<0.10
Selenium									
Silver									0.60–1.3
Thallium									6.0–21
Titanium									
Vandium								NA	
Zinc	5710	9988	NA	NA					
SVOCs and VOCs									
1,2-Dichlorobenzene									
1,2,4-Trichlorobenzene									
1,3-Dichlorobenzene									
1,4-Dichlorobenzene									
2-Chlorophenol									
2,4-Dichlorophenol									
2,4-Dimethylphenol									
2,4-Dinitrophenol									
2,4-Dinitrotoluene									
2,4,5-Trichlorophenol									
2,4,6-Trichlorophenol									
3,3'-Dichlorobenzidine									
Acenaphthene	ND	0.03	ND	ND	0.16	0.09	ND	ND	
Acenapthylene									
Aniline									
Anthracene	0.03	0.17	ND	0.01	0.03	0.03	ND	ND	
Azobenzene									
Benzo(a)anthracene	1.23	1.26	0.31	ND	0.29	0.98	0.06	ND	
Benzo(a)pyrene	8.58	3.56	0.78	0.08	0.61	0.25	0.06	0.41	
Benzo(b)fluoranthene	3.39	2.19	ND	ND	1.08	0.58	0.2	0.43	
Benzo(g, h, i)perylene	7.75	2.61	2.73	0.11	0.85	0.46	2.03	ND	
Benzo(k)fluoranthene	7.29	1.78	0.17	ND	0.14	0.18	0.1	0.99	
Benzoic acid									
Bis(2-chloroethyl)ether									

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Zhang *et al*. (2008 208-5919)[4]								
	Sample 1 A-Turf Rubber Crumb from Riverside Park (mg/kg)	Sample 2 A-Turf Rubber Crumb from Riverside Park (mg/kg)	Sample 3 A-Turf Rubber Crumb from Riverside Park (mg/kg)	Sample 4 A-Turf Fibers from Riverside Park (mg/kg)	Sample 5 FieldTurf Rubber Crumb from Parade Grounds (mg/kg)	Sample 6 FieldTurf Rubber Crumb from Parade Grounds (mg/kg)	Sample7 FieldTurf Rubber Crumb from Sara Roosevelt Park (mg/kg)	Sample 8 Astroplay Rubber Crumb from E. Rochester HS (mg/kg)	New Crumb Infill - Sweat (Range, mg/kg)
Bis(2-chloroisopropyl)ether									
Bis(2-ethylhexyl)phthalate									
Butylbenzyl phthalate									
Carbazole									
Chrysene	1.32	7.55	ND	ND	1.96	1.34	0.06	4.9	
Di-n-butylphthalate									
Di-n-octylphthalate									
Dibenz(a,h)anthracene	3.52	1.55	ND	ND	0.71	0.52	1.43	ND	
Diethyl phthalate									
Dimethylphthalate									
Diphenylamine									
Fluoranthene	0.11	0.37	ND	ND	5.08	3.54	25.4	ND	
Fluorene	0.76	0.77	ND	ND	0.5	0.45	ND	ND	
Hexachlorobenzene									
Hexachlorobutadiene									
Indeno(1,2,3-cd)pyrene	0.4	0.37	ND	ND	ND	ND	ND	ND	
Isophorone									
N-Nitrosodiphenylamine									
Naphthalene	ND	0.1	0.4	0.2	0.03	0.03	ND	0.86	
Nitrobenzene									
Pentachlorophenol									
Phenanthrene	0.06	4.35	ND	ND	2.19	1.46	ND	ND	
Phenol									
Pyrene	3.73	8.76	ND	ND	6.24	9.61	2.45	13.5	

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Pavilonis *et al*. (2013 214-1253)[5]												
	New Turf Fiber - Sweat (Range, mg/kg)	Field Samples - Sweat (Range, mg/kg)	New Crumb Infill - Digestive (Range, mg/kg)	New Turf Fiber - Digestive (Range, mg/kg)	Field Samples - Digestive (Range, mg/kg)	New Crumb Infill - Lung (Range, mg/kg)	New Turf Fiber - Lung (Range, mg/kg)	Field Samples - Lung (Range, mg/kg)	New Crumb Infill - Nitric Acid (Range, mg/kg)	New Turf Fiber - Nitric Acid (Range, mg/kg)	Field Samples - Nitric Acid (Range, mg/kg)	All Samples - Sweat (Maximum, mg/kg)	All Samples - Lung (Maximum, mg/kg)
Metals													
Antimony													
Arsenic	<0.10	1.4–1.7	<0.10–0.48	<0.040	<3.0	<0.50	<0.20	<0.050	<0.70–0.80	<0.040–4.0	<0.70		
Barium													
Beryllium	<0.20	<0.20	<0.40	<0.40	<0.40	<0.50	<0.20	<0.030	<0.70	<0.040–0.51	<0.70		
Cadmium	<0.030	<0.20	<4.0	<0.30	2.5–11	<0.20	<0.090	<0.090	<0.70–1.1	<0.50	<0.70		
Chromium	0.10–1.3	2.1–2.7	<7.0	<0.60–0.74	<6.0	<0.20–0.66	<0.090–0.12	<0.050	<0.70–16	0.34–820	<0.70–0.92		
Cobalt													
Copper	0.030–1.6	1.8–2.2	<20–32	<1.0–1.6	<20	<0.40–0.58	<0.2–2.0	<0.20	<0.70–36	0.69–110	8.8–59		
Lead	0.030–12	<0.20–1.5	5.3–66	<0.30–4.7	2.5–260	<0.20–0.26	<0.02–0.61	<0.020–0.023	<0.010–17	0.53–4400	4.1–140		
Magnesium	3.3–18	<10	<1000–4600	<90	<900	650–970	77–300	<100	<7.0–7800	<30–12000	<70–160		
Mercury													
Molybdenum													
Nickel													
Selenium	<0.60	<0.70	<0.90–1.5	<0.10	<2.0	<2.0	<0.90	<0.10	<1.0	<0.10–2.9	<0.60–1.3		
Silver	<0.060	<0.70	<0.20–0.23	<0.20	<0.40–0.90	<0.50	<0.20	<0.10	<10	<8.0	<10		
Thallium													
Titanium	0.10–1.1	3.2–4.0	<10	<0.10	<10	1.5–6.7	0.20–0.96	<0.40	<0.70–18	0.81–820	1.9–9.6		
Vandium	0.50–1.6	15–18	<1.0	<0.10–0.12	<1.0	0.65-3.0	0.39–1.5	<0.70	<0.10–2.1	<40	<0.80–0.74		
Zinc													
SVOCs and VOCs													
1,2-Dichlorobenzene													
1,2,4-Trichlorobenzene													
1,3-Dichlorobenzene													
1,4-Dichlorobenzene													
2-Chlorophenol													
2,4-Dichlorophenol													
2,4-Dimethylphenol													
2,4-Dinitrophenol													
2,4-Dinitrotoluene													
2,4,5-Trichlorophenol													
2,4,6-Trichlorophenol													
3,3'-Dichlorobenzidine													
Acenaphthene												<0.11	<0.05
Acenapthylene												<0.17	<0.09
Aniline													
Anthracene												<0.08	<0.04
Azobenzene												<0.49	<0.24
Benzo(a)anthracene												<0.31	<0.16
Benzo(a)pyrene												<1.4	<0.74
Benzo(b)fluoranthene												<1.2	<0.56
Benzo(g, h, i)perylene													
Benzo(k)fluoranthene												<1.9	<0.69
Benzoic acid													
Bis(2-chloroethyl)ether													

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	Pavilonis *et al*. (2013 214-1253)[5]												
	New Turf Fiber - Sweat (Range, mg/kg)	Field Samples - Sweat (Range, mg/kg)	New Crumb Infill - Digestive (Range, mg/kg)	New Turf Fiber - Digestive (Range, mg/kg)	Field Samples - Digestive (Range, mg/kg)	New Crumb Infill - Lung (Range, mg/kg)	New Turf Fiber - Lung (Range, mg/kg)	Field Samples - Lung (Range, mg/kg)	New Crumb Infill - Nitric Acid (Range, mg/kg)	New Turf Fiber - Nitric Acid (Range, mg/kg)	Field Samples - Nitric Acid (Range, mg/kg)	All Samples - Sweat (Maximum, mg/kg)	All Samples - Lung (Maximum, mg/kg)
Bis(2-chloroisopropyl)ether													
Bis(2-ethylhexyl)phthalate													
Butylbenzyl phthalate													
Carbazole												<0.35	<0.18
Chrysene												<1.1	<0.54
Di-n-butylphthalate													
Di-n-octylphthalate													
Dibenz(a,h)anthracene												<2.0	<0.98
Diethyl phthalate													
Dimethylphthalate													
Diphenylamine													
Fluoranthene												<0.11	<0.06
Fluorene												<.07	<0.03
Hexachlorobenzene													
Hexachlorobutadiene													
Indeno(1,2,3-cd)pyrene													
Isophorone													
N-Nitrosodiphenylamine													
Naphthalene												<0.03	<0.02
Nitrobenzene													
Pentachlorophenol													
Phenanthrene												<0.10	<0.05
Phenol													
Pyrene												<0.10	<0.05

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	All Samples - Digestive (Maximum, mg/kg)	All Samples - Total Extract (Maximum, mg/kg)	Teter Engineering (2015 215-4633) for Sprinturf[6]					
			FieldTurf 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (mg/kg)	FieldTurf Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (mg/kg)	FieldTurf Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (mg/kg)	FieldTurf Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (mg/kg)	FieldTurf Crumb Rubber (2 Years of Age) (Lloy and Weisel, 2011) (mg/kg)	FieldTurf Crumb Rubber (2 Years of Age) (Lloy and Weisel, 2012) (mg/kg)
Metals								
Antimony			0.18	0.24	3.7	3.4	NA	NA
Arsenic			0.39	<1	<0.37	<0.4	<0.7	<0.7
Barium			2.2	0.41	2.7	6.4	NA	NA
Beryllium			<0.4	<0.4	<0.15	<0.16	<0.7	<0.7
Cadmium			1.5	<0.5	<0.37	<0.4	<0.7	<0.7
Chromium			0.72	1.9	1.2	1.9	<0.7	<0.7
Cobalt			<5	<5	130	120	NA	NA
Copper			11	0.4	54	26	15	59
Lead			<0.3	<0.3	15	8.4	40	8
Magnesium								
Mercury			0.011	<0.033	<0.15	<0.16	NA	NA
Molybdenum			NA	NA	0.57	0.64	NA	NA
Nickel			1.6	0.52	2	2.9	NA	NA
Selenium			0.37	<0.5	<0.74	<0.8	<1.2	1.3
Silver			0.14	<0.5	<0.37	<0.4	NA	NA
Thallium			1	<1	<0.74	<0.8	NA	NA
Titanium								
Vandium			0.52	0.55	1.2	2.2	0.71	0.74
Zinc			9,990	2.8	16,000	13,000	NA	NA
SVOCs and VOCs								
1,2-Dichlorobenzene								
1,2,4-Trichlorobenzene								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
2-Chlorophenol								
2,4-Dichlorophenol								
2,4-Dimethylphenol								
2,4-Dinitrophenol								
2,4-Dinitrotoluene								
2,4,5-Trichlorophenol								
2,4,6-Trichlorophenol								
3,3'-Dichlorobenzidine								
Acenaphthene	<0.56	<0.03						
Acenapthylene	<0.68	2.48						
Aniline								
Anthracene	<0.42	<0.02						
Azobenzene	<2.5	<0.12						
Benzo(a)anthracene	<1.7	<0.08						
Benzo(a)pyrene	<7.6	<0.37						
Benzo(b)fluoranthene	<6.4	<0.31						
Benzo(g, h, i)perylene								
Benzo(k)fluoranthene	<7.2	<0.34						
Benzoic acid								
Bis(2-chloroethyl)ether								

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	All Samples - Digestive (Maximum, mg/kg)	All Samples - Total Extract (Maximum, mg/kg)	Teter Engineering (2015 21S-4633) for Sprinturf[c]					
			FieldTurf 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (mg/kg)	FieldTurf Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (mg/kg)	FieldTurf Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (mg/kg)	FieldTurf Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (mg/kg)	FieldTurf Crumb Rubber (2 Years of Age) (Lioy and Weisel, 2011) (mg/kg)	FieldTurf Crumb Rubber (2 Years of Age) (Lioy and Weisel, 2012) (mg/kg)
Bis(2-chloroisopropyl)ether								
Bis(2-ethylhexyl)phthalate								
Butylbenzyl phthalate								
Carbazole	<1.9	<0.09						
Chrysene	<5.5	<0.27						
Di-n-butylphthalate								
Di-n-octylphthalate								
Dibenz(a,h)anthracene	<10	<0.49						
Diethyl phthalate								
Dimethylphthalate								
Diphenylamine								
Fluoranthene	<0.62	<0.03						
Fluorene	<0.35	<0.02						
Hexachlorobenzene								
Hexachlorobutadiene								
Indeno(1,2,3-cd)pyrene								
Isophorone								
N-Nitrosodiphenylamine								
Naphthalene	<0.12	0.27						
Nitrobenzene								
Pentachlorophenol								
Phenanthrene	<0.52	<0.02						
Phenol								
Pyrene	<0.52	<0.02						

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	FieldTurf Crumb Rubber (6 Years of Age) (Lioy and Weisel, 2013) (mg/kg)	FieldTurf Rubber (SBR?) (Maxxam, 2009) (mg/kg)	FieldTurf Crumb Rubber (TestAmerica, 2009) (mg/kg)	Teter Engineering (2015 215-4633) for Sprinturf[6]			
				FieldTurf 10-14 CRYO SBR (Conestoga-Rovers, 2008) (mg/kg)	FieldTurf SBR (TestAmerica, 2011a) (mg/kg)	FieldTurf SBR (TestAmerica, 2011b) (mg/kg)	FieldTurf SBR - Wellesley (Conestoga-Rovers, 2008) (mg/kg)
Metals							
Antimony	NA	NA	<1				
Arsenic	<0.7	<6	<1				
Barium	NA	<5	3.9				
Beryllium	<0.7	NA	<0.4				
Cadmium	<0.7	<0.5	0.36				
Chromium	<0.7	<2.0	1.3				
Cobalt	NA	10	81				
Copper	20	20	19				
Lead	37	<5	36				
Magnesium							
Mercury	NA	NA	0.018				
Molybdenum	NA	4	5.6				
Nickel	NA	<1	3.1				
Selenium	<1.2	NA	1.4				
Silver	NA	<2	<0.5				
Thallium	NA	NA	0.34				
Titanium							
Vandium	0.73	NA	1.3				
Zinc	NA	940	12,000				
SVOCs and VOCs							
1,2-Dichlorobenzene				NA	<9.7	<62	NA
1,2,4-Trichlorobenzene				NA	<9.7	<62	NA
1,3-Dichlorobenzene				NA	<9.7	<62	NA
1,4-Dichlorobenzene				0.025	<9.7	<62	0.021
2-Chlorophenol				NA	<9.7	<62	NA
2,4-Dichlorophenol				NA	<9.7	<62	NA
2,4-Dimethylphenol				<0.990	<9.7	<62	<0.990
2,4-Dinitrophenol				NA	<19	<120	NA
2,4-Dinitrotoluene				NA	<9.7	<62	NA
2,4,5-Trichlorophenol				NA	<9.7	<62	NA
2,4,6-Trichlorophenol				NA	<9.7	<62	NA
3,3'-Dichlorobenzidine				NA	<24	<160	NA
Acenaphthene				0.13	<9.7	<62	<0.2
Acenapthylene							
Aniline				NA	NA	NA	NA
Anthracene				<0.2	<9.7	<62	<0.2
Azobenzene							
Benzo(a)anthracene				<0.2	<9.7	<62	<0.2
Benzo(a)pyrene				<0.2	<9.7	<62	<0.2
Benzo(b)fluoranthene				1.9	<9.7	<62	<0.2
Benzo(g, h, i)perylene							
Benzo(k)fluoranthene				<0.2	<9.7	<62	<0.2
Benzoic acid				NA	NA	NA	NA
Bis(2-chloroethyl)ether				4	<48	<31	<0.2

Table A-1 Comparison of Turf Chemical Content to Residential Soil Screening Levels

Chemical	FieldTurf Crumb Rubber (6 Years of Age) (Lloy and Weisel, 2013) (mg/kg)	FieldTurf Rubber (SBR?) (Maxxam, 2009) (mg/kg)	FieldTurf Crumb Rubber (TestAmerica, 2009) (mg/kg)	Teter Engineering (2015 215-4633) for Sprinturf[6]			
				FieldTurf 10-14 CRYO SBR (Conestoga-Rovers, 2008) (mg/kg)	FieldTurf SBR (TestAmerica, 2011a) (mg/kg)	FieldTurf SBR (TestAmerica, 2011b) (mg/kg)	FieldTurf SBR - Wellesley (Conestoga-Rovers, 2008) (mg/kg)
Bis(2-chloroisopropyl)ether				NA	<9.7	<62	NA
Bis(2-ethylhexyl)phthalate				170	90	160	<0.990
Butylbenzyl phthalate				NA	NA	NA	NA
Carbazole							
Chrysene				<0.2	<9.7	<62	<0.2
Di-n-butylphthalate				4.8	<9.7	<62	<0.990
Di-n-octylphthalate				<0.990	<9.7	<62	<0.990
Dibenz(a,h)anthracene				<0.2	<12	<78	<0.2
Diethyl phthalate				0.25	<9.7	<62	<0.990
Dimethylphthalate				<0.990	<9.7	<62	<0.990
Diphenylamine				NA	NA	NA	NA
Fluoranthene				7.4	<9.7	<62	<0.2
Fluorene				0.2	<9.7	<62	<0.2
Hexachlorobenzene				NA	<9.7	<62	NA
Hexachlorobutadiene				NA	<9.7	<62	NA
Indeno(1,2,3-cd)pyrene				<0.2	<9.7	<62	<0.2
Isophorone				NA	NA	NA	NA
N-Nitrosodiphenylamine				NA	NA	NA	NA
Naphthalene				1.5	<9.7	<62	<0.2
Nitrobenzene				NA	<9.7	<62	NA
Pentachlorophenol				NA	<24	<160	NA
Phenanthrene				3.6	<9.7	<62	<0.2
Phenol				1.9	<9.7	<62	<0.2
Pyrene				16	<9.7	<62	<0.2

Table A-2 Comparison of Airborne Concentrations of Turf Constituents to Residential Air Screening Levels

Chemical	Residential Screening Level (µg/m3)	Milone & MacBroom (2008 215-3891) (FieldTurf - Crumb Rubber)[1]										NYC DHMH (2009 212-7391)[2]		DPH (2010 212-739	A DRRR (2010 212-7602	ES (2007 215-460	
		Field F SF-1 (µg/m³)	Field F SF-2 (µg/m³)	Field F SF-3 (µg/m³)	Field F SF-4 (µg/m³)	Field F SF-5 (µg/m³)	Field G SF-1 (µg/m³)	Field G SF-2 (µg/m³)	Field G SF-3 (µg/m³)	Field G SF-4 (µg/m³)	Field G SF-5 (µg/m³)	Synthetic Turf Fields (Range, µg/m³)	Background - Grass/Upwind (Range, µg/m³)	Max. Detect at 4 Crumb Rubber Fields (µg/m³)	Max. Detect in 4 Towns with Crumb Rubber Fields (µg/m³)	Crumb Rubber (ng/mL air)	Thomas Jefferson Field Max. On-field (µg/m³)
Metals																	
Cadmium	0.001											ND	ND				
Chromium	NI											0.87-1.4	ND-1.8				
Copper	NI											ND	ND				
Iron	NI											ND	ND				
Lead	0.15											ND	ND				
Manganese	0.0052											ND	ND				
Nickel	0.0094											ND	ND				
Silver	NI											ND	ND				
Tin	NI											ND	ND				
Zinc	NI											ND	ND-83				
Particulate Matter																	
PM 2.5	1.2											0.003-0.048	0.003-0.05				
PM 10	150																
PM 10 (Cr)	NI																
PM 10 (Pb)	0.15																
PM 10 (Zn)	NI																
SVOCs and VOCs																	
1,2,4-Trimethylbenzene	0.73														10.7		
1,3-Butadiene, 2-methyl	NI																0.46
1,3-Pentadiene	NI																NR
1,3-Pentadione, (E-)	NI																0.12
1,4-Dichlorobenzene	0.26																NR
1,4-Pentadiene	NI													9.3x10-3			
1-Methylnapthalene	NI											ND-3	ND	2.94			
2-Butanone (MEK)	520														1.9		
2-Propanol	21															5.64	
4-(tert-octyl)phenol	NI	<0.19	<0.20	<0.19	<0.19	<0.20	<0.21	<0.21	<0.21	<0.21	<0.21				6.3		
4-Ethyltoluene	NI													3.39			ND
4-Methyl-2-pentanone	310											ND	ND				
Acenaphthene	NI											ND	ND	6.6x10-3			
Acenapthylene	NI											9.3-51	ND-11	52.2			
Acetone	3200											ND	ND				
Anthracene	NI																
Benzaldehyde, ethyl-	NI													1.56			0.4
Benzene	0.36																0.41
Benzene, 1-ethyl-4-methyl	NI											ND	ND	1.1x10-4			
Benzo(a)anthracene	0.0092											ND	ND	1.9x10-4			
Benzo(a)pyrene	0.00092											ND	ND	2.1x10-4			
Benzo(b)fluoranthene	0.0092													2.6x10-4			
Benzo(e)pyrene	NI											ND	ND	1.4x10-4			
Benzo(g, h, i)perylene	NI											ND	ND	8x10-5			
Benzo(k)fluoranthene	0.0092											ND	ND	1.2			
Benzothiazole	NI	<0.19	<0.20	<0.19	<0.19	<0.20	0.39	<0.21	<0.21	<0.21	<0.21					225.87	
Butane	NI																NR
Butylated hydroxyanisole (BHT alteration product)	49															13.89	

Table A-2 Comparison of Airborne Concentrations of Turf Constituents to Residential Air Screening Levels

Chemical	Residential Screening Level (µg/m3)	Milone & MacBroom (2008 215-3891) (FieldTurf - Crumb Rubber)[1]										NYC DHMH (2009 212-7391)[2]		DPH (2010 212-7394	DRRR (2010 212-7602	ES (2007 215-460	
		Field F SF-1 (µg/m³)	Field F SF-2 (µg/m³)	Field F SF-3 (µg/m³)	Field F SF-4 (µg/m³)	Field F SF-5 (µg/m³)	Field G SF-1 (µg/m³)	Field G SF-2 (µg/m³)	Field G SF-3 (µg/m³)	Field G SF-4 (µg/m³)	Field G SF-5 (µg/m³)	Synthetic Turf Fields (Range, µg/m³)	Background - Grass/Upwind (Range, µg/m³)	Max. Detect at 4 Crumb Rubber Fields (µg/m³)	Max. Detect in 4 Towas with Crumb Rubber Fields (µg/m³)	Crumb Rubber (ng/mL air)	Thomas Jefferson Field Max. On-field (µg/m³)
Carbon Disulfide	73													0.47			
Carbon tetrachloride	0.47																
Chloroform	0.12											ND-2.9	ND				ND
Chromethane	9.4											ND-1.1	ND-1.1	1.7			
Chrysene	0.092											ND	ND	3.4x10-4			
Cyclohexane	630													17.5	1.2		
Cyclohexane, 1,1,3-trimethyl	NI																
Cyclohexane, 1,4-dimethyl	NI																
Decanal	NI																NR
Dibenz(a,h)anthracene	0.00084											ND	ND				
Dichlorodifluoromethane	10																
Ethanol	NI											6.2-22	5.1-8.9				
Ethyl benzene	1.1													4.29			
Fluoranthene	NI											ND	ND	6.8x10-3			
Fluorene	NI											ND	ND				
Freon 11	NI																0.34
Freon 113	NI																0.085
Freon 12	NI																
Heptane	NI													5.72			0.31
Hexadecane	NI															1.58	
Indeno(1,2,3-cd)pyrene	0.0092											ND	ND				
Isopropylbenzene	42 (cumene)														11.6		
Methylchloride	9.4 (chloromethane)																
Methylene Chloride	63											ND-9	ND-6.9	14.1			0.11
Naphthalene	0.083											ND	ND				
n-Hexane	73											ND-2.1	ND	31.3			
Nitrosodibutylamine (n-)	0.0018	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nitrosodiethylamine (n-)	0.000024	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nitrosodimethylamine (n-)	0.000072	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nitrosodipropylamine (n-)	0.0014	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nitrosomorpholine (n-)	0.0015	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nitrosopiperidine (n-)	0.001	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nitrosopyrrolidine (n-)	0.0046	<1.1	<1.1	<1.4	<1.1	<1	<1.3	<1.4	<1.4	<1.4	<1.4						
Nonane	2.1																1.1
Pentane	100																
Pentane, 2-methyl	NI																
Phenanthrene	NI											ND	ND				
Pyrene	NI											ND	ND	6.9x10-3			
Styrene	100													1.96			
Toluene	520											ND-2.7	ND-2	52.7	6.4		
Trichloro-fluoromethane	73																
Trichloro-trifluoromethane	NI																
Xylenes	10													14.7	44.3		

Notes:

ND = Not Detected; NI = Not Identified; NR = Not Reported; SVOC = Semivolatile Organic Compound; VOC = Volatile Organic Compound.

(1) Data from Milone & MacBroom (2008, Section 2, Tables 2, 3, 5, and 6, pp. 10-11, 15).

(2) Data from NYC DHMH (2009, Table B-1, p.). Note, more chemicals were analyzed but they were ND.

(3) Data from CT DPH (2010, Table 2, p. 35). Note, more chemicals were analyzed but they were ND.

(4) Data from CA DRRR (2010, Table 11, p. 25). Note, more chemicals were analyzed but were left out because they were ND or considered contamination and not further evaluated.

(5) Data from CAES (2007, Table 2, p. 5). Out-gassing experiment. Note that the values were converted to µg/m³ for comparison across studies.

(6) Data from NY DH (2009, Tables 8.4 and 8.5). Note, more chemicals were analyzed but they were not selected for health risk evaluation.

(7) Data from US EPA (2009, Table 6, p .31). Note, more chemicals were analyzed but they were not reported in summary tables. Note that the values were converted to µg/m³ when necessary for comparison across studies.

Highlighted cells are those with values above their respective Residential Screening Level.

Data was not reported for blank cells.

Table A-2 Comparison of Airborne Concentrations of Turf Constituents to Residential Air Screening Levels

Chemical	NY DH (2009 215-4606)[6]					US EPA (2009 210-1256)[7]							
	Thomas Jefferson Field Upwind ($\mu g/m^3$)	Thomas Jefferson Field Max. Downwind ($\mu g/m^3$)	John Mullaly Field Max On-field ($\mu g/m^3$)	John Mullaly Field Upwind ($\mu g/m^3$)	John Mullaly Field Max. Downwind ($\mu g/m^3$)	Synthetic Turf Field F1D1 - On-field ($\mu g/m^3$)	Synthetic Turf Field F1D1 - Background ($\mu g/m^3$)	Synthetic Turf Field F1D2 - On-field ($\mu g/m^3$)	Synthetic Turf Field F1D2 - Background ($\mu g/m^3$)	Synthetic Turf Field F2 - On-field ($\mu g/m^3$)	Synthetic Turf Field F2 - Background ($\mu g/m^3$)	Synthetic Turf Field F4 - On Field ($\mu g/m^3$)	Synthetic Turf Field F4 - Background ($\mu g/m^3$)
Metals													
Cadmium													
Chromium													
Copper													
Iron													
Lead													
Manganese													
Nickel													
Silver													
Tin													
Zinc													
Particulate Matter													
PM 2.5													
PM 10						27.8	29.5	29.8	29.5	NR	NR	31.8	28.6
PM 10 (Cr)						0.0029	0.002	0.0036	0.0033	NR	NR	ND	ND
PM 10 (Pb)						ND	ND	0.0077	0.0063	NR	NR	ND	ND
PM 10 (Zn)						0.0108	0.0238	0.0118	0.0116	NR	NR	0.0314	0.0217
SVOCs and VOCs													
1,2,4-Trimethylbenzene													
1,3-Butadiene, 2-methyl			NR	0.23	NR								
1,3-Pentadiene	1.1	0.58	NR	0.52	0.53								
1,3-Pentadiene, (E-)	NR	0.62											
1,4-Dichlorobenzene	0.18	0.13											
1,4-Pentadiene	NR	0.52											
1-Methylnapthalene													
2-Butanone (MEK)						1.39	1.30	1.12	1.06	1.21	1.09	1.27	1.30
2-Propanol													
4-(tert-octyl)phenol													
4-Ethyltoluene													
4-Methyl-2-pentanone	1.2	ND	ND	0.78	ND	0.53	ND	0.49	ND	ND	ND	ND	ND
Acenaphthene													
Acenapthylene													
Acetone			ND	0.56	ND								
Anthracene													
Benzaldehyde, ethyl-			NR	9.6	NR								
Benzene	0.54	0.41				0.29	0.22	0.26	0.29	0.35	0.38	0.64	0.38
Benzene, 1-ethyl-4-methyl	0.67	0.55											
Benzo(a)anthracene													
Benzo(a)pyrene													
Benzo(b)fluoranthene													
Benzo(e)pyrene													
Benzo(g, h, i)perylene													
Benzo(k)fluoranthene													
Benzothiazole			ND	6.5	ND								
Butane	0.48	0.34											
Butylated hydroxyanisole (BHT alteration product)													

Table A-2 Comparison of Airborne Concentrations of Turf Constituents to Residential Air Screening Levels

Chemical	NY DH (2009 215-4606)[6]					US EPA (2009 210-1256)[7]							
	Thomas Jefferson Field Upwind ($\mu g/m^3$)	Thomas Jefferson Field Max. Downwind ($\mu g/m^3$)	John Mullaly Field Max On-field ($\mu g/m^3$)	John Mullaly Field Upwind ($\mu g/m^3$)	John Mullaly Field Max. Downwind ($\mu g/m^3$)	Synthetic Turf Field F1D1 - On-field ($\mu g/m^3$)	Synthetic Turf Field F1D1 - Background ($\mu g/m^3$)	Synthetic Turf Field F1D2 - On-field ($\mu g/m^3$)	Synthetic Turf Field F1D2 - Background ($\mu g/m^3$)	Synthetic Turf Field F2 - On-field ($\mu g/m^3$)	Synthetic Turf Field F2 - Background ($\mu g/m^3$)	Synthetic Turf Field F4 - On Field ($\mu g/m^3$)	Synthetic Turf Field F4 - Background ($\mu g/m^3$)
Carbon Disulfide													
Carbon tetrachloride						0.57	0.63	0.63	0.63	0.57	0.50	0.57	0.63
Chloroform	0.15	0.084	ND	0.96	0.15								
Chromethane			ND	0.1	0.1								
Chrysene													
Cyclohexane													
Cyclohexane, 1,1,3-trimethyl			NR	0.6	NR								
Cyclohexane, 1,4-dimethyl			NR	1.1	NR								
Decanal	0.46	NR											
Dibenz(a,h)anthracene													
Dichlorodifluoromethane						2.57	2.72	2.47	2.77	2.77	2.52	2.37	2.67
Ethanol													
Ethyl benzene													
Fluoranthene													
Fluorene													
Freon 11	0.69	0.4	0.4	0.69	0.7								
Freon 113	0.13	0.1	0.092	0.22	0.16								
Freon 12			0.74	1	1.1								
Heptane	0.43	0.3											
Hexadecane													
Indeno(1,2,3-cd)pyrene													
Isopropylbenzene													
Methylchloride						0.97	0.99	0.97	0.95	0.93	0.93	0.99	1.07
Methylene Chloride	0.17	0.29	0.19	2.3	3	0.24	0.21	ND	ND	0.21	0.21	0.21	0.21
Naphthalene													
n-Hexane						0.74	0.21	0.28	0.28	0.28	0.18	0.49	0.18
Nitrosodibutylamine (n-)													
Nitrosodiethylamine (n-)													
Nitrosodimethylamine (n-)													
Nitrosodipropylamine (n-)													
Nitrosomorpholine (n-)													
Nitrosopiperidine (n-)													
Nitrosopyrrolidine (n-)													
Nonane	2.5	2.3											
Pentane			NR	0.46	NR								
Pentane, 2-methyl			NR	NR	0.35								
Phenanthrene													
Pyrene													
Styrene													
Toluene						1.58	0.57	0.41	0.45	0.68	0.72	1.05	0.72
Trichloro-fluoromethane						1.46	1.57	1.46	1.52	1.52	1.40	1.35	1.68
Trichloro-trifluoromethane						0.08 (ppbV)	0.08 (ppbV)	0.08 (ppbV)	0.08 (ppbV)	0.08 (ppbV)	0.07 (ppbV)	0.07(ppbV)	0.15 (ppbV)
Xylenes						0.74	0.35	0.43	ND	0.30	0.35	0.61	ND

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Guideline Level (µg/L)	Curtis & Tompkins (2011 215-4632)		Milone & MacBroom (2008 215-3891) (FieldTurf - Crumb Rubber)[2]						Teter Engineering (2015 215-4633) for Sprinturf[3]			
		Limonta Infill-Pro Geo (µg/L)	Limonta Turf-Max-S (µg/L)	Raw Crumb Rubber (µg/L)	Field F (4 months) (µg/L)	Field F (6 months) (µg/L)	Field G (6 months) (µg/L)	Field F (1 year) (µg/L)	Field E (4 months) (µg/L)	Green Crumb Rubber - SPLP 1 (µg/L)	Green Crumb Rubber - SPLP 2 (µg/L)	Black Crumb Rubber - SPLP 1 (µg/L)	Black Crumb Rubber - SPLP 2 (µg/L)
Metals													
Aluminum	4,000												
Antimony	120	ND	ND										
Arsenic	3	ND	ND	<4	<4	<4	<4	<4	<4				
Barium	120,000	430	ND	<50	<50	<50	<50	<50	<50				
Beryllium	20	ND	ND										
Bromide	NI	ND	ND										
Cadmium	80	ND	ND	<5	<5	<1	<1	<5	<5				
Calcium	NI												
Chromium	NI	ND	ND	<50	<50	<50	<50	<50	<50				
Cobalt	2,000	ND	ND										
Copper	26,000	ND	ND	<40	<40	<40	<40	NA	NA				
Iron	NI												
Lead	100	ND	ND	<13	<13	6	4	<13	<13				
Magnesium	NI												
Manganese	1,000												
Mercury	40	ND	ND	<2	<2	<2	<2	<2	<2				
Molybdenum	NI	ND	ND										
Nickel	2000 (soluble salts)	ND	ND	<50	<50	<50	<50	NA	NA				
Potassium	NI												
Selenium	800	ND	ND	<10	<10	<2	<2	<10	<10				
Silver	800	ND	ND	<20	<20	<20	<20	<20	<20				
Sodium	NI												
Thallium	10	ND	ND										
Vanadium	2	ND	ND										
Zinc	40,000	ND	ND	1600	910	1900	1100	2400	4700	8.4	110	38	69
SVOCs and VOCs													
1H-isoindole-1,3(2H)-dione	NI												
1,2-Dichlorobenzene	12,000												
1,2,4-Trichlorobenzene	180												
1,3-Dichlorobenzene	12,000												
1,4-Dichlorobenzene	1,500												
2-Chlorophenol	800												
2(3H)-benzothiazolone	NI												
2,4-Dichlorophenol	400												
2,4-Dimethylphenol	2,000												
2,4-Dinitrophenol	200												
2,4-Dinitrotoluene	NI												
2-Mercaptobenzothiazole	NI												
2-Methylphenol	NI												
2,4,5-Trichlorophenol	14,000												
2,4,6-Trichlorophenol	20												
4-Methylphenol	NI												
3,3'-Dichlorobenzidine	30												

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Guideline Level (µg/L)	Curtis & Tompkins (2011 215-4632)		Milone & MacBroom (2008 215-3891) (FieldTurf - Crumb Rubber)[2]						Teter Engineering (2015 215-4633) for Sprinturf[3]			
		Limonta Infill-Pro Geo (µg/L)	Limonta Turf-Max-S (µg/L)	Raw Crumb Rubber (µg/L)	Field F (4 months) (µg/L)	Field F (6 months) (µg/L)	Field G (6 months) (µg/L)	Field F (1 year) (µg/L)	Field E (4 months) (µg/L)	Green Crumb Rubber - SPLP 1 (µg/L)	Green Crumb Rubber - SPLP 2 (µg/L)	Black Crumb Rubber - SPLP 1 (µg/L)	Black Crumb Rubber - SPLP 2 (µg/L)
Acenaphthene	4,200												
Acetophenone	14,000												
Aniline	NI									<9.6	<9.4	<9.6	<9.4
Anthracene	43												
Benzaldehyde, 3-hydroxyl-4-methoxy	NI												
Benzo(a)anthracene	1												
Benzo(a)pyrene	0.1												
Benzo(b)fluoranthene	1												
Benzo(k)fluoranthene	0.8												
Benzoic Acid	NI												
Benzothiazole	NI												
Benzyl alcohol	NI												
Bis(2-chloroethyl)ether	7												
Bis(2-chloroisopropyl)ether	6,000												
Bis(2-ethylhexyl) phthalate	40												
Butylbenzyl phthalate	2,000												
Carbazole	NI												
Chrysene	2												
Cyclohexane, isothiocyanato-	NI												
Cyclohexaneamine, N-cyclohexyl	NI												
Cyclohexanone	NI												
Dibenz(a,h)anthracene	0.3												
Diethyl phthalate	120,000												
Dimethylphthalate	NI												
Di-n-butyl phthalate	11,000												
Di-n-octylphthalate	20												
Diphenylamine	NI												
Fluoranthene	210												
Fluorene	2000												
Formamide, N-cyclohexyl-	NI												
Hexachlorobenzene	0.4												
Hexachlorobutadiene	8 (Hexachloro-1,3-butadiene)												
Hexanedioic acid, bis(2-ethylhexyl)	NI												
Indeno(1,2,3-cd)pyrene	0.2												
Isophorone	800												
Methane, diethoxy-cyclohexane	NI												
Methyl isobutyl ketone	NI												
Napthalene	6,000												
Nitrobenzene	80												
n-Nitrosodiphenylamine	140												
o-cyanobenzoic acid	NI												
Pentachlorophenol	6												

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Guideline Level (µg/L)	Curtis & Tompkins (2011 215-4632)		Milone & MacBroom (2008 215-3891) (FieldTurf - Crumb Rubber)[2]						Teter Engineering (2015 215-4633) for Sprinturf[3]			
		Limonta Infill-Pro Geo (µg/L)	Limonta Turf-Max-S (µg/L)	Raw Crumb Rubber (µg/L)	Field F (4 months) (µg/L)	Field F (6 months) (µg/L)	Field G (6 months) (µg/L)	Field F (1 year) (µg/L)	Field E (4 months) (µg/L)	Green Crumb Rubber - SPLP 1 (µg/L)	Green Crumb Rubber - SPLP 2 (µg/L)	Black Crumb Rubber - SPLP 1 (µg/L)	Black Crumb Rubber - SPLP 2 (µg/L)
Phenanthrene	NI												
Phenol	40,000									37	15	37	15
Phthalimide	NI												

Notes:

NA = Not Analyzed; ND = Not Detected; NI = Not Identified; SBR = Styrene Butadiene Rubber; SPLP = Synthetic Precipitation Leachate Procedure; SVOC = Semivolatile Organic Compound; TCLP = Toxicity Characteristic Leaching Procedure;

(1) Data from Curtis & Tompkins (2011, pp. 13-14).

(2) Data from Milone & MacBroom (2008, Section 3, Table 4, p. 7). Note that the values were converted to µg/L for comparison across studies.

(3) Data from Teter Engineering (2015, Table 2).

(4) Data from Baumann (2014, Table 1, p. 5).

(5) Data from CAES (2007, Table 3, p. 6).

(6) Data from NY DH (2009, Tables 2.2, 2.3, and 2.4). Note, more chemicals were analyzed but they were ND.

(7) Data from OEEHA (2007, Table 14, p. 54). Note, more chemicals were analyzed but they were not reported in summary table.

(8) Data from Teter Engineering (2015, Tables A-2 and A-4).

Highlighted cells are those with values above their respective Residential Screening Level.

Data was not reported for blank cells.

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Baumann (2014 215-4638)[4]	CAES (2007 215-4603)[5]		NY DH (2009 215-4606)[6]	OEEHA (2007 215-4614)[7]					
	Synthetic Turf (µg/L)	Crumb Rubber - Amount in Water (µg/kg tire)	Crumb Rubber - Amount in Acidified Water (µg/kg tire)	Crumb Rubber (31 samples, average µg/L)	Tire Sample "G" (µg/L)	Tire Sample "S" (µg/L)	Tire Sample "C" (µg/L)	FieldTurf - SPLP 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - SPLP Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (µg/L)	FieldTurf- SPLP Cryogenic Crumb Rubber (A-1007/T12) (*Li et al.*, 2010a) (µg/L)
Metals										
Aluminum				ND						
Antimony				ND	110	42	1.7	<10	<10	NA
Arsenic	<50			ND	6.1	5.4	4.7	<10	<10	<3.0
Barium				30.4	130	110	870	6.3	0.74	13
Beryllium				ND				<4	<4	NA
Bromide										
Cadmium	<4	0.07	0.26	ND	2.2	2.8	1.1	<5	<5	<1
Calcium				2443.5						
Chromium	<5			ND	41	57	35	<5	1.7	<1
Cobalt				ND	45	50	33	1.4	<50	NA
Copper				9.8	1500	960	1600	0.93	5	0.69
Iron				1704.8						
Lead	<40	1.85	3.26	12.8	140	120	48	<100	<100	0.19
Magnesium				ND						
Manganese				20.7						
Mercury	<0.5			ND				<0.2	<0.2	NA
Molybdenum				ND	11	18	8.5	NA	NA	NA
Nickel				ND	27	27	22	<40	<40	0.65
Potassium				ND						
Selenium		246	260	ND	18	10	7.1	NA	NA	NA
Silver				ND				<5	<5	NA
Sodium				ND						
Thallium				ND				<10	<10	NA
Vanadium				ND	9	9.5	5.8	<50	1.1	NA
Zinc	95	20957	55010	1947.4	17000	26000	13000	342	4.3	2,450
SVOCs and VOCs										
1H-isoindole-1,3(2H)-dione					ND	490	ND			
1,2-Dichlorobenzene								NA	NA	NA
1,2,4-Trichlorobenzene								NA	NA	NA
1,3-Dichlorobenzene								NA	NA	NA
1,4-Dichlorobenzene								<5.0	<5.0	NA
2-Chlorophenol								NA	NA	NA
2(3H)-benzothiazolone				261.9	640	450	480			
2,4-Dichlorophenol								NA	NA	NA
2,4-Dimethylphenol				2.6				2.7	<10	NA
2,4-Dinitrophenol								NA	NA	NA
2,4-Dinitrotoluene								NA	NA	NA
2-Mercaptobenzothiazole				52.4						
2-Methylphenol				1.4						
2,4,5-Trichlorophenol								NA	NA	NA
2,4,6-Trichlorophenol								NA	NA	NA
4-Methylphenol				3.2						
3,3'-Dichlorobenzidine								NA	NA	NA

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Baumann (2014 215-4638)[4]	CAES (2007 215-4603)[5]		NY DH (2009 215-4606)[6]	OEEHA (2007 215-4614)[7]					
	Synthetic Turf (µg/L)	Crumb Rubber - Amount in Water (µg/kg tire)	Crumb Rubber - Amount in Acidified Water (µg/kg tire)	Crumb Rubber (31 samples, average µg/L)	Tire Sample "G" (µg/L)	Tire Sample "S" (µg/L)	Tire Sample "C" (µg/L)	FieldTurf - SPLP 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - SPLP Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (µg/L)	FieldTurf- SPLP Cryogenic Crumb Rubber (A-1007/T12) (Li *et al.*, 2010a) (µg/L)
Acenaphthene								<2.0	<2.1	NA
Acetophenone				2.3						
Aniline				103.4	2800	3000	6700	<2.0	<2.1	NA
Anthracene								<2.0	<2.1	NA
Benzaldehyde, 3-hydroxyl-4-methoxy					ND	ND	ND			
Benzo(a)anthracene								<2.0	<2.1	NA
Benzo(a)pyrene								<2.0	<2.1	NA
Benzo(b)fluoranthene								<2.0	3.9	NA
Benzo(k)fluoranthene								<2.0	<2.1	NA
Benzoic Acid				19.8				NA	NA	NA
Benzothiazole				526.3	320	450	390			
Benzyl alcohol				2.8						
Bis(2-chloroethyl)ether								<2.0	<2.1	NA
Bis(2-chloroisopropyl)ether								NA	NA	NA
Bis(2-ethylhexyl) phthalate				1.6				<10	<10	NA
Butylbenzyl phthalate								<10	<10	NA
Carbazole				1.4						
Chrysene								<2.0	<2.1	NA
Cyclohexane, isothiocyanato-				129.6						
Cyclohexaneamine, N-cyclohexyl				208.1	190	410	ND			
Cyclohexanone					ND	ND	48			
Dibenz(a,h)anthracene								<2.0	<2.1	NA
Diethyl phthalate				1.7				3	<10	NA
Dimethylphthalate								<10	<10	NA
Di-n-butyl phthalate				1.2				<10	<10	NA
Di-n-octylphthalate								4.1	<10	NA
Diphenylamine										
Fluoranthene								<2.0	<2.1	NA
Fluorene								<2.0	<2.1	NA
Formamide, N-cyclohexyl-					ND	ND	110			
Hexachlorobenzene								NA	NA	NA
Hexachlorobutadiene								NA	NA	NA
Hexanedioic acid, bis(2-ethylhexyl)					ND	ND	ND			
Indeno(1,2,3-cd)pyrene								<2.0	<2.1	NA
Isophorone				3.6				NA	NA	NA
Methane, diethoxy-cyclohexane				330						
Methyl isobutyl ketone				173.5						
Napthalene				1.4				0.93	<2.1	NA
Nitrobenzene								NA	NA	NA
n-Nitrosodiphenylamine				3.6				NA	NA	NA
o-cyanobenzoic acid					990	ND	910			
Pentachlorophenol								NA	NA	NA

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Baumann (2014 215-4638)[4]	CAES (2007 215-4603)[5]		NY DH (2009 215-4606)[6]	OEEHA (2007 215-4614)[7]					
	Synthetic Turf (µg/L)	Crumb Rubber - Amount in Water (µg/kg tire)	Crumb Rubber - Amount in Acidified Water (µg/kg tire)	Crumb Rubber (31 samples, average µg/L)	Tire Sample "G" (µg/L)	Tire Sample "S" (µg/L)	Tire Sample "C" (µg/L)	FieldTurf - SPLP 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - SPLP Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (µg/L)	FieldTurf- SPLP Cryogenic Crumb Rubber (A-1007/T12) (Li *et al*., 2010a) (µg/L)
Phenanthrene								<2.0	0.76	NA
Phenol				12.8	190	ND	ND	35	0.86	NA
Phthalimide				108.6						

: VOC = Volatile Organic Compound.

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Teter Engineering (2015 215-4633) for Sprinturf[8]					
	FieldTurf- SPLP Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf- SPLP Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf - TCLP 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - TCLP Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - WET SBR (TestAmerica, 2011a) (µg/L)	FieldTurf - WET SBR (TestAmerica, 2011b) (µg/L)
Metals						
Aluminum						
Antimony	<1	<1	NA	NA	<200	<200
Arsenic	<1.2	<1.2	130	140	<200	<200
Barium	2.8	<1	29	2.5	220	<200
Beryllium	<4.3	<4.3	NA	NA	<80	<80
Bromide						
Cadmium	<1.3	<1.3	<100	<100	<100	<100
Calcium						
Chromium	<1	<1	3	3.5	100	<100
Cobalt	1.1	2.4	NA	NA	<200	<200
Copper	<1	9.7	NA	NA	880	310
Iron						
Lead	<1	<1	3.3	<500	<100	<100
Magnesium						
Manganese						
Mercury	<0.2	<0.2	<2	<2	<2	<2
Molybdenum	<3.2	<3.2	NA	NA	<400	<400
Nickel	<3.0	<3.0	NA	NA	<200	<200
Potassium						
Selenium	<1	<1	<250	<250	<200	<200
Silver	<1	<1	<500	<500	<200	<200
Sodium						
Thallium	<1	<1	NA	NA	<200	<200
Vanadium	<1.1	<1.1	NA	NA	<200	<200
Zinc	240	870	NA	NA	15,000	5,900
SVOCs and VOCs						
1H-isoindole-1,3(2H)-dione						
1,2-Dichlorobenzene	<10	<10	NA	NA		
1,2,4-Trichlorobenzene	<10	<10	NA	NA		
1,3-Dichlorobenzene	<10	<10	NA	NA		
1,4-Dichlorobenzene	<10	<10	<50	<50		
2-Chlorophenol	<10	<10	NA	NA		
2(3H)-benzothiazolone						
2,4-Dichlorophenol	<10	<10	NA	NA		
2,4-Dimethylphenol	<10	<10	NA	NA		
2,4-Dinitrophenol	<50	<51	NA	NA		
2,4-Dinitrotoluene	<10	<10	<50	<50		
2-Mercaptobenzothiazole						
2-Methylphenol						
2,4,5-Trichlorophenol	<10	<10	<50	<50		
2,4,6-Trichlorophenol	<10	<10	<50	<50		
4-Methylphenol						
3,3'-Dichlorobenzidine	<20	<20	NA	NA		

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Teter Engineering (2015 215-4633) for Sprinturf[8]					
	FieldTurf- SPLP Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf- SPLP Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf - TCLP 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - TCLP Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - WET SBR (TestAmerica, 2011a) (µg/L)	FieldTurf - WET SBR (TestAmerica, 2011b) (µg/L)
Acenaphthene	<10	<10	NA	NA		
Acetophenone						
Aniline	<10	<10	NA	NA		
Anthracene	<10	<10	NA	NA		
Benzaldehyde, 3-hydroxyl-4-methoxy						
Benzo(a)anthracene	<10	<10	NA	NA		
Benzo(a)pyrene	<10	<10	NA	NA		
Benzo(b)fluoranthene	<10	<10	NA	NA		
Benzo(k)fluoranthene	<10	<10	NA	NA		
Benzoic Acid	<50	<51	NA	NA		
Benzothiazole						
Benzyl alcohol						
Bis(2-chloroethyl)ether	<10	<10	NA	NA		
Bis(2-chloroisopropyl)ether	<10	<10	NA	NA		
Bis(2-ethylhexyl) phthalate	<10	11	NA	NA		
Butylbenzyl phthalate	<10	<10	NA	NA		
Carbazole						
Chrysene	<10	<10	NA	NA		
Cyclohexane, isothiocyanato-						
Cyclohexaneamine, N-cyclohexyl						
Cyclohexanone						
Dibenz(a,h)anthracene	<10	<10	NA	NA		
Diethyl phthalate	<10	<10	NA	NA		
Dimethylphthalate	<10	<10	NA	NA		
Di-n-butyl phthalate	<10	<10	NA	NA		
Di-n-octylphthalate	<10	<10	NA	NA		
Diphenylamine						
Fluoranthene	<10	<10	NA	NA		
Fluorene	<10	<10	NA	NA		
Formamide, N-cyclohexyl-						
Hexachlorobenzene	<10	<10	<50	<50		
Hexachlorobutadiene	<10	<10	<50	<50		
Hexanedioic acid, bis(2-ethylhexyl)						
Indeno(1,2,3-cd)pyrene	<10	<10	NA	NA		
Isophorone	<10	<10	NA	NA		
Methane, diethoxy-cyclohexane						
Methyl isobutyl ketone						
Napthalene	<10	<10	NA	NA		
Nitrobenzene	<10	<10	<50	<50		
n-Nitrosodiphenylamine	<10	<10	NA	NA		
o-cyanobenzoic acid						
Pentachlorophenol	<20	<20	<250	<250		

Table A-3 Comparison of Turf Leaching Results to Regulatory Guideline Levels

Chemical	Teter Engineering (2015 215-4633) for Sprinturf[6]					
	FieldTurf- SPLP Ambient Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf- SPLP Cryogenic Crumb Rubber (Curtis & Tompkins, 2013b) (µg/L)	FieldTurf - TCLP 10-14 Cryogenic Crumb Rubber (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - TCLP Crumb Rubber (Wellesley Field) (Conestoga-Rovers, 2008) (µg/L)	FieldTurf - WET SBR (TestAmerica, 2011a) (µg/L)	FieldTurf - WET SBR (TestAmerica, 2011b) (µg/L)
Phenanthrene	<10	<10	NA	NA		
Phenol	<10	<10	NA	NA		
Phthalimide						

Appendix B

Conclusions From Regulatory and Other Agencies

Appendix B: Conclusions From Regulatory and Other Agencies

California Office of Environmental Health Hazard Assessment (2007)

- In 2007, CalOEHHA performed an extensive evaluation of possible exposure to and effects from chemicals in SBR. They evaluated ingestion, gastric bioavailability, and chronic hand-to-mouth activity. The performed a detailed risk assessment that involved calculating hazard indices and cancer risks for these scenarios. They found that none of the scenarios evaluated were associated with unacceptable risks.
- CalOEHHA acknowledges limitations of its study, including uncertainties that might increase or decrease risk estimates, as well as uncertainty in the data evaluated. They also did not perform an evaluation of possible risks related to inhalation exposure.

Connecticut Agricultural Experiment Station (2007)

- This is a "very modest study" of artificial turf infill conducted to determine if compounds volatilized from infill and whether chemicals could leach from the infill. The authors concluded that chemicals did volatilize (including benzothiazole) and leach (zinc, selenium, lead, and cadmium) from the materials under laboratory conditions. They further state that additional data should be collected, in particular from field studies. No statements related to the health implications of the volatilization or leaching are provided.

Connecticut Department of Public Health (2007)

- This "Technical Fact Sheet" was produced in response to concerns related to exposures from artificial turf. It is a general review of the literature available at the time. The authors note that people are exposed to the chemical of concern (metals, PAHs, particulate matter) during everyday activity, and also note that in some urban areas approximately 1-2% of the ambient particulate matter is composed of tire material.
- The evaluation concludes, "Based upon the current evidence, a public health risk appears unlikely. DPH does not believe there is a unique or significant exposure from chemicals that can be inhaled or ingested at these fields. However, there is still uncertainty and additional investigation is warranted."

New Jersey Dept. of Environmental Protection (2007)

- This document is a literature review and evaluation of possible toxicity from ingestion, dermal, and inhalation of component of artificial turf. In general, the authors states that there is not enough information to complete a standard risk assessment. However, the evaluation concludes, "...with the possible exception of allergic reactions among individuals sensitized to latex, rubber and related products, there was no obvious toxicological concern raised that crumb rubber in its intended outdoor use on playgrounds and playing fields would cause adverse health effects in the normal population."

CDC (2008)

- This document is a CDC health advisory that is related to lead samples taken on artificial turf fields. The advisory notes that nylon/polyethylene blend turf fibers may have levels of lead that are a public health concern. Fields with polyethylene fibers only had low levels of lead.
- As noted previously, after 2008 the lead content of artificial turf fields has decreased substantially.

Consumer Product Safety Commission (2008a)

- This is a limited study that evaluated potential risks from exposure to lead at artificial turf fields. The evaluation concluded that young children are not at risk from exposure to lead in these fields. The limitations of the study are explicitly addressed, including sample uniformity, sample method quality, and the uncertain bioavailability of lead from fields.

TRC/New York City Department of Health and Mental Hygiene (2008)

- This document is a literature review and compilation of the other risk assessments conducted up until 2008. They note that, "Eleven different risk assessments applied various available concentrations of COPCs [Chemicals of Potential Concern] and none identified an increased risk for human health effects as a result of ingestion, dermal or inhalation exposure to crumb rubber."

New York City Department of Health and Mental Hygiene (2009)

- Based upon possible data gaps from an earlier review of the literature, an air monitoring study was conducted to determine concentrations of SVOCs, VOCs, metals, and particulate matter above artificial turf fields.
- The only chemicals detected were considered to be either a) at similar levels to background samples, or b) at levels below those associated with possible health effects. None of the PAHs were detected, and a marker for synthetic rubber (benzothiazole) was also not detected.
- Based on the lack of detected and/or elevated concentrations, a risk assessment was not deemed to be necessary. The report did note that one bulk sample contained elevated levels of lead. However, since this time period the levels of lead used in artificial turf products has decreased significantly.

New York State Department of Environmental Conservation (2009)

- This study evaluated the potential toxicity associated with SBR using a number of different experiments.
- The leaching investigation (using the SPLP protocol) found that "Zinc (solely from truck tires), aniline, and phenol have the potential to be released above groundwater standards or guidance

values." However, when the New York dilution-attenuation factor was applied to the results, it indicated that there was unlikely to be an impact on groundwater.

- An evaluation of SBR digested in acid revealed that the levels of lead did not exceed federal standards.
- Ambient air sampling at artificial turf fields did not reveal concentrations that were above normal urban levels or above health guideline levels. Particulate matter samples were not elevated, which the authors indicate is likely because most of the particulate in SBR is not the respirable size range. They conclude, "A public health evaluation was conducted on the results from the ambient air sampling and concluded that the measured levels of chemicals in air at the Thomas Jefferson and John Mullaly Fields do not raise a concern for non-cancer or cancer health effects for people who use or visit the fields."
- Limitations of this study are discussed by the authors, "This report is not intended to broadly address all synthetic turf issues, including the potential public health implications associated with the presence of lead-based pigments in synthetic turf fibers."

US EPA (2009)

- The US EPA conducted a limited scale air monitoring study for VOCs and particulate matter at several artificial turf fields in 2008. In addition, they analyzed multiple artificial turf and wipe samples.
- The air monitoring results did not find that particulate matter or VOCs were elevated above background at the fields, with the exception of one detection of methyl isobutyl ketone. Concentrations of lead in the extraction tests were below levels of concern. The authors note that the aggressive nature of the extraction tests likely overestimates the availability of metals from SBR.
- The report concludes, "On average, concentrations of components monitored in this study were below levels of concern; however, given the very limited nature of this study (i.e., limited number of components monitored, samples sites [sic], and samples taken at each site) and the wide diversity of tire crumb material, it is not possible to reach any more comprehensive conclusions without the consideration of additional data."

Connecticut Dept. of Public Health (2010)

- This evaluation involved air sampling at four outdoor fields and one indoor field in Connecticut, as well as laboratory off-gas studies. A human health risk assessment was prepared using the analytical results.
- The study reported that 27 chemicals were evaluated in the risk assessment due to their detection above the indoor or outdoor fields, and the fact that they were potentially associated with the artificial surface. The authors indicate that conservative, health protection assumptions were used in their assessment.
- The authors report that despite the conservative nature of the assessment, only the indoor scenario showed a risk (slightly) above *de minimis* levels. Non-cancer hazards were not elevated in any scenario. The evaluation concludes, "Based upon these findings, the use of outdoor and indoor artificial turf fields is not associated with elevated health risks."

- The results of this Connecticut study have been published in three peer-reviewed articles (Ginsberg *et al.*, 2011a,b; Simcox *et al.*, 2011).

Mount Sinai Children's Environmental Health Center (Undated)

- This document is a fact sheet that presents a brief review of the literature. Potential exposure routes, chemical of concern, and exposure levels are discussed. The fact sheet notes that exposure where health effects have been observed from chemicals associated with artificial turf infills are much higher than exposures at artificial turf fields. Several recommendations for minimizing exposure (washing, wearing shoes, *etc.*) are presented.

New Jersey Dept. of Environmental Protection (2011)

- This document presents the results of a limited study of airborne lead concentrations associated with several artificial turf fields in New Jersey. The study observed higher levels of lead were detected during sampling with either a robotic sampler or a soccer player. They also found that where significant amounts of lead were found *via* wipe samples at a field that there was the potential for inhalation exposure. The author concluded, "While it is not possible to draw broad conclusions from this limited sample of fields the results suggest that there is a potential for inhalable lead to be present on turf fields that have significant amounts of lead present as detectable by surface wipes. It also would appear likely from this sample that if the lead is present to any appreciable extent in the wipes it will likely be present in the breathing zone of players who are active on these fields, and that furthermore, these levels potentially exceed ambient EPA standards."
- The levels found in ambient air at fields where high lead levels were observed were approximately half of the US EPA guideline level for lead.

CalOEHHA (2010)

- CalOEHHA undertook a second evaluation of artificial turf in 2010 under contract to the California Department of Resources Recycling and Recovery. The primary focus of their evaluation was VOC and PM2.5 (including metals) concentrations above playing fields using SBR.
- The PM2.5 (and associated metals) samples did not show elevations above the detection limit or normal background. Most VOCs were also below the limit of detection. For those VOCs that were detected, they were generally not consistent across the fields evaluated. Regardless, seven VOCs were evaluated in a screening risk assessment and all were found to be below health based screening levels.
- Interestingly, the report notes that increasing temperatures were not correlated with increasing VOC levels from the fields.

Consumer Product Safety Commission (2013)

- This document is a letter response to an appeal from Public Employees for Environmental Responsibility (PEER). PEER appealed for the removal of CPSC's conclusions regarding artificial turf from 2008, specifically the conclusion in the 2008 press release, "OK to install, OK to play on." PEER believed that headline was misleading given the limited scope of the study. They specifically requested the removal of all materials related to artificial turf from the CPSC's website, the dissemination of a warning regarding exposure to contaminants in artificial turf, and the commissioning of an ambient air study of artificial turf fields.
- The letter denies the appeal request, except for adding an explanatory note about the limitations of the study to the previously posted press release.
- There have been subsequent news stories (*e.g.*, Stockman, 2015) indicating that CPSC has withdrawn its determination that artificial turf is safe. However, we were unable to find any documentation of that on their website, and the 2008 press release (with the added note) is still posted. It is uncertain what these news reports are referring to, but it is possible that the addition of the note on limitations was misinterpreted as a retraction.

Connecticut Dept. of Public Health (2015)

- This document is a letter in response to concerns expressed by a university soccer coach regarding possible cancer clusters related to artificial turf fields. The Connecticut Department of Public Health reiterated its opinion that "...outdoor artificial turf fields do not represent an elevated health risk..."
- The document also states that the cancer cluster reports are anecdotal in nature, and the current news reports of cancer "...does not constitute a correlation or causality and thus raises a concern that currently lacks scientific support."
- Subsequent investigations of this proposed cancer cluster have raised doubts about its validity (Green, 2015), however, as Dr. Green notes in her review there has been no systematic collection of data for these cases so a cluster investigation is not possible currently.

Massachusetts Dept. of Public Health (2015)

- This document is a letter reviewing more recent literature and risk assessment related to artificial turf components. In addition, the author discussed the possible cancer cluster discussed above.
- The review indicates that the recent literature continues to "...suggest that exposure opportunities to artificial turf fields are not generally expected to result in health effects." In addition, the author discusses several issues related to the proposed cluster, including the wide variety of cancers reported.