Malé Declaration on Control and Preservation of Air Pollution and its Likely Trans-boundary Effects for South Asia

Presentation on Monitoring Activity

9th Regional Refresher Workshop of Malé Declaration of Bangladesh

Delhi, India

Presented by

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Presentation on Monitoring Activity of Male' Declaration

Outline of the Presentation

- Background and Implementation of Male′ Declaration
- National implementing agency and institutional arrangement
- Monitoring activities.
- Challenges and difficulties
- Next 3 Years Plan

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Presentation on Monitoring Activity of Male' Declaration

Background and Implementation of Male´ Declaration

- Adopted by the 7th Governing Council Meeting of SACEP held in Male´ capital of Maldives in the year 1998.
- Implimenting Countries: Bangladesh,India,Pakistan,Srilanka,Bhutan,Nepal,Maldives and Iran.
- Phase wise Implimentation
- Phase I – Base line Study and
  National Action Plan
- Phase II – Network establishment, Monitoring and Capacity building and organizing National Stakeholder Workshop
- Phase III – Strengthening Monitoring Activities, Awareness building, Impact assessment, Policy support etc.

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National implementing agencies and Institutional Arrangement

Ministry of Environment and Forest (NFP)

National Advisory Committee

Department of Occupational & Environmental Health (DOEH),NIPSOM

Department of Environment (NIA)

Environment Science Department Bangladesh Agricultural University

Monitoring Station, Sathkhira

Khulna Divisional Lab of DOE

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Presentation on Monitoring of Male' Declaration

Male' Monitoring activities

- Analysis Concentration of Air Pollutants (Dry Deposition)
  - By High Volume samplers (Suspending Particulate Matter- PM_{10}) and Diffusive samplers (SO_X, NO_X and Ozone O_3).
- Rain water Analysis (Wet Deposition)
  - Sample Collection By Bulk Collector and Wet only Collector).
  - P^H, EC, Anion (Sulfate, Nitrate, Chloride, Bicarbonate), Cation (Sodium, Potassium, Calcium, Magnesium, Ammonium).
  - Analyze by using P^H, EC meter, Spectrophotometer and Atomic Absorption Spectrophotometer.
- Metrological Parameter
  - Data Collected from Metrological dept of Shatkhira.
- All Technical Manual of Male Monitoring activities translated into Bangla
- Bangladesh has been fulfilled all monitoring parameters as per as recommendation of Male' head quarter.

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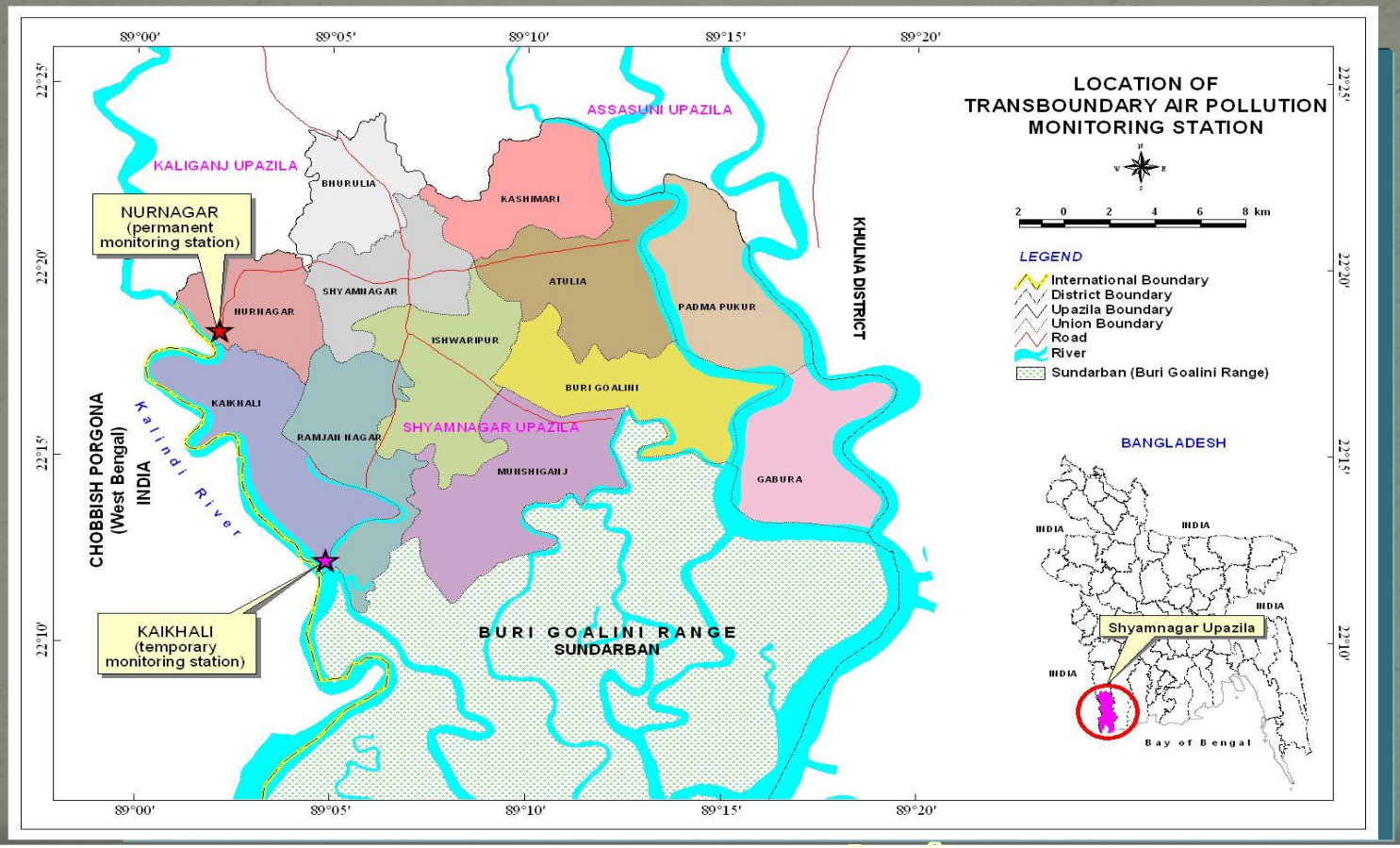
Location of Trans-boundary Air Pollution Monitoring Station



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- Two types of monitoring
  - Dry Deposition Monitoring
  - Wet Deposition Monitoring

In Dry Deposition Monitoring
- Metrological Data
- Field Temperature
- Air Quality Monitoring

In Wet deposition Monitoring
- Rain water Quality Test
- Precipitation Amount

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- Metrological Data
  - Metrological Parameters are
    - Wind Direction
    - Wind Speed
    - Solar Radiation
    - Av. Rain Fall
  - All Metrological Parameters have been being monitored by Metrological Dept, Shatkhira
  - Male' station personnel has been collecting data from metrological Dept monthly basis.
  - Data have been being sent to UNEP through NIA (DP of Male')
  - The metrological Data is very important for measurement of Air Quality Parameters by Passive Sampler

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- Field Temperature
  - Field Temperature has been being monitored by Station Personnel every day basis.
  - The recorded temperature has been sent to UNEP through NIA (PD of Male')
  - The Field Temperature is very important for measurement of air Quality

Dry Deposition

- Air Quality
  - The parameter are :
    - PM10 (Particulate Matter 10micron)
    - SO_2 (Oxide of Sulfure)
    - NO_2 (Oxide of Nitrogen)
    - O_3 (Ozone)
  - PM10 has been monitored by High Volume sampler (HVS) and measured in Khulna Male Lab
  - SO_2, NO_2 and O_3 have been Monitored by passive sampler and samples have been sent IVL (Swedish Environmental Lab) for analysis
  - Require Instruments are:
    - High Volume Sampler (HVS)
    - Electric Balance(Four Digits)
    - Desiccators

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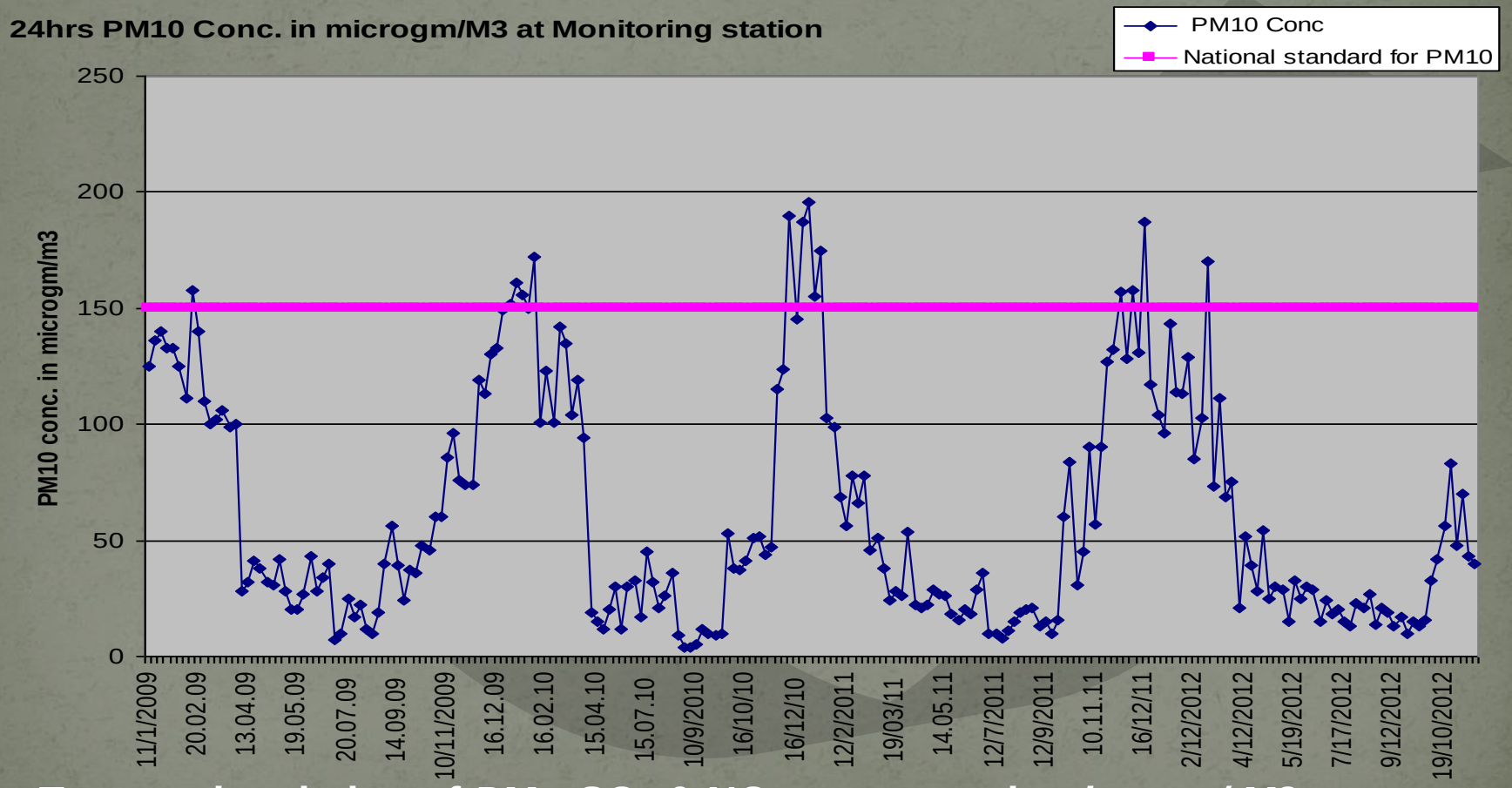
Last 3 Years Monitoring Activity (Data Completeness)



Temporal variation of *PM_{10}*, SO_2 & NO_2 concentration *in µgm/ M3*

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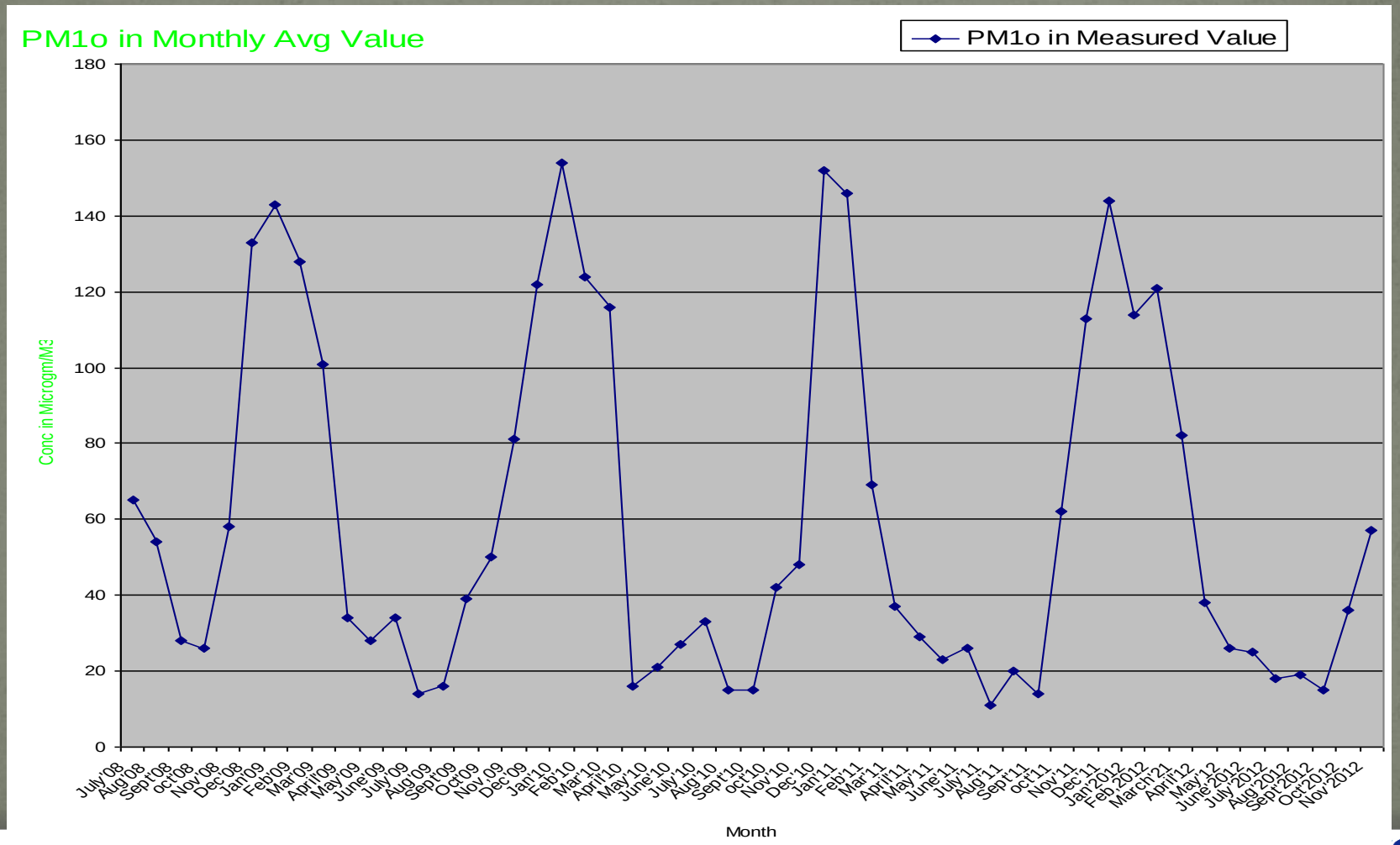
Last 3 Years Monitoring Activity (Data Completeness)



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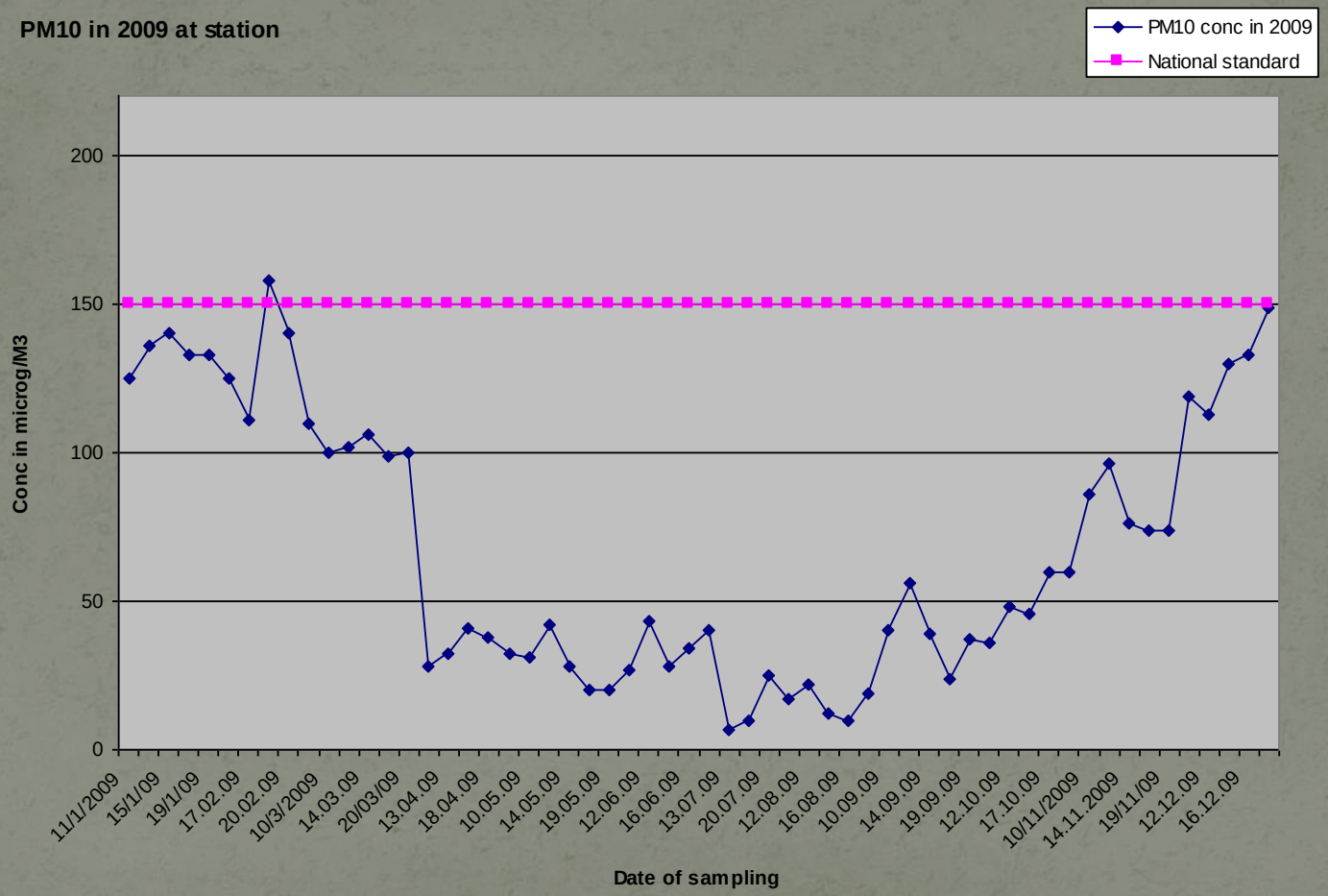
Temporal Variation of PM10 in 2009



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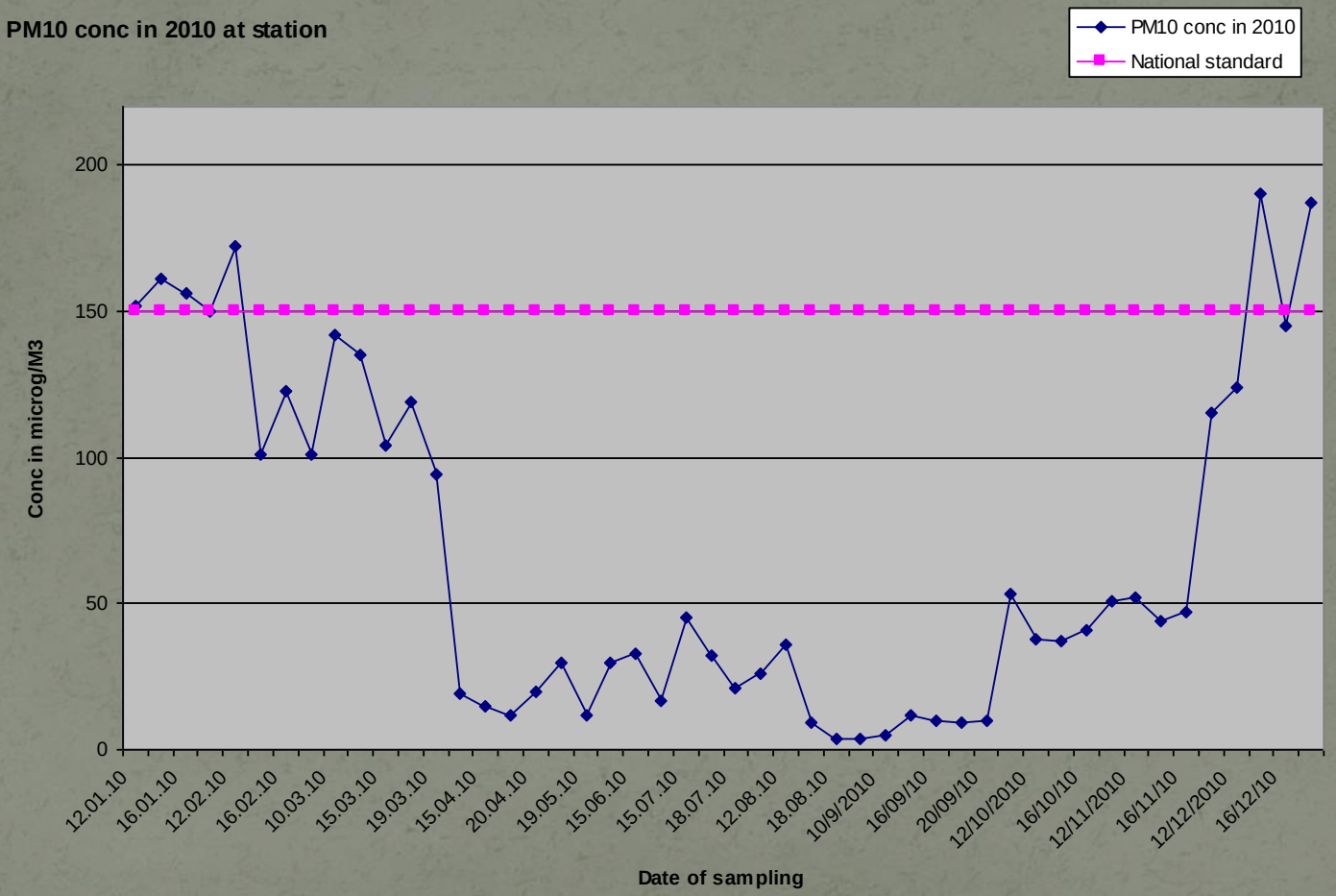
Temporal Variation PM10 Conc. in 2010



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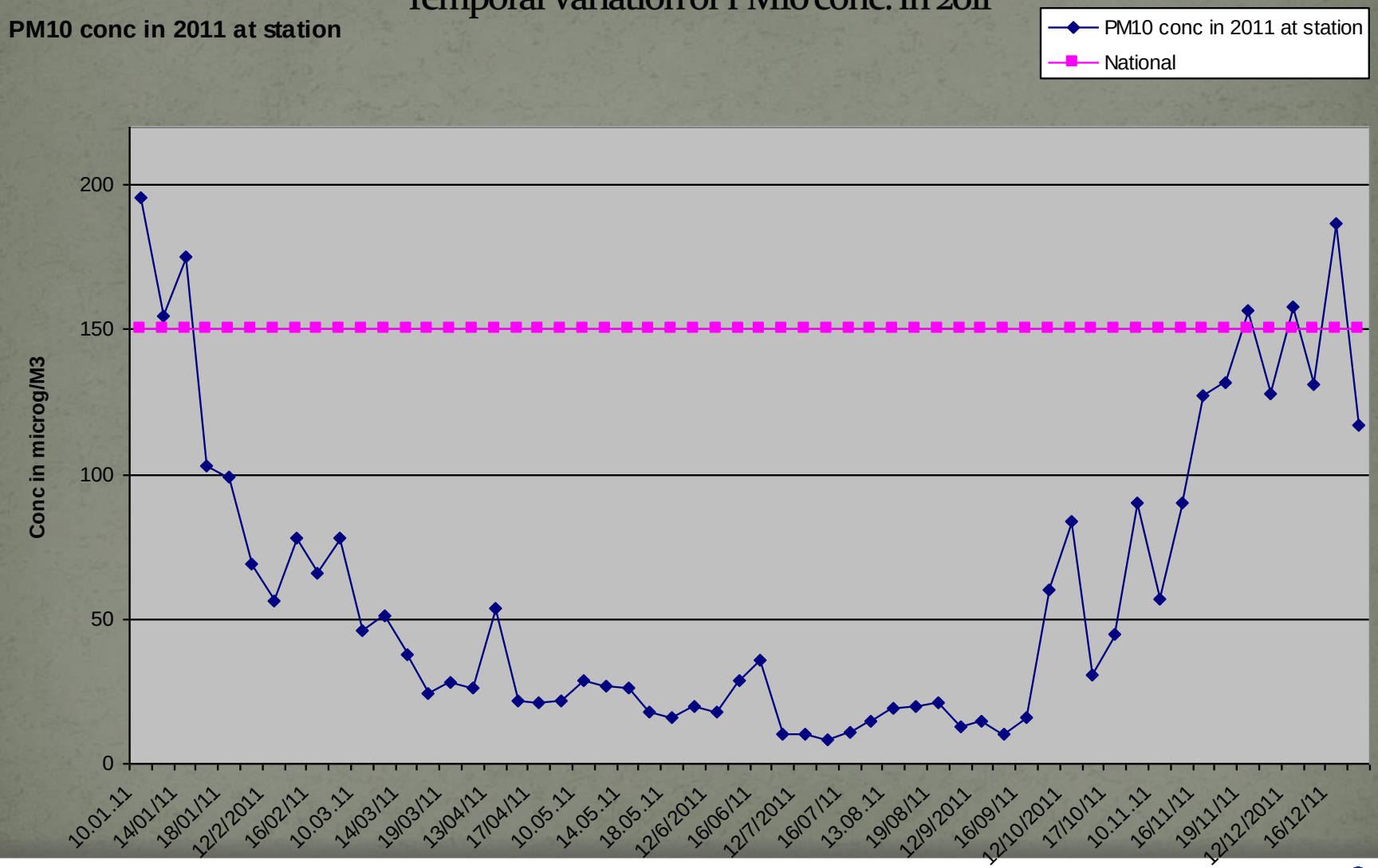
Temporal Variation of PM10 conc. In 2011



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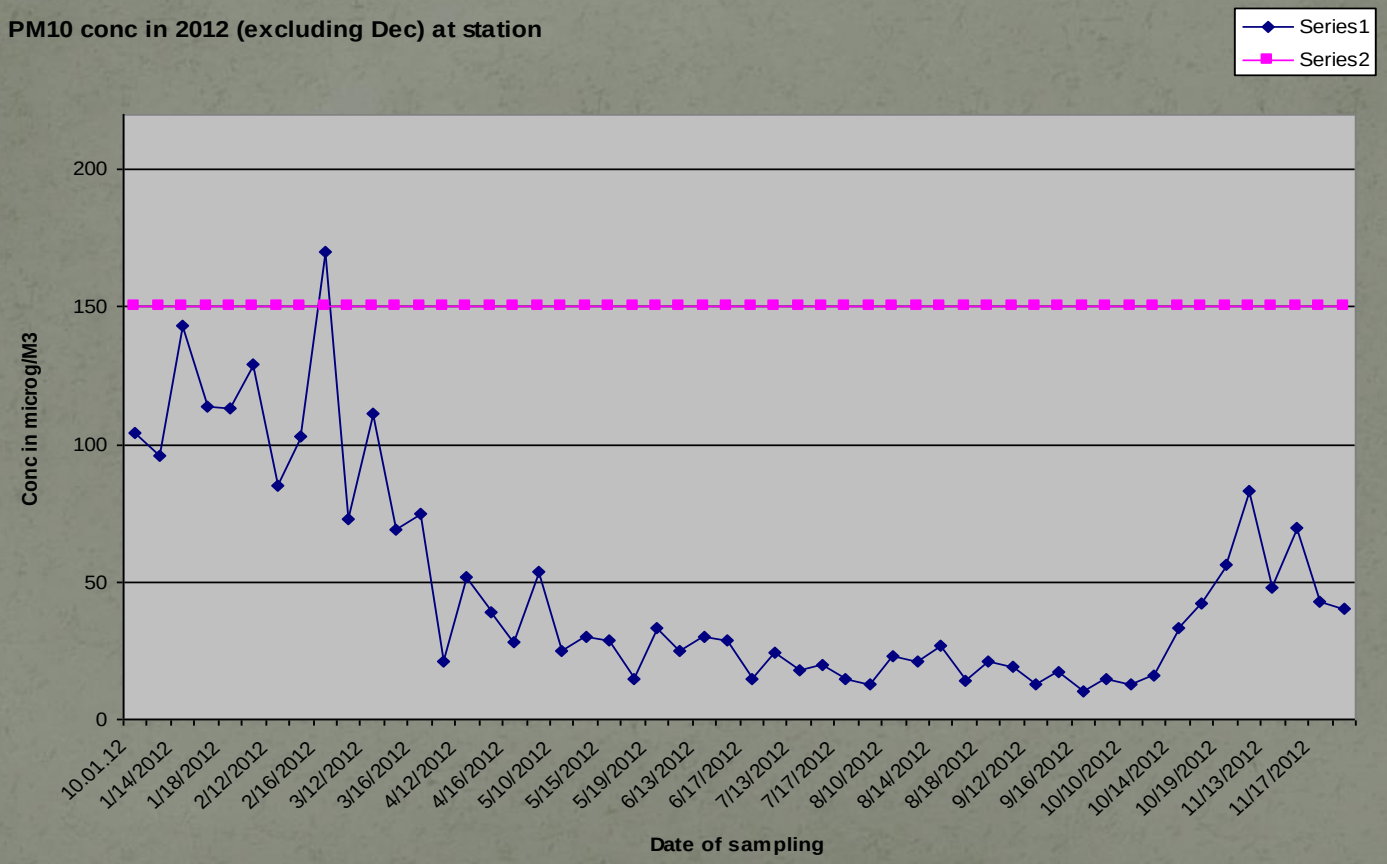
Temporal Variation of PM10 Conc. in 2012 (Excluding Dec)



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Last 3Years Monitoring Activity

Data Completeness

Year	PM_{10} Microgm/m3	National standard
2009	68	50
2010	64	50
2011	58	50

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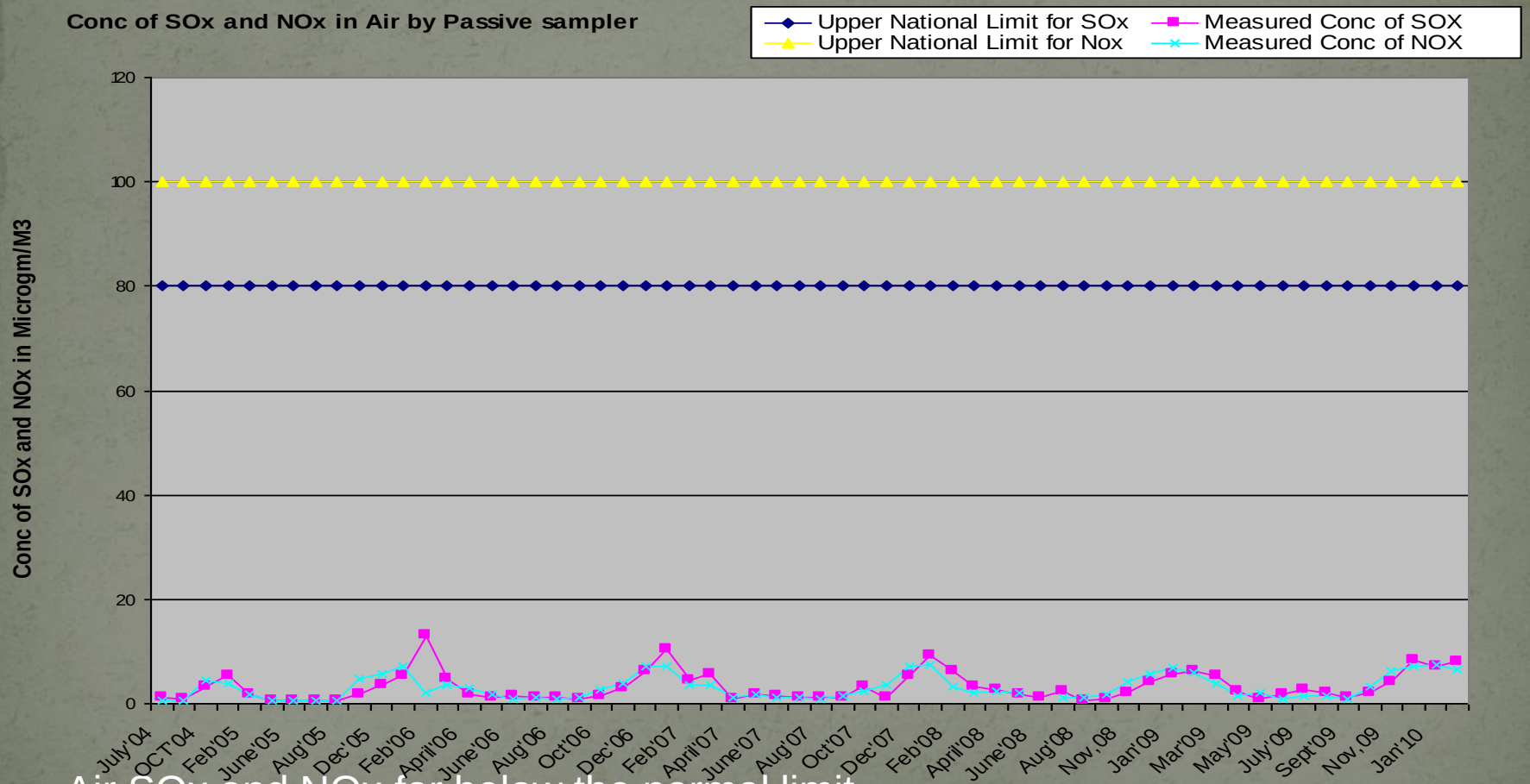
Last 3 Years Monitoring Activity (Data Completeness)



Air SOx and NOx far below the normal limit

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Observation about dry deposition Monitoring

- PM_{10} Sampling has been started from July'2008
- In 2009 57 samples (24hrs avg) had been collected out of 60
- In 2010 48 samples (24hrs avg) had been collected out of 60
- In 2011 56 samples (24hrs avg) had been collected out of 60
- In 2012 (excluding Dec) 52 (24hrs avg) have been collected out of 55
- Seasonal variation of PM is near about same in every year
- Jan, Feb and Dec of a year have shown higher PM Value
- PM Conc. Has been decreased sharply in April every year.
- Yearly Av data of PM_{10} on basis of 24hrs sampling is higher than national standard.
- SOX and NOX sampling Have been done by passive sampler from may'2005
- The sample of SO_X and NO_X have not been collected by High Volume sampler because SOX and NOX Conc. Lower than measurement limit of this instrument.

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Last 3 Years Monitoring Activity (Data Completeness)

Wet Deposition

- Precipitation amount
- Rain water Quality
  - The Monitoring Parameters are:
    - P^H
    - EC
    - Sodium ion(Na^+), Potassium Ion (K^+), Calcium(Ca^{2+}), Magnesium(Mg^{2+}), Ammonium(NH_4^+)
    - Sulfate(SO_4^{2-}), Nitrate (NO_3^-), Chloride (Cl^-)
  - The used Instruments are
    - Bulk Collector
    - Rain Collector
    - P^H Meter, EC meter
    - Atomic absorption spectrometer
    - Spectrophotometer
    - Digital Balance

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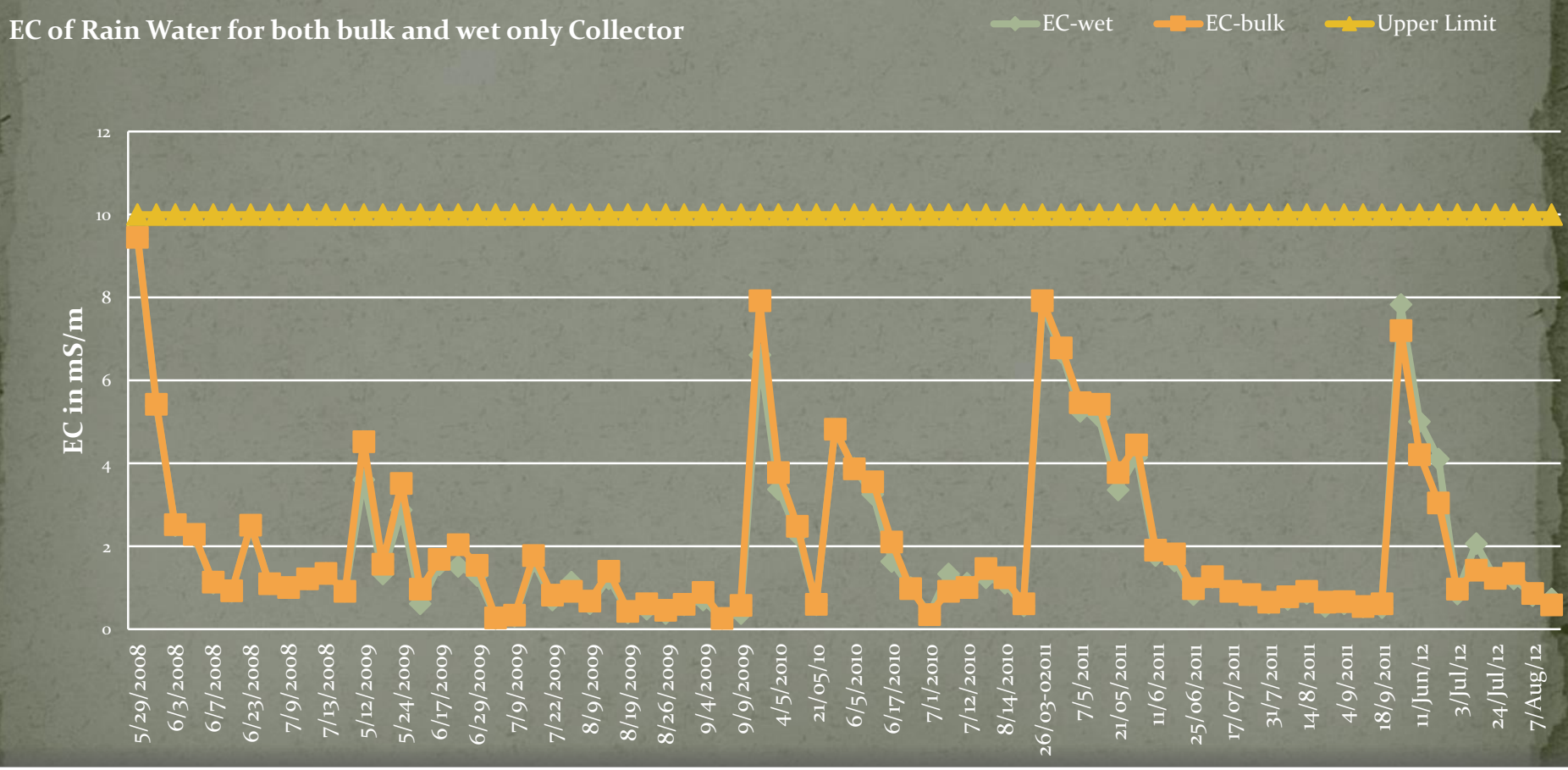
EC of Rain water (bulk and wet only collector) in mS/m (2008 to 2012)



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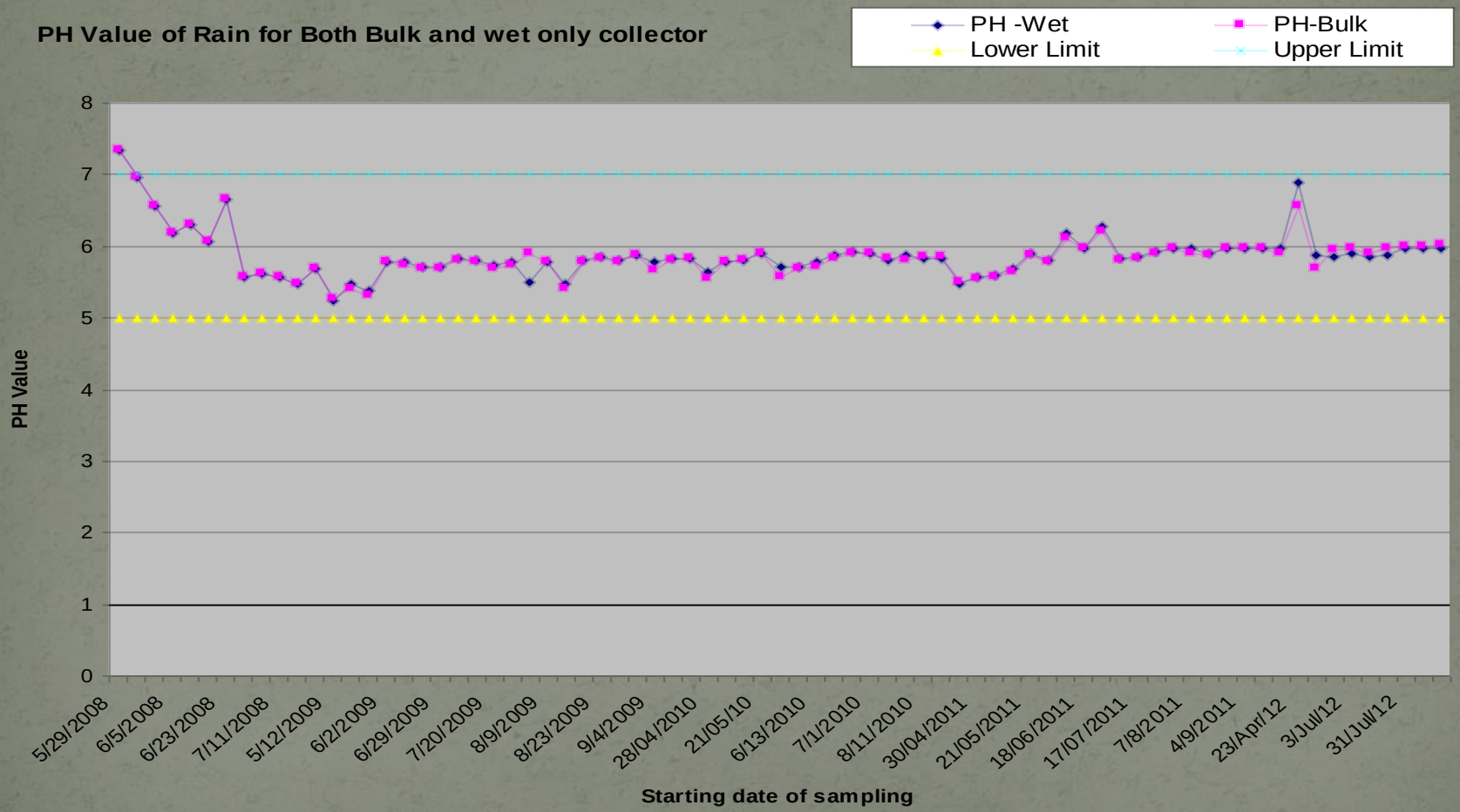
PH of Rain water (bulk and wet only collector) (2008 to 2012)



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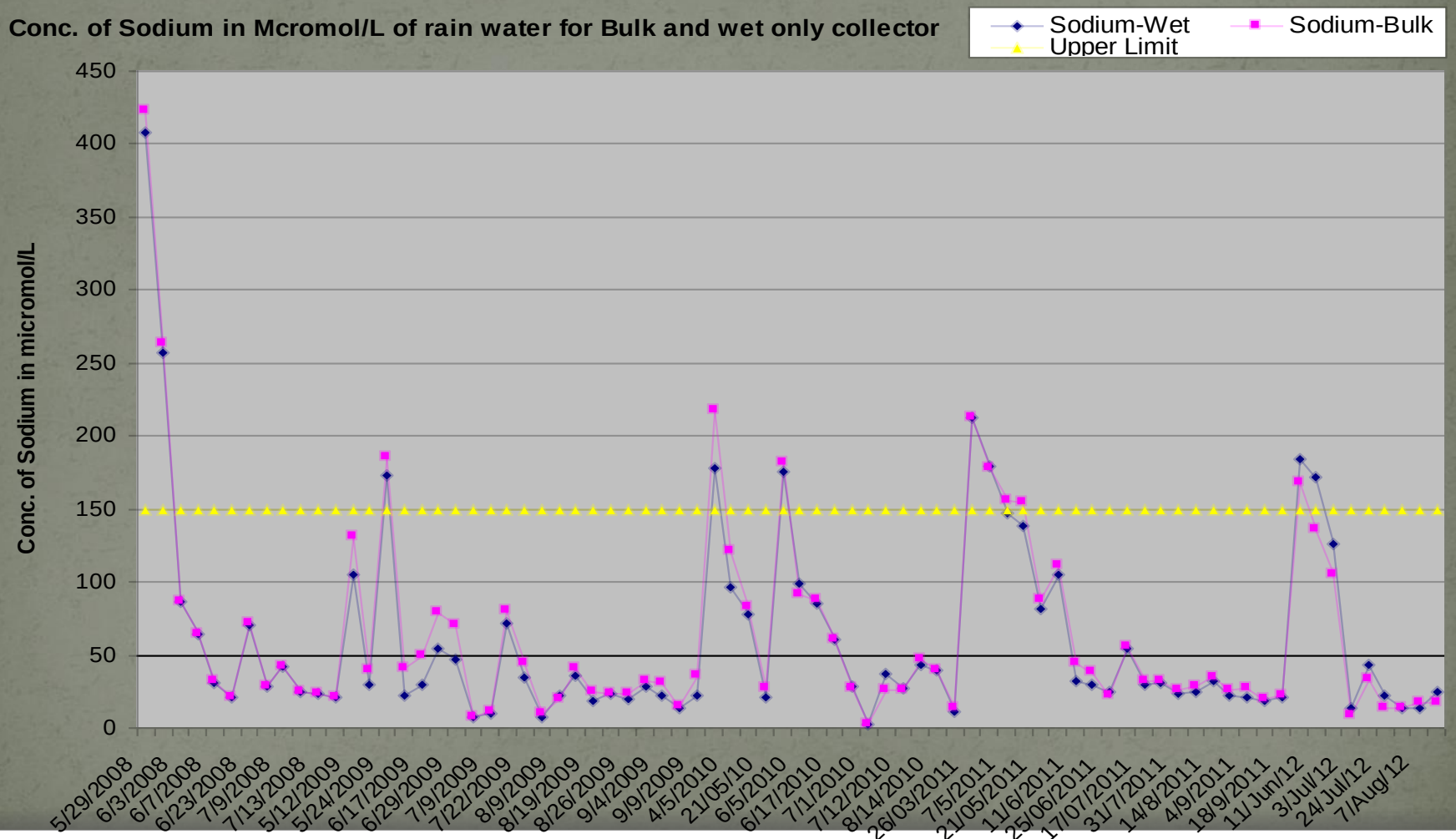
Presentation on Implementation of Male' Declaration

Sulfate cons. of Rain water (bulk and wet only collector) in µmol/L (2008 to 2012)



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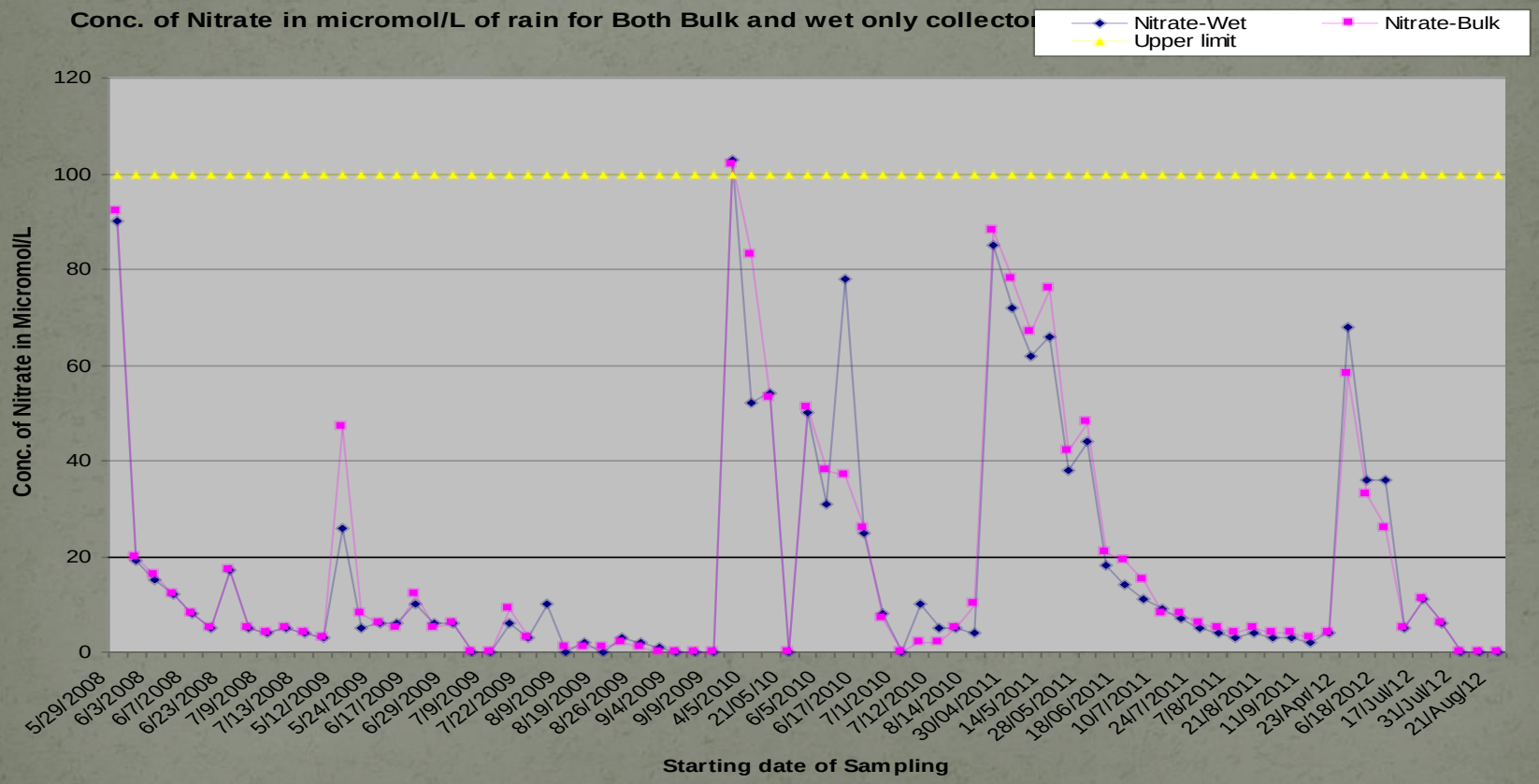
Nitrate conc. of Rain water (bulk and wet only collector) in µmol/L (2008 to 2012)



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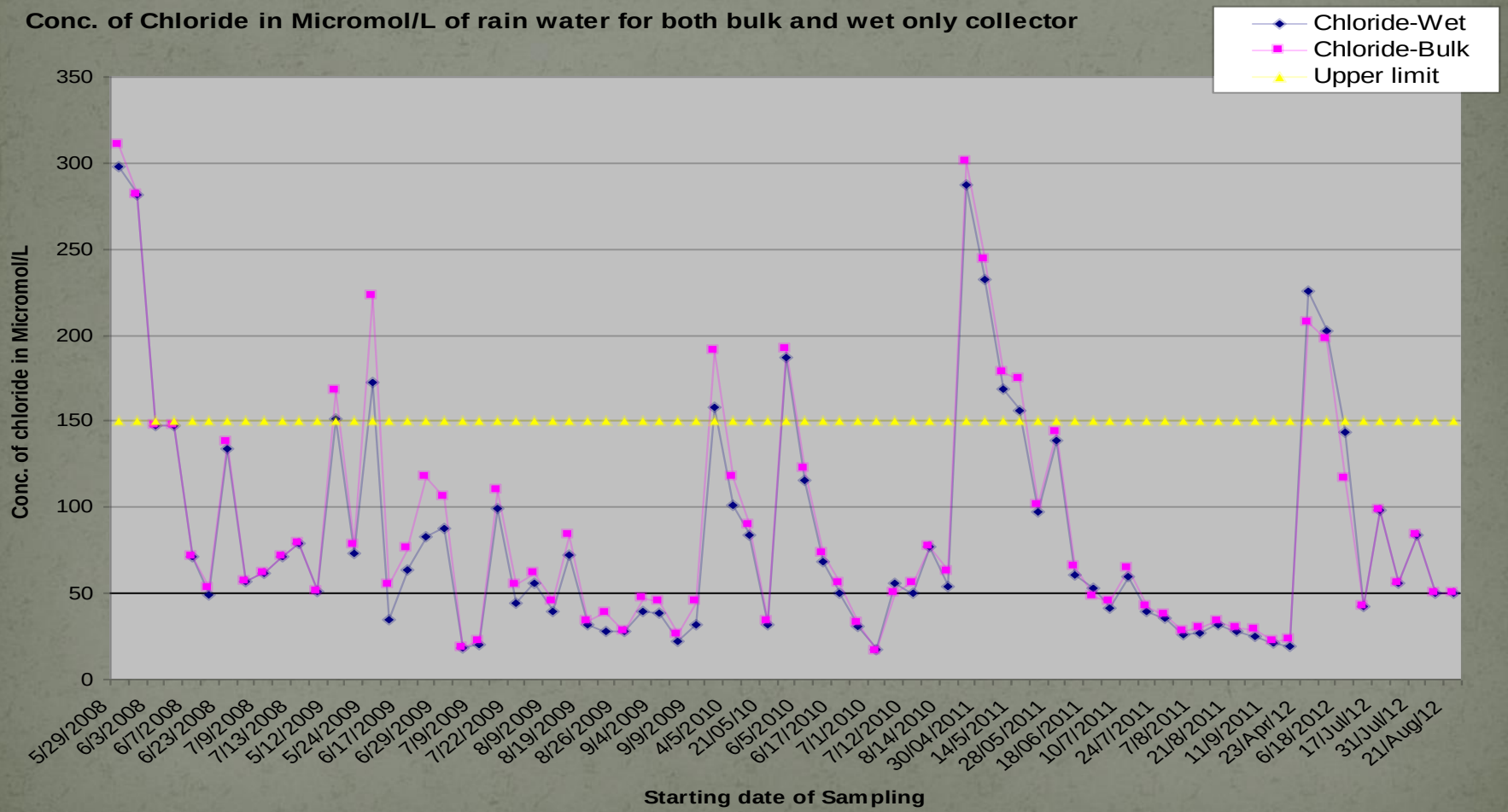
Chloride conc. of Rain water (bulk and wet only collector) in µmol/L (2008 to 2012)



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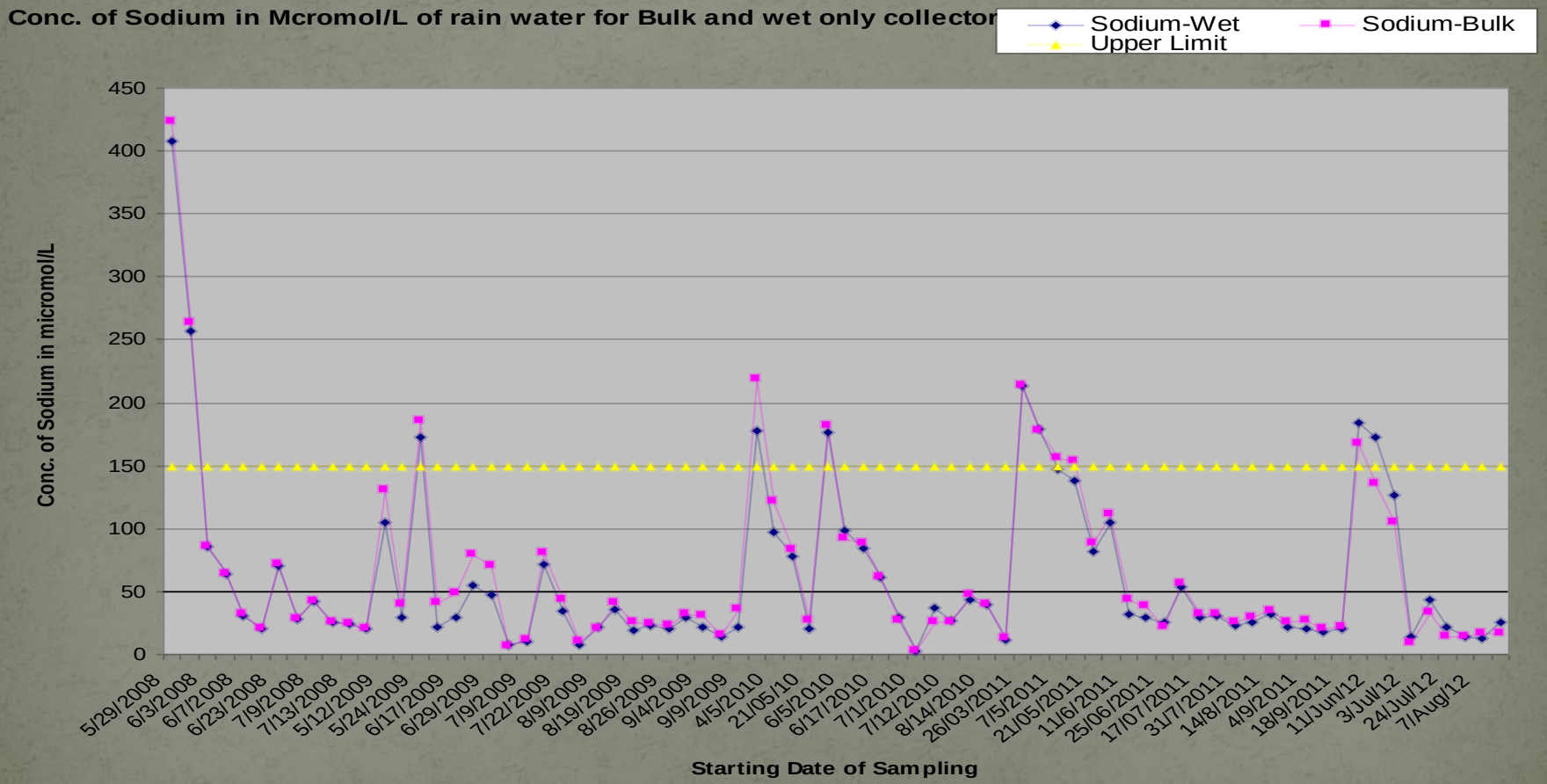
Presentation Monitoring Activity of Male' Declaration

Sodium conc . of Rain water (bulk and wet only collector) in µmol/L (2008 to 2012)



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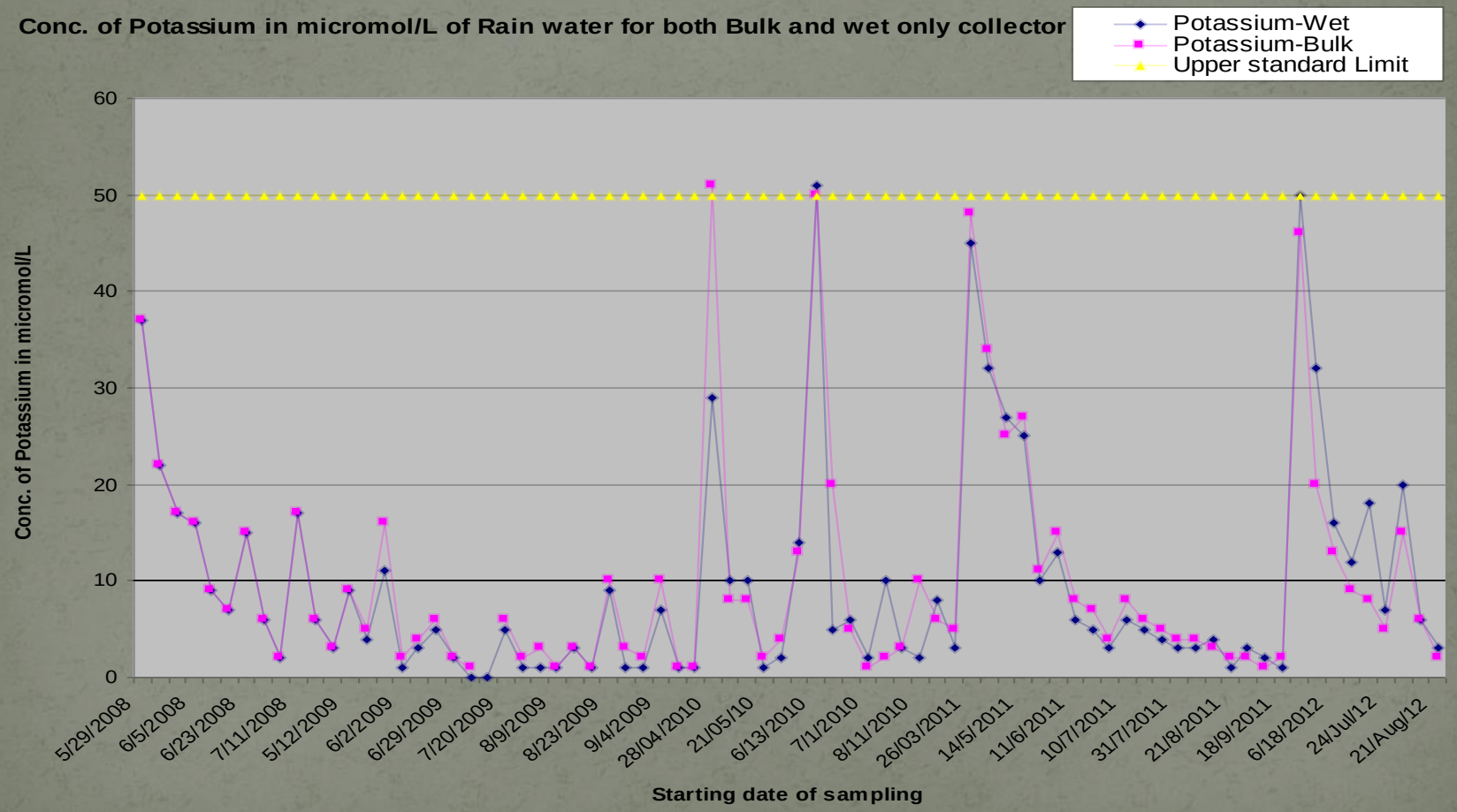
Potassium cons. of Rain water (bulk and wet only collector) in µmol/L (2008-2012)



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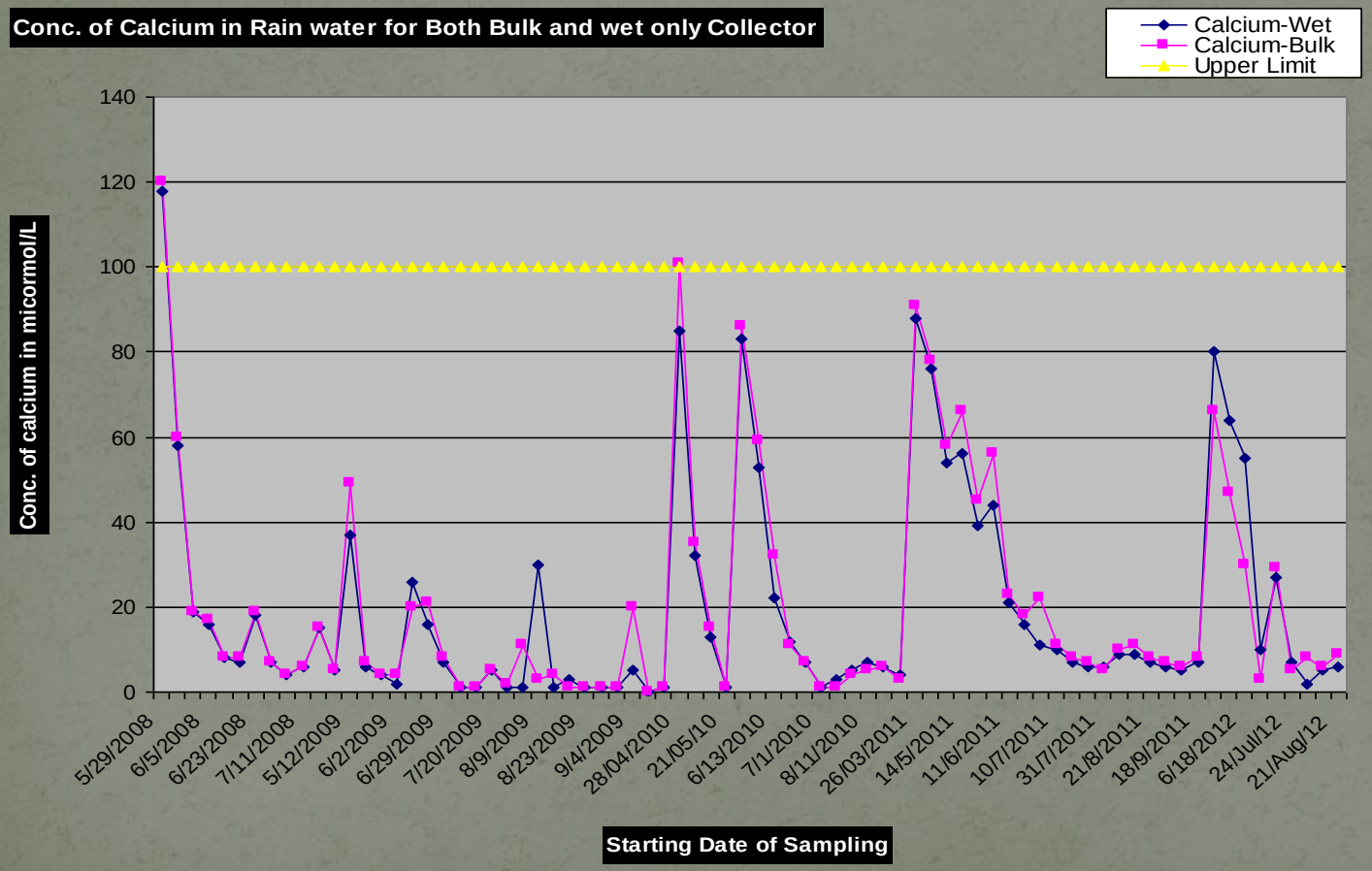
Calcium conc. of Rain water (bulk and wet only collector) in µmol/L (2008 to 2012)



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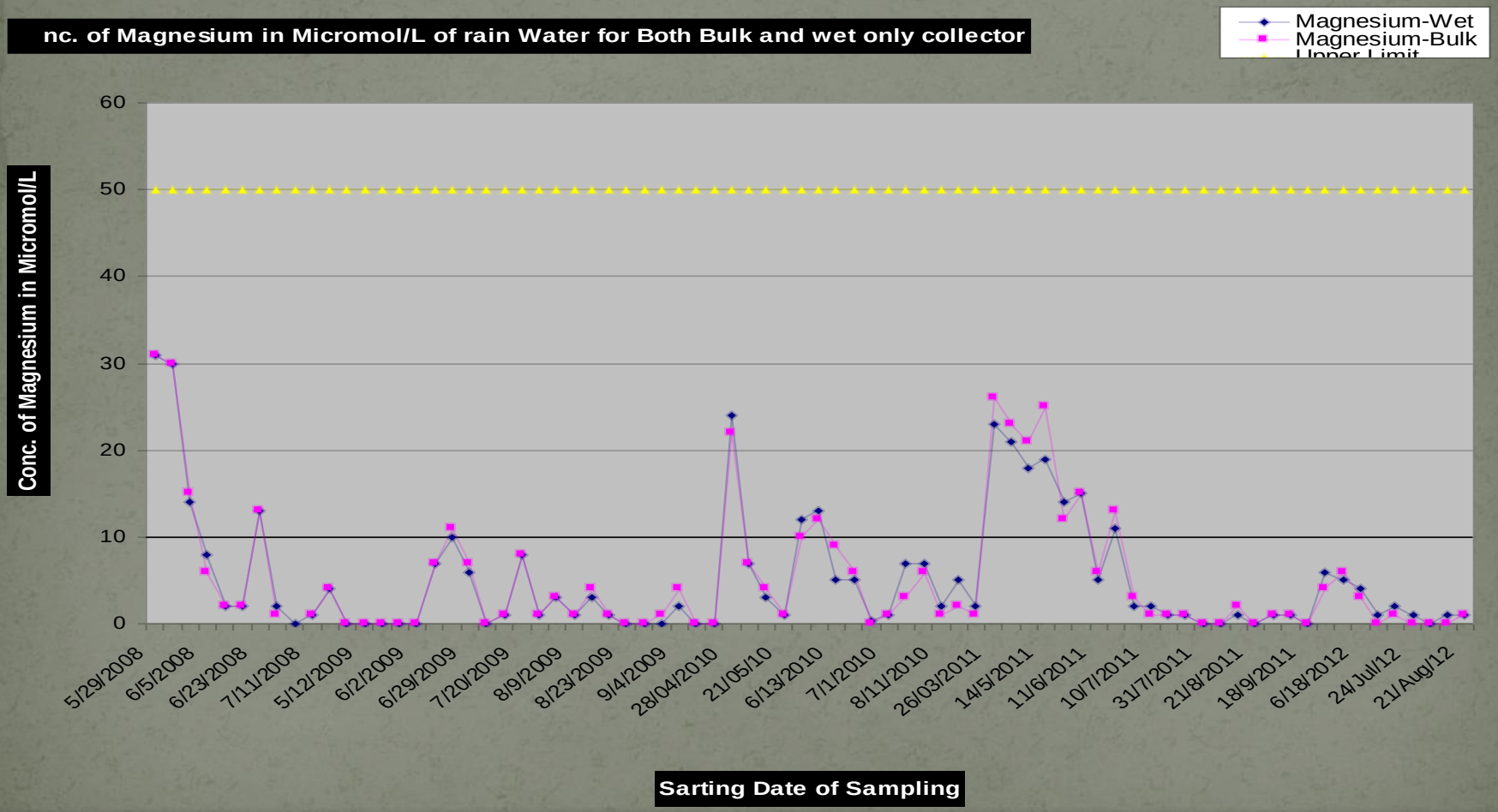
Magnesium conc. of Rain water (bulk and wet only collector) in µmol/L



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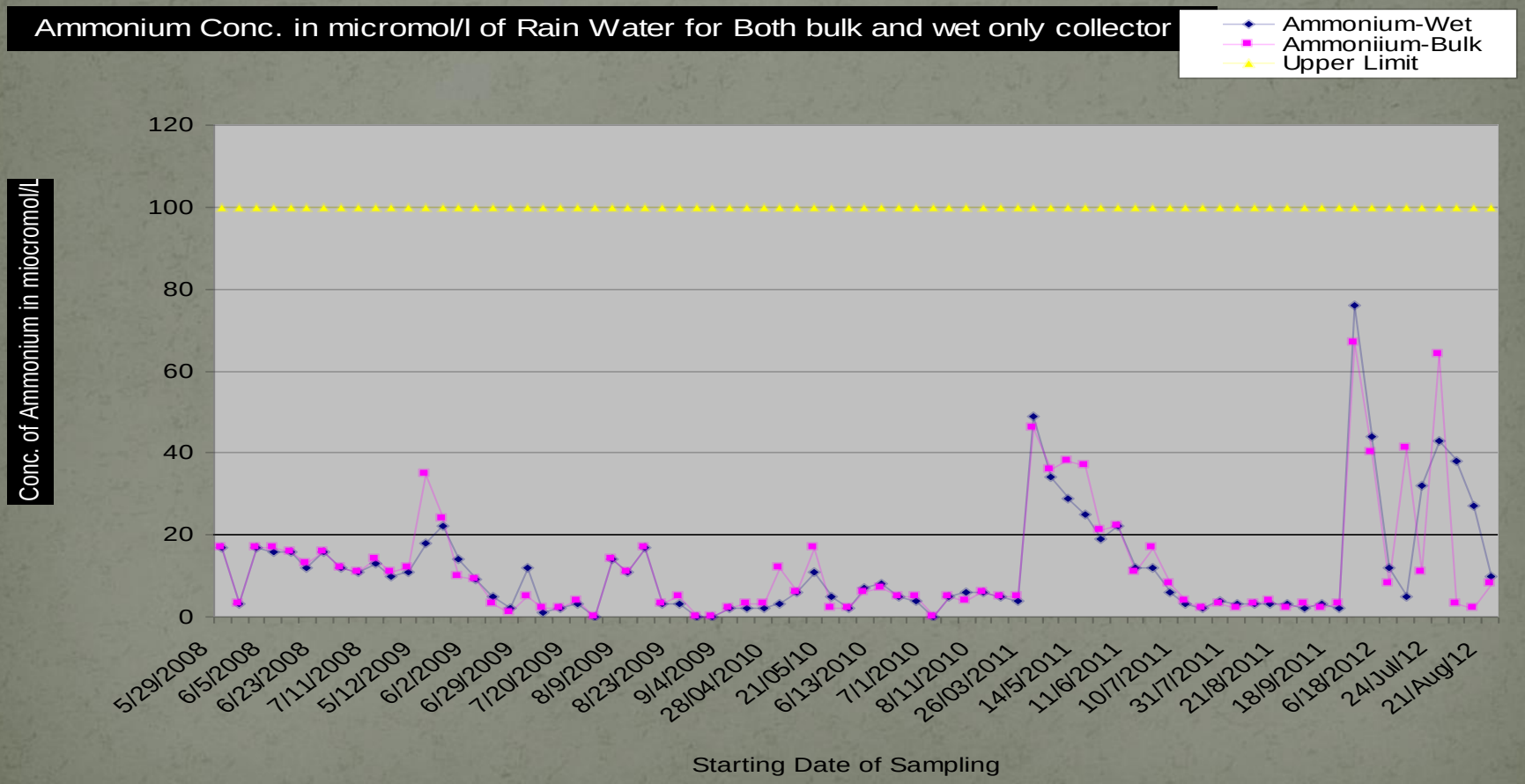
Ammonium conc .of Rain water (bulk and wet only collector) in µmol/L (2008-2012)



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Observation of Wet Deposition Monitoring

- The graphical data represent single sample of rain for both Bulk and wet only collectors.
- Initial one or two rain is shown higher minerals concentration than another rains of same year.
- Sodium and Chloride conc of rain water is shown higher than limit in several cases.
- From 2011 Rain water has been collected in weekly basis
- Before 2011Rain water has been collected in daily basis

Presentation on Monitoring Activity of Male' Declaration

National Advisory Committee for Male'

- Government has been formed nation National Advisory Committee (NAC) for strengthening Male' activities.
- The committee is comprised with academician, scientist and administrative personnel.
- The committee is met every three months for assess activities of Male' monitoring in Bangladesh and given suggestions for smooth and uninterrupted operation.
- From January'2012 the committee has been met four times.
- Decisions taken in those meetings were come out as minute which was also be sent UNEP regional office.
- Male' activities in Bangladesh have been boosted up by regular NAC Meetings

Presentation on Monitoring Activity of Male' Declaration

Challenges and difficulties

- Calibration of High Volume Sampler
- Replacement of Hollow cathode Lamps (Na^{+}, K^{+} and Ca^{2+})
- Maintenance of AAS by local agent (Recently local agent of Varian is changed)
- Arrangement of STD solution of Na, K, Ca and Mg for AAS

Presentation on Monitoring Activity of Male'Declaration

- Black Carbon Analysis :

Exposed filters from monitoring station for analysis have sent to Environment Canada by Dr. Abdus Salam of Dhaka University. They have analyzed them. But they could not send us the results due to the Blank filter. Blank filters have been to Canada four weeks before with EMS service. Hopefully, they will send the results after soon

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Presentation on Monitoring of Male' Declaration

Plan for Next 3 Years

Institutional Arrangement

This will be almost same. The institutional arrangement may change with inclusion of new study.

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Presentation on Implementation of Male' Declaration

Plan for Next 3 Years

Monitoring Activities

- All parameters will be monitored as usual.
- 2nd monitoring station will be set up, if fund is made available
- Inclusion of New Parameter- $PM_{2.5}$

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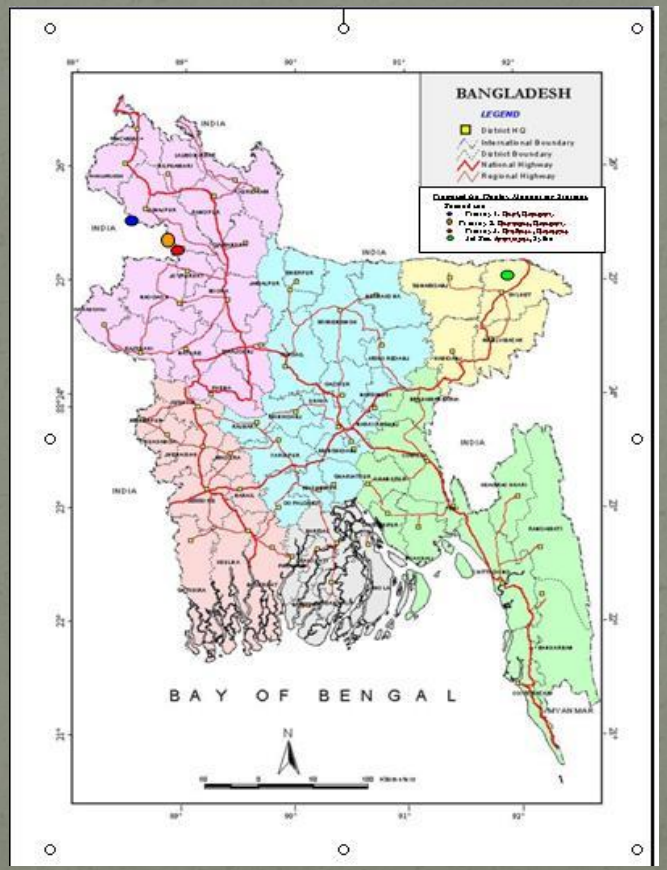
Last 3 Years Implementation

Selection of 2nd Monitoring Station



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Plan for Next 3 Years

PLAN FOR EMMISION INVENTORY AND MODELLING

Updating emission inventory by using 2005 data

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Thank you.....

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