UPPER COLUMBIA RIVER

FINAL
Final Data Summary Report for the Soil Amendment Technology Evaluation Study

Prepared for

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ACRONYMS AND ABBREVIATIONS

ALS	ALS Laboratory Kelso
Arcadis	Arcadis U.S., Inc.
CAS	Chemical Abstracts Service
CCT	Confederated Tribes of the Colville Reservation
CI	confidence interval
COC	chain of custody
CVAA	cold vapor atomic absorption
df	degrees of freedom
DQO	data quality objective
DSR	data summary report
EDTA	ethylenediaminetetraacetic acid
EPA	U.S. Environmental Protection Agency
ESI	Environmental Standards, Inc.
EXAFS	extended x-ray absorption fine structure
FSR	Field Summary Report
GC/MS	gas chromatography/mass spectroscopy
IC	incremental composite
ICP-AES	inductively coupled plasma - atomic emission spectroscopy
ID	identification
ITRC	Interstate Technology and Regulatory Council
IVBA	*in vitro* bioaccessible
J	quantitation is approximate due to limitations identified during the QA review
J-	quantitation is approximate, but the result may be biased low
J+	quantitation is approximate, but the result may be biased high

K-jarosite	potassium-jarosite
KCl	potassium chloride
MDL	method detection limit
ME	monitoring event
na	not available
NA	not applicable
ns	not sampled
OSU	The Ohio State University
PVP	polyvinylpyrrolidone
QA	quality assurance
QC	quality control
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RI/FS	remedial investigation and feasibility study
RL	reporting limit
RPD	relative percent difference
SATES	Soil Amendment Technology Evaluation Study
SE	standard error
SM	Standard Method
SOP	standard operating procedure
SPLP	synthetic precipitation leaching procedure
Std. Dev	standard deviation
TAI	Teck American Incorporated
TAL	target analyte list for metals analyses
TER	treatment effect ratio
U*	the analyte should be considered "not-detected" because it was detected in an associated blank at a similar level

U	the analyte was not detected at or above the associated detection limit
UCR	Upper Columbia River

UNITS OF MEASURE

°C	degree(s) Celsius
g	gram(s)
gal	gallon(s)
in.	inch(es)
kg	kilogram(s)
L	liter(s)
lb	pounds
mg	milligram(s)
mg/kg	Milligram(s) per kilogram
mg/L	Milligram(s) per liter
mL	milliliter(s)
mm	millimeter(s)
µm	micrometer(s)
µS/cm	microsiemens per centimeter

1 INTRODUCTION AND BACKGROUND

This report summarizes all phases of work (Phases I to IV) and results from the Upper Columbia River (UCR) Soil Amendment Technology Evaluation Study (SATES) conducted at the UCR site (hereafter, the Site[1]) in northeastern Washington state. SATES has been conducted as part of the UCR remedial investigation and feasibility study (RI/FS) that Teck American Incorporated (TAI) is conducting under U.S. Environmental Protection Agency (EPA) oversight, as required by the Settlement Agreement for implementation of the RI/FS (agreement dated June 2, 2006; USEPA 2006). The overall objective for SATES is to identify, evaluate, and test potential soil treatment technology options that may be effective in reducing health risks from human exposure to lead-contaminated soil at the Site.

The majority of work completed for SATES was performed on behalf of TAI by Ramboll and The Ohio State University (OSU), with some additional technical studies performed by EPA's Office of Research and Development (ORD). Additionally, all the work completed was performed in collaboration and consultation with EPA's Region 10 oversight personnel and ORD, as well as representatives of the Confederated Tribes of the Colville Reservation (CCT), Spokane Tribe of Indians, National Park Service (U.S. Department of the Interior), Washington Department of Ecology (Ecology), and Citizens for a Clean Columbia (CCC) — together, the SATES technical team.

This report presents an overview of the methods and results for the entire study, the statistical analysis of Phase IV field monitoring data (incremental composite soil sampling results), and the data and statistical analysis for depth-discrete soil samples that were collected at the end of the Phase IV. The work described herein was performed in accordance with the following EPA-approved documents that detail the scope of work, methods, procedures, and other requirements for SATES:

- *Final Work Plan for the Soil Amendment Technology Evaluation Study Phase I: Test Plot Characterization and Initial Amendment Alternatives Evaluation* (hereinafter the Phase IA Work Plan; Ramboll 2017a)
- *Addendum - Soil Amendment Technology Evaluation Study (SATES) Final Work Plan for The Soil Amendment Technology Evaluation Study, Phase I: Test Plot Characterization and*

[1] The Site as defined within the June 2, 2006, Settlement Agreement is the areal extent of hazardous substances contamination within the United States in or adjacent to the Upper Columbia River, including the Franklin D. Roosevelt Lake, from the U.S. - Canada border to the Grand Coulee Dam and those areas in proximity to the contamination that are suitable and necessary for implementation of response actions.

Initial Amendment Alternatives Evaluation (hereafter the Phase IA Addendum; Ramboll 2017b)

- *Phase IB: Soil Amendment Technology Evaluation Study (SATES) Soil Amendment Technology Screening and Design* (hereafter the Phase IB Work Plan, 2019a)
- *Final Work Plan for Soil Amendment Technology Evaluation Study (SATES), Phase II: Bench-Scale Treatability Testing* (hereinafter the Phase II Work Plan; Ramboll 2019b)
- *Work Plan for the Soil Amendment Technology Evaluation Study Phase II: Bench-Scale Treatability Study Soil Collection* (hereafter the Soil Collection Work Plan; Ramboll 2018)
- *Final Soil Amendment Technology Evaluation Study Phase III & IV Work Plan: Test Plot Field-scale Implementation & Test Plot Monitoring* (hereafter the Phase III & IV Work Plan; Ramboll 2020), including Change Requests 1 through 4 that were approved during Phases III and IV work.
- *Final Soil Amendment Technology Evaluation Study Phase III & IV Work Plan Addendum: Depth-Discrete Sampling Plan* (hereinafter the Depth-Discrete Sampling Plan; Ramboll 2023a)

Previous SATES reports include the following:

- *Final Data Summary Report for the Soil Amendment Technology Evaluation Study Phase I: Test Plot Selection and Characterization* (hereafter Phase IA DSR; Ramboll 2019c)
- *Final Data Summary Report for the Soil Amendment Technology Evaluation Study Phase II: Bench-Scale Treatability Testing* (hereafter Phase II DSR; Ramboll 2021)
- *Draft Interim Data Summary Report for the Soil Amendment Technology Evaluation Study Phase III: Test Plot Field Implementation Phase IV: 2021 Test Plot Monitoring* (hereafter 2022 Phase III and IV IDSR; Ramboll 2022a)
- *Draft 2021 Field-Scale Statistical Analysis Technical Memo for the Soil Amendment Technology Evaluation Study* (hereafter the Statistical Memo; Ramboll 2022b)
- *Draft Interim Data Summary and Statistical Report for the Soil Amendment Technology Evaluation Study Phase IV: 2022 Test Plot Monitoring* (hereafter 2023 Phase IV IDSR; Ramboll 2023b)

Digital copies of these reports can be found in the UCR RI/FS project database, accessible to registered users at: http://teck-ucr.exponent.com/sates/document_list.

1.1 BACKGROUND

The background, purpose, and description of the SATES program are detailed in the Phase I and Phase II Work Plans (Ramboll 2017, 2019). The overall SATES objective was to identify and field test soil amendment technology or technologies that could appropriately and cost-effectively reduce the long-term potential for human exposure to lead in surficial and shallow soils in the UCR area (USEPA 2016). Reduction of the long-term potential for human exposure to lead in surficial and shallow soils may be accomplished by one or more of the following results:

- Reducing bioaccessibility of lead in soil by chemical sequestration
- Reducing lead mobility and leachability in soil by increasing soil pH
- Increasing vegetation cover in a manner that reduces the potential for direct human exposure and reduces erosion and transport of affected soil
- Increasing the thickness of the humus barrier over the lead-bearing soil
- Improving soil structure in a manner that reduces the potential for erosion and transport of affected soils.

Although a primary focus was on reduction of lead exposure and bioavailability, the study also evaluated the effects of the soil amendments on co-located arsenic and other metals in soil.

The SATES program was designed to be implemented in four phases, with the scope and design of each phase being dependent upon the outcomes of the preceding phases, as follows:

- Phase I – Test plot characterization and amendment alternatives screening
  - Phase IA – Test plot screening and selection (Part 1) and baseline soil characterization (Part 2)
  - Phase IB – Soil amendment technology screening and design
- Phase II – Bench-scale treatability studies
- Phase III – Test plot field implementation
- Phase IV – Test plot monitoring.

The field treatability testing (Phases III and IV) took place at specific locations (test plots) on three tribal allotments owned by members of the CCT. The test plots are in areas referred to as decision units (DUs) within the tribal allotments that were sampled during the 2014 residential soil sampling study; results from that study are summarized in the UCR Residential Soil Study Field Sampling and Data Summary Report (CH2MHILL 2016). All SATES field activities conducted by TAI on the allotments, including the amendment application and soil sample collection tasks described in this report, are covered by a right-of-way permit issued by the Bureau of Indian Affairs in August 2017 and a research permit granted by CCT, also issued in August 2017.

The test plots were located on 2014 residential soil sampling study DUs 258, 401, and 441 (see Map 1-1) and, for the purpose of SATES, designated as test plots 258-3, 401-1, 401-2, 441-1 (Maps 1-2, 1-3, and 1-4). The test plot sampling and selection criteria are described in Section 4.3.1.1 of the Phase I Work Plan (Ramboll 2017a), and the baseline test plot characterization results along with the recommendation to focus the remaining work for the study (Phases II, III, and IV) on these four test plots are documented in the Phase IA DSR (Ramboll 2019c).

Soil amendments were selected for field treatability testing based on their performance in Phase II bench-scale tests and with stakeholder input as described in the Phase III & IV Work Plan (Ramboll 2020). The amendment selection process, which included the elimination of ineffective or undesirable amendments, was conducted jointly by TAI, EPA's Office of Research and Development, and other SATES technical team members in Spring 2020, as discussed in Section 2.1 of the Phase III & IV Work Plan (Ramboll 2020).

Amendment application (Phase III) was initiated in late October 2020 and completed in April 2021. To monitor amendment effects over time (Phase IV), soil samples were collected from the test plots in a series of monitoring events in accordance with the Phase III & IV Work Plan (Ramboll 2020). This included three monitoring events in May, July, and October 2021, referred to as monitoring events 1, 2, and 3 (ME1, ME2, and ME3, respectively), three in May, July, and October 2022 (ME4, ME5, and ME6, respectively), and a final soil sampling event in May 2023. Soil sampling methods, analyses, and results are summarized in Section 4 of this report.

In addition to soil sampling and analysis, periodic vegetation monitoring was conducted on the test plots by CCT to evaluate whether and how soil amendments affected plant density and diversity. Vegetation monitoring began in August 2017, prior to soil sampling for Phase I, and continued through Phase IV. Vegetation monitoring thus included several years of baseline data prior to soil amendment application (2017-2020), as summarized in the Baseline Vegetation Monitoring report (CCT 2018), and three years of post-amendment application monitoring data (2021-2023), which are summarized in annual vegetation monitoring reports (CCT 2021, CCT 2022, CCT 2023). Vegetation reports are available to registered users at https://www.ucr-rifs.com/. In most years, sampling was conducted during the spring, summer, and fall to record vegetation throughout the seasonal growth period. A statistical analysis of vegetation data will be provided in an addendum to this DSR.

This report summarizes the Phases III and IV field-scale test design, sample collection, test procedures (i.e., field procedures, laboratory analytical procedures, quality assurance and quality control [QA/QC]), and monitoring results. The statistical analysis, results, and discussion in this DSR focus on the incremental composite soil samples collected in 2021 and 2022 and the depth-discrete soil samples collected in 2023.

1.2 DATA QUALITY OBJECTIVES

The SATES data quality objectives (DQOs), developed by EPA (USEPA 2016), are provided in Appendix A of the Phase I Work Plan. The DQOs were used to guide development of work plans for each study phase, including the Phase III & IV Work Plan.

1.3 REPORT ORGANIZATION

This report is organized into the following sections:

Section 1 – Introduction and Background

Section 2 – Literature Review

Section 3 – Overview of Phases I-III: Methods and Results

Section 4 – Phase IV Test Plot Monitoring Methods, Statistical Methods, and Results

Section 5 – Results and Discussion

Appendices provided with this report contain additional supporting information, including a summary of the literature review, extended x-ray absorption fine structure (EXAFS) speciation (performed by the EPA's Office of Research and Development team members), field reports, data validation, laboratory reports, and statistical output reports (Appendices A, B, C, D, E, and F, respectively). Phase I and Phase IV data can be found in the UCR RI/FS project database, accessible to registered users at: http://teck-ucr.exponent.com.

2 LITERATURE REVIEW

In the past few years, soil remediation methods for reduction of lead *in vitro* bioaccessibility (IVBA) has been a topic of scientific interest because reducing lead concentrations in soil also reduces human exposure and health risks. To evaluate the most recent developments in this area and how they apply to SATES, experimental studies were identified using Google Scholar, from reference lists of relevant articles, and from other online searches. The literature search primarily targeted peer-reviewed articles published since 2017. Other technical reports, theses, and dissertations were considered if readily available.

A total of 20 soil remediation studies were identified. Traditional soil amendment materials that were available when SATES began and were used in the identified literature studies were phosphate, biochar, compost, iron, and aluminum. New 'green' (i.e., sustainable) materials used in the identified literature studies included bauxite refinery residue, potassium jarosite (K-jarosite) + ferric sulfate, and others. These new materials were either not available for inclusion when SATES began in 2017, and/or did not meet the criterion of being readily available to consumers (for example, ferric sulfate is readily available, but bauxite refinery residue and K-jarosite are not). In 2017, it was also not generally known how important soil pH was to reduction of lead IVBA. A recent review by Mayer et al. (2022) identified soil pH as one of the most important factors for success of phosphate soil amendments to reduce lead IVBA. Mayer et al. (2022) found that the addition of phosphoric acid lowered soil pH to between 3 – 6 in multiple studies, coinciding with significantly greater reduction in lead IVBA. Subsampled soils tested in the SATES bench tests were acidic, but field soils were less acidic overall, which could have contributed to differences between laboratory and field results of SATES.

Most of the 20 studies that were reviewed took place under laboratory conditions, so their applicability to the SATES field-scale test results is limited. However, the review did identify a study of biochars in greenhouse conditions (Janus et al. 2020), a study of compost in field conditions (Attanayake et al. 2017), and a study of compost and phosphate in field conditions (Li et al. 2021). Unfortunately, there were no studies in the recent literature like SATES that combined both laboratory and field analyses. As noted, there were only two field studies and, of those, the composition of soil treated by Attanyake et al. (2017) was dissimilar to soil at the UCR Site.

It is important to measure multiple parameters during soil amendment studies so that treatment efficacy and mode of action can be properly assessed. Parameters evaluated during the literature review included: amendment material used and application rate; treatment temperature and time; contamination source and total lead concentration; lead speciation in unamended soil; lead extraction method used; soil pH before and after treatment; soil cation exchange capacity and particle size; and soil moisture, clay, and organic carbon content.

Treatment effect ratio (TER) was used to assess the efficacy of soil amendment methods and is calculated as the ratio of lead IVBA in amended soil to lead IVBA in unamended soil. Lower TER values (generally < 1.0) indicate more effective lead IVBA reduction. Study design parameters and lead IVBA data from the 20 studies are tabulated in Appendix A.

The three amendments selected for field-scale application and testing for SATES were soluble phosphate, compost, and the combination of soluble phosphate and biochar, as specified in the Phase III & IV Work Plan. Therefore, the discussion below is focused on the efficacy and mechanism of soil amendments in the identified field studies that used phosphate and compost (Li et al. 2021). Also presented are the findings of an innovative EPA study using K-jarosite seeding paired with ferric sulfate, which has shown promising early results (Sowers et al. 2023).

2.1 PHOSPHATE COMPOUNDS

For a phosphate-based soil amendment, the solubility of lead and phosphate control the formation of insoluble lead-phosphate compounds, which decrease the amount of lead IVBA. When a soluble source of phosphate is used, lead dissolution from soil is the rate limiting step (Scheckel and Ryan 2002, Scheckel et al. 2013) and is dependent on the contamination sources, lead speciation in the soil, and other soil properties.

The recent studies in the literature review indicate that soluble phosphate amendments (especially phosphoric acid) generally reduce lead IVBA more effectively than insoluble phosphate amendments, and phosphate amendments are more effective when used in shooting range soils and soils near smelting operations because the lead contamination is primarily present in bioavailable fractions. Phosphate amendments are comparatively less effective when used in urban and agricultural soils associated with lead-based paint, lead arsenate-based pesticides, and leaded gasoline because lead in these soils is mainly sorbed to iron oxy(hydr)oxide and organic carbon in the soil, which limit lead dissolution from soil and the formation of insoluble lead-phosphate compounds (Mayer et al. 2022).

Li et al. (2021) conducted a field study with mining wastes (a mixture of tailings and chats), testing triple super phosphate (TSP) and five phosphate-enriched compost amendments including Mizzou Doo compost (a proprietary blend of animal waste, post-consumer paper, sawdust, and other patented ingredients), spent mushroom compost, turkey litter compost, composted chicken litter, and composted sewage sludge (biosolids). All tested amendments effectively reduced lead IVBA (TER = 0.022 – 0.035) after 8 to 10 years of treatment. The purpose of the study was to evaluate long-term stability and effectiveness of amendments, so lead IVBA was only measured after 8 years of treatment, and no data are available from earlier time points. The reduction in lead IVBA was accomplished by the formation of pyromorphite or pyromorphite-like minerals. Composted sewage sludge and spent mushroom compost were the most effective composts in lead IVBA reduction in that study.

Lead carbonate (no mineral named) was identified as the primary species present in the mining wastes treated by Li et al. (2021), which is relatively soluble and easy to react with the added phosphate to form lead-phosphate compounds. The chemical interaction between phosphate and lead carbonates in the Li et al. (2021) study could explain the significant reduction in lead IVBA that was not seen in the other phosphate amendment studies that were reviewed. Other factors that could have contributed to the high success rate of the Li et al. (2021) study in comparison to other studies may include the different contamination sources, lead speciation, and other properties of the treated soil, length of treatment period, as well as the *in vitro* extraction methods used.

In contrast to the soils evaluated in the Li et al. (2021) study, no lead carbonates were found in soil samples from all four SATES test plots in the x-ray absorption spectroscopy speciation analyses conducted by the EPA in 2017 (Scheckel et al. 2018). Instead, most samples were dominated by lead bound to organic matter (64 percent on average). In the EXAFS analyses conducted as part of SATES in 2023, which investigated lead speciation in soil at a single test plot (441-1), some subplots had 10 to 15 percent lead carbonate (as cerussite) after phosphate treatment (see Appendix B); however, most of the lead in that test plot's soils was present as mineral oxides (approximately 70 percent), which are considered less bioavailable than lead carbonate. Mineralogical analyses indicate that soil in test plot 441-1 may differ from the other test plots (Hazen 2018); and according to x-ray absorption spectroscopy speciation analyses, clay/oxide sorbed lead was more prevalent at test plot 441-1 compared to other test plots (50 percent on average vs. 36-43 percent at test plots 401-1, 401-2, and 258-3; Scheckel et al. 2018). However, based on the available data there is no evidence to indicate that lead carbonates are prevalent in soil in the SATES test plots (Appendix B, Scheckel et al. 2018). Therefore, the findings from the Li et al. (2021) field study may be of limited relevance to the UCR Site.

2.2 NEW MATERIALS

In addition to the traditional soil amendment materials discussed above, new technologies have been explored in scientific research, although most of them are still in the experimental stage. Some of the materials tested in more recent studies include: ball milling steel slag, bone meal, and phosphate rock powder; nanoscale zero-valent iron; modified bauxite refinery residue; flue gas desulfurization gypsum; and K-jarosite + ferric sulfate. Of these, the K-jarosite amendment appears the most promising based on early laboratory testing results. Many of these new materials are considered sustainable because they repurpose industrial byproducts that would otherwise be disposed of.

Sowers et al. (2023) used 0.8 – 3.3 percent K-jarosite seeding paired with ferric sulfate under water-saturated conditions to amend soils contaminated by lead arsenate-based pesticide (lead primarily adsorbed to iron oxides) or historical zinc smelter deposition (lead primarily adsorbed to hydroxyapatite). This new soil amendment technology resulted in successful lead IVBA reduction (TER = 0.085 – 0.83) within 16 hours of treatment through formation of iron-hydroxysulfate minerals (i.e., plumbojarosite) that are stable at acidic conditions (i.e., pH 1.5 – 3.0) such as those found in human digestive systems. While soils with higher total soil lead concentrations (> 2,000 milligrams per kilogram [mg/kg]) may require heating to 40 °C or a longer reaction time, the study results suggested that contaminated soils with relatively lower total lead concentrations (< 1,000 mg/kg) could require less stringent reaction conditions (e.g., room temperature). In addition, long-term stability and continued formation of plumbojarosite after pH adjustment to environmental conditions (pH 6 – 8) were achievable for at least nine months (TER = 0.028 – 0.13).

Addition of K-jarosite has the potential to maximize lead IVBA reduction. This is because lead has the potential to participate in substitution reactions with jarosite-group minerals (Aguilar-Carrillo et al. 2018, Frost et al. 2005a,b), and the presence of K-jarosite promotes seeding effects by acting as a nucleation site to increase jarosite mineral formation (Dutrizac et al. 1980, Dutrizac 1996, Dutrizac and Jambor 2000).

Treatments with ferric sulfate in the absence of K-jarosite seed were considerably less effective (TER = 0.41 – 0.96) than treatments where K-jarosite seed was present. K-jarosite treatment is substantially more effective than other common alternatives (e.g., phosphate-based treatments). It is also an option that effectively treats both lead and arsenic in soil. Field application of K-jarosite treatment is being conducted by EPA to evaluate reaction parameters (e.g., longer reaction periods at normal soil temperatures) and lead stability in natural environments and with soils of diverse mineralogy and chemistry. Additionally, EPA is conducting laboratory tests of K-jarosite treatment on UCR soils (among others) from test plots used in SATES. However, results from that work are not yet available.

2.3 SUMMARY

Since SATES began in 2017, research and testing of traditional soil amendment materials and some new materials has continued, providing new insights into their effectiveness in remediating lead-contaminated soils, with a focus on reducing lead IVBA to decrease human exposure and health risks.

Phosphate-based soil amendments have been studied the most with variable experimental results highly dependent on soil contamination sources, lead speciation, soil properties, pH, and *in vitro* extraction methods used. These amendments may also require considerable treatment time to significantly reduce lead IVBA. As highlighted by Li et al. (2021), a phosphate amendment is more likely to reduce lead IVBA when soluble phosphate is added to soils with lead primarily present in bioavailable fractions.

As to other traditional materials, biochar amendments tested in recent studies generally show slight or modest effectiveness in lead IVBA reduction. Iron oxide amendments did not have significant impact on lead IVBA in urban soils or soils affected by mining and smelting activities. Compost amendments had limited effectiveness in urban soils, but phosphate-enriched compost amendments could effectively reduce lead IVBA in soils with lead carbonate identified as the primary species (Li et al. 2021). However, UCR Site soils analyzed by EXAFS were found to contain lead mostly present in the less bioavailable mineral oxide forms, so the Li et al. (2021) study is difficult to extrapolate to the UCR Site.

Some of the new materials that have been tested provide promising results not only for significant reduction in lead IVBA but also for their sustainable characteristics. K-jarosite seeding paired with ferric sulfate is the best example among such materials in studies reviewed. The contamination source (smelter) and lead speciation (primarily lead adsorbed to hydroxyapatite) in one of the soils tested by Sowers et al. (2023) is comparable to the UCR Site. While K-jarosite has been previously tested with soil suspensions, Sowers et al. (2023) is the first study conducted with typical soils.

Most soil remediation studies with traditional materials and all of the soil remediation studies that tested new materials were conducted under laboratory conditions. To facilitate comparisons across different remediation technologies, a set of minimum reported data (e.g., contamination source, lead speciation in soil, soil properties including pH) should be included in published studies and standardized *in vitro* extraction methods validated against *in vivo* assays are needed. Long-term field studies are also required to extrapolate the results observed in laboratory studies to real natural environments with different climates and soils of diverse mineralogy and chemistry.

3 OVERVIEW OF PHASES I – III

As noted in Section 1.1, SATES has been conducted in four phases. Phase I addressed selection of the appropriate field test plots for pilot testing of the selected soil amendment technology options, characterization of those plots, and screening of the available options that were later evaluated as part of bench-scale testing (Phase II). Phase II involved laboratory bench-scale testing of the amendment options selected in Phase I. Following completion of Phase II and based on the results, three amendments were selected for field application in Phase III, which consisted of applying the selected amendments to the field test plots. Assessment and characterization methods utilized in Phases I through III are further discussed in this section. Phase IV methods are presented in Section 4.

3.1 PHASE I: TEST PLOT CHARACTERIZATION AND AMENDMENT ALTERNATIVES SCREENING

Field observation, sample collection, and analysis were used to characterize soil conditions at each plot for the study. The soil sampling process in Phase I of the study included two phases of field sample collection: 1) initial test plot screening and 2) baseline test plot characterization.

3.1.1 Phase IA Soil Screening and Characterization

In Phase IA, soil sampling was completed to provide a comprehensive understanding of the soil chemical, mineralogical, and physical properties at six test plots located on three tribal allotments. The purposes for this phase, which was conducted in two parts, were to: 1) identify the characteristics that will affect amendment performance and inform the design of appropriate soil amendment options for pilot testing (Part 1); and 2) establish the baseline conditions at each test plot (Part 2). Data collection and analysis methods are detailed in the Phase I Work Plan, the Phase I Work Plan Addendum, and the Phase IA DSR (Ramboll 2017a, 2017b, 2019c), and in supporting mineralogical analysis reports (Hazen 2018, Scheckel et al. 2018).

3.1.1.1 Screening

Initial screening was conducted on six test plots within DUs 258, 401, and 441.[2] The purpose of this screening was to identify the distribution of lead and arsenic concentrations in surficial and shallow soil across each test plot, soil pH values, and forest litter (duff) thicknesses. The results of the initial screening showed that lead and arsenic concentrations varied widely between samples, even within close distances, but that some of the test plots had higher lead concentration than others. Based on the results, the four test plots with higher concentrations of lead (258-3, 401-1, 401-2, and 441-1) were selected for the additional baseline characterization in Phase IA Part 2 and later field-scale testing of the different soil amendments. The locations of the final four test plots are shown in Maps 1-1, 1-2, 1-3, and 1-4.

3.1.1.2 Characterization

For the baseline characterization, the test plots were subdivided into four subplots of equal size. This part of the study involved depth-discrete soil sampling and analysis, incremental composite (IC) sampling and chemical analysis of two soil size fractions (< 2 millimeter [mm] and < 150 micrometers [µm]), soil profile analysis and classification by a soil scientist, analysis of soil physical properties (grain size, bulk density, and permeability), and mineralogical analyses of select samples. The soil classification, sampling, and analysis methods and results are detailed in the Phase IA DSR (Ramboll 2019c).

3.1.2 Phase IB Soil Amendment Technology Screening and Design

The soil amendment qualities that were evaluated in advance of the Phase II bench tests, in order of importance, include the ability to: 1) reduce lead bioaccessibility; 2) improve vegetative barrier through improved soil quality or improve soil structure to reduce mobility of contaminated soil at the surface; and 3) establish a physical barrier to exposure to soils with elevated lead concentrations (Ramboll 2019a). The decision basis for each of these criteria for selecting amendments to advance to the bench testing phase included:

- Soil amendments that have a predicted ability to reduce lead bioaccessibility (i.e., predicted lead binding, available phosphorus content, and lead sorption and retention capacity).

[2] The locations of the original six plots are provided in Figures 1-1 through 1-4 of the Phase IA DSR (Ramboll 2019c).

- If an amendment does not have the potential to reduce lead bioaccessibility but has material properties that could influence soil quality (e.g., nutrient enrichment, organic carbon, pH), and potential for use in combination with another soil treatment.
- Local source/supplier options and ease of application.

If an amendment option was identified that did not show potential to convert the lead to a less bioaccessible form or to improve soil quality but could be used as a physical barrier to lead-impacted soil, it was not recommended for bench-scale testing. The amendment selection process and analysis of the different amendment options that were considered are detailed further in the amendment screening and design technical memorandum (Phase IB) (Ramboll 2019a). That analysis recommended that the following materials should be tested as individual soil treatments and in combination with other treatments in the Phase II bench-scale tests: soluble phosphorus, biosolids, wood ash, biochar, and compost. A further recommendation that was incorporated into the Phase II bench experiments was to monitor and evaluate the effectiveness of different treatment alternatives for reducing lead bioaccessibility and how they may affect soil structure, texture, nitrogen content, and chemistry (Ramboll 2019a).

3.2 PHASE II: BENCH-SCALE TREATABILITY STUDIES

The objectives of the Phase II bench-scale treatability testing were to: 1) evaluate whether soil amendments showed potential to reduce the bioaccessibility of lead in Site soils; 2) evaluate the impact of amendments on key soil chemical and physical properties; and 3) develop data that could be used to reduce uncertainty about selection of amendment technologies for field-scale treatment testing in Phase III of the study.

3.2.1 Soil Collection

Phase II involved soil sample collection at the Site, shipping the bulk soil sample to the OSU laboratory in Columbus, Ohio, and then setting up and conducting the bench-top treatability tests. All four test plots were considered for supplying soil for tests; however, soil was collected only from 401-2 because it had the largest number of locations within it, as determined in Phase I, that met the following criteria, consistent with the Phase II Work Plan (Ramboll 2018):

- Soil lead concentrations > 800 mg/kg
- Soil lead mineralogy representative of potential treatment areas (i.e., Site soils)

- Soil lead bioaccessibility greater than 60 percent
- Consistency of soil physiochemical characteristics (e.g., pH, organic carbon, grain size distribution) representative of Site soils.

To minimize disturbance of field test locations in each subplot within test plot 401-2, 48 5-gallon buckets were collected from the buffer area between the subplots and shipped to OSU for use in the bench tests. Details regarding soil collection for the bench-scale testing are provided in the Phase II Soil Collection Work Plan (Ramboll 2018) and the Phase II Soil Collection: Field Summary Report (Arcadis U.S., Inc. [Arcadis] 2020). Additional details for this work are provided in the Phase II DSR (Ramboll 2021).

3.2.2 Bench-Scale Results: Amendment Selection

Complete results for all amendment and soil samples collected during the study are available in Figures 5-1a through 5-35c, and Tables 5-1 through 5-7 in the Phase II DSR (Ramboll 2021), which include data for amendment samples analyzed prior to setting up the experimental pots, baseline soil samples, and progress soil samples from sampling events at times 1, 2, and 3 (t_1, t_2, and t_3).

The results of testing through t_2 – four months into the planned 6-month-long bench test period, were used to identify the soil amendment options that effectively met the DQOs and to select which amendments to carry forward for further evaluation in the field (Phases III and IV). Upon evaluation of the t_2 results jointly with EPA Region 10, ORD, and the SATES technical team, three amendments were selected for field-scale testing: soluble phosphate, compost, and the combination of soluble phosphate and biochar.[3] Additional information about amendment selection criteria and Phase II bench-scale testing results can be found in the Phase II DSR (Ramboll 2021).

[3] Three soil treatment amendments were recommended for field pilot testing following a series of webinars in which the available bench-scale test results and the 12 amendments being tested were discussed with the SATES technical team. In conjunction with the webinars, several participants and their colleagues rated and ranked the amendment options to aid the process for selecting three amendments to test in the field. A working group of study participants then recommended the three amendments that were ultimately selected for the field test: phosphate, phosphate combined with biochar, and compost (Mills 2020, pers. communication).

3.3 Phase III

Phase III involved the field application of the selected soil treatment amendments (soluble phosphate, compost, and the combination of soluble phosphate and biochar) on the test plots 258-3, 401-1, 401-2, and 441-1, followed by the Phase IV monitoring (i.e., with periodic soil sample collection and analysis for two years), as discussed in Section 4 of this report.

3.3.1 Phase III Field Implementation Methods and Results – Amendment Application

This section summarizes the amendment placement procedures for Phase III. The Phase III field implementation took place in November 2020 and April 2021. Sampling of the amendment materials for prescreening analyses and the field amendment application were conducted by Arcadis. Detailed information and documentation of the amendment application methods are provided in the field summary report (FSR) prepared by Arcadis and included in Appendix C of this DSR.

3.3.1.1 Amendment Placement Timeline

Preapplication amendment testing and amendment application at one test plot (258-3) were conducted in October and November 2020, while amendment application at the other three test plots was completed in April 2021. Amendment application at test plot 258-3 was conducted between November 5 and November 14, 2020, then Phase III was paused until spring of 2021 due to inclement weather, in agreement with change request no. 2 (see Section 3.3.1.4 and Appendix D of Ramboll 2022a).[4] In Spring 2021, field application of amendments to test plots 441-1, 401-1, and 401-2 resumed; this work began on April 6, 2021 and was finished on April 13, 2021.

3.3.1.2 Amendment Sampling Methods and Results

Composite samples of each of the amendment materials were collected on October 7, 2020, and November 9, 2020, and analyzed for the following parameters (see Table 3-1 in Ramboll 2022a):

- Total target analyte list (TAL) metals, by EPA Method 6010 (except mercury)
- Mercury by EPA Method 7471B
- Semivolatile organic compounds by EPA Method 8270, biochar and compost only.

[4] Amendments were stored in a secured covered facility at Colville Construction during the winter.

Samples of each amendment material were collected from 10 percent of bags or from each corner of super sacks, depending on how the material was supplied and delivered to the Site, and composited. The amendment sample collection procedures were specified in Standard Operating Procedure (SOP) 3 (SOP-3), provided in Appendix B in the Phase III & IV Work Plan (Ramboll 2020).

Water that was to be applied to the subplots alone or in solution with phosphate was sampled from the water storage tank at the staging area in Northport and analyzed for the following parameters:

- Total TAL metals, by EPA Method 6010 (except mercury)
- Mercury by EPA Method 7470A
- Temperature, pH, and electrical conductivity.

Water samples were collected twice in October 2020 (with one field replicate) and twice in March 2021 when the tank was refilled for the 2021 use, consistent with the Phase III & IV Work Plan (Ramboll 2020) and change request no. 1 (Appendix C).

Results from water and amendment testing were screened for acceptability and approved for field application. Results of water and amendment testing can be found in Table 3-2 in the Phase III and IV IDSR (Ramboll 2022a).

3.3.1.3 Amendment Placement Methodology and Results

This section summarizes the amendment application processes used. Details of amendment placement can be found in the FSR (Appendix C of this DSR). Amendment application was completed in accordance with the Phase III & IV Work Plan (Ramboll 2020) and, as applicable, change request nos. 1 and 2, as well as the Amendment Placement Quality Management Plan prepared by Arcadis (Arcadis 2020, 2021; see Appendix C of this DSR).

3.3.1.3.1 Locate and Mark Subplot Boundaries

Each test plot was subdivided into four 50-ft by 50-ft subplots that are designated as subplots A, B, C, and D. The subplot boundaries were established by locating the corner markers that were placed during Phase I of the study. Wooden laths were driven into corners of the subplots and marked with fluorescent survey flags. Prior to amendment placement, fluorescent string was run between the laths to clearly mark subplot borders. Plastic sheeting was hung between subplots to avoid spillage into adjacent subplots.

Maps of each subplot were then created to document where certain features, such as large trees or rocks, would require modification of the amendment placement specifications for that subplot. The area of features that would preclude amendment placement were summed and subtracted from the 2,500-ft^2 area of each subplot to calculate the adjusted surface area. The adjusted surface area was used to calculate the correct amount of amendment to place in each subplot, in accordance with the application rates specified in the Phase III & IV Work Plan, as discussed below.

3.3.1.3.2 Preparation of Amendments

Staging and preparation of amendments took place at each test plot site. Prior to application, the dry TSP and potash were mixed with water for application to both the soluble phosphate and the soluble phosphate and biochar subplots. The mixing procedures differed somewhat between 2020 and 2021 and are described in detail in the FSR (Appendix C). The solid amendments—biochar and compost—were weighed prior to application.

3.3.1.3.3 Design and Application of Amendments

In each of the four test plots, three of the four subplots received amendments for pilot testing and the fourth subplot was reserved as a control for the study. The amendments were randomly assigned to subplots, with no replication within the same test plot, as shown in Table 3-1. The application rate requirements for each soil amendment for each subplot are included in Table 3-1. Application rates were given in weight per area (dry amendments) or volume per area (liquid amendments) to facilitate measurement in the field and their application to the subplots. Amendment placement requirements and methods were specified in the Amendment Placement Quality Plan, which is included as Appendix B of the FSR (see Appendix C of this report). Methods to avoid, minimize, or mitigate any adverse effects on historic and cultural resources can also be found in the Phase III & IV Work Plan (Ramboll 2020) and Section 4 of the FSR.

At each plot, liquid amendments were applied using pumps and hoses from 300-gal totes, as described in the FSR. Water was applied first to the control subplot and the compost subplot as described in the Phase III & IV Work Plan and the FSR. After the water application, the TSP and potash mixture was applied to the soluble phosphate and soluble phosphate and biochar subplots.

Solid amendments were applied by hand as described in the FSR. To guide application, a 5 ft by 5 ft polyvinyl chloride template was used. The adjusted amendment surface area for each template was calculated, and the dry material was weighed into a 5-gal bucket for hand application by Arcadis field personnel. Detailed descriptions of the amendment application process are provided in the FSR.

3.3.1.4 Deviations from Planned Field Activities and Change Requests

No deviations occurred in Phase III, though there were four change requests as summarized below.

Four change requests, submitted by TAI and approved by EPA, modified the original design of the Phase III & IV Work Plan (Ramboll 2020). Summaries of the change requests are provided below. Signed copies of all four change requests are included in the FSR (see Appendix C).

- Change request 1, approved on October 13, 2020. This change altered the timing and number of water samples collected prior to application of water to test plots. For Phase III, water was hauled by truck from Kettle Falls, Washington, and stored in a water storage tank acquired for the project that was staged in Northport. Instead of collecting samples from each truck load, water samples were collected from the water tank after the first and last water deliveries to confirm that the storage tank was free of residues that might compromise the field phase of the study.
- Change request 2, approved on December 3, 2020. This change was to postpone amendment application on test plots 401-1, 401-2, and 441-1 from fall of 2020 to spring of 2021. All of the amendments were applied to test plot 258-3 in Fall 2020 but subfreezing weather made it unsafe to continue the work at that time. For reasons explained in the change request, this delay was not expected to negatively affect the study.
- Change request 3, approved on May 11, 2021. This request addressed the several procedural changes for Phase IV, including: shifting the schedule for Spring monitoring events from April to May; provided corrections and clarifications regarding sample analyses and sample handling and shipping requirements; and clarified requirements for the analytical laboratories regarding method detection limits (MDLs) and reporting limits (RLs).
- Change request 4, approved on May 21, 2021. This change request clarified requirements for measuring electrical conductivity and pH in the field during sample collection.

4 PHASE IV TEST PLOT MONITORING METHODS AND STATISTICAL METHODS

Phase IV test plot monitoring began in May 2021. This included periodic soil sample collection and analysis (both IC and depth-discrete sampling) and vegetation monitoring at all four test plots. On behalf of TAI, Ramboll oversaw sample collection by Arcadis and analytical work performed by both the ALS Laboratory (ALS) in Kelso, Washington, and OSU. A total of seven monitoring events (MEs) were conducted as part of Phase IV:

- ME1, ME2, and ME3 in May, July, and October 2021 (IC sampling)
- ME4, ME5, and ME6 in May, July, and October 2022 (IC sampling)
- Depth-discrete sampling in May 2023.

Data requirements for the IC and depth-discrete sampling events are listed in Tables 4-1a and 4-1b, respectively.

CCT performed vegetation monitoring surveys prior to five of the six IC soil sampling events, and concurrently with the July 2022 soil sampling, but coordinated with the field samplers to avoid trampled vegetation issues. Results from these plant surveys are documented in separate reports prepared by CCT (available to registered users at https://www.ucr-rifs.com/) that have been provided to TAI to evaluate the potential effects of the soil amendments on plant growth and diversity in the test plots.

This section describes the soil sampling and analysis methods, data QA/QC, and analytical results for soil samples collected in 2021, 2022, and 2023. Results and statistical analyses of vegetation data will be made available in a forthcoming addendum to this DSR.

4.1 MONITORING DESIGN

The Phase IV test plot monitoring design was developed to provide data needed to assess the changes in soil conditions over time in each test plot in response to the soil treatment amendments that were applied to each subplot and for comparison to soil conditions in the control subplots. The monitoring and analysis plans for the IC and depth-discrete sampling tasks, as specified in the Phase III & IV Work Plan (Ramboll 2020) and its Addendum (Ramboll 2023a), are summarized in Tables 4-2a and 4-2b, respectively.

As noted above, six test plot monitoring events (ME1 through ME6) were completed beginning in May 2021 and continuing until October 2022. Originally, as per the Phase III & IV Work Plan, test plot monitoring was planned to continue through October 2023

(Ramboll 2020), with one more IC sampling event to occur in May 2023 and depth-discrete sampling to occur in October 2023. However, in early 2023, following review of monitoring data collected through October 2022, TAI conferred with EPA and the SATES technical team and, by agreement, it was decided not to collect additional IC samples in 2023 because monitoring data from 2021 and 2022 did not show significant differences for lead IVBA between the treatment and control subplots. Instead, the depth-discrete sampling was conducted in May 2023. This was the final soil monitoring event for SATES.

4.2 FIELD METHODS

This section summarizes the sample collection procedures for collection of both the IC and depth-discrete soil samples used in Phase IV. Soil sampling was conducted by Arcadis. More details are provided in the FSR prepared by Arcadis (see Appendix C). Methods used for soil sample collection and all associated field activities were consistent with the Phase III & IV Work Plan (Ramboll 2020), which describes the IC sampling method used for ME1 through ME6, and the Phase III & IV Work Plan Addendum that describes the depth-discrete sampling and analysis plan (Ramboll 2023a), and applicable modifications described in change request nos. 3 and 4.

4.2.1 Soil Sample Collection

Soil samples were collected from each test plot in conducted in 2021, 2022, and 2023, as follows:

2021		2022		2023	
ME1	May 18 – 21	ME4	May 17 – 19	DD	May 16 –19
ME2	July 20 – 22	ME5	July 19 – 21		
ME3	October 12 – 14	ME6	October 11 – 13		

Notes:
ME – monitoring event
DD – depth-discrete

4.2.1.1 Incremental Composite Soil Sample Collection

Procedures for laying out the sampling grid and positioning each IC sample point in test plots 258-3, 401-1, 401-2, and 441-1 are detailed in SOP-5 contained in Appendix B of the Phase III & IV Work Plan (Ramboll 2020). Poor satellite reception at the test plot locations precluded precise mapping using a global positioning system (GPS) unit; therefore, measuring tapes and compasses were used instead.

For each monitoring event, soil samples were collected within each of the main subplot areas within test plots 258-3, 401-1, 401-2, and 441-1 (i.e., excluding the buffer areas between the subplots; see Maps 4-1 through 4-4). A sampling grid of 30 incremental sampling points was established for each subplot. For each monitoring event, the whole grid was shifted to new locations to avoid resampling the same locations, including those sampled during baseline characterization in Phase IA of the study, as described in the Phase III & IV Work Plan (Ramboll 2020). Each increment was collected from 0 to 3 inches (in.) depth from the soil surface after removing loose surficial debris (duff).

IC sampling involves collecting up to 30 single-point increment samples from a designated sampling area (e.g., a sampling unit; for SATES, each subplot is a sampling unit) and compositing the increment samples. The composited soil sample was then sent for laboratory analysis. The IC sample collection and sample processing methods are described in detail in the Phase III & IV Work Plan (Ramboll 2020) and is detailed further in guidance developed by the Interstate Technology and Regulatory Council (ITRC 2020).

Field QC samples included replicate and triplicate samples. Field replicate and triplicate samples were collected from co-located samples at each of the 30 increment locations, and both increment sets were developed and submitted as separate IC samples. For each monitoring event, two field replicate samples (approximately 15 percent of the total number) were collected for the required analyses. Field triplicate samples collected during ME1 through ME6 in 2021 and 2022 were randomly selected for each monitoring event, as per Section 3.3.3 of the Phase III & IV Work Plan (Ramboll 2020). Analytical results for the field QC samples were used to evaluate precision of field techniques and the homogeneity of the IC samples during the data validation process (Validation reports are provided in Appendix D.) Triplicate sample results were also used to calculate a 95% upper confidence interval for the mean concentration to help quantify the uncertainty in the estimate of the mean for each subplot, consistent with the ITRC guidelines (ITRC 2020). The 95% confidence interval results are presented with the statistical analysis of 2021 and 2022 data in the Statistical Methods and Results summary in Section 5 below.

4.2.1.2 Depth-discrete Soil Sample Collection

Depth-discrete soil samples were collected from each of the subplots (i.e., subplots A, B, C and D within test plots 258-3, 401-1, 401-2, and 441-1; Maps 4-5 through 4-8) over a deeper soil interval of 0 to 12 in. depth for total TAL metals analysis. Discrete samples were collected for each 2-in. depth horizon consistent with the discrete sample collection method that was used in Phase IA, Part 1 (Ramboll 2019). The depth-discrete sample data have been used to evaluate how the soil treatments tested on the subplots may have affected metals concentrations relative to the control plots and relative to the baseline data collected in Phase IA.

For the depth-discrete sampling, a total of 12 test pits were dug within each test plot, with three primary-sample test pits excavated in each subplot. The test pits were situated in approximately the same location in each subplot, as shown on Maps 4-5 through 4-8, and oriented to be positioned in areas that were not previously sampled; test pit coordinates are listed in Table 4-3. In each test pit, samples were taken from the pit wall at 2-in. depth intervals beginning at a depth of 0 in. and ending at a depth of 12 in. Samples were composited at each depth interval, resulting in 1 composite sample per subplot for each of the 6 2-in. depth intervals. Three additional test pits were dug in test plot 258-3 subplot D and in test plot 401-1 subplot C for collecting the replicate discrete samples. A detailed description of the depth-discrete soil sample collection procedure is provided in the Phase III and IV Workplan Addendum (Ramboll 2023a).

4.2.2 Sample Handling and Shipping

Soil collected from each IC or depth-discrete sample was placed into 1-quart resealable bags and checked for cultural materials as required by SOP-2 in the Phase III & IV Work Plan. Once the incremental composite or depth-discrete samples were examined by the on-site cultural resource monitor, they were composited in a clean 2.5-gal sample bucket using a disposable plastic spoon or a large stainless-steel spoon. A total of 16 primary samples, 2 replicate samples, and 1 set of triplicate samples was collected during each IC monitoring event, and 96 depth-discrete samples and 12 replicate samples were collected.

Three soil samples for measuring pH and conductivity were taken from each composite sample and set aside for later testing indoors, in the field office. Soil pH and conductivity measurements were obtained by Arcadis at the end of each day at the field office.

After removing the samples for pH and conductivity measurements, the sample buckets were sealed, and the soil samples were stored and packaged for shipping in accordance with the sample storage, packaging, and shipping procedures provided in the Phase III & IV Work Plan (SOP-9), requirements for maintaining the chain-of-custody (COC) and for documentation, preservation, and shipping of samples to the analytical laboratory (SOP-7 and SOP-8) (Ramboll 2020). The buckets containing the soil samples were shipped to ALS. ALS then processed the material in preparation for the required analyses and shipped portions of each prepared sample to OSU.

4.2.3 Deviations from Planned Field Activities

4.2.3.1 Depth-Discrete Test Pit Size

The Depth-Discrete Sampling Plan (Ramboll 2023a) initially specified that test pits should be approximately 2 ft by 2 ft. During the field sampling, the field personnel determined that the soil sidewalls were sturdy, and they were able to excavate the pits by digging pits approximately 1 ft by 1 ft, which caused less disturbance to the ground and vegetation. This deviation did not negatively impact the study.

4.2.3.2 Depth-Discrete Replicate Corrections

For the 2023 depth-discrete field sampling event, the Work Plan stipulated that primary samples should be collected from three test pits within each subplot and composited by sample depth. However, during the field event, field personnel noticed that Table 2-3 in the Work Plan indicated that replicate samples should be collected from a single test pit within a subplot (rather than three test pits as for the primary samples). To ensure consistency of the sampling protocol for primary and replicate samples, field personnel dug three replicate test pits instead of one in each subplot where replicate samples were specified (i.e., subplots 258-3D and 401-1C; Table 4-3). Depth-discrete samples from the three replicate pits were then composited by depth interval, as were the primary samples. This deviation did not negatively impact the study and allowed for more accurate statistical analysis.

4.3 LABORATORY METHODS

ALS and OSU received, processed, and analyzed the samples following the procedures for the laboratory analyses specified in the Phase III & IV Work Plan and the Phase III & IV Work Plan Addendum (Ramboll 2020, 2023a), including the applicable SOPs provided in Work Plan Appendix B. Sample preparation and analysis methods are summarized in Tables 4-2a and 4-2b and discussed in the following subsections. MDLs and RLs are provided in Tables 4-4a and 4-4b.

4.3.1 Laboratory Soil Sample Handling and Homogenization

All IC and depth-discrete samples were homogenized by ALS to prepare the samples for the chemical analyses listed in Tables 4-2a and 4-2b. ALS labeled, packaged, and shipped subsamples it prepared to OSU under the required COC procedures for this project, except for two deviations that are described in Section 4.3.3.

4.3.2 Soil Sample Analyses

4.3.2.1 Incremental Composite Soil Samples

After compositing, the IC soil samples were analyzed for the following parameters, as summarized in Tables 4-1a and 4-2a:

- Bioaccessible lead and arsenic by EPA Method 6010B, with sample aliquots extracted at pH 1.5 and at pH 2.5
- Electrical conductivity (soil salinity) measured by electrode
- Soil pH by the Thomas (1996) method
- Mehlich III extractable lead and phosphorus by the Mehlich (1984) method and EPA Method 6010
- Mineralizable nitrogen by the Waring and Bremner (1964) method
- Oxalate extraction McKeague and Day (1966) method and EPA 6010
- Synthetic precipitation leaching procedure (SPLP) TAL metals and phosphorus by EPA Method 1312 and EPA 6010
- Soil moisture by EPA Method 160.3 (sample preparation) and direct measurement
- Total arsenic and lead by EPA 3051A (sample preparation) and EPA 6010
- TAL metals (except mercury) by EPA 3051A (sample preparation) and EPA 6010 (see Section 3.2.3.1)
- Total carbon and nitrogen by the Bremner and Mulvaney (1982) and Nelson and Sommers (1996) methods
- Total organic carbon by the Heanes (1984) method.

Electrical conductivity and pH measurements were obtained on the bulk fraction of the IC samples in the field, as described above in Section 4.2.2. Total lead and arsenic bioaccessibility were conducted on the < 150-µm fraction of the composited soil samples, and the remaining analyses were conducted on the < 2-mm fraction of the composited soil samples.

Additional optional EXAFS for further assessment of lead and arsenic mineralogy (speciation) were analyzed by the EPA's National Risk Management Research Laboratory (Cincinnati, Ohio) on samples selected by EPA in consultation with Dr. Nick Basta at OSU. Results from this analysis are reported in Appendix B.

4.3.2.2 Depth-Discrete Soil Samples

Depth-discrete soil samples were collected, composited, and analyzed for the following parameters (see Tables 4-1b and Table 4-2b):

- Electrical conductivity (soil salinity) measured by electrode
- Soil pH by the Thomas (1996) method
- Mehlich III extractable phosphorus by the Mehlich (1984) method and EPA Method 6010
- Soil moisture by EPA Method 160.3 (sample preparation) and direct measurement
- TAL metals (except mercury) by EPA 3051A (sample preparation) and EPA 6010 (see Section 3.2.3.1)

Electrical conductivity and pH measurements were obtained on the bulk fraction of the depth-discrete samples in the field. Analyses were conducted on the < 2-mm fraction of the composited soil samples, consistent with the Phase IA baseline characterization analyses.

4.3.2.3 Missing TAL Metals Analyses in 2022

As shown in Table 4-2a, TAL metals and phosphorus should have been analyzed on the ME1 samples and samples from the final IC monitoring event. However, TAL metals and phosphorus were not analyzed for the final IC monitoring event, ME6, samples. This was because, at the time, it was not yet decided that ME6 would be the final IC sampling event. It was only after review of ME6 data that monitoring event ME7 was canceled due to a lack of demonstrated efficacy of the amendments. The additional data gained from analysis of TAL metals would not change the study outcome. Therefore, this omission is not expected to negatively impact the study.

4.3.3 Deviations from Planned Laboratory Activities

The deviations described below were noted regarding sample analyses and COC documentation.

4.3.3.1 Extra Analysis for TAL Metals in 2021

As shown in Table 4-2a, TAL metals and phosphorus should have been analyzed only on ME1 samples and on the samples from the final IC monitoring event (ME6) because the soil metal concentrations in the individual subplots were not expected to change considerably during the field test phase. Instead, TAL metals and phosphorus were analyzed on soil samples collected during ME1 and samples collected during ME2 and ME3 due to an incorrect notation on the COC forms for the ME2 and ME3 samples. The analytical results for all the total metals analyses from ME1, ME2, and ME3 are presented in Table 4-5; however, the results for ME2 and ME3 samples are marked as "not reportable" in the UCR project database. This deviation is not expected to negatively impact the study.

4.3.3.2 COC Form Corrections

Accompanying the ME3 samples collected in October of 2021, ALS erroneously sent a copy of the ME1 COC form to OSU instead of the correct ME3 COC form. The error was not noted at the time, and the ME1 COC form was signed by OSU for ME3. The error was discovered later and the correct COC form has been added to the project documentation. This deviation is not expected to negatively impact the study.

Accompanying the ME4 samples collected in May 2022, Arcadis sent a copy of a COC form to ALS with the wrong analyses listed. The error was noted immediately by TAI upon reviewing an automated sample check-in email from ALS. The error was fixed the next day with the corrected list of analyses and an updated COC form. This deviation did not negatively impact the study.

4.4 DATA SUMMARY AND QUALITY ASSESSMENT

This section includes the data summary, QA/QC, and laboratory analytical results for the Phase IV monitoring data. Sample identification numbers for IC and depth-discrete soil samples can be found in Tables 4-6a and 4-6b, respectively. The laboratories that conducted the analytical work (i.e., ALS and OSU) are shown in Tables 4-2a and 4-2b.

The analytical results for the IC samples are presented in Tables 4-7 through 4-15, and laboratory results for depth-discrete data are presented in Tables 4-16 through 4-18. These tables include data qualifiers assigned by the data validator, Environmental Standards, Inc. (ESI), during the data review and validation process, discussed in Section 4.4.2, below.

4.4.1 Data Documentation

Procedures for laboratory documentation and records for Phase IV work were consistent with those described in Section 6.2 of the Phase III & IV Work Plan (Ramboll 2020), the Phase III & IV Work Plan Addendum (Ramboll 2023), and approved change requests (nos. 3 and 4). The full laboratory reports are provided in Appendix E. Information regarding the samples, analytical procedures performed, and the analytical results were recorded by the analysts on laboratory forms or log files and are provided in Appendix E in the laboratory reports from ALS and OSU.

The laboratories prepared Level 2 data packages (modified reporting) for all Phase IV samples. Required elements and documentation for the Level 2 data packages included the following:

- COC forms
- Case narrative
- Final parameter concentration for all samples
- Preparation or extraction and analysis dates and times
- Method blanks
- Surrogate recoveries
- Inductively coupled plasma/mass spectroscopy serial dilution percent difference
- Matrix spike and matrix spike duplicate recoveries and relative percent difference (RPD)
- Laboratory duplicate RPD
- Laboratory control sample recoveries.

Laboratory documentation was reviewed, and no issues were found that could impact overall data quality.

4.4.2 Data Validation

ESI performed Stage 2 data validation for the Phase IV data in accordance with Section 7 of the Phase III & IV Work Plan (Ramboll 2020), and with the *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2017a), the *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2017b) (for review of the pre-screening analyses of the individual amendment materials that were analyzed for organic compounds), and the *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (USEPA 2009). The data validation reports are provided in Appendix D.

Data were qualified based on established quality control criteria specified in the Phase III & IV Work Plan (Ramboll 2020). It is important to note that EPA's validation guidance documents (USEPA 2009, USEPA 2017a, USEPA 2017b) were developed to address analyses performed in the EPA Contract Laboratory Program analytical methods and are not applicable to some of the analyses performed for SATES samples. ESI used professional judgment in its review of the analytical results and to determine compliance relative to the methods specified in the Phase III & IV Work Plan (Ramboll 2020).

The data validation process included checking the following information: COC forms, sample holding times, analyses performed, method detection and reporting limits, matrix spike and matrix spike duplicate analysis results, laboratory control sample analyses, calibration, method detection limits, instrument drift, linear range, matrix affects, and analytical results for field and laboratory duplicates and blanks.

Results from the chemical analyses performed on samples of the soil amendment materials as part of Phase III were used only for screening the amendment materials before they were applied to the test plots. These data are not considered data deliverables for SATES and therefore were not validated or uploaded into the UCR project database.

4.4.3 Overall Data Quality Assessment

The purpose of the data quality assessment is to determine the quality and usability of the data. Data that do not conform are qualified as “R” when they are unusable (rejected) or “J” when they are usable but are estimated values, e.g., when the concentration falls between the detection limit and the minimum calibration level. When data are qualified as “J,” the identity of the analyte is certain, and the concentration has been estimated by the laboratory, typically because the concentration was too low to accurately measure. If the chemical tested was undetected, the data are qualified as “U,” and the detection limit is reported as an estimated concentration. In this study, additional qualifiers were used to represent the reasons for qualification more accurately.

J = Quantitation is approximate due to limitations identified during the QA review.

J+ = Quantitation is approximate, but the result may be biased high.

J- = Quantitation is approximate, but the result may be biased low.

R = Unusable result; the analyte may or may not be present in this sample.

U* = The analyte should be considered "not detected" because it was detected in an associated blank at a similar level.

U = The analyte was not detected at or above the associated detection limit.

UJ = The analyte was not detected, and the detection limit may be higher due to a low bias identified during the QA review.

Data qualifiers assigned by the data validator are included with the results presented in Tables 4-5 and 4-8 through 4-17. Although some issues were identified during the data review and validation process, no issues were found that would impact overall data quality or usability for the study. Issues that were identified during data validation are as follows:

- Several inorganic results were qualified as "estimated" due to blank contamination, high and low matrix spike/matrix spike duplicate recoveries, low laboratory control sample recoveries, field replicate imprecision, and quantitation between the detection limit and the reporting limit
- All phosphorus results from ME1 were qualified as "estimated" due to a low matrix spike recovery
- Several results for IVBA arsenic at pH 1.5 and 2.5 were qualified as "not detected" due to blank contamination
- Some results for total carbon, SPLP sodium, total nitrogen, and mineralizable nitrogen were flagged as "estimated" due to field triplicate or replicate imprecision.

ESI concluded that, overall, the data reviewed are usable with the qualifications discussed in each of the data validation reports (see Appendix D).

4.5 STATISTICAL METHODS

The statistical methods used to analyze incremental composite sample data collected in 2021 and 2022 are described below in Section 4.5.1, while the results of the statistical analysis are described in Section 5.1 and discussed in Section 5.2. For depth-discrete samples, the statistical methods are described in Section 4.5.2, and the statistical analysis results are summarized in Sections 5.3 and discussed in Section 5.4.

4.5.1 Soil Samples From Monitoring Events 1 Through 6

Analytical results for the Phase IV incremental composite soil samples collected during monitoring events in 2021 and 2022 were statistically analyzed with linear mixed effects models. For these analyses, only results for the primary Phase IV IC samples were used, and the main comparison is between control subplots and the three subplots treated with the soil amendments. Data analyses were performed in R version 4.2.0. Details on the statistical analysis are provided below.

4.5.1.1 Linear Mixed Effects Models: Lead and Arsenic

Linear regression is used when the outcome of interest is a continuous variable and at least one predictor variable is continuous. A linear mixed effects model is an extension of linear regression that incorporates random effects, which allows the non-independence of plots or subjects that have been tested repeatedly to be addressed in the analyses. Since each test plot was sampled repeatedly over two years and understanding differences between the test plots themselves is not a goal of the study, using a linear model with a random effect for **test plot** is the preferred statistical analysis for these data. In previous analyses, the effect of **monitoring event** (a categorical variable) on analytes was analyzed via repeated measures analysis of variance. Linear regression was chosen for these analyses because **days since application** (a continuous variable) is being used as a predictor instead of **monitoring event**. Feedback from EPA on previous analyses indicated the need for *post hoc* testing to better understand the comparisons between control subplots and subplots with amendments applied to them. However, model output from linear regression includes estimates of the effect of each amendment type compared to control, precluding the need for additional *post hoc* comparisons when differences from control are the main parameters of interest.

Linear mixed effects models were developed for the outcome variables of interest: changes in concentrations of both total and bioavailable lead and arsenic. For this analysis, the independent variables included: 1) **treatment**, which included three amendments – soluble phosphate, compost, and soluble phosphate and biochar, and one control within each test plot; 2) **days since application**, which is a continuous variable for the number of days since the treatment was applied until the measurement was taken; and 3) an interaction term between **treatment** and **days since application**, which indicates whether differences emerged between treatments over time. This analysis is designed to determine how the different amendments affected soil lead and arsenic concentrations over time, while accounting for the repeated sampling of the same test plots.

4.5.1.2 Means Contrasts: Other Analytes

Feedback from EPA on previous analyses (covering results from only ME1 through ME3, presented in Ramboll 2022b) indicated the need for more careful consideration of the statistical approach to emphasize the main outcomes of interest (total and bioavailable lead and arsenic) while analyzing other changes in soil chemistry and composition. However, other analytes (e.g., aluminum, copper) were not the focus of the study nor the subject of *a priori* hypotheses. Therefore, a linear mixed effects model for each of these other analytes was built with a simplified model structure. In these models, **treatment** and **test plot** as a random effect were included, but not **days since application** or the interaction term between **treatment** and **days since application** as in the models for the main outcomes of interest described above in section 4.5.1.1. Estimates were then calculated, including 95% confidence intervals, for the mean differences between the four control subplots and amendment subplots (four subplots for each of the three amendment types). Pairwise comparisons were calculated using the emmeans (Estimated Marginal Means) package in

R, which uses the Kenward-Roger's F test and Tukey method to adjust for multiple comparisons within each model. As this set of analyses is largely exploratory and is not driven by *a priori* hypotheses, p-values are not reported and no family-wide adjustment for multiple comparisons (e.g., Bonferroni correction) was made. In this set of analyses, an analyte is considered to have been increased or decreased by the treatment if the 95% confidence interval for the difference in group means does not include 0. Reporting confidence intervals rather than p-values in this case provides information about the strength and direction of the difference in means and emphasizes the uncertainty around estimates.

4.5.2 Depth-discrete Soil Samples

Analytical results for Phase IV depth-discrete samples were also statistically analyzed with linear mixed effects models but with a different model structure from the analyses described above. The statistical analysis is designed to compare control subplots to the three amendment subplots. Only the primary samples were used; the replicates and triplicates were not included nor were samples from previous SATES phases. While depth-discrete samples were collected in SATES Phase 1A, the sampling protocol and analytical methods differed such that a direct comparison with depth-discrete samples collected in Phase IV is not possible. In Phase 1A, depth-discrete samples were collected from a single test pit in each subplot, which was chosen at the location with the highest soil surface lead concentrations (Ramboll 2019c). In contrast, Phase IV depth-discrete soil samples were collected by randomly sampling three test pits per subplot, to obtain representative samples from each subplot, and then composited, as described in Section 4.2.1.2.

Data analyses were performed in R version 4.3.1. Details on statistical testing are given below.

4.5.2.1 Linear Mixed Effects Models: Lead, Arsenic, and Phosphorus

Linear mixed effects models were built for the outcome variables of interest: total lead, Mehlich III lead, total arsenic, and Mehlich III phosphorus with test plot as a random effect. For this analysis, the independent variables included: 1) **treatment**, which included three amendments – soluble phosphate, compost, and soluble phosphate and biochar, and one control within each test plot; 2) **sample depth**, which is a continuous numerical variable for the depth from which the soil was taken (binned as 0-2, 2-4, 4-6, 6-8, 8-10, and 10-12 in.); and 3) an interaction term between **treatment** and **sample depth**, which indicates whether differences emerged among amendments, or between amendments and control, over the depth series. This analysis is designed to evaluate how soil amendments affect soil lead and arsenic concentrations and whether depth profiles differ among soil amendments. Therefore, a random effect for plot was included.

To directly compare concentrations of total lead, Mehlich III lead, total arsenic, and Mehlich III phosphorus among control and amendment subplots at the lowest depth sampled, a second set of models was built using only the subset of samples from 10-12 in. below the soil surface. For these models, the same outcome variables as above were used. The independent variable was **treatment,** which, as above, included three amendments – soluble phosphate, compost, and soluble phosphate and biochar, and one control within each test plot. These models directly test whether the treatment influenced levels of the focal analytes at the lowest depth sampled below the soil surface.

For all models, assumptions were checked. Models with residuals showing evidence of heteroscedasticity (unequal variance) or non-normality were transformed using the appropriate transformation as identified by the Box-Cox procedure [5]. Models were subsequently re-fit, and assumptions checked.

4.5.2.2 Means Contrasts: Other Analytes

The statistical analysis for the depth-discrete sample results was designed to emphasize the main outcomes of interest (lead, arsenic, and phosphorus) while analyzing other changes in soil chemistry and composition. Linear mixed effects models for each non-focal analyte were built with treatment as a predictor and test plot as a random effect, using only the subset of samples taken from a depth of 10-12 in. below the soil surface. Estimates of 95% confidence intervals, pairwise comparisons, and interpretation of confidence intervals were performed as described for incremental composite sample analyses in Section 4.5.1.2.

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[5] The Box-Cox procedure is a transformation technique used in statistics to stabilize variance and make the data more closely resemble a normal distribution, thus meeting the assumptions of the linear mixed effects models used in this analysis. It applies a power transformation to a dependent variable, with the optimal power (λ) determined by finding the value that maximizes the likelihood of the data under a normal model. The output of the procedure is a single λ which was used to transform the dependent variable (e.g., total lead) in the model.

5 RESULTS AND DISCUSSION

5.1 ANALYSIS OF RESULTS FROM MONITORING EVENTS 1 THROUGH 6

The statistical results for analysis of lead and arsenic are summarized in Table 5-1, and the full statistical printout from R for the linear mixed effects models is provided in Appendix F. Estimates and 95% confidence intervals for the differences between control and treated subplots, across test plots and monitoring events, for all other analytes are shown in Table 5-2. Means and 95% confidence intervals for bioaccessible lead and arsenic in triplicate samples are given in Table 5-3. These results are based on analyses of the 2021 and 2022 incremental composite data collected over six monitoring events.

Boxplots showing overall trends by treatment for all analyses performed on the soil samples are shown in panel *A* in Figures 5-1 through 5-37. The line in the center of the boxplots is the median, and the upper and lower edges of the box are the 25% and 75% quartiles, respectively. The whiskers represent values outside the middle 50% of values. In the boxplots, as in the statistics, only the primary samples were included; this means that there are four samples per boxplot for each treatment type or control, with the exception of soil conductivity and pH. Field measurements of soil conductivity (Figure 5-36) and soil pH (Figure 5-37) were measured with three discrete primary samples per subplot, so conductivity and pH figures contain 12 points per boxplot (three replicates per test plot multiplied by four test plots). Statistical outliers are shown on some figures as black dots outside of the boxplots.

Panel *B* in Figures 5-1 through 5-37 show point plots by experimental plot. These points represent the primary samples, as in the boxplots. However, here they are grouped by test plot, to show the differences between test plots and the differences within the test plots over time.

Figure 5-38 shows the precipitation from three weather stations (two in Northport, one located south of Northport in Evans)[6] and average precipitation amounts measured at these stations, along with the amendment application dates (Phase III) and the monitoring event dates (Phase IV).

[6] Precipitation data for Evans and Northport were downloaded from the following webpage: https://www.ncdc.noaa.gov/cdo-web/datasets/GHCND/locations/FIPS:53065/detail

5.1.1 Discussion of Monitoring Results

Based on the analysis of the ME1 through ME6 data collected in 2021 and 2022, the phosphate amendments have not significantly decreased the bioaccessibility of lead and do not show different trends over time compared to control subplots (Figures 5-29 and 5-30, Table 5-1). In contrast, the phosphate-amended subplot soils showed increased mobility and bioaccessibility of arsenic, as demonstrated by the statistically significant increases in SPLP arsenic concentrations (Figure 5-3, Table 5-1) and IVBA arsenic (Figures 5-27 and 5-28, Table 5-1) when compared to control subplot soils. These differences are statistically significant, confirming that phosphate treatments should not be undertaken at sites with both arsenic and lead without considering the potential for the treatment to increase soil arsenic relative bioavailability and health risk from the soil ingestion. At this site, there is no additional concern about risk to human health because total arsenic levels are sufficiently low that even with elevated IVBA (and increased relative bioavailability), the arsenic risk is below the concern level established in the human health risk assessment. Differences in SPLP and IVBA arsenic between the controls and the phosphate-treated subplots attenuated over time during the field test (as indicated by a significant interaction term between **days since application** and **treatment** type; Table 5-1), with larger differences between phosphate-treated and control subplots in early monitoring events compared to the last monitoring event, ME6.

The statistical results show changes in soil composition and chemistry expected for the specific amendments applied to the subplots. The SPLP potassium analysis results indicated higher potassium SPLP concentrations in the soluble phosphate treatments (i.e., soluble phosphate and soluble phosphate combined with biochar), to which potassium chloride potash was added (Figure 5-16, Table 5-2). Mehlich III extractable phosphorus concentrations increased significantly in both phosphate treatments compared to control subplots (Figure 5-24, Table 5-2).

The phosphate only and phosphate and biochar treatments are associated with increases in soil cadmium, calcium, magnesium, and manganese. The phosphate treatments may have increased SPLP zinc (Table 5-2), but this increase may not be meaningful given the scale of measurement (Tables 4-5, 4-8b).

Soil nutrient levels that support plant growth may be enhanced by phosphate-based treatments. Compared to the control subplots, phosphate-treated subplots have slightly higher levels of total organic carbon, total carbon, mineralizable nitrogen, and total nitrogen (Table 5-2). In contrast, the results for the compost and phosphate and biochar amendments show no differences in nutrient levels when compared to control.

Soil moisture levels are similar for the subplots treated with soil amendments and control subplots (Figure 5-35 and Table 5-2). The effects on plant cover will be analyzed in the forthcoming analysis of vegetation data on the test plots.

5.2 ANALYSIS OF DEPTH-DISCRETE SAMPLE RESULTS

The statistical results for analysis of focal analytes (total lead, total arsenic, Mehlich III lead, and Mehlich III phosphorus) by depth are shown in Table 5-4, the statistical results for analysis of focal analytes at the bottom discrete sampling depth of 10-12 in. are shown in Table 5-5. The full statistical printout from R for the linear mixed effects models for these results is provided in Appendix F.

Total soil lead and arsenic, and Mehlich III lead and phosphorus by sample depth are shown in Figure 5-39. The top of each bar depicts the mean soil concentration of the focal analyte, and the whiskers show the standard error around the mean. In the plot and the statistical analysis, only the primary samples were included. Therefore, there are four samples per bar (one from each subplot for each amendment) on the graph.

Estimates and 95% confidence intervals for the differences between control and amendment subplots for all other analytes at the lower sampling depth of 10-12 in. are shown in Table 5-6.

These results show that, across treatments, sample depth is significantly correlated with all the focal analytes (Table 5-4, Figure 5-39). Overall, total soil lead, Mehlich III lead, and Mehlich III phosphorus concentrations decrease significantly with sample depth. Total arsenic concentrations were positively correlated with sample depth (Table 5-4) because of overall higher soil concentrations just below the soil surface (samples from 2-4 and 4-6 in. below the soil surface), but like other focal analytes decreased at deeper sample intervals (Figure 5-39). For total soil arsenic and lead and Mehlich III lead, this pattern is not influenced by the soil amendments – in other words, the change in arsenic and lead concentrations with depth is similar for the control subplots and the subplots treated with the soil amendments.

For Mehlich III phosphorus, there was a significant effect of some amendments compared to control. Both the phosphate and the phosphate and biochar amendments significantly increased the soil phosphorus concentrations in comparison to the control subplots. As stated above, there was a significant decrease in Mehlich III phosphorus with sample depth, with the deeper samples having lower phosphorus concentrations. In subplots treated with the phosphate amendment, the rate of decrease of Mehlich III phosphorus with depth is greater than in the subplots treated with compost or phosphate and biochar or control subplots (as indicated by a significant negative interaction term between phosphate treatment and sample depth, Table 5-4).

Analysis of the samples collected only at the deepest sampling depth (10-12 in.) indicated no difference between treated subplots and control subplots for total arsenic, total lead, or Mehlich III lead concentrations at this depth (Table 5-5). Mehlich III phosphorus at 10-12 in. below soil surface was significantly higher for the phosphate and biochar treatment compared to control (Table 5-5), although phosphorus soil concentrations at the 10-12 in. depth were not significantly different from control in the phosphate-only treated subplots (Table 5-5). Based on these results, the steep decrease in phosphorus concentrations with depth, and the fact that only one of the phosphate treatments was still significantly different from control at the lowest depth, it appears that phosphate-based soil amendments applied at the rates specified for the SATES field-scale testing are unlikely to cause phosphate contamination in deeper soil or subsurface migration of phosphate to groundwater.

Soil concentrations of all other non-focal analytes (aluminum, antimony, barium, etc.) at the deepest sampling depth (10-12 in.) did not differ by treatment (Table 5-6).

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FIGURES

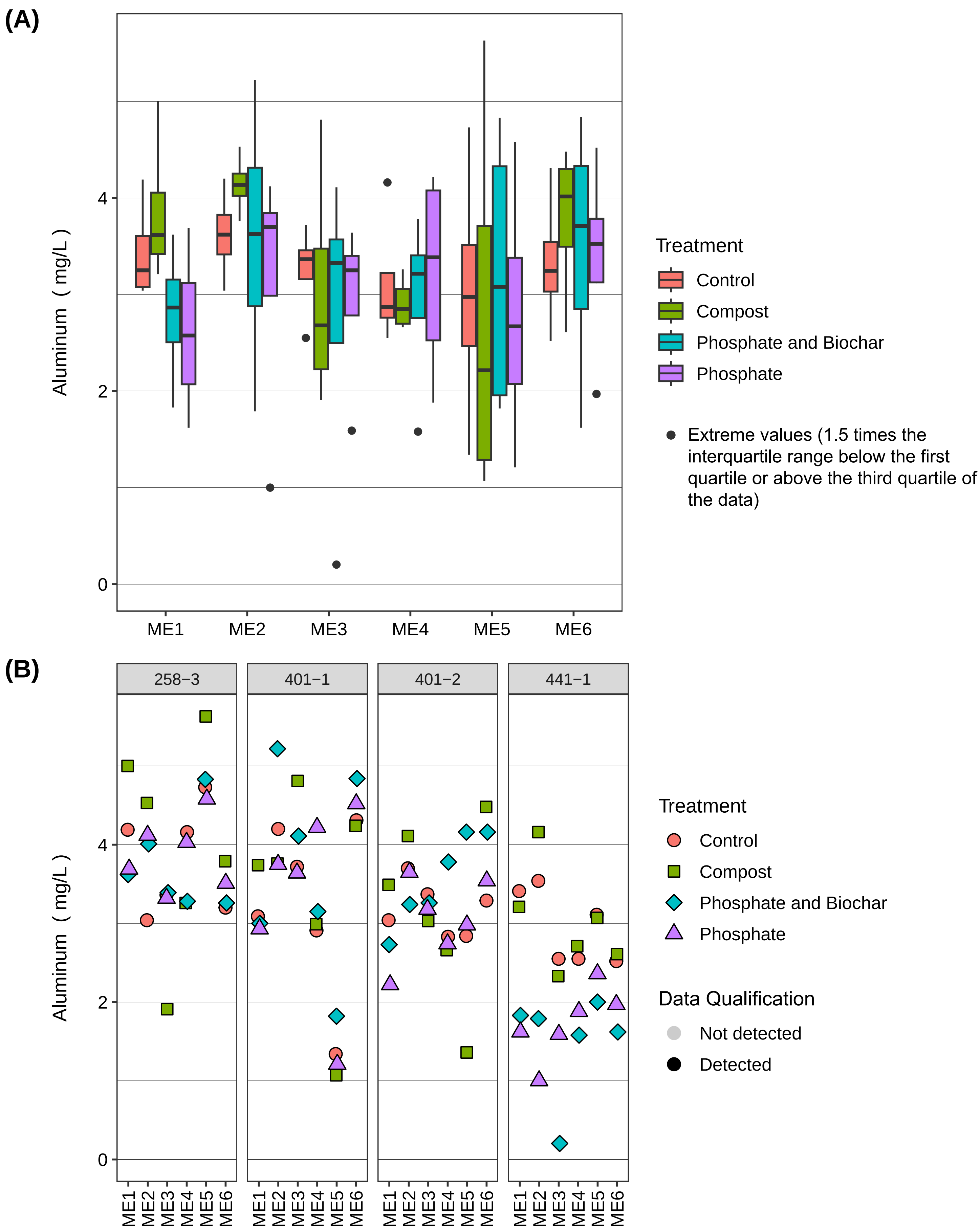


Figure 5−1. Aluminum in SPLP Extract Analyses for Soil Samples

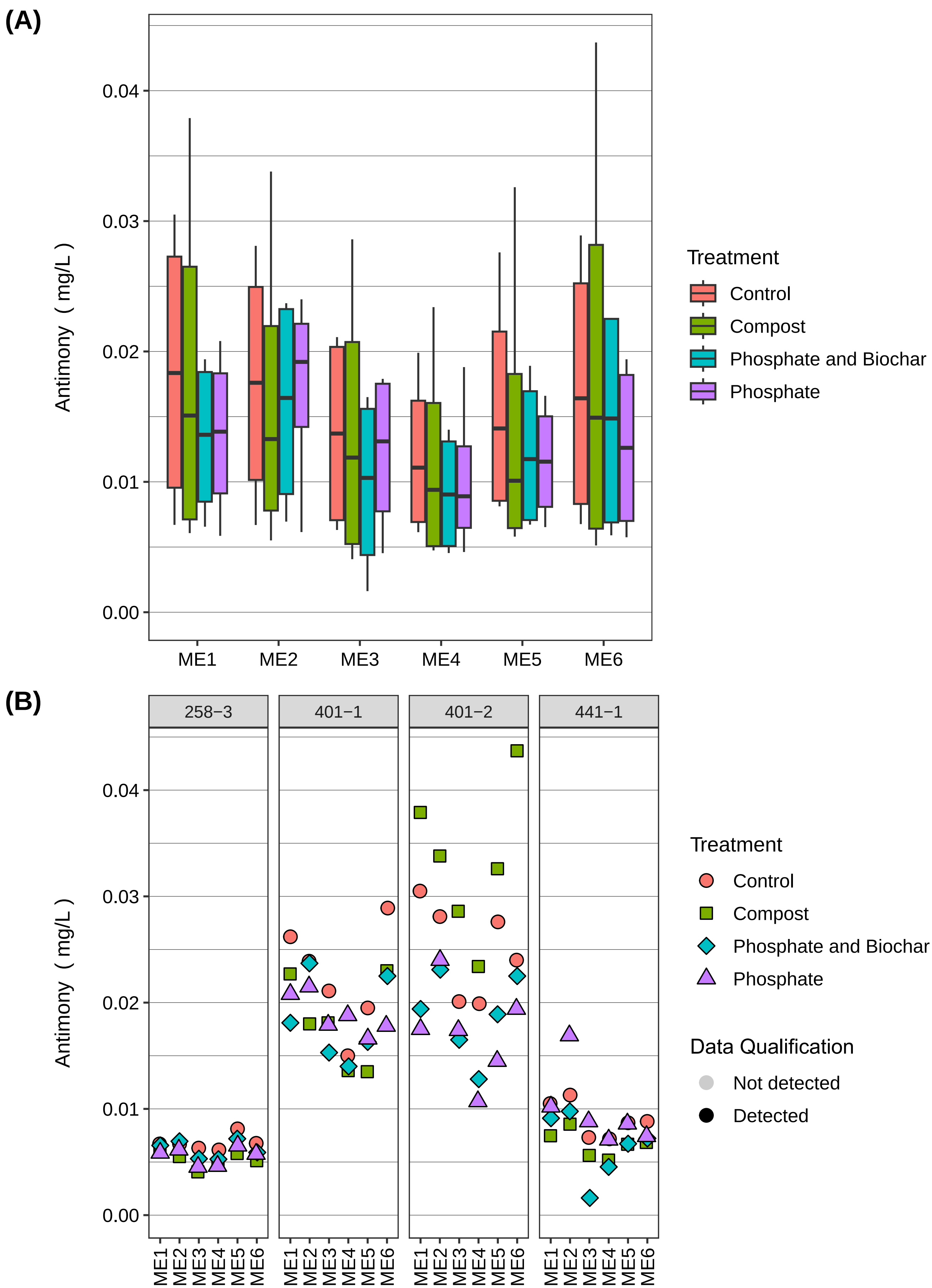


Figure 5−2. Antimony in SPLP Extract Analyses for Soil Samples

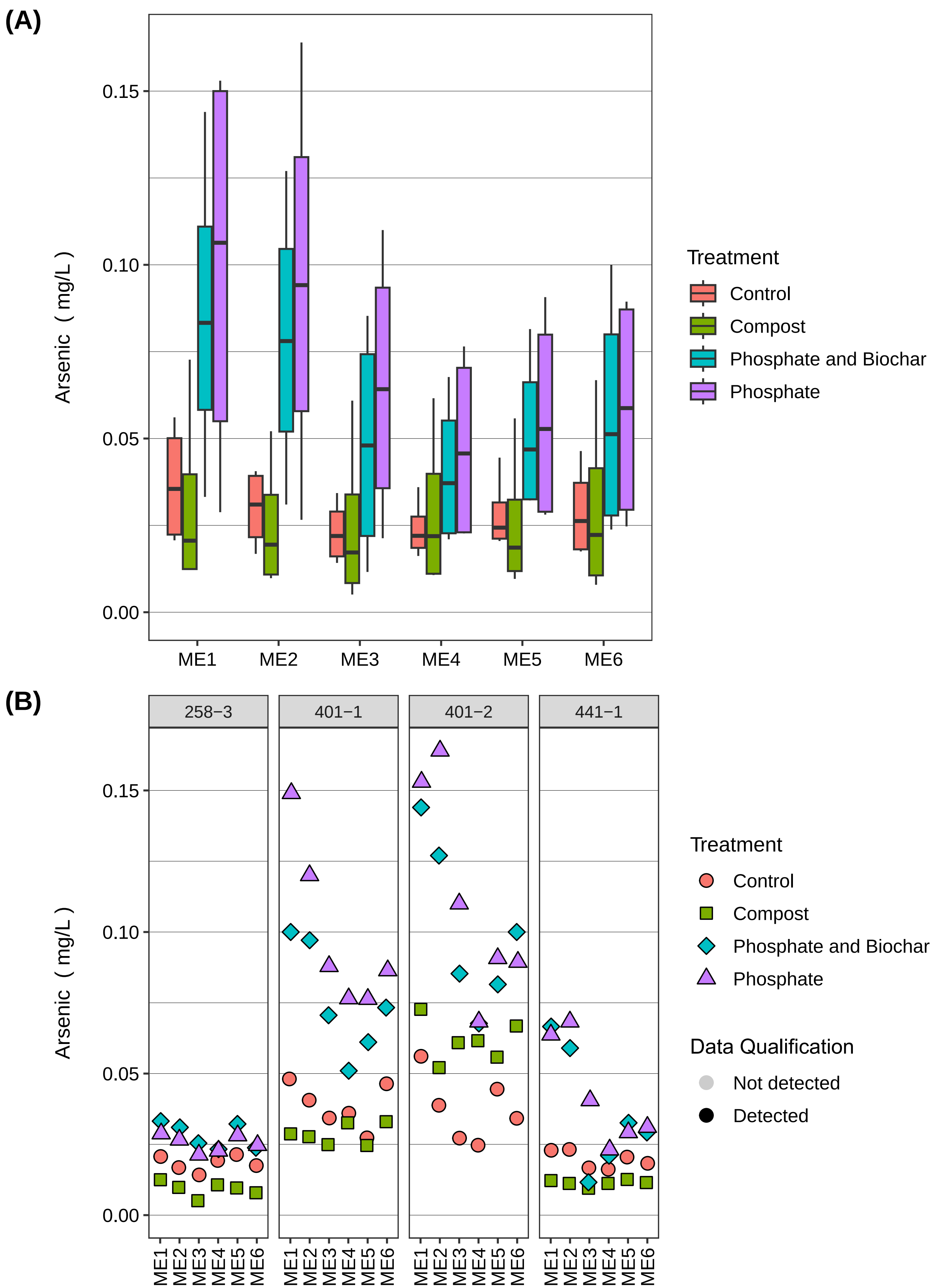


Figure 5−3. Arsenic in SPLP Extract Analyses for Soil Samples

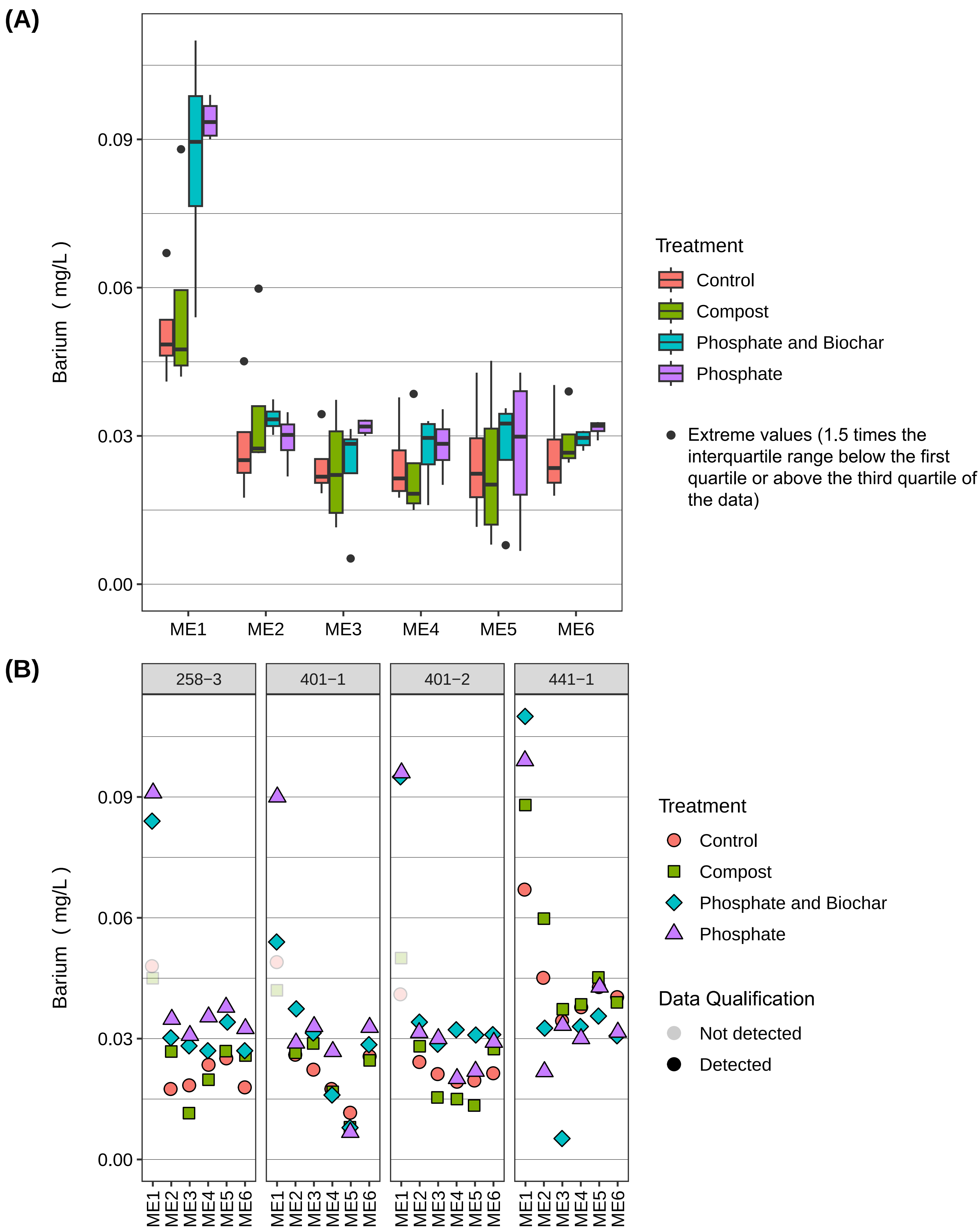
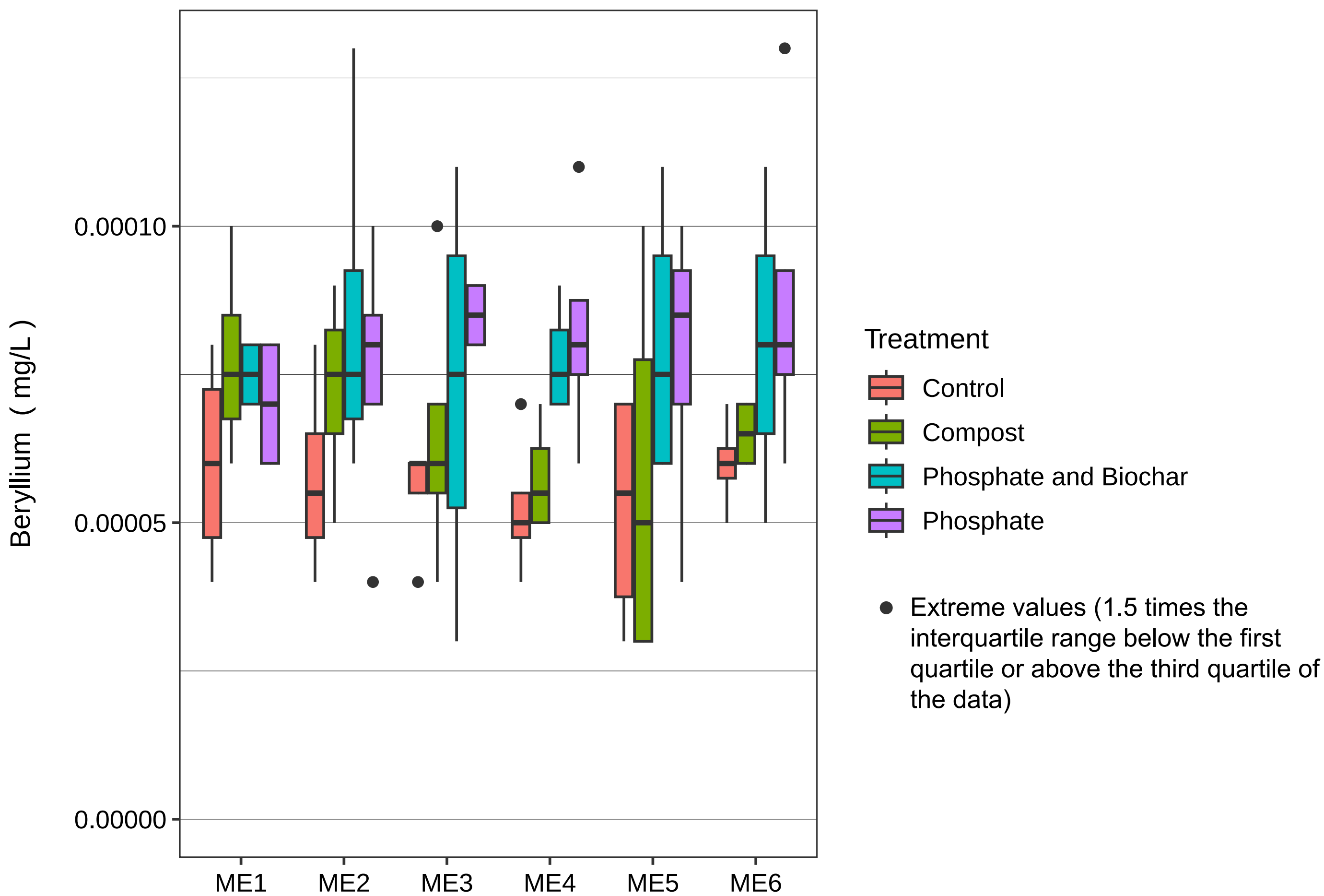


Figure 5−4. Barium in SPLP Extract Analyses for Soil Samples

(A)



(B)

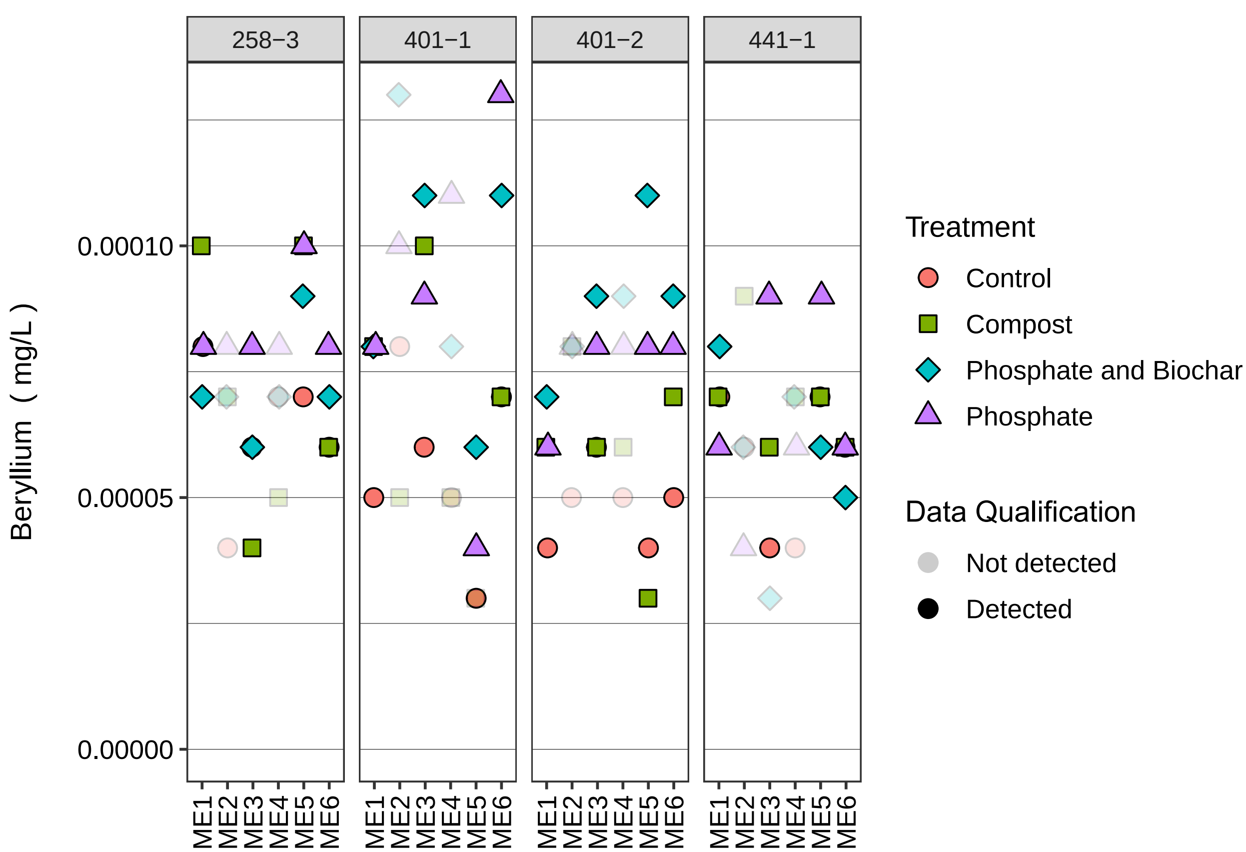


Figure 5−5. Beryllium in SPLP Extract Analyses for Soil Samples

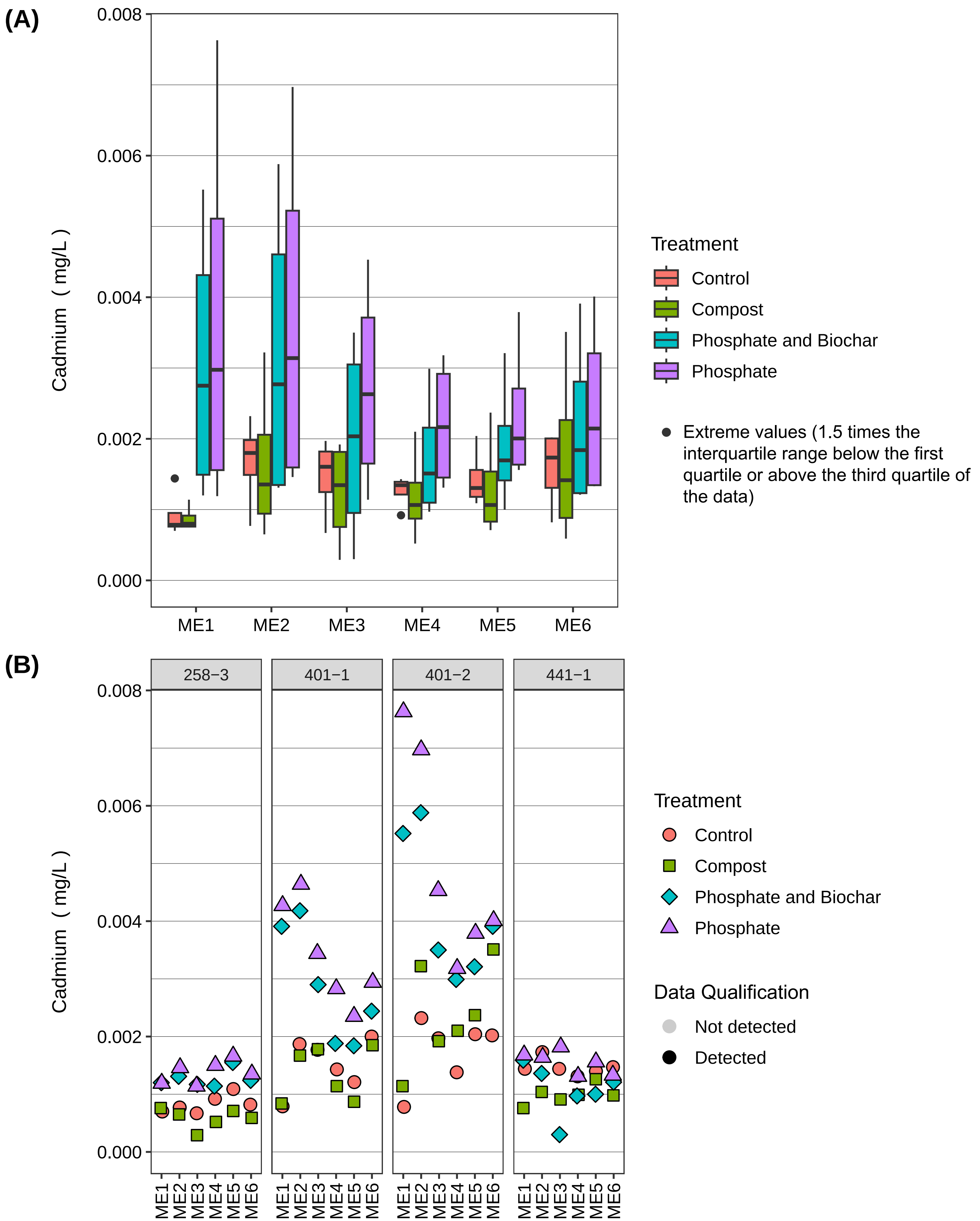


Figure 5−6. Cadmium in SPLP Extract Analyses for Soil Samples

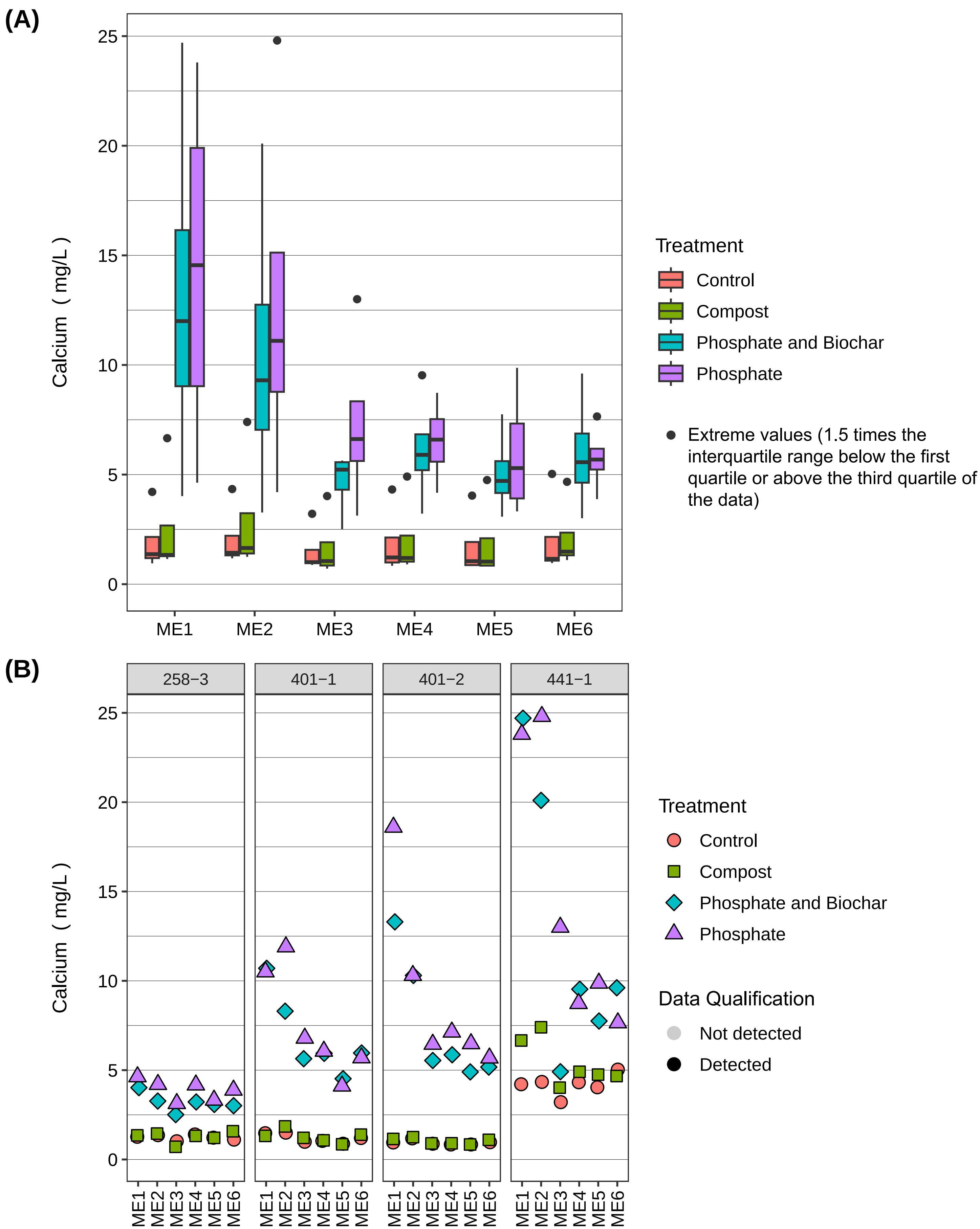


Figure 5−7. Calcium in SPLP Extract Analyses for Soil Samples

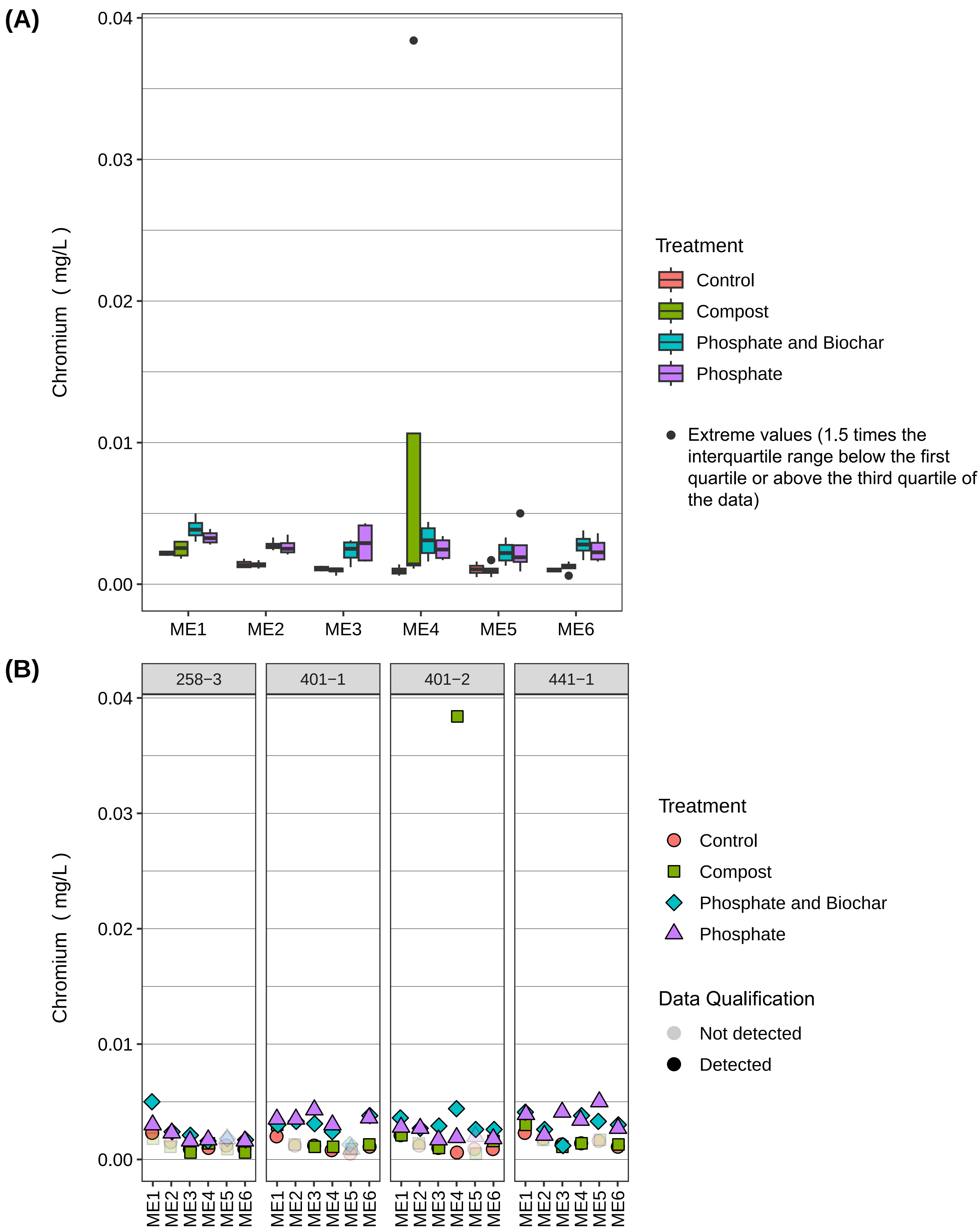


Figure 5−8. Chromium in SPLP Extract Analyses for Soil Samples

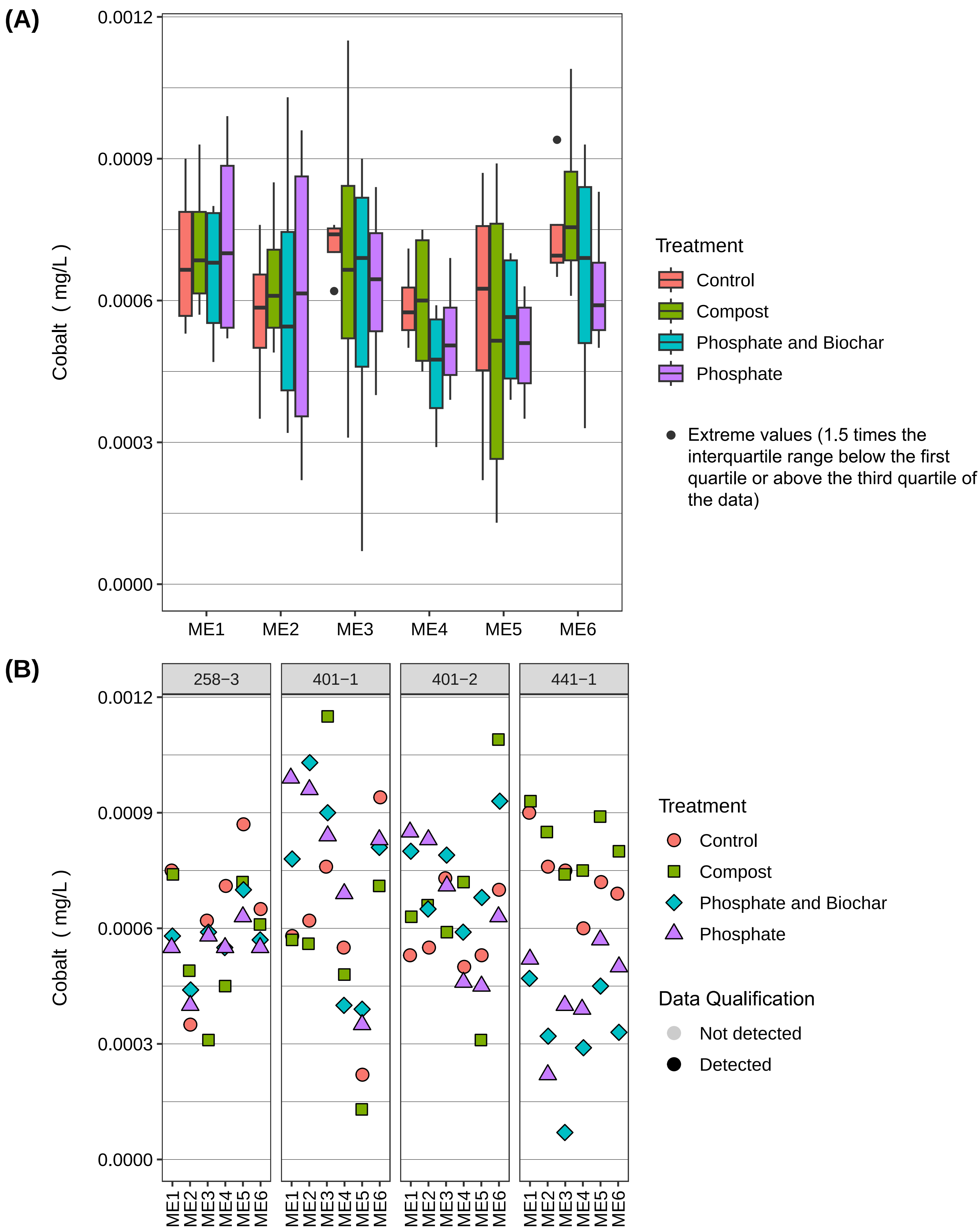


Figure 5−9. Cobalt in SPLP Extract Analyses for Soil Samples

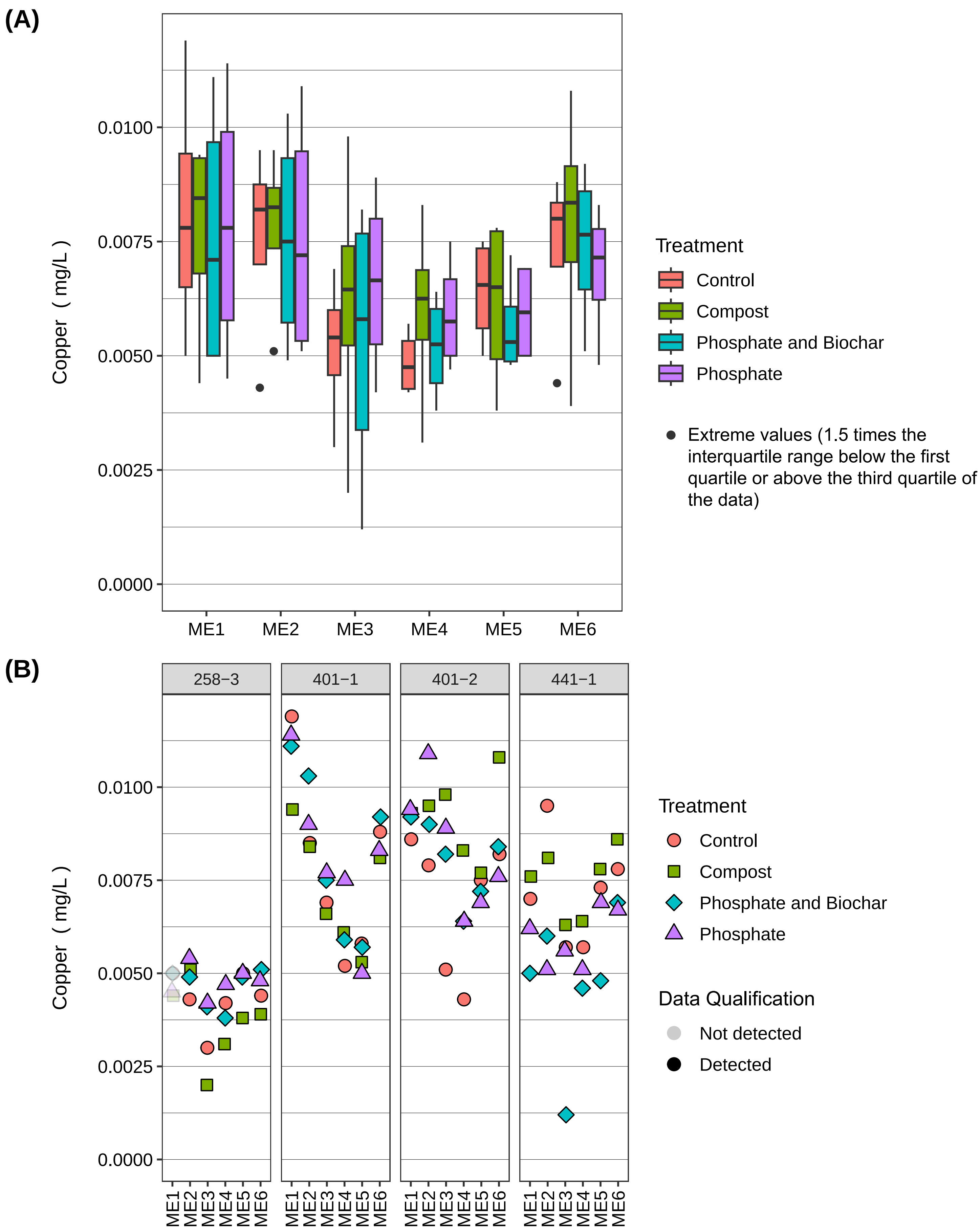


Figure 5−10. Copper in SPLP Extract Analyses for Soil Samples

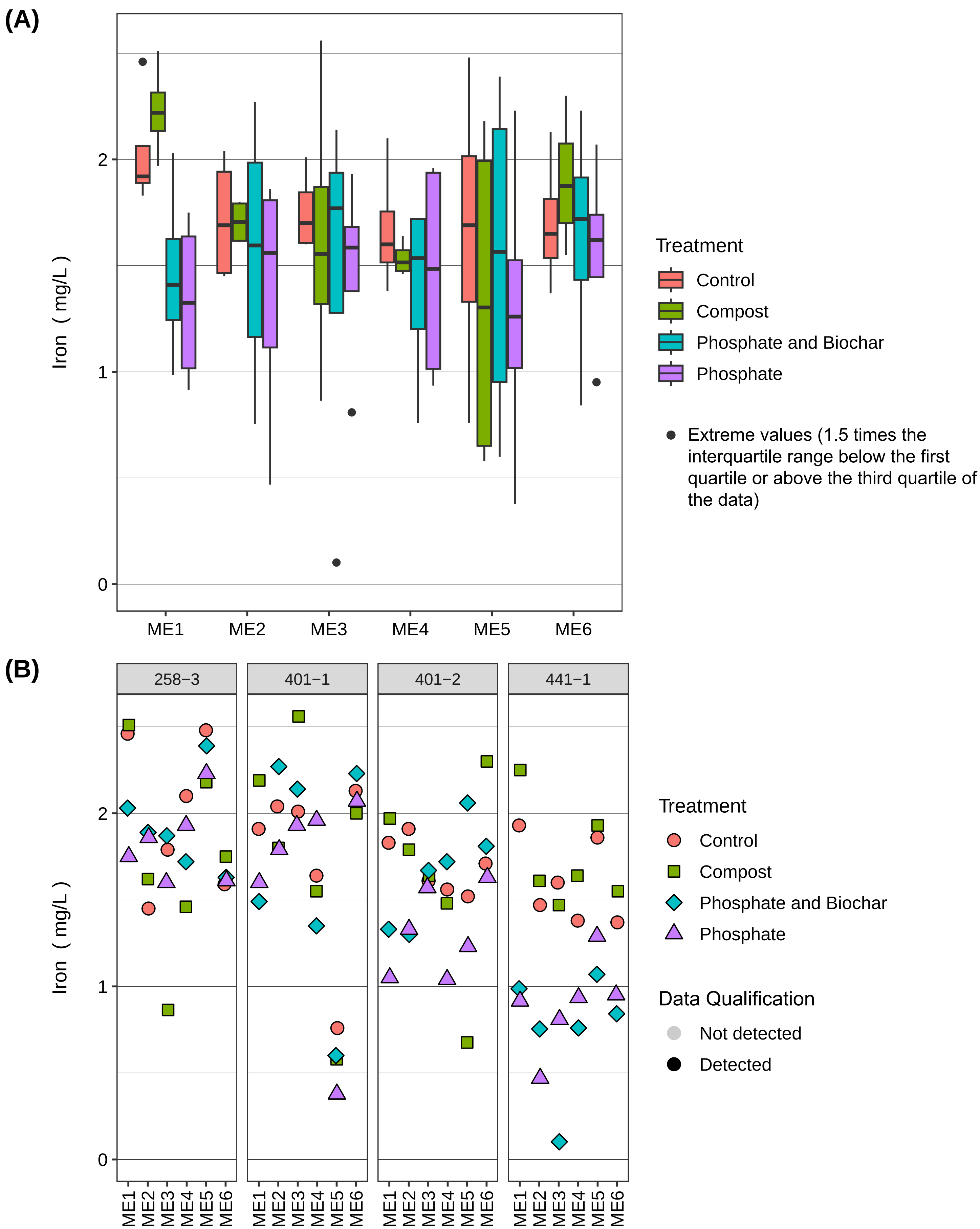


Figure 5−11. Iron in SPLP Extract Analyses for Soil Samples

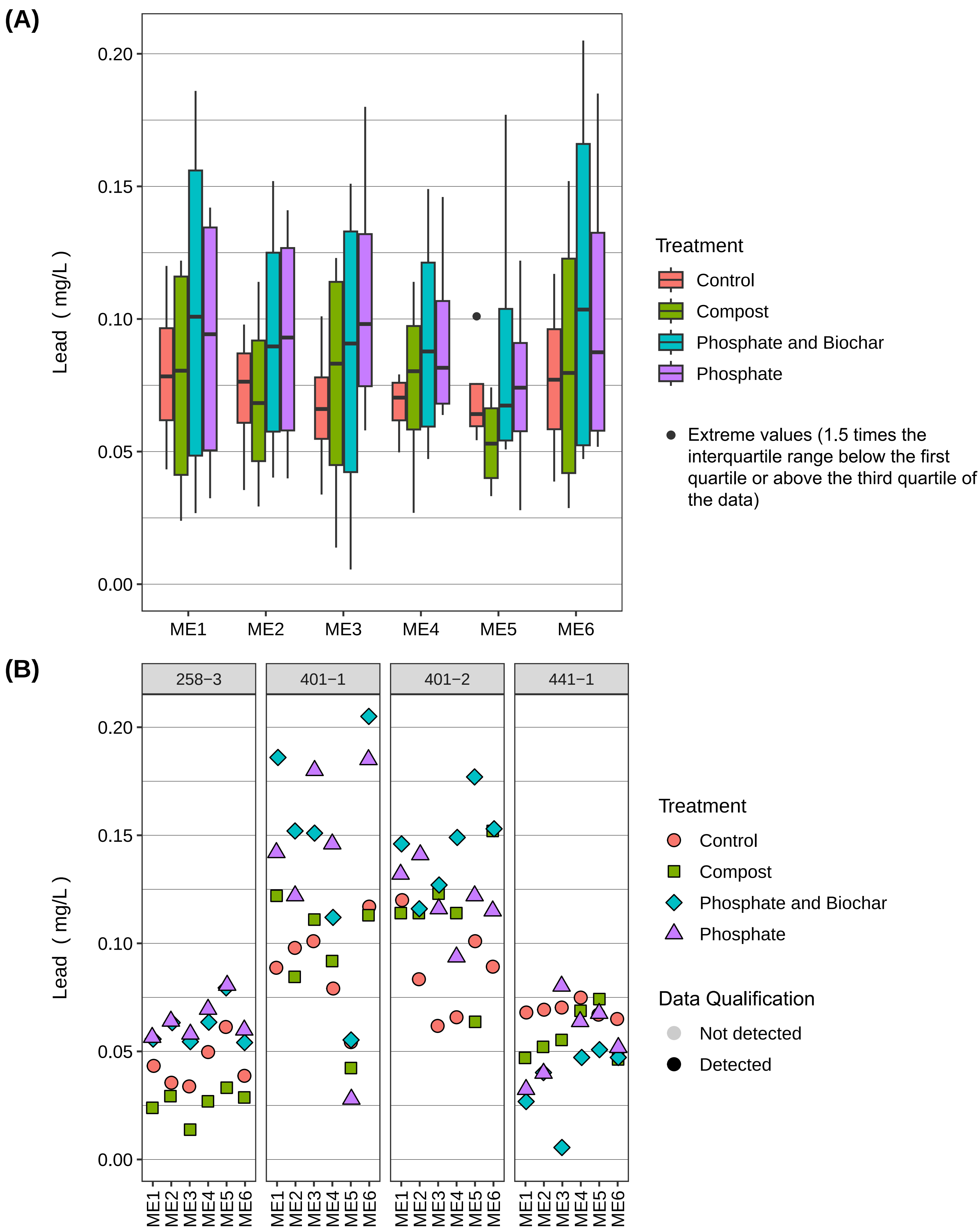


Figure 5−12. Lead in SPLP Extract Analyses for Soil Samples

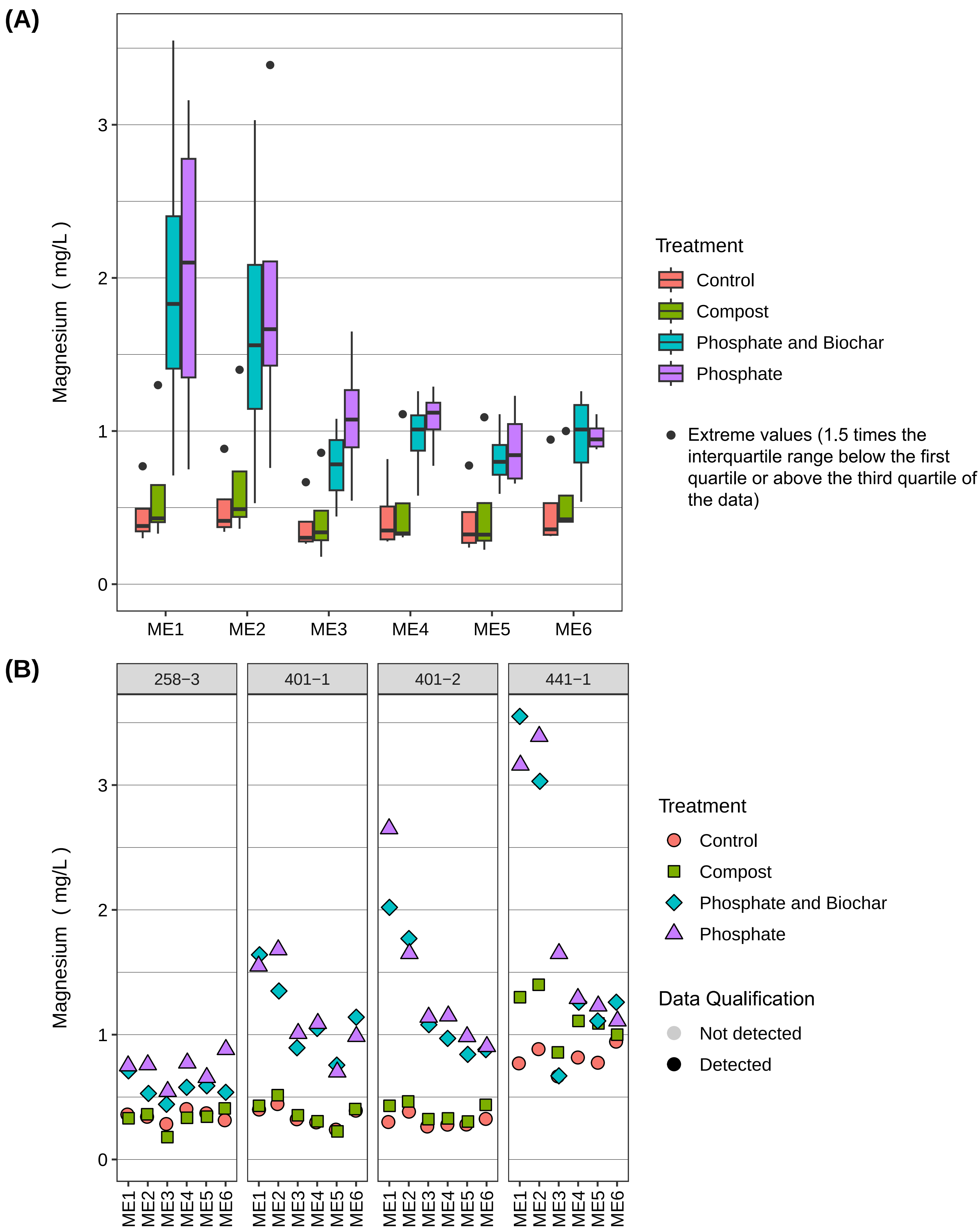


Figure 5−13. Magnesium in SPLP Extract Analyses for Soil Samples

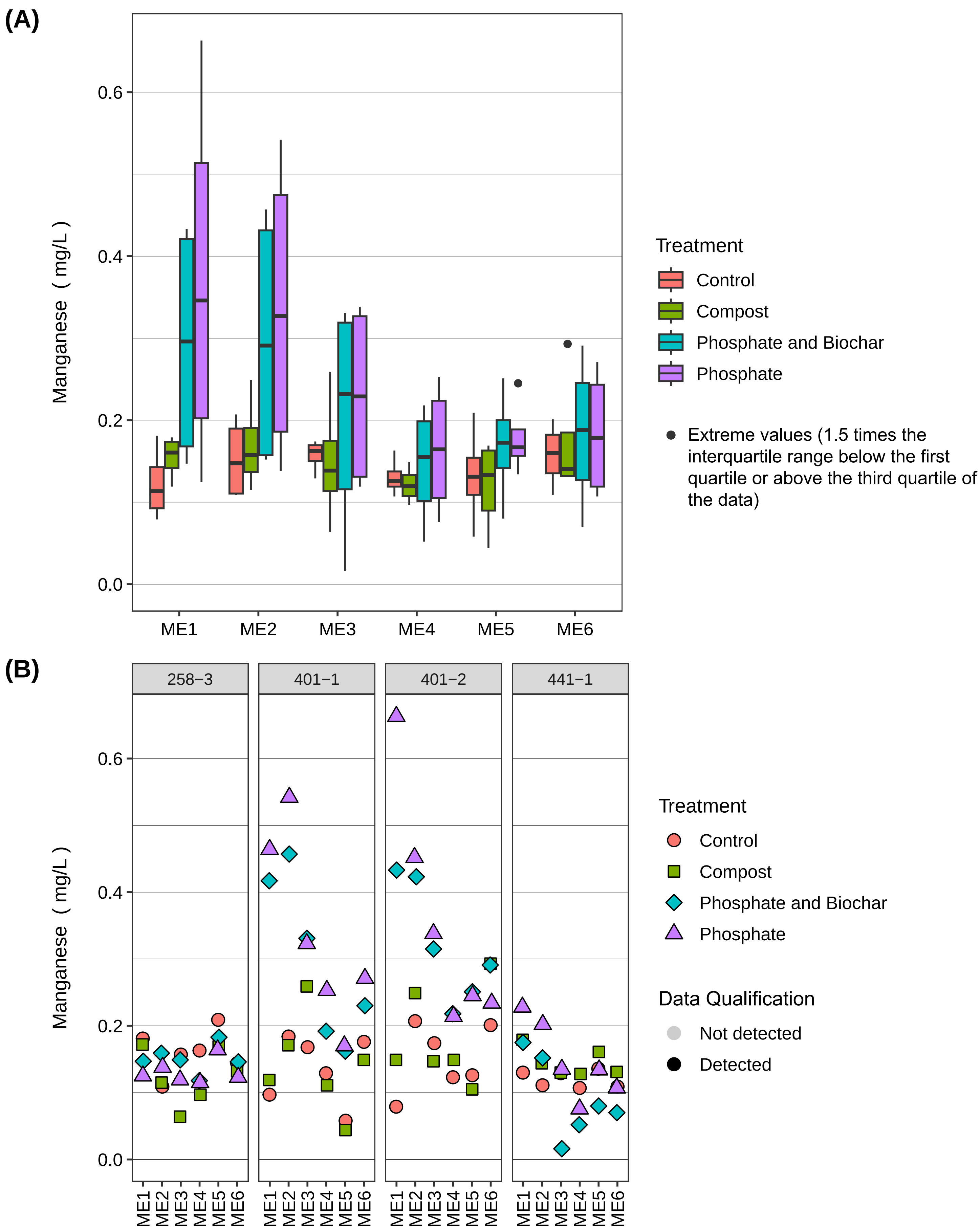


Figure 5−14. Manganese in SPLP Extract Analyses for Soil Samples

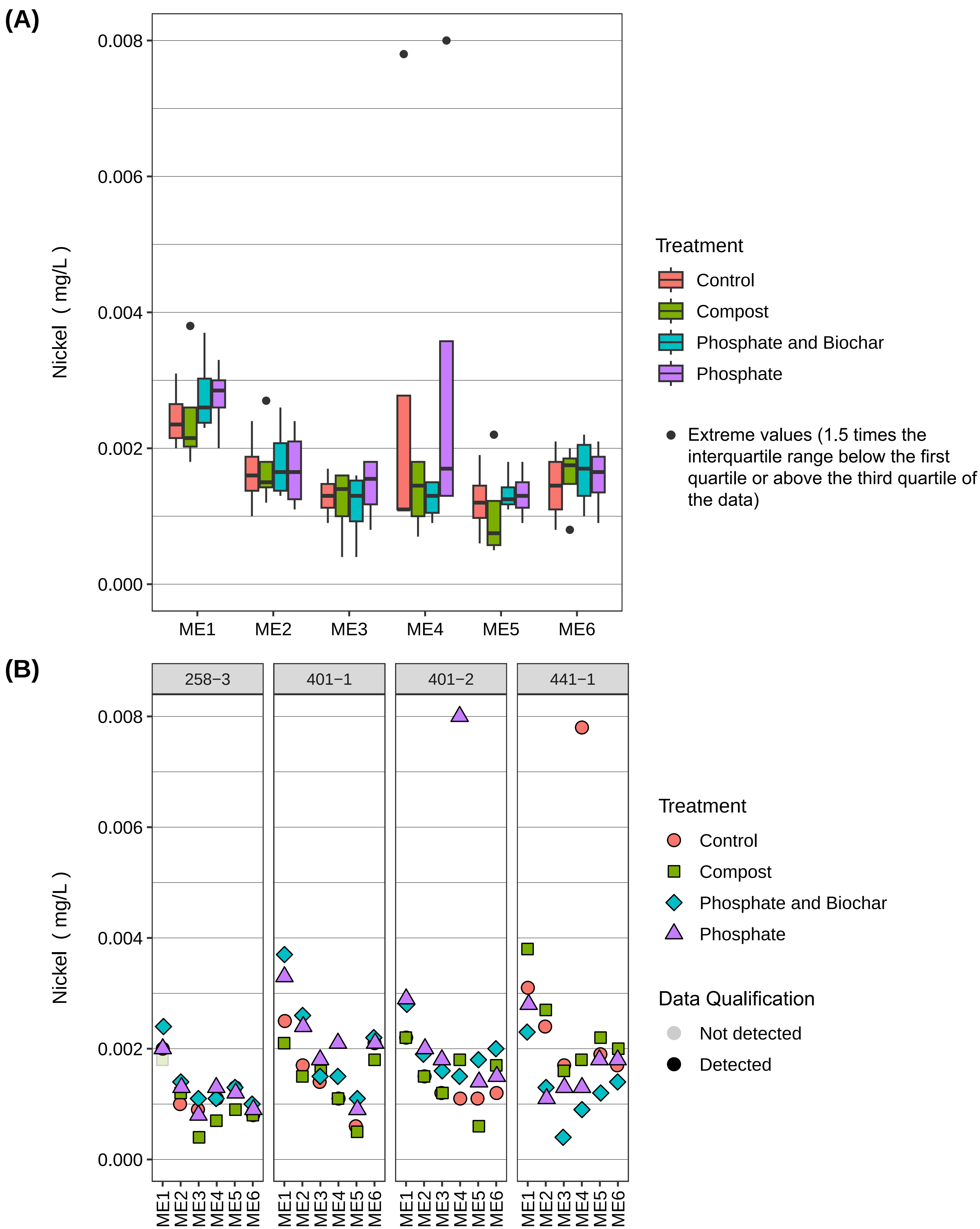


Figure 5−15. Nickel in SPLP Extract Analyses for Soil Samples

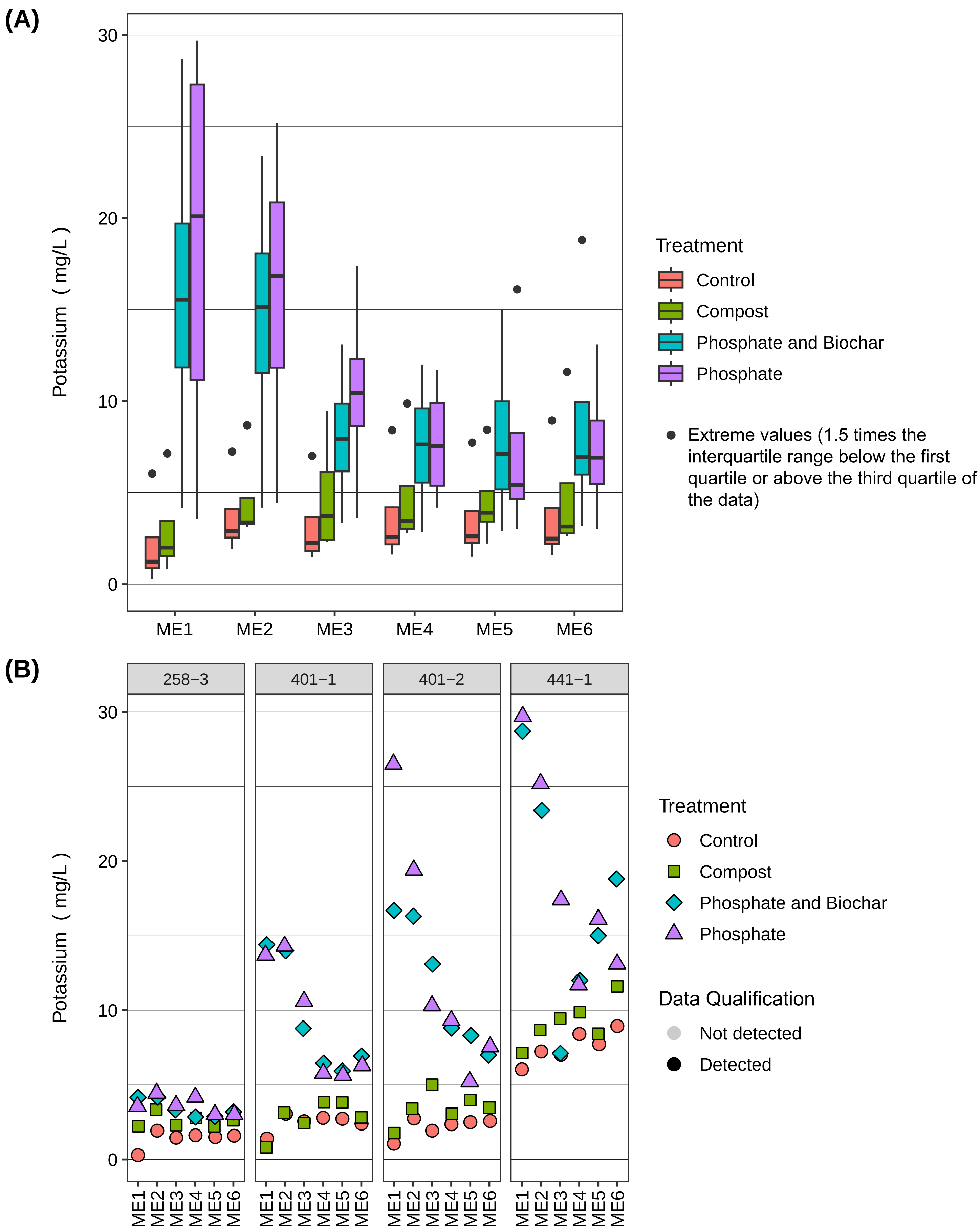


Figure 5−16. Potassium in SPLP Extract Analyses for Soil Samples

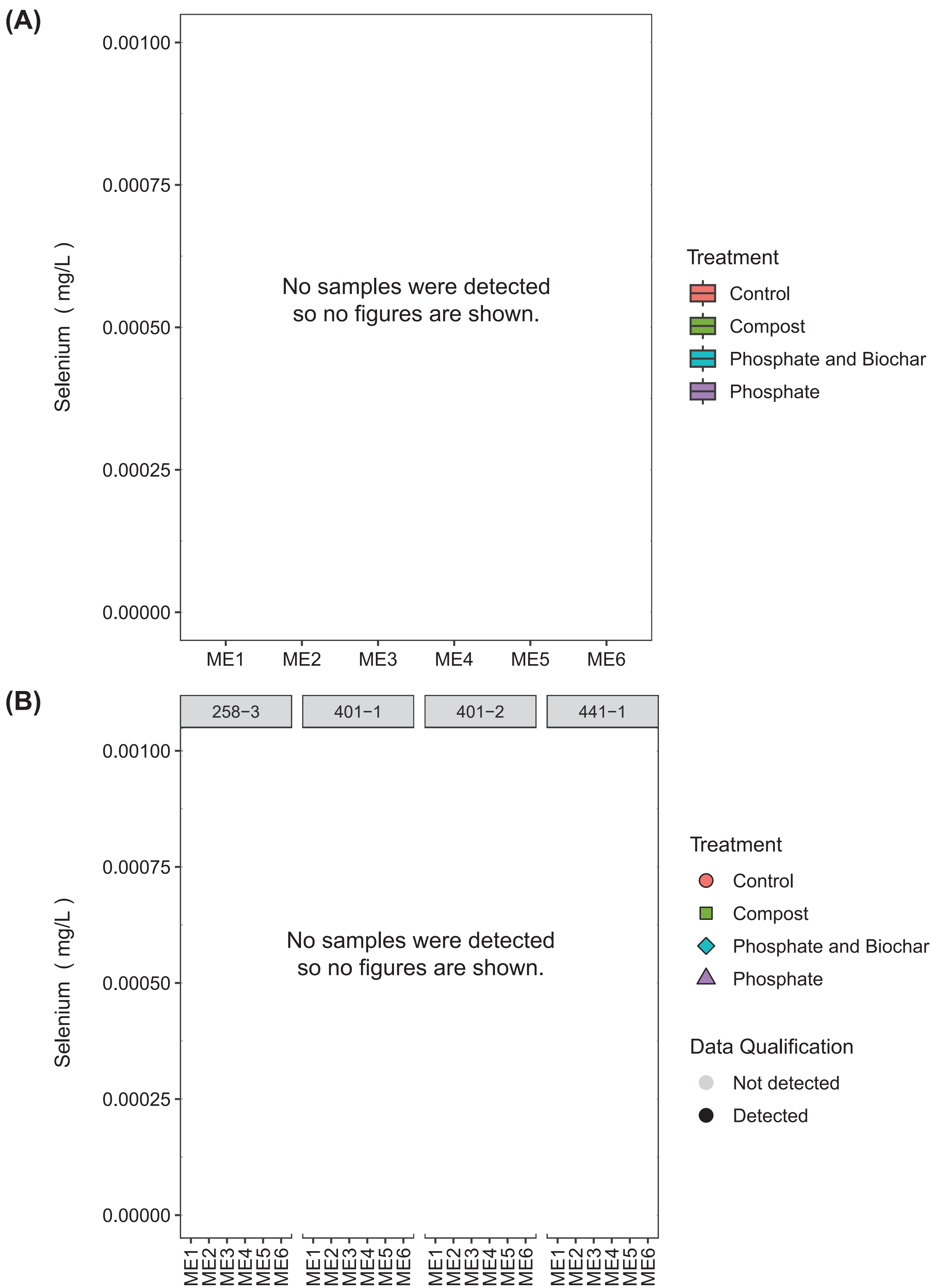


Figure 5−17. Selenium in SPLP Extract Analyses for Soil Samples

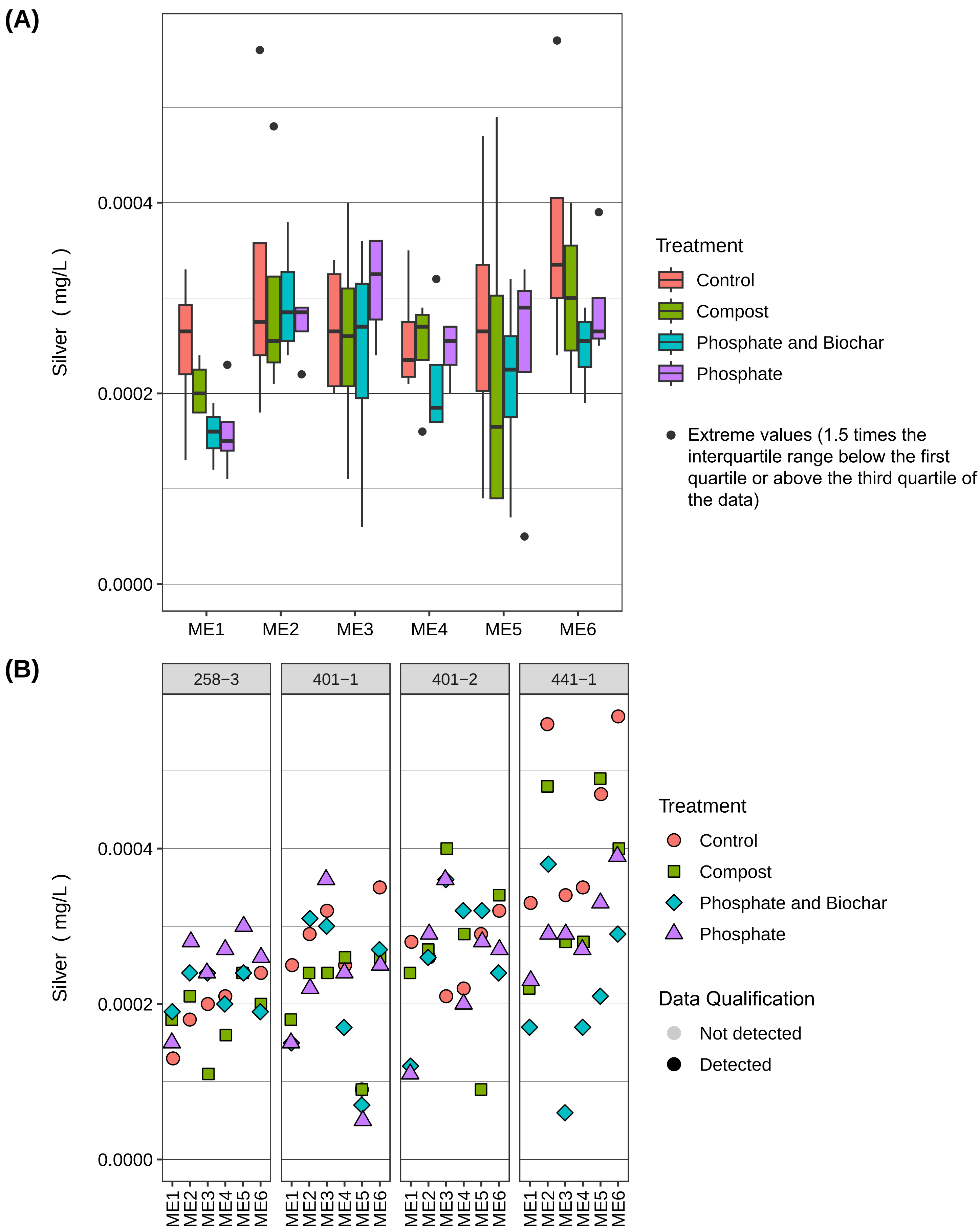


Figure 5−18. Silver in SPLP Extract Analyses for Soil Samples

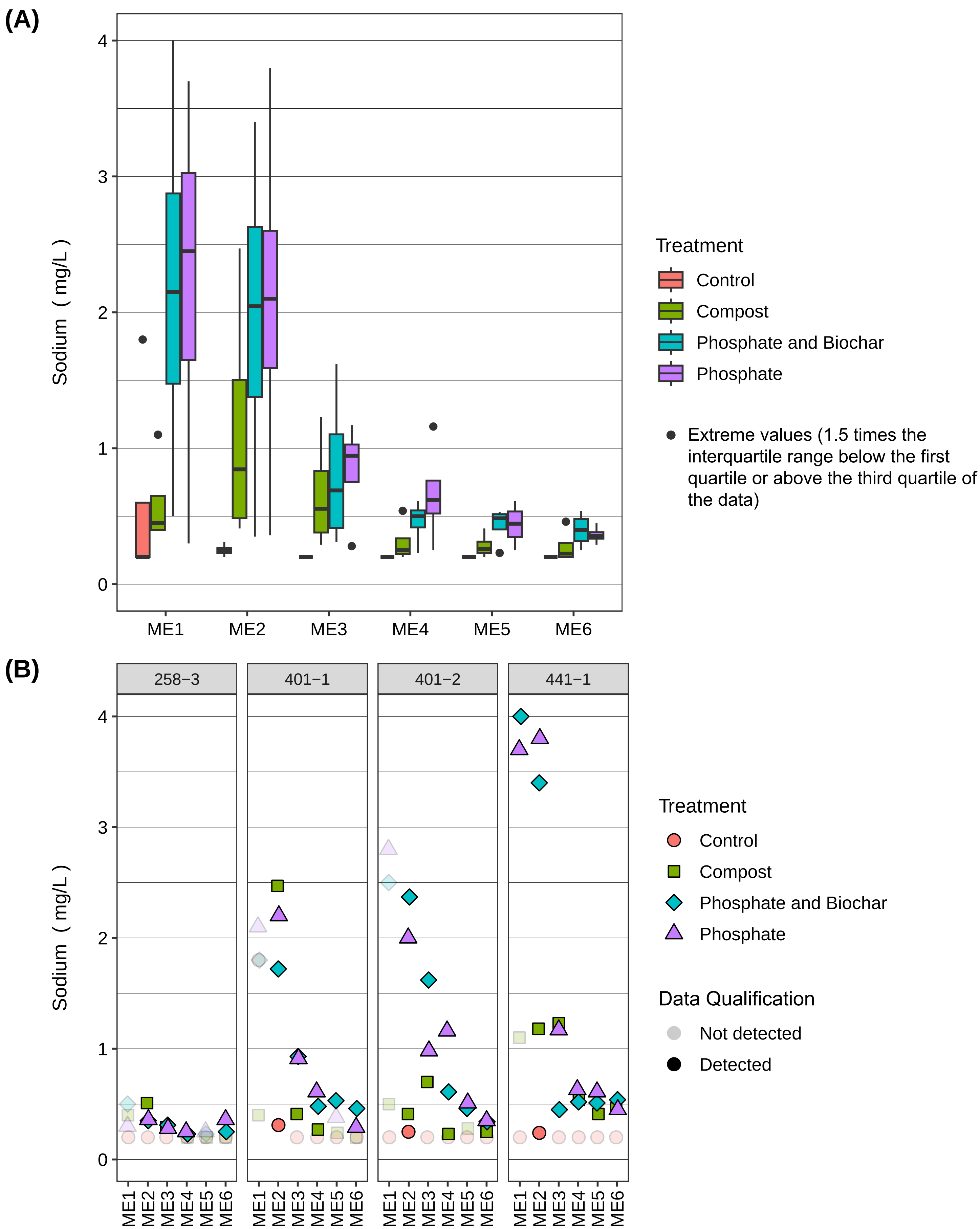


Figure 5−19. Sodium in SPLP Extract Analyses for Soil Samples

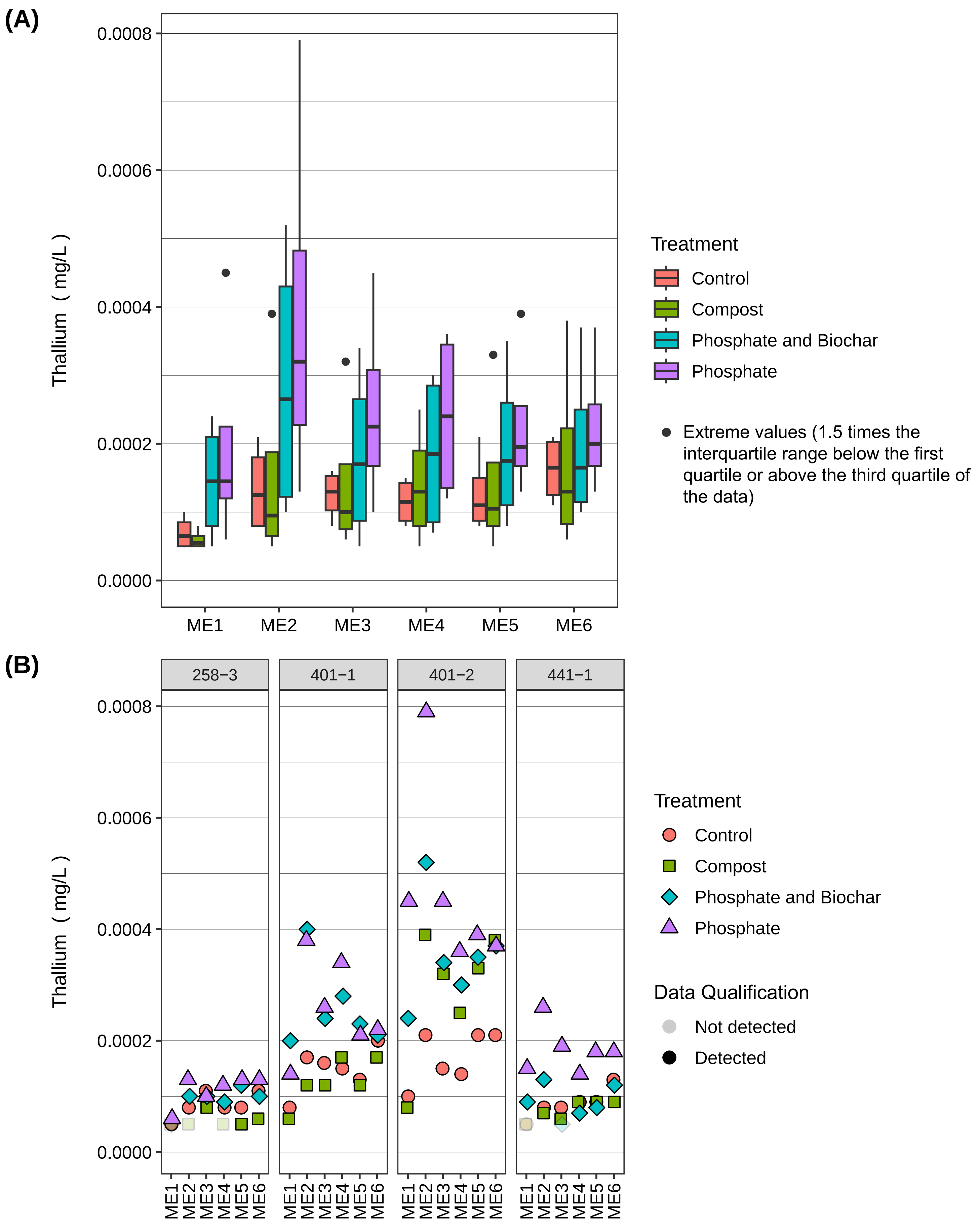


Figure 5−20. Thallium in SPLP Extract Analyses for Soil Samples

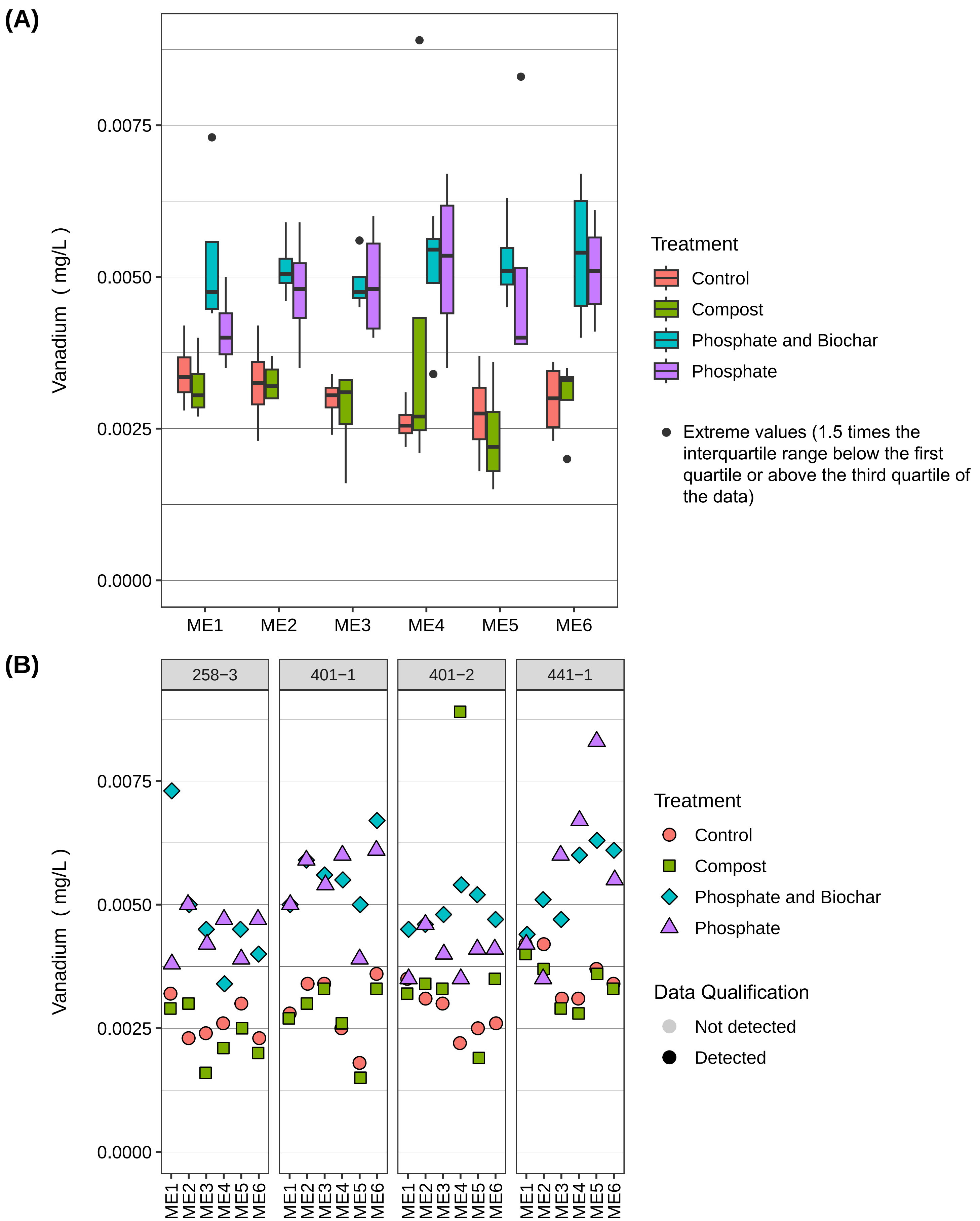


Figure 5−21. Vanadium in SPLP Extract Analyses for Soil Samples

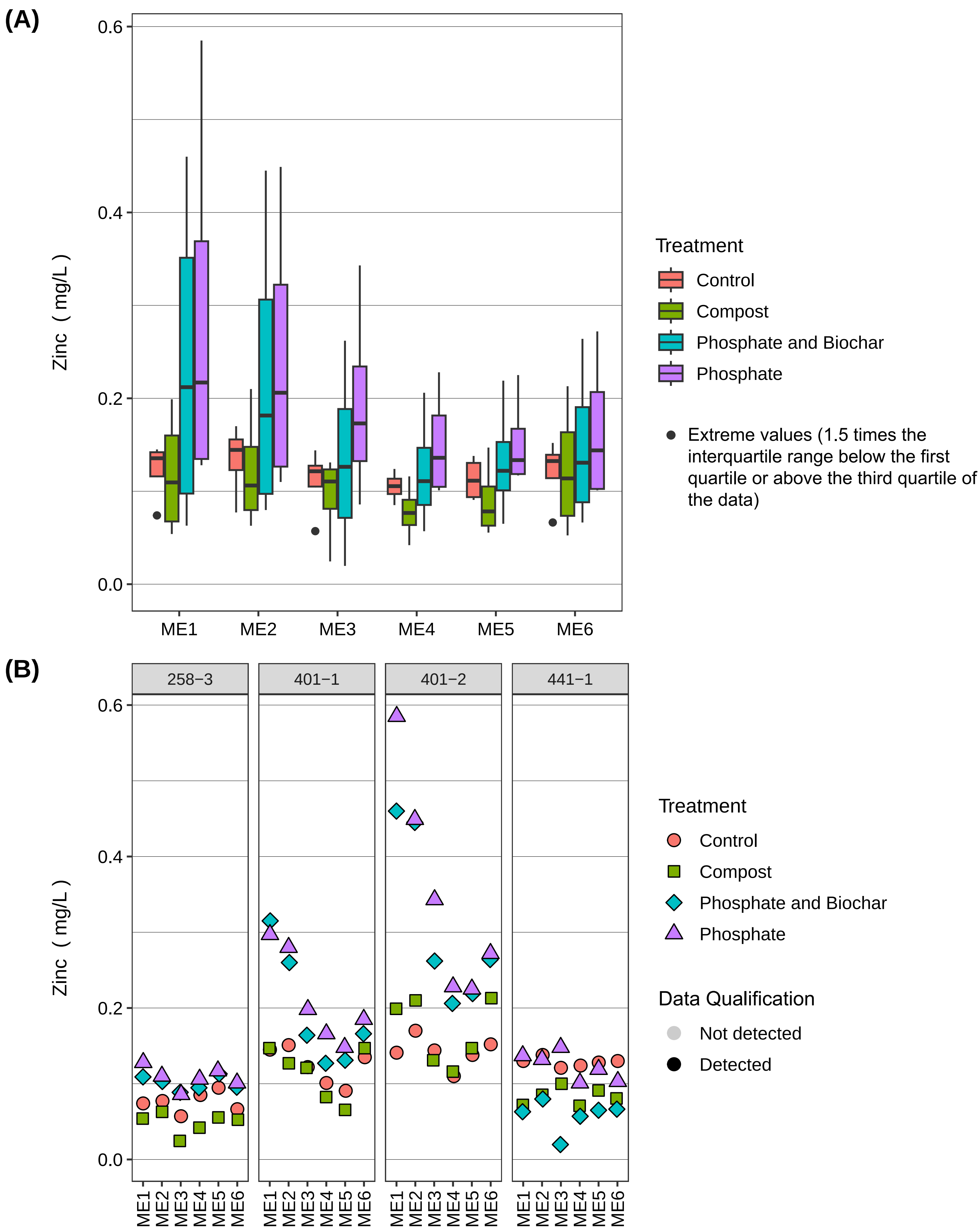


Figure 5−22. Zinc in SPLP Extract Analyses for Soil Samples

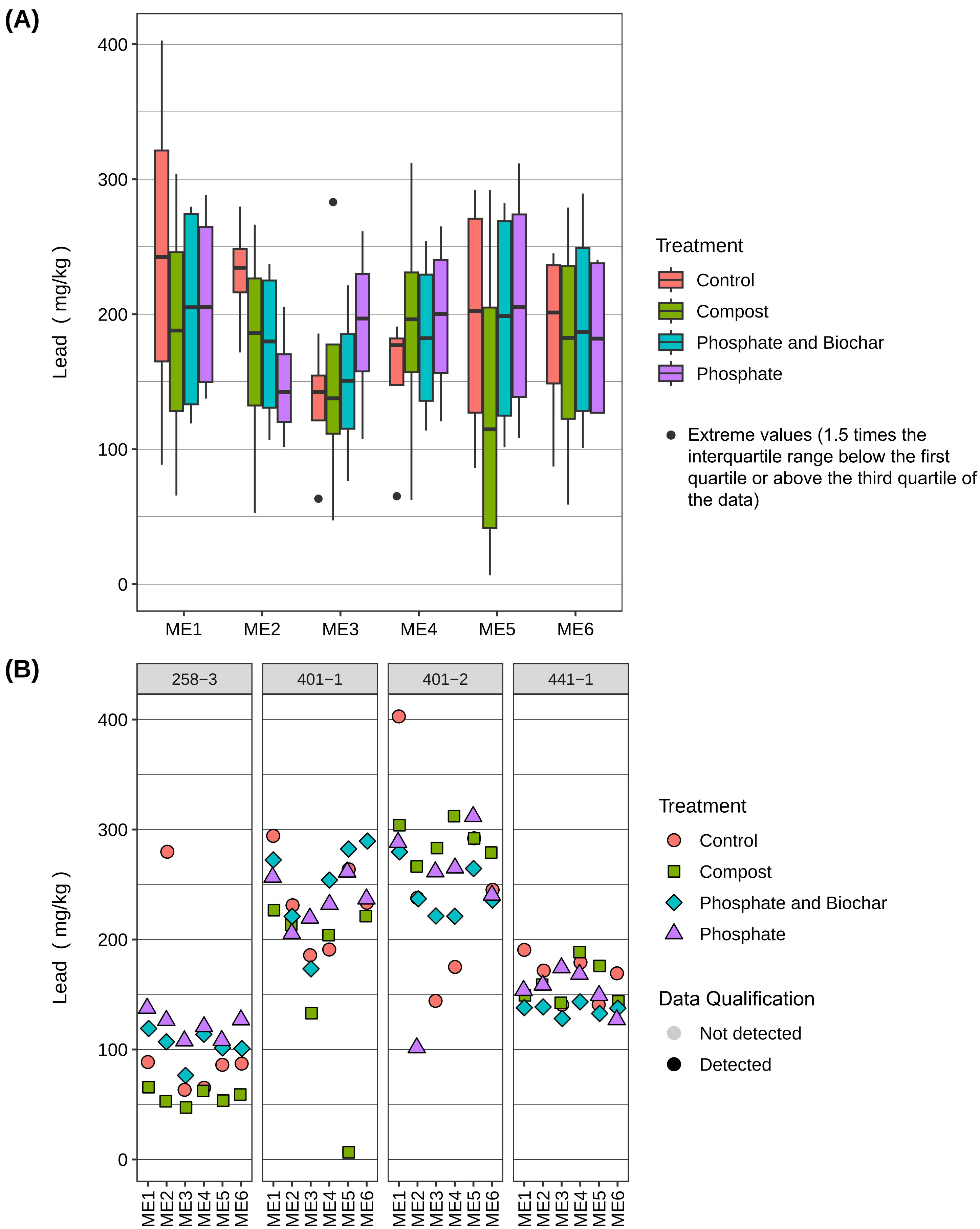


Figure 5−23. Mehlich III Extractable Lead in Soil Samples

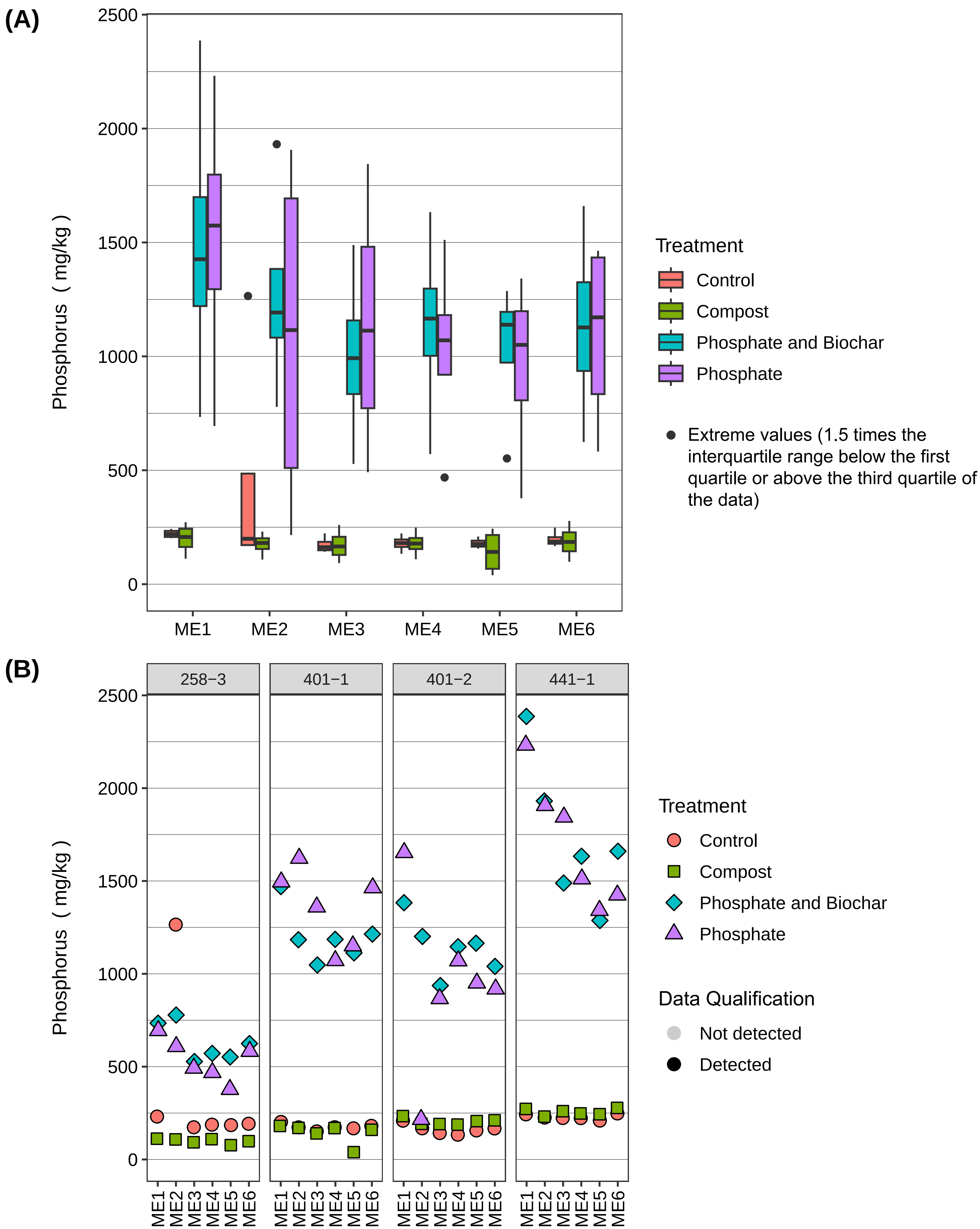


Figure 5−24. Mehlich III Extractable Phosphorus in Soil Samples

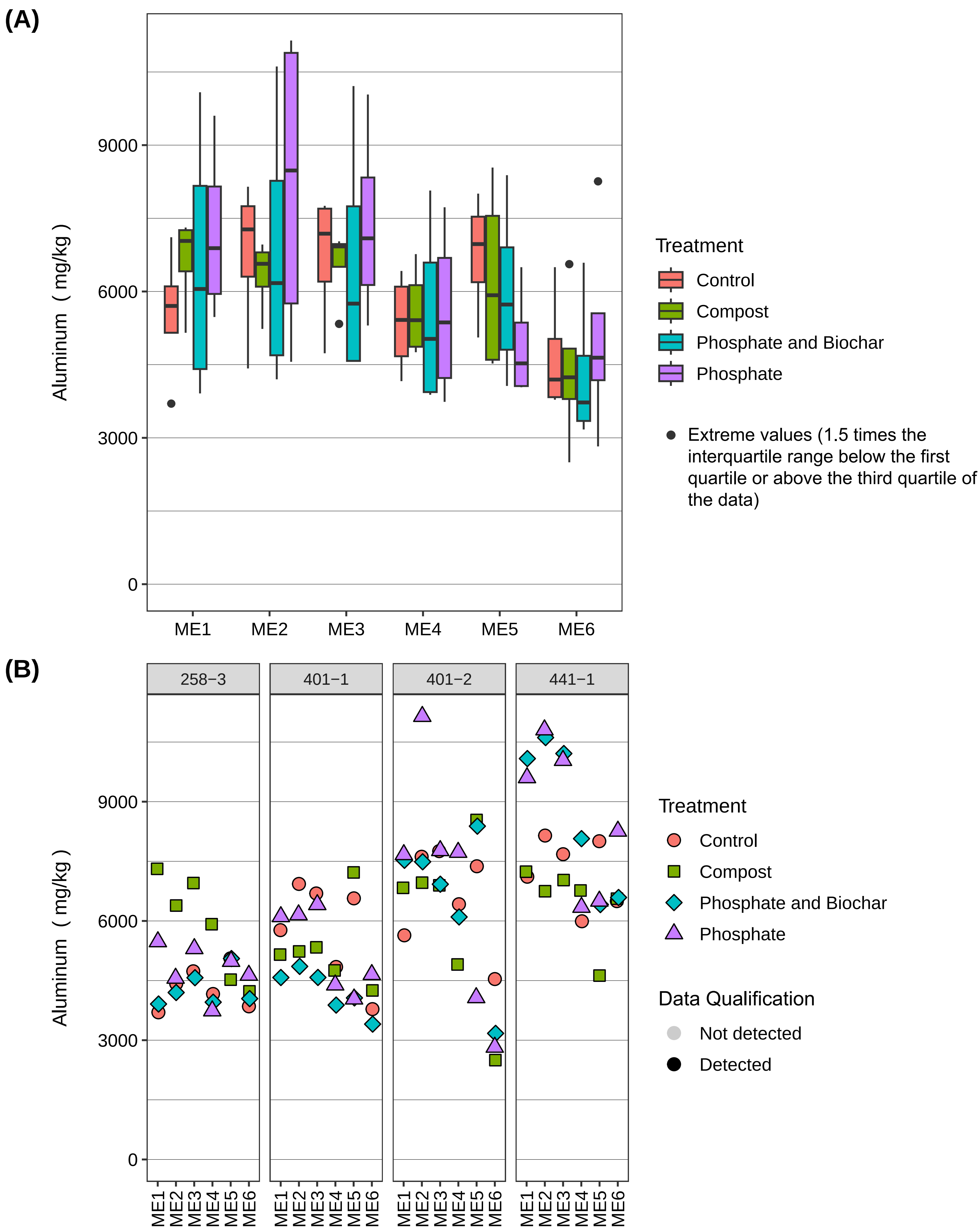


Figure 5−25. Oxalate Extractable Aluminum in Soil Samples

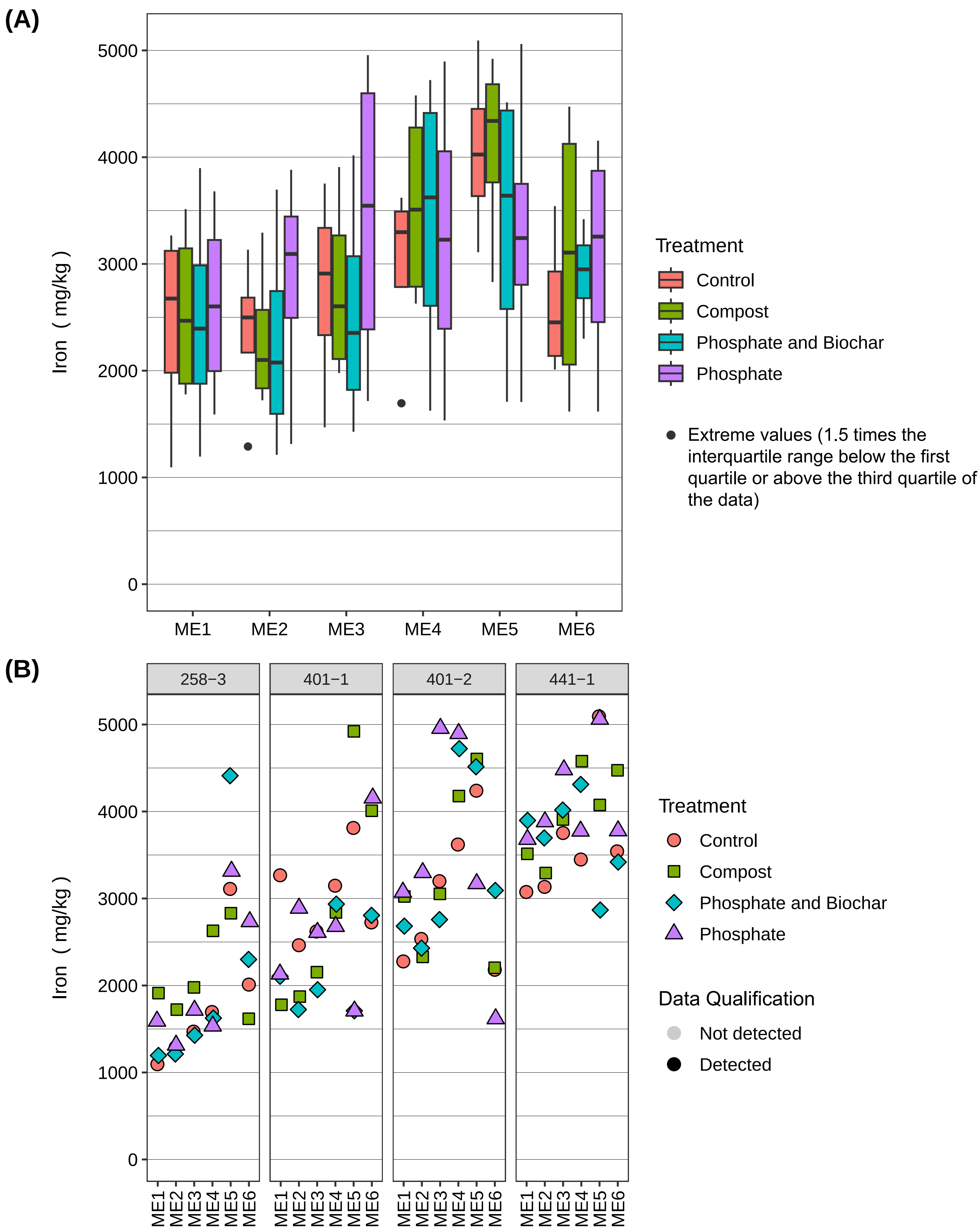


Figure 5−26. Oxalate Extractable Iron in Soil Samples

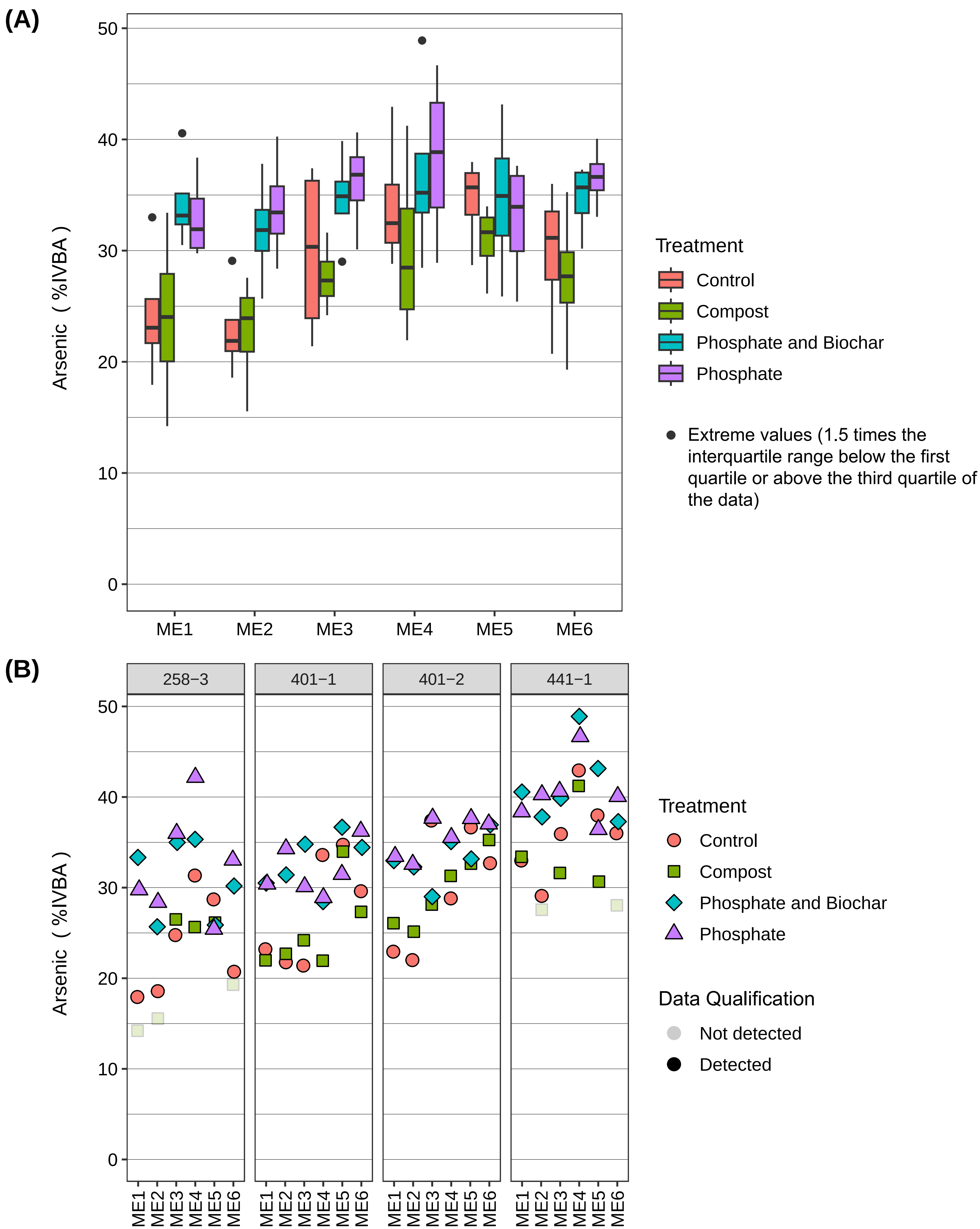


Figure 5−27. IVBA Arsenic (extracted at pH 1.5) in Soil Samples

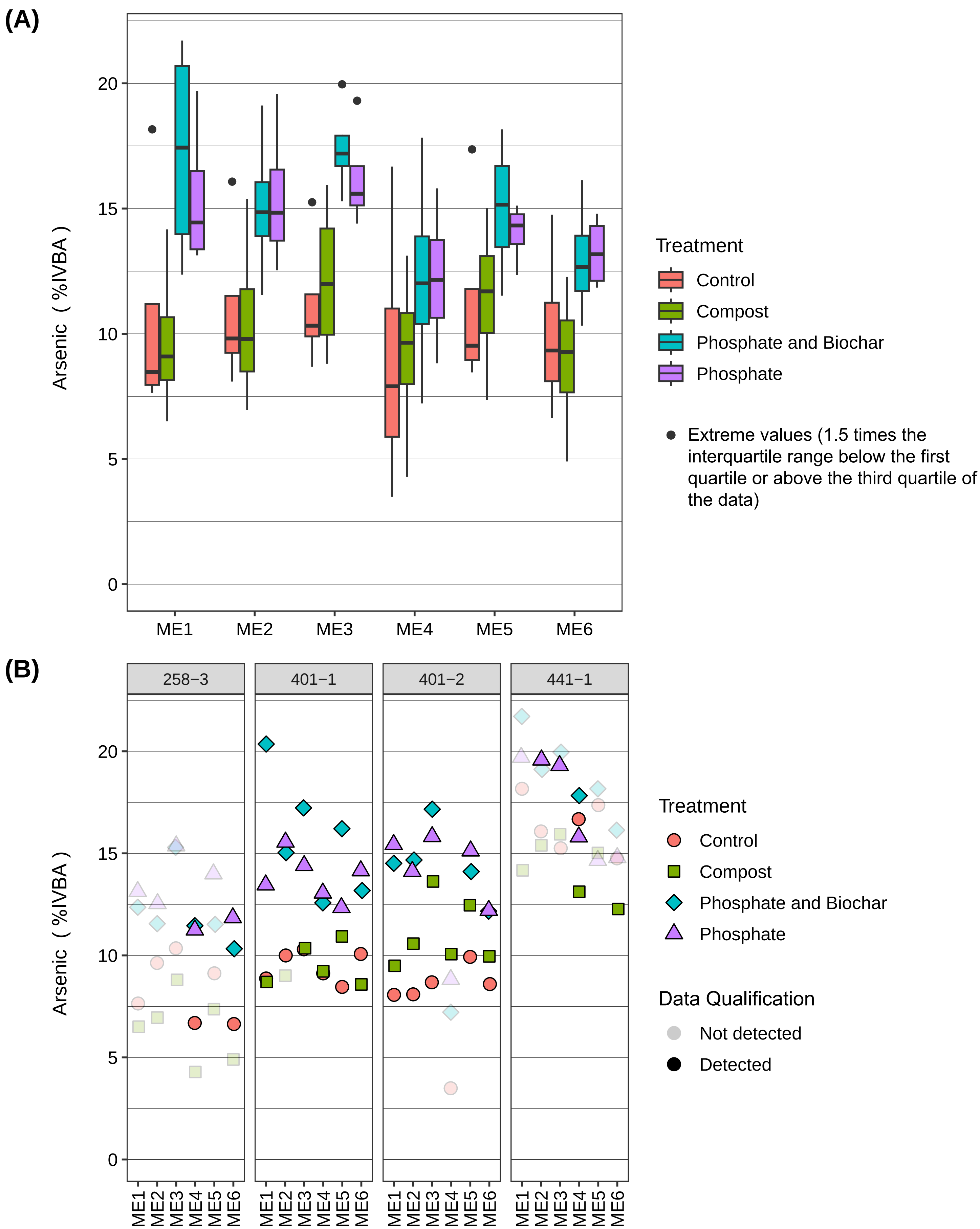


Figure 5−28. IVBA Arsenic (extracted at pH 2.5) in Soil Samples

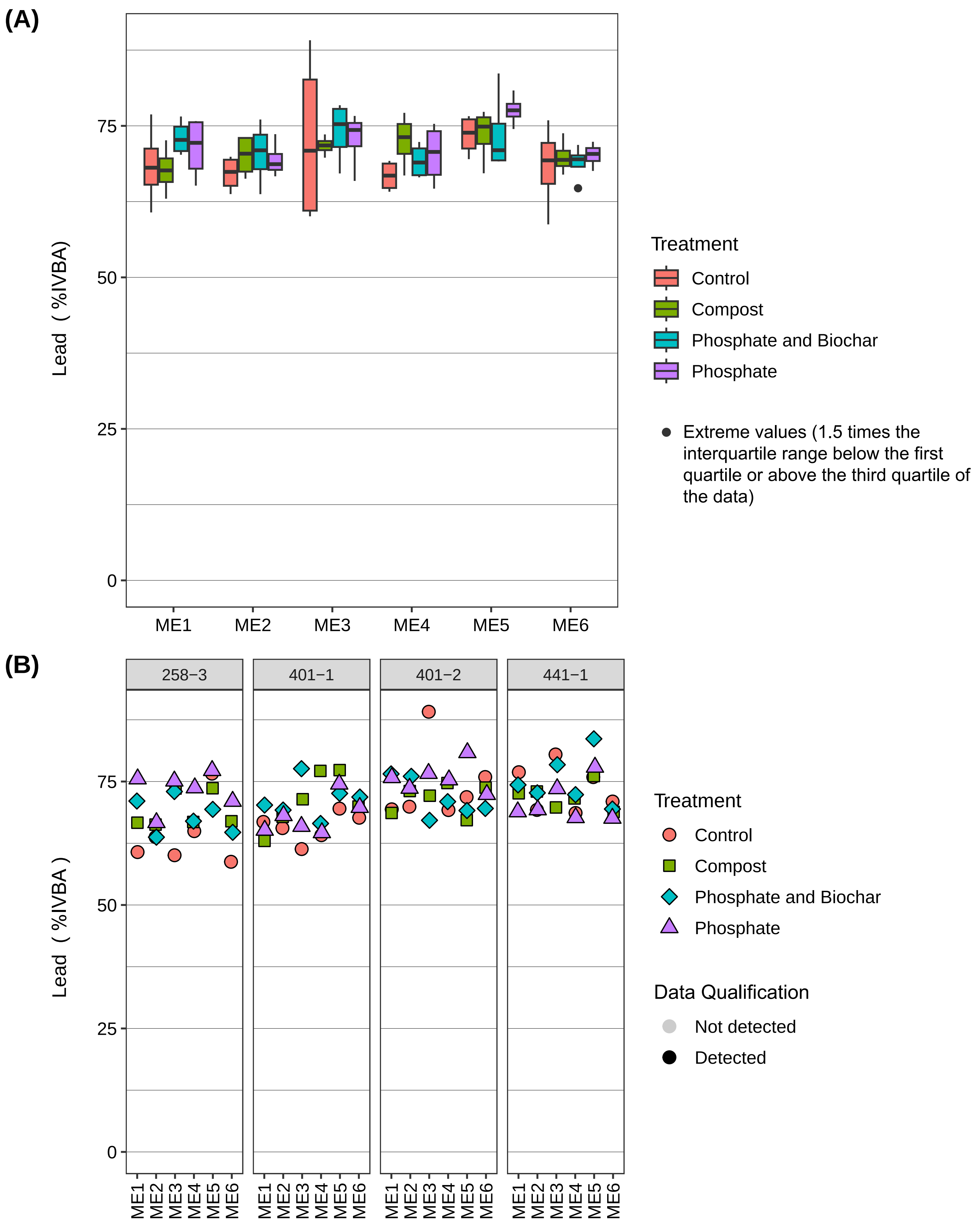
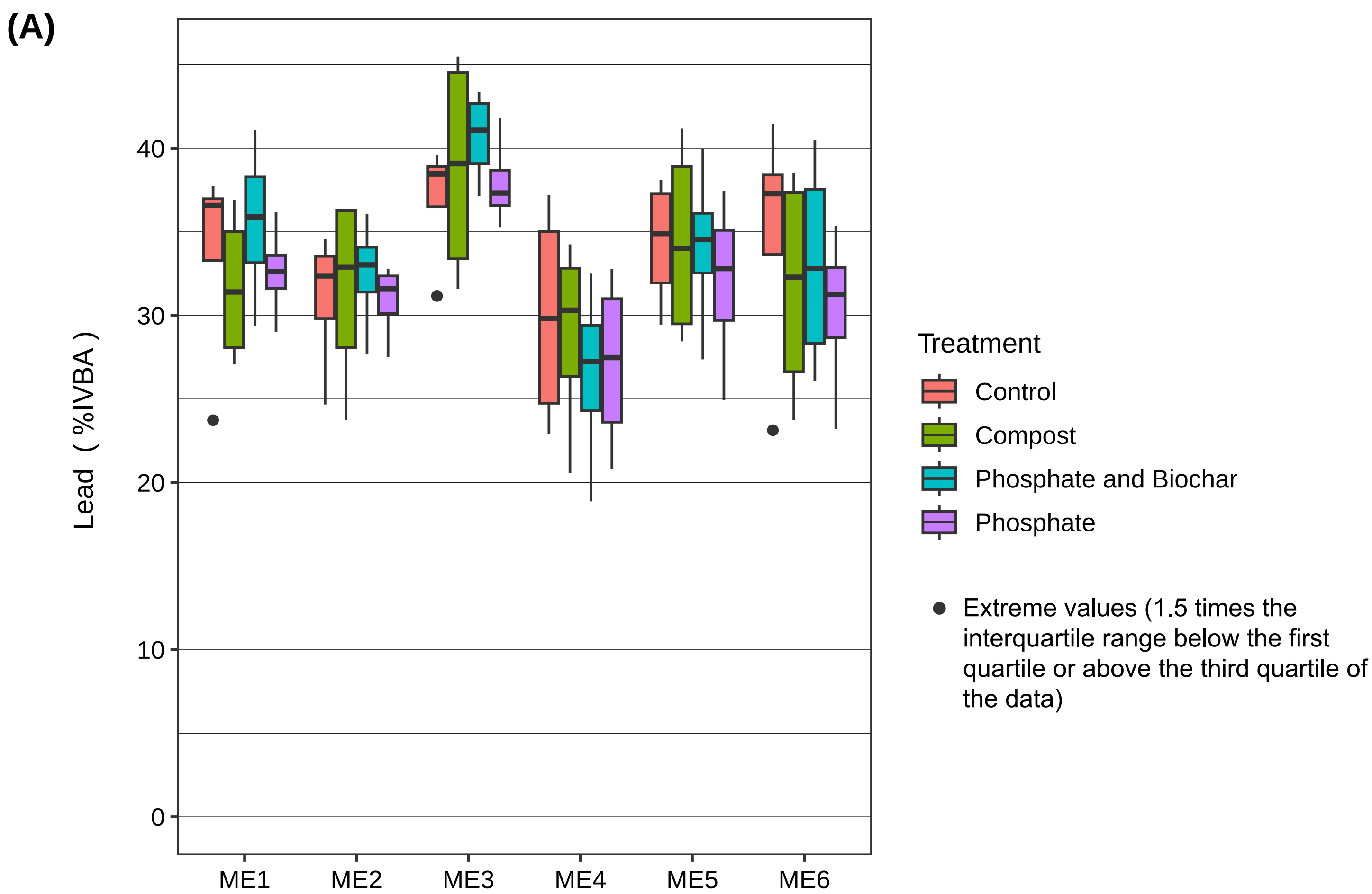


Figure 5−29. IVBA Lead (extracted at pH 1.5) in Soil Samples



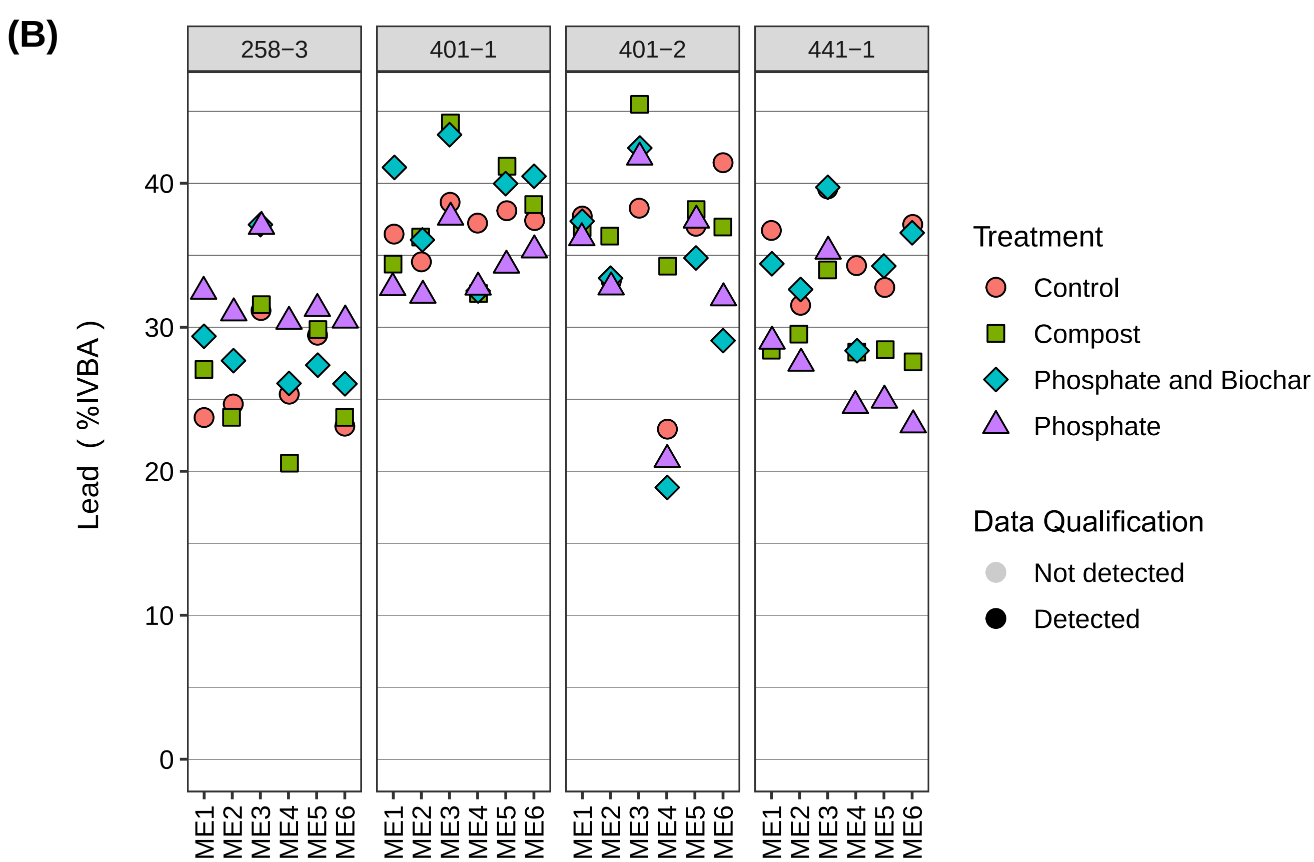


Figure 5−30. IVBA Lead (extracted at pH 2.5) in Soil Samples

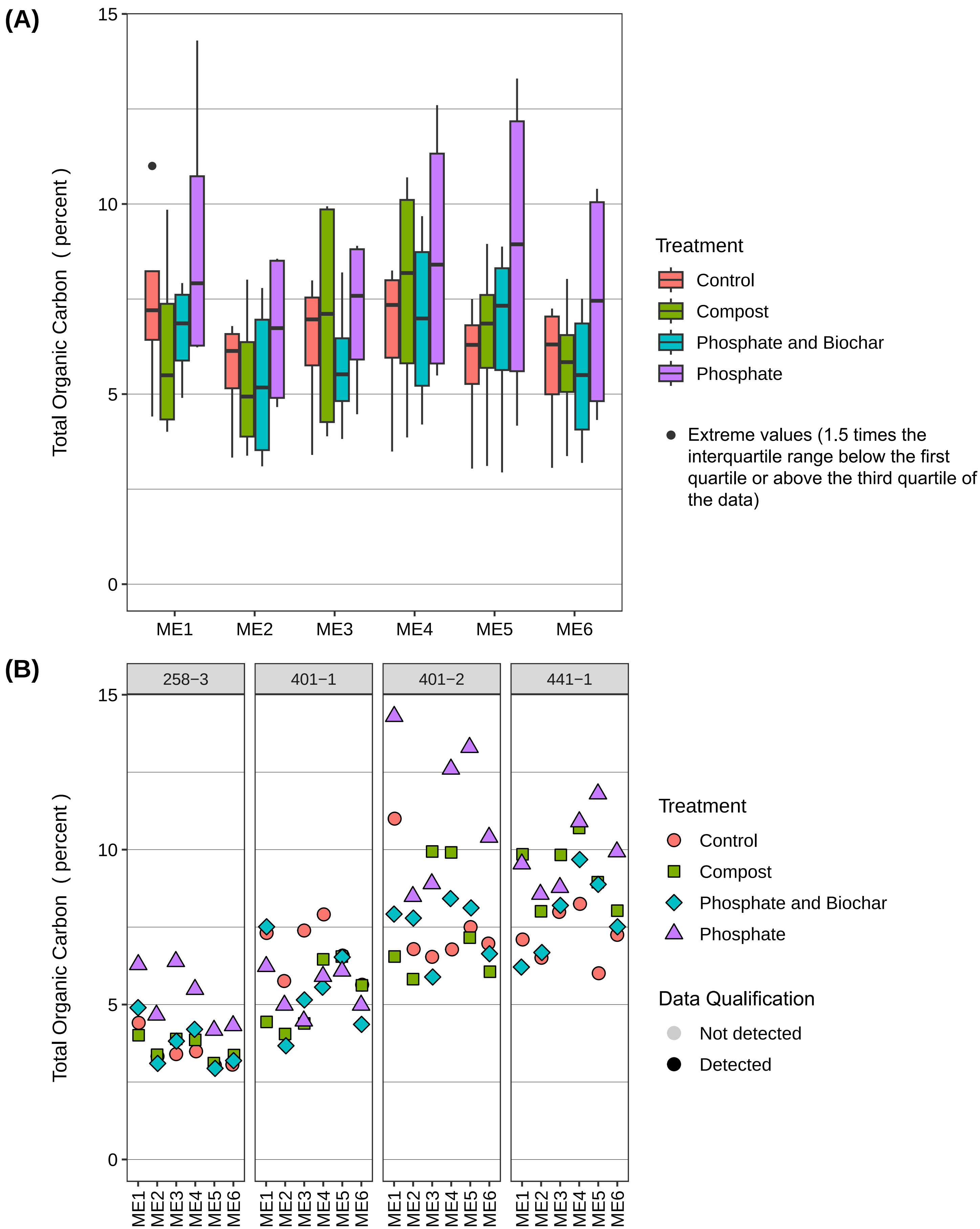


Figure 5−31. Total Organic Carbon in Soil Samples

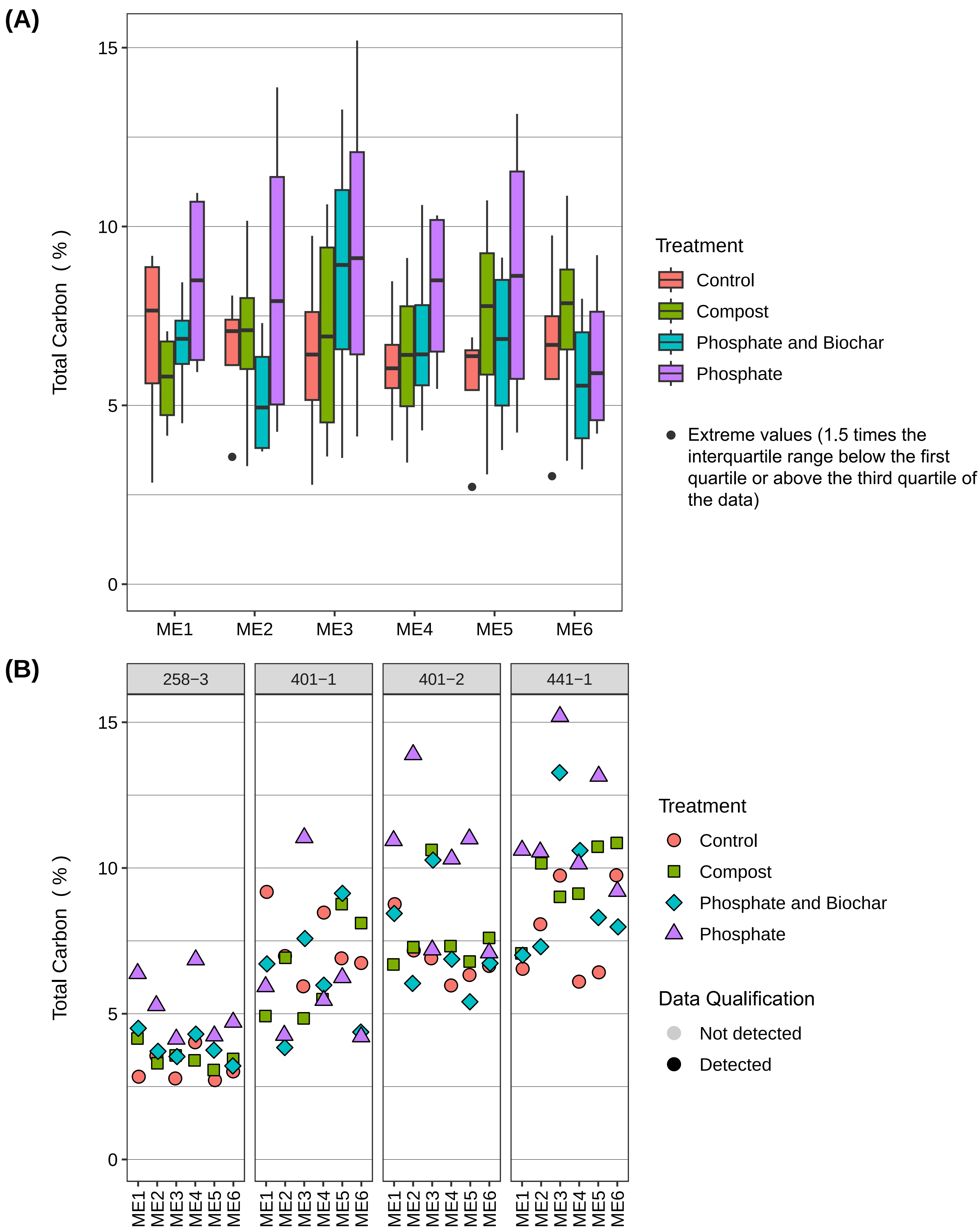


Figure 5−32. Total Carbon in Soil Samples

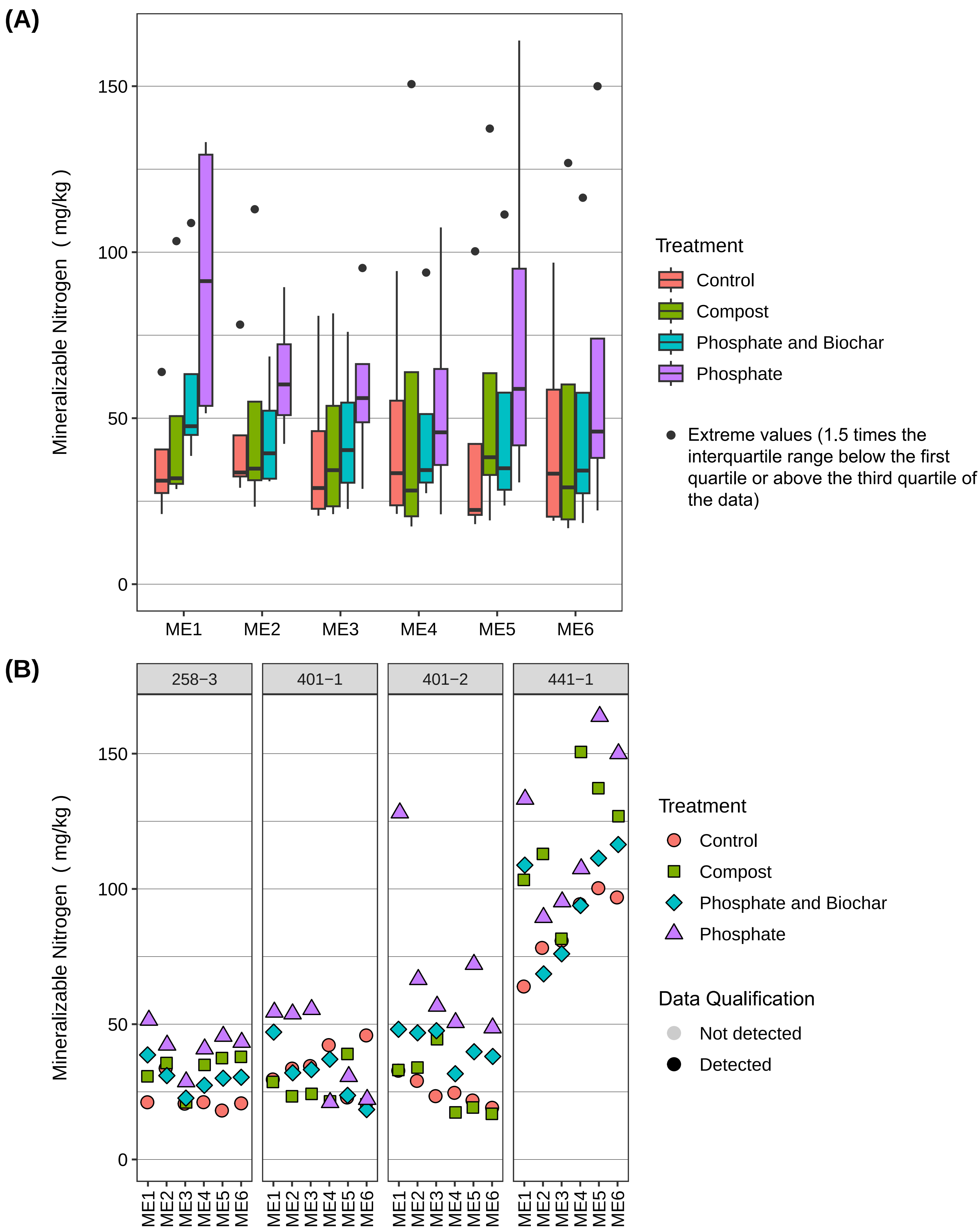


Figure 5−33. Mineralizable Nitrogen in Soil Samples

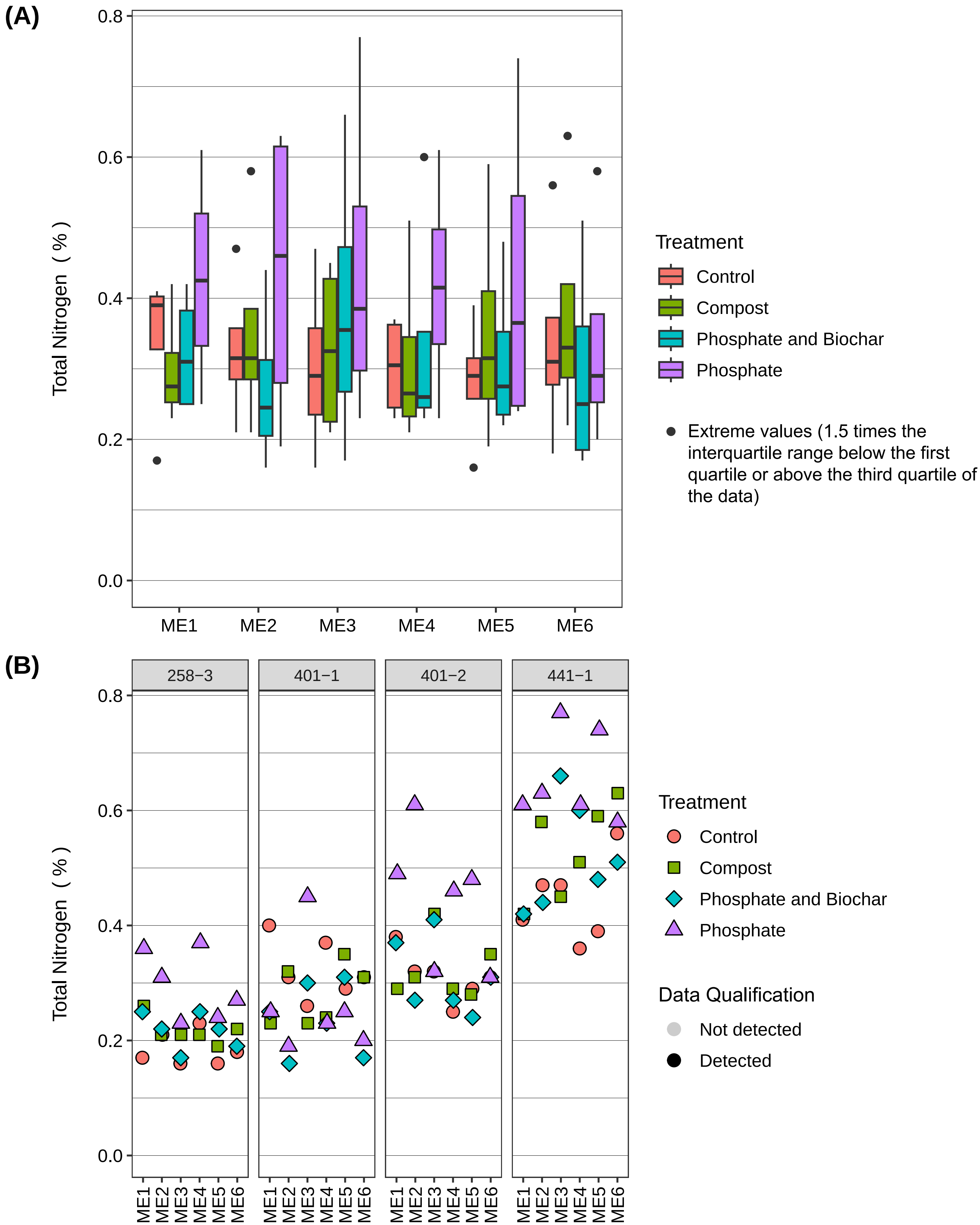


Figure 5−34. Total Nitrogen in Soil Samples

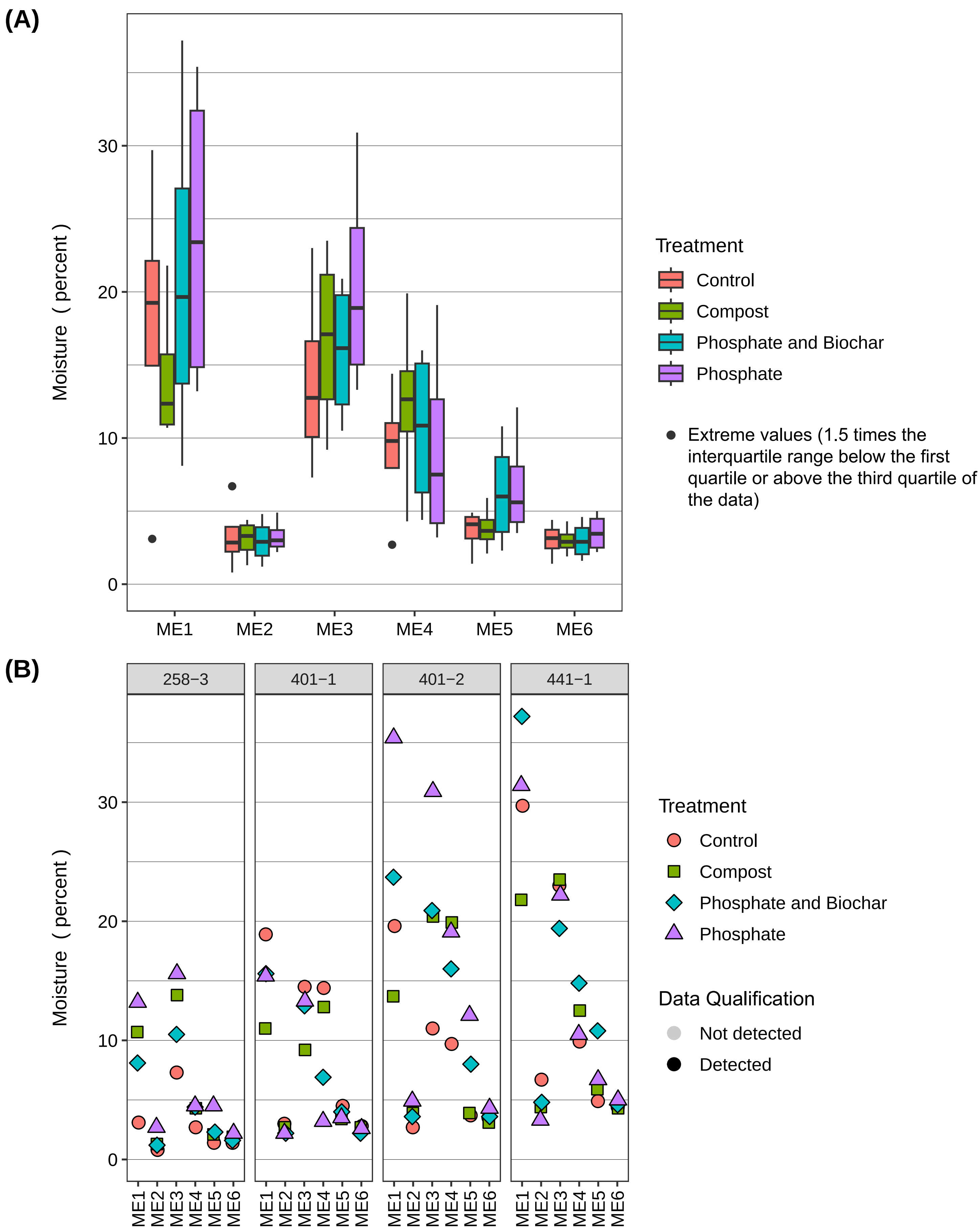


Figure 5−35. Percent Moisture in Soil Samples

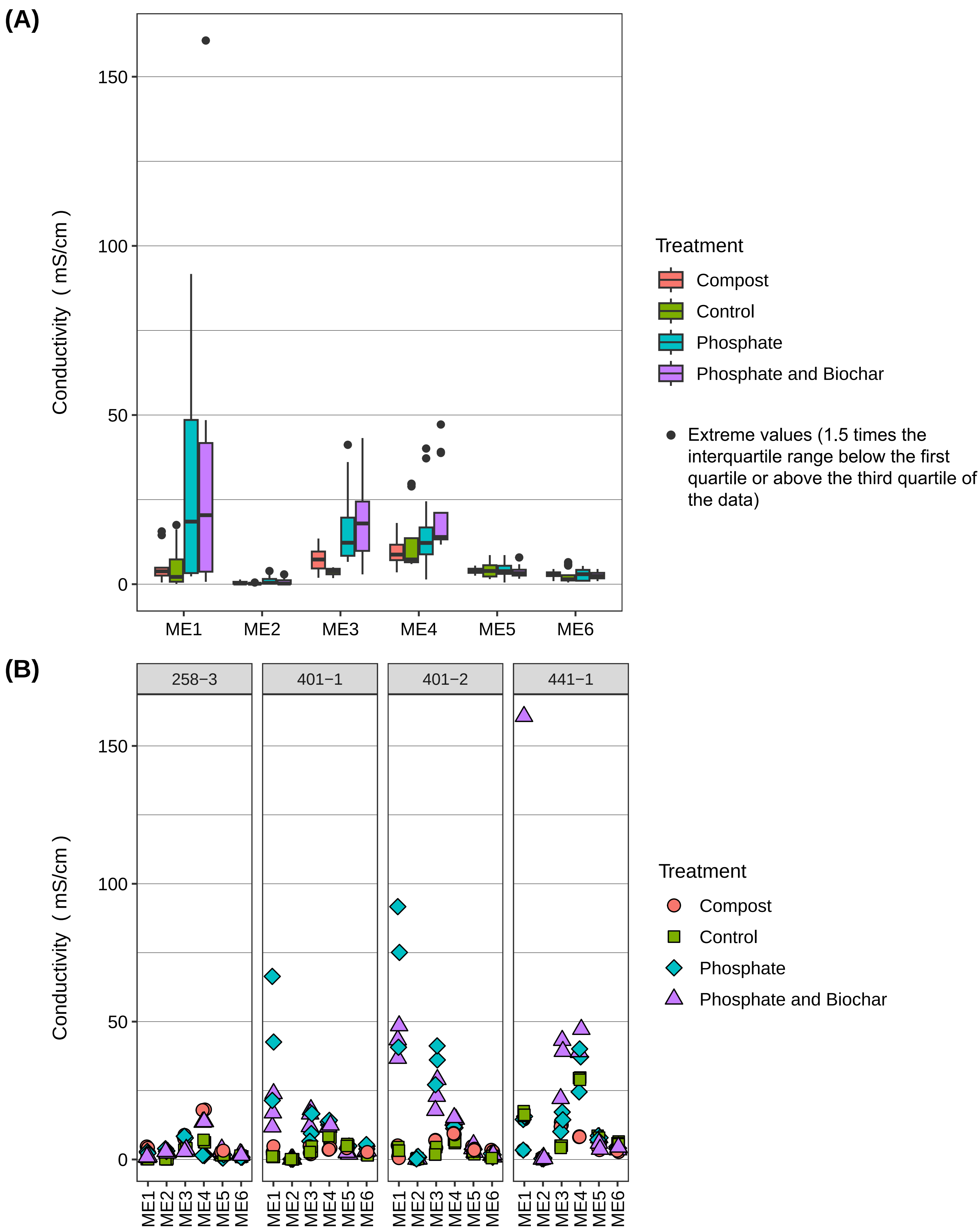
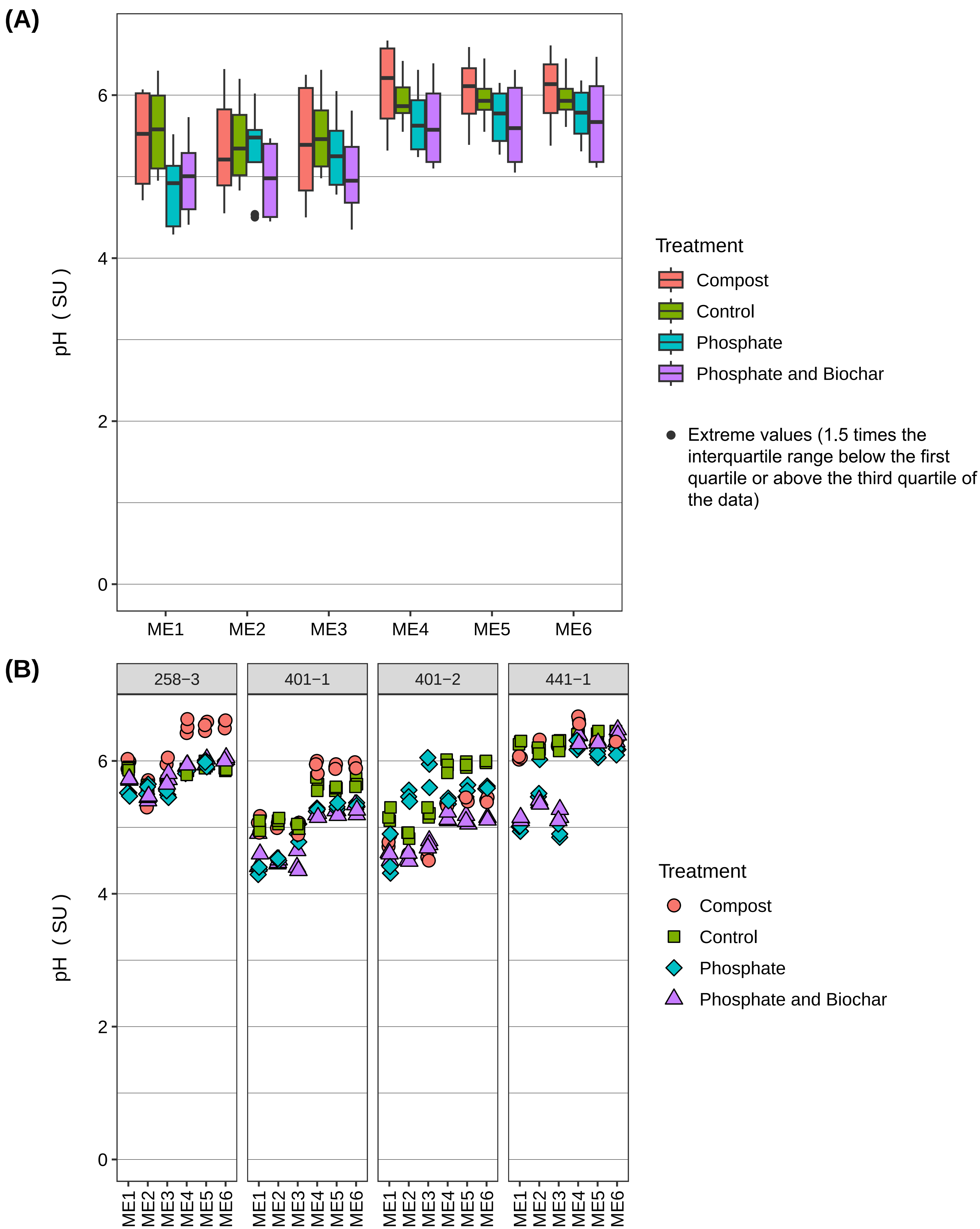

(A)
Conductivity（mS/cm）
150
100
50
0
ME1
ME2
ME3
ME4
ME5
ME6
Treatment
Compost
Control
Phosphate
Phosphate and Biochar
Extreme values (1.5 times the interquartile range below the first quartile or above the third quartile of the data)
(B)
258−3
401−1
401−2
441−1
Conductivity（mS/cm）
150
100
50
0
ME1 ME2 ME3 ME4 ME5 ME6
Treatment
Compost
Control
Phosphate
Phosphate and Biochar

Figure 5−36



(A)
pH (SU)
0
2
4
6
ME1
ME2
ME3
ME4
ME5
ME6
Treatment
Compost
Control
Phosphate
Phosphate and Biochar
Extreme values (1.5 times the interquartile range below the first quartile or above the third quartile of the data)
(B)
258−3
401−1
401−2
441−1
pH (SU)
0
2
4
6
ME1
ME2
ME3
ME4
ME5
ME6
Treatment
Compost
Control
Phosphate
Phosphate and Biochar

Figure 5−37

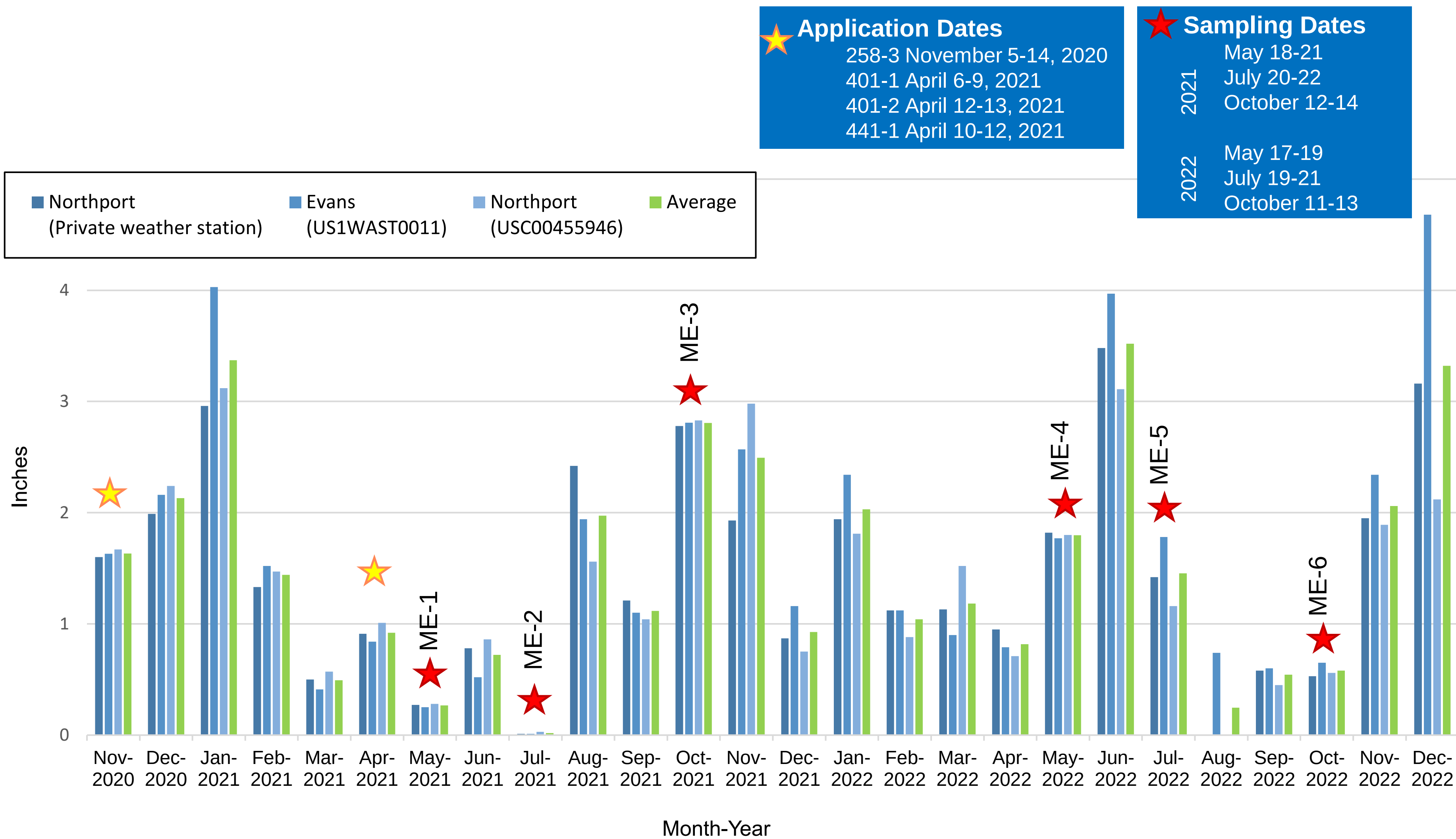


Figure 5-38. Regional Precipitation Data

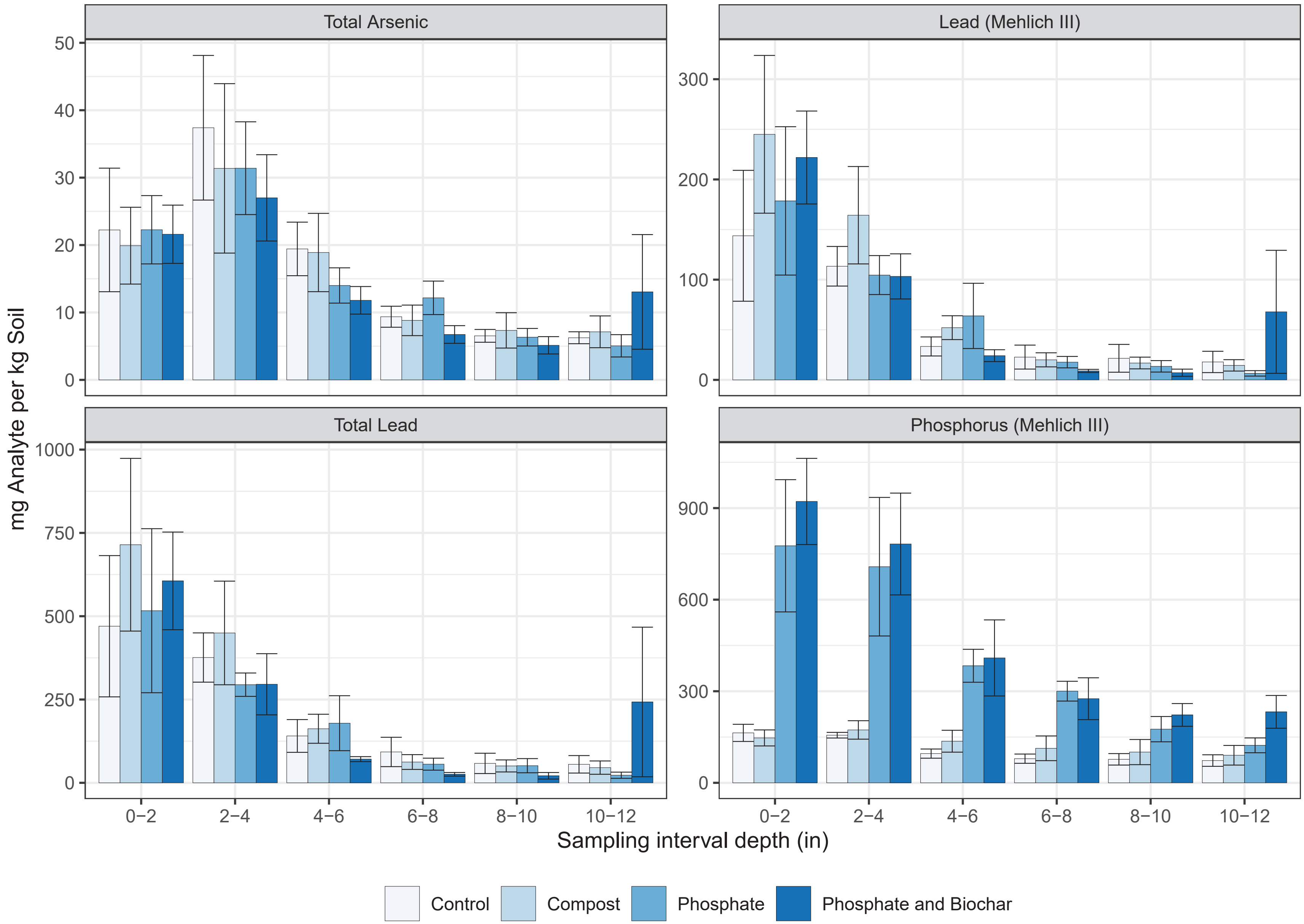
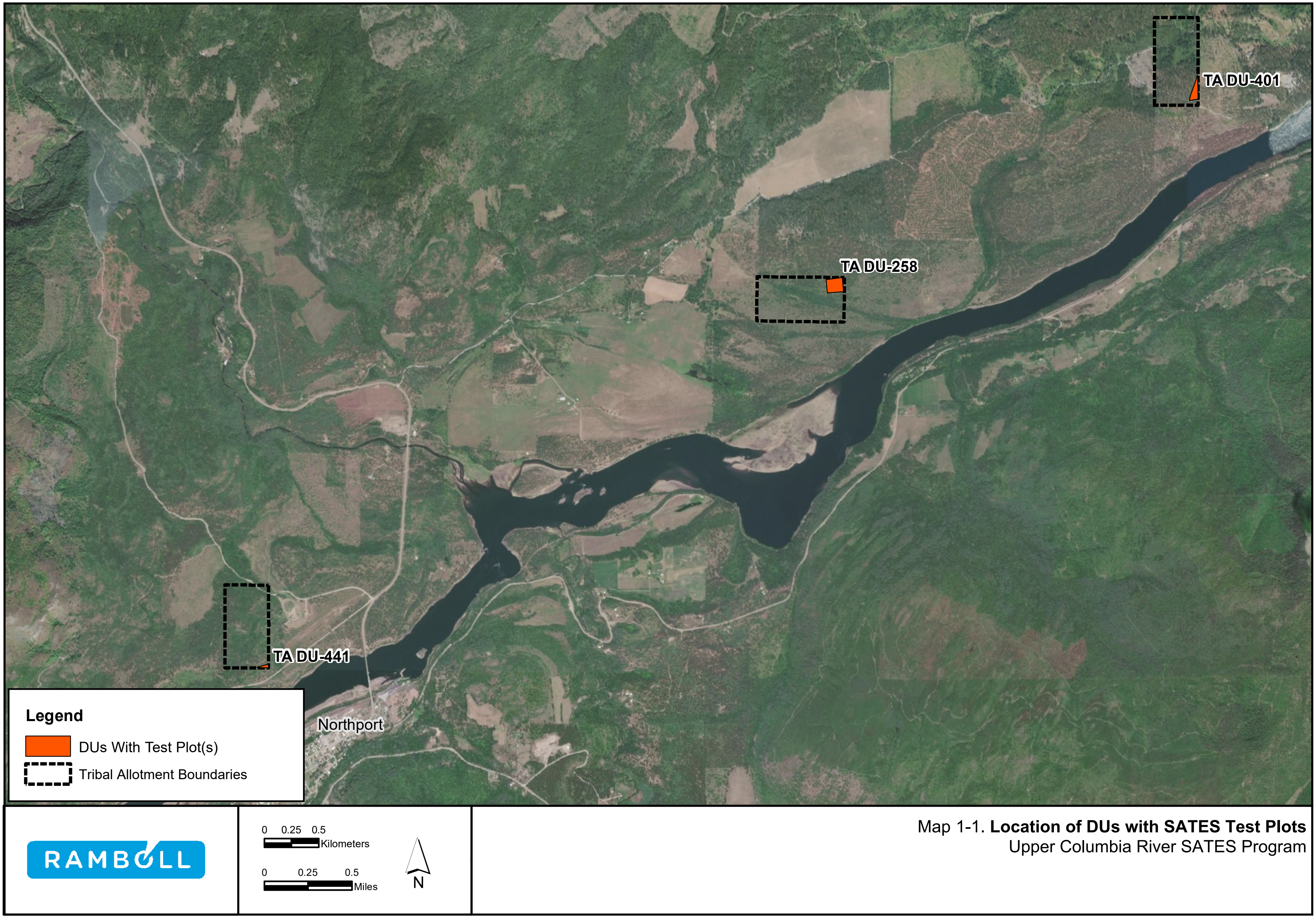


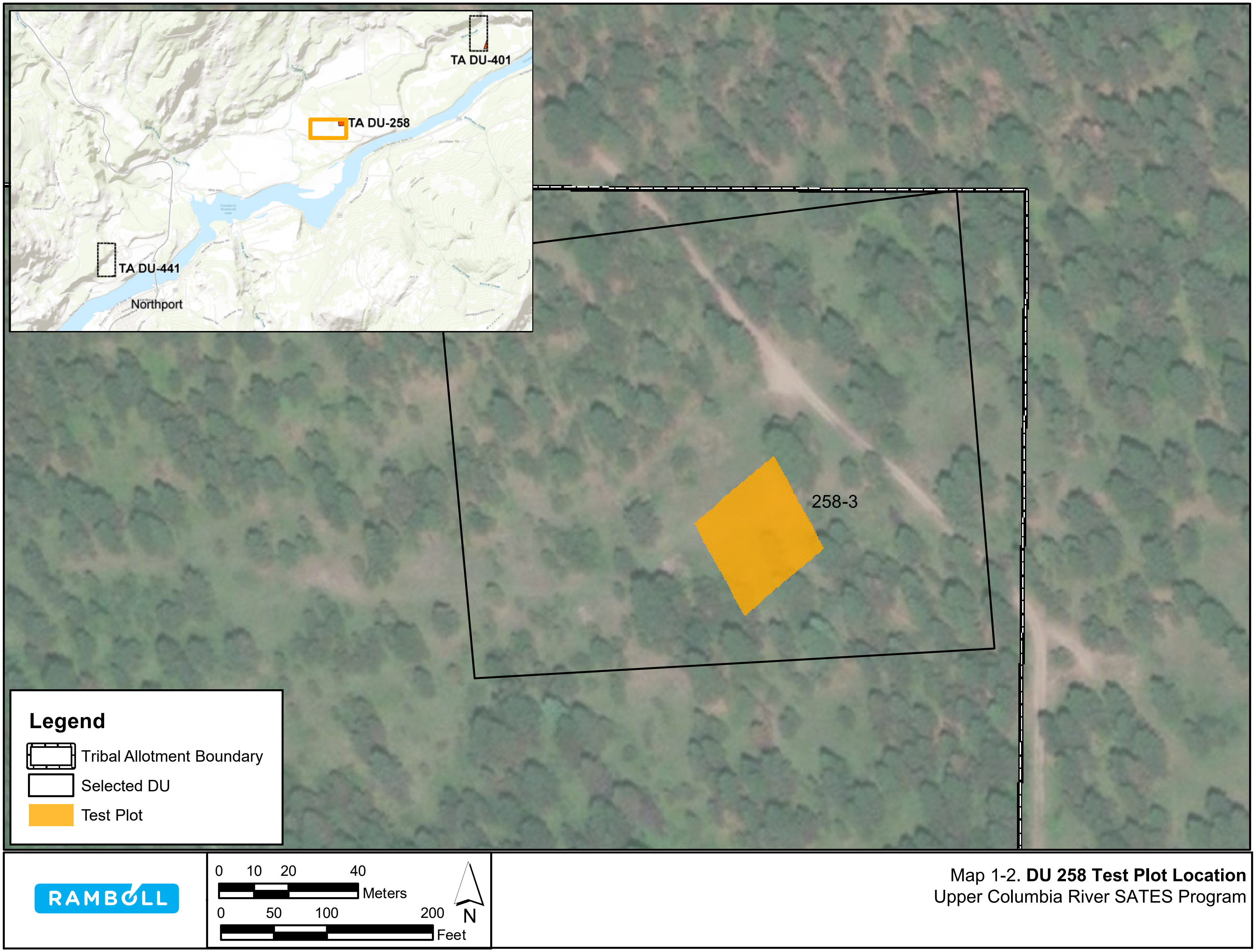
Figure 5-39. Concentrations of Focal Analytes in 2023 Depth-discrete Samples by Sample Depth

MAPS



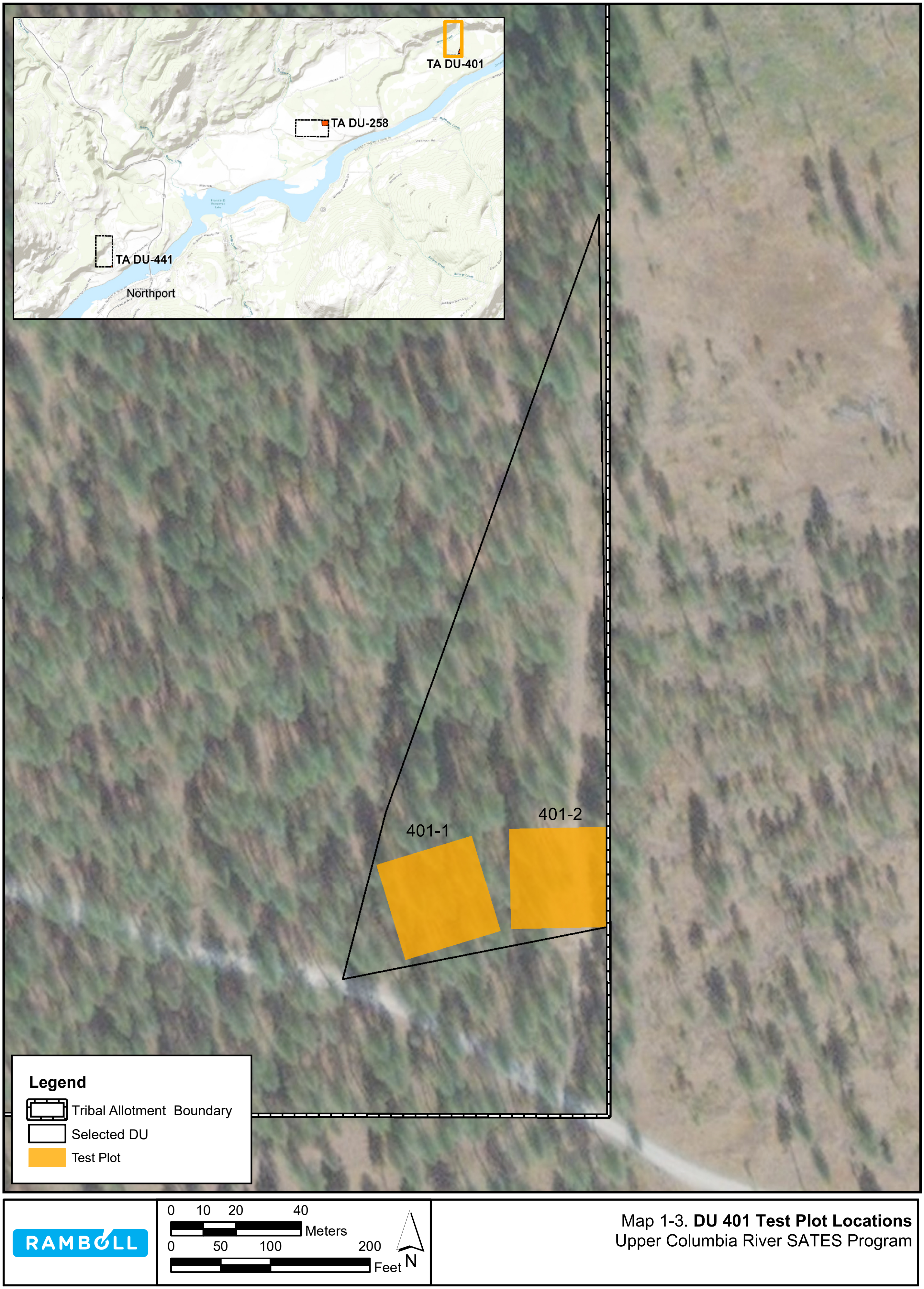
RAMBOLL

Map 1-1. **Location of DUs with SATES Test Plots**
Upper Columbia River SATES Program



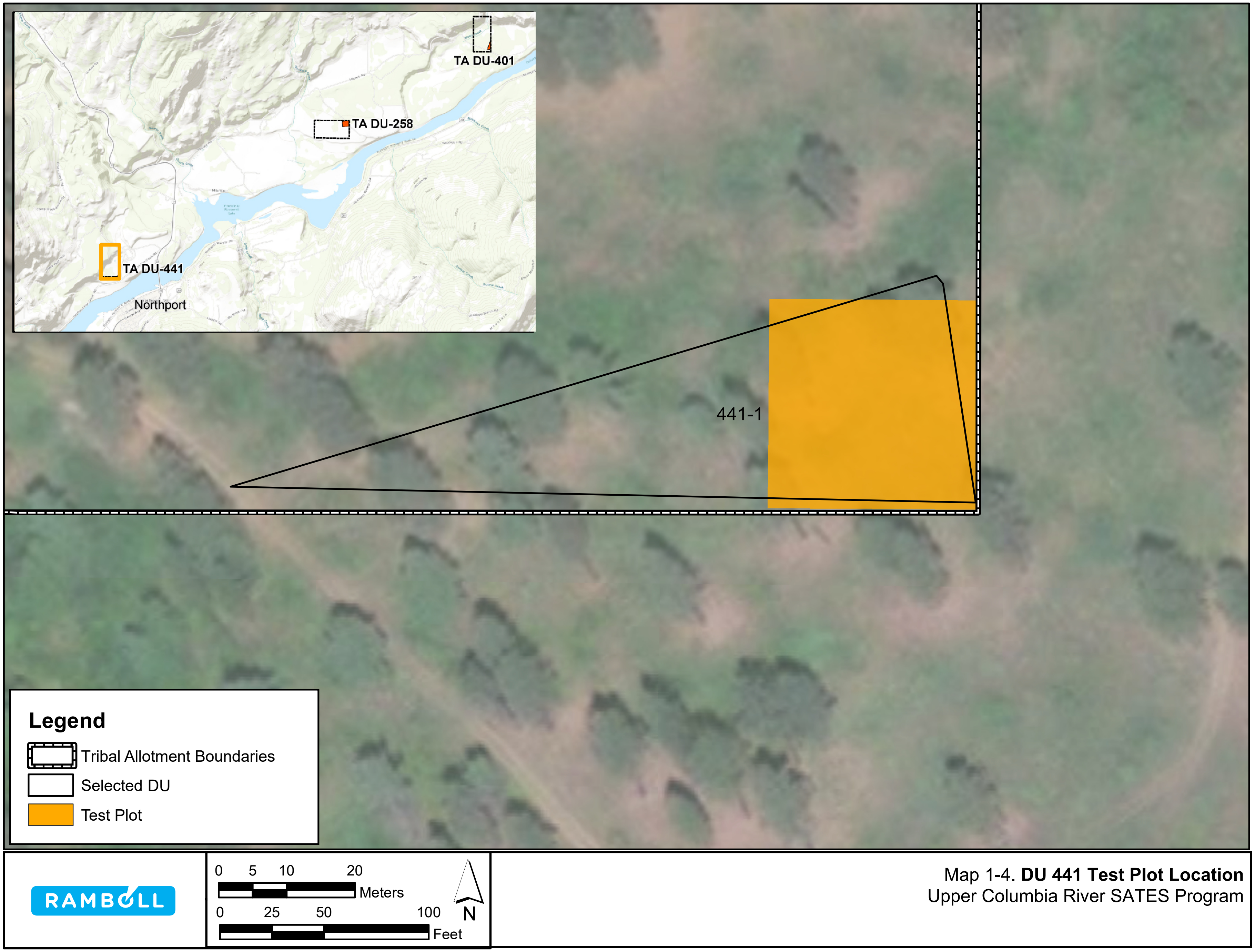
RAMBOLL

Map 1-2. **DU 258 Test Plot Location**
Upper Columbia River SATES Program



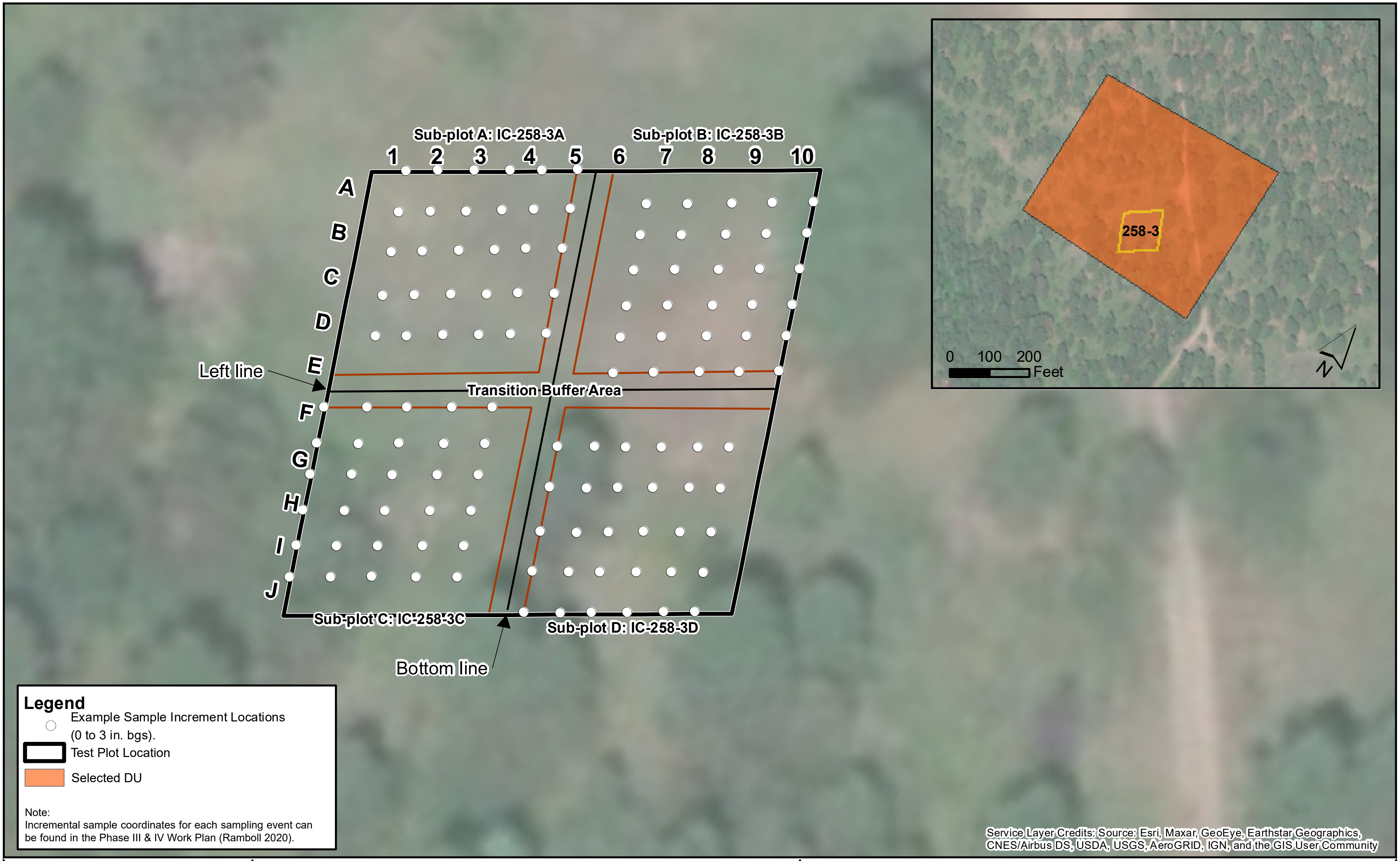
RAMBOLL

Map 1-3. **DU 401 Test Plot Locations**
Upper Columbia River SATES Program



RAMBOLL

Map 1-4. **DU 441 Test Plot Location**
Upper Columbia River SATES Program

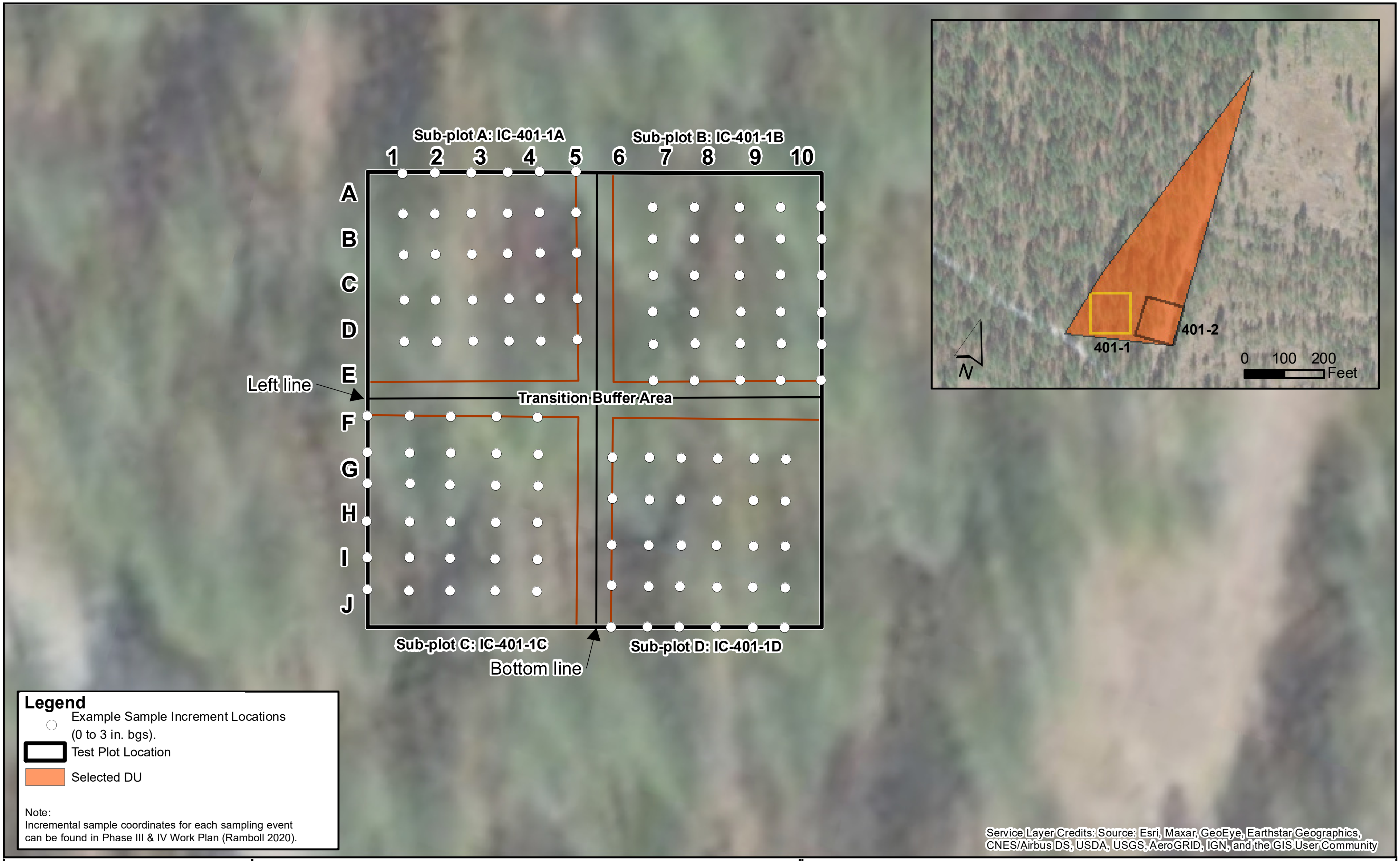


RAMBOLL

DRAFTED BY: JKing | Date: 8/6/2020

Map 4-1. **Example of Soil Increment Sample Location Array for Test Plot 258-3**

Upper Columbia River SATES Program



RAMBOLL

0 12.5 25 Meters

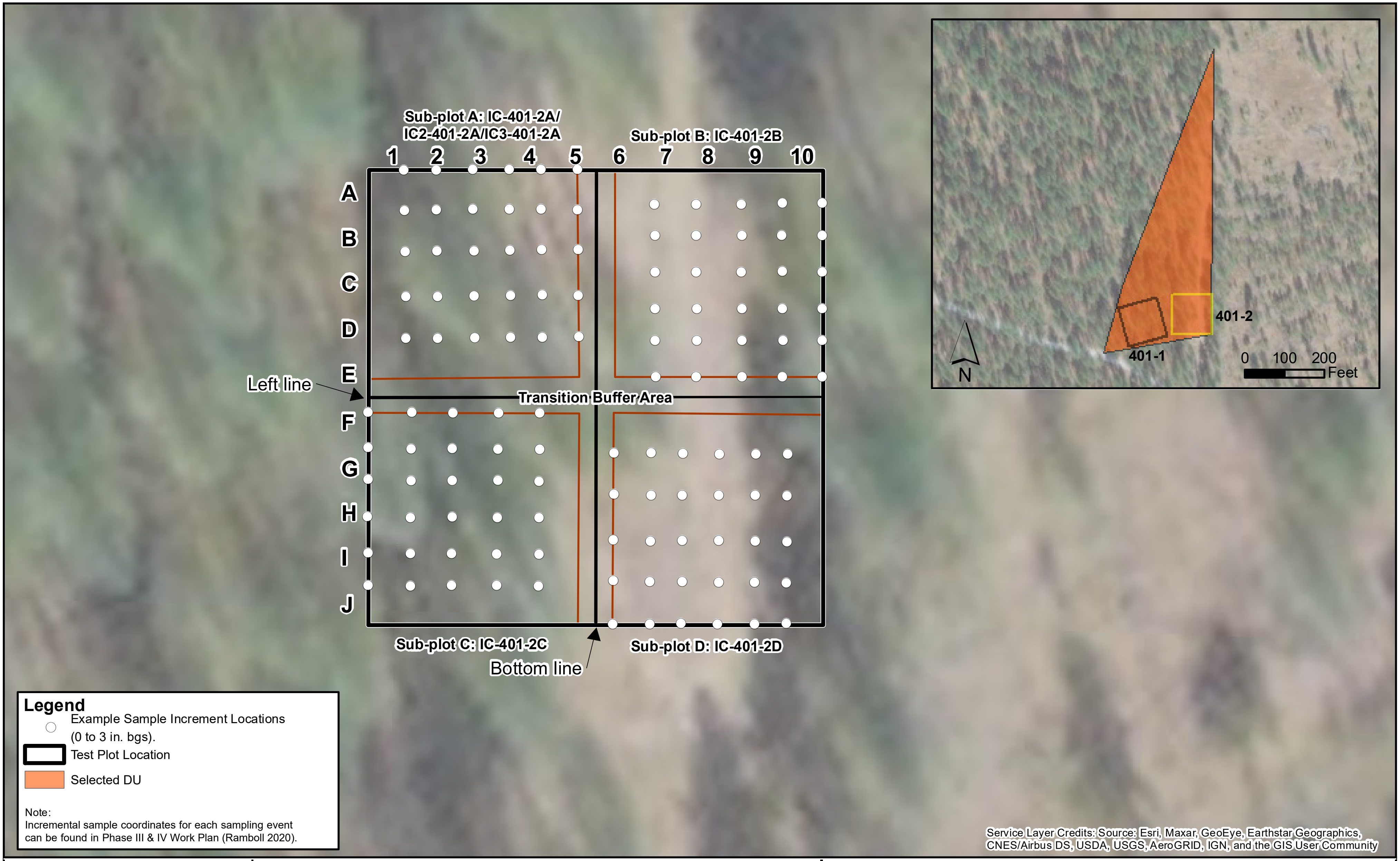
0 50 100 Feet

N

DRAFTED BY: JKing | Date: 8/6/2020

Map 4-2. **Example of Soil Increment Sample Location Array for Test Plot 401-1**

Upper Columbia River SATES Program



RAMBOLL

DRAFTED BY: JKing | Date: 8/6/2020

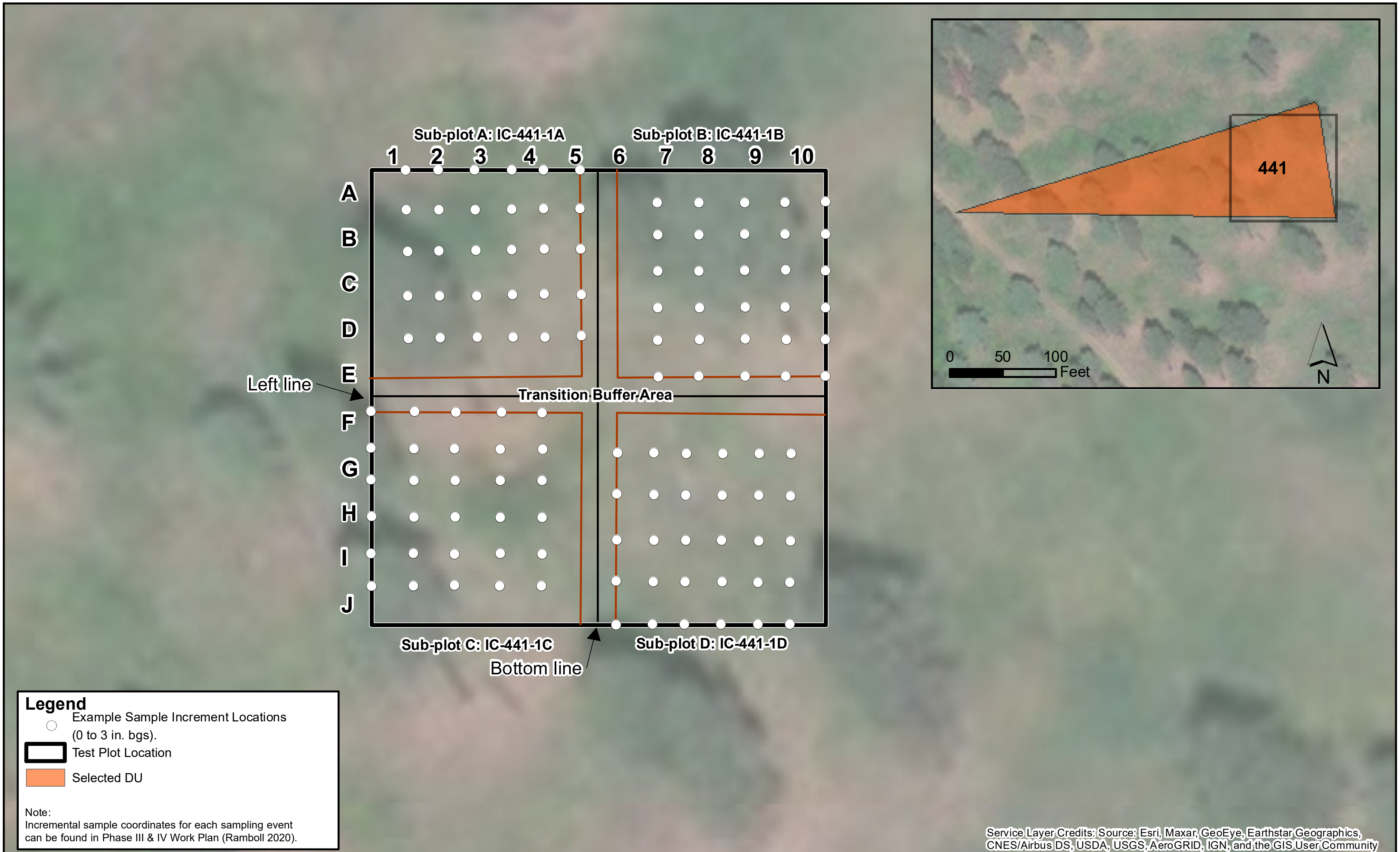
0 12.5 25 Meters

0 50 100 Feet

N

Map 4-3. **Example of Soil Increment Sample Location Array for Test Plot 401-2**

Upper Columbia River SATES Program



RAMBOLL

0 12.5 25 Meters

0 50 100 Feet

N

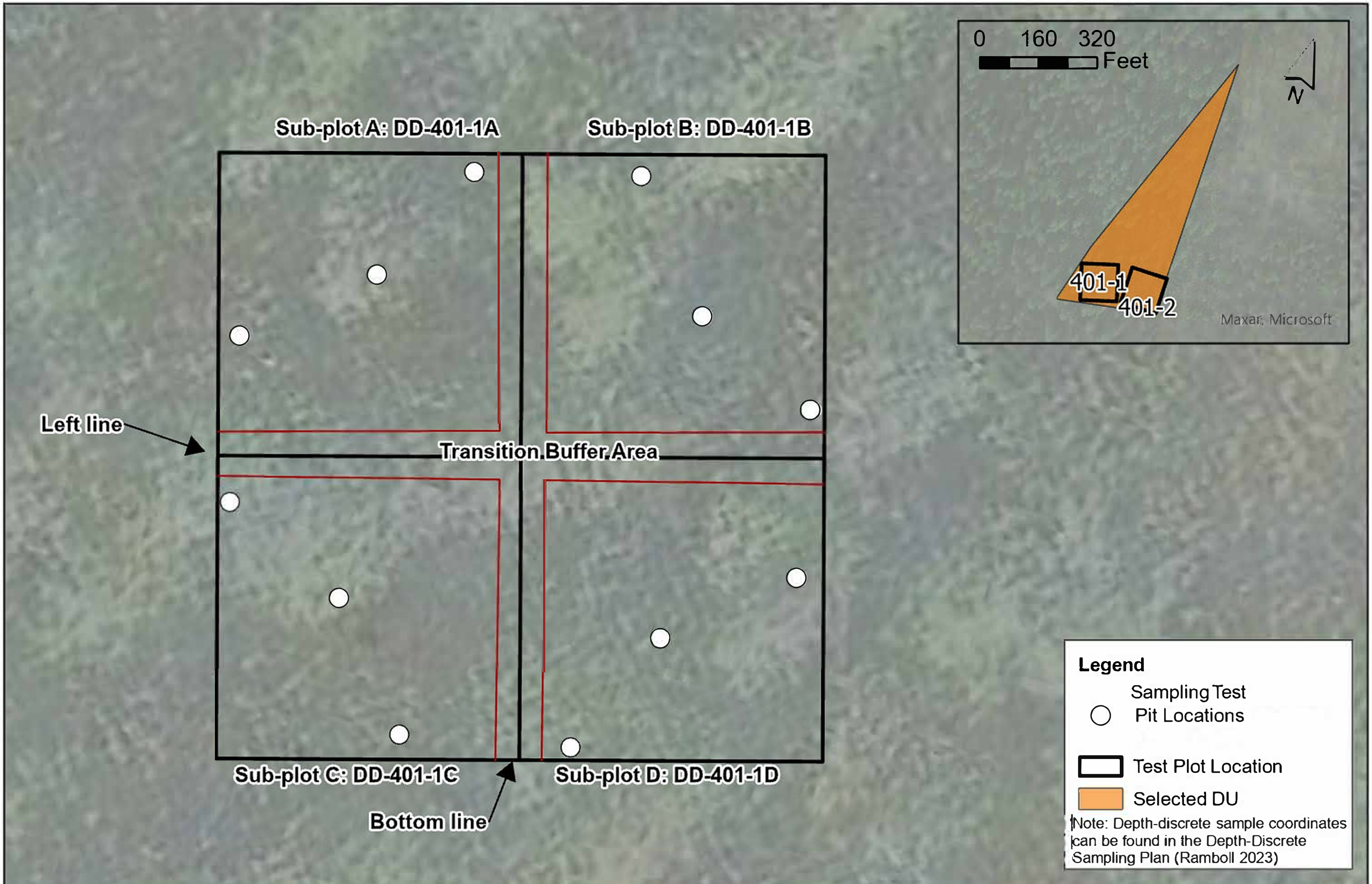
Map 4-4. **Example of Soil Increment Sample Location Array for Test Plot 441-1**

Upper Columbia River SATES Program

DRAFTED BY: JKing | Date: 8/6/2020

Map 4-5. **Depth-Discrete Sample Test Pit Locations for Test Plot 258-3**

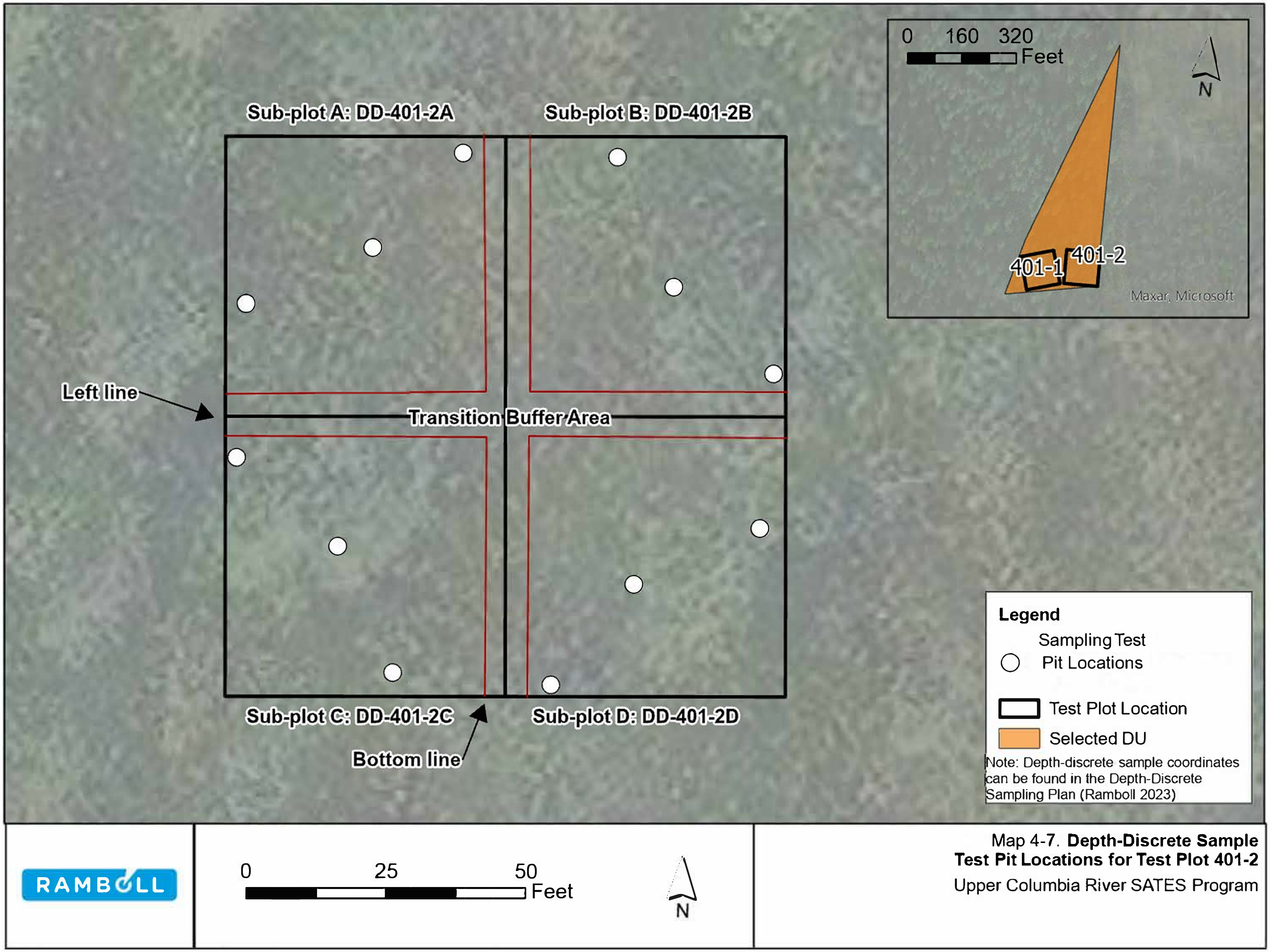
Upper Columbia River SATES Program



RAMBOLL

Map 4-6. **Depth-Discrete Sample Test Pit Locations for Test Plot 401-1**

Upper Columbia River SATES Program



RAMBOLL

Map 4-7. **Depth-Discrete Sample Test Pit Locations for Test Plot 401-2**

Upper Columbia River SATES Program

RAMBOLL

0 25 50 Feet

N

Map 4-8. **Depth-Discrete Sample Test Pit Locations for Test Plot 441-1**

Upper Columbia River SATES Program

TABLES

Table 3-1. Amendment Application Rates by Subplot

Plot	Subplot	Treatment	Water (gal)	Amendment (lbs)
401-1	A	soluble phosphate & biochar	1,800	645 (TSP) 43 (KCl) 574 (biochar)
	B	soluble phosphate	1,800	643 (TSP) 43 (KCl)
	C	compost	1,800	2,525
	D	control	1,800	na
401-2	A	compost	1,800	2,525
	B	soluble phosphate & biochar	1,800	645 (TSP) 43 (KCl) 574 (biochar)
	C	control	1,800	na
	D	soluble phosphate	1,800	643 (TSP) 43 (KCl)
258-3	A	compost	1,800	2,525
	B	control	1,800	na
	C	soluble phosphate	1,800	643 (TSP) 43 (KCl)
	D	soluble phosphate & biochar	1,800	645 (TSP) 43 (KCl) 574 (biochar)
441-1	A	compost	1,800	2,525
	B	soluble phosphate	1,800	643 (TSP) 43 (KCl)
	C	control	1,800	na
	D	soluble phosphate & biochar	1,800	645 (TSP) 43 (KCl) 574 (biochar)

Notes:
KCl - potassium chloride (i.e., potash) fertilizer (0-0-60)
na - not available
TSP - triple super phosphate (0-45-0)

Table 4-1a. Data Requirements for Field-Scale Pilot Testing for Incremental Composite Samples

Analysis	Rationale	Laboratory
Bioaccessible arsenic and lead pH 1.5	Characterize bioaccessibility of arsenic and lead in soil	OSU
Bioaccessible arsenic and lead pH 2.5	Evaluate treatment effect on bioaccessible arsenic and lead	OSU
Electrical conductivity (salinity)	Evaluate for potential for amendment applications to affect plant growth	NA
Mehlich III extractable lead and phosphorus	Evaluate treatment effect on available lead and phosphorus	OSU
Mercury	Pre-screening of amendments and water that will be used during application to evaluate potential changes from amendment application	ALS
Mineralizable nitrogen	Evaluate potentially available nitrogen	OSU
Oxalate extraction	Estimate concentrations of aluminum and iron in soils in both noncrystalline and crystalline forms to evaluate how much is available to bind to arsenic	OSU
pH	Affects bioavailability of metals and plant nutrients	NA
Semivolatile organic compounds (biochar and compost only)	Prescreening of amendments	ALS
Soil moisture	Affects chemical reactions in soil	ALS
SPLP TAL metals (except mercury)	Monitor changes in leachability of metals	ALS
Temperature	Necessary for field electrical conductivity measurement	NA
Total arsenic and lead (< 150 µm soil fraction)	Necessary for denominator for %IVBA calculation	OSU
Total carbon and nitrogen	Evaluate treatment effect on nutrient balance	OSU
Total organic carbon	Evaluate treatment effect on soil quality and nutrient balance	ALS
Total TAL metals (except mercury; < 2 mm soil fraction)	Prescreening of amendments and water, and evaluate potential changes due to treatment application	ALS
Lead/arsenic and general soil mineralogy, synchrotron x-rays	Evaluate treatment effect on changes in lead and arsenic mineralogy	EPA

Notes:

ALS - ALS Environmental Kelso

EPA - U.S. Environmental Protection Agency

IVBA - in vitro bioaccessible

NA - not applicable; field measured

OSU - The Ohio State University

SPLP - synthetic precipitation leaching procedure

TAL - target analyte list

Table 4-1b. Data Requirements for Field-Scale Pilot Testing for Depth-Discrete Samples

Analysis	Rationale	Laboratory
Electrical conductivity (salinity)	Evaluate for potential for amendment applications to affect plant growth	NA - field measured
Mehlich III extractable phosphorus	Evaluate treatment effect on available phosphorus	OSU
pH	Affects bioavailability of metals and plant nutrients	NA - field measured
Soil moisture	Affects chemical reactions in soil	ALS
Temperature	Necessary for field electrical conductivity measurement	NA - field measured
Total TAL metals (except mercury; <2mm soil fraction)	Evaluation of potential changes in soil chemistry following amendment application evaluate potential changes due to treatment application	ALS

Notes:

ALS - ALS Environmental Kelso

NA - not applicable

OSU - The Ohio State University

TAL - target analyte list

Table 4-2a. Incremental Composite Field-Scale Monitoring and Analysis Plan

Analysis	Sample Preparation Method Reference	Sample Preparation Procedure	Sample Analysis Method Reference	Sample Analysis Procedure
Phase III Analyses				
Semivolatile organic compounds	EPA 3510	separatory funnel liquid - liquid extraction	EPA 8270	GC/MS
Total TAL metals (except mercury)	EPA 3051A	acid digestion	EPA 6010	ICP-AES
Mercury	EPA 7471B	acid/permanganate digestion	EPA 7471B	CVAA
Mercury	EPA 7470A	acid/permanganate digestion	EPA 7470A	CVAA
Temperature	NA	NA	EPA 170.1	thermometer
Electrical conductivity (salinity)	NA	NA	SM 2510B	electrode
pH	NA	NA	Thomas 1996	electrode
Total TAL metals (except mercury)	EPA 3010	acid digestion	EPA 6010	ICP-AES
Phase IV Analyses				
Bioaccessible arsenic and lead	EPA 1340	glycine extraction (Extract at pH 1.5)	EPA 6010B	ICP-AES
Bioaccessible arsenic and lead	EPA 1340	glycine extraction (Extract at pH 2.5)	EPA 6010B	ICP-AES
Electrical conductivity (salinity)	NA	NA	SM 2510B	electrode
Mehlich III extractable lead and phosphorus	Mehlich 1984	acetic and nitric acid; ammonium fluoride and ammonium nitrate; EDTA	EPA 6010	ICP-AES
Total TAL metals (except mercury)	EPA 3051A	acid digestion	EPA 6010	ICP-AES
Mineralizable nitrogen	Waring and Bremner 1964	short-term (7-day) anaerobic incubation for mineralizable N from organic matter	Waring and Bremner 1964	Lachat
Oxalate extraction	McKeague and Day 1966	0.2 molar acid ammonium oxalate solution (pH 3.0)	EPA 6010	ICP-AES
pH	NA	NA	Thomas 1996	electrode
Soil moisture	EPA 160.3	evaporation of sample to dryness at 103-105°C	direct measurement	gravimetric
SPLP TAL metals (except mercury) and phosphorus	EPA 1312	SPLP	EPA 6010	ICP-AES
Total arsenic and lead	EPA 3051A	acid digestion	EPA 6010	ICP-AES
Total carbon and nitrogen	NA	NA	Bremner and Mulvaney 1982, Nelson and Sommers 1996	dry combustion at 900°Celsius
Total organic carbon	NA	NA	Heanes 1984	dichromate oxidation
Lead/arsenic and general soil mineralogy	NRMRL QMP L18735 ~500 mg of < 250-µm freeze-dried soil	~100 mg of soil blended with 10 mg of PVP binder, pressed into a 7-mm pellet and encased in Kapton tape	NRMRL QMP L18735 Athena software data analysis	Synchrotron x-rays

Table 4-2a. Incremental Composite Field-Scale Monitoring and Analysis Plan

Analysis	Sample Sources	Sample Time Points	Soil Grain Size Fraction	Required Mass or Volume Per Sample	Total Number of Original Samples
Phase III Analyses					
Semivolatile organic compounds	biochar and compost	prior to field application	NA	120 g	2
Total TAL metals (except mercury)	all amendment materials	prior to field application	NA	0.5 g	3
Mercury	all amendment materials	prior to field application	NA	15 g	3
Mercury	water from tanks	prior to field application	NA	125 ml	5
Temperature	water from tanks	prior to field application	NA	determined in field	5
Electrical conductivity (salinity)	water from tanks	prior to field application	NA	determined in field	5
pH	water from tanks	prior to field application	NA	determined in field	5
Total TAL metals (except mercury)	water from tanks	prior to field application	NA	5 ml	5
Phase IV Analyses					
Bioaccessible arsenic and lead	treated and control subplots	each Phase IV monitoring event	< 150 µm	1 g	20 per monitoring event
Bioaccessible arsenic and lead	treated and control subplots	each Phase IV monitoring event	< 150 µm	1 g	20 per monitoring event
Electrical conductivity (salinity)	treated and control subplots	each Phase IV monitoring event	bulk	5 g	20 per monitoring event
Mehlich III extractable lead and phosphorus	treated and control subplots	each Phase IV monitoring event	< 2 mm	1 g	20 per monitoring event
Total TAL metals (except mercury)	treated and control subplots	ME1 and last Phase IV monitoring event	< 2 mm	0.5 g	20 per monitoring event
Mineralizable nitrogen	treated and control subplots	each Phase IV monitoring event	< 2 mm	5 g	20 per monitoring event
Oxalate extraction	treated and control subplots	each Phase IV monitoring event	< 2 mm	0.25 g	20 per monitoring event
pH	treated and control subplots	each Phase IV monitoring event	bulk	5 g	20 per monitoring event
Soil moisture	treated and control subplots	each Phase IV monitoring event	< 2 mm	0 g	20 per monitoring event
SPLP TAL metals (except mercury) and phosphorus	treated and control subplots	each Phase IV monitoring event	< 2 mm	1.5 g	20 per monitoring event
Total arsenic and lead	treated and control subplots	each Phase IV monitoring event	<150 µm	0.5 g	20 per monitoring event
Total carbon and nitrogen	treated and control subplots	each Phase IV monitoring event	< 2 mm	10 g	20 per monitoring event
Total organic carbon	treated and control subplots	each Phase IV monitoring event	< 2 mm	0.5 g	20 per monitoring event
Lead/arsenic and general soil mineralogy	treated and control subplots	individual samples selected at the end of the study[a]	< 2 mm	20 g	≥ 4 [a]

Notes:

[a] Based on analytical results and the discretion of the project technical team

CVAA - cold vapor atomic absorption

EDTA - ethylenediaminetetraacetic acid

EPA - U.S. Environmental Protection Agency

GC/MS - gas chromatography/mass spectroscopy

ICP-AES - inductively coupled plasma - atomic emission spectroscopy

NA - not applicable

NRMRL QMP - National Risk Management Research Laboratory Quality Management Plan

PVP - polyvinylpyrrolidone

SM - Standard Method

SPLP - synthetic precipitation leaching procedure

TAL - target analyte list

Table 4-2b. Depth-Discrete Field-Scale Monitoring and Analysis Plan

Analysis	Sample Preparation Method Reference	Sample Preparation Procedure	Sample Analysis Method Reference	Sample Analysis Procedure	Sample Sources	Sample Time Points	Soil Grain Size Fraction	Required Mass or Volume Per Sample	Total Number of Original Samples
Electrical conductivity (salinity)	NA	NA	SM 2510B	electrode	treated and control subplots	Final Phase IV monitoring event	bulk	5 g	108
Mehlich III extractable phosphorus	Mehlich 1984	acetic and nitric acid; ammonium fluoride and ammonium nitrate; EDTA	EPA 6010	ICP-AES	treated and control subplots	Final Phase IV monitoring event	<2 mm	1 g	108
Total TAL metals (except mercury)[1]	EPA 3051A	acid digestion	EPA 6010C	ICP-AES	treated and control subplots	Final Phase IV monitoring event	<2 mm	0.5 g	108
pH	NA	NA	Thomas 1996	electrode	treated and control subplots	Final Phase IV monitoring event	bulk	5 g	108
Soil moisture	EPA 160.3	evaporation of sample to dryness at 103-105°C	EPA 160.3	gravimetric	treated and control subplots	Final Phase IV monitoring event	<2 mm	0 g	108

Notes:

EDTA - ethylenediaminetetraacetic acid

ICP-AES - inductively coupled plasma - atomic emission spectroscopy

NA - not applicable

TAL - target analyte list

[1] TAL metals include Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

Table 4-3. Depth-Discrete Sample Location Coordinates

Location	Coordinates (ft)		Plot and Subplot
Depth-Discrete Sampling Points for Each Subplot	X	Y	
Depth-Discrete Sampling Point 1	23	20	All
Depth-Discrete Sampling Point 2	46	30	All
Depth-Discrete Sampling Point 3	8	2	All
Depth-Discrete Sampling Points for Replicates	X	Y	
Depth-Discrete Sampling Replicate Point 1	23	20	258-3 D
Depth-Discrete Sampling Replicate Point 2	46	30	401-1 C

Table 4-4a. Analytical Parameters, Methods, and Target Laboratory Reporting Limits for TAL Metals for Incremental Composite Samples

Analyte (mg/kg) [a,b]	CAS Number	Laboratory MDL [c]					
		ME 1	ME2	ME3	ME4	ME5	ME6
OSU							
Aluminum (EPA Oxalate)	7429-90-5			2.4			
Iron (EPA Oxalate)	7439-89-6			1.73			
Arsenic (Total)	7440-38-2			0.6			
Lead (Total)	7439-92-1			0.24			
Lead (Mehlich III)	7439-92-2		0.07			0.02	
Phosphorus (Mehlich III)	7439-95-4			0.07			
TAL Metals - ALS							
Aluminum	7429-90-5	0.6 to 0.8	0.4 to 0.6	0.5 to 0.7		0.003	
Antimony	7440-36-0	0.02 to 0.03	0.015 to 0.020	0.015 to 0.024		0.0001	
Arsenic	7440-38-2	0.06 to 0.08	0.04 to 0.06	0.05 to 0.07		0.0005	
Barium	7440-39-3	0.02 to 0.026	0.015 to 0.02	0.015 to 0.02		0.0001	
Beryllium	7440-41-7	0.006 to 0.008	0.004 to 0.006	0.005 to 0.007	0.00004 to 0.00011	0.00003	0.00003
Cadmium	7440-43-9	0.007 to 0.009	0.005 to 0.007	0.005 to 0.008		0.00004	
Calcium	7440-70-2	1 to 1.3	0.7 to 1	0.8 to 1.2		0.03	
Chromium	7440-47-3	0.06 to 0.08	0.04 to 0.06	0.04 to 0.06	0.0002	0.0002 to 0.002	0.0002
Cobalt	7440-48-4	0.006 to 0.008	0.004 to 0.006	0.005 to 0.007		0.00005	
Copper	7440-50-8	0.04 to 0.05	0.03 to 0.04	0.03 to 0.05		0.0003	
Iron	7439-89-6	2 to 3	1.5 to 2	1.5 to 2.4		0.03	
Magnesium	7439-95-4	0.2 to 0.3	0.1 to 0.2	0.2		0.03	
Manganese	7439-96-5	0.04 to 0.05	0.03 to 0.04	0.03 to 0.05	0.0002	0.0005	0.0005
Nickel	7440-02-0	0.03 to 0.04	0.02 to 0.03	0.02 to 0.04		0.0002	
Potassium	7440-09-7	10 to 13	7 to 10	8 to 12		0.08	
Selenium	7782-49-2	0.09 to 0.1	0.07 to 0.09	0.07 to 1		0.001	
Silver	7440-22-4	0.004 to 0.005	0.003 to 0.004	0.003 to 0.004		0.00005	
Sodium	7440-23-5	5 to 7	4 to 5	4 to 6	0.2	0.2 to 0.38	0.2
Thallium	7440-28-0	0.004 to 0.005	0.003 to 0.004	0.003 to 0.004		0.00005	
Vanadium	7440-62-2	0.03 to 0.04	0.02 to 0.03	0.02 to 0.04		0.0002	
Zinc	7440-66-6	0.2 to 0.26	0.15 to 0.2	0.15 to 0.2		0.0025	
Other Analyses							
SPLP TAL metals (except mercury) and phosphorus (mg/L)	NA	0.004 to 13	0.003 to 10	0.003 to 10	0.00003 to 0.2	0.00003 to 0.38	0.00003 to 0.2
Bioaccessible arsenic (at pH 1.5 and pH 2.5) (%)	NA	0.59 to 7.9	0.59 to 7.02	0.59 to 6.5	0.59 to 5.1	0.59 to 6.4	0.59
Bioaccessible lead (at pH 1.5 and pH 2.5) (%)	NA			0.2412			
Mehlich III extractable lead and phosphorus (mg/kg)	NA		0.073			0.024 to 0.073	
Mineralizable nitrogen (mg/kg)	NA		1			0.065	
Total carbon (%)	NA			1			
Total nitrogen (%)	NA			0.1			
Total organic carbon (%)	NA			0.02			

Table 4-4a. Analytical Parameters, Methods, and Target Laboratory Reporting Limits for TAL Metals for Incremental Composite Samples

Analyte (mg/kg) [a,b]	Laboratory RL [c]					
	ME 1	ME2	ME3	ME4	ME5	ME6
OSU						
Aluminum (EPA Oxalate)		125		625	125	
Iron (EPA Oxalate)		50		250	50	
Arsenic (Total)	10	10	1	1	10	
Lead (Total)	5	5	25	25	20	
Lead (Mehlich III)		0.25			2.5	
Phosphorus (Mehlich III)		1.5			7.5	
TAL Metals - ALS						
Aluminum	4.1 to 5.3	1.5 to 2.0	1.4 to 2.4		0.02	
Antimony	0.11 to 0.13	0.037 to 0.051	0.038 to 0.06		0.0005	
Arsenic	0.51 to 0.66	0.37 to 0.51	0.38 to 0.6		0.005	
Barium	0.051 to 0.066	0.037 to 0.051	0.038 to 0.06		0.0005	
Beryllium	0.041 to 0.053	0.015 to 0.02	0.015 to 0.02		0.0002	
Cadmium	0.02 to 0.026	0.015 to 0.02	0.015 to 0.02		0.0002	
Calcium	4.1 to 5.3	3 to 4.1	3 to 4.8	0.02	0.1	0.02 to 0.04
Chromium	0.2 to 0.26	0.15 to 0.2	0.14 to 0.2		0.002	
Cobalt	0.02 to 0.026	0.015 to 0.02	0.03 to 0.048		0.0002	
Copper	0.1 to 0.13	0.075 to 0.1	0.076 to 0.12		0.001	
Iron	8.2 to 11	6 to 8.1	6.1 to 9.7	0.02	0.04	0.04
Magnesium	2 to 2.6	1.5 to 2	1.5 to 2.4	0.02	0.04	0.02
Manganese	0.2 to 0.26	0.15 to 0.2	0.15 to 0.2	0.0005	0.01	0.01
Nickel	0.2 to 0.26	0.15 to 0.2	0.15 to 0.2		0.002	
Potassium	41 to 53	60 to 81	30 to 48		0.2	
Selenium	1 to 1.3	0.75 to 1	0.76 to 1.2		0.01	
Silver	0.02 to 0.026	0.015 to 0.02	0.014 to 0.02		0.0002	
Sodium	41 to 53	30 to 41	30 to 48	0.02	0.04	0.02
Thallium	0.02 to 0.026	0.015 to 0.02	0.015 to 0.02		0.0002	
Vanadium	0.2 to 0.26	0.15 to 0.2	0.15 to 0.2		0.002	
Zinc	0.51 to 0.66	0.37 to 0.51	0.38 to 0.6		0.005	
Other Analyses						
SPLP TAL metals (except mercury) and phosphorus (mg/L)	0.02 to 53	0.015 to 81	0.014 to 39	0.0002 to 0.2	0.0002 to 0.4	0.0002 to 0.2
Bioaccessible arsenic (at pH 1.5 and pH 2.5) (%)	1 to 7.9	5 to 7.02	6 to 6.4	1 to 5.1	5 to 6.4	5
Bioaccessible lead (at pH 1.5 and pH 2.5) (%)		5			25	
Mehlich III extractable lead and phosphorus (mg/kg)		0.25 to 1.5			2.5 to 7.5	
Mineralizable nitrogen (mg/kg)		1			0.065	
Total carbon (%)			1			
Total nitrogen (%)			0.1			
Total organic carbon (%)			0.1			

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] Target analyte list (TAL) metals analyses were performed on the < 2 mm soil fraction, and analyses for total arsenic and lead were performed on the < 150 µm fraction only

[b] TAL metals analyzed using EPA 6010 or EPA 6020 unless otherwise indicated

[c] Method detection limit (MDL) and reporting limit (RL) concentrations for all MEs are reported in mg/kg dry weight unless otherwise indicated

ALS - ALS Laboratory Kelso

CAS - Chemical Abstracts Service

NA - not applicable

OSU - The Ohio State University

SPLP - synthetic precipitation leaching procedure

Table 4-4b. Analytical Parameters, Methods, and Target Laboratory Reporting Limits for TAL Metals for Depth-Discrete Samples

Analyte (mg/kg) [a,b]	CAS Number	Laboratory MDL [c]	Laboratory RL [c]
Metals - OSU			
Lead (Mehlich III)	7439-92-2	0.02412	2.50
Phosphorus (Mehlich III)	7439-95-4	0.07323	7.50
TAL Metals - ALS			
Aluminum	7429-90-5	0.5 to 0.8	1.5 to 2.5
Antimony	7440-36-0	0.015 to 0.025	0.39 to 0.063
Arsenic	7440-38-2	0.05 to 0.08	0.39 to 0.063
Barium	7440-39-3	0.015 to 0.025	0.039 to 0.063
Beryllium	7440-41-7	0.005 to 0.008	0.015 to 0.025
Cadmium	7440-43-9	0.005 to 0.009	0.015 to 0.025
Calcium	7440-70-2	0.8 to 1.3	3.1 to 5
Chromium	7440-47-3	0.05 to 0.08	0.15 to 0.25
Cobalt	7440-48-4	0.005 to 0.008	0.015 to 0.025
Copper	7440-50-8	0.031 to 0.05	0.077 to 0.13
Iron	7439-89-6	1.6 to 3	6.2 to 19
Lead	7439-92-1	0.015 to 0.025	0.039 to 0.063
Magnesium	7439-95-4	0.2 to 0.3	1.5 to 4.3
Manganese	7439-96-5	0.03 to 0.05	0.16 to 0.47
Nickel	7440-02-0	0.02 to 0.04	0.15 to 0.25
Potassium	7440-09-7	8 to 13	31 to 50
Selenium	7782-49-2	0.07 to 0.1	0.77 to 1.3
Silver	7440-22-4	0.003 to 0.005	0.015 to 0.025
Sodium	7440-23-5	4 to 6	31 to 50
Thallium	7440-28-0	0.003 to 0.005	0.015 to 0.025
Vanadium	7440-62-2	0.02 to 0.04	0.15 to 0.42
Zinc	7440-66-6	0.15 to 0.3	0.39 to 1.3

Notes:

Samples collected in May 2023

[a] Target analyte list (TAL) metals analyses were performed on the < 2 mm soil fraction

[b] TAL metals analyzed using EPA 6010 or EPA 6020 unless otherwise indicated

[c] Method detection limit (MDL) and reporting limit (RL) concentrations are reported in mg/kg dry weight unless otherwise indicated

ALS - ALS Laboratory

CAS - Chemical Abstracts Service

OSU - The Ohio State University

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Aluminum						Antimony						Arsenic		
		ME1		ME2		ME3		ME1		ME2		ME3		ME 1	ME2	ME3
Control																
IC-258-3B	primary	6,010	J-	7,360	J-	8,080	J-	2.2	J-	3.5	J	2.7	J	10.4	11.5	12.3
IC-401-1D	primary	10,000	J-	11,100	J-	11,100	J-	20.3	J-	12.5	J	14.8	J	50.1	40.6	45.4
IC-401-1D	replicate	10,600	J-	ns		ns		19.6	J-	ns		ns		46.5	ns	ns
IC-401-2C	primary	11,300	J-	12,800	J-	12,800	J-	26.0	J-	17.0	J	11.9	J	58.1	50.6	46.8
IC-441-1C	primary	19,800	J-	16,300	J-	17,600	J-	5.4	J-	3.9	J	4.8	J	32.9	25.7	27.9
IC-441-1C	replicate	ns		16,300	J-	16,500		ns		3.9	J	4.0	J	ns	25.6	27.9
Compost																
IC-258-3A	primary	8,850	J-	10,100	J-	11,400	J-	2.2	J-	2.2	J	2.4	J	10.2	10.5	11.1
IC-401-1C	primary	8,810	J-	9,360	J-	9,960	J-	9.3	J-	7.8	J	7.8	J	27.0	28.2	26.6
IC-401-2A	primary	10,200	J-	11,100	J-	10,500	J-	28.3	J-	17.3	J	23.2	J	54.5	47.1	53.5
IC-441-1A	primary	16,900	J-	15,500	J-	17,200	J-	3.9	J-	3.9	J	4.3	J	20.4	19.1	20.9
Soluble Phosphate																
IC-258-3C	primary	6,830	J-	8,150	J-	8,560	J-	3.5	J-	3.5	J	3.5	J	11.5	13.3	14.2
IC-258-3C	replicate	7,610	J-	ns		ns		3.1	J-	ns		ns		10.7	ns	ns
IC-401-1B	primary	10,300	J-	11,300	J-	10,800	J-	14.9	J-	10.8	J	11.8	J	40.9	34.6	36.9
IC-401-1B	replicate	ns		10,700	J-	ns		ns		9.7	J	ns		ns	31.6	ns
IC-401-2D	primary	16,800	J-	12,500	J-	13,700	J-	28.1	J-	17.8	J	18.4	J	51.5	49.0	56.6
IC-401-2D	replicate	ns		ns		13,300	J-	ns		ns		18.5	J	ns	ns	51.9
IC-441-1B	primary	21,200	J-	16,600	J-	19,000	J-	7.5	J-	5.9	J	8.2	J	35.2	35.3	36.2
Soluble Phosphate and Biochar																
IC-258-3D	primary	5,980	J-	6,940	J-	7,180	J-	3.1	J-	3.2	J	2.9	J	11.4	12.8	13.3
IC-258-3D	duplicate	ns		7,710	J-	ns		ns		3.0	J	ns		ns	15.0	ns
IC-258-3D	triplicate	ns		7,540	J-	ns		ns		3.3	J	ns		ns	14.7	ns
IC-401-1A	primary	8,120	J-	9,430	J-	9,340	J-	12.3	J-	9.5	J	8.8	J	29.6	27.6	27.3
IC-401-1A	duplicate	10,000	J-	ns		ns		13.1	J-	ns		ns		25.4	ns	ns
IC-401-1A	triplicate	8,400	J-	ns		ns		12.5	J-	ns		ns		26.6	ns	ns
IC-401-2B	primary	11,800	J-	12,100	J-	12,700	J-	17.4	J-	15.1	J	16.7	J	45.0	41.6	42.5
IC-401-2B	duplicate	ns		ns		13,000	J-	ns		ns		17.4	J	ns	ns	51.7
IC-401-2B	triplicate	ns		ns		12,500	J-	ns		ns		15.4	J	ns	ns	40.0
IC-441-1D	primary	21,000	J-	17,600	J-	17,200	J-	5.0	J-	3.8	J	3.9	J	34.6	26.6	26.2

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Barium			Beryllium			Cadmium	
		ME1	ME2	ME3	ME1	ME2	ME3	ME1	ME2
Control									
IC-258-3B	primary	62.1	72.9	78.9	0.20	0.25	0.27	3.2	4.3
IC-401-1D	primary	126.0	111.0	122.0	0.36	0.38	0.39	12.2	9.0
IC-401-1D	replicate	108.0	ns	ns	0.38	ns	ns	10.0	ns
IC-401-2C	primary	123.0	127.0	133.0	0.38	0.42	0.43	13.5	12.8
IC-441-1C	primary	273.0	219.0	242.0	0.66	0.52	0.58	15.8	10.4
IC-441-1C	replicate	ns	207.0	233.0	ns	0.49	0.52	ns	8.5
Compost									
IC-258-3A	primary	95.1	100.0	120.0	0.27	0.30	0.36	3.5	3.2
IC-401-1C	primary	86.1	92.7	89.7	0.29	0.31	0.32	6.8	6.4
IC-401-2A	primary	108.0	109.0	90.7	0.34	0.37	0.33	14.0	11.5
IC-441-1A	primary	272.0	234.0	276.0	0.59	0.53	0.57	8.9	7.0
Soluble Phosphate									
IC-258-3C	primary	95.5	94.9	110.0	0.23	0.28	0.30	5.2	5.1
IC-258-3C	replicate	93.1	ns	ns	0.29	ns	ns	4.8	ns
IC-401-1B	primary	104.0	102.0	108.0	0.36	0.40	0.38	10.4	8.6
IC-401-1B	replicate	ns	105.0	ns	ns	0.37	ns	ns	7.8
IC-401-2D	primary	146.0	115.0	171.0	0.61	0.41	0.44	17.8	12.4
IC-401-2D	replicate	ns	ns	141.0	ns	ns	0.44	ns	ns
IC-441-1B	primary	283.0	228.0	271.0	0.70	0.52	0.67	15.3	13.1
Soluble Phosphate and Biochar									
IC-258-3D	primary	67.3	77.6	79.1	0.21	0.25	0.24	4.1	4.5
IC-258-3D	duplicate	ns	86.2	ns	ns	0.26	ns	ns	4.8
IC-258-3D	triplicate	ns	82.6	ns	ns	0.25	ns	ns	4.8
IC-401-1A	primary	84.7	90.5	85.7	0.33	0.34	0.33	6.3	6.2
IC-401-1A	duplicate	79.1	ns	ns	0.39	ns	ns	5.8	ns
IC-401-1A	triplicate	81.4	ns	ns	0.31	ns	ns	6.2	ns
IC-401-2B	primary	123.0	121.0	133.0	0.42	0.41	0.43	12.9	11.7
IC-401-2B	duplicate	ns	ns	134.0	ns	ns	0.44	ns	ns
IC-401-2B	triplicate	ns	ns	122.0	ns	ns	0.42	ns	ns
IC-441-1D	primary	272.0	222.0	244.0	0.71	0.56	0.59	11.5	7.9

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Cadmium	Calcium				Chromium			Cobalt
		ME3	ME1	ME2		ME3	ME1	ME2	ME3	ME1
Control										
IC-258-3B	primary	3.8	1,780	2,110	J	1,960	6.2	6.8	7.9	2.59
IC-401-1D	primary	11.1	2,920	2,390	J	2,270	11.7	11.1	9.9	4.82
IC-401-1D	replicate	ns	2,820	ns		ns	10.5	ns	ns	4.08
IC-401-2C	primary	12.6	2,500	1,980	J	1,920	11.5	10.3	10.1	4.35
IC-441-1C	primary	12.4	9,140	6,930	J	8,820	20.1	16.5	18.9	7.82
IC-441-1C	replicate	12.4	ns	6,500	J	7,810	ns	20.3	17.2	ns
Compost										
IC-258-3A	primary	3.5	2,380	2,520	J	2,700	8.1	7.9	8.1	2.93
IC-401-1C	primary	6.8	1,990	2,560	J	2,020	10.5	10.7	11.5	3.34
IC-401-2A	primary	10.5	2,100	1,930	J	2,350	10.1	10.1	10.2	3.64
IC-441-1A	primary	10.3	9,130	8,570	J	8,960	20.3	18.1	20.4	7.93
Soluble Phosphate										
IC-258-3C	primary	5.8	3,570	3,400	J	3,620	8.5	8.4	8.5	2.72
IC-258-3C	replicate	ns	3,440	ns		ns	7.4	ns	ns	2.88
IC-401-1B	primary	9.1	3,340	3,480	J	3,440	12.0	12.7	11.2	3.67
IC-401-1B	replicate	ns	ns	3,290	J	ns	ns	12.4	ns	ns
IC-401-2D	primary	13.2	6,240	4,000	J	4,000	13.5	12.7	12.9	4.52
IC-401-2D	replicate	12.8	ns	ns		4,210	ns	ns	13.0	ns
IC-441-1B	primary	19.0	11,600	9,230	J	11,100	23.4	21.7	22.4	8.76
Soluble Phosphate and Biochar										
IC-258-3D	primary	4.3	2,640	2,500	J	2,380	7.9	7.5	7.9	2.52
IC-258-3D	duplicate	ns	ns	2,820	J	ns	ns	7.5	ns	ns
IC-258-3D	triplicate	ns	ns	2,610	J	ns	ns	8.3	ns	ns
IC-401-1A	primary	6.4	3,190	2,620	J	2,800	10.6	10.5	11.3	3.28
IC-401-1A	duplicate	ns	3,440	ns		ns	12.9	ns	ns	3.16
IC-401-1A	triplicate	ns	3,360	ns		ns	11.8	ns	ns	3.08
IC-401-2B	primary	11.5	4,400	3,710	J	3,780	14.9	12.3	13.7	4.24
IC-401-2B	duplicate	12.1	ns	ns		3,430	ns	ns	12.2	ns
IC-401-2B	triplicate	11.4	ns	ns		3,550	ns	ns	12.1	ns
IC-441-1D	primary	9.7	11,400	8,460	J	9,350	23.5	19.8	19.4	7.85

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Cobalt		Copper			Iron					
		ME2	ME3	ME1	ME2	ME3	ME1		ME2		ME3	
Control												
IC-258-3B	primary	2.49	2.90	13.3	16.1	15.5	6,950	J-	7,500	J-	8,010	J-
IC-401-1D	primary	3.85	4.30	44.3	34.8	41.0	11,600	J-	12,100	J-	12,200	J-
IC-401-1D	replicate	ns	ns	42.8	ns	ns	11,800	J-	ns		ns	
IC-401-2C	primary	4.27	4.65	53.5	42.2	35.7	12,400	J-	12,200	J-	12,500	J-
IC-441-1C	primary	6.32	7.36	53.1	41.8	43.6	17,800	J-	15,400	J-	16,900	J-
IC-441-1C	replicate	6.58	6.63	ns	38.0	44.1	ns		17,300	J-	15,800	J-
Compost												
IC-258-3A	primary	3.19	3.33	14.8	15.7	17.0	8,390	J-	9,300	J-	9,470	J-
IC-401-1C	primary	4.30	3.94	23.8	24.8	24.4	11,000	J-	12,700	J-	11,200	J-
IC-401-2A	primary	4.29	3.91	42.5	36.1	42.1	10,900	J-	12,500	J-	12,300	J-
IC-441-1A	primary	6.93	7.98	50.2	40.2	51.0	17,700	J-	18,800	J-	17,400	J-
Soluble Phosphate												
IC-258-3C	primary	2.76	2.97	16.0	17.6	19.7	7,890	J-	8,440	J-	8,160	J-
IC-258-3C	replicate	ns	ns	16.1	ns	ns	7,950	J-	ns		ns	
IC-401-1B	primary	5.01	3.87	35.7	31.6	33.6	11,500	J-	13,100	J-	12,400	J-
IC-401-1B	replicate	4.16	ns	ns	30.9	ns	ns		12,600	J-	ns	
IC-401-2D	primary	4.16	4.66	51.0	40.6	44.4	12,500	J-	13,200	J-	14,400	J-
IC-401-2D	replicate	ns	4.75	ns	ns	41.5	ns		ns		13,800	J-
IC-441-1B	primary	8.17	8.09	64.2	52.7	68.9	19,300	J-	17,700	J-	17,400	J-
Soluble Phosphate and Biochar												
IC-258-3D	primary	2.42	2.75	14.7	15.7	15.9	6,630	J-	7,220	J-	7,820	J-
IC-258-3D	duplicate	2.70	ns	ns	17.7	ns	ns		7,870	J-	ns	
IC-258-3D	triplicate	2.77	ns	ns	17.8	ns	ns		7,920	J-	ns	
IC-401-1A	primary	3.54	3.53	27.6	25.3	26.1	10,400	J-	11,200	J-	11,100	J-
IC-401-1A	duplicate	ns	ns	26.4	ns	ns	9,290	J-	ns		ns	
IC-401-1A	triplicate	ns	ns	27.4	ns	ns	9,920	J-	ns		ns	
IC-401-2B	primary	4.04	4.34	38.6	35.0	38.9	12,200	J-	12,300	J-	13,100	J-
IC-401-2B	duplicate	ns	4.43	ns	ns	41.2	ns		ns		12,400	J-
IC-401-2B	triplicate	ns	4.18	ns	ns	37.3	ns		ns		12,600	J-
IC-441-1D	primary	6.31	6.53	55.4	41.5	44.5	18,800	J-	15,700	J-	15,400	J-

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Lead			Magnesium				Manganese	
		ME1	ME2	ME3	ME1	ME2		ME3	ME1	ME2
Control										
IC-258-3B	primary	139	228	160	1,860	1,790	J	2,110	211	250
IC-401-1D	primary	990	692	822	2,500	2,350	J	2,510	403	422
IC-401-1D	replicate	930	ns	ns	2,570	ns		ns	361	ns
IC-401-2C	primary	1,350	916	629	2,510	2,370	J	2,350	377	491
IC-441-1C	primary	662	446	478	4,880	4,020	J	4,380	774	641
IC-441-1C	replicate	ns	376	481	ns	4,560	J	4,240	ns	595
Compost										
IC-258-3A	primary	118	137	146	2,410	2,420	J	2,550	265	301
IC-401-1C	primary	483	475	438	2,600	2,480	J	2,630	317	360
IC-401-2A	primary	1,010	816	1,050	2,440	2,460	J	2,490	423	519
IC-441-1A	primary	386	380	460	5,080	4,090	J	4,930	830	777
Soluble Phosphate										
IC-258-3C	primary	242	250	252	2,260	2,020	J	2,100	276	296
IC-258-3C	replicate	188	ns	ns	2,230	ns		ns	271	ns
IC-401-1B	primary	723	575	622	2,760	2,500	J	2,630	373	399
IC-401-1B	replicate	ns	518	ns	ns	2,420	J	ns	ns	410
IC-401-2D	primary	1,160	884	889	2,510	2,510	J	2,920	554	484
IC-401-2D	replicate	ns	ns	781	ns	ns		2,510	ns	ns
IC-441-1B	primary	631	560	795	5,450	4,960	J	4,770	905	778
Soluble Phosphate and Biochar										
IC-258-3D	primary	185	197	179	1,900	1,790	J	2,010	218	263
IC-258-3D	duplicate	ns	202	ns	ns	1,850	J	ns	ns	301
IC-258-3D	triplicate	ns	218	ns	ns	1,840	J	ns	ns	284
IC-401-1A	primary	604	496	463	2,310	2,330	J	2,330	279	330
IC-401-1A	duplicate	638	ns	ns	2,510	ns		ns	242	ns
IC-401-1A	triplicate	566	ns	ns	2,350	ns		ns	270	ns
IC-401-2B	primary	817	748	754	2,750	2,390	J	2,850	495	499
IC-401-2B	duplicate	ns	ns	810	ns	ns		2,550	ns	ns
IC-401-2B	triplicate	ns	ns	702	ns	ns		2,570	ns	ns
IC-441-1D	primary	462	368	403	5,570	3,920	J	4,020	743	637

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Manganese		Nickel			Potassium						Selenium			
		ME3		ME1	ME2	ME3	ME1		ME2		ME3		ME1		ME2	
Control																
IC-258-3B	primary	262	J	5.4	5.5	6.7	529	J-	537	J	564	J-	0.2	J	0.2	J
IC-401-1D	primary	429	J	9.6	8.4	9.0	787	J-	729	J	783	J-	0.7	J	0.6	J
IC-401-1D	replicate	ns		8.8	ns	ns	751	J-	ns		ns		0.8	J	ns	
IC-401-2C	primary	528	J	9.9	8.8	8.9	804	J-	691	J	735	J-	1.0	J	0.7	J
IC-441-1C	primary	694	J	19.1	15.0	18.4	2,250	J-	1,810	J	2,020	J-	0.6	J	0.5	J
IC-441-1C	replicate	668	J	ns	15.9	15.8	ns		1,620	J	1,960	J-	ns		0.5	J
Compost																
IC-258-3A	primary	318	J	7.0	6.7	7.2	723	J-	680	J	718	J-	0.2	J	0.2	J
IC-401-1C	primary	366	J	8.3	8.9	8.7	687	J-	653	J	707	J-	0.4	J	0.4	J
IC-401-2A	primary	397	J	8.6	8.4	8.1	778	J-	709	J	902	J-	0.9	J	0.7	J
IC-441-1A	primary	804	J	18.4	16.5	19.2	2,150	J-	1,820	J	2,330	J-	0.4	J	0.4	J
Soluble Phosphate																
IC-258-3C	primary	297	J	6.6	6.4	6.7	724	J-	669	J	701	J-	0.2	J	0.2	J
IC-258-3C	replicate	ns		6.4	ns	ns	691	J-	ns		ns		0.2	J	ns	
IC-401-1B	primary	360	J	9.7	9.9	9.2	1,190	J-	1,060	J	1,140	J-	0.6	J	0.5	J
IC-401-1B	replicate	ns		ns	9.7	ns	ns		1,080	J	ns		ns		0.5	J
IC-401-2D	primary	608	J	10.4	9.3	10.3	1,850	J-	1,260	J	1,310	J-	0.8	J	0.7	J
IC-401-2D	replicate	501	J	ns	ns	10.4	ns		ns		1,220	J-	ns		ns	
IC-441-1B	primary	828	J	22.2	19.8	19.9	3,150	J-	2,410	J	2,810	J-	0.6	J	0.5	J
Soluble Phosphate and Biochar																
IC-258-3D	primary	255	J	6.0	5.9	6.6	630	J-	625	J	644	J-	0.2	J	0.2	J
IC-258-3D	duplicate	ns		ns	6.3	ns	ns		653	J	ns		ns		0.2	J
IC-258-3D	triplicate	ns		ns	6.2	ns	ns		631	J	ns		ns		0.3	J
IC-401-1A	primary	310	J	8.0	8.0	8.0	1,120	J-	973	J	965	J-	0.5	J	0.5	J
IC-401-1A	duplicate	ns		9.0	ns	ns	1,120	J-	ns		ns		0.5	J	ns	
IC-401-1A	triplicate	ns		8.5	ns	ns	1,220	J-	ns		ns		0.5	J	ns	
IC-401-2B	primary	464	J	12.2	9.1	10.2	1,370	J-	1,140	J	1,270	J-	0.7	J	0.6	J
IC-401-2B	duplicate	456	J	ns	ns	9.7	ns		ns		1,270	J-	ns		ns	
IC-401-2B	triplicate	474	J	ns	ns	9.1	ns		ns		1,270	J-	ns		ns	
IC-441-1D	primary	621	J	20.9	15.5	16.5	2,970	J-	2,100	J	2,280	J-	0.5	J	0.4	J

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Selenium		Silver			Sodium					Thallium	
		ME3		ME1	ME2	ME3	ME1		ME2	ME3		ME1	ME2
Control													
IC-258-3B	primary	0.2	J	0.19	0.26	0.21	51	J-	81	52	J-	0.15	0.20
IC-401-1D	primary	0.6	J	1.00	0.60	0.73	80	J-	121	62	J-	0.61	0.44
IC-401-1D	replicate	ns		1.02	ns	ns	70	J-	ns	ns		0.51	ns
IC-401-2C	primary	0.6	J	1.27	0.77	0.59	76	J-	100	66	J-	0.78	0.59
IC-441-1C	primary	0.5	J	0.73	0.45	0.57	180	J-	201	164	J-	0.51	0.39
IC-441-1C	replicate	0.5	J	ns	0.39	0.52	ns		211	161	J-	ns	0.36
Compost													
IC-258-3A	primary	0.2	J	0.20	0.22	0.24	60	J-	110	84	J-	0.15	0.16
IC-401-1C	primary	0.4	J	0.46	0.35	0.39	65	J-	104	73	J-	0.36	0.36
IC-401-2A	primary	0.8	J	1.01	0.77	0.97	70	J-	99	84	J-	0.62	0.58
IC-441-1A	primary	0.4	J	0.45	0.38	0.50	142	J-	192	167	J-	0.32	0.28
Soluble Phosphate													
IC-258-3C	primary	0.3	J	0.30	0.26	0.33	63	J-	123	68	J-	0.20	0.22
IC-258-3C	replicate	ns		0.26	ns	ns	71	J-	ns	ns		0.18	ns
IC-401-1B	primary	0.5	J	0.72	0.48	0.58	107	J-	181	85	J-	0.50	0.44
IC-401-1B	replicate	ns		ns	0.46	ns	ns		150	ns		ns	0.41
IC-401-2D	primary	0.8	J	1.30	0.74	0.82	157	J-	149	97	J-	0.69	0.55
IC-401-2D	replicate	0.7	J	ns	ns	0.87	ns		ns	96	J-	ns	ns
IC-441-1B	primary	0.6	J	0.80	0.54	0.77	280	J-	275	212	J-	0.46	0.46
Soluble Phosphate and Biochar													
IC-258-3D	primary	0.2	J	0.25	0.22	0.24	54	J-	148	60	J-	0.17	0.19
IC-258-3D	duplicate	ns		ns	0.23	ns	ns		95	ns		ns	0.19
IC-258-3D	triplicate	ns		ns	0.25	ns	ns		88	ns		ns	0.20
IC-401-1A	primary	0.4	J	0.70	0.47	0.50	108	J-	140	76	J-	0.40	0.37
IC-401-1A	duplicate	ns		0.75	ns	ns	105	J-	ns	ns		0.40	ns
IC-401-1A	triplicate	ns		0.62	ns	ns	102	J-	ns	ns		0.35	ns
IC-401-2B	primary	0.7	J	0.83	0.63	0.83	134	J-	154	109	J-	0.55	0.53
IC-401-2B	duplicate	0.7	J	ns	ns	0.84	ns		ns	100	J-	ns	ns
IC-401-2B	triplicate	0.6	J	ns	ns	0.72	ns		ns	107	J-	ns	ns
IC-441-1D	primary	0.4	J	0.58	0.39	0.43	278	J-	275	182	J-	0.36	0.31

Table 4-5. TAL Metals Analytical Results for Incremental Composite Samples (< 2 mm soil fraction) [a,b]

Sample ID	Sample Type[a]	Thallium ME3	Vanadium ME1	Vanadium ME2	Vanadium ME3	Zinc ME1		Zinc ME2		Zinc ME3
Control										
IC-258-3B	primary	0.19	12.6	13.1	13.5	170	J-	222	J	190
IC-401-1D	primary	0.48	22.3	21.4	21.0	532	J-	372	J	456
IC-401-1D	replicate	ns	20.3	ns	ns	487	J-	ns		ns
IC-401-2C	primary	0.51	21.9	21.9	21.7	624	J-	508	J	470
IC-441-1C	primary	0.45	38.0	29.8	31.0	853	J-	614	J	722
IC-441-1C	replicate	0.41	ns	33.6	28.8	ns		505	J	704
Compost										
IC-258-3A	primary	0.19	14.9	16.4	16.8	178	J-	168	J	184
IC-401-1C	primary	0.32	18.8	22.6	19.8	291	J-	268	J	263
IC-401-2A	primary	0.63	18.4	21.8	21.0	482	J-	406	J	456
IC-441-1A	primary	0.34	34.4	30.8	32.9	455	J-	395	J	511
Soluble Phosphate										
IC-258-3C	primary	0.21	13.7	15.5	14.1	254	J-	245	J	261
IC-258-3C	replicate	ns	14.4	ns	ns	235	J-	ns		ns
IC-401-1B	primary	0.42	21.0	24.4	20.9	362	J-	322	J	330
IC-401-1B	replicate	ns	ns	24.4	ns	ns		304	J	ns
IC-401-2D	primary	0.62	22.0	25.3	24.4	750	J-	535	J	560
IC-401-2D	replicate	0.52	ns	ns	23.2	ns		ns		557
IC-441-1B	primary	0.58	38.9	36.4	37.9	817	J-	792	J	1,070
Soluble Phosphate and Biochar										
IC-258-3D	primary	0.18	12.7	12.8	12.7	192	J-	200	J	194
IC-258-3D	duplicate	ns	ns	13.6	ns	ns		222	J	ns
IC-258-3D	triplicate	ns	ns	13.6	ns	ns		215	J	ns
IC-401-1A	primary	0.36	18.5	20.7	19.8	304	J-	262	J	249
IC-401-1A	duplicate	ns	18.0	ns	ns	291	J-	ns		ns
IC-401-1A	triplicate	ns	18.8	ns	ns	274	J-	ns		ns
IC-401-2B	primary	0.52	22.0	22.1	23.6	562	J-	545	J	486
IC-401-2B	duplicate	0.56	ns	ns	23.6	ns		ns		485
IC-401-2B	triplicate	0.48	ns	ns	22.4	ns		ns		497
IC-441-1D	primary	0.32	36.5	30.9	30.4	516	J-	382	J	441

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021
All results reported as mg/kg
[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.
ns - not sampled
TAL - target analyte list

Data Qualifiers
J - Quantitation is approximate due to limitations identified during the QA review
J- - Quantitation is approximate, but the result may be biased low

Table 4-6a. Sample IDs and Guide to Nomenclature Used for Incremental Composite Samples

Sample ID	Monitoring Event	Plot	Subplot	Sample Type(s) [a]
Control				
IC-258-3B-051821-CTL	1	258-3	IC-258-3B	primary
IC-258-3B-072021-CTL	2	258-3	IC-258-3B	primary
IC-258-3B-101221-CTL	3	258-3	IC-258-3B	primary
IC-258-3B-051722-CTL	4	258-3	IC-258-3B	primary
IC-258-3B-071922-CTL	5	258-3	IC-258-3B	primary
IC-258-3B-101122-CTL	6	258-3	IC-258-3B	primary
IC-401-1D-052121-CTL	1	401-1	IC-401-1D	primary, replicate
IC-401-1D-072221-CTL	2	401-1	IC-401-1D	primary
IC-401-1D-101321-CTL	3	401-1	IC-401-1D	primary
IC-401-1D-051822-CTL	4	401-1	IC-401-1D	primary
IC-401-1D-072022-CTL	5	401-1	IC-401-1D	primary
IC-401-1D-101122-CTL	6	401-1	IC-401-1D	primary, triplicate
IC-401-2C-052021-CTL	1	401-2	IC-401-2C	primary
IC-401-2C-072121-CTL	2	401-2	IC-401-2C	primary
IC-401-2C-101321-CTL	3	401-2	IC-401-2C	primary
IC-401-2C-051922-CTL	4	401-2	IC-401-2C	primary, replicate
IC-401-2C-072122-CTL	5	401-2	IC-401-2C	primary
IC-401-2C-101222-CTL	6	401-2	IC-401-2C	primary
IC-441-1C-051921-CTL	1	441-1	IC-441-1C	primary
IC-441-1C-072121-CTL	2	441-1	IC-441-1C	primary, replicate
IC-441-1C-101221-CTL	3	441-1	IC-441-1C	primary, replicate
IC-441-1C-051722-CTL	4	441-1	IC-441-1C	primary
IC-441-1C-072022-CTL	5	441-1	IC-441-1C	primary
IC-441-1C-101322-CTL	6	441-1	IC-441-1C	primary
Compost				
IC-258-3A-051821-CPS	1	258-3	IC-258-3A	primary
IC-258-3A-072021-CPS	2	258-3	IC-258-3A	primary
IC-258-3A-101221-CPS	3	258-3	IC-258-3A	primary
IC-258-3A-051722-CPS	4	258-3	IC-258-3A	primary
IC-258-3A-071922-CPS	5	258-3	IC-258-3A	primary
IC-258-3A-101122-CPS	6	258-3	IC-258-3A	primary, replicate
IC-401-1C-052121-CPS	1	401-1	IC-401-1C	primary
IC-401-1C-072221-CPS	2	401-1	IC-401-1C	primary
IC-401-1C-101321-CPS	3	401-1	IC-401-1C	primary
IC-401-1C-051822-CPS	4	401-1	IC-401-1C	primary
IC-401-1C-072022-CPS	5	401-1	IC-401-1C	primary, replicate
IC-401-1C-101222-CPS	6	401-1	IC-401-1C	primary
IC-401-2A-052021-CPS	1	401-2	IC-401-2A	primary
IC-401-2A-072221-CPS	2	401-2	IC-401-2A	primary
IC-401-2A-101421-CPS	3	401-2	IC-401-2A	primary
IC-401-2A-051822-CPS	4	401-2	IC-401-2A	primary, replicate
IC-401-2A-072122-CPS	5	401-2	IC-401-2A	primary
IC-401-2A-101222-CPS	6	401-2	IC-401-2A	primary
IC-441-1A-051921-CPS	1	441-1	IC-441-1A	primary
IC-441-1A-072121-CPS	2	441-1	IC-441-1A	primary
IC-441-1A-101221-CPS	3	441-1	IC-441-1A	primary
IC-441-1A-051822-CPS	4	441-1	IC-441-1A	primary
IC-441-1A-071922-CPS	5	441-1	IC-441-1A	primary
IC-441-1A-101322-CPS	6	441-1	IC-441-1A	primary

Table 4-6a. Sample IDs and Guide to Nomenclature Used for Incremental Composite Samples

Sample ID	Monitoring Event	Plot	Subplot	Sample Type(s) [a]
Soluble Phosphate				
IC-258-3C-051821-PHO	1	258-3	IC-258-3C	primary, replicate
IC-258-3C-072021-PHO	2	258-3	IC-258-3C	primary
IC-258-3C-101221-PHO	3	258-3	IC-258-3C	primary
IC-258-3C-051722-PHO	4	258-3	IC-258-3C	primary
IC-258-3C-071922-PHO	5	258-3	IC-258-3C	primary
IC-258-3C-101122-PHO	6	258-3	IC-258-3C	primary, replicate
IC-401-1B-052121-PHO	1	401-1	IC-401-1B	primary
IC-401-1B-072221-PHO	2	401-1	IC-401-1B	primary, replicate
IC-401-1B-101321-PHO	3	401-1	IC-401-1B	primary
IC-401-1B-051822-PHO	4	401-1	IC-401-1B	primary
IC-401-1B-072022-PHO	5	401-1	IC-401-1B	primary
IC-401-1B-101222-PHO	6	401-1	IC-401-1B	primary
IC-401-2D-052021-PHO	1	401-2	IC-401-2D	primary
IC-401-2D-072121-PHO	2	401-2	IC-401-2D	primary
IC-401-2D-101421-PHO	3	401-2	IC-401-2D	primary, replicate
IC-401-2D-051922-PHO	4	401-2	IC-401-2D	primary
IC-401-2D-072122-PHO	5	401-2	IC-401-2D	primary
IC-401-2D-101222-PHO	6	401-2	IC-401-2D	primary
IC-441-1B-051921-PHO	1	441-1	IC-441-1B	primary
IC-441-1B-072121-PHO	2	441-1	IC-441-1B	primary
IC-441-1B-101321-PHO	3	441-1	IC-441-1B	primary
IC-441-1B-051822-PHO	4	441-1	IC-441-1B	primary
IC-441-1B-071922-PHO	5	441-1	IC-441-1B	primary, triplicate
IC-441-1B-101322-PHO	6	441-1	IC-441-1B	primary
Soluble Phosphate and Biochar				
IC-258-3D-051821-PBI	1	258-3	IC-258-3D	primary
IC-258-3D-072021-PBI	2	258-3	IC-258-3D	primary, triplicate
IC-258-3D-101221-PBI	3	258-3	IC-258-3D	primary
IC-258-3D-051722-PBI	4	258-3	IC-258-3D	primary
IC-258-3D-071922-PBI	5	258-3	IC-258-3D	primary
IC-258-3D-101122-PBI	6	258-3	IC-258-3D	primary
IC-401-1A-052021-PBI	1	401-1	IC-401-1A	primary, triplicate
IC-401-1A-072221-PBI	2	401-1	IC-401-1A	primary
IC-401-1A-101321-PBI	3	401-1	IC-401-1A	primary
IC-401-1A-051822-PBI	4	401-1	IC-401-1A	primary
IC-401-1A-072022-PBI	5	401-1	IC-401-1A	primary, replicate
IC-401-1A-101222-PBI	6	401-1	IC-401-1A	primary
IC-401-2B-052021-PBI	1	401-2	IC-401-2B	primary
IC-401-2B-072221-PBI	2	401-2	IC-401-2B	primary
IC-401-2B-101421-PBI	3	401-2	IC-401-2B	primary, triplicate
IC-401-2B-051922-PBI	4	401-2	IC-401-2B	primary
IC-401-2B-072122-PBI	5	401-2	IC-401-2B	primary
IC-401-2B-101222-PBI	6	401-2	IC-401-2B	primary
IC-441-1D-051921-PBI	1	441-1	IC-441-1D	primary
IC-441-1D-072121-PBI	2	441-1	IC-441-1D	primary
IC-441-1D-101321-PBI	3	441-1	IC-441-1D	primary
IC-441-1D-051722-PBI	4	441-1	IC-441-1D	primary, triplicate
IC-441-1D-072022-PBI	5	441-1	IC-441-1D	primary
IC-441-1D-101322-PBI	6	441-1	IC-441-1D	primary

Note:

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

Table 4-6b. Sample IDs and Guide to Nomenclature Used for Depth-Discrete Monitoring Samples

Sample ID	Plot	Subplot	Depth Interval (in.)	Sample Type(s)[a]
Control				
D-258-3B-051623-0-2-CTL	258-3	D-258-3B	0-2	primary
D-258-3B-051623-2-4-CTL	258-3	D-258-3B	2-4	primary
D-258-3B-051623-4-6-CTL	258-3	D-258-3B	4-6	primary
D-258-3B-051623-6-8-CTL	258-3	D-258-3B	6-8	primary
D-258-3B-051623-8-10-CTL	258-3	D-258-3B	8-10	primary
D-258-3B-051623-10-12-CTL	258-3	D-258-3B	10-12	primary
D-401-1D-051823-0-2-CTL	401-1	D-401-1D	0-2	primary
D-401-1D-051823-2-4-CTL	401-1	D-401-1D	2-4	primary
D-401-1D-051823-4-6-CTL	401-1	D-401-1D	4-6	primary
D-401-1D-051823-6-8-CTL	401-1	D-401-1D	6-8	primary
D-401-1D-051823-8-10-CTL	401-1	D-401-1D	8-10	primary
D-401-1D-051823-10-12-CTL	401-1	D-401-1D	10-12	primary
D-401-2C-051723-0-2-CTL	401-2	D-401-2C	0-2	primary
D-401-2C-051723-2-4-CTL	401-2	D-401-2C	2-4	primary
D-401-2C-051723-4-6-CTL	401-2	D-401-2C	4-6	primary
D-401-2C-051723-6-8-CTL	401-2	D-401-2C	6-8	primary
D-401-2C-051723-8-10-CTL	401-2	D-401-2C	8-10	primary
D-401-2C-051723-10-12-CTL	401-2	D-401-2C	10-12	primary
D-441-1C-051923-0-2-CTL	441-1	D-441-1C	0-2	primary
D-441-1C-051923-2-4-CTL	441-1	D-441-1C	2-4	primary
D-441-1C-051923-4-6-CTL	441-1	D-441-1C	4-6	primary
D-441-1C-051923-6-8-CTL	441-1	D-441-1C	6-8	primary
D-441-1C-051923-8-10-CTL	441-1	D-441-1C	8-10	primary
D-441-1C-051923-10-12-CTL	441-1	D-441-1C	10-12	primary
Compost				
D-258-3A-051623-0-2-CPS	258-3	D-258-3A	0-2	primary
D-258-3A-051623-2-4-CPS	258-3	D-258-3A	2-4	primary
D-258-3A-051623-4-6-CPS	258-3	D-258-3A	4-6	primary
D-258-3A-051623-6-8-CPS	258-3	D-258-3A	6-8	primary
D-258-3A-051623-8-10-CPS	258-3	D-258-3A	8-10	primary
D-258-3A-051623-10-12-CPS	258-3	D-258-3A	10-12	primary
D-401-1C-051723-0-2-CPS	401-1	D-401-1C	0-2	primary, replicate
D-401-1C-051723-2-4-CPS	401-1	D-401-1C	2-4	primary, replicate
D-401-1C-051723-4-6-CPS	401-1	D-401-1C	4-6	primary, replicate
D-401-1C-051723-6-8-CPS	401-1	D-401-1C	6-8	primary, replicate
D-401-1C-051723-8-10-CPS	401-1	D-401-1C	8-10	primary, replicate
D-401-1C-051723-10-12-CPS	401-1	D-401-1C	10-12	primary, replicate
D-401-2A-051723-0-2-CPS	401-2	D-401-2A	0-2	primary
D-401-2A-051723-2-4-CPS	401-2	D-401-2A	2-4	primary
D-401-2A-051723-4-6-CPS	401-2	D-401-2A	4-6	primary
D-401-2A-051723-6-8-CPS	401-2	D-401-2A	6-8	primary
D-401-2A-051723-8-10-CPS	401-2	D-401-2A	8-10	primary
D-401-2A-051723-10-12-CPS	401-2	D-401-2A	10-12	primary
D-441-1A-051923-0-2-CPS	441-1	D-441-1A	0-2	primary
D-441-1A-051923-2-4-CPS	441-1	D-441-1A	2-4	primary
D-441-1A-051923-4-6-CPS	441-1	D-441-1A	4-6	primary
D-441-1A-051923-6-8-CPS	441-1	D-441-1A	6-8	primary
D-441-1A-051923-8-10-CPS	441-1	D-441-1A	8-10	primary
D-441-1A-051923-10-12-CPS	441-1	D-441-1A	10-12	primary

Table 4-6b. Sample IDs and Guide to Nomenclature Used for Depth-Discrete Monitoring Samples

Sample ID	Plot	Subplot	Depth Interval (in.)	Sample Type(s)[a]
Soluble Phosphate				
D-258-3C-051623-0-2-PHO	258-3	D-258-3C	0-2	primary
D-258-3C-051623-2-4-PHO	258-3	D-258-3C	2-4	primary
D-258-3C-051623-4-6-PHO	258-3	D-258-3C	4-6	primary
D-258-3C-051623-6-8-PHO	258-3	D-258-3C	6-8	primary
D-258-3C-051623-8-10-PHO	258-3	D-258-3C	8-10	primary
D-258-3C-051623-10-12-PHO	258-3	D-258-3C	10-12	primary
D-401-1B-051823-0-2-PHO	401-1	D-401-1B	0-2	primary
D-401-1B-051823-2-4-PHO	401-1	D-401-1B	2-4	primary
D-401-1B-051823-4-6-PHO	401-1	D-401-1B	4-6	primary
D-401-1B-051823-6-8-PHO	401-1	D-401-1B	6-8	primary
D-401-1B-051823-8-10-PHO	401-1	D-401-1B	8-10	primary
D-401-1B-051823-10-12-PHO	401-1	D-401-1B	10-12	primary
D-401-2D-051723-0-2-PHO	401-2	D-401-2D	0-2	primary
D-401-2D-051723-2-4-PHO	401-2	D-401-2D	2-4	primary
D-401-2D-051723-4-6-PHO	401-2	D-401-2D	4-6	primary
D-401-2D-051723-6-8-PHO	401-2	D-401-2D	6-8	primary
D-401-2D-051723-8-10-PHO	401-2	D-401-2D	8-10	primary
D-401-2D-051723-10-12-PHO	401-2	D-401-2D	10-12	primary
D-441-1B-051823-0-2-PHO	441-1	D-441-1B	0-2	primary
D-441-1B-051823-2-4-PHO	441-1	D-441-1B	2-4	primary
D-441-1B-051823-4-6-PHO	441-1	D-441-1B	4-6	primary
D-441-1B-051823-6-8-PHO	441-1	D-441-1B	6-8	primary
D-441-1B-051823-8-10-PHO	441-1	D-441-1B	8-10	primary
D-441-1B-051823-10-12-PHO	441-1	D-441-1B	10-12	primary
Soluble Phosphate and Biochar				
D-258-3D-051623-0-2-PBI	258-3	D-258-3D	0-2	primary, replicate
D-258-3D-051623-2-4-PBI	258-3	D-258-3D	2-4	primary, replicate
D-258-3D-051623-4-6-PBI	258-3	D-258-3D	4-6	primary, replicate
D-258-3D-051623-6-8-PBI	258-3	D-258-3D	6-8	primary, replicate
D-258-3D-051623-8-10-PBI	258-3	D-258-3D	8-10	primary, replicate
D-258-3D-051623-10-12-PBI	258-3	D-258-3D	10-12	primary, replicate
D-401-1A-051723-0-2-PBI	401-1	D-401-1A	0-2	primary
D-401-1A-051723-2-4-PBI	401-1	D-401-1A	2-4	primary
D-401-1A-051723-4-6-PBI	401-1	D-401-1A	4-6	primary
D-401-1A-051723-6-8-PBI	401-1	D-401-1A	6-8	primary
D-401-1A-051723-8-10-PBI	401-1	D-401-1A	8-10	primary
D-401-1A-051723-10-12-PBI	401-1	D-401-1A	10-12	primary
D-401-2B-051723-0-2-PBI	401-2	D-401-2B	0-2	primary
D-401-2B-051723-2-4-PBI	401-2	D-401-2B	2-4	primary
D-401-2B-051723-4-6-PBI	401-2	D-401-2B	4-6	primary
D-401-2B-051723-6-8-PBI	401-2	D-401-2B	6-8	primary
D-401-2B-051723-8-10-PBI	401-2	D-401-2B	8-10	primary
D-401-2B-051723-10-12-PBI	401-2	D-401-2B	10-12	primary
D-441-1D-051823-0-2-PBI	441-1	D-441-1D	0-2	primary
D-441-1D-051823-2-4-PBI	441-1	D-441-1D	2-4	primary
D-441-1D-051823-4-6-PBI	441-1	D-441-1D	4-6	primary
D-441-1D-051823-6-8-PBI	441-1	D-441-1D	6-8	primary
D-441-1D-051823-8-10-PBI	441-1	D-441-1D	8-10	primary
D-441-1D-051823-10-12-PBI	441-1	D-441-1D	10-12	primary

Note:

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples.

Table 4-7. Total Arsenic and Total Lead Analytical Results for Incremental Composite Samples (< 150 µm Soil Fraction)

		Arsenic (mg/kg)					
Sample ID	Sample Type [a]	ME1	ME2	ME3	ME4	ME5	ME6
Control							
IC-258-3B	primary	39	37	40	30	37	41
IC-401-1D	primary	98	92	96	55	99	ns
IC-401-1D	replicate	103	ns	ns	ns	ns	ns
IC-401-2C	primary	103	96	90	71	107	83
IC-401-2C	replicate	ns	ns	ns	66	ns	ns
IC-441-1C	primary	37	40	35	26	36	34
IC-441-1C	replicate	ns	37	38	ns	ns	ns
Compost							
IC-258-3A	primary	34	32	30	31	32	33
IC-258-3A	replicate	ns	ns	ns	ns	ns	30
IC-401-1C	primary	83	78	72	69	70	75
IC-401-1C	replicate	ns	ns	ns	ns	75	ns
IC-401-2A	primary	126	103	111	79	133	118
IC-401-2A	replicate	ns	ns	ns	82	ns	ns
IC-441-1A	primary	27	24	26	21	27	25
Soluble Phosphate							
IC-258-3C	primary	35	34	36	23	36	33
IC-258-3C	replicate	33	ns	ns	23	ns	38
IC-401-1B	primary	97	80	86	59	85	82
IC-401-1B	replicate	ns	77	ns	ns	ns	ns
IC-401-2D	primary	80	89	90	50	71	67
IC-401-2D	replicate	ns	ns	87	ns	ns	ns
IC-441-1B	primary	40	47	42	28	35	ns
IC-441-1B	duplicate	ns	ns	ns	ns	36	ns
IC-441-1B	triplicate	ns	ns	ns	ns	37	ns
Soluble Phosphate and Biochar							
IC-258-3D	primary	36	40	40	30	39	37
IC-258-3D	duplicate	ns	43	ns	ns	ns	ns
IC-258-3D	triplicate	ns	39	ns	ns	ns	ns
IC-401-1A	primary	70	70	68	42	61	70
IC-401-1A	replicate	ns	ns	ns	ns	56	ns
IC-401-1A	duplicate	66	ns	ns	ns	ns	ns
IC-401-1A	triplicate	69	ns	ns	ns	ns	ns
IC-401-2B	primary	85	81	80	ns	72	86
IC-401-2B	duplicate	ns	ns	91	ns	ns	ns
IC-401-2B	triplicate	ns	ns	74	ns	ns	ns
IC-441-1D	primary	ns	ns	ns	23	35	34
IC-441-1D	duplicate	ns	ns	ns	24	ns	ns
IC-441-1D	triplicate	ns	ns	ns	21	ns	ns

Table 4-7. Total Arsenic and Total Lead Analytical Results for Incremental Composite Samples (< 150 µm Soil Fraction)

		Lead (mg/kg)					
Sample ID	Sample Type [a]	ME1	ME2	ME3	ME4	ME5	ME6
Control							
IC-258-3B	primary	640	723	593	641	663	679
IC-401-1D	primary	1,520	1,290	1,530	1,420	1,980	ns
IC-401-1D	replicate	1,770	ns	ns	ns	ns	ns
IC-401-2C	primary	2,070	1,300	1,060	1,360	1,820	1,310
IC-401-2C	replicate	ns	ns	ns	1,210	ns	ns
IC-441-1C	primary	597	550	509	694	580	693
IC-441-1C	replicate	ns	450	568	ns	ns	ns
Compost							
IC-258-3A	primary	396	392	416	531	380	447
IC-258-3A	replicate	ns	ns	ns	ns	ns	394
IC-401-1C	primary	1,560	1,280	1,220	1,340	1,680	1,480
IC-401-1C	replicate	ns	ns	ns	ns	1,720	ns
IC-401-2A	primary	1,610	1,310	1,880	1,890	1,960	1,730
IC-401-2A	replicate	ns	ns	ns	2,050	ns	ns
IC-441-1A	primary	447	396	487	760	683	567
Soluble Phosphate							
IC-258-3C	primary	659	624	633	671	718	627
IC-258-3C	replicate	548	ns	ns	671	ns	677
IC-401-1B	primary	1,460	1,200	1,460	1,460	1,540	1,440
IC-401-1B	replicate	ns	1,170	ns	ns	ns	ns
IC-401-2D	primary	1,300	1,150	1,240	1,220	1,580	1,240
IC-401-2D	replicate	ns	ns	1,090	ns	ns	ns
IC-441-1B	primary	560	672	812	791	646	ns
IC-441-1B	duplicate	ns	ns	ns	ns	777	ns
IC-441-1B	triplicate	ns	ns	ns	ns	817	ns
Soluble Phosphate and Biochar							
IC-258-3D	primary	655	621	612	784	717	636
IC-258-3D	duplicate	ns	614	ns	ns	ns	ns
IC-258-3D	triplicate	ns	534	ns	ns	ns	ns
IC-401-1A	primary	1,450	1,160	1,120	1,450	1,650	1,650
IC-401-1A	replicate	ns	ns	ns	ns	1,610	ns
IC-401-1A	duplicate	1,430	ns	ns	ns	ns	ns
IC-401-1A	triplicate	1,310	ns	ns	ns	ns	ns
IC-401-2B	primary	1,300	1,130	1,240	1,220	1,630	1,400
IC-401-2B	duplicate	ns	ns	1,260	ns	ns	ns
IC-401-2B	triplicate	ns	ns	1,200	ns	ns	ns
IC-441-1D	primary	ns	ns	ns	498	515	552
IC-441-1D	duplicate	ns	ns	ns	503	ns	ns
IC-441-1D	triplicate	ns	ns	ns	449	ns	ns

Notes :

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

Sample ID	Sample Type [b]	Aluminum			Antimony			Arsenic	
		ME1	ME2	ME3	ME1	ME2	ME3	ME 1	ME2
Control									
IC-258-3B	primary	4.19	3.04	3.36	0.00670	0.00669	0.00631	0.0207	0.0168
IC-401-1D	primary	3.09	4.20	3.72	0.0262	0.0239	0.0211	0.0481	0.0406
IC-401-1D	replicate	3.74	ns	ns	0.0280	ns	ns	0.0628	ns
IC-401-2C	primary	3.04	3.70	3.37	0.0305	0.0281	0.0201	0.0561	0.0388
IC-441-1C	primary	3.41	3.54	2.55	0.0105	0.0113	0.00731	0.0229	0.0232
IC-441-1C	replicate	ns	3.15	2.31	ns	0.0096	0.00722	ns	0.0208
Compost									
IC-258-3A	primary	5.00	4.53	1.91	0.00607	0.00551	0.00407	0.0125	0.0098
IC-401-1C	primary	3.74	3.76	4.81	0.0227	0.0180	0.0181	0.0287	0.0277
IC-401-2A	primary	3.49	4.11	3.03	0.0379	0.0338	0.0286	0.0727	0.0521
IC-441-1A	primary	3.21	4.16	2.33	0.00747	0.00856	0.00562	0.0122	0.0112
Soluble Phosphate									
IC-258-3C	primary	3.69	4.12	3.32	0.00586	0.00615	0.00453	0.0288	0.0266
IC-258-3C	replicate	3.66	ns	ns	0.00588	ns	ns	0.0303	ns
IC-401-1B	primary	2.93	3.75	3.64	0.0208	0.0215	0.0179	0.149	0.120
IC-401-1B	replicate	ns	5.00	ns	ns	0.0259	ns	ns	0.136
IC-401-2D	primary	2.22	3.65	3.18	0.0175	0.0240	0.0174	0.153	0.164
IC-401-2D	replicate	ns	ns	2.95	ns	ns	0.0159	ns	ns
IC-441-1B	primary	1.62	1.00	1.59	0.0102	0.0169	0.00881	0.0637	0.0683
Soluble Phosphate and Biochar									
IC-258-3D	primary	3.62	4.01	3.39	0.00656	0.00695	0.00531	0.0332	0.0310
IC-258-3D	duplicate	ns	4.53	ns	ns	0.00665	ns	ns	0.0348
IC-258-3D	triplicate	ns	5.18	ns	ns	0.00849	ns	ns	0.0388
IC-401-1A	primary	3.00	5.22	4.11	0.0181	0.0237	0.0153	0.100	0.0971
IC-401-1A	duplicate	4.18	ns	ns	0.0209	ns	ns	0.108	ns
IC-401-1A	triplicate	3.54	ns	ns	0.0204	ns	ns	0.102	ns
IC-401-2B	primary	2.73	3.24	3.26	0.0194	0.0231	0.0165	0.144	0.127
IC-401-2B	duplicate	ns	ns	3.70	ns	ns	0.0181	ns	ns
IC-401-2B	triplicate	ns	ns	3.66	ns	ns	0.0189	ns	ns
IC-441-1D	primary	1.83	1.79	0.203	0.00912	0.00977	0.00162	0.0666	0.0590

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Arsenic	Barium				Beryllium					
Sample ID	Sample Type [b]	ME3	ME1		ME2	ME3	ME1		ME2		ME3	
Control												
IC-258-3B	primary	0.0142	0.048	U*	0.0175	0.0184	0.00008	J	0.00004	U*	0.00006	J
IC-401-1D	primary	0.0343	0.049	U*	0.026	0.0223	0.00005	J	0.00008	U*	0.00006	J
IC-401-1D	replicate	ns	0.05	U*	ns	ns	0.00006	J	ns		ns	
IC-401-2C	primary	0.0272	0.041	U*	0.0242	0.0212	0.00004	J	0.00005	U*	0.00006	J
IC-441-1C	primary	0.0167	0.067		0.0451	0.0344	0.00007	J	0.00006	U*	0.00004	J
IC-441-1C	replicate	0.0168	ns		0.0393	0.0331	ns		0.00007	U*	0.00005	J
Compost												
IC-258-3A	primary	0.00510	0.045	U*	0.0268	0.0115	0.00010	J	0.00007	U*	0.00004	J
IC-401-1C	primary	0.0249	0.042	U*	0.0265	0.0288	0.00008	J	0.00005	U*	0.00010	J
IC-401-2A	primary	0.0609	0.05	U*	0.0281	0.0154	0.00006	J	0.00008	U*	0.00006	J
IC-441-1A	primary	0.0095	0.088		0.0598	0.0373	0.00007	J	0.00009	U*	0.00006	J
Soluble Phosphate												
IC-258-3C	primary	0.0213	0.091		0.0348	0.0308	0.00008	J	0.00008	U*	0.00008	J
IC-258-3C	replicate	ns	0.086		ns	ns	0.00007	J	ns		ns	
IC-401-1B	primary	0.0879	0.09		0.0289	0.0330	0.00008	J	0.00010	U*	0.00009	J
IC-401-1B	replicate	ns	ns		0.0347	ns	ns		0.00013	U*	ns	
IC-401-2D	primary	0.110	0.096		0.0315	0.0300	0.00006	J	0.00008	U*	0.00008	J
IC-401-2D	replicate	0.106	ns		ns	0.0265	ns		ns		0.00010	J
IC-441-1B	primary	0.0405	0.099		0.0218	0.0333	0.00006	J	0.00004	U*	0.00009	J
Soluble Phosphate and Biochar												
IC-258-3D	primary	0.0254	0.084		0.0302	0.0282	0.00007	J	0.00007	U*	0.00006	J
IC-258-3D	duplicate	ns	ns		0.0331	ns	ns		0.00009	U*	ns	
IC-258-3D	triplicate	ns	ns		0.0358	ns	ns		0.00011	U*	ns	
IC-401-1A	primary	0.0706	0.054		0.0374	0.0314	0.00008	J	0.00013	U*	0.00011	J
IC-401-1A	duplicate	ns	0.097		ns	ns	0.00013	J	ns		ns	
IC-401-1A	triplicate	ns	0.091		ns	ns	0.00011	J	ns		ns	
IC-401-2B	primary	0.0853	0.095		0.0341	0.0286	0.00007	J	0.00008	U*	0.00009	J
IC-401-2B	duplicate	0.0983	ns		ns	0.0317	ns		ns		0.00010	J
IC-401-2B	triplicate	0.0808	ns		ns	0.0317	ns		ns		0.00010	J
IC-441-1D	primary	0.0116	0.110		0.0326	0.0052	0.00008	J	0.00006	U*	0.00003	U

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Cadmium			Calcium				Chromium			
Sample ID	Sample Type [b]	ME1	ME2	ME3	ME1		ME2	ME3	ME1		ME2	
Control												
IC-258-3B	primary	0.0007	0.00077	0.00067	1.27	J+	1.36	1.02	0.0023	J+	0.0015	U*
IC-401-1D	primary	0.00079	0.00187	0.00177	1.47	J+	1.50	0.99	0.0020	J+	0.0012	U*
IC-401-1D	replicate	0.00089	ns	ns	1.22	J+	ns	ns	0.0026	J+	ns	
IC-401-2C	primary	0.00078	0.00232	0.00197	0.95	J+	1.18	0.88	0.0021	J+	0.0012	U*
IC-441-1C	primary	0.00144	0.00173	0.00144	4.21		4.34	3.21	0.0023	J+	0.0018	U*
IC-441-1C	replicate	ns	0.00120	0.00127	ns		4.42	3.39	ns		0.0018	U*
Compost												
IC-258-3A	primary	0.00076	0.00065	0.00029	1.35	J+	1.45	0.71	0.0018	U*	0.0011	U*
IC-401-1C	primary	0.00084	0.00167	0.00178	1.32	J+	1.85	1.21	0.0030	J+	0.0013	U*
IC-401-2A	primary	0.00114	0.00322	0.00192	1.15	J+	1.25	0.90	0.0021	J+	0.0014	U*
IC-441-1A	primary	0.00076	0.00104	0.00091	6.66		7.40	4.02	0.0030	J+	0.0017	U*
Soluble Phosphate												
IC-258-3C	primary	0.00119	0.00146	0.00114	4.63		4.20	3.13	0.0030	J+	0.0023	
IC-258-3C	replicate	0.00097	ns	ns	4.61		ns	ns	0.0029	J+	ns	
IC-401-1B	primary	0.00427	0.00464	0.00344	10.5		11.9	6.79	0.0035	J+	0.0035	
IC-401-1B	replicate	ns	0.00496	ns	ns		11.1	ns	ns		0.0050	
IC-401-2D	primary	0.00763	0.00697	0.00453	18.6		10.3	6.45	0.0028	J+	0.0027	
IC-401-2D	replicate	ns	ns	0.00388	ns		ns	6.51	ns		ns	
IC-441-1B	primary	0.00168	0.00164	0.00182	23.8		24.8	13.0	0.0039	J+	0.0021	
Soluble Phosphate and Biochar												
IC-258-3D	primary	0.00120	0.00131	0.00117	4.02		3.27	2.51	0.0050	J+	0.0024	
IC-258-3D	duplicate	ns	0.00130	ns	ns		3.06	ns	ns		0.0025	
IC-258-3D	triplicate	ns	0.00154	ns	ns		3.25	ns	ns		0.0034	
IC-401-1A	primary	0.00391	0.00418	0.00290	10.7		8.30	5.64	0.0030	J+	0.0033	
IC-401-1A	duplicate	0.00400	ns	ns	15.6		ns	ns	0.0065	J+	ns	
IC-401-1A	triplicate	0.00355	ns	ns	11.9		ns	ns	0.0046	J+	ns	
IC-401-2B	primary	0.00552	0.00588	0.00350	13.3		10.3	5.54	0.0036	J+	0.0027	
IC-401-2B	duplicate	ns	ns	0.00380	ns		ns	4.42	ns		ns	
IC-401-2B	triplicate	ns	ns	0.00384	ns		ns	4.97	ns		ns	
IC-441-1D	primary	0.00159	0.00136	0.0003	24.7		20.1	4.91	0.0041	J+	0.0026	

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

Sample ID	Sample Type [b]	Chromium		Cobalt					Copper				Iron
		ME3		ME1	ME2		ME3		ME1		ME2	ME3	ME1
Control													
IC-258-3B	primary	0.0009	J	0.00075	0.00035	J	0.00062		0.005	U*	0.0043	0.003	2.46
IC-401-1D	primary	0.0012	J	0.00058	0.00062		0.00076		0.0119	J+	0.0085	0.0069	1.91
IC-401-1D	replicate	ns		0.00053	ns		ns		0.0089	J+	ns	ns	2.38
IC-401-2C	primary	0.0010	J	0.00053	0.00055		0.00073		0.0086	J+	0.0079	0.0051	1.83
IC-441-1C	primary	0.0013	J	0.00090	0.00076		0.00075		0.007	J+	0.0095	0.0057	1.93
IC-441-1C	replicate	0.0009	J	ns	0.00060		0.00067		ns		0.0077	0.0059	ns
Compost													
IC-258-3A	primary	0.0006	J	0.00074	0.00049		0.00031		0.0044	U*	0.0051	0.002	2.51
IC-401-1C	primary	0.0011	J	0.00057	0.00056		0.00115		0.0094	J+	0.0084	0.0066	2.19
IC-401-2A	primary	0.0010	J	0.00063	0.00066		0.00059		0.0093	J+	0.0095	0.0098	1.97
IC-441-1A	primary	0.0011	J	0.00093	0.00085		0.00074		0.0076	J+	0.0081	0.0063	2.25
Soluble Phosphate													
IC-258-3C	primary	0.0016	J	0.00055	0.00040		0.00058		0.0045	U*	0.0054	0.0042	1.75
IC-258-3C	replicate	ns		0.00059	ns		ns		0.0046	U*	ns	ns	1.81
IC-401-1B	primary	0.0043		0.00099	0.00096		0.00084		0.0114	J+	0.009	0.0077	1.60
IC-401-1B	replicate	ns		ns	0.00126		ns		ns		0.011	ns	ns
IC-401-2D	primary	0.0017	J	0.00085	0.00083		0.00071		0.0094	J+	0.0109	0.0089	1.05
IC-401-2D	replicate	0.0019	J	ns	ns		0.00072		ns		ns	0.0072	ns
IC-441-1B	primary	0.0041		0.00052	0.00022	J	0.0004		0.0062	J+	0.0051	0.0056	0.915
Soluble Phosphate and Biochar													
IC-258-3D	primary	0.0021		0.00058	0.00044		0.00059		0.005	U*	0.0049	0.0041	2.03
IC-258-3D	duplicate	ns		ns	0.00056		ns		ns		0.0053	ns	ns
IC-258-3D	triplicate	ns		ns	0.00067		ns		ns		0.0059	ns	ns
IC-401-1A	primary	0.0031		0.00078	0.00103		0.0009		0.0111	J+	0.0103	0.0075	1.49
IC-401-1A	duplicate	ns		0.00096	ns		ns		0.0105	J+	ns	ns	2.26
IC-401-1A	triplicate	ns		0.00094	ns		ns		0.0116	J+	ns	ns	1.89
IC-401-2B	primary	0.0029		0.00080	0.00065		0.00079		0.0092	J+	0.009	0.0082	1.33
IC-401-2B	duplicate	0.0021		ns	ns		0.00086		ns		ns	0.0084	ns
IC-401-2B	triplicate	0.0026		ns	ns		0.00078		ns		ns	0.0075	ns
IC-441-1D	primary	0.0012	J	0.00047	0.00032	J	0.00007	J	0.005	J+	0.006	0.0012	0.986

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Iron		Lead			Magnesium	
Sample ID	Sample Type [b]	ME2	ME3	ME1	ME2	ME3	ME1	ME2
Control								
IC-258-3B	primary	1.45	1.79	0.0433	0.036	0.0338	0.36	0.342
IC-401-1D	primary	2.04	2.01	0.0887	0.098	0.101	0.40	0.444
IC-401-1D	replicate	ns	ns	0.104	ns	ns	0.35	ns
IC-401-2C	primary	1.91	1.61	0.120	0.083	0.0618	0.30	0.383
IC-441-1C	primary	1.47	1.60	0.068	0.069	0.0703	0.77	0.884
IC-441-1C	replicate	1.64	1.42	ns	0.052	0.0613	ns	0.854
Compost								
IC-258-3A	primary	1.62	0.86	0.0239	0.029	0.0138	0.33	0.362
IC-401-1C	primary	1.80	2.56	0.122	0.085	0.111	0.43	0.515
IC-401-2A	primary	1.79	1.64	0.114	0.114	0.123	0.43	0.465
IC-441-1A	primary	1.61	1.47	0.047	0.052	0.0553	1.30	1.40
Soluble Phosphate								
IC-258-3C	primary	1.86	1.60	0.0565	0.064	0.058	0.75	0.759
IC-258-3C	replicate	ns	ns	0.0519	ns	ns	0.72	ns
IC-401-1B	primary	1.79	1.93	0.142	0.122	0.18	1.55	1.68
IC-401-1B	replicate	1.96	ns	ns	0.146	ns	ns	1.65
IC-401-2D	primary	1.33	1.57	0.132	0.141	0.116	2.65	1.65
IC-401-2D	replicate	ns	1.25	ns	ns	0.0953	ns	ns
IC-441-1B	primary	0.469	0.809	0.0324	0.040	0.0802	3.16	3.39
Soluble Phosphate and Biochar								
IC-258-3D	primary	1.89	1.87	0.0557	0.063	0.0545	0.71	0.529
IC-258-3D	duplicate	1.99	ns	ns	0.063	ns	ns	0.524
IC-258-3D	triplicate	2.40	ns	ns	0.074	ns	ns	0.62
IC-401-1A	primary	2.27	2.14	0.186	0.152	0.151	1.64	1.35
IC-401-1A	duplicate	ns	ns	0.197	ns	ns	2.24	ns
IC-401-1A	triplicate	ns	ns	0.191	ns	ns	1.69	ns
IC-401-2B	primary	1.30	1.67	0.146	0.116	0.127	2.02	1.77
IC-401-2B	duplicate	ns	1.70	ns	ns	0.132	ns	ns
IC-401-2B	triplicate	ns	1.57	ns	ns	0.124	ns	ns
IC-441-1D	primary	0.754	0.102	0.0268	0.0402	0.00554	3.55	3.03

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Magnesium	Manganese			Nickel						Potassium
Sample ID	Sample Type [b]	ME3	ME1	ME2	ME3	ME1		ME2		ME3		ME1
Control												
IC-258-3B	primary	0.284	0.181	0.109	0.157	0.0020	J+	0.001	J	0.0009	J	0.29
IC-401-1D	primary	0.322	0.097	0.184	0.168	0.0025	J+	0.0017	J	0.0014	J	1.40
IC-401-1D	replicate	ns	0.103	ns	ns	0.0027	J+	ns		ns		1.28
IC-401-2C	primary	0.264	0.079	0.207	0.174	0.0022	J+	0.0015	J	0.0012	J	1.06
IC-441-1C	primary	0.666	0.130	0.111	0.129	0.0031	J+	0.0024		0.0017	J	6.04
IC-441-1C	replicate	0.68	ns	0.106	0.107	ns		0.0019	J	0.0014	J	ns
Compost												
IC-258-3A	primary	0.179	0.172	0.115	0.064	0.0018	U*	0.0012	J	0.0004	J	2.23
IC-401-1C	primary	0.354	0.119	0.171	0.259	0.0021	J+	0.0015	J	0.0016	J	0.82
IC-401-2A	primary	0.323	0.149	0.249	0.147	0.0022	J+	0.0015	J	0.0012	J	1.77
IC-441-1A	primary	0.858	0.179	0.144	0.130	0.0038	J+	0.0027		0.0016	J	7.14
Soluble Phosphate												
IC-258-3C	primary	0.545	0.125	0.138	0.119	0.0020	J+	0.0013	J	0.0008	J	3.56
IC-258-3C	replicate	ns	0.133	ns	ns	0.0021	J+	ns		ns		3.22
IC-401-1B	primary	1.01	0.464	0.542	0.323	0.0033	J+	0.0024		0.0018	J	13.7
IC-401-1B	replicate	ns	ns	0.537	ns	ns		0.0032		ns		ns
IC-401-2D	primary	1.14	0.663	0.452	0.338	0.0029	J+	0.002	J	0.0018	J	26.5
IC-401-2D	replicate	1.10	ns	ns	0.313	ns		ns		0.0019	J	ns
IC-441-1B	primary	1.65	0.228	0.202	0.135	0.0028	J+	0.0011	J	0.0013	J	29.7
Soluble Phosphate and Biochar												
IC-258-3D	primary	0.442	0.147	0.159	0.149	0.0024	J+	0.0014	J	0.0011	J	4.17
IC-258-3D	duplicate	ns	ns	0.170	ns	ns		0.0014	J	ns		ns
IC-258-3D	triplicate	ns	ns	0.197	ns	ns		0.0016	J	ns		ns
IC-401-1A	primary	0.895	0.417	0.457	0.331	0.0037	J+	0.0026		0.0015	J	14.4
IC-401-1A	duplicate	ns	0.495	ns	ns	0.0036	J+	ns		ns		14.6
IC-401-1A	triplicate	ns	0.427	ns	ns	0.0032	J+	ns		ns		16.9
IC-401-2B	primary	1.08	0.433	0.423	0.315	0.0028	J+	0.0019	J	0.0016	J	16.7
IC-401-2B	duplicate	0.867	ns	ns	0.304	ns		ns		0.0018	J	ns
IC-401-2B	triplicate	0.967	ns	ns	0.307	ns		ns		0.0016	J	ns
IC-441-1D	primary	0.670	0.175	0.152	0.016	0.0023	J+	0.0013	J	0.0004	J	28.7

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Potassium		Selenium						Silver					
Sample ID	Sample Type [b]	ME2	ME3	ME1		ME2		ME3		ME1		ME2		ME3	
Control															
IC-258-3B	primary	1.93	1.46	0.001	U	0.001	U	0.001	U	0.00013	J	0.00018	J	0.0002	
IC-401-1D	primary	3.06	2.56	0.001	U	0.001	U	0.001	U	0.00025		0.00029		0.00032	
IC-401-1D	replicate	ns	ns	0.001	U	ns		ns		0.00028		ns		ns	
IC-401-2C	primary	2.75	1.93	0.001	U	0.001	U	0.001	U	0.00028		0.00026		0.00021	
IC-441-1C	primary	7.24	7.01	0.001	U	0.001	U	0.001	U	0.00033		0.00056		0.00034	
IC-441-1C	replicate	6.39	7.00	ns		0.001		0.001	U	ns		0.00043		0.00039	
Compost															
IC-258-3A	primary	3.34	2.30	0.001	U	0.001	U	0.001	U	0.00018	J	0.00021		0.00011	J
IC-401-1C	primary	3.14	2.44	0.001	U	0.001	U	0.001	U	0.00018	J	0.00024		0.00024	
IC-401-2A	primary	3.41	5.01	0.001	U	0.001	U	0.001	U	0.00024		0.00027		0.0004	
IC-441-1A	primary	8.68	9.45	0.001	U	0.001	U	0.001	U	0.00022		0.00048		0.00028	
Soluble Phosphate															
IC-258-3C	primary	4.44	3.62	0.001	U	0.001	U	0.001	U	0.00015	J	0.00028		0.00024	
IC-258-3C	replicate	ns	ns	0.001	U	ns		ns		0.00018	J	ns		ns	
IC-401-1B	primary	14.3	10.6	0.001	U	0.001	U	0.001	U	0.00015	J	0.00022		0.00036	
IC-401-1B	replicate	15.8	ns	ns		0.001	U	ns		ns		0.00027		ns	
IC-401-2D	primary	19.4	10.3	0.001	U	0.001	U	0.001	U	0.00011	J	0.00029		0.00036	
IC-401-2D	replicate	ns	9.56	ns		ns		0.001	U	ns		ns		0.0003	
IC-441-1B	primary	25.2	17.4	0.001	U	0.001	U	0.001	U	0.00023		0.00029		0.00029	
Soluble Phosphate and Biochar															
IC-258-3D	primary	4.18	3.33	0.001	U	0.001	U	0.001	U	0.00019	J	0.00024		0.00024	
IC-258-3D	duplicate	4.62	ns	ns		0.001	U	ns		ns		0.00024		ns	
IC-258-3D	triplicate	4.90	ns	ns		0.001	U	ns		ns		0.0003		ns	
IC-401-1A	primary	14.0	8.78	0.001	U	0.001	U	0.001	U	0.00015	J	0.00031		0.0003	
IC-401-1A	duplicate	ns	ns	0.001	U	ns		ns		0.00022		ns		ns	
IC-401-1A	triplicate	ns	ns	0.001	U	ns		ns		0.00017	J	ns		ns	
IC-401-2B	primary	16.3	13.1	0.001	U	0.001	U	0.001	U	0.00012	J	0.00026		0.00036	
IC-401-2B	duplicate	ns	10.9	ns		ns		0.001	U	ns		ns		0.00039	
IC-401-2B	triplicate	ns	11.1	ns		ns		0.001	U	ns		ns		0.00036	
IC-441-1D	primary	23.4	7.11	0.001	U	0.001	U	0.001	U	0.00017	J	0.00038		0.00006	J

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Sodium						Thallium						Vanadium	
Sample ID	Sample Type [b]	ME1		ME2		ME3		ME1		ME2		ME3		ME1	ME2
Control															
IC-258-3B	primary	0.2	U	0.2	U	0.2	U	0.00005	J	0.00008	J	0.00011	J	0.0032	0.0023
IC-401-1D	primary	1.8	U*	0.31		0.2	U	0.00008	J	0.00017	J	0.00016	J	0.0028	0.0034
IC-401-1D	replicate	0.2	U*	ns		ns		0.00009	J	ns		ns		0.0039	ns
IC-401-2C	primary	0.2	U	0.25		0.2	U	0.00010	J	0.00021	J	0.00015	J	0.0035	0.0031
IC-441-1C	primary	0.2	U	0.24		0.2	U	0.00005	U	0.00008	J	0.00008	J	0.0042	0.0042
IC-441-1C	replicate	ns		0.23		0.2	U	ns		0.00007	J	0.00009	J	ns	0.004
Compost															
IC-258-3A	primary	0.4	U*	0.51		0.29		0.00005	U	0.00005	J	0.00008	J	0.0029	0.003
IC-401-1C	primary	0.4	U*	2.47		0.41		0.00006	J	0.00012	J	0.00012	J	0.0027	0.003
IC-401-2A	primary	0.5	U*	0.41		0.7		0.00008	J	0.00039	J	0.00032		0.0032	0.0034
IC-441-1A	primary	1.1	U*	1.18		1.23		0.00005	U	0.00007	J	0.00006	J	0.0040	0.0037
Soluble Phosphate															
IC-258-3C	primary	0.3	U*	0.36		0.28		0.00006	J	0.00013	J	0.0001	J	0.0038	0.005
IC-258-3C	replicate	0.3	U*	ns		ns		0.00005	U	ns		ns		0.0051	ns
IC-401-1B	primary	2.1	U*	2.2		0.91		0.00014	J	0.00038	J	0.00026		0.0050	0.0059
IC-401-1B	replicate	ns		2.12		ns		ns		0.00037		ns		ns	0.0072
IC-401-2D	primary	2.8	U*	2		0.98		0.00045		0.00079	J	0.00045		0.0035	0.0046
IC-401-2D	replicate	ns		ns		0.96		ns		ns		0.00042		ns	ns
IC-441-1B	primary	3.7	J+	3.8		1.17		0.00015	J	0.00026	J	0.00019	J	0.0042	0.0035
Soluble Phosphate and Biochar															
IC-258-3D	primary	0.5	U*	0.35		0.31		0.00005	U	0.0001	J	0.0001	J	0.0073	0.005
IC-258-3D	duplicate	ns		0.36		ns		ns		0.0001	J	ns		ns	0.0049
IC-258-3D	triplicate	ns		0.46		ns		ns		0.00013	J	ns		ns	0.0062
IC-401-1A	primary	1.8	U*	1.72		0.93		0.00020		0.0004	J	0.00024		0.005	0.0059
IC-401-1A	duplicate	2.4	U*	ns		ns		0.00018	J	ns	J	ns		0.0077	ns
IC-401-1A	triplicate	2.1	U*	ns		ns		0.00014	J	ns	J	ns		0.0065	ns
IC-401-2B	primary	2.5	U*	2.37		1.62	J	0.00024		0.00052	J	0.00034		0.0045	0.0046
IC-401-2B	duplicate	ns		ns		0.97	J	ns		ns	J	0.00042		ns	ns
IC-401-2B	triplicate	ns		ns		1.19	J	ns		ns	J	0.00039		ns	ns
IC-441-1D	primary	4.0	J+	3.4		0.45		0.00009	J	0.00013	J	0.00005	U	0.0044	0.0051

Table 4-8a. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME1 - ME3[a]

		Vanadium		Zinc		
Sample ID	Sample Type [b]	ME3		ME1	ME2	ME3
Control						
IC-258-3B	primary	0.0024		0.074	0.0772	0.0571
IC-401-1D	primary	0.0034		0.145	0.151	0.122
IC-401-1D	replicate	ns		0.137	ns	ns
IC-401-2C	primary	0.003		0.141	0.170	0.144
IC-441-1C	primary	0.0031		0.130	0.138	0.121
IC-441-1C	replicate	0.0033		ns	0.100	0.104
Compost						
IC-258-3A	primary	0.0016	J	0.054	0.0629	0.0245
IC-401-1C	primary	0.0033		0.147	0.127	0.121
IC-401-2A	primary	0.0033		0.199	0.210	0.131
IC-441-1A	primary	0.0029		0.072	0.0854	0.100
Soluble Phosphate						
IC-258-3C	primary	0.0042		0.128	0.110	0.0858
IC-258-3C	replicate	ns		0.117	ns	ns
IC-401-1B	primary	0.0054		0.297	0.280	0.198
IC-401-1B	replicate	ns		ns	0.322	ns
IC-401-2D	primary	0.004		0.585	0.449	0.343
IC-401-2D	replicate	0.0041		ns	ns	0.326
IC-441-1B	primary	0.006		0.137	0.132	0.148
Soluble Phosphate and Biochar						
IC-258-3D	primary	0.0045		0.109	0.103	0.0886
IC-258-3D	duplicate	ns		ns	0.109	ns
IC-258-3D	triplicate	ns		ns	0.124	ns
IC-401-1A	primary	0.0056		0.315	0.260	0.164
IC-401-1A	duplicate	ns		0.349	ns	ns
IC-401-1A	triplicate	ns		0.279	ns	ns
IC-401-2B	primary	0.0048		0.46	0.445	0.262
IC-401-2B	duplicate	0.0047		ns	ns	0.268
IC-401-2B	triplicate	0.005		ns	ns	0.297
IC-441-1D	primary	0.0047		0.063	0.0798	0.0197

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021

[a] All results reported as mg/L

[b] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

SPLP - synthetic precipitation leaching procedure

TAL - target analyte list

<u>Data Qualifiers</u>

J - Quantitation is approximate due to limitations identified during the QA review

J+ - Quantitation is approximate, but the result may be biased high

U* - The analyte should be considered "not-detected" because it was detected in an associated blank at a similar level

U - The analyte was not detected at or above the associated detection limit

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Aluminum			Antimony			Arsenic		
		ME4	ME5	ME6	ME4	ME5	ME6	ME4	ME5	ME6
Control										
IC-258-3B	primary	4.16	4.73	3.20	0.00614	0.00812	0.00676	0.0193	0.0214	0.0175
IC1-401-1D	primary	2.91	1.34	4.31	0.0150	0.0195	0.0289	0.0360	0.0273	0.0464
IC2-401-1D	duplicate	ns	ns	3.88	ns	ns	0.0304	ns	ns	0.0434
IC3-401-1D	triplicate	ns	ns	3.71	ns	ns	0.0309	ns	ns	0.0422
IC-401-2C	primary	2.83	2.84	3.29	0.0199	0.0276	0.0240	0.0247 J	0.0445	0.0342
IC-401-2C	replicate	3.96	ns	ns	0.0196	ns	ns	0.0351 J	ns	ns
IC-441-1C	primary	2.55	3.11	2.52	0.00718	0.00869	0.00882	0.0162	0.0205	0.0183
Compost										
IC-258-3A	primary	3.26	5.63	3.79	0.00474	0.00580	0.00512	0.0107	0.00960	0.00790
IC-258-3A	replicate	ns	ns	3.79	ns	ns	0.00492	ns	ns	0.00860
IC-401-1C	primary	2.99	1.07	4.24	0.0136	0.0135	0.0230	0.0326	0.0246	0.0330
IC-401-1C	replicate	ns	0.942	ns	ns	0.0141	ns	ns	0.0240	ns
IC-401-2A	primary	2.66	1.36	4.48	0.0234	0.0326	0.0437	0.0616	0.0558	0.0668
IC-401-2A	replicate	2.89	ns	ns	0.0277	ns	ns	0.0706	ns	ns
IC-441-1A	primary	2.71	3.07	2.61	0.00518	0.00667	0.00684	0.0112	0.0126	0.0115
Soluble Phosphate										
IC-258-3C	primary	4.03	4.58	3.51	0.00462	0.00653	0.00575	0.0227	0.0281	0.0247
IC-258-3C	replicate	ns	ns	3.73	ns	ns	0.00613	ns	ns	0.0269
IC-401-1B	primary	4.22	1.21	4.52	0.0188	0.0166	0.0178	0.0765	0.0763	0.0864
IC-401-2D	primary	2.74	2.98	3.54	0.0107	0.0145	0.0194	0.0683	0.0907	0.0894
IC-441-1B	primary	1.88	2.36	1.97	0.00709	0.00860	0.00742	0.0231	0.0292	0.0311
IC-441-1B	duplicate	ns	2.10	ns	ns	0.00981	ns	ns	0.0311	ns
IC-441-1B	triplicate	ns	2.25	ns	ns	0.00946	ns	ns	0.0310	ns
Soluble Phosphate and Biochar										
IC-258-3D	primary	3.28	4.83	3.26	0.00526	0.00719	0.00590	0.0233	0.0322	0.0238
IC-401-1A	primary	3.15	1.82	4.84	0.0140	0.0163	0.0225	0.0510	0.0611	0.0733
IC-401-1A	replicate	ns	1.72	ns	ns	0.0134	ns	ns	0.0486	ns
IC-401-1A	duplicate	3.14	ns	ns	0.0140	ns	ns	0.0533	ns	ns
IC-401-2B	primary	3.78	4.16	4.16	0.0128	0.0189	0.0225	0.0677	0.0815	0.100
IC-401-2B	duplicate	ns	4.21	ns	ns	0.0189	ns	ns	0.0793	ns
IC-441-1D	primary	1.58	2.00	1.62	0.00454	0.00672	0.00722	0.0210	0.0326	0.0292
IC-441-1D	duplicate	1.44	ns	ns	0.00437	ns	ns	0.0208	ns	ns
IC-441-1D	triplicate	1.83	ns	ns	0.00432	ns	ns	0.0206	ns	ns

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Barium			Beryllium						Cadmium	
		ME4	ME5	ME6	ME4		ME5		ME6		ME4	ME5
Control												
IC-258-3B	primary	0.0235	0.0251	0.0179	0.00007	U*	0.00007	J	0.00006	J	0.000920	0.00109
IC1-401-1D	primary	0.0175	0.0116	0.0256	0.00005	U*	0.00003	J	0.00007	J	0.00143	0.00121
IC2-401-1D	duplicate	ns	ns	0.0254	ns		ns		0.00006	J	ns	ns
IC3-401-1D	triplicate	ns	ns	0.0231	ns		ns		0.00006	J	ns	ns
IC-401-2C	primary	0.0193	0.0196	0.0214	0.00005	U*	0.00004	J	0.00005	J	0.00138	0.00204
IC-401-2C	replicate	0.0225	ns	ns	0.00006	U*	ns		ns		0.00170	ns
IC-441-1C	primary	0.0378	0.0428	0.0403	0.00004	U*	0.00007	J	0.00006	J	0.00131	0.00140
Compost												
IC-258-3A	primary	0.0198	0.0269	0.0258	0.00005	U*	0.00010	J	0.00006	J	0.00052	0.000710
IC-258-3A	replicate	ns	ns	0.0239	ns		ns		0.00006	J	ns	ns
IC-401-1C	primary	0.0168	0.00801	0.0246	0.00005		0.00003	U	0.00007	J	0.00114	0.000870
IC-401-1C	replicate	ns	0.00729	ns	ns	U*	0.00003	U	ns		ns	0.000880
IC-401-2A	primary	0.0150	0.0134	0.0274	0.00006	U*	0.00003	J	0.00007	J	0.00210	0.00237
IC-401-2A	replicate	0.0161	ns	ns	0.00007	U*	ns		ns		0.00225	ns
IC-441-1A	primary	0.0385	0.0452	0.0390	0.00007	U*	0.00007	J	0.00006	J	0.00099	0.00126
Soluble Phosphate												
IC-258-3C	primary	0.0354	0.0378	0.0325	0.00008	U*	0.00010	J	0.00008	J	0.00150	0.00166
IC-258-3C	replicate	ns	ns	0.0327	ns		ns		0.00008	J	ns	ns
IC-401-1B	primary	0.0268	0.00673	0.0328	0.00011	U*	0.00004	J	0.00013	J	0.00283	0.00235
IC-401-2D	primary	0.0201	0.0219	0.0291	0.00008	U*	0.00008	J	0.00008	J	0.00318	0.00379
IC-441-1B	primary	0.0300	0.0428	0.0316	0.00006	U*	0.00009	J	0.00006	J	0.00131	0.00156
IC-441-1B	duplicate	ns	0.0412	ns	ns		0.00008	J	ns		ns	0.00176
IC-441-1B	triplicate	ns	0.0425	ns	ns		0.00007	J	ns		ns	0.00158
Soluble Phosphate and Biochar												
IC-258-3D	primary	0.0270	0.0341	0.0270	0.00007	U*	0.00009	J	0.00007	J	0.00114	0.00155
IC-401-1A	primary	0.0160	0.00789	0.0285	0.00008	U*	0.00006	J	0.00011	J	0.00188	0.00184
IC-401-1A	replicate	ns	0.00551	ns	ns		0.00006	J	ns		ns	0.00152
IC-401-1A	duplicate	0.0156	ns	ns	0.00009	U*	ns		ns		0.00184	ns
IC-401-2B	primary	0.0322	0.0309	0.0310	0.00009	U*	0.00011	J	0.00009	J	0.00299	0.00321
IC-401-2B	duplicate	ns	0.0311	ns	ns	U*	0.00009	J	ns		ns	0.00326
IC-441-1D	primary	0.0330	0.0356	0.0307	0.00007	U*	0.00006	J	0.00005	J	0.00097	0.00100
IC-441-1D	duplicate	0.0274	ns	ns	0.00005	U*	ns		ns		0.00095	ns
IC-441-1D	triplicate	0.0338	ns	ns	0.00006	U*	ns		ns		0.00102	ns

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Cadmium	Calcium			Chromium					
		ME6	ME4	ME5	ME6	ME4		ME5		ME6	
Control											
IC-258-3B	primary	0.000820	1.400	1.22	1.11	0.001	J	0.0009	U*	0.0009	J
IC1-401-1D	primary	0.00200	1.04	0.880	1.20	0.0008	J	0.0005	U*	0.0011	J
IC2-401-1D	duplicate	0.00229	ns	ns	1.48	ns		ns		0.001	J
IC3-401-1D	triplicate	0.00188	ns	ns	1.35	ns		ns		0.0012	J
IC-401-2C	primary	0.00202	0.838	0.840	0.965	0.0006	J	0.0009	U*	0.0009	J
IC-401-2C	replicate	ns	0.961	ns	ns	0.001	J	ns		ns	
IC-441-1C	primary	0.00147	4.32	4.04	5.03	0.0014	J	0.0016	U*	0.0011	J
Compost											
IC-258-3A	primary	0.000590	1.32	1.21	1.58	0.0014	J	0.0009	U*	0.0006	J
IC-258-3A	replicate	0.000620	ns	ns	1.55	ns		ns		0.0008	J
IC-401-1C	primary	0.00185	1.07	0.850	1.39	0.0011		0.0009	U*	0.0013	J
IC-401-1C	replicate	ns	ns	0.830	ns	ns	J	0.0005	U*	ns	
IC-401-2A	primary	0.00351	0.905	0.840	1.10	0.0384	J	0.0005	U*	0.0016	J
IC-401-2A	replicate	ns	0.973	ns	ns	0.001	J	ns		ns	
IC-441-1A	primary	0.000980	4.91	4.75	4.67	0.0014	J	0.0017	U*	0.0013	J
Soluble Phosphate											
IC-258-3C	primary	0.00135	4.17	3.32	3.88	0.0017	J	0.0018	U*	0.0016	J
IC-258-3C	replicate	0.00148	ns	ns	3.37	ns		ns		0.0012	J
IC-401-1B	primary	0.00294	6.06	4.11	5.69	0.003		0.0009	U*	0.0036	
IC-401-2D	primary	0.00401	7.13	6.48	5.68	0.0019	J	0.002	U*	0.0018	J
IC-441-1B	primary	0.00133	8.73	9.87	7.65	0.0034		0.005		0.0027	
IC-441-1B	duplicate	ns	ns	10.2	ns	ns		0.0052		ns	
IC-441-1B	triplicate	ns	ns	9.53	ns	ns		0.0047		ns	
Soluble Phosphate and Biochar											
IC-258-3D	primary	0.00124	3.22	3.08	3.01	0.0016	J	0.0018	U*	0.0017	J
IC-401-1A	primary	0.00244	5.94	4.52	5.96	0.0024		0.0013	U*	0.0038	
IC-401-1A	replicate	ns	ns	4.72	ns	ns		0.001	U*	ns	
IC-401-1A	duplicate	ns	5.79	ns	ns	0.0025		ns		ns	
IC-401-2B	primary	0.00391	5.86	4.90	5.17	0.0044		0.0026		0.0026	
IC-401-2B	duplicate	ns	ns	5.31	ns	ns		0.0028		ns	
IC-441-1D	primary	0.00121	9.53	7.75	9.61	0.0038		0.0033		0.003	
IC-441-1D	duplicate	ns	10.1	ns	ns	0.0034		ns		ns	
IC-441-1D	triplicate	ns	9.91	ns	ns	0.0042		ns		ns	

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Cobalt					Copper					Iron	
		ME4	ME5		ME6		ME4	ME5		ME6		ME4	ME5
Control													
IC-258-3B	primary	0.00071	0.00087		0.00065	J	0.0042	0.0050	J	0.0044	J	2.10	2.48
IC1-401-1D	primary	0.00055	0.00022		0.00094	J	0.0052	0.0058	J	0.0088	J	1.64	0.759
IC2-401-1D	duplicate	ns	ns		0.00083	J	ns	ns		0.0101	J	ns	ns
IC3-401-1D	triplicate	ns	ns		0.00076	J	ns	ns		0.0094	J	ns	ns
IC-401-2C	primary	0.00050	0.00053		0.0007	J	0.0043	0.0075	J	0.0082	J	1.56	1.52
IC-401-2C	replicate	0.00066	ns		ns		0.0059	ns		ns		2.07	ns
IC-441-1C	primary	0.00060	0.00072		0.00069	J	0.0057	0.0073	J	0.0078	J	1.38	1.86
Compost													
IC-258-3A	primary	0.00045	0.00072		0.00061	J	0.0031	0.0038	J	0.0039	J	1.46	2.18
IC-258-3A	replicate	ns	ns		0.00065	J	ns	ns		0.0041	J	ns	ns
IC-401-1C	primary	0.00048	0.00013	J	0.00071	J	0.0061	0.0053	J	0.0081	J	1.55	0.579
IC-401-1C	replicate	ns	0.00016	J	ns		ns	0.0059	J	ns		ns	0.497
IC-401-2A	primary	0.00072	0.00031		0.00109	J	0.0083	0.0077	J	0.0108	J	1.48	0.676
IC-401-2A	replicate	0.00053	ns		ns		0.0091	ns		ns		1.59	ns
IC-441-1A	primary	0.00075	0.00089		0.00080	J	0.0064	0.0078	J	0.0086	J	1.64	1.93
Soluble Phosphate													
IC-258-3C	primary	0.00055	0.00063		0.00055	J	0.0047	0.0050	J	0.0048	J	1.93	2.23
IC-258-3C	replicate	ns	ns		0.00066	J	ns	ns		0.0050	J	ns	ns
IC-401-1B	primary	0.00069	0.00035		0.00083		0.0075	0.0050	J	0.0083		1.96	0.378
IC-401-2D	primary	0.00046	0.00045		0.00063	J	0.0064	0.0069	J	0.0076	J	1.04	1.23
IC-441-1B	primary	0.00039	0.00057		0.0005		0.0051	0.0069	J	0.0067		0.935	1.29
IC-441-1B	duplicate	ns	0.00055		ns		ns	0.0071	J	ns		ns	1.13
IC-441-1B	triplicate	ns	0.00057		ns		ns	0.0068	J	ns		ns	1.32
Soluble Phosphate and Biochar													
IC-258-3D	primary	0.00055	0.00070		0.00057	J	0.0038	0.0049	J	0.0051	J	1.72	2.39
IC-401-1A	primary	0.00040	0.00039		0.00081		0.0059	0.0057	J	0.0092		1.35	0.600
IC-401-1A	replicate	ns	0.00030		ns		ns	0.0046	J	ns		ns	0.417
IC-401-1A	duplicate	0.00048	ns		ns		0.0056	ns		ns		1.28	ns
IC-401-2B	primary	0.00059	0.00068		0.00093		0.0064	0.0072	J	0.0084		1.72	2.06
IC-401-2B	duplicate	ns	0.00068		ns		ns	0.0097	J	ns		ns	2.11
IC-441-1D	primary	0.00029	0.00045		0.00033		0.0046	0.0048	J	0.0069		0.760	1.07
IC-441-1D	duplicate	0.00027	ns		ns		0.0034	ns		ns		0.736	ns
IC-441-1D	triplicate	0.00033	ns		ns		0.0037	ns		ns		0.876	ns

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Iron	Lead			Magnesium			Manganese	
		ME6	ME4	ME5	ME6	ME4	ME5	ME6	ME4	ME5
Control										
IC-258-3B	primary	1.59	0.0497	0.0613	0.0387	0.404	0.370	0.314	0.163	0.209
IC1-401-1D	primary	2.13	0.0791	0.0543	0.117	0.297	0.239	0.391	0.129	0.058
IC2-401-1D	duplicate	1.91	ns	ns	0.124	ns	ns	0.422	ns	ns
IC3-401-1D	triplicate	1.81	ns	ns	0.107	ns	ns	0.393	ns	ns
IC-401-2C	primary	1.71	0.0658	0.101	0.0892	0.279	0.280	0.325	0.123	0.126
IC-401-2C	replicate	ns	0.0844	ns	ns	0.337	ns	ns	0.158	ns
IC-441-1C	primary	1.37	0.0749	0.0670	0.0650	0.817	0.775	0.944	0.107	0.136
Compost										
IC-258-3A	primary	1.75	0.0269	0.0332	0.0287	0.334	0.343	0.409	0.0969	0.169
IC-258-3A	replicate	1.78	ns	ns	0.0264	ns	ns	0.409	ns	ns
IC-401-1C	primary	2.00	0.0918	0.0423	0.113	0.306	0.225	0.404	0.111	0.044
IC-401-1C	replicate	ns	ns	0.0411	ns	ns	0.221	ns	ns	0.048
IC-401-2A	primary	2.30	0.114	0.0637	0.152	0.329	0.304	0.438	0.149	0.105
IC-401-2A	replicate	ns	0.122	ns	ns	0.369	ns	ns	0.143	ns
IC-441-1A	primary	1.55	0.0688	0.0742	0.0463	1.11	1.09	1.00	0.128	0.161
Soluble Phosphate										
IC-258-3C	primary	1.61	0.0695	0.0806	0.0599	0.773	0.657	0.881	0.115	0.164
IC-258-3C	replicate	1.74	ns	ns	0.0661	ns	ns	0.639	ns	ns
IC-401-1B	primary	2.07	0.146	0.0279	0.185	1.09	0.701	0.986	0.253	0.17
IC-401-2D	primary	1.63	0.0937	0.122	0.115	1.15	0.984	0.905	0.214	0.245
IC-441-1B	primary	0.951	0.0638	0.0676	0.0518	1.29	1.23	1.11	0.0756	0.134
IC-441-1B	duplicate	ns	ns	0.0817	ns	ns	1.29	ns	ns	0.144
IC-441-1B	triplicate	ns	ns	0.0785	ns	ns	1.29	ns	ns	0.131
Soluble Phosphate and Biochar										
IC-258-3D	primary	1.63	0.0635	0.0794	0.0541	0.578	0.590	0.538	0.118	0.183
IC-401-1A	primary	2.23	0.112	0.0553	0.205	1.05	0.756	1.14	0.192	0.162
IC-401-1A	replicate	ns	ns	0.0371	ns	ns	0.813	ns	ns	0.138
IC-401-1A	duplicate	ns	0.111	ns	ns	1.00	ns	ns	0.188	ns
IC-401-2B	primary	1.81	0.149	0.177	0.153	0.970	0.842	0.880	0.218	0.251
IC-401-2B	duplicate	ns	ns	0.176	ns	ns	0.877	ns	ns	0.255
IC-441-1D	primary	0.842	0.0472	0.0508	0.0472	1.26	1.11	1.26	0.0519	0.08
IC-441-1D	duplicate	ns	0.0417	ns	ns	1.34	ns	ns	0.0468	ns
IC-441-1D	triplicate	ns	0.0458	ns	ns	1.39	ns	ns	0.0587	ns

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

	Sample	Manganese	Nickel						Potassium		
Sample ID	Type [c]	ME6	ME4		ME5		ME6		ME4	ME5	ME6
Control											
IC-258-3B	primary	0.144	0.0011	J	0.0013	J	0.0008	J	1.62	1.5	1.59
IC1-401-1D	primary	0.176	0.0011	J	0.0006	J	0.0021		2.79	2.73	2.40
IC2-401-1D	duplicate	0.172	ns		ns		0.0017	J	ns	ns	3.18
IC3-401-1D	triplicate	0.166	ns		ns		0.0014	J	ns	ns	2.73
IC-401-2C	primary	0.201	0.0011	J	0.0011	J	0.0012	J	2.36	2.5	2.58
IC-401-2C	replicate	ns	0.0014	J	ns		ns		2.56	ns	ns
IC-441-1C	primary	0.109	0.0078		0.0019	J	0.0017	J	8.41	7.73	8.94
Compost											
IC-258-3A	primary	0.132	0.0007	J	0.0009	J	0.0008	J	2.79	2.22	2.63
IC-258-3A	replicate	0.131	ns		ns		0.0007	J	ns	ns	2.78
IC-401-1C	primary	0.149	0.0011		0.0005	J	0.0018	J	3.85	3.82	2.82
IC-401-1C	replicate	ns	ns	J	0.0005	J	ns		ns	3.69	ns
IC-401-2A	primary	0.293	0.0018	J	0.0006	J	0.0017	J	3.07	3.98	3.48
IC-401-2A	replicate	ns	0.0012	J	ns		ns		3.86	ns	ns
IC-441-1A	primary	0.131	0.0018	J	0.0022		0.002		9.87	8.43	11.6
Soluble Phosphate											
IC-258-3C	primary	0.123	0.0013	J	0.0012	J	0.0009	J	4.18	3.01	3.02
IC-258-3C	replicate	0.141	ns		ns		0.0009	J	ns	ns	3.35
IC-401-1B	primary	0.271	0.0021		0.0009	J	0.0021		5.78	5.64	6.28
IC-401-2D	primary	0.234	0.0080		0.0014	J	0.0015	J	9.31	5.22	7.55
IC-441-1B	primary	0.107	0.0013	J	0.0018	J	0.0018	J	11.7	16.1	13.1
IC-441-1B	duplicate	ns	ns		0.0018	J	ns		ns	15.2	ns
IC-441-1B	triplicate	ns	ns		0.0019	J	ns		ns	15.3	ns
Soluble Phosphate and Biochar											
IC-258-3D	primary	0.146	0.0011	J	0.0013	J	0.001	J	2.85	2.89	3.19
IC-401-1A	primary	0.23	0.0015	J	0.0011	J	0.0022		6.45	5.93	6.93
IC-401-1A	replicate	ns	ns		0.0008	J	ns		ns	5.98	ns
IC-401-1A	duplicate	ns	0.0015	J	ns		ns		6.34	ns	ns
IC-401-2B	primary	0.291	0.0015	J	0.0018	J	0.002	J	8.81	8.31	6.99
IC-401-2B	duplicate	ns	ns	ns	0.0019	J	ns		ns	8.87	ns
IC-441-1D	primary	0.07	0.0009	J	0.0012	J	0.0014	J	12.0	15.0	18.8
IC-441-1D	duplicate	ns	0.0009	J	ns		ns		14.4	ns	ns
IC-441-1D	triplicate	ns	0.0011	J	ns		ns		13.6	ns	ns

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Selenium						Silver						Sodium					
		ME4		ME5		ME6		ME4		ME5		ME6		ME4		ME5		ME6	
Control																			
IC-258-3B	primary	0.001	U	0.001	U	0.001	U	0.00021		0.00024		0.00024		0.2	U	0.2	U	0.2	U
IC1-401-1D	primary	0.001	U	0.001	U	0.001	U	0.00025		0.00009	J	0.00035		0.2	U	0.2	U	0.2	U
IC2-401-1D	duplicate	ns		ns		0.001	U	ns		ns		0.00034		ns		ns		0.2	U
IC3-401-1D	triplicate	ns		ns		0.001	U	ns		ns		0.00033		ns		ns		0.23	
IC-401-2C	primary	0.001	U	0.001	U	0.001	U	0.00022		0.00029		0.00032		0.2	U	0.2	U	0.2	U
IC-401-2C	replicate	0.001	U	ns		ns		0.00029		ns		ns		0.2	U	ns		ns	
IC-441-1C	primary	0.001	U	0.001	u	0.001	U	0.00035		0.00047		0.00057		0.2	U	0.2	U	0.2	U
Compost																			
IC-258-3A	primary	0.001	U	0.001	U	0.001	U	0.00016	J	0.00024		0.0002	J	0.2	U	0.2	U	0.2	U
IC-258-3A	replicate	ns		ns		0.001	U	ns		ns		0.00022		ns		ns		0.2	U
IC-401-1C	primary	0.001		0.001	U	0.001	U	0.00026		0.00009	J	0.00026		0.27		0.24	U*	0.2	U
IC-401-1C	replicate	ns	U	0.001	U	ns		ns		0.00008	J	ns		ns		0.22	U*	ns	
IC-401-2A	primary	0.001	U	0.001	U	0.001	U	0.00029		0.00009	J	0.00034		0.23		0.28	U*	0.25	
IC-401-2A	replicate	0.001	U	ns		ns		0.00029		ns		ns		0.25		ns		ns	
IC-441-1A	primary	0.001	U	0.001	U	0.001	U	0.00028		0.00049		0.0004		0.54		0.41	J+	0.46	
Soluble Phosphate																			
IC-258-3C	primary	0.001	U	0.001	U	0.001	U	0.00027		0.00030		0.00026		0.25		0.25	U*	0.36	
IC-258-3C	replicate	ns		ns		0.001	U	ns		ns		0.00027		ns		ns		0.2	U
IC-401-1B	primary	0.001	U	0.001	U	0.001	U	0.00024		0.00005	J	0.00025		0.61		0.38	U*	0.29	
IC-401-2D	primary	0.001	U	0.001	U	0.001	U	0.00020		0.00028		0.00027		1.16		0.51	J+	0.35	
IC-441-1B	primary	0.001	U	0.001	U	0.001	U	0.00027		0.00033		0.00039		0.63		0.61	J+	0.45	
IC-441-1B	duplicate	ns		0.001	U	ns		ns		0.00029		ns		ns		0.62	J+	ns	
IC-441-1B	triplicate	ns		0.001	U	ns		ns		0.00041		ns		ns		0.65	J+	ns	
Soluble Phosphate and Biochar																			
IC-258-3D	primary	0.001	U	0.001	U	0.001	U	0.00020	J	0.00024		0.00019	J	0.23		0.23	U*	0.25	
IC-401-1A	primary	0.001	U	0.001	U	0.001	U	0.00017	J	0.00007	J	0.00027		0.48		0.53	J+	0.46	
IC-401-1A	replicate	ns		0.001	U	ns		ns		0.00005	U	ns		ns		0.42	J+	ns	
IC-401-1A	duplicate	0.001	U	ns		ns		0.00018	J	ns		ns		0.47		ns		ns	
IC-401-2B	primary	0.001	U	0.001	U	0.001	U	0.00032		0.00032		0.00024		0.61		0.46	J+	0.34	
IC-401-2B	duplicate	ns		0.001	U	ns		ns		0.00034		ns		ns		0.5	J+	ns	
IC-441-1D	primary	0.001	U	0.001	U	0.001	U	0.00017	J	0.00021		0.00029		0.52		0.51	J+	0.54	
IC-441-1D	duplicate	0.001	U	ns		ns		0.00019	J	ns		ns		0.54		ns		ns	
IC-441-1D	triplicate	0.001	U	ns		ns		0.0002		ns		ns		0.5		ns		ns	

Table 4-8b. SPLP TAL Metals Results for Incremental Composite Samples (< 2 mm) ME4 - ME6[a,b]

Sample ID	Sample Type [c]	Thallium			Vanadium			Zinc		
		ME4	ME5	ME6	ME4	ME5	ME6	ME4	ME5	ME6
Control										
IC-258-3B	primary	0.00008 J	0.00008 J	0.00011 J	0.0026	0.0030	0.0023	0.0851 J	0.0947	0.0664
IC1-401-1D	primary	0.00015 J	0.00013 J	0.0002 J	0.0025	0.0018 J	0.0036	0.101 J	0.0907	0.135
IC2-401-1D	duplicate	ns	ns	0.00022	ns	ns	0.0035	ns	ns	0.162
IC3-401-1D	triplicate	ns	ns	0.00021	ns	ns	0.0031	ns	ns	0.141
IC-401-2C	primary	0.00014 J	0.00021	0.00021	0.0022	0.0025	0.0026	0.110 J	0.138	0.152
IC-401-2C	replicate	0.00019 J	ns	ns	0.0028	ns	ns	0.134 J	ns	ns
IC-441-1C	primary	0.00009 J	0.00009 J	0.00013 J	0.0031	0.0037	0.0034	0.124 J	0.128	0.130
Compost										
IC-258-3A	primary	0.00005 U	0.00005 J	0.00006 J	0.0021	0.0025	0.002	0.0420 J	0.0555	0.0525
IC-258-3A	replicate	ns	ns	0.00009 J	ns	ns	0.002	ns	ns	0.0500
IC-401-1C	primary	0.00017	0.00012 J	0.00017 J	0.0026	0.0015 J	0.0033	0.0824	0.0655	0.147
IC-401-1C	replicate	ns J	0.00011 J	ns	ns	0.0013 J	ns	ns J	0.0673	ns
IC-401-2A	primary	0.00025	0.00033	0.00038	0.0089 J	0.0019 J	0.0035	0.116 J	0.147	0.213
IC-401-2A	replicate	0.00026	ns	ns	0.0028 J	ns	ns	0.128 J	ns	ns
IC-441-1A	primary	0.00009 J	0.00009 J	0.00009 J	0.0028	0.0036	0.0033	0.0709 J	0.0911	0.0806
Soluble Phosphate										
IC-258-3C	primary	0.00012 J	0.00013 J	0.00013 J	0.0047	0.0039	0.0047	0.106 J	0.117	0.101
IC-258-3C	replicate	ns	ns	0.00012 J	ns	ns	0.0033	ns	ns	0.101
IC-401-1B	primary	0.00034	0.00021	0.00022	0.0060	0.0039	0.0061	0.166 J	0.148	0.185
IC-401-2D	primary	0.00036	0.00039	0.00037	0.0035	0.0041	0.0041	0.228 J	0.225	0.272
IC-441-1B	primary	0.00014 J	0.00018 J	0.00018 J	0.0067	0.0083	0.0055	0.101 J	0.119	0.103
IC-441-1B	duplicate	ns	0.00019 J	ns	ns	0.0082	ns	ns	0.127	ns
IC-441-1B	triplicate	ns	0.00017 J	ns	ns	0.0076	ns	ns	0.125	ns
Soluble Phosphate and Biochar										
IC-258-3D	primary	0.00009 J	0.00012 J	0.0001 J	0.0034	0.0045	0.0040	0.0947 J	0.113	0.0954
IC-401-1A	primary	0.00028	0.00023	0.00021	0.0055	0.0050	0.0067	0.127 J	0.131	0.166
IC-401-1A	replicate	ns	0.00020 J	ns	ns	0.0048	ns	ns	0.108	ns
IC-401-1A	duplicate	0.00023	ns	ns	0.0053	ns	ns	0.126 J	ns	ns
IC-401-2B	primary	0.00030	0.00035	0.00037	0.0054	0.0052	0.0047	0.206 J	0.219	0.264
IC-401-2B	duplicate	ns	0.00032	ns	ns	0.0051	ns	ns	0.219	ns
IC-441-1D	primary	0.00007 J	0.00008 J	0.00012 J	0.0060	0.0063	0.0061	0.0570 J	0.0650	0.0664
IC-441-1D	duplicate	0.00007 J	ns	ns	0.0059	ns	ns	0.0548 J	ns	ns
IC-441-1D	triplicate	0.00008 J	ns	ns	0.0059	ns	ns	0.0559 J	ns	ns

Notes:

Monitoring event (ME)4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All results reported in units of mg/L.

[b] All Samples analyzed using method EPA 6010C and EPA 6020A

[c] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

SPLP - synthetic precipitation leaching procedure

TAL - target analyte list

<u>Data Qualifiers</u>

J - Quantitation is approximate due to limitations identified during the QA review

J+ - Quantitation is approximate, but the result may be biased high

J- - Quantitation is approximate, but the result may be biased low

U* - The analyte should be considered "not-detected" because it was detected in an associated blank at a similar level

U - The analyte was not detected at or above the associated detection limit

Table 4-9. Mehlich III Extract Analytical Results for Incremental Composite Samples

		Lead (mg/kg)						Phosphorus (mg/kg)					
Sample ID	Sample Type [a]	ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Control													
IC-258-3B	primary	88.6	280	63.3	65.2	86.0	87.1	231	1,260	173	187	185	193
IC-401-1D	primary	294	231	186	191	264	233	202	173	151	173	168	181
IC-401-1D	replicate	332	ns	ns	ns	ns	ns	218	ns	ns	ns	ns	ns
IC-401-1D	duplicate	ns	ns	ns	ns	ns	260	ns	ns	ns	ns	ns	176
IC-401-1D	triplicate	ns	ns	ns	ns	ns	233	ns	ns	ns	ns	ns	175
IC-401-2C	primary	403	238	144	175	292	245	209	168	142	133	156	167
IC-401-2C	replicate	ns	ns	ns	184	ns	ns	ns	ns	ns	145	ns	ns
IC-441-1C	primary	191	172	141	179	141	169	243	226	223	223	209	248
IC-441-1C	replicate	ns	150	154	ns	ns	ns	ns	221	208	ns	ns	ns
Compost													
IC-258-3A	primary	65.7	52.9	47.3	62.3	53.5	59.0	112	108	92.6	109	76.9	98.4
IC-258-3A	replicate	ns	ns	ns	ns	ns	53.5	ns	ns	ns	ns	ns	97.3
IC-401-1C	primary	227	213	133	204	7 J	221	180	170	140	169	39.2 J	160
IC-401-1C	replicate	ns	ns	ns	ns	260 J	ns	ns	ns	ns	ns	189 J	ns
IC-401-2A	primary	304	266	283	312	292	279	234	192	191	188	207	211
IC-401-2A	replicate	ns	ns	ns	332	ns	ns	ns	ns	ns	184	ns	ns
IC-441-1A	primary	149	159	142	189	176	144	272	231	260	248	244	278
Soluble Phosphate													
IC-258-3C	primary	138	126	108	121	108	127	694	608	492	468	377	582
IC-258-3C	replicate	114	ns	ns	ns	ns	123	699	ns	ns	ns	ns	626
IC-401-1B	primary	257	205	219	232	261	237	1,500	1,620	1,360	1,070	1,150	1,460
IC-401-1B	replicate	ns	209	ns	ns	ns	ns	ns	1,580	ns	ns	ns	ns
IC-401-2D	primary	288	102	261	265	312	240	1,650	216	866	1,070	950	918
IC-401-2D	replicate	ns	ns	215	ns	ns	ns	ns	ns	951	ns	ns	ns
IC-441-1B	primary	154	159	174	168	149	127	2,230	1,910	1,840	1,510	1,340	1,420
IC-441-1B	duplicate	ns	ns	ns	ns	166	ns	ns	ns	ns	ns	1,420	ns
IC-441-1B	triplicate	ns	ns	ns	ns	160	ns	ns	ns	ns	ns	1,270	ns

Table 4-9. Mehlich III Extract Analytical Results for Incremental Composite Samples

Sample ID	Sample Type [a]	Lead (mg/kg)						Phosphorus (mg/kg)					
		ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Soluble Phosphate and Biochar													
IC-258-3D	primary	119	107	76.4	114	101	101	734	778	528	571	552	624
IC-258-3D	duplicate	ns	101	ns	ns	ns	ns	ns	793	ns	ns	ns	ns
IC-258-3D	triplicate	ns	94.7	ns	ns	ns	ns	ns	756	ns	ns	ns	ns
IC-401-1A	primary	272	221	173	254	282	289	1,470	1,180	1,050	1,190	1,110	1,210
IC-401-1A	replicate	ns	ns	ns	ns	299	ns	ns	ns	ns	ns	1120	ns
IC-401-1A	duplicate	310	ns	ns	ns	ns	ns	1,770	ns	ns	ns	ns	ns
IC-401-1A	triplicate	265	ns	ns	ns	ns	ns	1,720	ns	ns	ns	ns	ns
IC-401-2B	primary	280	237	221	221	264	236	1,380	1,200	937	1,150	1,160	1,040
IC-401-2B	duplicate	ns	ns	230	ns	ns	ns	ns	ns	851	ns	ns	ns
IC-401-2B	triplicate	ns	ns	221	ns	ns	ns	ns	ns	842	ns	ns	ns
IC-441-1D	primary	138	139	128	143	133	138	2,390	1,930	1,490	1,630	1,290	1,660
IC-441-1D	duplicate	ns	ns	ns	137	ns	ns	ns	ns	ns	1,620	ns	ns
IC-441-1D	triplicate	ns	ns	ns	130	ns	ns	ns	ns	ns	1,610	ns	ns

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

Data Qualifier

J - Quantitation is approximate due to limitations identified during the QA review

Table 4-10. Total Carbon and Total Nitrogen Analytical Results for Incremental Composite Samples

		Total Carbon (%)						Total Nitrogen (%)					
Sample ID	Sample Type [a]	ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Control													
IC-258-3B	primary	2.84	3.56	2.78	4.02	2.72	3.02	0.17	0.21	0.16	0.23	0.16	0.18
IC-401-1D	primary	9.18	6.98	5.94	8.47	6.90	6.74	0.40	0.31	0.26	0.37	0.29	0.31
IC-401-1D	replicate	8.01	ns	ns	ns	ns	ns	0.34	ns	ns	ns	ns	ns
IC-401-1D	duplicate	ns	ns	ns	ns	ns	4.82	ns	ns	ns	ns	ns	0.24
IC-401-1D	triplicate	ns	ns	ns	ns	ns	5.36	ns	ns	ns	ns	ns	0.25
IC-401-2C	primary	8.76	7.17	6.90	5.97	6.33	6.64	0.38	0.32	0.32	0.25	0.29	0.31
IC-401-2C	replicate	ns	ns	ns	7.79	ns	ns	ns	ns	ns	0.34	ns	ns
IC-441-1C	primary	6.54	8.07	9.74	6.10	6.42	9.75	0.41	0.47	0.47	0.36	0.39	0.56
IC-441-1C	replicate	ns	6.87	10.2	ns	ns	ns	ns	0.40	0.51	ns	ns	ns
Compost													
IC-258-3A	primary	4.15	3.30	3.57	3.40	3.07	3.45	0.26	0.21	0.21	0.21	0.19	0.22
IC-258-3A	replicate	ns	ns	ns	ns	ns	2.92	ns	ns	ns	ns	ns	0.19
IC-401-1C	primary	4.92	6.92	4.84	5.5	8.76	8.11	0.23	0.32	0.23	0.24	0.35	0.31
IC-401-1C	replicate	ns	ns	ns	ns	5.43	ns	ns	ns	ns	ns	0.24	ns
IC-401-2A	primary	6.69	7.28	10.6	7.32	6.79	7.60	0.29	0.31	0.42	0.29	0.28	0.35
IC-401-2A	replicate	ns	ns	ns	8.75	ns	ns	ns	ns	ns	0.34	ns	ns
IC-441-1A	primary	7.07	10.2	9.01	9.12	10.7	10.9	0.42	0.58	0.45	0.51	0.59	0.63
Soluble Phosphate													
IC-258-3C	primary	6.38	5.28	4.13	6.85	4.24	4.71	0.36	0.31	0.23	0.37	0.24	0.27
IC-258-3C	replicate	4.70	ns	ns	ns	ns	6.16	0.27	ns	ns	ns	ns	0.36
IC-401-1B	primary	5.93	4.26	11.0	5.46	6.24	4.21	0.25	0.19	0.45	0.23	0.25	0.20
IC-401-1B	replicate	ns	5.53	ns	ns	ns	ns	ns	0.24	ns	ns	ns	ns
IC-401-2D	primary	10.9	13.9	7.19	10.3	11.0	7.09	0.49	0.61	0.32	0.46	0.48	0.31
IC-401-2D	replicate	ns	ns	10.7	ns	ns	ns	ns	ns	0.47	ns	ns	ns
IC-441-1B	primary	10.6	10.6	15.2	10.1	13.2	9.20	0.61	0.63	0.77	0.61	0.74	0.58
IC-441-1B	duplicate	ns	ns	ns	ns	8.14	ns	ns	ns	ns	ns	0.50	ns
IC-441-1B	triplicate	ns	ns	ns	ns	14.1	ns	ns	ns	ns	ns	0.81	ns

Table 4-10. Total Carbon and Total Nitrogen Analytical Results for Incremental Composite Samples

Sample ID	Sample Type [a]	Total Carbon (%)						Total Nitrogen (%)					
		ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Soluble Phosphate and Biochar													
IC-258-3D	primary	4.50	3.71	3.53	4.30	3.75	3.21	0.25	0.22	0.17	0.25	0.22	0.19
IC-258-3D	duplicate	ns	3.68	ns	ns	ns	ns	ns	0.21	ns	ns	ns	ns
IC-258-3D	triplicate	ns	3.54	ns	ns	ns	ns	ns	0.21	ns	ns	ns	ns
IC-401-1A	primary	6.71 J	3.84	7.58	5.98	9.13	4.37	0.25	0.16	0.30	0.23	0.31	0.17
IC-401-1A	replicate	ns	ns	ns	ns	8.95	ns	ns	ns	ns	ns	0.32	ns
IC-401-1A	duplicate	4.95 J	ns	ns	ns	ns	ns	0.19	ns	ns	ns	ns	ns
IC-401-1A	triplicate	4.14 J	ns	ns	ns	ns	ns	0.16	ns	ns	ns	ns	ns
IC-401-2B	primary	8.44	6.04	10.3	6.87	5.41	6.73	0.37	0.27	0.41 J	0.27	0.24	0.31
IC-401-2B	duplicate	ns	ns	9.27	ns	ns	ns	ns	ns	0.32 J	ns	ns	ns
IC-401-2B	triplicate	ns	ns	16.3	ns	ns	ns	ns	ns	0.66 J	ns	ns	ns
IC-441-1D	primary	7.01	7.30	13.3	10.6	8.30	7.98	0.42	0.44	0.66	0.6	0.48	0.51
IC-441-1D	primary	ns	ns	ns	9.66	ns	ns	ns	ns	ns	0.54	ns	ns
IC-441-1D	primary	ns	ns	ns	8.77	ns	ns	ns	ns	ns	0.53	ns	ns

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

Data Qualifier

J - Quantitation is approximate due to limitations identified during the QA review

Table 4-11. Mineralizable Nitrogen and TOC Analytical Results for Incremental Composite Samples (< 2 mm Soil Fraction)

	Sample	Mineralizable Nitrogen (mg/kg)								Total Organic Carbon (%)						
Sample ID	Type [a]	ME1	ME2	ME3		ME4	ME5		ME6	ME1		ME2	ME3	ME4	ME5	ME6
Control																
IC-258-3B	primary	21.1	33.7	20.6		21.2	18.1		20.7	4.41	J+	3.33	3.40	3.49	3.04	3.06
IC-401-1D	primary	29.6	33.6	34.5		42.3	22.9		45.8	7.31	J	5.76	7.39	7.91	6.58	5.64
IC-401-1D	replicate	42.8	ns	ns		ns	ns		ns	13.3	J	ns	ns	ns	ns	ns
IC-401-1D	duplicate	ns	ns	ns		ns	ns		19.2	ns		ns	ns	ns	ns	6.98
IC-401-1D	triplicate	ns	ns	ns		ns	ns		22.7	ns		ns	ns	ns	ns	6.50
IC-401-2C	primary	32.8	29.0	23.4		24.6	21.8		19.1	11.0	J+	6.79	6.54	6.78	7.50	6.97
IC-401-2C	replicate	ns	ns	ns		22.1	ns		ns	ns		ns	ns	7.70	ns	ns
IC-441-1C	primary	63.9	78.2	80.8		94.3	100		96.9	7.10	J+	6.51	7.99	8.25	6.01	7.25
IC-441-1C	replicate	ns	52.4	80.6		ns	ns		ns	ns		5.93	7.35	ns	ns	ns
Compost																
IC-258-3A	primary	30.7	35.7	21.1		35.0	37.5		37.9	4.01	J+	3.38	3.89	3.86	3.11	3.37
IC-258-3A	replicate	ns	ns	ns		ns	ns		37.2	ns		ns	ns	ns	ns	3.55
IC-401-1C	primary	28.7	23.3	24.2		21.5	39.0	J	20.4	4.44	J+	4.05	4.39	6.46	6.55	5.62
IC-401-1C	replicate	ns	ns	ns		ns	20.0	J	ns	ns		ns	ns	ns	6.40	ns
IC-401-2A	primary	33.1	34.0	44.4		17.4	19.2		16.9	6.55	J+	5.82	9.94	9.91	7.16	6.06
IC-401-2A	replicate	ns	ns	ns		15.1	ns		ns	ns		ns	ns	9.80	ns	ns
IC-441-1A	primary	103	113	81.6		151	137		127	9.85	J+	8.01	9.83	10.7	8.95	8.03
Soluble Phosphate																
IC-258-3C	primary	51.5	42.3	28.7		40.9	45.5		43.3	6.29	J+	4.66	6.39	5.49	4.17	4.32
IC-258-3C	replicate	41.6	ns	ns		ns	ns		44.7	5.49	J+	ns	ns	ns	ns	3.89
IC-401-1B	primary	54.5	53.8	55.4		21.1	30.7		22.2	6.23	J+	4.98	4.47	5.91	6.08	4.98
IC-401-1B	replicate	ns	45.3	ns		ns	ns		ns	ns		4.43	ns	ns	ns	ns
IC-401-2D	primary	128	66.5	56.7	J	50.6	72.1		48.6	14.3	J+	8.49	8.90	12.6	13.3	10.4
IC-401-2D	replicate	ns	ns	33.6	J	ns	ns		ns	ns		ns	11.3	ns	ns	ns
IC-441-1B	primary	133	89.5	95.2		107	164		150	9.54	J+	8.56	8.78	10.9	11.8	9.93
IC-441-1B	duplicate	ns	ns	ns		ns	167		ns	ns		ns	ns	ns	10.5	ns
IC-441-1B	triplicate	ns	ns	ns		ns	170		ns	ns		ns	ns	ns	10.7	ns
Soluble Phosphate and Biochar																
IC-258-3D	primary	38.6	31.0	22.7		ns	30.0		30.4	4.90	J+	3.10	3.82	4.20	2.94	3.19
IC-258-3D	duplicate	ns	23.3	ns		ns	ns		ns	ns		3.08	ns	ns	ns	ns
IC-258-3D	triplicate	ns	25.2	ns		ns	ns		ns	ns		2.91	ns	ns	ns	ns
IC-401-1A	primary	47.1	32.0	33.2		ns	23.7		18.4	7.51	J+	3.67	5.15	5.56	6.53	4.36
IC-401-1A	replicate	ns	ns	ns		ns	27.8		ns	ns		ns	ns	ns	5.69	ns
IC-401-1A	duplicate	65.9	ns	ns		ns	ns		ns	8.39	J+	ns	ns	5.78	ns	ns
IC-401-1A	triplicate	41.2	ns	ns		ns	ns		ns	5.80	J+	ns	ns	ns	ns	ns
IC-401-2B	primary	48.1	46.8	47.6		ns	39.8		38.1	7.92	J+	7.79	5.89	8.42	8.12	6.64
IC-401-2B	duplicate	ns	ns	44.2		ns	ns		ns	ns		ns	8.35	ns	ns	ns
IC-401-2B	triplicate	ns	ns	43.4		ns	ns		ns	ns		ns	9.87	ns	ns	ns
IC-441-1D	primary	109	68.6	76.0		93.9	111		116	6.21	J+	6.68	8.20	9.68	8.88	7.51
IC-441-1D	duplicate	ns	ns	ns		105	ns		ns	ns		ns	ns	10.1	ns	ns
IC-441-1D	triplicate	ns	ns	ns		151	ns		ns	ns		ns	ns	9.25	ns	ns

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

Data Qualifiers

J - Quantitation is approximate due to limitations identified during the quality assurance review.

J+ - Quantitation is approximate, but the result may be biased high.

Table 4-12. Bioaccessible Arsenic Analytical Results for Incremental Composite Samples (< 150 µm)[a]

Sample ID	Sample Type [a]	1.5 pH (%) [b]						2.5 pH (%) [b]					
		ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Control													
IC-258-3B	primary	17.9	18.6	24.8	31.3	28.7	20.7	7.64 U*	9.63 U*	10.3 U*	6.69	9.12 U*	6.64
IC-401-1D	primary	23.2	21.8	21.4	33.6 J-	34.7	29.6	8.87	10.0	10.3	9.12	8.46	10.1
IC-401-1D	replicate	24.0	ns	ns	ns	ns	ns	9.75	ns	ns	ns	ns	ns
IC-401-1D	duplicate	ns	ns	ns	ns	ns	28.0	ns	ns	ns	ns	ns	9.77
IC-401-1D	triplicate	ns	ns	ns	ns	ns	32.6	ns	ns	ns	ns	ns	8.90
IC-401-2C	primary	22.9	22.0	37.4	28.8	36.6	32.7	8.07	8.09	8.68	3.49 U*	9.93	8.59
IC-401-2C	replicate	ns	ns	ns	30.5	ns	ns	ns	ns	ns	4.21 U*	ns	ns
IC-441-1C	primary	33.0	29.1	35.9	42.9	38.0	36.0	18.2 U*	16.1 U*	15.3 U*	16.7	17.4 U*	14.8
IC-441-1C	replicate	ns	33.8	35.4	ns	ns	ns	ns U*	16.9 U*	15.2 U*	ns	ns	ns
Compost													
IC-258-3A	primary	14.2 U*	15.5 U*	26.5	25.6	26.1	19.3	6.51 U*	6.95 U*	8.80 U*	4.29 U*	7.37 U*	4.90
IC-258-3A	replicate	ns	ns	ns	ns	ns	21.4	ns	ns	ns	ns	ns	6.43
IC-401-1C	primary	22.0	22.7	24.2	21.9 J-	34.0	27.3	8.70	9.01 U*	10.4	9.22	10.9	8.58
IC-401-1C	replicate	ns	ns	ns	ns	37.4 J	ns	ns	ns	ns	ns	10.6	ns
IC-401-2A	primary	26.1	25.1	28.1	31.3 J-	32.6	35.3	9.49	10.6	13.6	10.1	12.5	10.0
IC-401-2A	replicate	ns	ns	ns	33.6	ns	ns	ns	ns	ns	6.19 U*	ns	ns
IC-441-1A	primary	33.4	27.6 U*	31.6	41.2	30.7	28.0	14.2 U*	15.4 U*	15.9 U*	13.1	15.0 U*	12.3
Soluble Phosphate													
IC-258-3C	primary	29.8	28.4	36.0	42.2	25.4	33.0	13.1 U*	12.5 U*	15.4 U*	11.2	14.0 U*	11.8
IC-258-3C	replicate	30.8	ns	ns	ns	ns	32.7	14.1 U*	ns	ns	ns	ns	11.2
IC-401-1B	primary	30.4	34.3	30.1	28.9 J-	31.5	36.2	13.5	15.6	14.4	13.1	12.3	14.1
IC-401-1B	replicate	ns	34.2	ns	ns	ns	ns	ns	16.3	ns	ns	ns	ns
IC-401-2D	primary	33.4	32.6	37.7	35.5	37.6	37.0	15.4	14.1	15.8	8.82 U*	15.1	12.2
IC-401-2D	replicate	ns	ns	34.7	ns	ns	ns	ns	ns	16.9	ns	ns	ns
IC-441-1B	primary	38.4	40.3	40.6	46.7	36.4	40.1	19.7 U*	19.6	19.3	15.8	14.7 U*	14.8
IC-441-1B	duplicate	ns	ns	ns	ns	39.6	ns	ns	ns	ns	ns	17.2	ns
IC-441-1B	triplicate	ns	ns	ns	ns	32.9	ns	ns	ns	ns	ns	16.8	ns

Table 4-12. Bioaccessible Arsenic Analytical Results for Incremental Composite Samples (< 150 µm)[a]

Sample ID	Sample Type [a]	1.5 pH (%) [b]						2.5 pH (%) [b]					
		ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Soluble Phosphate and Biochar													
IC-258-3D	primary	33.3	25.7	35.0	35.3	25.9	30.2	12.4	11.6 U*	15.3	11.5	11.5 U*	10.3
IC-258-3D	duplicate	ns	27.7	ns	ns	ns	ns	ns	11.2 J	ns	ns	ns	ns
IC-258-3D	triplicate	ns	27.3	ns	ns	ns	ns	ns	12.0 J	ns	ns	ns	ns
IC-401-1A	primary	30.5	31.4	34.8	28.5 J-	36.7	34.4	20.4	15.0	17.2	12.6	16.2	13.2
IC-401-1A	replicate	ns	ns	ns	ns	27.3	ns	ns	ns	ns	ns	13.7	ns
IC-401-1A	duplicate	32.0	ns	ns	ns	ns	ns	15.6	ns	ns	ns	ns	ns
IC-401-1A	triplicate	38.9	ns	ns	ns	ns	ns	16.2	ns	ns	ns	ns	ns
IC-401-2B	primary	33.0	32.3	29.0	ns	33.2	36.9	14.5	14.7	17.2	ns U*	14.1	12.2
IC-401-2B	duplicate	ns	ns	31.9	ns	ns	ns	ns	ns	16.2	ns	ns	ns
IC-401-2B	triplicate	ns	ns	34.8	ns	ns	ns	ns	ns	16.0	ns	ns	ns
IC-441-1D	primary	40.6	37.8	39.9	48.9	43.1	37.3	21.7 U*	19.1 U*	20.0 U*	17.8	18.2 U*	16.1
IC-441-1D	duplicate	ns	ns	ns	45.0 J-	ns	ns	ns	ns	ns	21.6	ns	ns
IC-441-1D	triplicate	ns	ns	ns	44.5 J-	ns	ns	ns	ns	ns	22.2	ns	ns

Notes:

Bioaccessibility (%) was obtained for each sample by dividing the reported bioaccessible value (mg/kg) by the total arsenic value (mg/kg). Total arsenic values are shown in Table 3-6.

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

[b] Qualifiers (i.e., U*, J) reflect the bioaccessible arsenic in the numerator

ns - not sampled

Data Qualifiers

J - Quantitation is approximate due to limitations identified during the QA review

J- - Quantitation is approximate, but the result may be biased low

U* - The analyte should be considered "not-detected" because it was detected in an associated blank at a similar level

Table 4-13. Bioaccessible Lead Analytical Results for Incremental Composite Samples (< 150 µm)[a]

Sample ID	Sample Type [a]	1.5 pH (%) [b]						2.5 pH (%) [b]					
		ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Control													
IC-258-3B	primary	60.7	63.7	60.1	65.0	76.6	58.7	23.7	24.7	31.2	25.4	29.4	23.1
IC-401-1D	primary	66.8	65.6	61.3	64.1	69.5	67.7	36.5	34.5	38.7	37.2	38.1	37.4
IC-401-1D	replicate	66.4	ns	ns	ns	ns	ns	37.5	ns	ns	ns	ns	ns
IC-401-1D	duplicate	ns	ns	ns	ns	ns	66.7	ns	ns	ns	ns	ns	37.5
IC-401-1D	triplicate	ns	ns	ns	ns	ns	70.6	ns	ns	ns	ns	ns	33.4
IC-401-2C	primary	69.4	69.9	89.1	69.2	71.8	75.9	37.7	33.2	38.3	22.9	37.0	41.4
IC-401-2C	replicate	ns	ns	ns	72.9	ns	ns	ns	ns	ns	27.8	ns	ns
IC-441-1C	primary	76.9	69.2	80.5	68.6	75.9	70.9	36.7	31.5	39.6	34.3	32.8	37.1
IC-441-1C	replicate	ns	74.5	75.0	ns	ns	ns	ns	33.3	38.0	ns	ns	ns
Compost													
IC-258-3A	primary	66.7	66.3	73.6	66.8	73.6	67.0	27.1	23.7	31.6	20.6	29.8	23.7
IC-258-3A	replicate	ns	ns	ns	ns	ns	65.2	ns	ns	ns	ns	ns	25.6
IC-401-1C	primary	63.0	67.8	71.4	77.1	77.3	69.9	34.4	36.3	44.2	32.3	41.2	38.5
IC-401-1C	replicate	ns	ns	ns	ns	79.5 J	ns	ns	ns	ns	ns	40.5 J	ns
IC-401-2A	primary	68.6	73.1	72.1	74.7	67.2	73.8	36.9	36.3	45.5	34.2	38.2	37.0
IC-401-2A	replicate	ns	ns	ns	69.3	ns	ns	ns	ns	ns	27.5	ns	ns
IC-441-1A	primary	72.6	73.0	69.8	71.6	76.1	68.8	28.4	29.5	34.0	28.3	28.4	27.6
Soluble Phosphate													
IC-258-3C	primary	75.5	66.7	75.1	73.7	77.2	71.0	32.5	31.0	37.0	30.4	31.3	30.5
IC-258-3C	replicate	69.0	ns	ns	ns	ns	69.6	30.6	ns	ns	ns	ns	29.5
IC-401-1B	primary	65.1	68.1	65.9	64.6	74.5	69.7	32.7	32.2	37.6	32.8	34.3	35.4
IC-401-1B	replicate	ns	69.7	ns	ns	ns	ns	ns	34.3	ns	ns	ns	ns
IC-401-2D	primary	75.8	73.6	76.6	75.3	80.8	72.4	36.2	32.8	41.8	20.8	37.4	32.0
IC-401-2D	replicate	ns	ns	72.9	ns	ns	ns	ns	ns	39.8	ns	ns	ns
IC-441-1B	primary	68.9	69.3	73.5	67.7	77.9	67.6	29.0	27.5	35.3	24.5	24.9	23.2
IC-441-1B	duplicate	ns	ns	ns	ns	75.6	ns	ns	ns	ns	ns	24.6	ns
IC-441-1B	triplicate	ns	ns	ns	ns	69.2	ns	ns	ns	ns	ns	25.3	ns

Table 4-13. Bioaccessible Lead Analytical Results for Incremental Composite Samples (< 150 µm)[a]

Sample ID	Sample Type [a]	1.5 pH (%) [b]						2.5 pH (%) [b]					
		ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Soluble Phosphate and Biochar													
IC-258-3D	primary	71.0	63.7	73.0	67.0	69.4	64.7	29.4	27.7	37.1	26.1	27.4	26.1
IC-258-3D	duplicate	ns	66.3	ns	ns	ns	ns	ns	24.5	ns	ns	ns	ns
IC-258-3D	triplicate	ns	62.8	ns	ns	ns	ns	ns	27.6	ns	ns	ns	ns
IC-401-1A	primary	70.2	69.2	77.6	66.5	72.6	71.9	41.1	36.1	43.4	32.5	40.0	40.5
IC-401-1A	replicate	ns	ns	ns	ns	78.1	ns	ns	ns	ns	ns	39.3	ns
IC-401-1A	duplicate	69.7	ns	ns	ns	ns	ns	40.8	ns	ns	ns	ns	ns
IC-401-1A	triplicate	82.8	ns	ns	ns	ns	ns	39.0	ns	ns	ns	ns	ns
IC-401-2B	primary	76.5	76.0	67.2	70.9	69.1	69.5	37.4	33.4	42.4	18.9	34.8	29.1
IC-401-2B	duplicate	ns	ns	72.5	ns	ns	ns	ns	ns	43.1	ns	ns	ns
IC-401-2B	triplicate	ns	ns	72.1	ns	ns	ns	ns	ns	41.8	ns	ns	ns
IC-441-1D	primary	74.3	72.7	78.4	72.3	83.6	69.4	34.4	32.6	39.7	28.4	34.2	36.6
IC-441-1D	duplicate	ns	ns	ns	69.0	ns	ns	ns	ns	ns	32.9	ns	ns
IC-441-1D	triplicate	ns	ns	ns	68.8	ns	ns	ns	ns	ns	32.7	ns	ns

Notes:

Bioaccessibility (%) was obtained for each sample by dividing the reported bioaccessible value (mg/kg) by the total lead value (mg/kg). Total lead values are shown in Table 3-6.

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

[b] Qualifiers (i.e. U*, J) reflect the bioaccessible lead in the numerator

ns - not sampled

<u>Data Qualifier</u>

J - Quantitation is approximate due to limitations identified during the QA review

Table 4-14. Oxalate Extraction Analytical Results for Incremental Composite Samples (< 2 mm soil fraction)[a]

Sample ID	Sample Type [a]	Aluminum (mg/kg)							Iron (mg/kg)					
		ME1	ME2	ME3	ME4	ME5		ME6	ME1	ME2	ME3	ME4	ME5	ME6
Control														
IC-258-3B	primary	3,700	4,420	4,730	4,160	5,060		3,850	1,090	1,290	1,470	1,690	3,110	2,010
IC-401-1D	primary	5,770	6,930	6,690	4,840	6,570	J	3,780	3,270	2,460	2,620	3,150	3,810	2,720
IC-401-1D	replicate	5,550	ns	ns	ns	ns	J	ns	2,650	ns	ns	ns	ns	ns
IC-401-1D	duplicate	ns	ns	ns	ns	ns		2,620	ns	ns	ns	ns	ns	2,240
IC-401-1D	triplicate	ns	ns	ns	ns	ns		2,640	ns	ns	ns	ns	ns	2,240
IC-401-2C	primary	5,640	7,610	7,760	6,420	7,380	J	4,540	2,280	2,530	3,200	3,620	4,240	2,180
IC-401-2C	replicate	ns	ns	ns	6,710	ns		ns	ns	ns	ns	3,230	ns	ns
IC-441-1C	primary	7,110	8,150	7,680	5,990	8,010		6,500	3,070	3,130	3,750	3,450	5,090	3,540
IC-441-1C	replicate	ns	7,600	8,840	ns	ns		ns	ns	3,360	3,710	ns	ns	ns
Compost														
IC-258-3A	primary	7,310	6,390	6,950	5,920	4,520	J	4,230	1,910	1,720	1,980	2,630	2,830	1,620
IC-258-3A	replicate	ns	ns	ns	ns	ns		6,380	ns	ns	ns	ns	ns	2,930
IC-401-1C	primary	5,150	5,230	5,340	4,750	7,220	J	4,250	1,780	1,870	2,150	2,840	4,920	4,010
IC-401-1C	replicate	ns	ns	ns	ns	6,890	J	ns	ns	ns	ns	ns	4,140	ns
IC-401-2A	primary	6,830	6,960	6,900	4,900	8,540	J	2,500	3,020	2,330	3,050	4,180	4,600	2,200
IC-401-2A	replicate	ns	ns	ns	4,430	ns		ns	ns	ns	ns	3,800	ns	ns
IC-441-1A	primary	7,240	6,750	7,030	6,770	4,630		6,560	3,510	3,290	3,910	4,580	4,080	4,470
Soluble Phosphate														
IC-258-3C	primary	5,480	4,560	5,300	3,740	4,980		4,630	1,590	1,310	1,720	1,530	3,310	2,730
IC-258-3C	replicate	4,970	ns	ns	ns	ns		4,680	1,450	ns	ns	ns	ns	2,150
IC-401-1B	primary	6,110	6,150	6,410	4,390	4,040	J	4,650	2,130	2,890	2,610	2,680	1,710	4,160
IC-401-1B	replicate	ns	6,730	ns	ns	ns		ns	ns	2,380	ns	ns	ns	ns
IC-401-2D	primary	7,670	11,100	7,770	7,730	4,070	J	2,820	3,070	3,300	4,960	4,900	3,170	1,620
IC-401-2D	replicate	ns	ns	9,170	ns	ns		ns	ns	ns	3,950	ns	ns	ns
IC-441-1B	primary	9,600	10,800	10,000	6,340	6,500		8,260	3,680	3,880	4,480	3,770	5,060	3,780
IC-441-1B	duplicate	ns	ns	ns	ns	7,000		ns	ns	ns	ns	ns	3,960	ns
IC-441-1B	triplicate	ns	ns	ns	ns	6,870		ns	ns	ns	ns	ns	3,340	ns
Soluble Phosphate and Biochar														
IC-258-3D	primary	3,910	4,200	4,570	3,960	5,050		4,050	1,200	1,210	1,430	1,630	4,410	2,300
IC-258-3D	duplicate	ns	4,230	ns	ns	ns		ns	ns	1,200	ns	ns	ns	ns
IC-258-3D	triplicate	ns	4,600	ns	ns	ns		ns	ns	1,340	ns	ns	ns	ns
IC1-401-1A	primary	4,580	4,860	4,580	3,880	4,060	J	3,400	2,110	1,720	1,950	2,940	1,710	2,810
IC-401-1A	replicate	ns	ns	ns	ns	3,720	J	ns	ns	ns	ns	ns	1,580	ns
IC-401-1A	duplicate	4,490	ns	ns	ns	ns		ns	2,220	ns	ns	ns	ns	ns
IC-401-1A	triplicate	4,280	ns	ns	ns	ns		ns	1,710	ns	ns	ns	ns	ns
IC-401-2B	primary	7,530	7,490	6,920	6,100	8,380	J	3,170	2,680	2,430	2,760	4,720	4,510	3,090
IC-401-2B	duplicate	ns	ns	7,140	ns	ns		ns	ns	ns	2,710	ns	ns	ns
IC-401-2B	triplicate	ns	ns	8,470	ns	ns		ns	ns	ns	3,040	ns	ns	ns
IC-441-1D	primary	10,100	10,600	10,200	8,070	6,410		6,590	3,900	3,700	4,020	4,310	2,870	3,420
IC-441-1D	duplicate	ns	ns	ns	7,780	ns		ns	ns	ns	ns	4,160	ns	ns
IC-441-1D	triplicate	ns	ns	ns	7,060	ns		ns	ns	ns	ns	4,010	ns	ns

Notes:

Analyses conducted using U.S. Environmental Protection Agency Method 6010

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

Data Qualifier

J - Quantitation is approximate due to limitations identified during the QA review

Table 4-15. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Incremental Composite Samples

Sample ID	Instrument Replicate [a]	Sample Type [b]	Conductivity (µS/cm)						pH						Soil Moisture (%)					
			ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Control																				
IC-258-3B	1	primary	0.10	0	3.10	6.30	1.70	0.90	5.91	5.63	5.65	5.85	5.92	5.85	3.10	0.80	7.30	2.70	1.40	1.40
	2	primary	0.20	0.30	3.50	6.20	2.40	1.10	5.89	5.55	5.62	5.79	6.00	5.89	ns	ns	ns	ns	ns	ns
	3	primary	0.10	0.10	4.10	7.10	1.50	1.40	5.86	5.64	5.70	5.88	5.89	5.87	ns	ns	ns	ns	ns	ns
IC-401-1D	1	primary	0.90	0.10	3.00	7.90	5.10	1.70	4.97	5.05	5.01	5.55	5.61	5.74	18.9	3.00	14.5	14.4	4.50	2.80
		replicate	0.80	ns	ns	ns	ns	ns	4.90	ns	ns	ns	ns	ns	18.6	ns	ns	ns	ns	ns
	2	primary	0.90	0	4.70	7.50	5.60	1.50	4.95	5.10	4.98	5.65	5.55	5.65	ns	ns	ns	ns	ns	3.10
		replicate	2.50	ns	ns	ns	ns	ns	5.05	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	primary	1.10	0.10	2.70	8.50	4.90	1.50	5.10	5.14	5.05	5.75	5.59	5.61	ns	ns	ns	ns	ns	3.10
		replicate	2.90	ns	ns	ns	ns	ns	4.97	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	1	duplicate	ns	ns	ns	ns	ns	1.90	ns	ns	ns	ns	ns	5.72	ns	ns	ns	ns	ns	ns
	2	duplicate	ns	ns	ns	ns	ns	1.70	ns	ns	ns	ns	ns	5.72	ns	ns	ns	ns	ns	ns
	3	duplicate	ns	ns	ns	ns	ns	1.00	ns	ns	ns	ns	ns	5.63	ns	ns	ns	ns	ns	ns
	1	triplicate	ns	ns	ns	ns	ns	2.10	ns	ns	ns	ns	ns	5.69	ns	ns	ns	ns	ns	ns
	2	triplicate	ns	ns	ns	ns	ns	1.80	ns	ns	ns	ns	ns	5.69	ns	ns	ns	ns	ns	ns
	3	triplicate	ns	ns	ns	ns	ns	16.0	ns	ns	ns	ns	ns	5.67	ns	ns	ns	ns	ns	ns
IC-401-2C	1	primary	4.50	0.20	1.80	7.10	1.90	1.10	5.10	4.83	5.15	5.82	5.94	6.00	19.6	2.70	11.0	9.70	3.70	3.50
		replicate	ns	ns	ns	7.30	ns	ns	ns	ns	ns	5.95	ns	ns	ns	ns	ns	5.60	ns	ns
	2	primary	3.20	0.50	4.50	5.95	2.50	1.30	5.15	4.92	5.21	5.94	5.90	5.97	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	6.30	ns	ns	ns	ns	ns	6.01	ns	ns	ns	ns	ns	ns	ns	ns
	3	primary	3.20	0.20	1.80	6.55	2.90	0.50	5.30	4.92	5.30	6.02	5.99	5.99	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	6.20	ns	ns	ns	ns	ns	6.18	ns	ns	ns	ns	ns	ns	ns	ns
IC-441-1C	1	primary	15.8	0.10	5.00	29.5	8.60	5.50	6.29	6.17	6.15	6.40	6.41	6.45	29.7	6.70	23.0	9.90	4.90	4.40
		replicate	ns	0.20	3.70	ns	ns	ns	ns	6.44	6.25	ns	ns	ns	ns	5.10	18.7	ns	ns	ns
	2	primary	17.5	0.30	5.00	28.9	5.60	6.50	6.25	6.20	6.31	6.32	6.45	6.45	ns	ns	ns	ns	ns	ns
		replicate	ns	0.20	4.90	ns	ns	ns	ns	6.50	6.30	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	primary	16.2	0.20	4.20	29.7	7.90	5.90	6.30	6.11	6.30	6.42	6.31	6.31	ns	ns	ns	ns	ns	ns
		replicate	ns	0.10	3.70	ns	ns	ns	ns	6.57	6.22	ns	ns	ns	ns	ns	ns	ns	ns	ns
Compost																				
IC-258-3A	1	primary	4.70	0.70	7.80	17.9	2.50	1.20	5.88	5.30	5.71	6.63	6.59	6.61	10.7	1.30	13.8	4.30	2.10	1.90
		replicate	ns	ns	ns	ns	ns	1.50	ns	ns	ns	ns	ns	6.57	ns	ns	ns	ns	ns	2.00
	2	primary	3.40	1.20	8.90	18.1	3.20	1.50	5.99	5.64	5.95	6.51	6.54	6.60	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	ns	ns	1.50	ns	ns	ns	ns	ns	6.61	ns	ns	ns	ns	ns	ns
	3	primary	4.20	1.40	7.50	17.9	2.80	0.90	6.03	5.71	6.05	6.42	6.45	6.49	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	ns	ns	1.10	ns	ns	ns	ns	ns	6.52	ns	ns	ns	ns	ns	ns
IC-401-1C	1	primary	2.10	0.10	4.80	3.50	4.10	3.70	4.92	5.12	4.89	5.81	5.91	5.89	11.0	2.70	9.20	12.8	3.40	2.70
		replicate	ns	ns	ns	ns	4.00	ns	ns	ns	ns	ns	6.01	ns	ns	ns	ns	ns	3.20	ns
	2	primary	2.70	0	1.90	3.60	4.90	4.50	5.07	4.99	5.07	5.95	5.88	5.98	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	ns	3.80	ns	ns	ns	ns	ns	5.98	ns	ns	ns	ns	ns	ns	ns
	3	primary	4.80	0.20	2.40	4.10	4.50	2.70	5.17	5.07	5.05	6.00	5.95	5.89	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	ns	3.90	ns	ns	ns	ns	ns	6.08	ns	ns	ns	ns	ns	ns	ns
IC-401-2A	1	primary	5.10	0.10	4.20	9.60	4.80	3.50	4.71	4.57	4.55	5.36	5.42	5.41	13.7	3.90	20.4	19.9	3.90	3.10
		replicate	ns	ns	ns	9.00	ns	ns	ns	ns	ns	5.37	ns	ns	ns	ns	ns	16.1	ns	ns
	2	primary	1.10	0	7.10	9.10	3.90	2.80	4.89	4.60	4.65	5.42	5.39	5.38	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	10.2	ns	ns	ns	ns	ns	5.62	ns	ns	ns	ns	ns	ns	ns	ns
	3	primary	0.50	0.20	6.90	9.40	3.40	2.90	4.78	4.55	4.50	5.32	5.45	5.45	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	9.90	ns	ns	ns	ns	ns	5.59	ns	ns	ns	ns	ns	ns	ns	ns
IC-441-1A	1	primary	3.40	0.10	12.5	8.20	5.50	3.50	6.02	6.22	6.22	6.67	6.29	6.34	21.8	4.40	23.5	12.5	5.90	4.30
	2	primary	14.5	0.70	13.5	8.40	4.20	2.70	6.05	6.17	6.25	6.56	6.27	6.31	ns	ns	ns	ns	ns	ns
	3	primary	15.6	0.20	11.9	8.10	3.40	3.20	6.07	6.32	6.20	6.61	6.29	6.29	ns	ns	ns	ns	ns	ns

Table 4-15. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Incremental Composite Samples

Sample ID	Instrument Replicate [a]	Sample Type [b]	Conductivity (µS/cm) ME1	ME2	ME3	ME4	ME5	ME6	pH ME1	ME2	ME3	ME4	ME5	ME6	Soil Moisture (%) ME1	ME2	ME3	ME4	ME5	ME6
Soluble Phosphate																				
IC-258-3C	1	primary	2.50	3.90	8.40	1.50	0.80	1.10	5.52	5.65	5.49	5.85	5.91	5.99	13.2	2.70	15.6	4.50	4.50	2.20
		replicate	2.50	ns	ns	ns	ns	0.80	5.71	ns	ns	ns	ns	6.05	13.8	ns	ns	ns	ns	2.10
	2	primary	2.90	2.90	7.80	1.70	1.70	0.80	5.52	5.50	5.45	5.81	6.01	6.01	ns	ns	ns	ns	ns	ns
		replicate	3.40	ns	ns	ns	ns	0.70	5.70	ns	ns	ns	ns	5.98	ns	ns	ns	ns	ns	ns
	3	primary	2.30	3.10	8.40	1.40	0.50	0.80	5.47	5.61	5.55	5.86	5.98	5.95	ns	ns	ns	ns	ns	ns
		replicate	2.10	ns	ns	ns	ns	0.90	5.72	ns	ns	ns	ns	5.97	ns	ns	ns	ns	ns	ns
IC-401-1B	1	primary	21.4	0.10	9.40	13.6	4.60	4.80	4.36	4.54	4.78	5.24	5.27	5.31	15.4	2.20	13.3	3.20	3.50	2.60
		replicate	ns	0	ns	ns	ns	ns	ns	4.70	ns	ns	ns	ns	ns	2.60	ns	ns	ns	ns
	2	primary	66.4	0.10	6.60	12.5	4.90	3.80	4.29	4.50	5.05	5.29	5.31	5.33	ns	ns	ns	ns	ns	ns
		replicate	ns	0.20	ns	ns	ns	ns	ns	4.57	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	primary	42.6	0.10	16.6	14.2	4.00	5.40	4.40	4.53	4.90	5.27	5.37	5.37	ns	ns	ns	ns	ns	ns
		replicate	ns	0.10	ns	ns	ns	ns	ns	4.62	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
IC-401-2D	1	primary	40.7	0.80	36.1	11.2	3.70	2.10	4.31	5.56	5.60	5.44	5.55	5.58	35.4	4.90	30.9	19.1	12.1	4.30
		replicate	ns	ns	31.2	ns	ns	ns	ns	ns	5.75	ns	ns	ns	ns	ns	23.0	ns	ns	ns
	2	primary	75.1	1.10	41.2	11.5	3.50	1.70	4.90	5.46	5.95	5.35	5.64	5.62	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	61.7	ns	ns	ns	ns	ns	6.00	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	primary	91.7	0.20	27.1	11.9	3.70	0.80	4.41	5.39	6.05	5.40	5.46	5.59	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	23.4	ns	ns	ns	ns	ns	5.85	ns	ns	ns	ns	ns	ns	ns	ns	ns
		duplicate	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	11.5	ns
IC-441-1B	1	primary	3.40	0.20	17.2	24.5	7.10	4.60	4.94	5.46	4.85	6.22	6.15	6.17	31.4	3.30	22.2	10.5	6.70	5.00
	2	primary	14.5	0.50	10.1	37.2	8.60	3.90	5.01	6.02	4.90	6.31	6.10	6.18	ns	ns	ns	ns	6.40	ns
	3	primary	15.6	0.30	14.4	40.1	7.90	4.10	5.02	5.51	5.05	6.17	6.05	6.09	ns	ns	ns	ns	6.40	ns
	1	duplicate	ns	ns	ns	ns	6.50	ns	ns	ns	ns	ns	6.25	ns	ns	ns	ns	ns	ns	ns
	2	duplicate	ns	ns	ns	ns	6.70	ns	ns	ns	ns	ns	6.30	ns	ns	ns	ns	ns	ns	ns
	3	duplicate	ns	ns	ns	ns	6.40	ns	ns	ns	ns	ns	6.35	ns	ns	ns	ns	ns	ns	ns
	1	triplicate	ns	ns	ns	ns	6.70	ns	ns	ns	ns	ns	6.21	ns	ns	ns	ns	ns	ns	ns
	2	triplicate	ns	ns	ns	ns	7.10	ns	ns	ns	ns	ns	6.25	ns	ns	ns	ns	ns	ns	ns
	3	triplicate	ns	ns	ns	ns	5.70	ns	ns	ns	ns	ns	6.27	ns	ns	ns	ns	ns	ns	ns
Soluble Phosphate and Biochar																				
IC-258-3D	1	primary	0.70	2.50	3.00	13.7	2.90	1.90	5.73	5.40	5.72	5.94	5.95	6.02	8.10	1.20	10.5	4.40	2.30	1.60
	2	primary	1.00	2.30	3.70	13.5	3.80	1.50	5.71	5.45	5.81	5.94	6.03	6.05	ns	ns	ns	ns	ns	ns
	3	primary	0.90	2.90	2.90	13.7	1.60	2.10	5.73	5.47	5.65	5.92	5.94	6.00	ns	ns	ns	ns	ns	ns
	1	duplicate	ns	2.70	ns	ns	ns	ns	ns	5.41	ns	ns	ns	ns	ns	1.50	ns	ns	ns	ns
	2	duplicate	ns	3.40	ns	ns	ns	ns	ns	5.47	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	duplicate	ns	3.10	ns	ns	ns	ns	ns	5.43	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	1	triplicate	ns	3.40	ns	ns	ns	ns	ns	5.50	ns	ns	ns	ns	ns	1.50	ns	ns	ns	ns
	2	triplicate	ns	3.50	ns	ns	ns	ns	ns	5.49	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	triplicate	ns	2.90	ns	ns	ns	ns	ns	5.47	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
IC-401-1A	1	primary	11.8	0.10	18.1	11.7	2.60	3.30	4.41	4.45	4.40	5.15	5.25	5.34	15.6	2.20	12.9	6.90	4.00	2.20
		duplicate	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	6.80	4.10	ns
		replicate	ns	ns	ns	ns	1.90	ns	ns	ns	ns	ns	5.22	ns	ns	ns	ns	ns	4.60	ns
	2	primary	16.9	0.10	16.5	11.9	1.90	3.10	4.60	4.47	4.65	5.19	5.25	5.19	ns	ns	ns	ns	ns	ns
		replicate	ns	ns	ns	ns	2.40	ns	ns	ns	ns	ns	5.17	ns	ns	ns	ns	ns	ns	ns
		primary	23.9	0.20	11.9	12.5	2.40	2.80	4.91	4.51	4.35	5.21	5.18	5.26	ns	ns	ns	ns	ns	ns
	3	replicate	ns	ns	ns	ns	1.50	ns	ns	ns	ns	ns	5.26	ns	ns	ns	ns	ns	ns	ns
	1	duplicate	15.8	ns	ns	ns	ns	ns	4.50	ns	ns	ns	ns	ns	17.1	ns	ns	6.80	ns	ns
	2	duplicate	15.4	ns	ns	ns	ns	ns	4.45	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	duplicate	22.6	ns	ns	ns	ns	ns	4.55	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	1	triplicate	18.1	ns	ns	ns	ns	ns	4.70	ns	ns	ns	ns	ns	14.0	ns	ns	ns	ns	ns
	2	triplicate	33.8	ns	ns	ns	ns	ns	4.83	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	triplicate	19.8	ns	ns	ns	ns	ns	4.91	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns

Table 4-15. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Incremental Composite Samples

Sample ID	Instrument Replicate [a]	Sample Type [b]	Conductivity (µS/cm)						pH						Soil Moisture (%)					
			ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6	ME1	ME2	ME3	ME4	ME5	ME6
Soluble Phosphate and Biochar (continued)																				
IC-401-2B	1	primary	36.7	0.10	22.9	14.6	2.60	1.80	4.50	4.51	4.80	5.12	5.18	5.15	23.7	3.60	20.9	16.0	8.00	3.60
	2	primary	43.4	0.20	17.8	15.2	5.40	1.50	4.62	4.49	4.74	5.10	5.05	5.15	ns	ns	ns	ns	ns	ns
	3	primary	48.5	0.10	29.0	14.2	3.90	0.90	4.60	4.61	4.69	5.23	5.09	5.11	ns	ns	ns	ns	ns	ns
	1	duplicate	ns	ns	18.2	ns	ns	ns	ns	ns	4.75	ns	ns	ns	ns	ns	17.7	16.4	ns	ns
	2	duplicate	ns	ns	22.7	ns	ns	ns	ns	ns	4.80	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	duplicate	ns	ns	17.4	ns	ns	ns	ns	ns	4.70	ns	ns	ns	ns	ns	ns	ns	ns	ns
	1	triplicate	ns	ns	28.1	ns	ns	ns	ns	ns	4.65	ns	ns	ns	ns	ns	19.9	ns	ns	ns
	2	triplicate	ns	ns	17.2	ns	ns	ns	ns	ns	4.71	ns	ns	ns	ns	ns	ns	ns	ns	ns
	3	triplicate	ns	ns	29.4	ns	ns	ns	ns	ns	4.60	ns	ns	ns	ns	ns	ns	ns	ns	ns
IC-441-1D	1	primary	161	0.80	43.2	38.8	5.90	4.20	5.14	5.37	5.15	6.39	6.27	6.47	37.2	4.80	19.4	14.8	10.8	4.60
	2	primary	ns	0.10	22.1	47.2	7.90	3.50	5.10	5.41	5.27	6.38	6.31	6.39	ns	ns	ns	ns	ns	ns
	3	primary	ns	0.30	39.2	39.1	3.70	4.50	5.15	5.35	5.10	6.26	6.27	6.29	ns	ns	ns	ns	ns	ns
	1	duplicate	ns	ns	ns	51.2	ns	ns	ns	ns	ns	6.25	ns	ns	ns	ns	ns	14.1	ns	ns
	2	duplicate	ns	ns	ns	49.7	ns	ns	ns	ns	ns	6.23	ns	ns	ns	ns	ns	ns	ns	ns
	3	duplicate	ns	ns	ns	53.4	ns	ns	ns	ns	ns	6.20	ns	ns	ns	ns	ns	ns	ns	ns
	1	triplicate	ns	ns	ns	51.7	ns	ns	ns	ns	ns	6.32	ns	ns	ns	ns	ns	12.5	ns	ns
		duplicate	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	12.7	ns	ns
	2	triplicate	ns	ns	ns	50.4	ns	ns	ns	ns	ns	6.29	ns	ns	ns	ns	ns	ns	ns	ns
	3	triplicate	ns	ns	ns	51.2	ns	ns	ns	ns	ns	6.31	ns	ns	ns	ns	ns	ns	ns	ns

Notes:

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

[a] For each sample ID, regardless of sample type (i.e. primary, duplicate, triplicate, replicate) three instrument reading replicates on each field soil sample (see 'Instrument Replicate' column) were produced for conductivity and pH

[b] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples (eg. IC-401-1D). Samples labeled as "duplicate" and "triplicate" (eg. IC-401-2B) indicate the second and third samples collected along with the

ns - not sampled

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Aluminum	Antimony		Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
Control														
D-258-3B	0-2	primary	6730	2.6	J-	14	69	0.23	4.6	1740	6.6	2.5	16	6510
D-258-3B	2-4	primary	7290	4.54	J-	11.6	79.2	0.242	3.91	1860	7.2	2.64	17.4	7170
D-258-3B	4-6	primary	7770	4.39	J-	11.9	81.8	0.254	4.1	1990	7.36	3.03	17.8	7620
D-258-3B	6-8	primary	8320	2.47	J-	10.7	79	0.264	2.8	1890	8.26	3.07	15.3	8370
D-258-3B	8-10	primary	7940	1.88	J-	7.75	59.9	0.256	2.3	1580	7.83	2.63	13	7520
D-258-3B	8-12	primary	8030	1.93	J-	7.78	60.5	0.265	1.92	1440	7.57	2.88	13.5	7590
D-401-1D	0-2	primary	8980	14	J-	47.5	104	0.311	9.75	2800	10.9	3.47	51.5	12200
D-401-1D	2-4	primary	12100	6.99	J-	57.5	124	0.426	12.1	2110	11.1	5.34	32.1	11800
D-401-1D	4-6	primary	14100	2.51	J-	14.9	141	0.475	4.76	2420	11.5	5.13	18.6	12700
D-401-1D	6-8	primary	13800	3.59	J-	12.4	126	0.474	3.52	2500	13.1	4.52	21.7	12700
D-401-1D	8-10	primary	14200	1.54	J-	8.29	113	0.465	1.69	2220	11.9	4.68	17.6	13200
D-401-1D	8-12	primary	16100	1.4	J-	7.37	122	0.552	1.65	2500	14.9	5.7	18.7	14600
D-401-2C	0-2	primary	13700	1.03	J-	5.07	130	0.423	1.14	1990	10.8	5.34	15.6	12000
D-401-2C	2-4	primary	12800	13.9	J-	52.4	122	0.421	11.3	1730	10.7	5.32	33.4	12400
D-401-2C	4-6	primary	13500	3.61	J-	21	126	0.428	12.2	1680	10.6	4.34	16.5	11700
D-401-2C	6-8	primary	13600	1.32	J-	5.1	117	0.444	1.68	1860	10.4	4.37	15.8	12500
D-401-2C	8-10	primary	14300	0.863	J-	4.1	115	0.453	0.516	2000	11.2	7.38	17.1	12600
D-401-2C	8-12	primary	14000	0.724	J-	3.84	110	0.448	0.565	1920	11.2	4.88	15.5	12400
D-441-1C	0-2	primary	14100	4.14	J-	22.8	252	0.478	11.1	10600	18.3	6.25	42.5	14000
D-441-1C	2-4	primary	18600	3.62	J-	28.1	218	0.641	7.81	6960	20.8	8.01	47.2	17400
D-441-1C	4-6	primary	21100	3.42	J-	29.9	220	0.676	3.75	5060	22.5	8.71	53.1	18900
D-441-1C	6-8	primary	18200	1.14	J-	9.26	171	0.59	0.516	3410	20.1	7.31	21.4	16100
D-441-1C	8-10	primary	19200	0.597	J-	5.98	167	0.616	0.428	3900	19.6	7.64	20.4	16600
D-441-1C	8-12	primary	19800	0.543	J-	6	159	0.636	0.373	3150	21.3	7.15	20.9	17600
Compost														
D-258-3A	0-2	primary	8440	1.96	J-	9.83	81.8	0.268	3.15	2490	7.58	2.89	15.8	7940
D-258-3A	2-4	primary	9130	2.34	J-	10.8	87.7	0.287	3.8	2440	10.1	2.94	16.3	8060
D-258-3A	4-6	primary	9610	1.57	J-	6.87	88.1	0.308	1.59	2200	7.74	3.06	12.8	8290
D-258-3A	6-8	primary	10600	0.769	J-	2.41	83.6	0.334	0.225	2090	8.75	3.05	10.2	8710
D-258-3A	8-10	primary	10600	0.367	J-	1.91	74.4	0.323	0.129	1730	7.39	3.09	9.4	8230
D-258-3A	8-12	primary	10100	0.222	J-	1.82	71.1	0.314	0.116	1710	7.71	3.01	9.87	8400
D-401-1C	0-2	primary	5130	16	J-	21.8	56.9	0.163	5.73	4450	8.74	2.33	38.3	7550
D-401-1C	2-4	primary	9610	7.41	J-	30.9	80	0.339	8.06	1680	9.31	4.54	26	11400
D-401-1C	4-6	primary	10800	3.35	J-	12.6	98.8	0.353	6.43	1640	10.6	4.99	16.5	12000

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Control													
D-258-3B	0-2	primary	206	1600	250	5.5	549	0.19	0.24	39	0.18	12	218
D-258-3B	2-4	primary	255	1780	256	6.63	548	0.2	0.24	48	0.178	12.7	214
D-258-3B	4-6	primary	262	1930	266	6.41	564	0.23	0.27	51	0.189	13.9	220
D-258-3B	6-8	primary	143	2180	248	6.81	597	0.22	0.22	57	0.15	14.8	168
D-258-3B	8-10	primary	144	1910	185	6.86	545	0.17	0.13	52	0.167	13.7	149
D-258-3B	8-12	primary	129	1950	189	6.57	512	0.16	0.13	51	0.127	13.2	113
D-401-1D	0-2	primary	1040	2700	324	8.77	805	0.7	0.71	65	0.558	22.7	507
D-401-1D	2-4	primary	270	2270	529	9.06	719	0.41	0.37	72	0.294	21.5	327
D-401-1D	4-6	primary	61.2	2440	516	10.2	698	0.3	0.18	93	0.158	24	305
D-401-1D	6-8	primary	191	2610	407	10.9	718	0.32	0.24	93	0.183	25.5	286
D-401-1D	8-10	primary	59.9	2420	363	9.76	666	0.23	0.17	94	0.133	23.9	131
D-401-1D	8-12	primary	57.6	2880	388	11.7	702	0.2	0.23	102	0.138	29.4	125
D-401-2C	0-2	primary	95.8	2330	302	9.4	649	0.23	0.17	84	0.123	22.8	102
D-401-2C	2-4	primary	573	2350	573	9.37	707	0.64	0.58	70	0.538	22.9	473
D-401-2C	4-6	primary	60.3	2400	482	9.41	649	0.31	0.18	71	0.258	23.2	398
D-401-2C	6-8	primary	19.6	2410	349	9.65	576	0.26	0.14	76	0.115	23.7	329
D-401-2C	8-10	primary	13.7	2390	329	10.2	603	0.25	0.14	87	0.105	24.5	270
D-401-2C	8-12	primary	17.5	2290	311	10.8	588	0.21	0.14	88	0.103	23.7	131
D-441-1C	0-2	primary	538	3930	715	15.3	1970	0.4	0.62	144	0.382	27.3	640
D-441-1C	2-4	primary	406	4520	707	18.7	2020	0.4	0.36	158	0.304	37.9	376
D-441-1C	4-6	primary	179	4870	722	20.2	1930	0.4	0.31	158	0.214	37.5	214
D-441-1C	6-8	primary	16.8	3950	482	16.2	1630	0.24	0.14	162	0.136	33	71
D-441-1C	8-10	primary	15.4	4000	448	17.1	1570	0.2	0.11	160	0.144	34.6	67.1
D-441-1C	8-12	primary	17.9	4330	434	18.2	1500	0.21	0.13	161	0.143	38.5	66.5
Compost													
D-258-3A	0-2	primary	123	2230	249	6.99	681	0.2	0.19	62	0.148	15	186
D-258-3A	2-4	primary	165	2170	271	7.29	617	0.18	0.22	62	0.162	15.1	207
D-258-3A	4-6	primary	91.1	2110	257	6.86	572	0.18	0.13	69	0.119	15.4	117
D-258-3A	6-8	primary	14.4	2080	243	7.36	560	0.1	0.079	77	0.087	15.9	37.6
D-258-3A	8-10	primary	7.03	2000	208	6.7	536	0.15	0.069	76	0.084	15.2	31.5
D-258-3A	8-12	primary	7.62	2130	192	7.11	551	0.12	0.072	74	0.083	16.3	29.7
D-401-1C	0-2	primary	750	1770	183	6.42	696	0.9	1.1	69	0.548	14.5	482 J
D-401-1C	2-4	primary	365	2660	411	8.83	824	0.39	0.36	66	0.323	20.5	257
D-401-1C	4-6	primary	96.8	2640	421	9.08	718	0.27	0.17	96	0.173	22.5	219

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Aluminum	Antimony		Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
Compost (continued)														
D-401-1C	6-8	primary	10900	2	J-	8.9	104	0.363	2.56	1680	12.1	4.51	14.8	11500
D-401-1C	8-10	primary	10600	1.43	J-	6.14	102	0.34	1.74	1620	11.1	4.39	14.4	11100
D-401-1C	8-12	primary	10300	0.845	J-	4.68	84.5	0.349	0.827	1610	9.51	4	12.4	10800
D-401-1C	0-2	replicate	6580	8.16	J-	23.7	51.8	0.207	3.66	3290	11.6	3.78	24.8	10300
D-401-1C	2-4	replicate	9630	8.15	J-	35.9	70.2	0.326	7.15	1760	11	4.02	28.3	11200
D-401-1C	4-6	replicate	11100	2.28	J-	7.44	104	0.363	5.26	1590	11.2	4.11	14.4	11900
D-401-1C	6-8	replicate	10800	0.962	J-	4.07	119	0.339	1.14	1850	14.2	4.04	12.3	11200
D-401-1C	8-10	replicate	10700	1.08	J-	5.43	87.4	0.35	1.33	1800	12.6	4.07	12.5	11200
D-401-1C	8-12	replicate	10800	0.567	J-	3.39	98.1	0.345	0.678	1680	11.9	3.99	12.3	11600
D-401-2A	0-2	primary	6650	38.3	J-	35.2	80.6	0.229	10.4	2920	8.76	2.54	51.4	8570
D-401-2A	2-4	primary	10300	20.1	J-	66.9	88.3	0.339	14.9	1910	9.55	4.14	47.2	11200
D-401-2A	4-6	primary	12100	7.47	J-	33.2	110	0.408	11.7	1910	10.4	4.59	22.4	11700
D-401-2A	6-8	primary	11600	4.2	J-	12.4	101	0.382	5.17	1700	10.1	4.15	16.8	11200
D-401-2A	8-10	primary	12300	1.6	J-	6.81	98.3	0.406	1.64	1540	10.9	4.45	15.5	11600
D-401-2A	8-12	primary	12200	3.17	J-	12.1	107	0.402	4.22	1710	11.1	4.17	16.7	12300
D-441-1A	0-2	primary	12500	4.88	J-	12.8	220	0.434	11.2	9970	16.6	5.99	40.4	14500
D-441-1A	2-4	primary	13900	3.54	J-	16.9	204	0.49	7.22	6700	18.1	6.58	34.9	14400
D-441-1A	4-6	primary	20700	3.56	J-	22.9	253	0.711	5.61	8050	23.2	9.81	47.5	20400
D-441-1A	6-8	primary	16300	1.44	J-	11.6	177	0.545	1.15	4730	20.5	7.02	25.4	15000
D-441-1A	8-10	primary	20500	1.83	J-	14.5	212	0.675	2.09	6070	26.3	9.24	33.6	19800
D-441-1A	8-12	primary	19200	0.961	J-	9.92	185	0.647	1.01	4270	25.4	8.35	28.2	18100
Soluble Phosphate														
D-258-3C	0-2	primary	5520	4.77	J-	9.38	88.9	0.226	5.42	4140	11.5	2.23	16.9	6150
D-258-3C	2-4	primary	6030	3.8	J-	13.4	80	0.219	5.82	2840	7.31	2.36	16	6800
D-258-3C	4-6	primary	7560	4.61	J-	17.3	102	0.247	6.35	2870	7.95	2.74	24.4	7580
D-258-3C	6-8	primary	8160	1.4	J-	11.5	84.5	0.26	1.44	2390	7.21	2.94	12.6	7790
D-258-3C	8-10	primary	7920	1.04	J-	5.92	74.6	0.255	0.944	2120	7.43	2.75	10.6	7100
D-258-3C	8-12	primary	8080	0.466	J-	2.7	66.4	0.251	0.329	2050	7.09	2.84	8.94	7550
D-401-1B	0-2	primary	6410	11.3	J-	25.5	60.2	0.263	5.07	3400	12.7	2.7	27.3	8630
D-401-1B	2-4	primary	12100	10.6	J-	45.1	116	0.407	6.39	2370	10.1	4.33	30.6	11400
D-401-1B	4-6	primary	11600	1.21	J-	6.22	98.8	0.405	1.63	2150	11	4.41	14.2	11800
D-401-1B	6-8	primary	11000	0.671	J-	6.38	97.6	0.371	2.88	2180	11.1	4.9	13.1	11800
D-401-1B	8-10	primary	11100	0.464	J-	4.32	92.7	0.376	0.493	1910	10.6	4.19	12.9	11900
D-401-1B	8-12	primary	13500	0.429	J-	3.84	97.4	0.434	0.468	1550	10.5	4.2	14.5	11900

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Compost (continued)													
D-401-1C	6-8	primary	68.9	2460	335	9.22	709	0.2	0.16	77	0.13	22.5	265
D-401-1C	8-10	primary	42.3	2600	295	9.48	711	0.2	0.14	75	0.122	23	268
D-401-1C	8-12	primary	29.1	2340	250	8.55	721	0.19	0.11	79	0.109	19.5	175
D-401-1C	0-2	replicate	425	2420	228	7.86	725	0.39	0.64	75	0.382	19.4	265 J
D-401-1C	2-4	replicate	440	2510	330	8.1	723	0.35	0.37	62	0.368	21.3	244
D-401-1C	4-6	replicate	37.5	2580	396	9.56	763	0.21	0.15	76	0.112	23.3	201
D-401-1C	6-8	replicate	25.9	2690	345	9.58	743	0.21	0.13	95	0.098	23	248
D-401-1C	8-10	replicate	32.8	2550	293	9.61	672	0.19	0.12	89	0.103	20.2	213
D-401-1C	8-12	replicate	16.4	2560	264	8.88	699	0.17	0.12	80	0.092	22.5	158
D-401-2A	0-2	primary	1380	1850	212	6.59	671	1.3	1.5	48	0.552	15.3	729
D-401-2A	2-4	primary	893	2340	515	8.33	732	0.72	0.73	60	0.675	19.5	513
D-401-2A	4-6	primary	185	2470	592	9.15	697	0.4	0.33	67	0.318	22.3	518
D-401-2A	6-8	primary	120	2180	404	8.88	638	0.27	0.24	66	0.184	20.8	383
D-401-2A	8-10	primary	59.6	2370	301	9.48	600	0.24	0.13	73	0.128	21.8	236
D-401-2A	8-12	primary	101	2710	360	9.63	655	0.24	0.21	72	0.178	24.1	250
D-441-1A	0-2	primary	605	3830	709	14.7	1830	0.4	0.51	121	0.362	30.3	625
D-441-1A	2-4	primary	376	3780	621	15.2	1640	0.32	0.34	111	0.262	29.4	355
D-441-1A	4-6	primary	276	5130	876	21.3	2170	0.4	0.38	151	0.276	42.5	344
D-441-1A	6-8	primary	46.2	4040	607	17.6	1510	0.2	0.17	117	0.144	30.6	114
D-441-1A	8-10	primary	93.7	5340	739	22.8	1930	0.3	0.22	181	0.194	42.4	172
D-441-1A	8-12	primary	44.7	4810	630	23.8	1690	0.27	0.16	147	0.152	41.3	111
Soluble Phosphate													
D-258-3C	0-2	primary	262	1660	211	5.78	549	0.2	0.36	54	0.219	13.7	255
D-258-3C	2-4	primary	276	1770	248	5.41	531	0.21	0.28	53	0.205	12.1	261
D-258-3C	4-6	primary	332	1910	274	6.44	642	0.27	0.34	59	0.233	13.7	330
D-258-3C	6-8	primary	40.2	2010	279	6.63	597	0.15	0.17	53	0.102	13.8	138
D-258-3C	8-10	primary	114	1810	248	6.27	514	0.13	0.094	51	0.086	12.8	98.6
D-258-3C	8-12	primary	10.7	1870	232	6.5	553	0.12	0.054	56	0.074	14.1	46.3
D-401-1B	0-2	primary	402	1890	173	7.3	790	0.55	0.83	70	0.348	19.1	332
D-401-1B	2-4	primary	390	2340	446	9.06	941	0.5	0.45	77	0.351	21	309
D-401-1B	4-6	primary	12.7	2540	335	9.57	842	0.26	0.17	83	0.114	22.7	100
D-401-1B	6-8	primary	15.8	2430	350	9.71	784	0.2	0.11	120	0.095	22.4	233
D-401-1B	8-10	primary	25.2	2430	277	8.99	802	0.2	0.11	81	0.092	21.7	175
D-401-1B	8-12	primary	15.1	2390	246	9.53	681	0.2	0.17	86	0.097	22.8	173

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Aluminum	Antimony		Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
Soluble Phosphate (continued)														
D-401-2D	0-2	primary	9700	27.3	J-	33.6	121	0.371	13.5	5630	15.6	3.48	50.8	10400
D-401-2D	2-4	primary	14000	7.37	J-	38.4	133	0.451	12.4	3160	10.8	4.34	23.1	11700
D-401-2D	4-6	primary	13500	6.92	J-	15.7	137	0.43	4.41	3070	10.4	4.03	24.1	11600
D-401-2D	6-8	primary	14300	3.61	J-	18.5	122	0.453	4.46	2380	11.4	4.53	17.9	12800
D-401-2D	8-10	primary	15100	1.46	J-	4.97	114	0.474	1.09	2010	11.6	4.14	15	12900
D-401-2D	8-12	primary	15400	1.09	J-	3.71	109	0.497	0.548	1980	12.1	4.35	14.5	13000
D-441-1B	0-2	primary	19700	3.55	J-	20.6	224	0.715	6.29	10500	23.2	7.62	43	15500
D-441-1B	2-4	primary	19400	3.62	J-	28.7	256	0.631	7.68	9030	22.9	7.69	51	16200
D-441-1B	4-6	primary	20100	1.87	J-	16.8	207	0.641	2.14	5470	18.4	7.2	28.3	15900
D-441-1B	6-8	primary	22100	1.26	J-	12.3	214	0.707	1.62	5110	20.6	8.46	28	16900
D-441-1B	8-10	primary	19700	1.14	J-	10.1	213	0.627	1.58	5320	17.5	7.27	26.5	15700
D-441-1B	8-12	primary	21700	0.943	J-	9.96	206	0.661	1.41	4810	22	7.72	27.7	16400
Soluble Phosphate and Biochar														
D-258-3D	0-2	primary	6530	2.46	J-	10.1	76.5	0.245	4.17	2920	9.03	2.43	15.3	6930
D-258-3D	2-4	primary	7280	2.5	J-	12.2	79	0.239	4.32	2360	8.16	2.84	16.3	7780
D-258-3D	4-6	primary	6700	2.01	J-	11.2	77.5	0.226	2.86	1990	6.22	2.53	13.2	6580
D-258-3D	6-8	primary	7450	0.99	J-	4.01	71.3	0.242	0.473	1800	6.94	2.72	8.88	7350
D-258-3D	8-10	primary	7610	0.608	J-	2.6	60.8	0.234	0.307	1900	6.74	2.55	8.31	7000
D-258-3D	8-12	primary	7810	0.592	J-	2.8	63.2	0.242	0.424	2010	7.43	2.68	8.36	7510
D-258-3D	0-2	replicate	6420	2.57	J-	10.9	73.9	0.235	4.21	2500	6.86	2.71	14.8	6830
D-258-3D	2-4	replicate	6480	2.53	J-	11.4	79.2	0.23	4.43	2390	7.85	2.56	15.4	7080
D-258-3D	4-6	replicate	6810	1.54	J-	9.11	74.7	0.221	2.27	2280	7.25	2.62	12.4	7060
D-258-3D	6-8	replicate	7220	0.876	J-	4.64	70.7	0.236	0.561	1990	7.78	2.46	8.85	7070
D-258-3D	8-10	replicate	7590	0.573	J-	2.64	65.5	0.251	0.251	1880	6.51	2.64	9.05	7110
D-258-3D	8-12	replicate	7660	0.488	J-	2.5	60.2	0.262	0.271	1840	6.54	2.63	8.13	7310
D-401-1A	0-2	primary	8580	9.92	J-	24.8	60.3	0.317	3.66	2910	13.5	3.67	27.7	11100
D-401-1A	2-4	primary	9530	5.99	J-	20.4	78.5	0.343	5.23	2450	10	4.24	22.8	10600
D-401-1A	4-6	primary	9610	1.93	J-	9.86	105	0.32	5.11	1980	10.8	3.91	14.1	10600
D-401-1A	6-8	primary	9680	0.747	J-	4.97	116	0.32	4.23	1850	10.9	3.62	11.4	10700
D-401-1A	8-10	primary	9610	0.357	J-	3.31	89.2	0.32	0.475	1780	10.3	3.6	11	10600
D-401-1A	8-12	primary	9730	0.413	J-	3.74	81.8	0.323	0.362	1760	10.3	3.92	10.8	11000
D-401-2B	0-2	primary	9140	15.2	J-	20.9	102	0.34	8.84	5100	19.6	4.27	34.7	11500
D-401-2B	2-4	primary	12100	12	J-	38.3	137	0.452	12.9	4060	11.6	4.47	34.2	12300
D-401-2B	4-6	primary	14600	1.96	J-	8.44	138	0.461	2.51	2310	13.6	4.66	16.6	12700

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Soluble Phosphate (continued)													
D-401-2D	0-2	primary	1240	1970	362	8.64	833	1	1	84	0.576	23.5	651
D-401-2D	2-4	primary	222	2160	532	9.47	784	0.44	0.39	76	0.354	22.5	475
D-401-2D	4-6	primary	309	2250	411	8.81	759	0.41	0.43	83	0.218	22.6	455
D-401-2D	6-8	primary	99.1	2310	427	9.53	699	0.36	0.24	80	0.205	24.3	297
D-401-2D	8-10	primary	24.2	2310	331	8.96	649	0.26	0.16	87	0.127	25.1	188
D-401-2D	8-12	primary	14.8	2500	302	9.65	661	0.2	0.14	90	0.114	26.1	133
D-441-1B	0-2	primary	162	4010	807	18.8	2840	0.4	0.38	247	0.258	34	431
D-441-1B	2-4	primary	290	4460	766	20	2000	0.4	0.43	193	0.281	32.2	444
D-441-1B	4-6	primary	61.9	3960	600	16.8	1620	0.3	0.19	185	0.172	33	165
D-441-1B	6-8	primary	68.7	4210	590	19.1	1800	0.3	0.18	193	0.178	34.7	145
D-441-1B	8-10	primary	42.1	3930	588	17.3	1480	0.2	0.17	167	0.155	31.8	115
D-441-1B	8-12	primary	50.5	4280	585	19.3	1510	0.3	0.16	185	0.162	33.1	133
Soluble Phosphate and Biochar													
D-258-3D	0-2	primary	180	1790	241	5.98	592	0.19	0.25	53	0.161	13.3	207
D-258-3D	2-4	primary	193	2090	265	6.69	599	0.2	0.22	48	0.162	14.5	224
D-258-3D	4-6	primary	93.1	1630	269	5.45	512	0.18	0.14	42	0.116	11.1	177
D-258-3D	6-8	primary	14.2	1780	234	6.34	538	0.16	0.077	50	0.086	12.6	85.6
D-258-3D	8-10	primary	8.81	1740	206	5.9	485	0.13	0.073	46	0.066	12.9	42.6
D-258-3D	8-12	primary	15	1920	213	6.2	546	0.12	0.088	45	0.071	13.2	49.7
D-258-3D	0-2	replicate	204	1710	249	5.59	576	0.18	0.25	43	0.16	12.3	217
D-258-3D	2-4	replicate	197	1840	253	6.45	554	0.19	0.22	37	0.172	12.1	227
D-258-3D	4-6	replicate	83.7	1850	246	6.19	570	0.14	0.15	49	0.113	12.8	160
D-258-3D	6-8	replicate	16.7	1800	232	5.99	558	0.15	0.071	44	0.071	12.5	79.8
D-258-3D	8-10	replicate	7.72	1740	219	6.08	546	0.12	0.071	49	0.066	12	43.2
D-258-3D	8-12	replicate	10.9	1670	198	5.51	508	0.12	0.074	44	0.063	12.6	38.7
D-401-1A	0-2	primary	677	2450	178	8.61	839	0.43	0.64	65	0.415	22.8	238
D-401-1A	2-4	primary	266	2250	323	8.07	793	0.3	0.27	49	0.253	19.1	185
D-401-1A	4-6	primary	64.5	2200	348	8.57	720	0.21	0.12	52	0.118	19.7	196
D-401-1A	6-8	primary	23.2	2240	272	8.58	709	0.18	0.086	61	0.092	21.3	183
D-401-1A	8-10	primary	10.8	2130	238	8.75	674	0.15	0.097	59	0.081	20.3	145
D-401-1A	8-12	primary	16.9	2240	216	7.9	609	0.17	0.089	67	0.087	20.9	126
D-401-2B	0-2	primary	847	3210	367	9.68	885	0.6	0.81	79	0.459	26.2	518
D-401-2B	2-4	primary	563	2260	548	10.2	892	0.5	0.58	80	0.378	22.8	552
D-401-2B	4-6	primary	60.5	2650	402	11.6	747	0.25	0.19	121	0.128	24.5	277

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Aluminum	Antimony		Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
Soluble Phosphate and Biochar (continued)														
D-401-2B	6-8	primary	13400	2.56	J-	8.84	125	0.429	1.56	2310	12.3	4.35	15.9	12300
D-401-2B	8-10	primary	13500	1.78	J-	6.7	126	0.444	1.54	2080	11.6	4.99	17.4	12500
D-401-2B	8-12	primary	8930	20.9	J-	38.4	83.7	0.302	9.03	2500	8.53	3.39	37.6	9910
D-441-1D	0-2	primary	15300	6	J-	30.6	198	0.555	12.7	7940	23.4	6.03	54	14900
D-441-1D	2-4	primary	17200	3.6	J-	37.1	172	0.562	4.93	4610	19.6	10.4	36.4	18100
D-441-1D	4-6	primary	19000	1.92	J-	17.7	181	0.613	1.68	3990	20.9	6.93	26.3	16600
D-441-1D	6-8	primary	17900	1	J-	9.11	172	0.588	0.735	3710	19.4	6.54	21.6	15600
D-441-1D	8-10	primary	18000	0.715	J-	7.9	164	0.567	0.507	3750	19.3	6.85	20.6	16700
D-441-1D	8-12	primary	21800	0.723	J-	7.26	177	0.679	0.598	3790	22.1	8.39	23.1	18300

Table 4-16. TAL Metals Analytical Results for Depth-Discrete Samples (< 2 mm soil fraction) [a,b]

Sample ID	Depth	Sample Type [c]	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
Soluble Phosphate and Biochar (continued)													
D-401-2B	6-8	primary	40.3	2530	395	10.8	759	0.22	0.2	93	0.13	23.4	226
D-401-2B	8-10	primary	50.3	2570	374	9.71	821	0.2	0.18	86	0.142	26.8	171
D-401-2B	8-12	primary	916	1940	301	7.52	584	0.91	1.2	62	0.495	18.6	544
D-441-1D	0-2	primary	720	3760	530	16.1	2000	0.5	0.41	145	0.379	33.5	539
D-441-1D	2-4	primary	161	3680	568	20	1910	0.4	0.25	125	0.211	32	284
D-441-1D	4-6	primary	66.4	4000	556	18	1800	0.26	0.19	146	0.174	35.2	157
D-441-1D	6-8	primary	24.6	3770	485	16.7	1520	0.3	0.16	131	0.133	32.8	86.1
D-441-1D	8-10	primary	14.6	3900	460	16.1	1490	0.2	0.14	139	0.126	35.3	77.7
D-441-1D	8-12	primary	22.6	4270	484	19.3	1530	0.3	0.16	160	0.152	41.1	85.4

Notes:

[a] All results reported in units of mg/kg dry weight.
[b] All Samples analyzed using method EPA6010C and EPA6020A
c All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples.
Samples collected in May 2023
TAL - target analyte list

Data Qualifiers
J = Quantitation is approximate due to limitations identified during the QA review.
J+ = Quantitation is approximate, but the result may be biased high.
J- = Quantitation is approximate, but the result may be biased low.

Table 4-17. Mehlich III Extract Analytical Results for Depth-Discrete Samples

Sample ID	Sample Depth (in.)	Sample Type [a]	Lead (mg/kg)		Phosphorus (mg/kg)
Control					
D-258-3B	0-2	primary	81.4		185
	2-4	primary	98.8		152
	4-6	primary	52.5		125
	6-8	primary	29.6		102
	8-10	primary	61.7		128
	10-12	primary	48.8		127
D-401-1D	0-2	primary	323		220
	2-4	primary	74.5		182
	4-6	primary	17.5		82.8
	6-8	primary	53.6		74.4
	8-10	primary	18		63.1
	10-12	primary	14.9		56.4
D-401-2C	0-2	primary	20.9		87.5
	2-4	primary	168		138
	4-6	primary	16.5		59.5
	6-8	primary	4.73		37.9
	8-10	primary	2.46	J	38.9
	10-12	primary	4.44		39.3
D-441-1C	0-2	primary	150		162
	2-4	primary	112		153
	4-6	primary	46.8		115
	6-8	primary	2.95		102
	8-10	primary	3.81		77.8
	10-12	primary	3.4		69.3
Compost					
D-258-3A	0-2	primary	53.5		115
	2-4	primary	69.1		86
	4-6	primary	35.2		69.2
	6-8	primary	3.06		51.5
	8-10	primary	2.45	J	45.6
	10-12	primary	2.22	J	40.2
D-401-1C	0-2	primary	293		126
		replicate	200		176
	2-4	primary	133		179
		replicate	161		225
	4-6	primary	33.4	J	120
		replicate	12.8	J	102
	6-8	primary	21.4	J	92.3
		replicate	9.12	J	85.5
	8-10	primary	14.6		79.3
		replicate	11.7		76.5
	10-12	primary	11.3	J	67.3
		replicate	5.05	J	61.5
D-401-2A	0-2	primary	429		122
	2-4	primary	299		209
	4-6	primary	55.2		118
	6-8	primary	37.3		76.5
	8-10	primary	19.6		55.3
	10-12	primary	29.5		68.8

Table 4-17. Mehlich III Extract Analytical Results for Depth-Discrete Samples

Sample ID	Sample Depth	Sample Type [a]	Lead (mg/kg)		Phosphorus (mg/kg)	
Compost (continued)						
D-441-1A	0-2	primary	205		226	
	2-4	primary	156		219	
	4-6	primary	84.6		238	
	6-8	primary	18.2		232	
	8-10	primary	30.7		223	
	10-12	primary	14.8		185	
Soluble Phosphate						
D-258-3C	0-2	primary	123		315	
	2-4	primary	146		284	
	4-6	primary	146		355	
	6-8	primary	18.3		315	
	8-10	primary	28.5		252	
	10-12	primary	3.9		157	
D-401-1B	0-2	primary	172		653	
	2-4	primary	128		599	
	4-6	primary	3.54		244	
	6-8	primary	4.69		385	
	8-10	primary	3.65		160	
	10-12	primary	3.86		64.1	
D-401-2D	0-2	primary	384		782	
	2-4	primary	63.4		597	
	4-6	primary	86		453	
	6-8	primary	32.4		242	
	8-10	primary	5.62		66	
	10-12	primary	3.62		102	
D-441-1B	0-2	primary	35.4		1360	
	2-4	primary	80.7		1350	
	4-6	primary	20.2		482	
	6-8	primary	15.4		258	
	8-10	primary	16.3		225	
	10-12	primary	14.6		167	
Soluble Phosphate and Biochar						
D-258-3D	0-2	primary	92.1		568	
		replicate	101		565	
	2-4	primary	94		361	
		replicate	93.4		422	
	4-6	primary	41.6		228	J
		replicate	42		482	J
	6-8	primary	5.93		189	J
		replicate	7.11		367	J
	8-10	primary	3.29		319	
		replicate	2.45	J	297	
	10-12	primary	6.53		370	
		replicate	4.2		324	
D-401-1A	0-2	primary	304		1050	
	2-4	primary	111		1180	
	4-6	primary	19.5		693	
	6-8	primary	8.41		427	
	8-10	primary	4.29		242	
	10-12	primary	7.06		263	

Table 4-17. Mehlich III Extract Analytical Results for Depth-Discrete Samples

Sample ID	Sample Depth	Sample Type [a]	Lead (mg/kg)	Phosphorus (mg/kg)
Soluble Phosphate and Biochar (continued)				
D-401-2B	0-2	primary	270	843
	2-4	primary	158	779
	4-6	primary	15.6	175
	6-8	primary	13.3	134
	8-10	primary	17.8	154
	10-12	primary	252	133
D-441-1D	0-2	primary	222	1220
	2-4	primary	49.4	813
	4-6	primary	19.9	541
	6-8	primary	8.11	352
	8-10	primary	3.11	175
	10-12	primary	5.98	163

Notes:

[a] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples. Samples labeled as "duplicate" and "triplicate" indicate the second and third samples collected along with the primary sample in a set of three samples.

ns - not sampled

Table 4-18. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Depth-Discrete Samples

Sample ID	Depth (in.)	Rep [a]	Sample Type [b]	Conductivity (uS/cm)	pH	Soil Moisture (%)
Control						
D-258-3B	0-2	1	primary	2.50	5.78	7.7
		2	primary	2.20	5.69	ns
		3	primary	2.40	5.75	ns
	2-4	1	primary	3.60	5.52	10.6
		2	primary	3.60	5.51	ns
		3	primary	3.50	5.65	ns
	4-6	1	primary	4.60	5.63	9.7
		2	primary	4.50	5.47	ns
		3	primary	4.50	5.73	ns
	6-8	1	primary	4.10	5.72	8.9
		2	primary	3.90	5.87	ns
		3	primary	4.30	5.82	ns
	8-10	1	primary	1.50	5.50	7.1
		2	primary	2.00	5.45	ns
		3	primary	1.70	5.45	ns
	10-12	1	primary	3.80	5.82	7.2
		2	primary	3.60	5.75	ns
		3	primary	2.90	5.68	ns
D-401-1D	0-2	1	primary	8.70	5.72	21.1
		2	primary	7.50	5.76	ns
		3	primary	8.40	5.71	ns
	2-4	1	primary	1.00	5.81	17.2
		2	primary	1.10	5.79	ns
		3	primary	1.80	5.77	ns
	4-6	1	primary	2.90	5.76	15.6
		2	primary	3.00	5.81	ns
		3	primary	2.70	5.87	ns
	6-8	1	primary	2.00	5.92	16.6
		2	primary	2.30	6.01	ns
		3	primary	2.50	5.98	ns
	8-10	1	primary	1.80	5.89	14.3
		2	primary	1.80	5.91	ns
		3	primary	1.70	5.88	ns
	10-12	1	primary	3.30	5.94	13.9
		2	primary	3.50	5.84	ns
		3	primary	3.70	6.02	ns
D-401-2C	0-2	1	primary	3.90	5.22	14.2
		2	primary	3.70	5.12	ns
		3	primary	3.80	5.09	ns
	2-4	1	primary	2.20	5.21	18.1
		2	primary	2.50	5.33	ns
		3	primary	2.30	5.45	ns
	4-6	1	primary	1.20	5.32	16.2
		2	primary	1.20	5.43	ns
		3	primary	1.20	5.55	ns
	6-8	1	primary	2.10	5.68	15.1
		2	primary	2.70	5.55	ns
		3	primary	2.10	5.78	ns
	8-10	1	primary	2.00	5.78	15.1
		2	primary	2.10	5.89	ns
		3	primary	2.10	5.76	ns
	10-12	1	primary	1.50	6.03	15.1
		2	primary	1.40	6.09	ns
		3	primary	1.30	5.89	ns

Table 4-18. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Depth-Discrete Samples

Sample ID	Depth (in.)	Rep [a]	Sample Type [b]	Conductivity (uS/cm)	pH	Soil Moisture (%)
Control (continued)						
D-441-1C	0-2	1	primary	6.20	6.70	29.8
		2	primary	6.30	6.68	ns
		3	primary	6.50	6.54	ns
	2-4	1	primary	6.30	6.64	25.3
		2	primary	6.50	6.65	ns
		3	primary	6.80	6.55	ns
	4-6	1	primary	14.1	6.73	24.5
		2	primary	13.8	6.87	ns
		3	primary	14.0	6.70	ns
	6-8	1	primary	9.10	6.55	21.8
		2	primary	11.3	6.63	ns
		3	primary	11.6	6.49	ns
	8-10	1	primary	8.70	6.48	20.8
		2	primary	8.50	6.55	ns
		3	primary	8.80	6.38	ns
	10-12	1	primary	9.20	6.75	19.9
		2	primary	8.70	6.81	ns
		3	primary	9.00	6.40	ns
Compost						
D-258-3A	0-2	1	primary	4.40	6.01	9.9
		2	primary	4.50	6.11	ns
		3	primary	4.50	5.98	ns
	2-4	1	primary	3.30	6.22	12.9
		2	primary	3.50	6.20	ns
		3	primary	2.70	6.27	ns
	4-6	1	primary	4.20	6.19	12.1
		2	primary	4.00	6.22	ns
		3	primary	5.50	6.25	ns
	6-8	1	primary	3.80	6.27	12.3
		2	primary	4.20	6.31	ns
		3	primary	4.20	6.33	ns
	8-10	1	primary	3.40	6.30	11.60
		2	primary	37.0	6.40	ns
		3	primary	2.60	6.41	ns
	10-12	1	primary	2.00	6.37	11.1
		2	primary	2.10	6.29	ns
		3	primary	2.00	6.41	ns
D-401-1C	0-2	1	primary	2.60	5.37	20.3
		2	primary	2.60	5.45	ns
		3	primary	2.40	5.29	ns
		1	replicate	1.90	5.77	16.2
		2	replicate	1.80	5.67	ns
		3	replicate	1.50	5.72	ns
	2-4	1	primary	2.90	5.39	12.3
		2	primary	2.80	5.28	ns
		3	primary	2.60	5.35	ns
		1	replicate	1.30	5.78	12.4
		2	replicate	1.20	5.83	ns
		3	replicate	1.20	5.68	ns
	4-6	1	primary	1.60	5.55	11.6
		2	primary	1.50	5.38	ns
		3	primary	1.50	5.40	ns
		1	replicate	1.80	5.82	11.4
		2	replicate	1.60	5.91	ns
		3	replicate	1.80	5.84	ns

Table 4-18. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Depth-Discrete Samples

Sample ID	Depth (in.)	Rep [a]	Sample Type [b]	Conductivity (uS/cm)	pH	Soil Moisture (%)
Compost (continued)						
D-401-1C (continued)	6-8	1	primary	1.70	5.61	10.7
		2	primary	1.70	5.78	ns
		3	primary	1.60	5.85	ns
		1	replicate	2.20	5.67	10.6
		2	replicate	2.00	5.69	ns
		3	replicate	2.20	5.67	ns
	8-10	1	primary	1.90	5.65	10.1
		2	primary	1.50	5.49	ns
		3	primary	1.70	5.66	ns
		1	replicate	2.80	5.66	10.3
		2	replicate	2.60	5.57	ns
		3	replicate	2.40	5.72	ns
	10-12	1	primary	1.50	5.72	9.8
		2	primary	1.40	5.72	ns
		3	primary	1.50	5.62	ns
		1	replicate	1.80	5.74	10.3
		2	replicate	1.70	5.71	ns
		3	replicate	1.70	5.71	ns
D-401-2A	0-2	1	primary	6.90	5.12	30.1
		2	primary	7.20	5.27	ns
		3	primary	6.50	5.33	ns
	2-4	1	primary	1.10	5.67	19.2
		2	primary	1.30	5.33	ns
		3	primary	1.70	5.42	ns
	4-6	1	primary	2.30	5.47	15.6
		2	primary	3.90	5.31	ns
		3	primary	2.90	5.48	ns
	6-8	1	primary	3.60	5.72	14
		2	primary	2.90	5.66	ns
		3	primary	4.20	5.67	ns
	8-10	1	primary	1.80	5.68	11.8
		2	primary	2.20	5.71	ns
		3	primary	1.90	5.72	ns
	10-12	1	primary	2.90	5.70	12.6
		2	primary	2.70	5.88	ns
		3	primary	3.70	6	ns
D-441-1A	0-2	1	primary	10.5	6.65	24.3
		2	primary	9.80	6.75	ns
		3	primary	10.2	6.57	ns
	2-4	1	primary	5.80	6.55	21.3
		2	primary	6.60	6.59	ns
		3	primary	7.10	6.75	ns
	4-6	1	primary	7.20	6.50	22.3
		2	primary	7.50	6.52	ns
		3	primary	8.10	6.38	ns
	6-8	1	primary	5.10	6.43	22.7
		2	primary	5.50	6.26	ns
		3	primary	4.60	6.55	ns
	8-10	1	primary	7.80	6.3	20.6
		2	primary	6.50	6.35	ns
		3	primary	7.10	6.46	ns
	10-12	1	primary	7.20	6.2	19.4
		2	primary	7.50	6.19	ns
		3	primary	8.10	6.4	ns

Table 4-18. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Depth-Discrete Samples

Sample ID	Depth (in.)	Rep [a]	Sample Type [b]	Conductivity (uS/cm)	pH	Soil Moisture (%)
Soluble Phosphate						
D-258-3C	0-2	1	primary	4.40	5.76	21.4
		2	primary	4.20	5.74	ns
		3	primary	4.40	5.81	ns
	2-4	1	primary	4.90	5.81	15.1
		2	primary	5.00	5.75	ns
		3	primary	5.00	5.42	ns
	4-6	1	primary	2.10	5.77	13.7
		2	primary	2.20	5.70	ns
		3	primary	2.00	5.67	ns
	6-8	1	primary	6.00	5.92	11.2
		2	primary	5.90	5.88	ns
		3	primary	5.80	5.91	ns
	8-10	1	primary	3.40	6.02	10.9
		2	primary	3.70	6.11	ns
		3	primary	3.40	6.05	ns
	10-12	1	primary	3.30	6.17	10.4
		2	primary	3.30	6.12	ns
		3	primary	3.20	6.21	ns
D-401-1B	0-2	1	primary	9.60	5.44	20.5
		2	primary	8.20	5.47	ns
		3	primary	9.10	5.43	ns
	2-4	1	primary	3.20	5.67	16.6
		2	primary	2.90	5.72	ns
		3	primary	2.80	5.54	ns
	4-6	1	primary	4.80	5.59	11
		2	primary	5.00	5.61	ns
		3	primary	4.70	5.49	ns
	6-8	1	primary	4.60	5.71	8.5
		2	primary	4.30	5.73	ns
		3	primary	4.40	5.76	ns
	8-10	1	primary	2.80	5.71	10.1
		2	primary	2.70	5.72	ns
		3	primary	2.80	5.81	ns
	10-12	1	primary	4.10	5.68	11.6
		2	primary	3.90	5.58	ns
		3	primary	4.20	5.65	ns
D-401-2D	0-2	1	primary	8.40	5.38	25.7
		2	primary	7.30	5.49	ns
		3	primary	7.70	5.33	ns
	2-4	1	primary	3.20	5.40	20.2
		2	primary	3.40	5.46	ns
		3	primary	3.10	5.45	ns
	4-6	1	primary	14.6	5.39	19.8
		2	primary	14.5	5.45	ns
		3	primary	13.5	5.65	ns
	6-8	1	primary	7.20	5.65	18.2
		2	primary	7.20	5.78	ns
		3	primary	7.30	5.41	ns
	8-10	1	primary	10.6	5.58	16.5
		2	primary	10.7	5.67	ns
		3	primary	10.3	5.69	ns
	10-12	1	primary	3.80	5.82	16.2
		2	primary	3.20	5.90	ns
		3	primary	3.50	5.63	ns

Table 4-18. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Depth-Discrete Samples

Sample ID	Depth (in.)	Rep [a]	Sample Type [b]	Conductivity (uS/cm)	pH	Soil Moisture (%)
Soluble Phosphate (continued)						
D-441-1B	0-2	1	primary	33.2	5.89	29.3
		2	primary	33.1	5.88	ns
		3	primary	34.3	5.90	ns
	2-4	1	primary	31.9	5.79	26
		2	primary	32.0	5.81	ns
		3	primary	32.2	5.88	ns
	4-6	1	primary	26.3	6.01	24.2
		2	primary	26.5	5.98	ns
		3	primary	26.5	5.99	ns
	6-8	1	primary	20.1	6.15	21.5
		2	primary	20.7	6.02	ns
		3	primary	20.4	6.09	ns
	8-10	1	primary	13.1	6.19	23.8
		2	primary	15.5	6.05	ns
		3	primary	13.6	6.18	ns
	10-12	1	primary	18.3	6.13	23.8
		2	primary	19.3	6.19	ns
		3	primary	19.9	6.24	ns
Soluble Phosphate and Biochar						
D-258-3D	0-2	1	primary	2.10	5.80	8.4
		2	primary	2.20	5.78	ns
		3	primary	2.30	5.55	ns
		1	replicate	2.20	5.87	6.2
		2	replicate	2.30	5.67	ns
		3	replicate	2.20	5.79	ns
	2-4	1	primary	2.00	5.91	8.8
		2	primary	2.30	5.82	ns
		3	primary	2.20	5.95	ns
		1	replicate	2.10	5.88	8.7
		2	replicate	2.00	5.89	ns
		3	replicate	2.10	5.69	ns
	4-6	1	primary	2.40	5.67	9.6
		2	primary	2.60	5.83	ns
		3	primary	2.40	5.73	ns
		1	replicate	2.50	5.75	9.6
		2	replicate	2.50	5.74	ns
		3	replicate	2.40	6.01	ns
	6-8	1	primary	1.50	5.99	8.5
		2	primary	1.50	5.92	ns
		3	primary	1.50	6.00	ns
		1	replicate	1.90	5.91	9.4
		2	replicate	1.50	5.89	ns
		3	replicate	1.70	5.87	ns
	8-10	1	primary	2.20	6.09	8.5
		2	primary	2.00	5.96	ns
		3	primary	2.20	6.12	ns
		1	replicate	2.40	5.99	9.1
		2	replicate	2.50	6.05	ns
		3	replicate	2.20	6.03	ns
	10-12	1	primary	3.60	6.12	8.4
		2	primary	3.20	6.03	ns
		3	primary	3.10	6.21	ns
		1	replicate	4.20	6.03	8.7
		2	replicate	4.00	6.09	ns
		3	replicate	3.90	6.11	ns

Table 4-18. Soil Electrical Conductivity, pH, and Moisture Analytical Results for Depth-Discrete Samples

Sample ID	Depth (in.)	Rep [a]	Sample Type [b]	Conductivity (uS/cm)	pH	Soil Moisture (%)
Soluble Phosphate and Biochar (continued)						
D-401-1A	0-2	1	primary	3.10	5.33	14.1
		2	primary	3.50	5.41	ns
		3	primary	3.40	5.39	ns
	2-4	1	primary	2.10	5.44	10.9
		2	primary	2.10	5.73	ns
		3	primary	2.10	5.52	ns
	4-6	1	primary	4.30	5.35	9.9
		2	primary	4.10	5.65	ns
		3	primary	4.20	5.57	ns
	6-8	1	primary	2.20	5.54	9.5
		2	primary	2.10	5.49	ns
		3	primary	2.10	5.45	ns
	8-10	1	primary	2.90	5.62	9
		2	primary	2.50	5.78	ns
		3	primary	2.50	5.71	ns
	10-12	1	primary	2.20	5.66	9.1
		2	primary	2.10	5.92	ns
		3	primary	2.30	5.72	ns
D-401-2B	0-2	1	primary	11.5	5.47	24.8
		2	primary	10.9	5.27	ns
		3	primary	9.20	5.31	ns
	2-4	1	primary	9.20	5.45	20.1
		2	primary	9.70	5.39	ns
		3	primary	10.7	5.45	ns
	4-6	1	primary	2.60	5.55	14.7
		2	primary	3.80	5.44	ns
		3	primary	1.90	5.52	ns
	6-8	1	primary	8.80	5.69	15.2
		2	primary	8.60	5.57	ns
		3	primary	8.90	5.67	ns
	8-10	1	primary	4.30	5.49	15.5
		2	primary	4.90	5.52	ns
		3	primary	4.50	5.45	ns
	10-12	1	primary	7.70	5.74	21.1
		2	primary	7.70	5.67	ns
		3	primary	7.50	5.78	ns
D-441-1D	0-2	1	primary	47.1	5.96	28.5
		2	primary	46.6	6.10	ns
		3	primary	47.2	6.07	ns
	2-4	1	primary	54.1	5.88	23.8
		2	primary	54.3	5.78	ns
		3	primary	55.2	5.98	ns
	4-6	1	primary	26.5	5.97	23.4
		2	primary	26.5	5.89	ns
		3	primary	27.1	5.99	ns
	6-8	1	primary	49.3	5.99	21.5
		2	primary	49.2	6.19	ns
		3	primary	50.2	6.18	ns
	8-10	1	primary	31.6	6.07	20.4
		2	primary	31.5	6.10	ns
		3	primary	31.3	6.20	ns
	10-12	1	primary	31.4	6.25	23
		2	primary	31.5	6.33	ns
		3	primary	31.5	6.45	ns

Notes:

[a] For each sample ID, regardless of sample type (i.e. primary, replicate) three replicates (see 'Rep' column) were produced for conductivity and pH. For select sample IDs (i.e. DD-401-1D, DD-441-1C, etc.), replicates of the three original replicates (see 'Rep' column) were collected and analyzed.

[b] All "primary" samples are the original samples. Samples labeled as "replicate" were the field replicates collected along with the primary sample as a set of two samples.

ns - not sampled

Table 5-1. Statistical Results of Linear Mixed Models for Arsenic and Lead for Incremental Composite Samples

Fixed Effects	Estimate	SE	df	t value	*P*	Random Effect	Variance
IVBA Arsenic (%, extracted at pH 1.5), n = 96							
(Intercept)	23.9	2.93	6	8.17	0.00	plot	23.9
Compost	-0.194	2.25	85	-0.09	0.93	Residual	16.7
Phosphate and Biochar	**8.91**	**2.25**	**85**	**3.95**	**0.00**		
Phosphate	**9.07**	**2.25**	**85**	**4.02**	**0.00**		
Days since application	**0.0161**	**0.00419**	**85**	**3.85**	**0.00**		
Compost:Days since application	-0.00578	0.00585	85	-0.99	0.33		
Phosphate and Biochar:Days since application	-0.0109	0.00584	85	-1.87	0.07		
Phosphate:Days since application	-0.00966	0.00585	85	-1.66	0.10		
IVBA Arsenic (%, extracted at pH 2.5), n = 96							
(Intercept)	11.0	1.55	5	7.10	0.00	plot	7.3
Compost	0.304	1.07	85	0.28	0.78	Residual	3.79
Phosphate and Biochar	**6.43**	**1.07**	**85**	**5.99**	**0.00**		
Phosphate	**4.88**	**1.07**	**85**	**4.55**	**0.00**		
Days since application	-0.00163	0.00199	85	-0.82	0.42		
Compost:Days since application	-0.00150	0.00278	85	-0.54	0.59		
Phosphate and Biochar:Days since application	**-0.00593**	**0.00278**	**85**	**-2.13**	**0.04**		
Phosphate:Days since application	-0.00290	0.00278	85	-1.04	0.30		
SPLP Arsenic, n = 96							
(Intercept)	0.0283	0.0142	5	1.99	0.11	plot	0.000643
Compost	-0.00153	0.00898	85	-0.17	0.86	Residual	0.000265
Phosphate and Biochar	**0.0529**	**0.00898**	**85**	**5.89**	**0.00**		
Phosphate	**0.0744**	**0.00898**	**85**	**8.29**	**0.00**		
Days since application	0.000000984	0.0000167	85	0.06	0.95		
Compost:Days since application	0.00000206	0.0000233	85	0.09	0.93		
Phosphate and Biochar:Days since application	**-0.0000648**	**0.0000233**	**85**	**-2.78**	**0.01**		
Phosphate:Days since application	**-0.000101**	**0.0000233**	**85**	**-4.34**	**0.00**		
Mehlich III Extractable Lead, n = 96							
(Intercept)	216	39.5	5	5.48	0.00	plot	4711
Compost	-31.2	27.2	85	-1.15	0.25	Residual	2433
Phosphate and Biochar	-39.4	27.2	85	-1.45	0.15		
Phosphate	-37.8	27.2	85	-1.39	0.17		
Days since application	-0.0801	0.0506	85	-1.58	0.12		
Compost:Days since application	0.0287	0.0706	85	0.41	0.68		
Phosphate and Biochar:Days since application	0.0983	0.0705	85	1.40	0.17		
Phosphate:Days since application	0.112	0.0705	85	1.60	0.11		
IVBA Lead (%, extracted at pH 1.5), n = 96							
(Intercept)	69.8	2.20	23	31.70	0.00	plot	5.54
Compost	-0.670	2.61	85	-0.26	0.80	Residual	22.4
Phosphate and Biochar	3.43	2.61	85	1.31	0.19		
Phosphate	-0.0713	2.61	85	-0.03	0.98		
Days since application	-0.00107	0.00484	86	-0.27	0.83		
Compost:Days since application	0.00650	0.00676	85	0.95	0.34		
Phosphate and Biochar:Days since application	-0.00416	0.00676	85	-0.61	0.54		
Phosphate:Days since application	0.00777	0.00676	85	1.15	0.25		

Table 5-1. Statistical Results of Linear Mixed Models for Arsenic and Lead for Incremental Composite Samples

Fixed Effects	Estimate	SE	df	t value	*P*	Random Effect	Variance
IVBA Lead (%, extracted at pH 2.5), n = 96							
(Intercept)	34.3	2.56	13	13.40	0.00	plot	11.4
Compost	0.156	2.68	85	0.06	0.95	Residual	23.7
Phosphate and Biochar	2.23	2.68	85	0.83	0.41		
Phosphate	-1.59	2.68	85	-0.59	0.56		
Days since application	-0.00253	0.00499	85	-0.51	0.61		
Compost:Days since application	-0.00238	0.00697	85	-0.34	0.73		
Phosphate and Biochar:Days since application	-0.00599	0.00696	85	-0.86	0.39		
Phosphate:Days since application	-0.000161	0.00696	85	-0.02	0.98		
SPLP Lead, n = 96							
(Intercept)	0.0719	0.0216	6	3.33	0.02	plot	0.00133
Compost	0.00570	0.0161	85	0.35	0.72	Residual	0.000857
Phosphate and Biochar	0.0202	0.0161	85	1.25	0.21		
Phosphate	0.0221	0.0161	85	1.37	0.17		
Days since application	0.00000137	0.0000300	85	0.05	0.96		
Compost:Days since application	-0.0000163	0.0000419	85	-0.39	0.70		
Phosphate and Biochar:Days since application	0.0000122	0.0000419	85	0.29	0.77		
Phosphate:Days since application	-0.00000259	0.0000419	85	-0.06	0.95		

Notes:

SE = standard error, df = degrees of freedom, IVBA = *in vitro* bioaccessible, SPLP = synthetic precipitation leaching procedure

Bioaccessibility (%) was obtained for each sample by dividing the reported bioaccessible value (mg/kg) by the total lead or arsenic value (mg/kg). Total lead and arsenic values are shown in Table 3-6.

Rows in bold indicate results that are statistically significant ($p < 0.05$)

Table 5-2. Statistical Results for Other Analytes in Incremental Composite Samples

Analyte	Contrast	Estimate	SE	df	Upper 95% CI Limit	Lower 95% CI Limit
SPLP Aluminum	Control - Compost	0.123	0.257	89	0.797	-0.551
	Control - Phosphate	-0.281	0.257	89	0.393	-0.955
	Control - Phosphate and Biochar	-0.172	0.257	89	0.503	-0.846
SPLP Antimony	Control - Compost	0.0000513	0.00131	89	0.00347	-0.00337
	Control - Phosphate	-0.00291	0.00131	89	0.000504	-0.00633
	Control - Phosphate and Biochar	-0.00334	0.00131	89	0.0000835	-0.00676
SPLP Barium	Control - Compost	0.0018	0.0059	89	0.0172	-0.0136
	Control - Phosphate	0.0105	0.0059	89	0.0259	-0.00498
	Control - Phosphate and Biochar	0.00784	0.0059	89	0.0233	-0.0076
SPLP Beryllium	Control - Compost	9.58E-06	0.0000054	89	0.0000237	-0.00000455
	Control - Phosphate	0.0000233	0.0000054	89	0.0000375	0.0000092
	Control - Phosphate and Biochar	0.0000221	0.0000054	89	0.0000362	0.00000795
SPLP Cadmium	Control - Compost	-6.12E-05	0.000251	89	0.000596	-0.000718
	Control - Phosphate	**0.00145**	**0.000251**	**89**	**0.00211**	**0.000796**
	Control - Phosphate and Biochar	**0.000953**	**0.000251**	**89**	**0.00161**	**0.000295**
SPLP Calcium	Control - Compost	0.358	0.976	89	2.91	-2.20
	Control - Phosphate	**6.90**	**0.976**	**89**	**9.46**	**4.34**
	Control - Phosphate and Biochar	**5.69**	**0.976**	**89**	**8.25**	**3.14**
SPLP Chromium	Control - Compost	0.00165	0.00112	89	0.00457	-0.00128
	Control - Phosphate	0.00142	0.00112	89	0.00434	-0.0015
	Control - Phosphate and Biochar	0.00156	0.00112	89	0.00448	-0.00136
SPLP Cobalt	Control - Compost	0.0000125	0.0000602	89	0.00017	-0.000145
	Control - Phosphate	-4.71E-05	0.0000602	89	0.000111	-0.000205
	Control - Phosphate and Biochar	-6.13E-05	0.0000602	89	0.0000965	-0.000219
SPLP Copper	Control - Compost	0.000367	0.000461	89	0.00157	-0.00084
	Control - Phosphate	0.000233	0.000461	89	0.00144	-0.000973
	Control - Phosphate and Biochar	-0.000133	0.000461	89	0.00107	-0.00134
SPLP Iron	Control - Compost	-0.0308	0.131	89	0.313	-0.374
	Control - Phosphate	-0.341	0.131	89	0.0026	-0.684
	Control - Phosphate and Biochar	-0.254	0.131	89	0.0896	-0.597
SPLP Magnesium	Control - Compost	0.0993	0.134	89	0.451	-0.253
	Control - Phosphate	**0.868**	**0.134**	**89**	**1.22**	**0.516**
	Control - Phosphate and Biochar	**0.742**	**0.134**	**89**	**1.09**	**0.39**
SPLP Manganese	Control - Compost	0.00666	0.0259	89	0.0746	-0.0612
	Control - Phosphate	**0.101**	**0.0259**	**89**	**0.169**	**0.0333**
	Control - Phosphate and Biochar	**0.0733**	**0.0259**	**89**	**0.141**	**0.00544**
SPLP Nickel	Control - Compost	-0.000246	0.000318	89	0.000585	-0.00108
	Control - Phosphate	0.000183	0.000318	89	0.00101	-0.000648
	Control - Phosphate and Biochar	-0.000142	0.000318	89	0.00069	-0.000973
SPLP Potassium	Control - Compost	1.10	1.16	89	4.15	-1.95
	Control - Phosphate	**7.82**	**1.16**	**89**	**10.9**	**4.77**
	Control - Phosphate and Biochar	**7.10**	**1.16**	**89**	**10.2**	**4.05**
SPLP Silver	Control - Compost	-3.33E-05	0.0000253	89	0.0000328	-0.0000995
	Control - Phosphate	-3.62E-05	0.0000253	89	0.0000299	-0.000102
	Control - Phosphate and Biochar	-6.17E-05	0.0000253	89	0.00000449	-0.000128
SPLP Sodium	Control - Compost	0.270	0.223	89	0.855	-0.315
	Control - Phosphate	**0.827**	**0.223**	**89**	**1.41**	**0.242**
	Control - Phosphate and Biochar	**0.771**	**0.223**	**89**	**1.36**	**0.186**

Table 5-2. Statistical Results for Other Analytes in Incremental Composite Samples

Analyte	Contrast	Estimate	SE	df	Upper 95% CI Limit	Lower 95% CI Limit
SPLP Thallium	Control - Compost	0.000015	0.0000221	89	0.0000728	-0.0000428
	Control - Phosphate	**0.000133**	**0.0000221**	**89**	**0.000191**	**0.0000751**
	Control - Phosphate and Biochar	**0.0000767**	**0.0000221**	**89**	**0.000134**	**0.0000189**
SPLP Vanadium	Control - Compost	0.000129	0.000293	89	0.000896	-0.000638
	Control - Phosphate	**0.00186**	**0.000293**	**89**	**0.00263**	**0.0011**
	Control - Phosphate and Biochar	**0.00218**	**0.000293**	**89**	**0.00295**	**0.00141**
SPLP Zinc	Control - Compost	-0.0137	0.0186	89	0.0351	-0.0624
	Control - Phosphate	**0.0808**	**0.0186**	**89**	**0.130**	**0.032**
	Control - Phosphate and Biochar	0.0479	0.0186	89	0.0966	-0.000888
Mehlich III Extractable Phosphorus	Control - Compost	-59.2	88.7	89	173	-291
	Control - Phosphate	**904**	**88.7**	**89**	**1140**	**671**
	Control - Phosphate and Biochar	**943**	**88.7**	**89**	**1170**	**711**
Oxalate Extractable Aluminum	Control - Compost	-17.3	437	89	1130	-1160
	Control - Phosphate	413	437	89	1560	-732
	Control - Phosphate and Biochar	-25.7	437	89	1120	-1170
Oxalate Extractable Iron	Control - Compost	196	237	89	816	-424
	Control - Phosphate	218	237	89	839	-402
	Control - Phosphate and Biochar	-41.1	237	89	579	-661
Total Organic Carbon	Control - Compost	0.164	0.415	89	1.25	-0.923
	Control - Phosphate	**1.73**	**0.415**	**89**	**2.81**	**0.64**
	Control - Phosphate and Biochar	-0.131	0.415	89	0.956	-1.22
Total Carbon	Control - Compost	0.488	0.504	89	1.81	-0.832
	Control - Phosphate	**1.94**	**0.504**	**89**	**3.26**	**0.616**
	Control - Phosphate and Biochar	0.304	0.504	89	1.62	-1.02
Mineralizable Nitrogen	Control - Compost	9.30	4.89	89	22.1	-3.50
	Control - Phosphate	**26.8**	**4.89**	**89**	**39.6**	**14.0**
	Control - Phosphate and Biochar	7.89	4.89	89	20.7	-4.91
Total Nitrogen	Control - Compost	0.0217	0.0216	89	0.0782	-0.0348
	Control - Phosphate	**0.0992**	**0.0216**	**89**	**0.156**	**0.0427**
	Control - Phosphate and Biochar	0.005	0.0216	89	0.0615	-0.0515
Moisture	Control - Compost	0.400	2.28	89	6.36	-5.56
	Control - Phosphate	2.71	2.28	89	8.67	-3.24
	Control - Phosphate and Biochar	1.49	2.28	89	7.44	-4.47
pH	Control - Compost	-0.00319	0.119	89	0.307	-0.314
	Control - Phosphate	-0.303	0.119	89	0.00771	-0.613
	Control - Phosphate and Biochar	**-0.409**	**0.119**	**89**	**-0.0987**	**-0.719**
Conductivity	Control - Compost	0.204	3.22	88	8.63	-8.22
	Control - Phosphate	7.25	3.22	88	15.7	-1.18
	Control - Phosphate and Biochar	6.17	3.25	88	14.7	-2.35

Notes:

SE = standard error, df = degrees of freedom, CI = confidence interval, SPLP = synthetic precipitation leaching procedure

n = 96 for all analytes (24 per treatment)

Rows in bold indicate that the amendment compared to control in the 'Contrast' column has statistically different levels of the analyte (95% confidence intervals do not overlap zero, indicating a non-zero difference in means). Positive values in the 'Estimate' column indicate that the amendment subplots have higher levels of the analyte compared to control, and negative values in the 'Estimate' column indicate that the amendment subplots have lower levels of the analyte compared to control.

Table 5-3. Confidence Intervals (95%) for Triplicate Samples in Incremental Composite Samples

Monitoring Event	Plot ID	Treatment	Mean	Std. Dev.	Lower 95% CI Limit	Upper 95% CI Limit
IVBA Arsenic (%, extracted at pH 1.5)						
ME1	401-1A	Phosphate and Biochar	33.8	4.47	31.3	36.3
ME2	258-3D	Phosphate and Biochar	26.9	1.07	26.3	27.5
ME3	401-2B	Phosphate and Biochar	31.9	2.89	30.3	33.5
ME4	441-1D	Phosphate and Biochar	46.1	2.40	44.8	47.5
ME5	441-1B	Phosphate	36.3	3.38	34.5	38.2
ME6	401-1D	Control	30.1	2.31	28.8	31.3
IVBA Arsenic (%, extracted at pH 2.5)						
ME1	401-1A	Phosphate and Biochar	17.4	2.59	16.0	18.8
ME2	258-3D	Phosphate and Biochar	11.6	0.428	11.4	11.8
ME3	401-2B	Phosphate and Biochar	16.5	0.616	16.1	16.8
ME4	441-1D	Phosphate and Biochar	20.5	2.37	19.2	21.8
ME5	441-1B	Phosphate	16.2	1.37	15.5	17.0
ME6	401-1D	Control	9.58	0.607	9.25	9.91
IVBA Lead (%, extracted at pH 1.5)						
ME1	401-1A	Phosphate and Biochar	74.2	7.42	70.2	78.3
ME2	258-3D	Phosphate and Biochar	64.3	1.80	63.3	65.3
ME3	401-2B	Phosphate and Biochar	70.6	2.98	68.9	72.2
ME4	441-1D	Phosphate and Biochar	70.1	1.98	69.0	71.1
ME5	441-1B	Phosphate	74.2	4.50	71.8	76.7
ME6	401-1D	Control	68.3	2.06	67.2	69.5
IVBA Lead (%, extracted at pH 2.5)						
ME1	401-1A	Phosphate and Biochar	40.3	1.15	39.7	40.9
ME2	258-3D	Phosphate and Biochar	26.6	1.84	25.6	27.6
ME3	401-2B	Phosphate and Biochar	42.4	0.656	42.1	42.8
ME4	441-1D	Phosphate and Biochar	31.3	2.57	29.9	32.7
ME5	441-1B	Phosphate	25.0	0.373	24.8	25.2
ME6	401-1D	Control	36.1	2.30	34.8	37.4

Notes:

Std. Dev = standard deviation, CI = confidence interval, IVBA = *in vitro* bioaccessible

n = 3 for each monitoring event (3 triplicate samples)

Bioaccessibility (%) was obtained for each sample by dividing the reported bioaccessible value (mg/kg) by the total lead or arsenic value (mg/kg). Total lead and arsenic values are shown in Table 3-6.

Monitoring event (ME)1 samples collected in May 2021; ME2 samples collected in July 2021; ME3 samples collected in October 2021; ME4 samples collected in June 2022; ME5 samples collected in July 2022; ME6 samples collected in October 2022

Table 5-4. Statistical Results of Linear Mixed Models for Arsenic, Lead, and Phosphorus for Depth-Discrete Samples

Fixed Effects	Estimate	SE	df	t value	*P*	Random Effect	Variance
Total Arsenic$^{(-0.07)}$, n = 96							
(Intercept)	0.781	0.0203	10	38.50	<0.001	plot	0.00
Compost	0.00368	0.0219	86	0.17	0.87	Residual	0.00
Phosphate	-0.00849	0.0219	86	-0.39	0.70		
Phosphate and Biochar	0.00804	0.0219	86	0.37	0.71		
Sample depth	**0.0176**	**0.00398**	86	**4.43**	**0.00**		
Compost:Sample depth	0.000806	0.00562	86	0.14	0.89		
Phosphate:Sample depth	0.00342	0.00562	86	0.61	0.54		
Phosphate and Biochar:Sample depth	0.000547	0.00562	86	0.10	0.92		
Total Lead$^{(0.005)}$, n = 96							
(Intercept)	1.03	0.00227	81	455.00	<0.001	plot	0.00
Compost	0.00247	0.00319	86	0.77	0.44	Residual	0.00
Phosphate	0.000909	0.00319	86	0.29	0.78		
Phosphate and Biochar	0.000135	0.00319	86	0.04	0.97		
Sample depth	**-0.00265**	**0.000578**	86	**-4.58**	**0.00**		
Compost:Sample depth	-0.000599	0.000818	86	-0.73	0.47		
Phosphate:Sample depth	-0.000513	0.000818	86	-0.63	0.53		
Phosphate and Biochar:Sample depth	-0.000466	0.000818	86	-0.57	0.57		
Lead (Mehlich III)$^{(0.05)}$, n = 96							
(Intercept)	1.29	0.0274	88	47.30	<0.001	plot	0.00
Compost	0.0457	0.0387	88	1.18	0.24	Residual	0.00
Phosphate	0.0251	0.0387	88	0.65	0.52		
Phosphate and Biochar	0.0175	0.0387	88	0.45	0.65		
Sample depth	**-0.0323**	**0.00703**	88	**-4.59**	**0.00**		
Compost:Sample depth	-0.00778	0.00995	88	-0.78	0.44		
Phosphate:Sample depth	-0.00777	0.00995	88	-0.78	0.44		
Phosphate and Biochar:Sample depth	-0.00534	0.00995	88	-0.54	0.59		
Phosphorus (Mehlich III)$^{(0.001)}$, n = 96							
(Intercept)	1.01	0.000243	13	4130.00	<0.001	plot	0.00
Compost	-0.00000977	0.00028	86	-0.03	0.97	Residual	0.00
Phosphate	**0.00181**	**0.00028**	86	**6.49**	**0.00**		
Phosphate and Biochar	**0.00179**	**0.00028**	86	**6.39**	**0.00**		
Sample depth	**-0.000196**	**0.0000508**	86	**-3.86**	**0.00**		
Compost:Sample depth	0.0000415	0.0000718	86	0.58	0.56		
Phosphate:Sample depth	**-0.000184**	**0.0000718**	86	**-2.56**	**0.01**		
Phosphate and Biochar:Sample depth	-0.000122	0.0000718	86	-1.71	0.09		

Notes

SE = standard error, df = degrees of freedom, SPLP = synthetic precipitation leaching procedure

Rows in bold indicate results that are statistically significant ($p < 0.05$)

Estimates are reported on the scale of the transformed variable, and the transformation exponent is given in the parentheses in superscript after each target analyte.

Table 5-5. Statistical Results of Linear Mixed Models for Arsenic, Lead, and Phosphorus at a Sample Depth of 10-12 in

Fixed Effects	Estimate	SE	df	t value	*P*	Random Effect	Variance
Total Arsenic$^{(-0.5)}$, n = 16							
(Intercept)	0.417	0.0865	6	4.82	0.00	plot	0.01
Compost	0.0408	0.0981	10	0.42	0.69	Residual	0.02
Phosphate	0.0774	0.0981	10	0.79	0.45		
Phosphate and Biochar	0.000445	0.0981	10	0.00	1.00		
Total Lead$^{(-0.5)}$, n = 16							
(Intercept)	0.174	0.0465	12	3.74	0.00	plot	0.00
Compost	0.0254	0.0658	12	0.39	0.71	Residual	0.01
Phosphate	0.0671	0.0658	12	1.02	0.33		
Phosphate and Biochar	0.0124	0.0658	12	0.19	0.85		
Lead (Mehlich III)$^{(-0.5)}$, n = 16							
(Intercept)	0.355	0.0884	12	4.01	0.00	plot	0.00
Compost	-0.00174	0.125	12	-0.01	0.99	Residual	0.03
Phosphate	0.0958	0.125	12	0.77	0.46		
Phosphate and Biochar	-0.0449	0.125	12	-0.36	0.73		
Phosphorus (Mehlich III)$^{(0.02)}$, n = 16							
(Intercept)	1.09	0.00588	8	185.00	0.00	plot	0.00
Compost	0.00313	0.00734	10	0.43	0.68	Residual	0.00
Phosphate	0.0119	0.00734	10	1.63	0.13		
Phosphate and Biochar	**0.0258**	**0.00734**	10	**3.52**	**0.01**		

Notes
in = inch or inches, SE = standard error, df = degrees of freedom, SPLP = synthetic precipitation leaching procedure
Rows in bold indicate results that are statistically significant ($p < 0.05$)
Estimates are reported on the scale of the transformed variable, and the transformation exponent is given in the parentheses in superscript after each target analyte.

Table 5-6. Statistical Results for Other Analytes at a Sample Depth of 12 in

Analyte	Contrast	Estimate	SE	df	Upper CI Limit	Lower CI Limit
Aluminum	Control - Compost	-1530	1410	10	2790	-5860
	Control - Phosphate	188	1410	10	4510	-4140
	Control - Phosphate and Biochar	-2420	1410	10	1910	-6740
Antimony	Control - Compost	0.15	3.63	10	11.2	-10.9
	Control - Phosphate	-0.417	3.63	10	10.7	-11.5
	Control - Phosphate and Biochar	4.51	3.63	10	15.6	-6.58
Barium	Control - Compost	-0.975	10.2	10	30.2	-32.1
	Control - Phosphate	6.83	10.2	10	38	-24.3
	Control - Phosphate and Biochar	-11.5	10.2	10	19.7	-42.6
Beryllium	Control - Compost	-0.0473	0.0437	10	0.0865	-0.181
	Control - Phosphate	-0.0145	0.0437	10	0.119	-0.148
	Control - Phosphate and Biochar	-0.0888	0.0437	10	0.045	-0.222
Cadmium	Control - Compost	0.416	1.68	10	5.54	-4.71
	Control - Phosphate	-0.438	1.68	10	4.69	-5.57
	Control - Phosphate and Biochar	1.48	1.68	10	6.6	-3.65
Calcium	Control - Compost	72.5	347	10	1130	-989
	Control - Phosphate	345	347	10	1410	-716
	Control - Phosphate and Biochar	263	347	10	1320	-799
Chromium	Control - Compost	-0.313	1.22	10	3.41	-4.03
	Control - Phosphate	-0.82	1.22	10	2.9	-4.54
	Control - Phosphate and Biochar	-1.65	1.22	10	2.07	-5.37
Cobalt	Control - Compost	-0.27	0.437	10	1.07	-1.61
	Control - Phosphate	-0.375	0.437	10	0.963	-1.71
	Control - Phosphate and Biochar	-0.558	0.437	10	0.781	-1.9
Copper	Control - Compost	-0.358	5.13	10	15.3	-16
	Control - Phosphate	-0.74	5.13	10	15	-16.4
	Control - Phosphate and Biochar	2.82	5.13	10	18.5	-12.9
Iron	Control - Compost	-648	829	10	1890	-3180
	Control - Phosphate	-835	829	10	1700	-3370
	Control - Phosphate and Biochar	-1370	829	10	1170	-3900
Magnesium	Control - Compost	135	155	10	609	-339
	Control - Phosphate	-103	155	10	371	-576
	Control - Phosphate and Biochar	-270	155	10	204	-744
Manganese	Control - Compost	27.5	46.5	10	170	-115
	Control - Phosphate	10.8	46.5	10	153	-131
	Control - Phosphate and Biochar	-27	46.5	10	115	-169
Nickel	Control - Compost	0.455	1.09	10	3.78	-2.87
	Control - Phosphate	-0.573	1.09	10	2.75	-3.89
	Control - Phosphate and Biochar	-1.59	1.09	10	1.73	-4.91
Potassium	Control - Compost	78.8	35.5	10	187	-30
	Control - Phosphate	25.8	35.5	10	134	-83
	Control - Phosphate and Biochar	-8.25	35.5	10	100	-117
Selenium	Control - Compost	0.01	0.134	10	0.419	-0.399
	Control - Phosphate	0.01	0.134	10	0.419	-0.399
	Control - Phosphate and Biochar	0.18	0.134	10	0.589	-0.229
Silver	Control - Compost	-0.0178	0.195	10	0.579	-0.614
	Control - Phosphate	-0.0243	0.195	10	0.572	-0.621
	Control - Phosphate and Biochar	0.23	0.195	10	0.826	-0.367

Table 5-6. Statistical Results for Other Analytes at a Sample Depth of 12 in

Analyte	Contrast	Estimate	SE	df	Upper CI Limit	Lower CI Limit
Sodium	Control - Compost	-7.5	8.52	10	18.6	-33.6
	Control - Phosphate	3.75	8.52	10	29.8	-22.3
	Control - Phosphate and Biochar	-17	8.52	10	9.08	-43.1
Thallium	Control - Compost	0.00275	0.0734	10	0.227	-0.221
	Control - Phosphate	-0.016	0.0734	10	0.208	-0.24
	Control - Phosphate and Biochar	0.0735	0.0734	10	0.298	-0.151
Vanadium	Control - Compost	-0.9	2.45	10	6.59	-8.39
	Control - Phosphate	-2.18	2.45	10	5.32	-9.67
	Control - Phosphate and Biochar	-2.75	2.45	10	4.74	-10.2
Zinc	Control - Compost	32.6	79.7	10	276	-211
	Control - Phosphate	12.5	79.7	10	256	-231
	Control - Phosphate and Biochar	92.4	79.7	10	336	-151
pH	Control - Compost	0.0417	0.138	10	0.463	-0.38
	Control - Phosphate	-0.142	0.138	10	0.280	-0.563
	Control - Phosphate and Biochar	-0.095	0.138	10	0.326	-0.516
Conductivity	Control - Compost	0.775	3.55	10	11.6	-10.1
	Control - Phosphate	3.18	3.55	10	14.0	-7.69
	Control - Phosphate and Biochar	6.83	3.55	10	17.7	-4.04

Notes

in = inch or inches, SE = standard error, df = degrees of freedom, CI = confidence interval, = synthetic precipitation leaching procedure

n = 16 for all analytes (4 per treatment)

Rows in bold indicate that the amendment compared to control in the 'Contrast' column has statistically different levels of the analyte (95% confidence intervals do not overlap zero, indicating a non-zero difference in means). Positive values in the 'Estimate' column indicate that the amendment subplots have higher levels of the analyte compared to control, and negative values in the 'Estimate' column indicate that the amendment subplots have lower levels of the analyte compared to control.