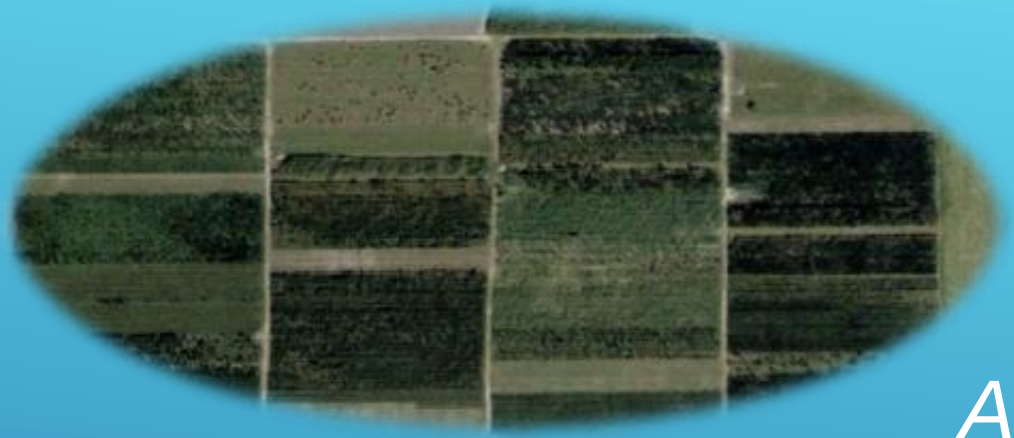

REVISED *SITE ASSESSMENT GUIDANCE FOR* ***FORMER*** *AGRICULTURAL SITES IN MIAMI-DADE COUNTY*

AUGUST 6, 2021

Presented via Zoom™ Webinar

Presented by Wilbur Mayorga, P.E., MS
Chief Environmental Monitoring and Restoration Division
RER-DERM

OBJECTIVES

- Provide additional technical input regarding the guidance
- Provide an update on revisions since publishing the interim guidance in September 2020
- To respond to public comments received in response to the September 2020 interim guidance

DERM's Mission

" To protect water quality, drinking water supply, air quality and natural resources that are vital to the health and well-being of all Miami-Dade County residents and visitors and the ecosystem…"

EMRD's GUIDING PRINCIPLE

Data driven, scientifically defensible, proactive approach to protecting human heath and the environment by ensuring that any ground or water pollution is adequately addressed while facilitating development

INTRODUCTION

We cannot solve our problems with the same thinking we used when we created them

Albert Einstein

RECAP OF BACKGROUND TO GUIDANCE

THE GUIDANCE:

1. Is NOT AN ORDINANCE.

2. Supplements the current DERM RBCA Guidance No:2, “SITE ASSESSMENT GUIDANCE FOR CONTAMINATED SITES REGULATED BY SECTION 24-11.1(2), CODE OF MIAMI-DADE COUNTY” dated March 10, 2003.

3. Does not replace the ASTM Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process (Phase II).

RECAP OF BACKGROUND TO GUIDANCE

- Does NOT apply to sites or portions of a site that are remaining agriculture.
- Provides minimum site assessment guidance for former agricultural site which are undergoing land use changes to non-agricultural land uses.
- The responsible party may submit alternate assessment plans, supported by appropriate data and justification, for Department approval.
- Developed in response to request of some stakeholders.
- Provides a streamlined and consistent approach to environmental assessment at these former agricultural sites which are being developed to a non-agricultural land use:

  to ensure the safety of the ultimate end users with respect to the potential exposure to agrichemical residual.

WHY THE GUIDANCE?

THE CONVERSION OF FORMER AGRICULTURAL LANDS INTO NONAGRICULTURAL USES, (E.G., RESIDENTIAL LAND USES, SCHOOLS, ETC.) RESULTS IN DIFFERENT EXPOSURE POPULATIONS (E.G., EXPECTANT MOTHERS, CHILDREN, CONSTRUCTION WORKERS, ETC.) DIFFERENT EXPOSURE SCENARIOS (E.G., INCREASED EXPOSURE FREQUENCY AND DURATION, ETC.) AND DIFFERENT EXPOSURE PATHWAYS." THEREFORE, THE GUIDANCE IS NEEDED TO PROVIDE A PROCEDURE TO ENSURE THAT THESE TRANSITIONING PROPERTIES ARE ADEQUATELY ASSESSED TO ENSURE THE SAFETY OF THE ULTIMATE END USERS WITH RESPECT TO THE POTENTIAL EXPOSURE TO AGRICHEMICAL RESIDUAL.

School developed on former agricultural land without assessment (prior to DERM's involvement).

Phase I and Phase II conducted pursuant to financial transaction.

Arsenic concentration up to 94 mg/kg documented in school yard.

School serving Infant -12 years

Soil Arsenic concentration 0-2 ft

STAKEHOLDERS PERSPECTIVE

DERM's stakeholders reflect the diversity of the population of Miami-Dade county and the divergent opinions and interest as reflected in the comments received in response to the September 2020 Interim Guidance

Help protect our construction workers and all Miami-Dade County residents.

*****

Test the soil and water on Agricultural land before development.

*****

Protect our construction workers and all Miami-Dade County residents by requiring soil testing before re-zoning/changing Ag land to a non-agricultural use.

Any residual arsenic will have been rendered harmless by the soil, rocks and water of the South Dade agricultural area …

*****

Any and all arsenic whether from natural or human sources is rendered biologically unavailable.

*****

The reasoning for the guidance is based on limited testing data in South Miami-Dade

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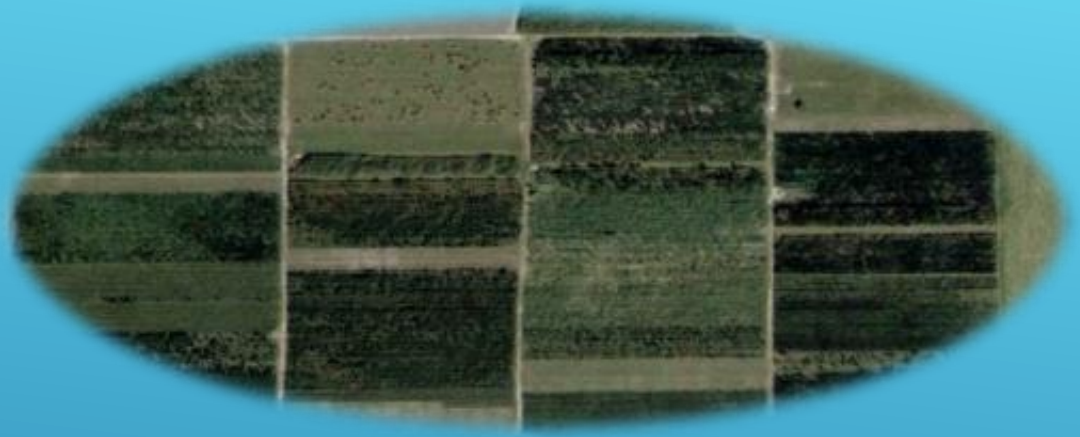
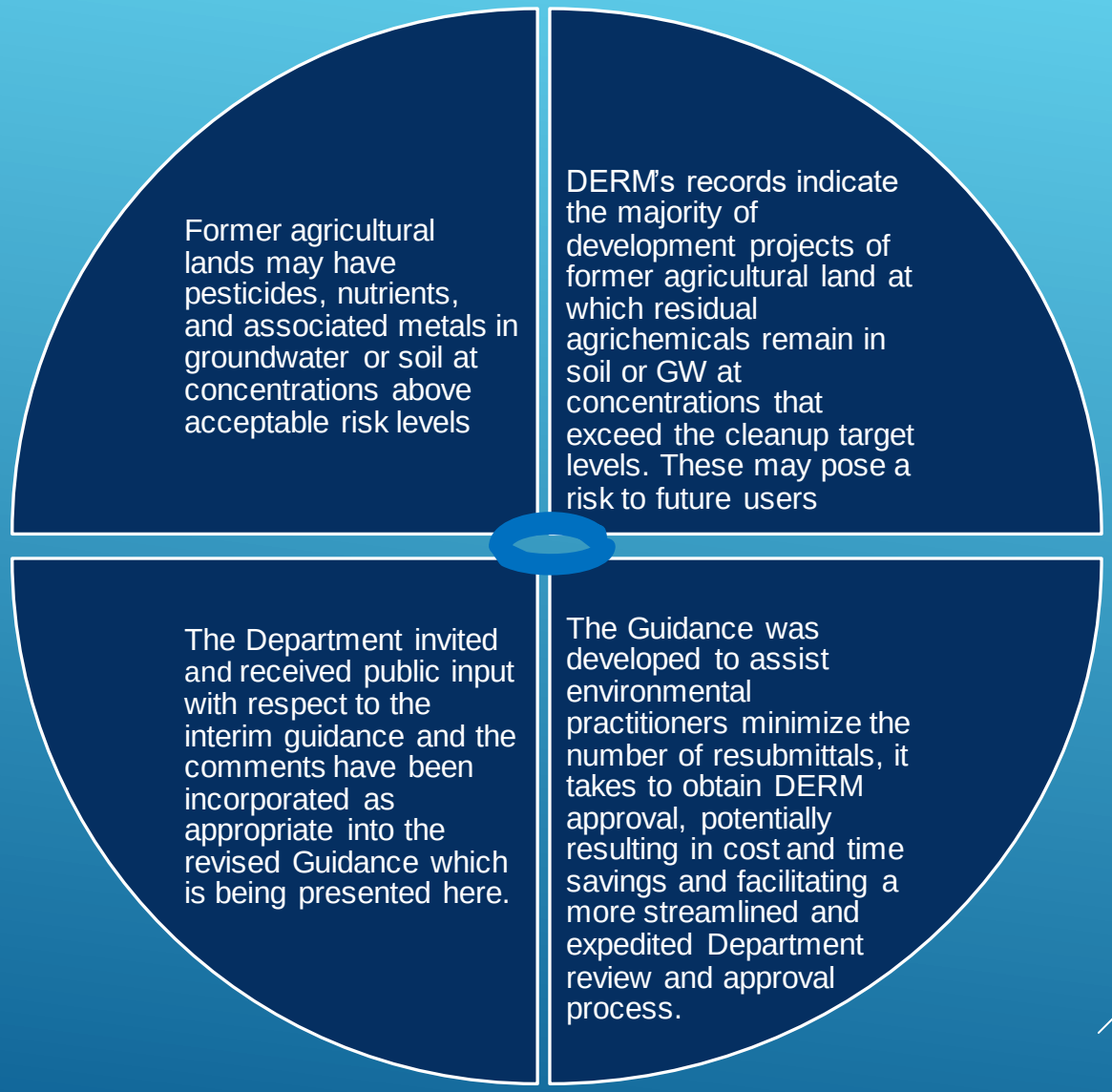


ANALYSIS

"Without data, you're [we are] just another person with an opinion."

W. Edwards Deming

THE CHALLENGE

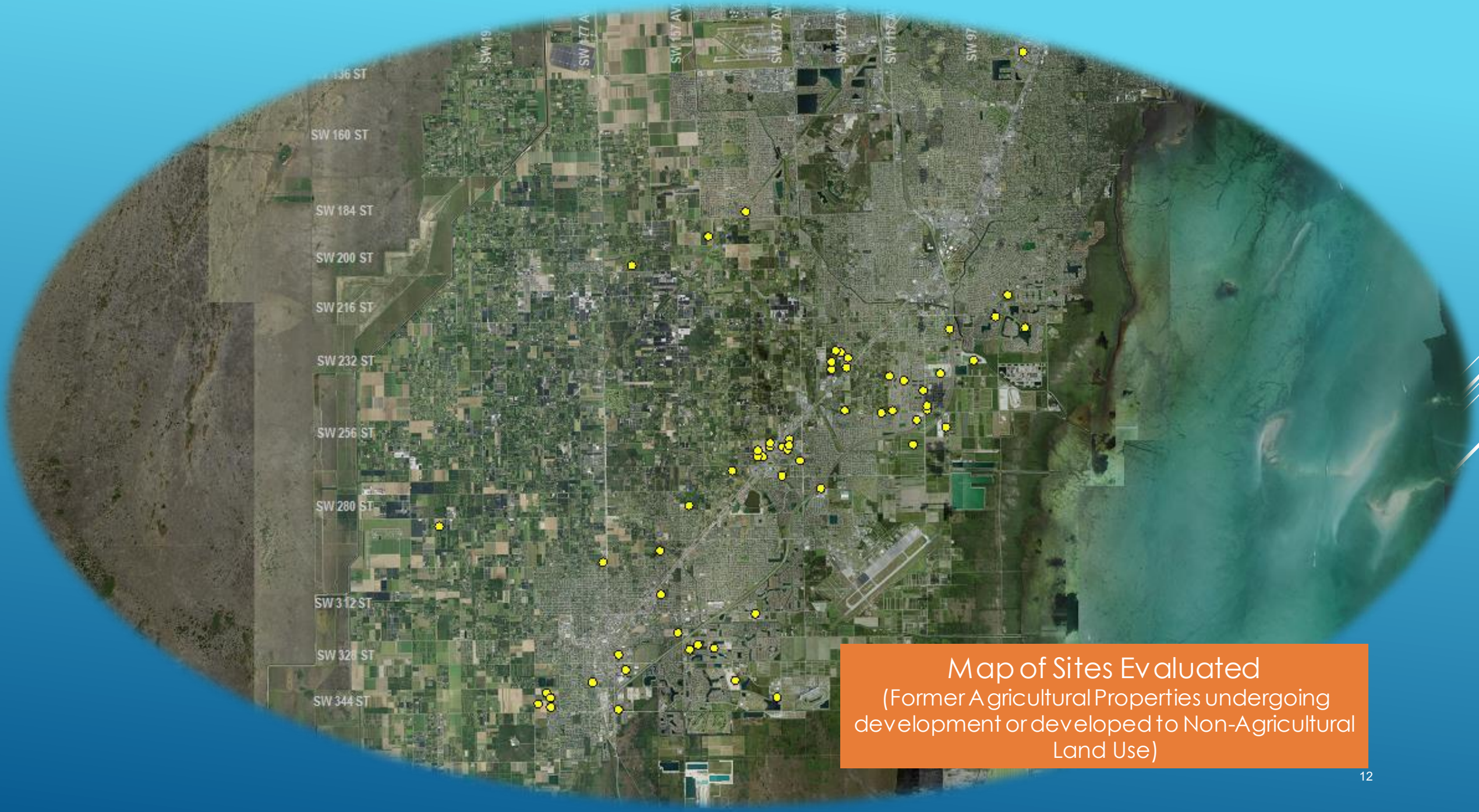


THE CHALLENGE

Data from 62 former agricultural sites which have undergone or are undergoing change from a former agricultural land use to non-agricultural land use was evaluated. Data obtained from DERM's files

Site concentrations were evaluated against background concentrations, and against regulatory limits.

Determination of contamination frequency and identification of appropriate contaminants of concern (COC's).

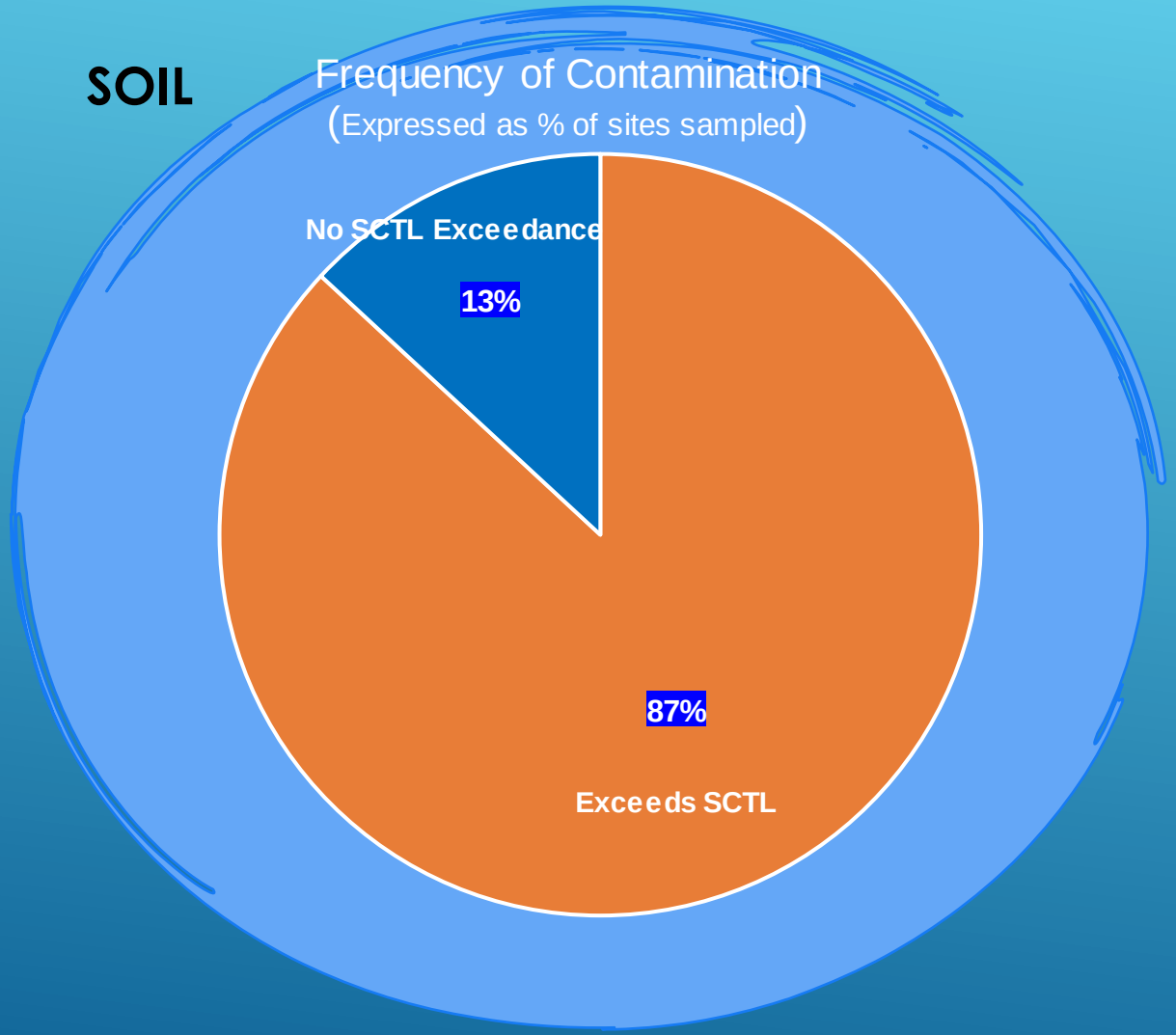


Map of Sites Evaluated

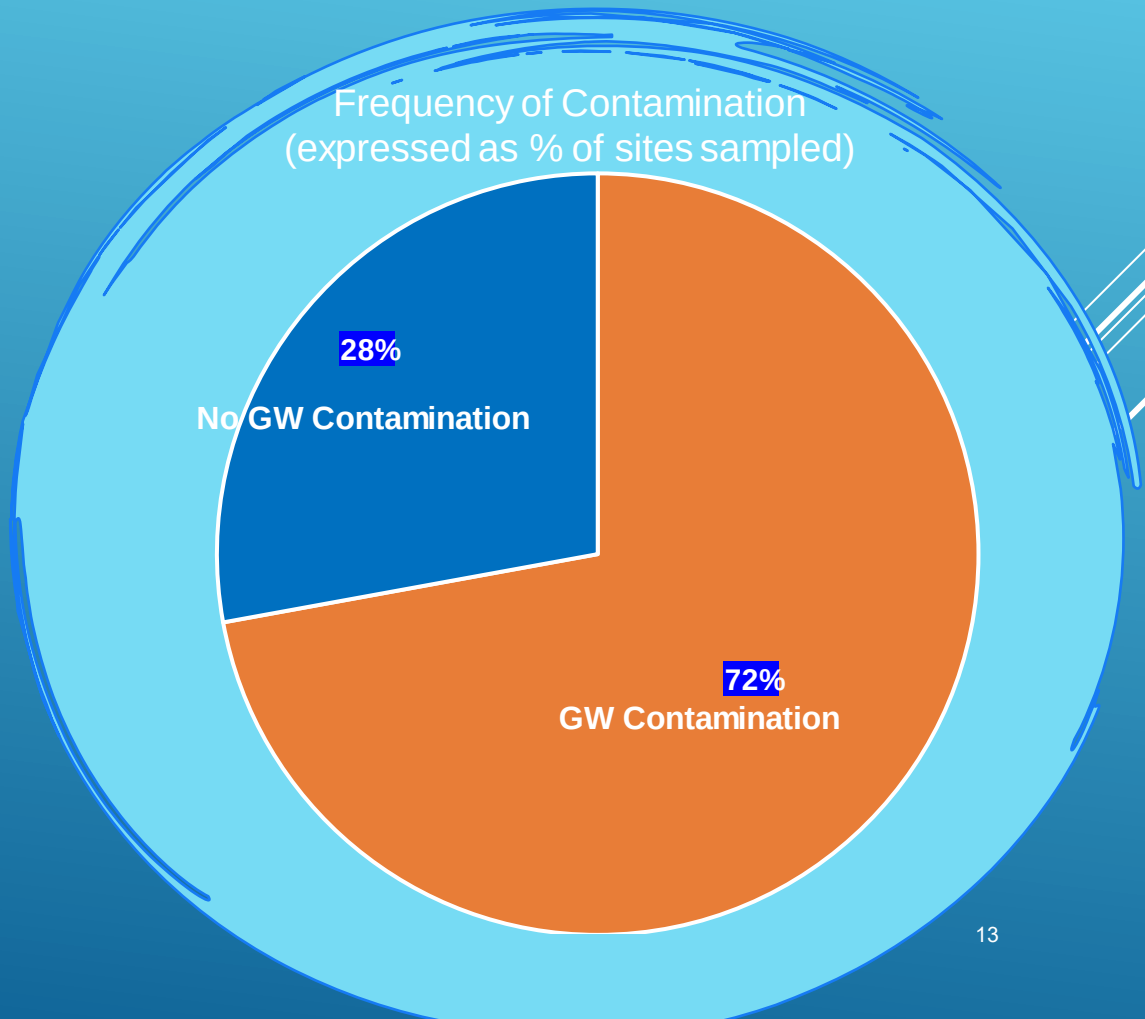
(Former Agricultural Properties undergoing development or developed to Non-Agricultural Land Use)

THE CHALLENGE QUANTIFIED

SOIL



GROUNDWATER



THE QUESTION: AGRICHEMICAL RESIDUAL OR BACKGROUND???

Are the contaminant concentrations documented in soil and groundwater at former agricultural sites consistent with background or the result of agrichemical residuals?

AGRICHEMICAL RESIDUAL OR BACKGROUND???

LINES of EVIDENCE

1. Miami-Dade County Background Information

   - Countywide Anthropogenic Soil Background Concentrations
   - Ambient Water Quality Monitoring
   - Synoptic Groundwater Sampling

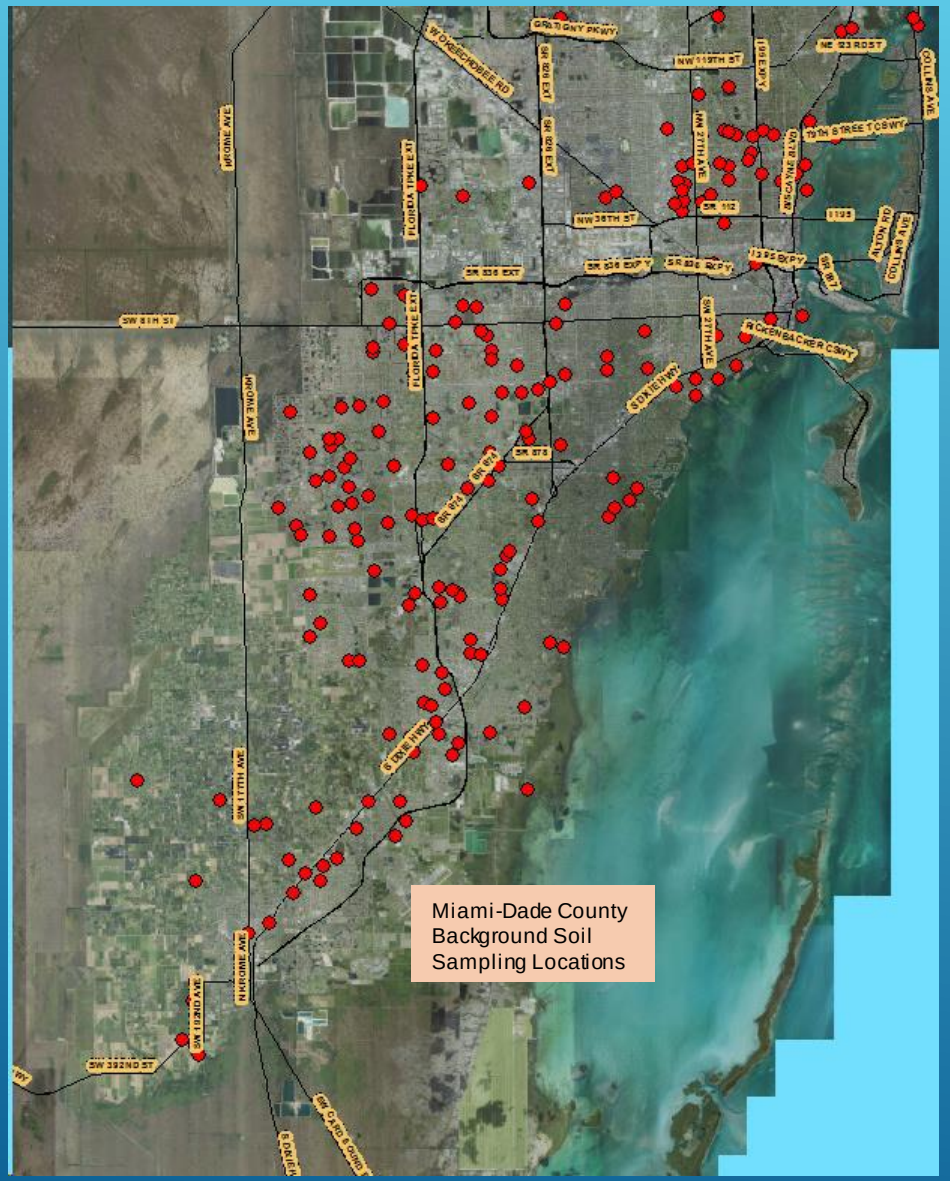
1. Subset of background data specific for the South Miami-Dade Agricultural Area.

LINES OF EVIDENCE - SOIL

Miami-Dade County Anthropogenic Background Study (2014)

https://www.miamidade.gov/environment/library/reports/2014-anthropogenic-background-study.pdf

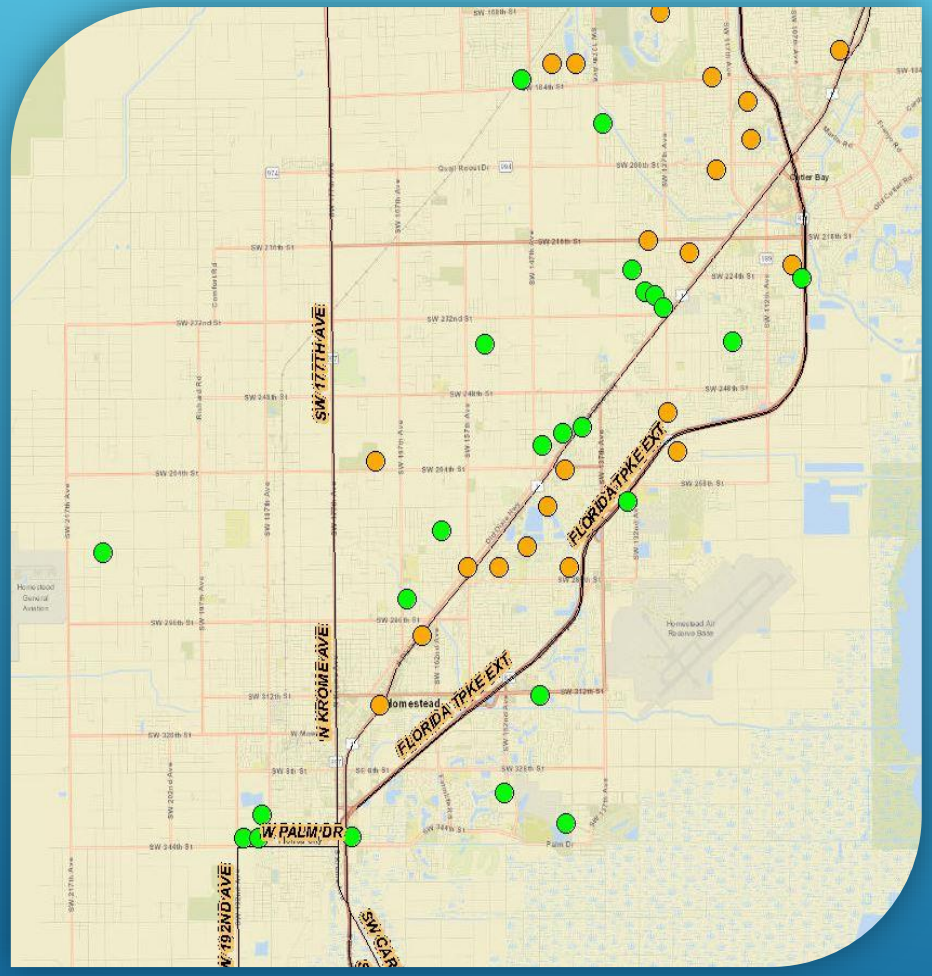
- Surficial soils (upper 2 feet of soil horizon) at over 160 locations throughout the urban corridor of MDC
- Locations selected to be representative of county-wide heterogeneity with respect to development history (older urban centers as well as newer suburban areas), land use (public buildings-libraries, residents and public parks), geology (coastal ridge versus low lying areas to the south and west, etc.)
- Analyzed for 14 inorganic chemicals and polycyclic aromatic hydrocarbons (PAHs). Ten percent (10%) of samples also analyzed for organochlorine pesticides and polychlorinated biphenyls (PCBs)



The Background Study documented that:

1. Arsenic occurred ubiquitously, at concentrations above the regulatory limit for direct exposure, in surficial soils (0 to 6 inches below land surface (bls)) throughout the County.
2. The background concentrations of arsenic in soils from south Miami-Dade County (south of SW 88 Street) were significantly higher than for samples from the northern areas of the county.
3. While elevated concentrations of arsenic were not typically found in soils below 0-6 inches in the northern portions of the county, for south Miami-Dade County, soils at depth down to 2 feet bls exhibited elevated concentrations of arsenic
4. The other contaminants evaluated did not indicate a background signature.

SUPPLEMENTAL DATA



- 2014 Anthropogenic Background Study Location
- Agricultural Site with arsenic concentrations in soil consistent with background

Based on an expressed concern that the MDC background dataset included insufficient samples from the "truly" agricultural area of southern Miami-Dade County,

"Background guidance includes too few samples from actual agricultural areas"

DERM extracted data from 23 sites, with historical agricultural land use where, based on the assessment data for arsenic, DERM has indicated that the soil arsenic concentrations are consistent with background.

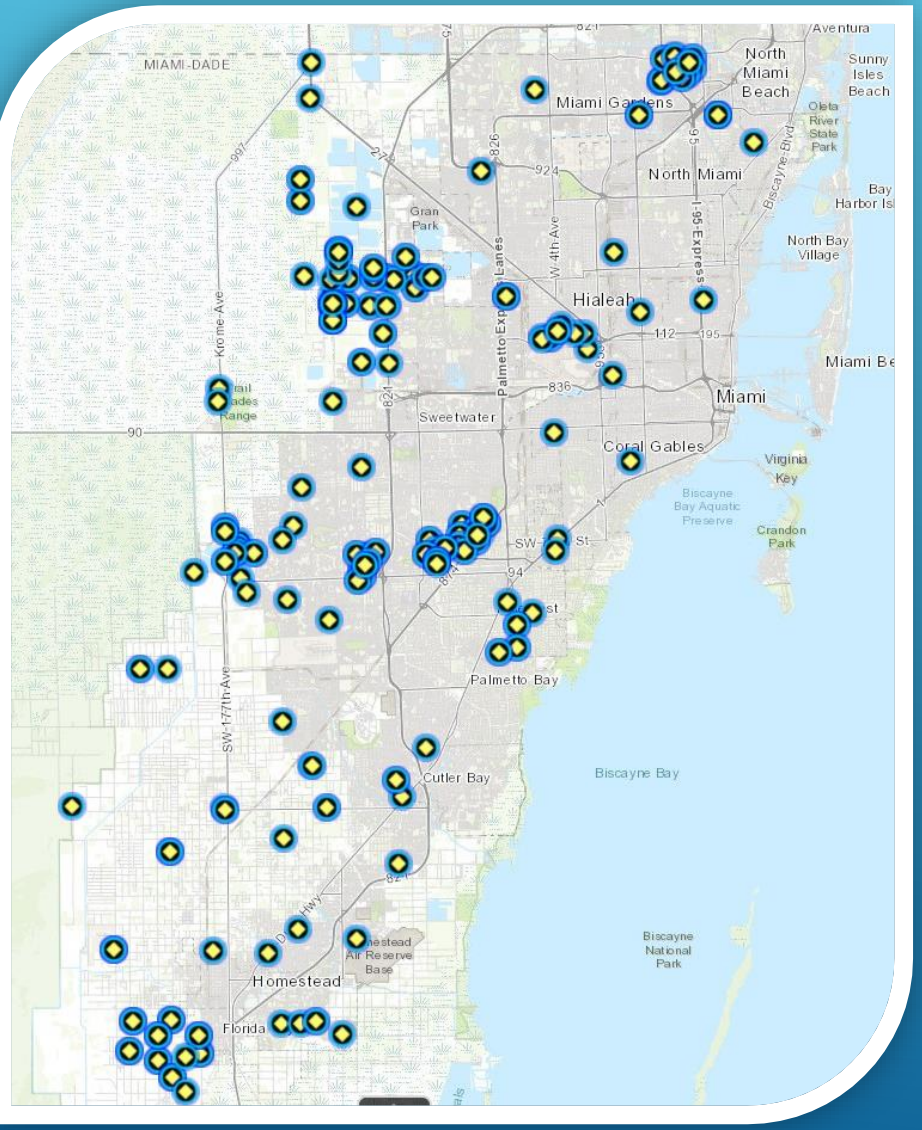
	2014 Background Study Data South of Kendall Dr		23 Former Ag Sites with Concentrations Consistent with Background	
Sample Depth	0-6"	6-24"	0-6"	6-24"
Number of Samples	40	39	494	355
MVUE	7	5	2.7	1.6

The data from the 23 sites suggest that the published anthropogenic background numbers for arsenic in soil south of Kendall Drive may not properly characterize the sub-regional anthropogenic background concentrations of the agricultural areas of southern Miami-Dade County and the background concentrations for this area might be lower than previously thought.

DERM will conduct further evaluation on this issue.

The magnitude and distribution of background concentration inorganic contaminants, specifically metals, in soil within the urban areas of MDC is well understood.

LINES OF EVIDENCE - GROUNDWATER



https://www.miamidade.gov/environment/water-protection.asp

GROUNDWATER QUALITY MONITORING

1. DERM Ambient Water Quality Monitoring Program

Currently 185 monitoring wells are routinely sampled.

- 135 within COI of major County wellfields - Early detection of threats to WPA
- 50 ambient water quality monitoring - establish baseline water quality, determine trends and detect changes in groundwater quality.

2. DERM Synoptic Groundwater Sampling Event (Dec 19 – Feb '20)*

Pre-existing shallow monitoring wells at permitted facilities (primarily petroleum facilities) utilized.

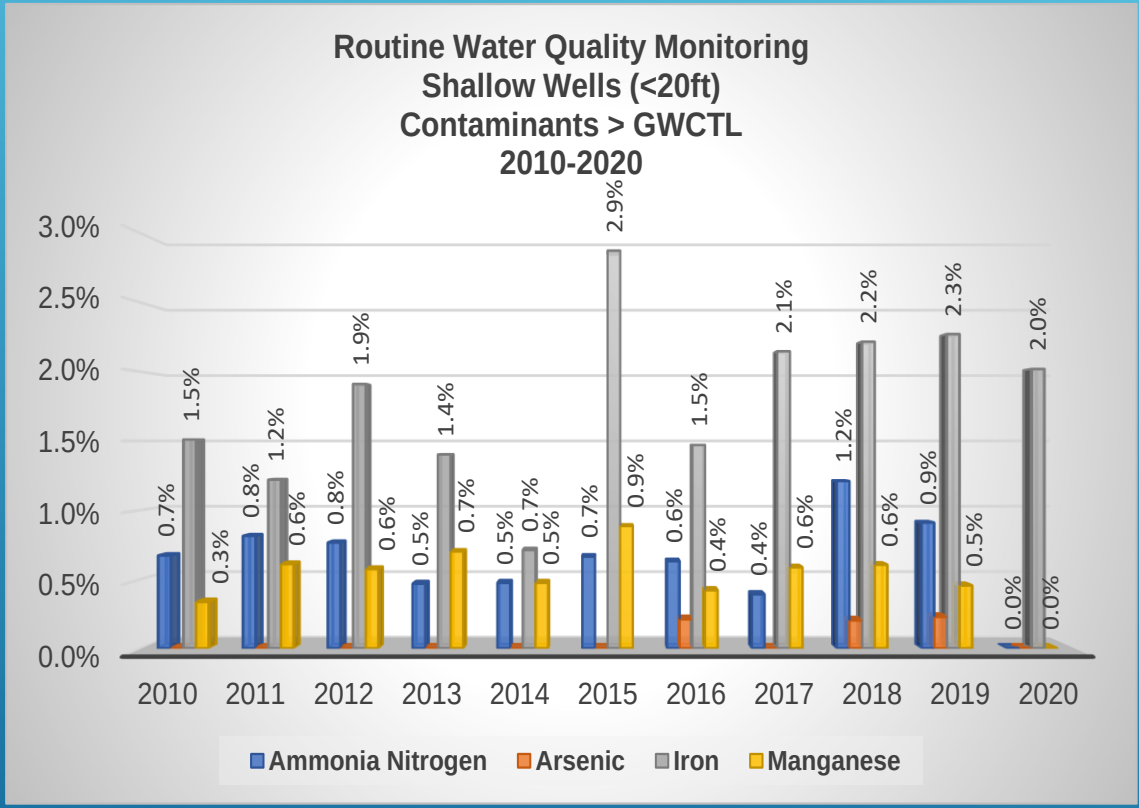
- 543 monitoring wells sampled
- Groundwater analyzed for:

Inorganics: Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, Ag, Zn

Nutrients: Total Phosphorus, Nitrate + Nitrite (NOX-N), Ammonia, TKN.

*(DERM unpublished data)

LINES OF EVIDENCE - GROUNDWATER

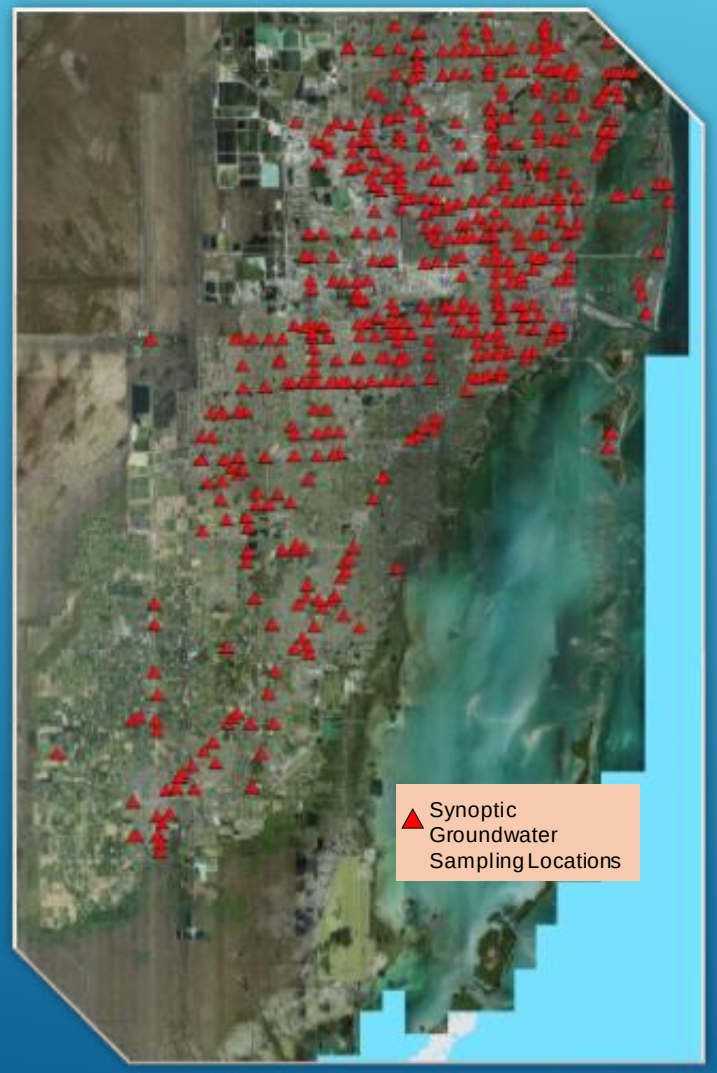


Contaminants Detected In Miami-Dade County Shallow (<20 feet) Background Groundwater 2010-2020

- Low frequency of detections at concentrations exceeding the (GWCTL).
- Average of 3% (of approx. 4834) of samples exceeded the GWCTL over the period of record.
- No Nitrate-Nitrite exceedances.
- Ammonia, iron, arsenic and manganese detected above GWCTL in “background” groundwater.
  - Iron most frequency detected above criteria.
  - Arsenic in shallow groundwater exceeded the GWCTL in a total of 3 of 249 samples during the 2010 to 2020 period of record. Maximum concentration 16 ppb.

LINES OF EVIDENCE - GROUNDWATER

DERM SYNOPTIC GROUNDWATER SAMPLING EVENT*



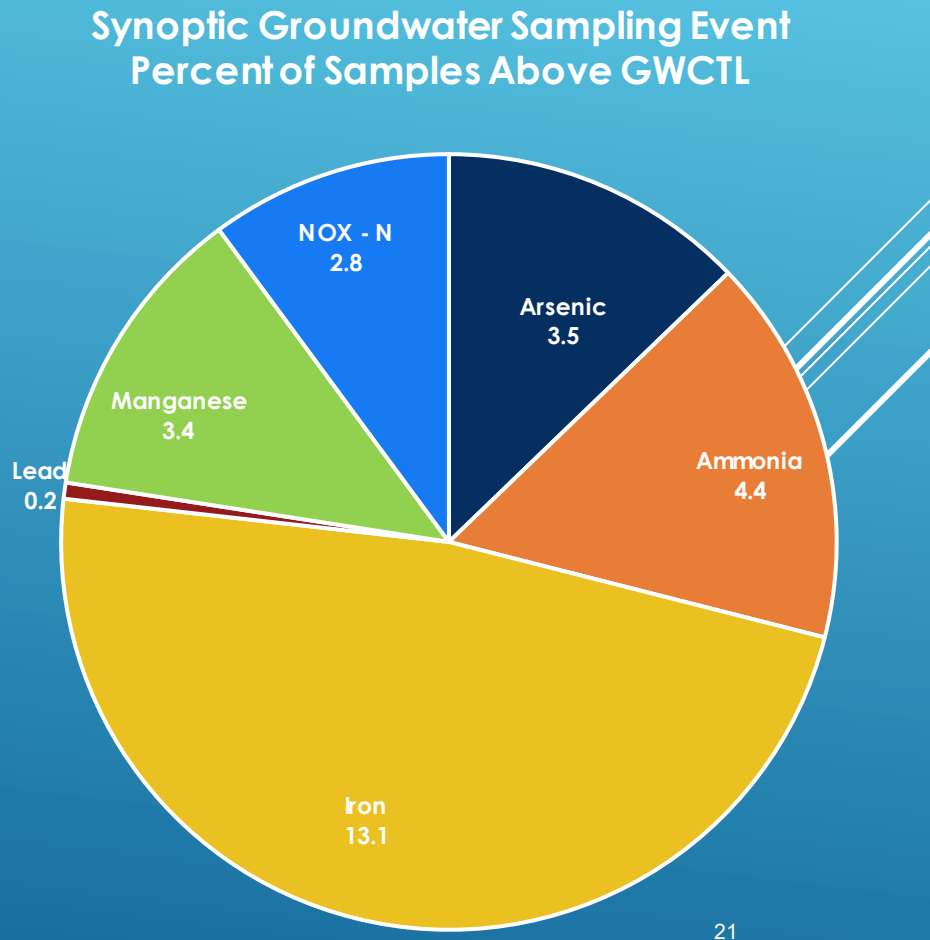
*(DERM unpublished data)

Metals:

- The background signature for metals in shallow groundwater in Miami-Dade County is unremarkable.
- Low frequency of detection at concentrations above GWCTL for arsenic and manganese. Overall iron detected at concentrations above GWCTL in 13% of samples, however iron most frequently detected and at concentrations above criteria in groundwater in the northern areas of the county

Nutrients:

- For nitrate-nitrites were detected at concentrations above GWCTL at 2.8% of sites, sampled.



LINES OF EVIDENCE - GROUNDWATER

Data from DERM's long term routine ground water monitoring and DERM's synoptic groundwater sampling event does not indicate pervasive occurrences of background concentrations above GWCTL

THE DATA

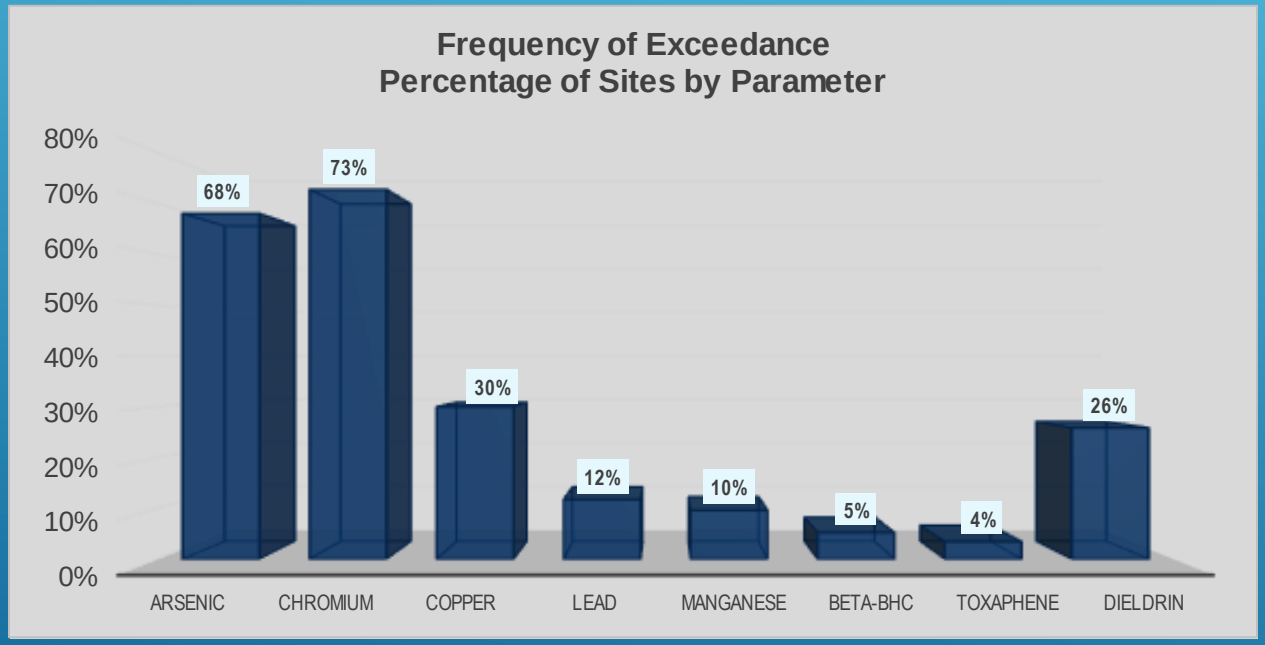
AGRICHEMICAL RESIDUALS QUANTIFIED

AGRICHEMICAL RESIDUALS QUANTIFIED

SOIL

Data from DERM's records for 61 former agricultural sites evaluated

CONTAMINANTS DETECTED ABOVE SCTL



1. Inorganics

Metals represent the parameter group most frequently detected above SCTL.

- Arsenic detected above background at 68% of sites sampled.
- Chromium detected above leachability SCTL at 73% of sites.
- Copper detected above residential SCTL at 30% of sites.

2. Chlorinated Pesticides (OCP)

- Three OCP pesticides - toxaphene, beta-BHC, and dieldrin were detected above SCTL with dieldrin being detected at concentrations above leachability SCTL at 26% of sites.

THE ARSENIC QUESTION

Arsenic is indicated as a primary COC at former agricultural sites.

It has been suggested that the concentrations of arsenic documented in soils at former agricultural sites are the result of intrinsically high background concentrations based on soil characteristics unique to the historical agricultural areas of southern Miami-Dade County.

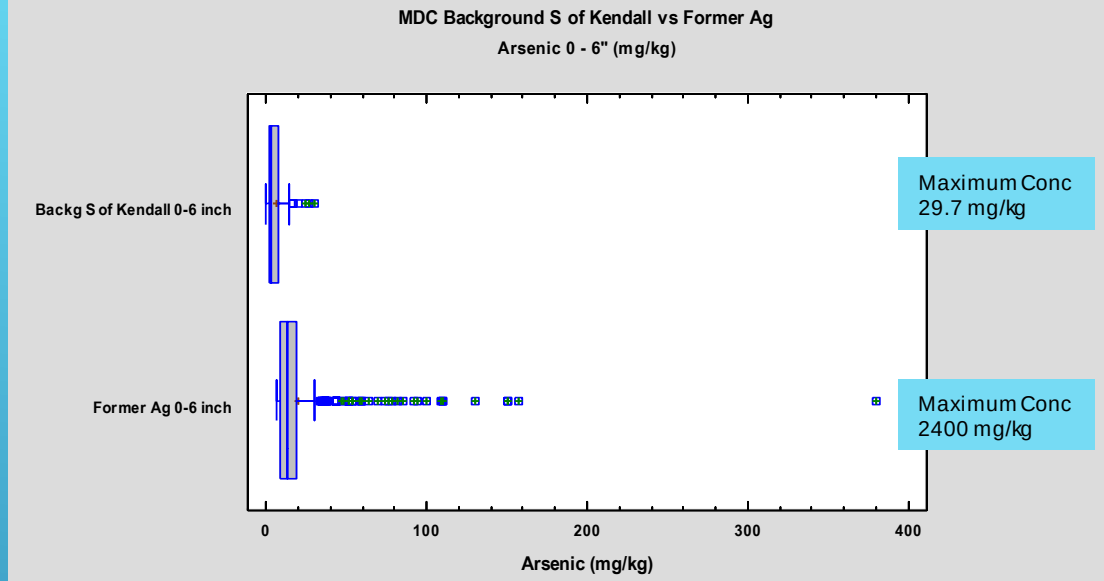
To evaluate:

- Test Hypothesis that :

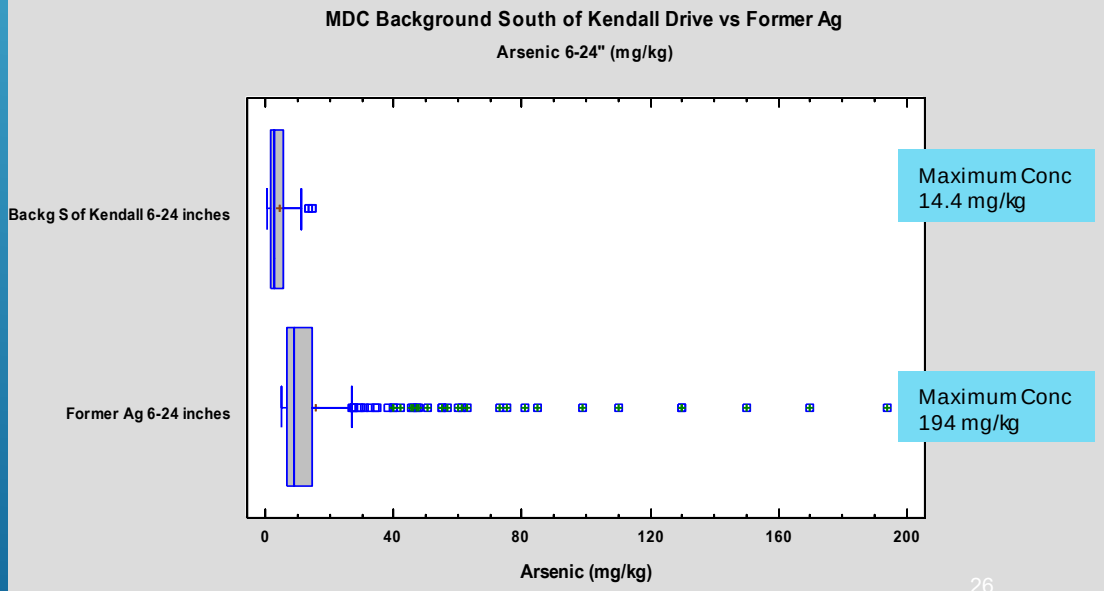
  The arsenic concentrations at former agricultural sites is consistent with the sub-regional background arsenic background concentrations south of Kendall Dr.

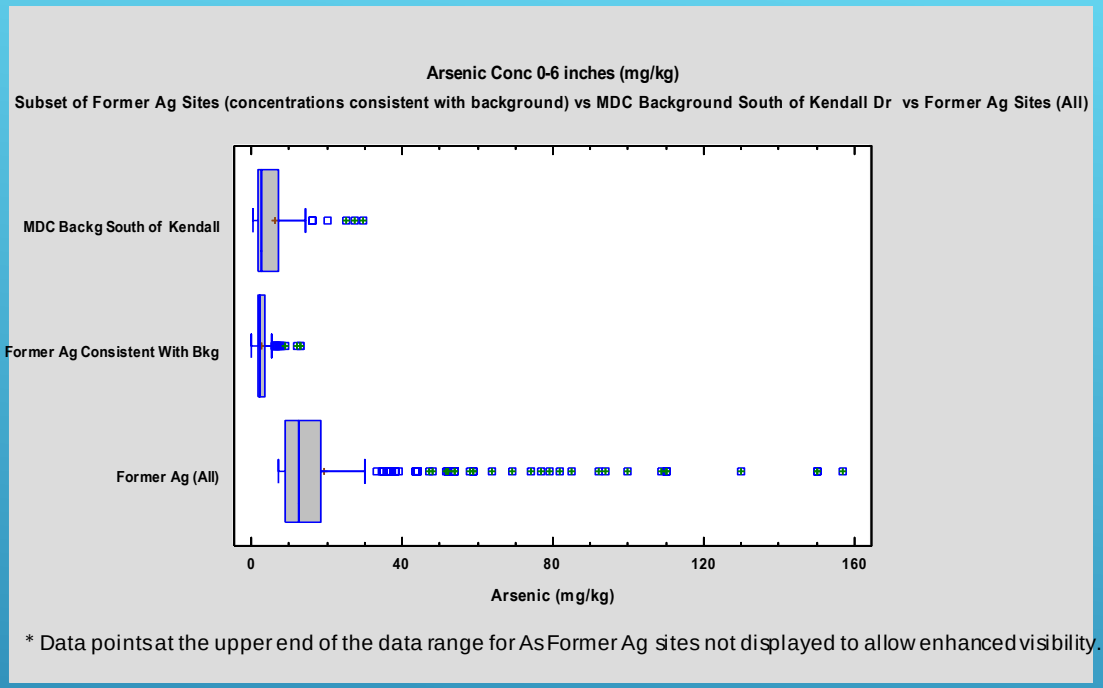
1. Population Distribution Comparison - Kolmogorov-Smirnov Test
2. Comparison of Medians - Mann-Whitney W-test

There is a statistically significant difference between the two distributions as well as between the median concentrations at the 95.0% confidence level.

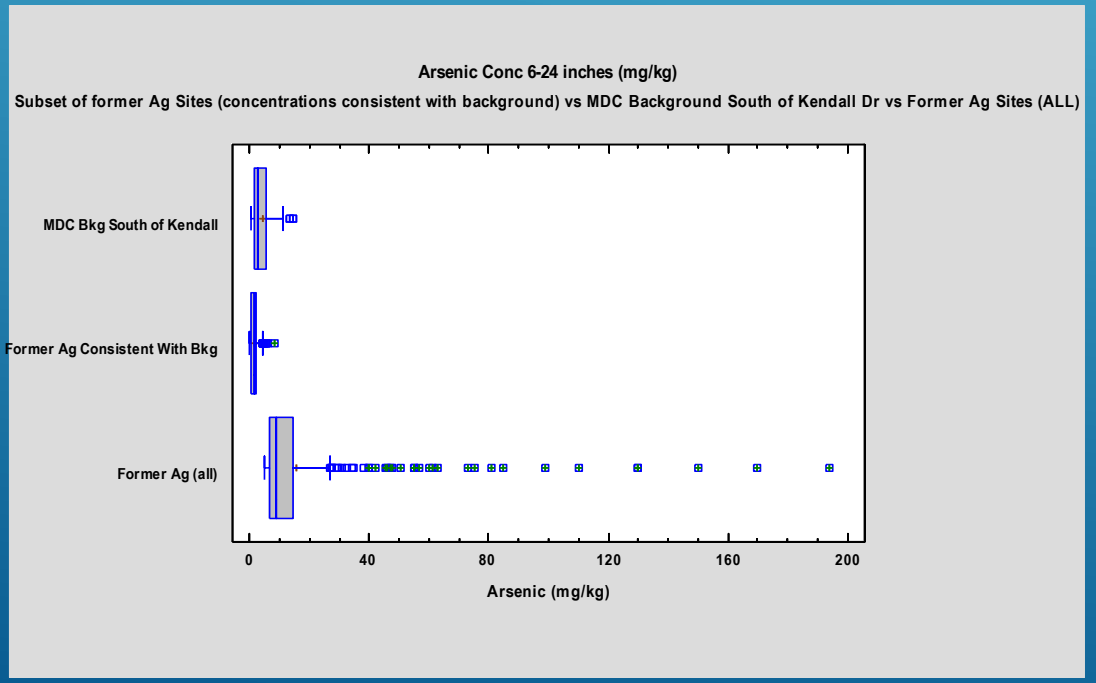


* Data points at the upper end of the data range for Ag sites not displayed to allow for enhanced visibility of the "box".





* Data points at the upper end of the data range for As Former Ag sites not displayed to allow enhanced visibility.



THE ARSENIC QUESTION

The subset of former agricultural site (23) with arsenic concentrations indicated as being consistent with sub-regional (south of Kendall Drive) background concentrations, and the sub-regional data sets were compared to the full population data set for former agricultural sites.

The population distribution of the former agricultural site was again found to be statistically significant different from the other populations.

DETERMINING CONTAMINANTS OF CONCERN

Screening Criteria Utilized for determining Group A and Group B COCs for the purposes of the Guidance

1. Is the maximum concentration below the background (if applicable)?
   - If yes, the chemical is eliminated as a COC.

     Except for arsenic (as discussed on previous slides) the MDC background data does not indicate a background fingerprint (above the SCTL) for the other parameters which have been detected at concentrations above SCTL at former agricultural sites.

2. Is the maximum detected concentration less than the lower of the leachability or direct exposure SCTL?
   - If yes, the chemical is eliminated as a COC.

3. Is the chemical detected above the lower of the leachability or direct exposure SCTL at more than 15% of the sites evaluated?
   - If yes, the chemical (or chemical group) is listed as a Group A COC.
   - If no, the chemical is listed as a Group B COC.

CONTAMINANTS OF CONCERN - SOIL

1. GROUP A

   - Metals: Arsenic, Chromium, Copper
   - Pesticides: Organochlorine Pesticides

2. GROUP B

   - Metals: Manganese, Lead

IMPACTS FROM ANCILLARY ACTIVITIES

- In addition to the assessment for agrichemicals based on the former agricultural uses, 25 sites were assessed for petroleum COCs primarily based on point sources (i.e., AST, storage building, etc.) identified in the Phase I environmental assessment.

- Concentrations exceeding the SCTL were documented at 7 sites (28%) of sites.

- Total Recoverable Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons (PAHs) – specifically the carcinogenic PAH's (represented by benzo(a)pyrene equivalents) were the primary COC detected above SCTL

AGRICHEMICAL RESIDUALS QUANTIFIED

GROUNDWATER

Data from DERM's records for 61 former agricultural sites evaluated

AGRICHEMICAL RESIDUALS - GROUNDWATER

- Former Agricultural sites with documented groundwater contamination
- Former Agricultural sites with no groundwater contamination

- 72% of sites with at least one COC above GWCTL
- 39% of sites with more than one COC above GWCTL and
- 15% of sites with more than two COC's above GW CTL.

AGRICHEMICAL RESIDUALS - GROUNDWATER

Contaminants Detected above GWCTL

Group 1

Contaminants detected above GWCTL at over 15% of sites sampled:

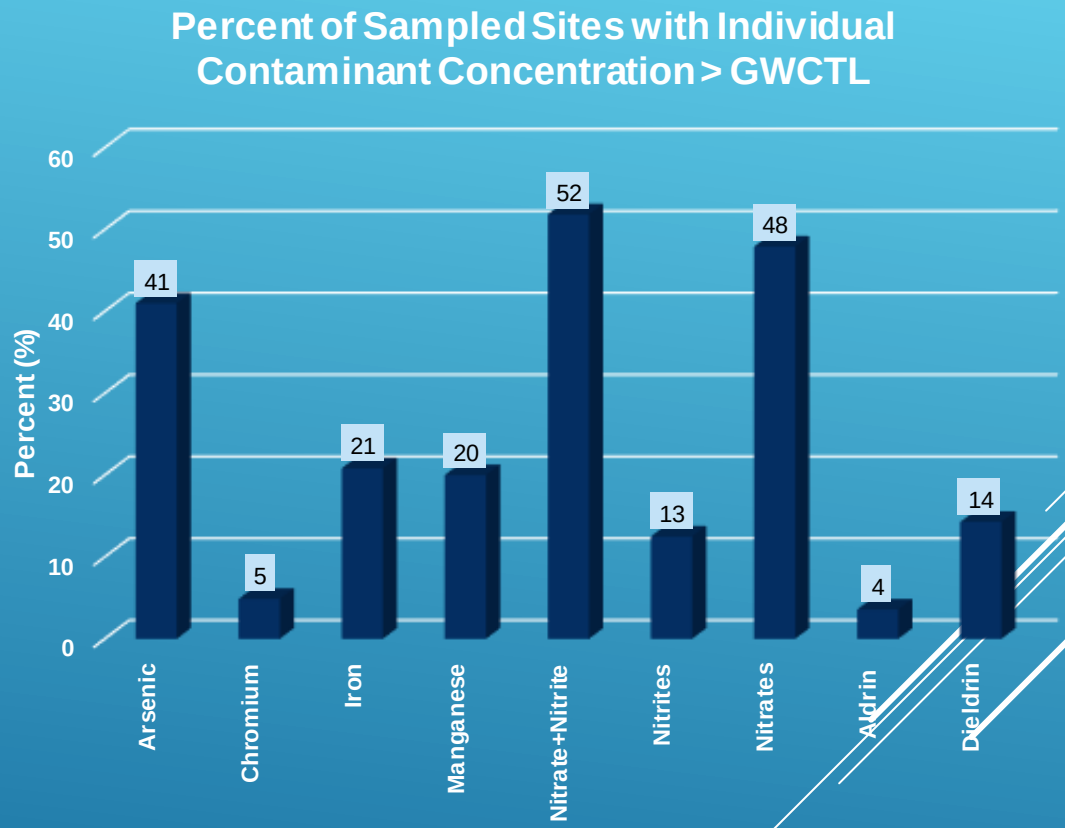
- ❑ Arsenic, Nitrate, Nitrate-Nitrite, Iron*, Manganese.

*Iron concentration compared to MDC background
https://www.miamidade.gov/environment/library/memos/groundwater-study.pdf

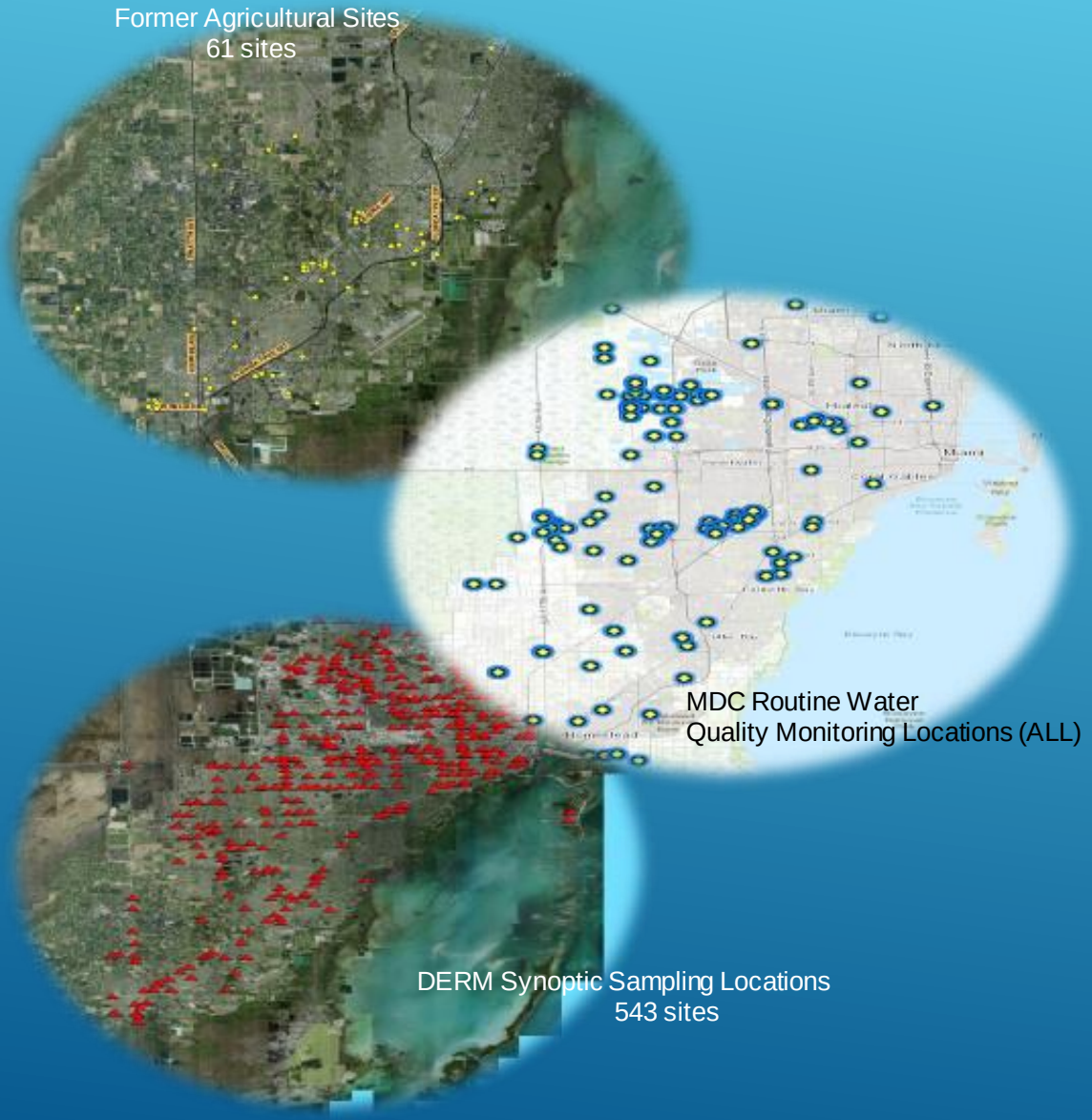
Group 2

Contaminants above GWCTL detected at 15% or less of sites sampled:

- ❑ Organochloride Pesticides
- ❑ Chromium
- ❑ Nitrites



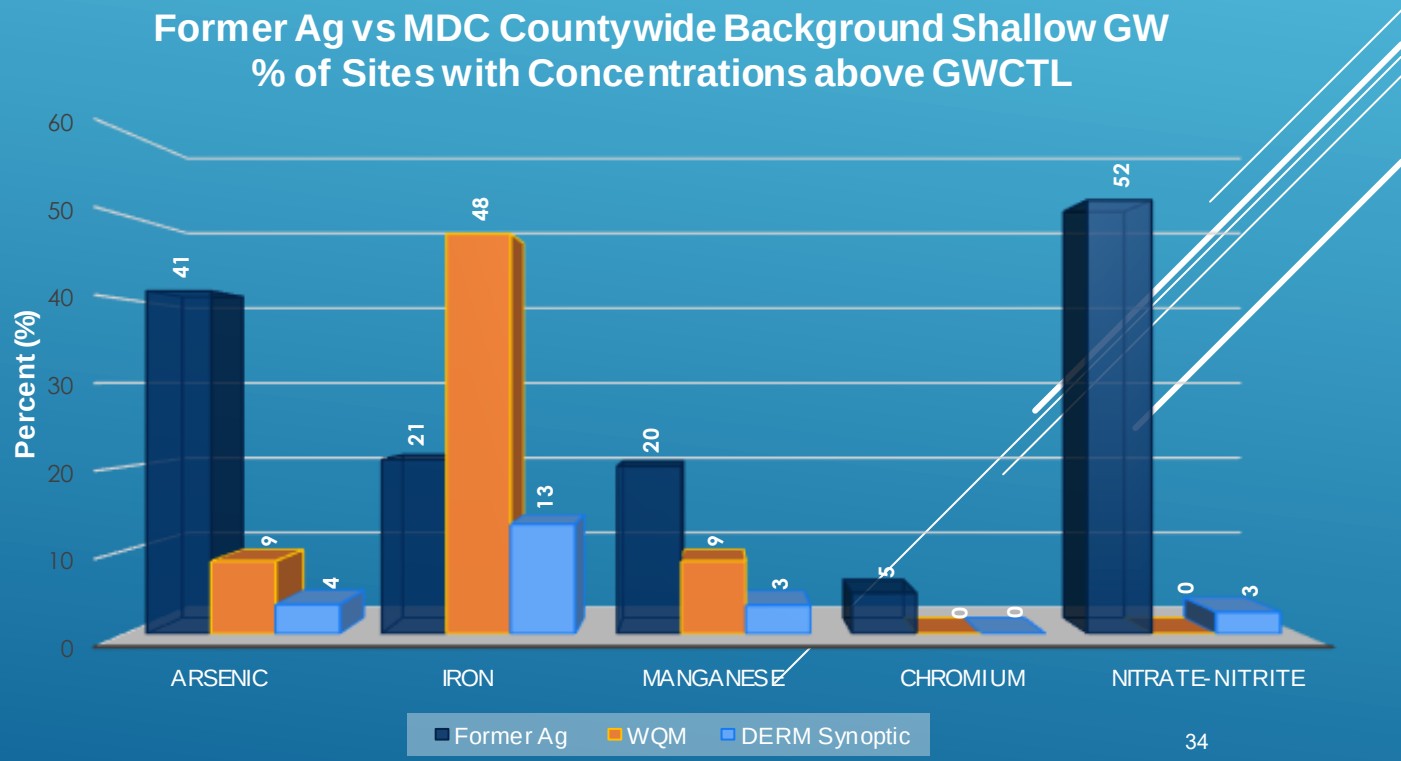
AGRICHEMICAL RESIDUAL
GROUNDWATER



The data from former agricultural sites was evaluated against data from the 29 shallow wells (<20 ft) in MDC countywide background groundwater datasets:

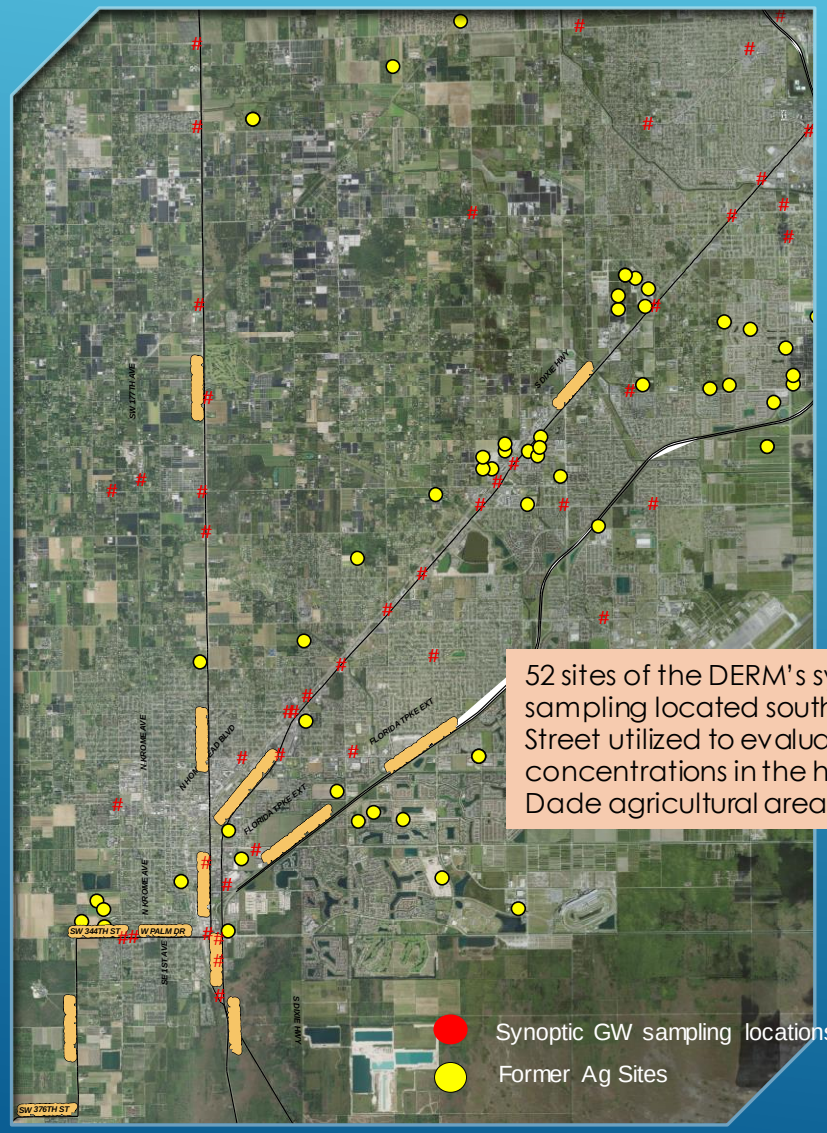
Except for iron* former agricultural site were found to have a greater frequency of sites with exceedances of the indicator contaminants.

*as noted in slide 21 iron most frequently detected and at concentrations above criteria in groundwater in the northern areas of the county



Nitrites and nitrates not individually analyzed in DERM synoptic sampling

AGRICHEMICAL RESIDUAL OR BACKGROUND???

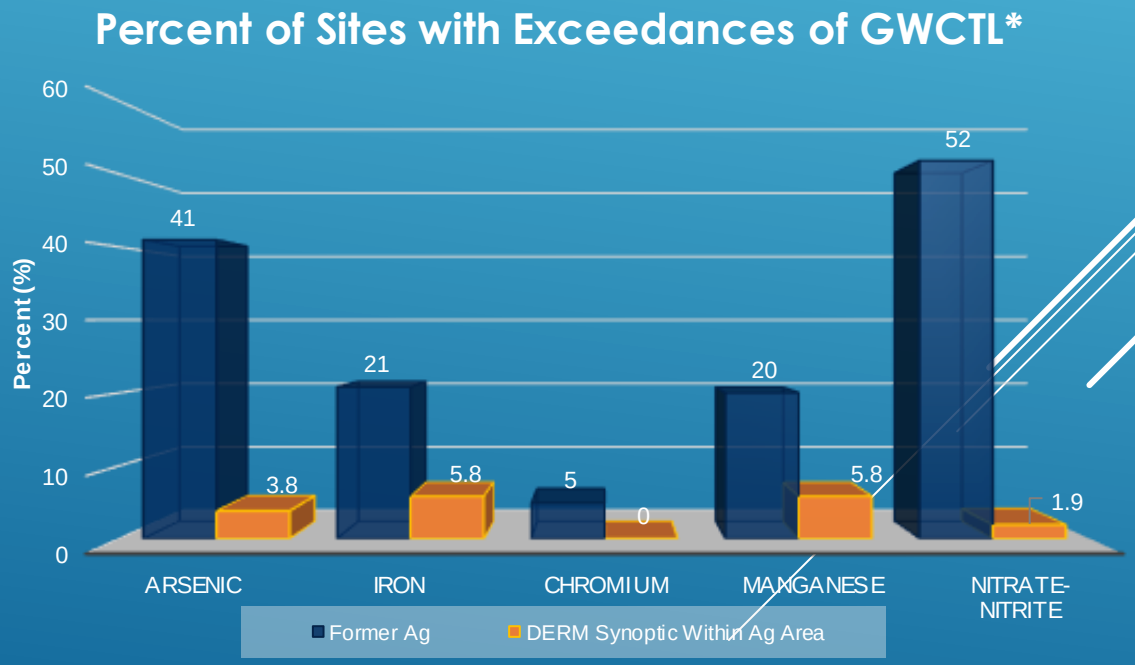


52 sites of the DERM's synoptic sampling located south of SW 136 Street utilized to evaluate background concentrations in the historical South Dade agricultural areas.

Sub-regional Background Comparison.

A subset of the data from the synoptic groundwater sampling locations within areas with current and historical agricultural land use was compared to the data from the former agricultural site.

For consistency with the spatial range of the data from the former ag site the background sites selected are located south of SW 136 Street.



* Not enough data from Routine Water Quality monitoring to allow comparison.
Nitrites and nitrates not individually analyzed for during DERM Synoptic Sampling Event

CONTAMINANTS OF CONCERN - GROUNDWATER

1. GROUP A

   - Metals: Arsenic, Manganese, Iron
   - Anions: Nitrates, Nitrate-Nitrite

2. GROUP B

   - Metals: Chromium
   - Pesticides: Organochlorine Pesticides
   - Anions: Nitrites

AGRICHEMICAL RESIDUAL OR BACKGROUND???

CONCLUSION

1. Overall soil and groundwater at former agricultural sites are not consistent with background concentrations.

2. The data indicates that there is a reasonable presumption the historical usage of agrichemicals for bona fide agricultural purposes have resulted in the accumulation of residual amounts of these chemicals in the environment.

3. Residual agrichemical concentrations in the environment may accumulate at concentrations that cause water pollution or ground pollution which may pose an unacceptable health risk to exposed populations in the event of a land use change from agricultural use to a non-agricultural use

PLEASE HOLD QUESTIONS
A Q&A SESSION WILL FOLLOW AT THE END OF THE PRESENTATIONS