July 12, 2021

Ministry of the Environment, Conservation and Parks
Drinking Water and Environmental Compliance Division
West Central Region
Niagara District Office

Linda Gabriel
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301 St. Paul Street
St. Catharines, ON, L2R 7R4

RE: Letter received from MECP dated June 10, 2021

Dear Linda,

A letter was received by Vale on June 10, 2021 sent by the Ministry of Environment, Conservation and Parks (MECP) via email. This letter was a continuation of the cooperative interaction between the MECP and Vale to progress the Port Colborne Community Action Plan (PCCAP). The letter was discussed in a telephone conference, and the information and data discussed and viewed are now appended to this written report.

Vale's commitment to completing the PCCAP was supported by the August 2020 response to MECP comments on the draft PCCAP. As noted in the August 2020 submission, Vale revisited the science within the CBRA and identified areas where the science had evolved. While the science has been refined, the exposure reduction measures planned within the PCCAP are still to be offered to all stakeholders as envisioned in the earlier stages of the PCCAP. Some of these actions relate to further studies on woodlot health and aquatic toxicity, while others are related to stakeholder engagement and exposure reduction practices. As per the referenced June 10 letter, the status of many of the actions is detailed herein.

Communications Plan

The details of the Communications Plan have been reviewed by the MECP. The website to access the PCCAP documentation is in the planning stages and document uploads will begin later this summer. In light of the provincial COVID-19 public health guidance, there will not be a Vale Open House in 2021.

Human Health

1. A.

Gravel

Gravel driveway installations were completed in the summer of 2020. There were eight properties where the existing parking pad was excavated, and a granular A-stone driveway installed. During site visits, the parking pads were observed to be on soil, or stone impregnated into soil, as described on the individual site journals. In conversation with residents, the driveway was one of the common areas of dust generation and soil tracking into the home. The gravel was laid at depths between 30 cm and 45 cm depending on the substrate. The greater depths were applied where soil organic content was high and a thicker bed of gravel was required to support vehicular traffic.

Bare Soil / Sod

Vale will accept the MECP guidance to apply 0.15 to 0.20 m of topsoil prior to the application of hydroseed or sod. Either hydroseed or sod will be used to cover areas where bare soil is exposed. The vegetated bed will assist in reducing exposure to the underlaying soil. If the addition of the new topsoil creates a mound in the yard, an appropriate amount of the existing soil bed will be removed prior. The exchange or replacement of the thin layer of topsoil will only be performed where a lack of vegetative cover is not a result of shade or due to material storage. In cases where shade may be the reason for thin sod growth, an appropriate shade-tolerant sod will be applied on the existing soil. A more robust layer of grass or other vegetative cover will limit the exposure to bare soil. By limiting direct exposure, the likelihood of tracking soil into the home is reduced.

Gardens

During site visits in 2019, Vale identified one residence which had a vegetable garden. In 2020 that garden had been removed as the homeowner was not interested in gardening. If additional vegetable gardens are identified during site visits in 2021 an offer will be made to replace 45 cm of soil from the existing garden area and replace with suitable gardening soil. The MECP reference to a 1.0 m of clean cap is not applicable to this situation as the CBRA metals are not underlaying the garden. A depth of 45 cm adequately removes the average shovel depth of soil that has been turned. Test pit work performed as part of the CBRA identified the nickel concentration to be significantly reduced at and beyond 30 cm. Therefore, in an abundance of caution the exposure reduction measure of garden soil replacement will be 45 cm depth for existing gardens.

1.B. Stakeholder Comments

The comments from residential stakeholders at the time of the site visits have been documented on each property journal and provided to the MECP under separate cover. The vast majority of engagements with PCCAP stakeholders, both residential and agricultural, have been positive and appreciative. Reviewing the Site Journals directory, Vale is now aware that a journal entry was not created for residential stakeholders that denied property access or chose to not be part of the PCCAP. Journals with comments will be developed for those properties (three) once it is determined that the same persons reside at the residences. If the property owner has changed, a new Site Journal will be created. All other comments are documented in the individual Site Journals so that the MECP can view the comments and the associated individuals.

1.C. Playgrounds and Schools

On multiple occasions in 2019, 2020 and 2021 Vale has visited playgrounds and schools in the vicinity of PCR to assess the condition of the grounds with the intent of identifying the groundcover in the area of the playground and the condition of that cover.

Figure 1 – Playgrounds and Schools

- A- East Village Park
- B- Fireman's Hall / DeWitt Carter School Park
- C- Lock 8 Park
- D- Ecole St. Joseph School
- E- St. Therese School
- F- Johnston St. Park

Each of the playgrounds visited were in the area referenced in the CBRA. Only Playground A is within the vicinity of the PCCAP, however each of the playgrounds were visited for assessment at the request of the MECP. Playgrounds A, C and F are maintained by the City of Port Colborne Parks Department (CPC), while Playground B belongs to the District School Board of Niagara, Playground D belongs to MonAvenir Catholic School Board, and Playground F belongs to Niagara Catholic Separate School Board.

In consultation with CPC, the playgrounds at East Village Park and Johnston Street Park are at the end of their normal service life. Vale has been in communication with the previous and the current Parks Managers as the City embarks on a Capital Replacement Plan for these two parks. Vale has requested to be informed of the CPC replacement decision so that there is opportunity for Vale to support initiatives

to reduce exposure to bare soils. Support could include excavation and backfill with new soil, or potentially using rubber or plastic mats in areas where soil exposure is common. As of July 2021, the CPC budget request for park capital costs is planned for 2022, however, Vale has offered its support for the existing playgrounds, as well as the potential redevelopment plans.

East Village Park

145 Welland Avenue

This playground is located on Welland Street, north of Nickel Street. There is a substrate of woodchips on the playground surface, however it was observed that this is a relatively thin layer, that was easily moved to expose underlaying soil. Through discussion with CPC staff it is believed that soil was imported during construction of the playground in 2007, however no construction details could be found. It is thought that the soil excavated for the playground forms the berm that is on the east side of the park, with imported soil being used to backfill prior to application of the woodchips. The area beneath the swingset was seen to have exposed soil most frequently. The CPC maintains this playground on a monthly basis or when a complaint is received. Additional maintenance occurs during the summer months when students are employed to remove weeds at parks. Playground maintenance includes the application of new woodchips or raking the surface to infill exposed soil areas.

Picture A1 -East Village Park playground

Picture A2 - East Village Park playground, worst case soil exposure, viewed December 2020

Fireman's Hall / DeWitt Carter School Playground

435 Fares Street

This playground is located on Fares Street, north of Bell Street. There is a thick layer of woodchips on the playground surface, which appeared to remain intact, not exposing underlaying soil at any time that site visits occurred.

The playground is maintained by the school/ grounds maintenance support.

Picture B- Playground serving the elementary grades of DeWitt Carter School.

Lock 8 Gateway Park

163 Mellanby Avenue

This playground is the furthest from Vale, located on Mellanby Avenue, south of Main Street. There is a thick layer of woodchips on the playground surface which, during site visits, was not observed to be disturbed to expose underlaying soil. Ruts that were present beneath swings did not pentrate through the woodchip layer. The playground is maintained by the CPC.

Picture C – Lock 8 Park

Ecole Elementaire Catholique Saint-Joseph
210 Elizabeth Street

This playground is located on Elizabeth Street, north of Killaly Street. The playground for elementary students is asphalt paved in some areas, and sod covered on the other half. The playground is maintained by the school/ grounds maintenance support. There was no indication of bare soil exposure in the sod covered area during site inspections.

Picture D – Playground for early years children at Ecole Saint Joseph

Saint Therese Catholic Elementary School
530 Killaly Street East

This playground is located at the rear of the school on Killaly Street, east of James Avenue. There is a thick layer of woodchips on the playground surface, which appeared to remain intact, not exposing underlaying soil at any time during which site inspections were made. The playground is maintained by the school/ grounds maintenance support.

Picture E – Playground for elementary grades at St. Therese School

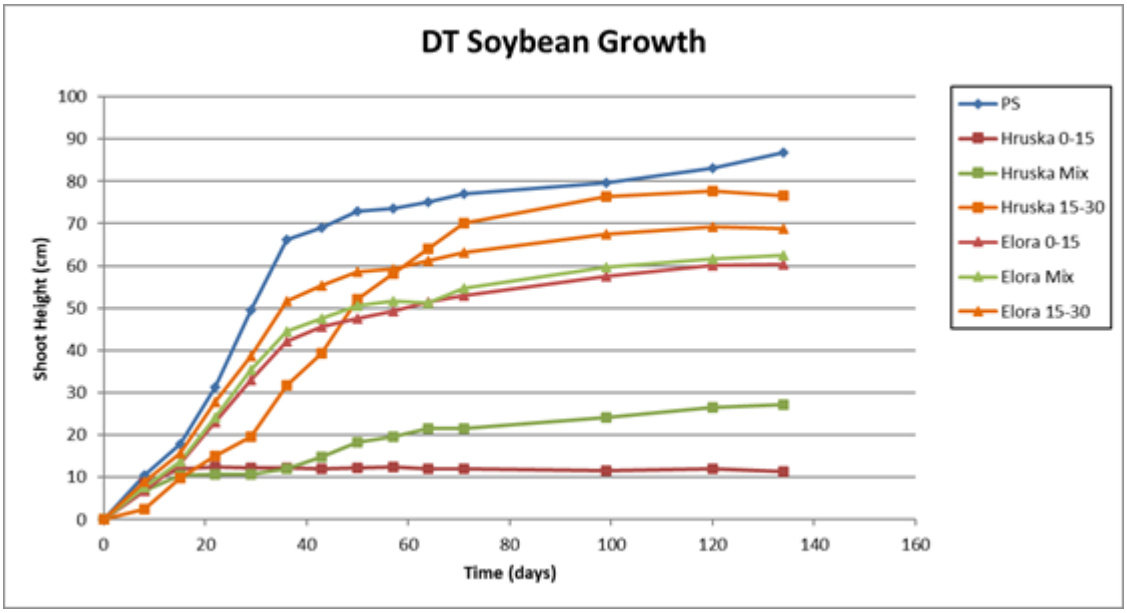
Natural Environment

2.A Crops

i) Professor Hale has submitted her NSERC report to Vale, which has been provided to MECP, and is attached in this email. While professor Hale is working on manuscripts for publication, the timeline for publication is unknown. Vale has received various preliminary reports from Dr. Hale, which have been used to guide the approach to agricultural remediation. The Report on Progress (attached) that Dr. Hale has submitted to Vale provides a summary of the five objectives that her work focused on. A brief description of each is included below.

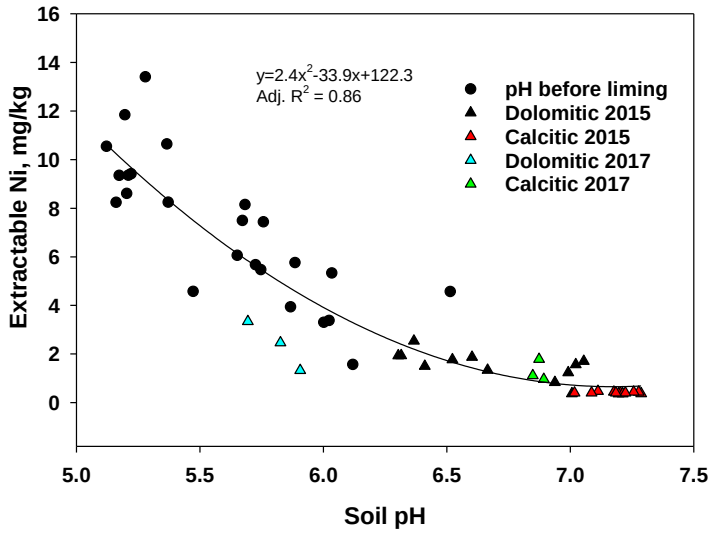
Regarding deep tilling, a 134-day lab incubator experiment was conducted using a contaminated Port Colborne soil and an uncontaminated soil (Elora soil) in which surface soil (0-15 cm) and deeper soil (15-30 cm depth) (the Port Colborne contamination is generally evident to an approximate 30 cm depth) were tested individually and with an equal-part mixture of 0-15 and 15-30 cm soil (to simulate mixing that would occur in deep tilling). The following figure illustrates the results. Deep tilling could work to distribute the metal contamination, but in discussions with agronomists and soil scientists, Vale was discouraged from large-scale deep tilling because some felt that it would permanently destroy the soil for agricultural use. As part of the PCCAP outreach with agricultural property owners, the option was discussed and local farm operators also felt that deep tilling was not viable. At farmlands along the Highway #3 corridor, the soil depth was felt to not be adequate to till at the depth performed in the

study. It was also felt that years or decades spent tilling the soil, which is primarily on a clay bed, would be undone by introducing unworked material from depth. As a result, Vale does not consider this approach a viable remediation option.



Regarding phytoremediation, the paper titled "Modeling phytoremediation of aged soil Ni from anthropogenic deposition using *Alyssum murale*" (Dehghani et al. 2020) was produced by Dr. Hale's lab group. It demonstrated that phytoremediation was not realistically practical, in spite of early promise. The peer-reviewed publication is attached to this email. Vale decided against attempting phytoremediation on agricultural soils of Port Colborne.

Regarding liming, Professor Hale is working on manuscripts for publication. The timeline for publication is uncertain as it is dependent on Dr. Hale's progress. Vale has received various preliminary reports from Dr. Hale, which have been used to guide Vale's approach to agricultural remediation. Although the increased pH associated with the lime additions did reduce extractable Ni in the soil, the lime application is so large that it has negative effects, including soil compaction, and the potential loss of crops for at least one growing season. Vale believes that 50-80 tonnes of lime per hectare is not an appropriately scaleable solution for the real world and has decided against such actions. This option was also discussed with agricultural practitioners within the PCCAP. The local community did not see value in altering their fields to the extent of applying 50-80 tonnes of lime.



Vale's decisions have been made without full peer-reviewed publications on these three potential agricultural remediation approaches. It is Vale's opinion that the decisions on the considered options were of a nature that did not require peer-reviewed publications.

ii) The potential to perform yield studies is currently under review. As the external lands that PCR owns do not have value to the operations, many of them are in the process of disposition. Currently there are sales agreements for all properties north of Killaly Street. These properties were the agricultural fields where Dr. Hale had performed her work. The agricultural fields south of Killaly St. have not been worked for several years and so Vale is first reviewing with area farmers what can be done on the fields, and what is required to bring them to a productive state. If feasible, Vale will then attempt to procure the service of a farmer to grow a crop from which yields can be determined, such as winter wheat or soy-corn rotation in the spring. The feasibility of performing a yield study will be determined by September 2021, and the study design will occur thereafter.

iii) Soil mapping has occurred on Vale-owned agricultural parcels. The fields mapped thus far are those that have higher concentrations of metals which will allow for a more thorough comparison of results to the general mapping. This comparison will assist in designing a field plan for other agricultural fields, with respect to spacing (number of samples). If mapping is warranted, it will not be performed until the current crops are harvested, likely late fall. This will allow for easier access across the fields and reduce the risk of harming the current crop by trampling. The soil mapping data that will be used to design the future scope was retrieved from the following locations:

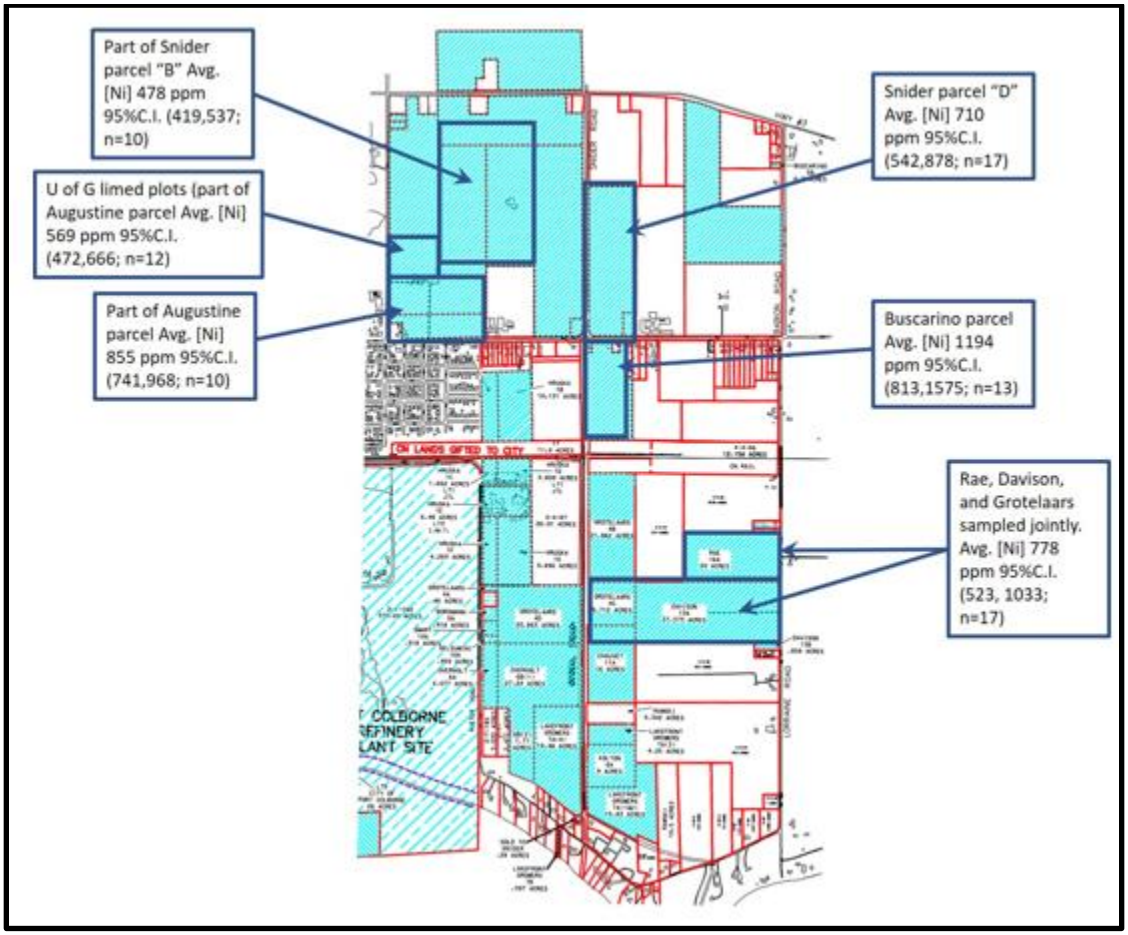


Figure 2: Soil mapping exercise on Vale owned properties

2.B Risk based soil concentrations for vegetation in non-agricultural areas

i and ii) Vale has committed to report on the SSDTLs in the first annual PCCAP report. This document will be prepared and delivered at end of 2021.

2.C. Best Management Practice for growing ornamentals

A guidance document will be prepared to provide insight to growing ornamental plants in the presence of elevated metals. The document will be submitted to the MECP by August 28, 2021 and will also be posted on the PCCAP internet site and be part of the communications plan.

2.D Copper Sensitive Pet Assessment

A guidance document following a structure and intent similar to the guidance document generated for Chronic Copper Poisoning in Sheep will be developed for copper sensitive pets. This guidance document will be prepared with reference to publications independent of the CBRA. The document will be submitted to the MECP by August 28, 2021 and will also be posted on the PCCAP internet site and be part of the communications plan.

2.E Woodlot

i) Vale has procured the services of the ecological study group North-South, as well as BPA Limited (M. Dutton). The woodlot health assessment is being undertaken by North-South in addition to a spring flora survey, breeding bird survey, and amphibian survey. Vale reported soil microbial biomass and fungal/microbial ratios in the February 2021 quarterly call. At the time, the microbial biomass

measurements showed no relationship to increasing soil Ni concentration. BPA proposed to discontinue that line of study. However, North-South ecologists indicated that the woodlot soils appeared to have significant fungal activity, and appeared normal. The elevated forest litter seen in the Reuter Road woodlots is the presumed natural state for Carolinian hardwood forests before earthworms were introduced to southern Ontario soils. Impaired litter decomposition seems to be related to impaired earthworm populations due to the metal toxicity rather than impaired microbial populations (at least the preliminary soil microbiometer data are suggestive of that reality). The microbial biomass in these forest soils will be examined more thoroughly over the next year in an attempt to understand the leaf litter/earthworm relationships in more detail.

ii) There is currently a gate at the single driving access point to the woodlot on the east side of Reuter Road. The majority of the northern boundary is fenced as the operational area of a heavy industrial property. The eastern limit is bound by the Wignell drain. There are currently signs posted prohibiting access. Vale will review with its legal department if the entire woodlot perimeter must be fenced. This would impede trespassers onto the site but will also block movement of mammals and amphibians in this natural and naturalizing setting.

iii) Vale will review with its legal department if registration on title is required. While Vale is divesting of properties external to the Port Colborne Refinery, this will not occur for the woodlot.

2.F Aquatic Environment

A Preliminary Aquatic Survey Report has been prepared by BPA and is being submitted along with this transmission. The results of the work to date were presented to the MECP during the June teleconference and are detailed in the report. The report will also be posted onto the PCCAP website.

3 Communication Plan

Vale remains committed to the Communication Plan as described. Guidance material regarding items listed in a. i through vi may be a collection of public resource documents as well as documents prepared specific to the PCCAP.

4 Stakeholder Engagement

During the launch of the PCCAP a meeting with the local financial institutions was hosted by Vale and attended by the MECP's Kim Groombridge. Local bank branch attendants voiced their challenges with their underwriters and various mortgage insurance companies, who previously had used environmental criteria to deny coverage to their prospective clients. One mortgage insurance brokerage was also in attendance at this meeting and conversations with Genworth Capital continued following the meeting. Having a greater understanding of the perceived impediment in the vicinity of PCR, various banks reached out to Vale on case by case concerns. The requests made to Vale subsided to a point where no contacts were made in 2020. However, as the real estate market in south Niagara is gaining competitiveness, concerns regarding environmental condition have returned. Between June and thus far in July there have been 4 real estate concerns brought to Vale's attention, and at least one also contacted the MECP. It appears as though Vale's confirmation that the engaged property is not the outstanding property of the Control Order, and that Vale is working cooperatively with the MECP, is sufficient to allay their concern at this time. Vale has been approached by both potential purchasers of property and by financial institutions to inquire about the CBRA and specifically about their property.

Vale has been in contact with both Enbridge Gas Company and Hydro One as they planned project work in the vicinity of Port Colborne Refinery (PCR). Both companies were aware of the presence of elevated metals and so the context of the conversation was with respect to additional health and safety precautions they would be required to put in place when performing excavation or subterraneous work. It was determined that the company's personal protective equipment guidance (gloves, separate eating area) that was already in place were adequate, and no added precautions for their employees were required. The Hydro One excavation in the northwest corner of PCR also enacted a dust control procedure and track-out mitigation as part of their internal obligations for a construction project.

Vale is committed to the PCCAP that was cooperatively developed with the MECP. This document is a response to the MECP Letter dated June 10, 2020 continuing the nature of working together in full transparency. This document and its attachments will be posted to the PCCAP internet site. If you have additional questions or require clarification of any of the information contained in this document please feel free to reach out to me.

Best Regards,

Eric Azzopardi

Encl: -Report on Progress CRDPJ 537287 (Dr. Hale, 2018)
-Modeling phytoremediation of aged soil Ni from anthropogenic deposition using *Alyssum murale*" (Dehghani et al. 2020)
-Preliminary Aquatic Survey Report (BPA, 2021)