ENVIRONMENTAL PARTNERS INC

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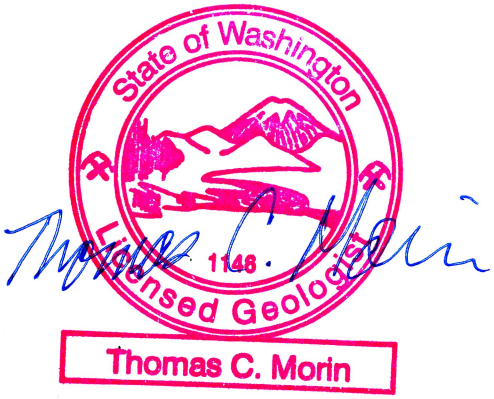
TECHNICAL MEMORANDUM

DATE: September 19, 2019

TO: Mr. Randy Barnett, Ichijo USA CO., LTD.
Mr. Paul Green, Azure Green Consultants

FROM: Thomas C. Morin, L.G.
President/Principal Geologist

RE: Response to Ecology Comments
Nicolina Meadows PPD Project
Tacoma, Washington



EPI Project Number: 74002.0

Environmental Partners, Inc. (EPI) is pleased to provide this Technical Memorandum addressing selected comments provided by the Washington State Department of Ecology (Ecology) during the pre-threshold consultation for the Nicolina Meadows PPD Project on Brookdale Road East in Tacoma, Washington (subject property). The Ecology comments were provided to Mr. Robert Jenkins of Pierce County Planning and Public Works in a letter dated September 12, 2019. Specifically, this Technical Memorandum addresses the comments provided on behalf of the Ecology Toxics Cleanup Program by Mr. Adam Harris.

Mr. Harris is the Cleanup Site Manager for the Former Brookdale Golf Course Site located immediately adjacent to the west of the Nicolina Meadows PPD Project. Mr. Harris's comments appear to be based on information provided to him for the Former Brookdale Golf Course Site via the Ecology Voluntary Cleanup Program (VCP) under which that Site has been investigated and is currently being remediated.

Ecology provided two general comments in the September 12, 2019 letter. The first comment relates to the compounds identified in soil at concentrations exceeding applicable cleanup levels on the Former Brookdale Golf Course Site and the second comment relates to the potential for similar compounds to be present on the Nicolina Meadows PPD Project based on proximity.

COMPOUNDS PRESENT

The Ecology letter states that the following compounds were present at the Former Brookdale Golf Course Site at *"…concentrations greater than 100 times appropriate cleanup screening levels"*:

- 4,4-DDE
- 4,4-DDT
- B-BHC
- D-BHC
- Aldrin
- Endosulfan I
- Dieldrin
- Endrin
- Endrin Aldehyde

This statement is factually incorrect.

As presented in the *Remedial Investigation and Focused Feasibility Study Report* (RI/FFS Report) for the Former Brookdale Golf Course Site dated March 18, 2018, only the organochlorine pesticides dieldrin and aldrin were detected in soil at a concentration exceeding a Model Toxics Control Act (WAC 173-340) Method B Soil Cleanup Level for Unrestricted Land Uses (MTCA Method B CUL). The MTCA Method B CULs are the strictest values available for those compounds and allow for residential land use. The RI/FFS Report was provided to Ecology under the VCP for review and consideration. Table 3 of the RI/FFS Report is included as Attachment A to this Technical Memorandum and demonstrates that only dieldrin and aldrin exceeded a cleanup level. While other compounds may have been detected, none of the other detected compounds were present at a concentration exceeding an available cleanup level or screening level.

The fact that the Former Brookdale Golf Course Site is less impacted than represented in the September 12, 2019 letter does not support Ecology's inference that, because the Former Brookdale Golf Course Site is impacted with numerous compounds at concentrations exceeding a cleanup level, it therefore presents a risk of contamination of the Nicolina Meadows PPD Project. The tangential issue of proximity aside, it is clear that the Former Brookdale Golf Course Site is not as highly impacted as stated by Ecology.

PROXIMITY TO FORMER BROOKDALE GOLF COURSE SITE

As acknowledged above, the Nicolina Meadows PPD Project is adjacent to the eastern boundary of the Former Brookdale Golf Course Site. However, simple proximity to the Former Brookdale Golf Course Site does not equate to contamination or the threat of contamination.

As demonstrated in the RI/FFS Report, the dieldrin and aldrin impacts at the Former Brookdale Golf Course Site are limited to only the tees and greens of that property. No pesticides of any kind were detected in any samples within the fairways of the golf course. This is consistent with the understanding that the use of pesticides was limited to those areas both due to the high cost of applying those compounds to large fairways and the importance of the appearance of tees and greens.

The data also demonstrate that dieldrin and aldrin are limited to those areas and have not migrated. This is expected based on the chemical characteristics of organochlorine pesticides. Dieldrin and aldrin have a very low aqueous solubility (0.195 milligrams per liter [mg/L] and 0.18 mg/L, respectively) and strongly sorb to the organic compounds in soil, as demonstrated by their high Soil Organic Carbon-Water Partitioning coefficients (Koc) of 25,500 liters per kilogram (L/kg) and 47,700 L/kg, respectively. Therefore, these compounds are highly immobile in the environment. This is consistent with the observed concentration distribution of these compounds, as presented in the RI/FFS Report, where these compounds are limited to the immediate vicinity of the tees and greens. The RI/FFS Report also clearly demonstrates that dieldrin and aldrin impacts are limited in depth, further demonstrating that they are not susceptible to leaching or dissolution via precipitation.

CLOSING

It is EPI's opinion that there is not a realistic potential for the known impacts on the Former Brookdale Golf Course Site to have resulted in impacts to the Nicolina Meadows PPD Project. EPI's opinion is based on the following:

- The Former Brookdale Golf Course Site is impacted only with dieldrin and aldrin at concentrations exceeding an applicable cleanup level.

- The impacts at the Former Brookdale Golf Course Site are limited to the tees and greens of the former golf course where they were directly applied. There is no evidence to suggest that dieldrin or aldrin were applied at the Nicolina Meadows PPD Project.

- Dieldrin and aldrin are highly insoluble in water (i.e., precipitation) and strongly sorb to carbon within the soil matrix (i.e., topsoil). These compounds are not mobile in the environment and remain where they were applied due to their inherent chemical properties and characteristics.

Please let me know if I can provide any addition information or if you have any questions.

ENCLOSURE

Attachment A Table 3 from RI/FFS Report dated March 18, 2018

Attachment A
Table 3 from RI/FFS Report
dated March 18, 2018

Table 3
Soil Analytical Results – 2017 EPI Focused Subsurface Investigation
Remedial Investigation and Focused Feasibility Study Report
Brookdale Golf Course
1802 Brookdale Road East, Tacoma, Washington

Area	Sample Location	Sample Depth (feet)	Sample Date	4,4-DDE	4,4-DDT	B-BHC	D-BHC	Aldrin	Endo-sulfan I	Dieldrin	Endrin	Endrin Aldehyde
Area 1	1:Tee	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	**0.028**	<0.010	<0.010	**0.044**	<0.010	<0.010
		1.5	01/25/2017	**0.014**	**0.016**	<0.010	<0.010	**0.028**	<0.010	**6.8**	**0.022**	<0.010
	9:Green	0.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**1.2**	<0.010	<0.010
		1.0	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.33**	<0.010	<0.010
		1.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.37**	<0.010	<0.010
Area 2	10:Tee	0.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/27/2017	<0.010	<0.010	<0.010	**0.011**	<0.010	<0.010	<0.010	<0.010	<0.010
	18:Green	0.5	01/26/2017	**0.060**	**0.026**	<0.010	**0.069**	<0.010	<0.010	**6.4**	**0.061**	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	**0.052**	<0.010	<0.010	**0.4**	<0.010	**0.017**
		1.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.11**	<0.010	<0.010
Area 3	1:Green	0.5	01/25/2017	<0.010	<0.010	<0.010	**0.085**	<0.010	<0.010	**0.63**	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	**0.05**	<0.010	<0.010	**0.023**	<0.010	<0.010
Area 5	10:Green	0.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.73**	<0.010	<0.010
		1.0	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.22**	<0.010	<0.010
		1.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.14**	<0.010	<0.010
Area 6	3:Tee	0.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.033**	<0.010	<0.010
		1.0	01/27/2017	<0.010	<0.010	<0.010	<0.010	**0.022**	<0.010	**0.14**	<0.010	<0.010
		1.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.056**	<0.010	<0.010
Area 7	7:Green	0.5	01/26/2017	<0.010	**0.70**	<0.010	**0.09**	<0.010	<0.010	**3.4**	0.053	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	**0.054**	<0.010	<0.010	**0.22**	<0.010	<0.010
		1.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.23**	<0.010	<0.010
Area 8	12:Tee	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**2.40**	**0.011**	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.12**	<0.010	<0.010
		1.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.12**	<0.010	<0.010
Area 9	17:Tee	0.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.63**	<0.010	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.13**	<0.010	<0.010
		1.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.065**	<0.010	<0.010
	16:Green	0.5	01/26/2017	**0.018**	<0.010	<0.010	**0.065**	<0.010	<0.010	**3.5**	**0.024**	**0.018**
		1.0	01/26/2017	<0.010	<0.010	<0.010	**0.063**	<0.010	<0.010	**0.48**	<0.010	<0.010
		1.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.038**	<0.010	<0.010
Area 10	4:Tee	0.5	01/26/2017	<0.010	<0.010	<0.010	**0.032**	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	**0.012**	<0.010	<0.010	<0.010	<0.010	<0.010
Area 11	13:Tee	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	**0.13**	<0.010	**1.50**	<0.010	<0.010
		1.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.27**	<0.010	<0.010
Area 12	6:Green	0.5	01/25/2017	<0.010	<0.010	<0.010	**0.13**	<0.010	**0.084**	**1.2**	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	**0.088**	<0.010	**0.028**	**0.49**	<0.010	<0.010
		1.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.17**	<0.010	<0.010
Area 13	15:Fairway	0.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	14:Green	0.5	01/26/2017	<0.010	<0.010	<0.010	**0.12**	<0.010	<0.010	**1.6**	**0.015**	<0.010
		1.0	01/26/2017	**0.015**	<0.010	<0.010	**0.071**	<0.010	<0.010	**0.5**	<0.010	<0.010
		1.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.41**	<0.010	<0.010
Area 14	5:Fairway	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Area 15	6:Tee	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	14:Tee	0.5	01/25/2017	<0.010	<0.010	<0.010	**0.18**	**0.11**	<0.010	**0.70**	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	5:Green	0.5	01/25/2017	**0.029**	**0.016**	<0.010	**0.22**	**0.16**	<0.010	**2.9**	**0.028**	<0.010
		1.0	01/25/2017	**0.014**	<0.010	**0.022**	**0.16**	**0.29**	<0.010	**1.6**	**0.014**	<0.010
		1.5	01/25/2017	<0.010	<0.010	<0.010	**0.052**	**0.014**	<0.010	**0.56**	<0.010	<0.010
Fairways	2:Fairway	0.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	4:Fairway	0.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	7:Fairway	0.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	11:Fairway	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	13:Fairway	0.5	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/25/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	16:Fairway	0.5	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/27/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	18:Fairway	0.5	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		1.0	01/26/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Soil Cleanup Level (MTCA Method B, CLARC Database)				**0.0625[a]**	**2.94[a]**	**0.556[a]**	**NVE**	**0.0588[a]**	**480[b]**	**0.0625[a]**	**24[b]**	**NVE**
Preliminary TEE Indicator Concentrations (WAC 173-340-900, Table 749-3)				**0.75**		**6**	**6**	**0.1**	**NVE**	**0.07**	**0.2**	**NVE**

Notes:

All results presented in milligrams per kilogram (mg/kg); all samples analyzed by EPA Method 8081.

Bold Bold results indicate that the compound was detected.

Shaded cells indicate that the compound was detected at a concentration greater than a cleanup level.

a Based on Model Toxics Control Act (MTCA) Method B (Cancer) Soil Cleanup Level; Cleanup Levels and Risk Calculations (CLARC) database.

b Based on MTCA Method B (Non-Cancer) Soil Cleanup Level; CLARC database.

TEE Terrestrial Ecological Evaluation.

WAC Washington Administrative Code.

NVE No value established.

Compounds:

4,4-DDE Dichlorodiphenyldichloroethylene

4,4-DDT Dichlorodiphenyltrichloroethane

B-BHC beta-Hexachlorocyclohexane

D-BHC delta-Hexachlorocyclohexane