

**U.S. Environmental Protection Agency, Region II
New York/New Jersey Harbor Estuary Program
Water Management Division
Surface Water Quality Branch**

**DEVELOPMENT OF TOTAL MAXIMUM DAILY
LOADS AND WASTELOAD ALLOCATIONS
FOR TOXIC METALS IN NY/NJ HARBOR**

**MODELING REPORT
APPENDICES**

Job Number: TETRO103

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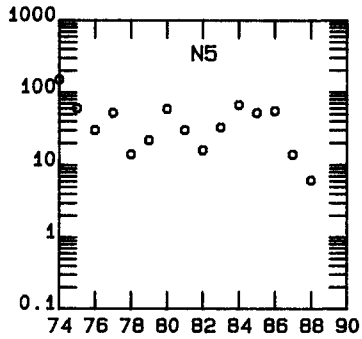
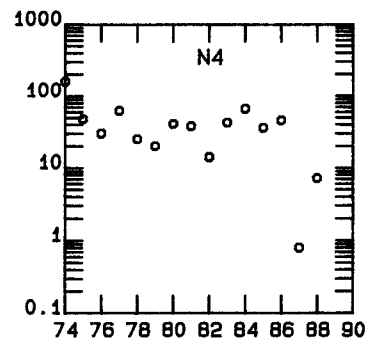
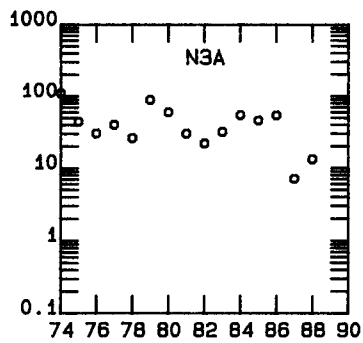
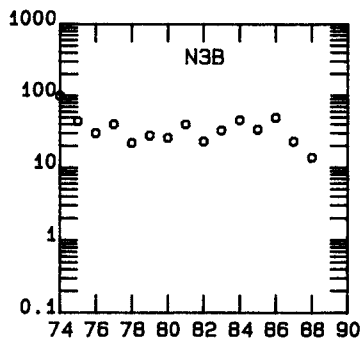
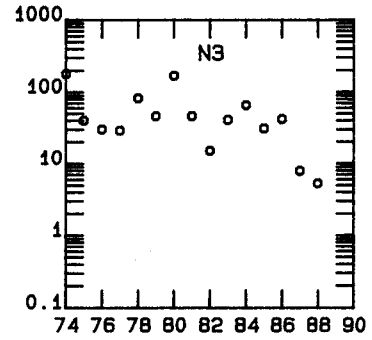
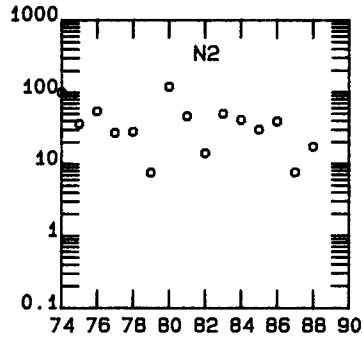
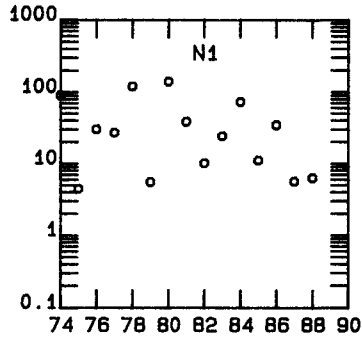
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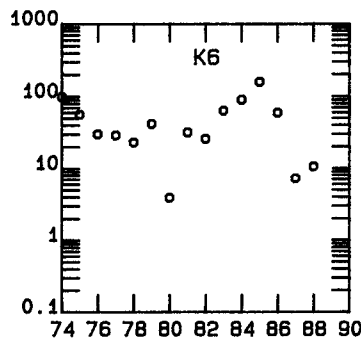
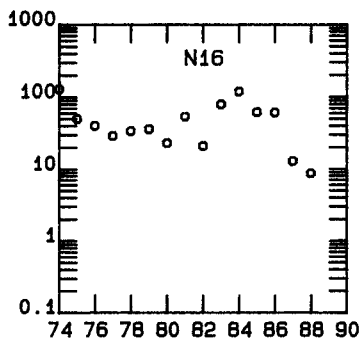
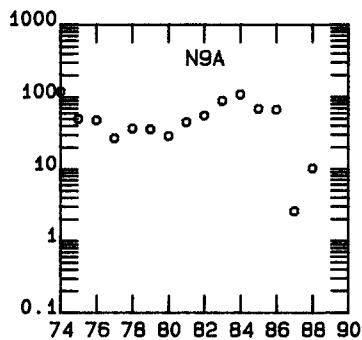
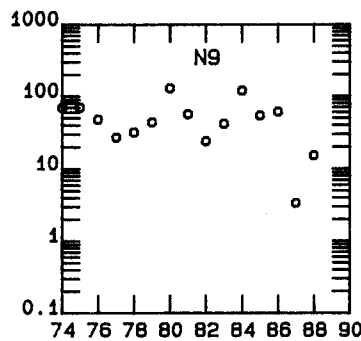
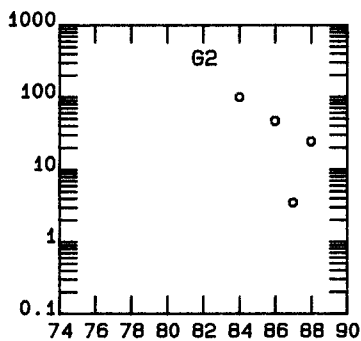
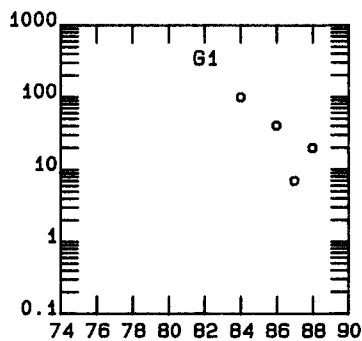
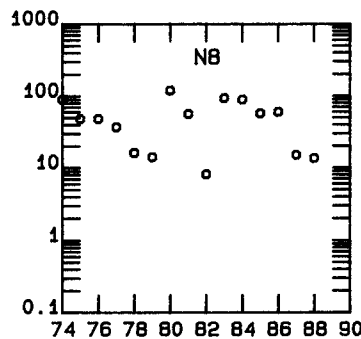
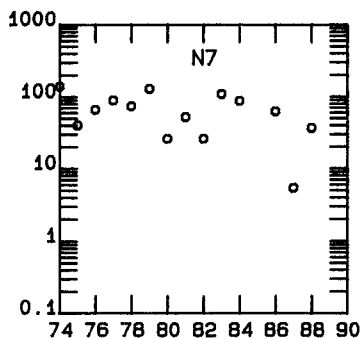
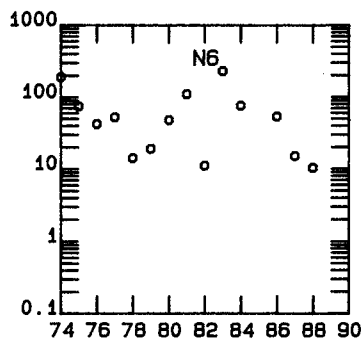
APPENDIX I

**SPATIAL AND TEMPORAL ANALYSES
OF NYCDEP HARBOR SURVEY
HISTORICAL METALS DATA**

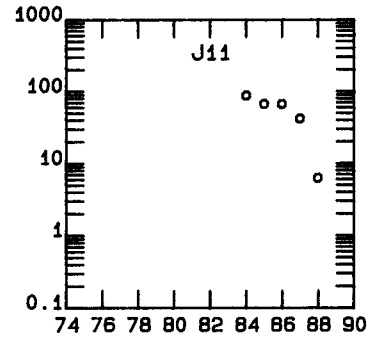
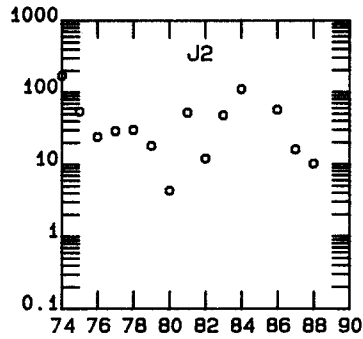
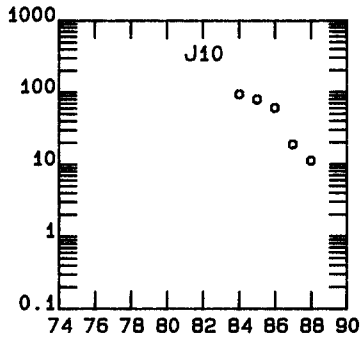
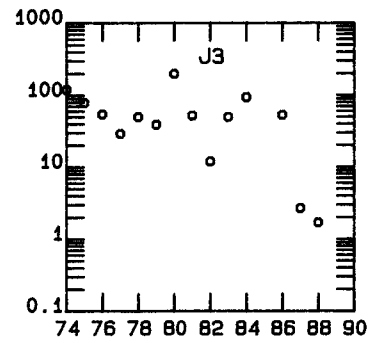
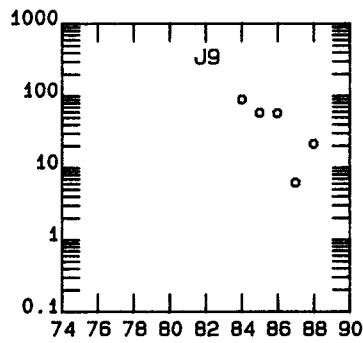
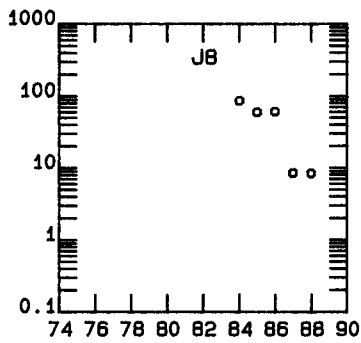
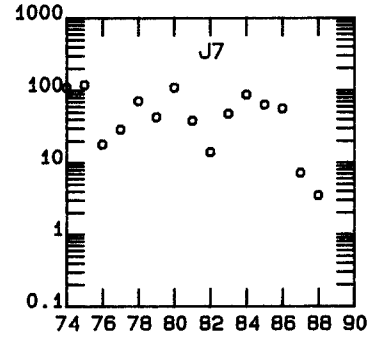
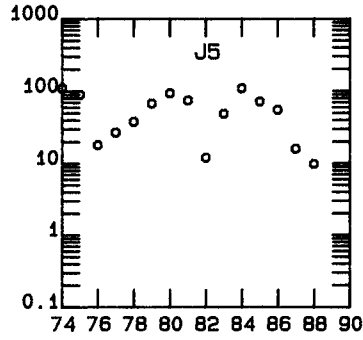
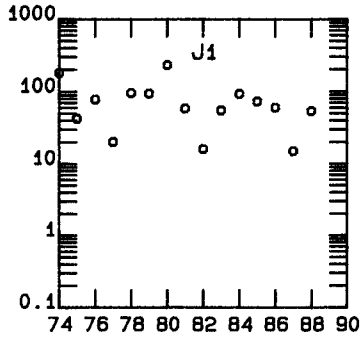
Hudson River Water Column Copper (ug/l)
NYC DEP Harbor Survey 1974-1988



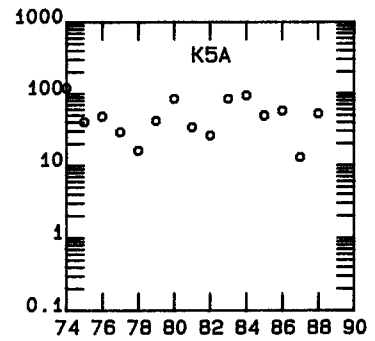
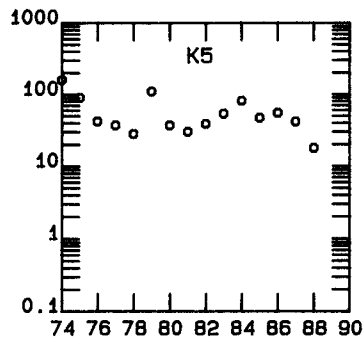
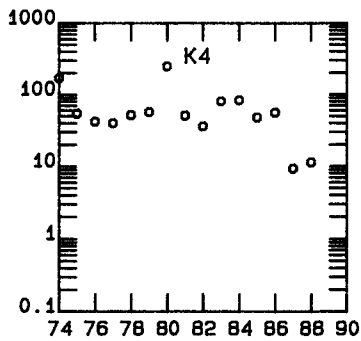
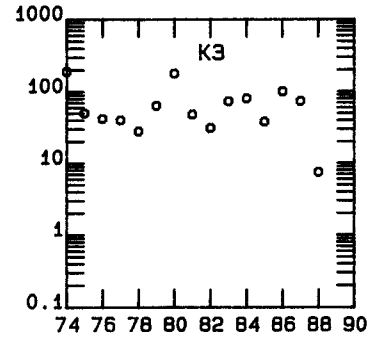
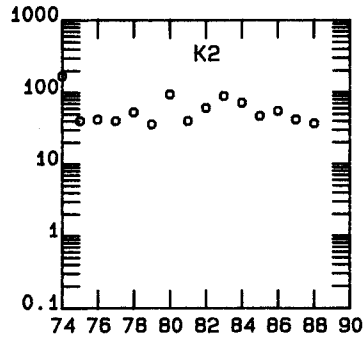
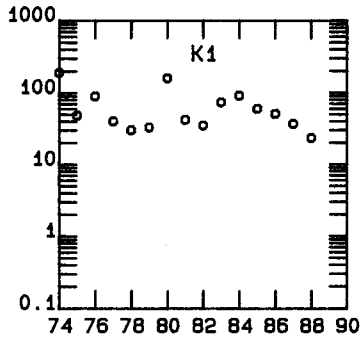
Inner and Outer Harbor Water Column Copper (ug/l) NYC DEP Harbor Survey 1974-1988



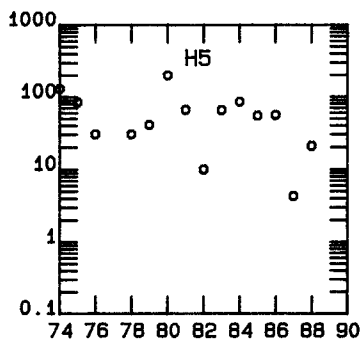
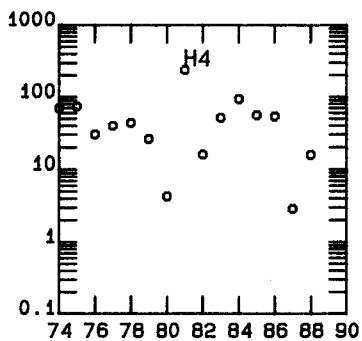
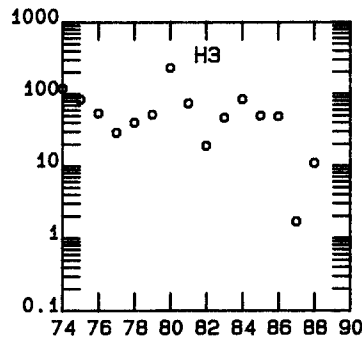
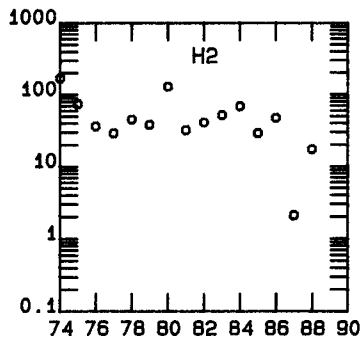
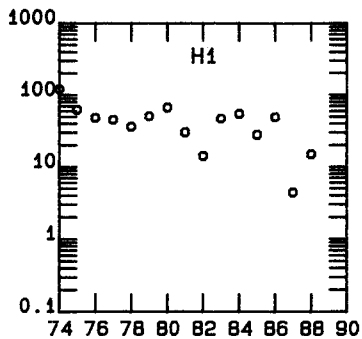
Jamaica Bay Water Column Copper (ug/l)
NYC DEP Harbor Survey 1974-1988



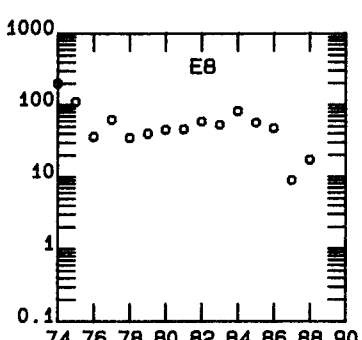
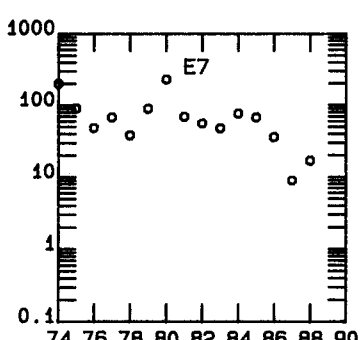
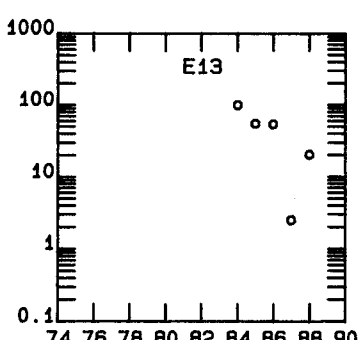
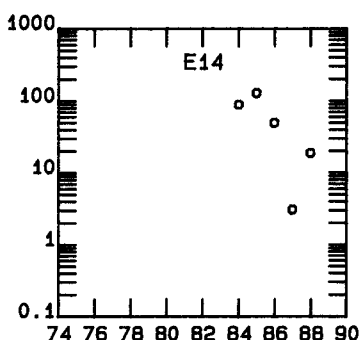
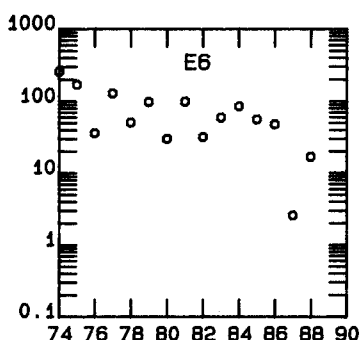
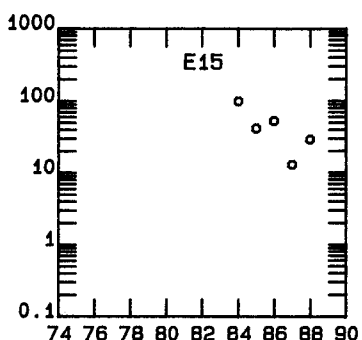
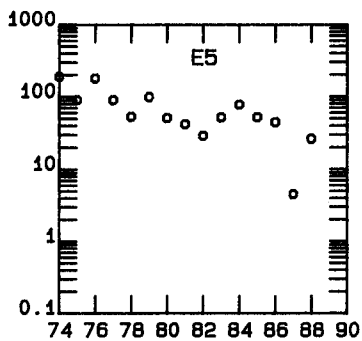
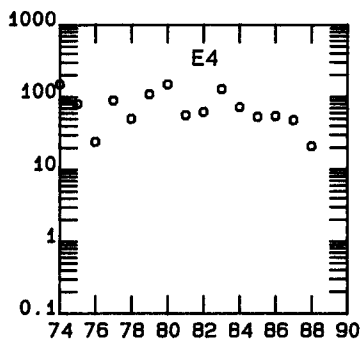
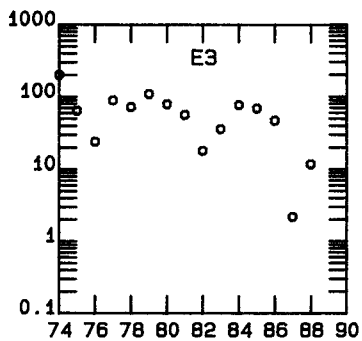
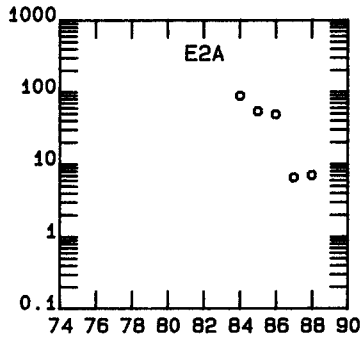
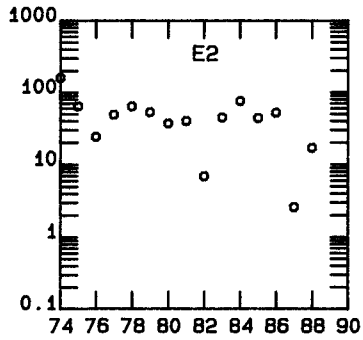
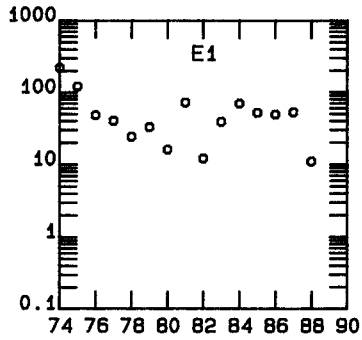
Kills - Raritan Bay Water Column Copper (ug/l)
NYC DEP Harbor Survey 1974-1988



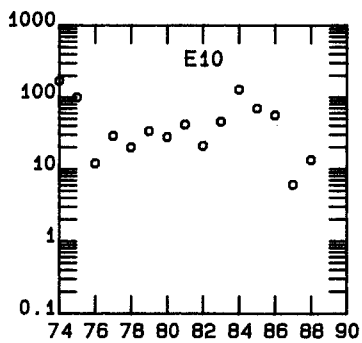
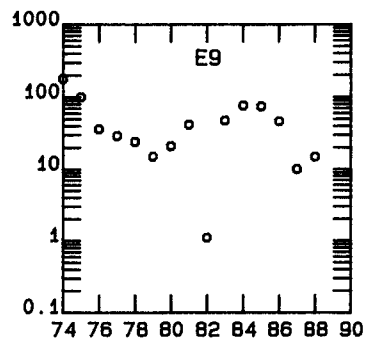
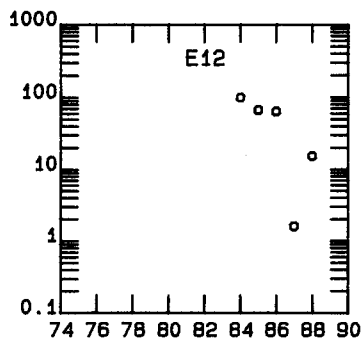
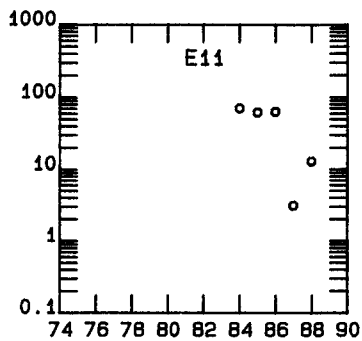
Harlem River Water Column Copper (ug/l)
NYC DEP Harbor Survey 1974-1988



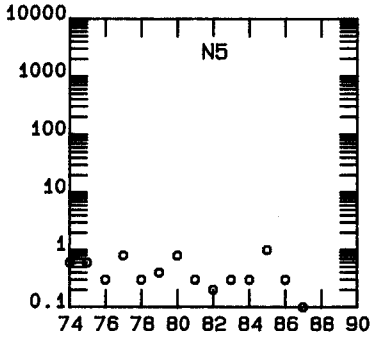
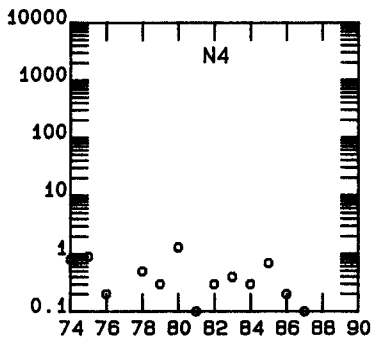
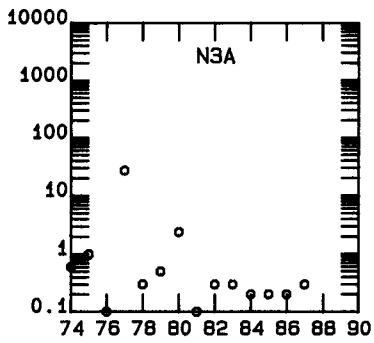
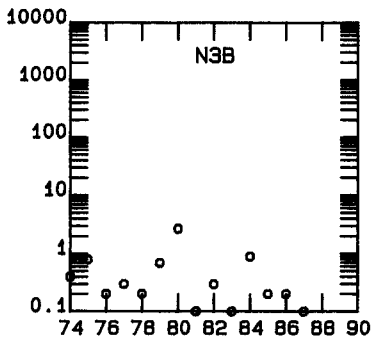
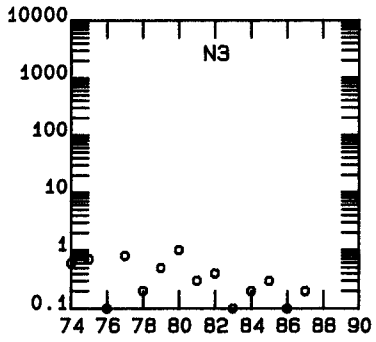
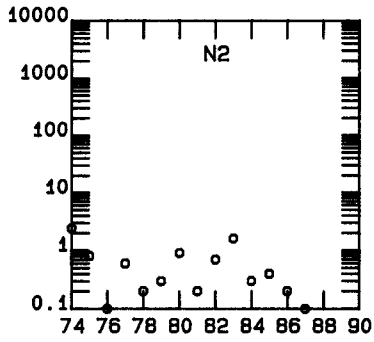
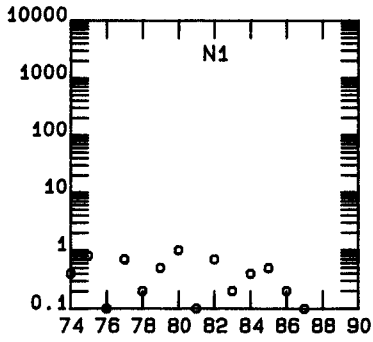
East River Water Column Copper (ug/l)
NYC DEP Harbor Survey 1974-1988



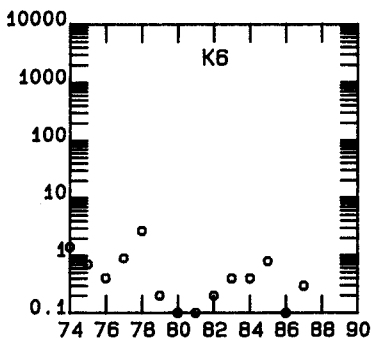
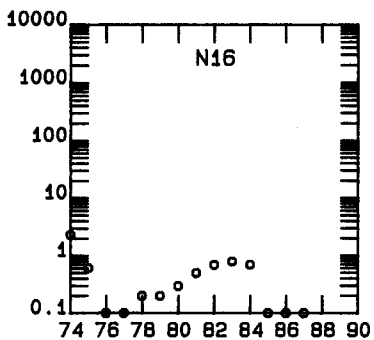
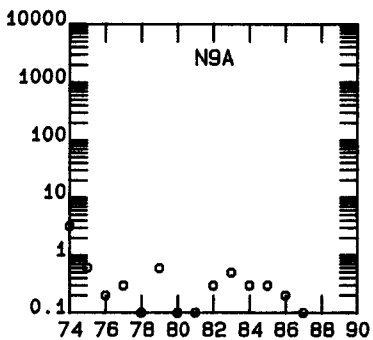
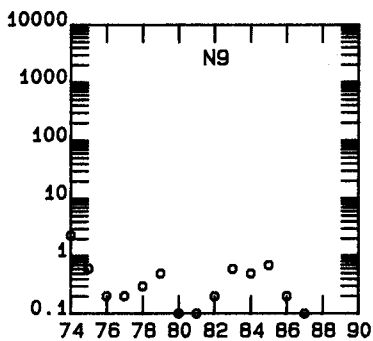
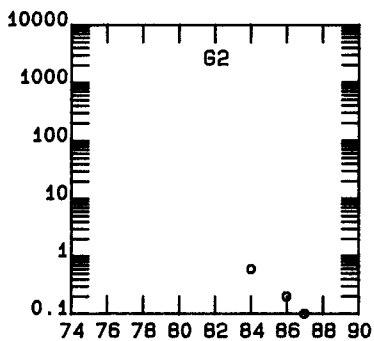
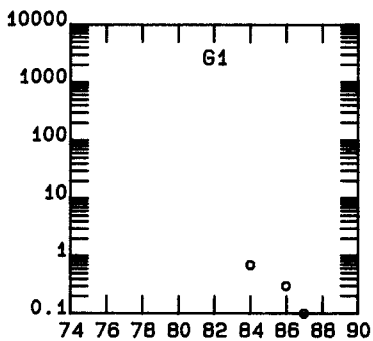
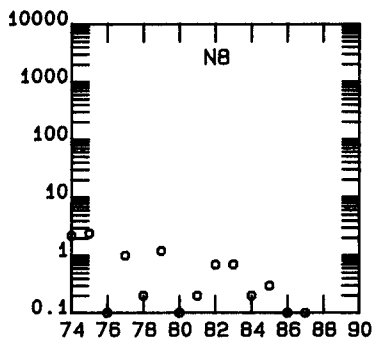
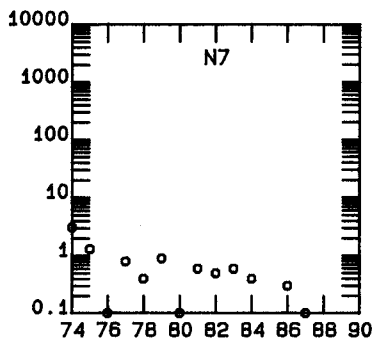
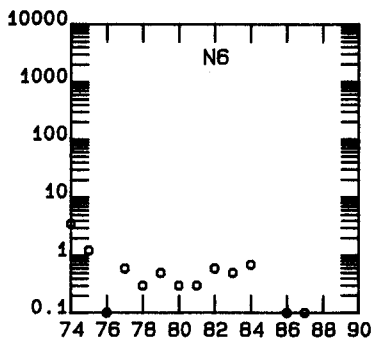
Outer East River Water Column Copper (ug/l)
NYC DEP Harbor Survey 1974-1988



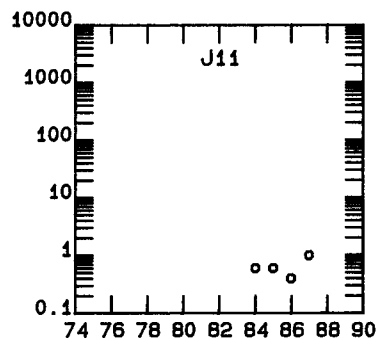
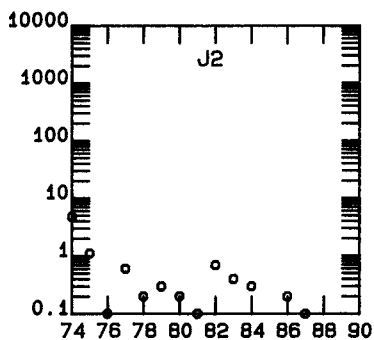
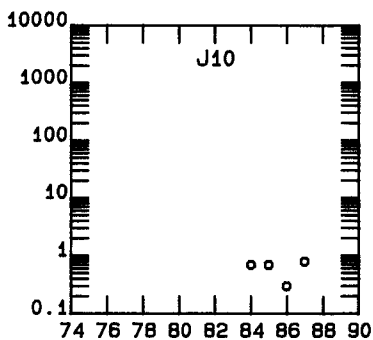
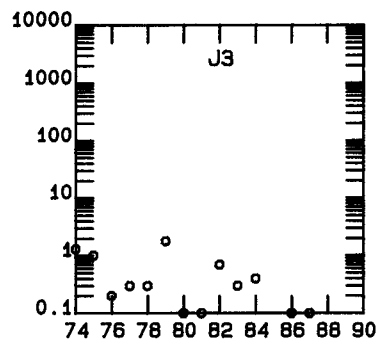
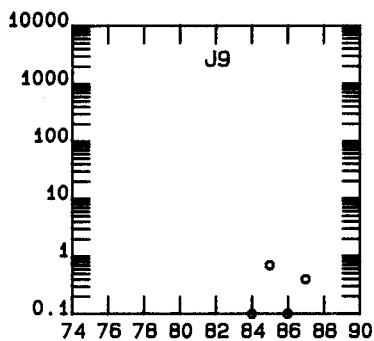
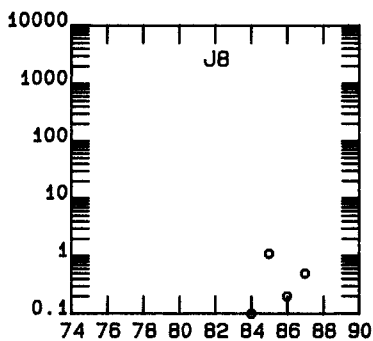
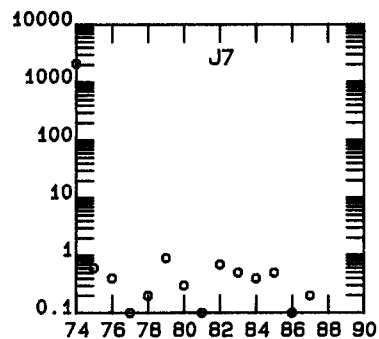
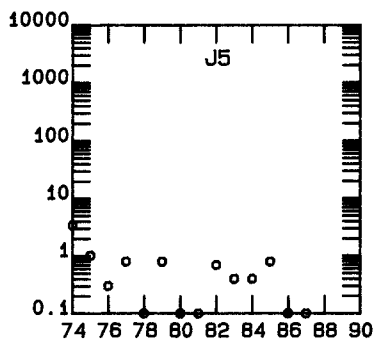
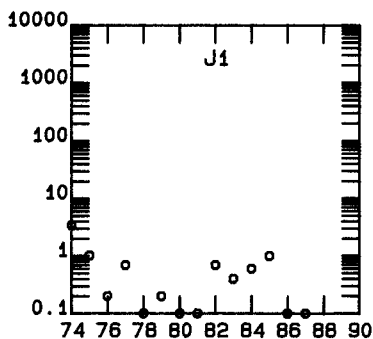
Hudson River Water Column Mercury (ug/l)
NYC DEP Harbor Survey 1974-1988



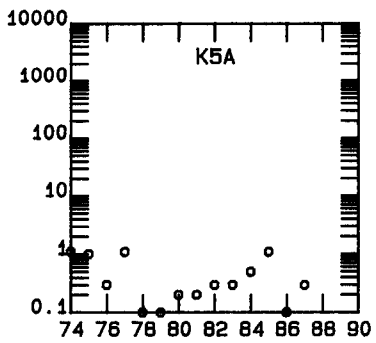
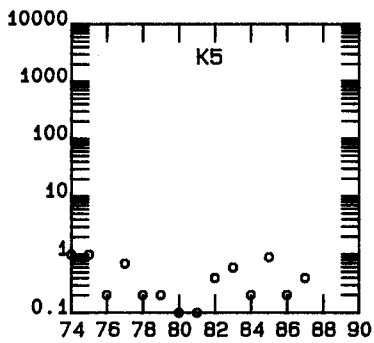
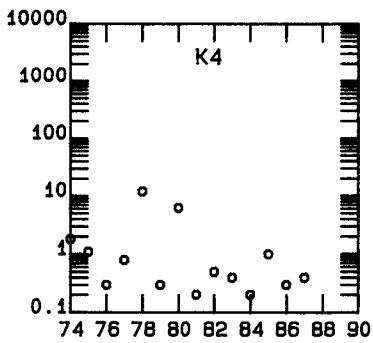
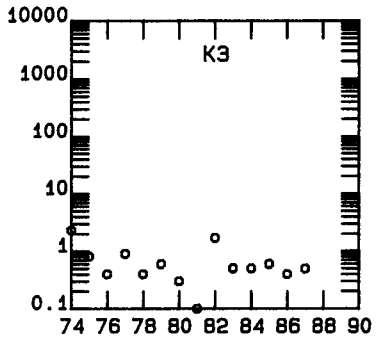
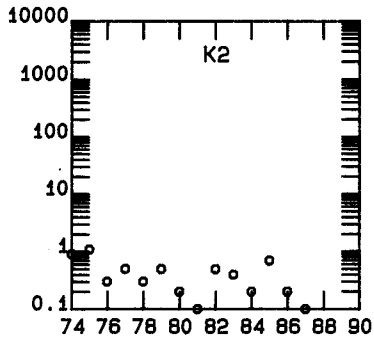
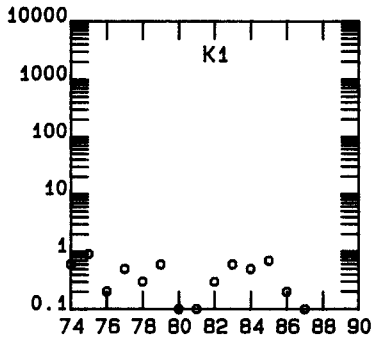
Inner and Outer Harbor Water Column Mercury (ug/l) NYC DEP Harbor Survey 1974-1988



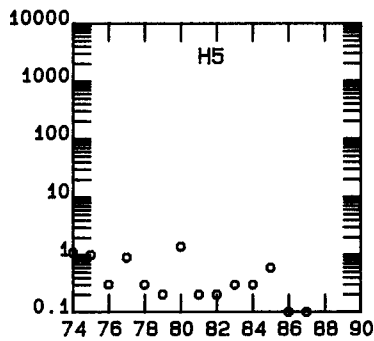
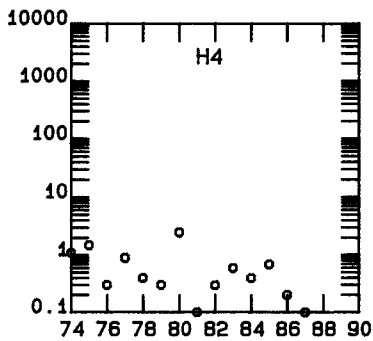
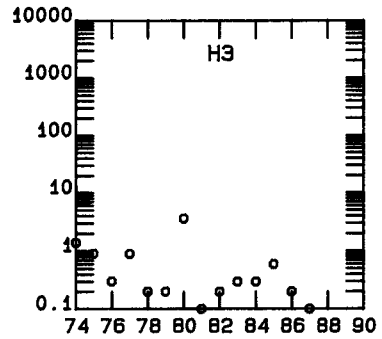
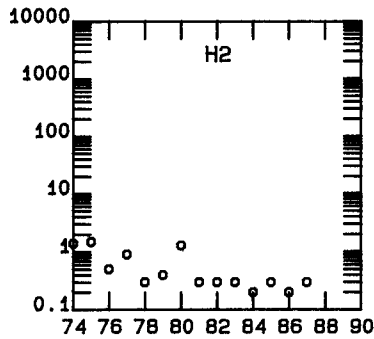
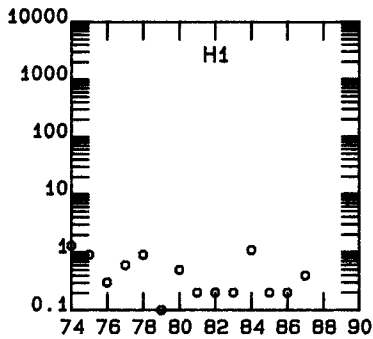
Jamaica Bay Water Column Mercury (ug/l)
NYC DEP Harbor Survey 1974-1988



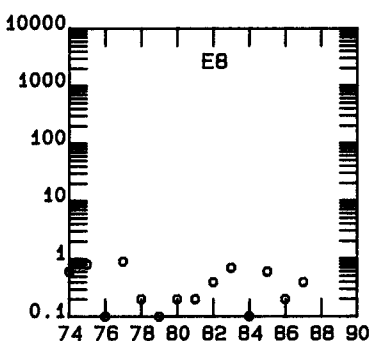
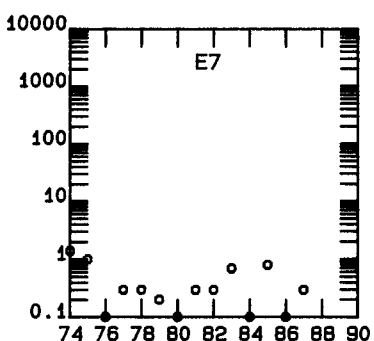
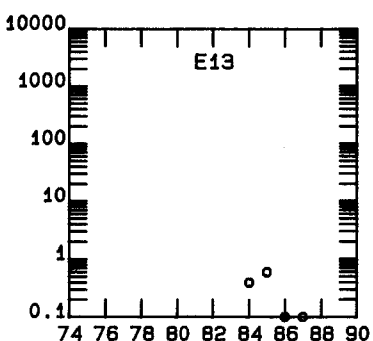
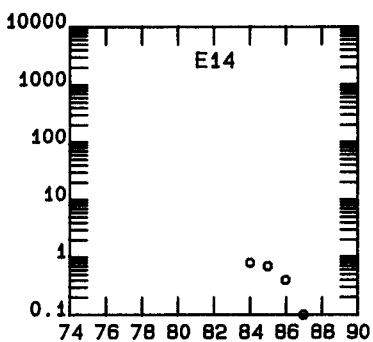
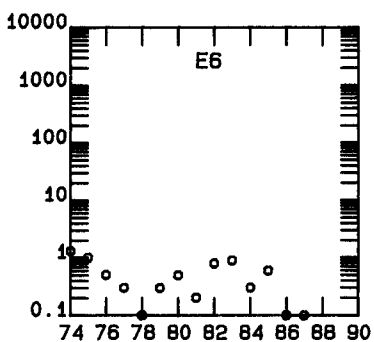
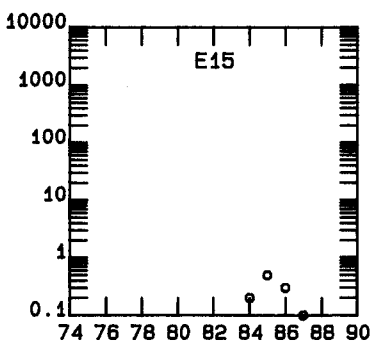
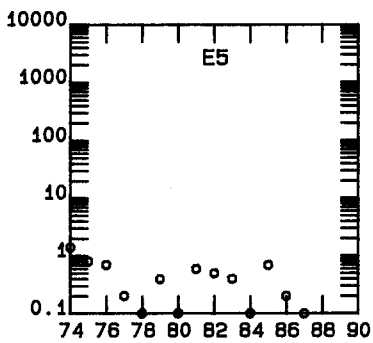
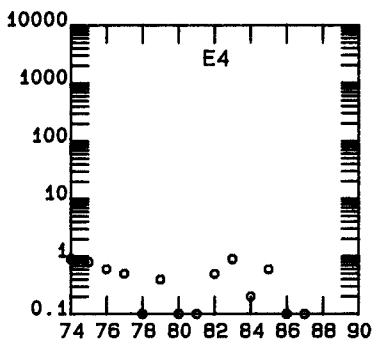
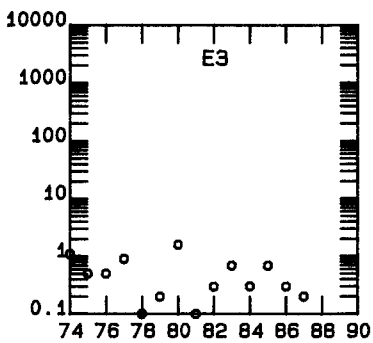
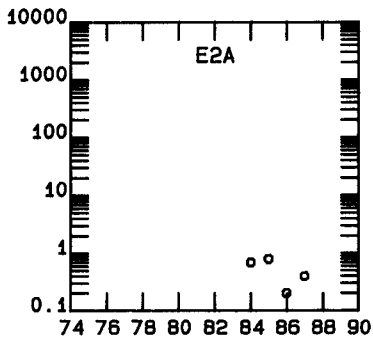
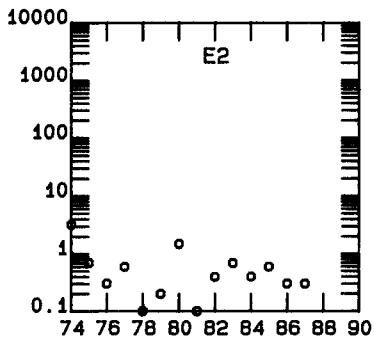
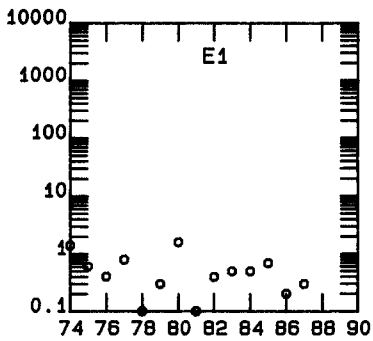
Kills - Raritan Bay Water Column Mercury (ug/l)
NYC DEP Harbor Survey 1974-1988



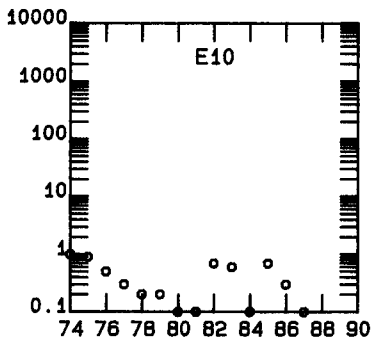
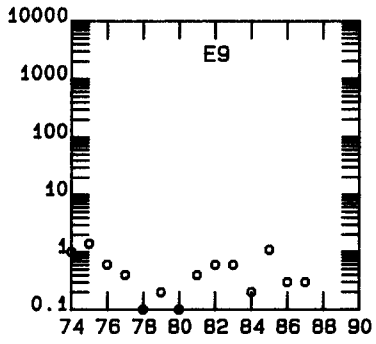
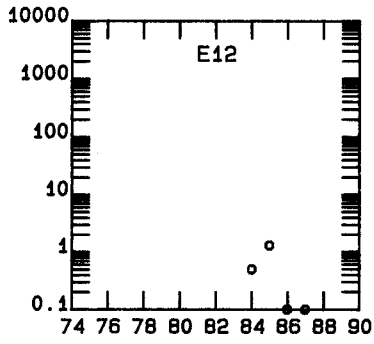
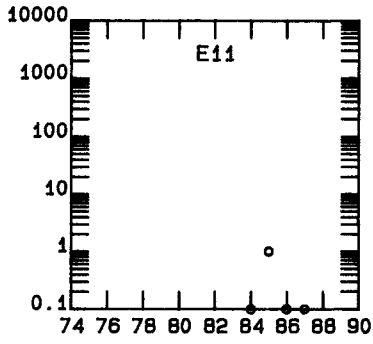
Harlem River Water Column Mercury (ug/l)
NYC DEP Harbor Survey 1974-1988



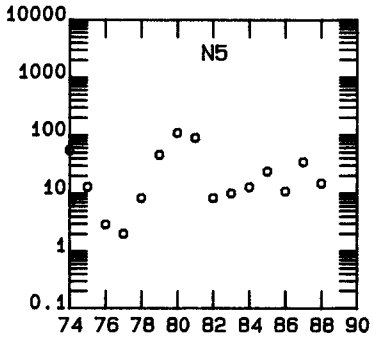
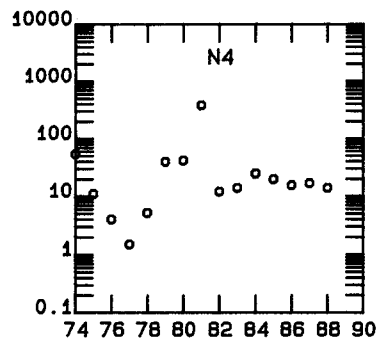
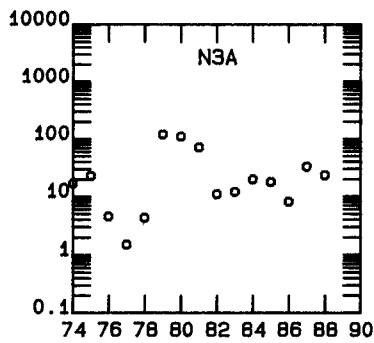
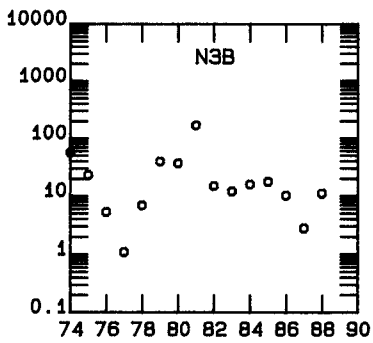
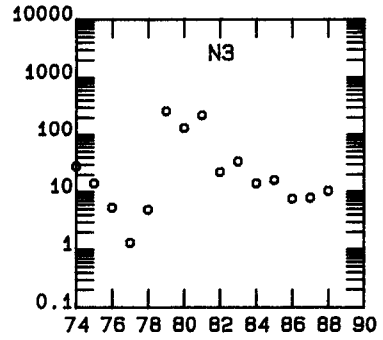
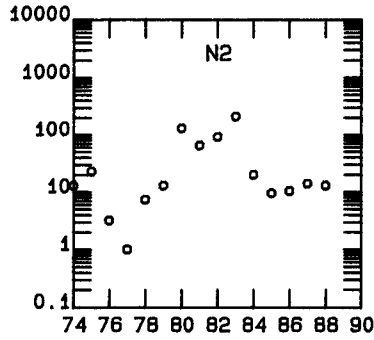
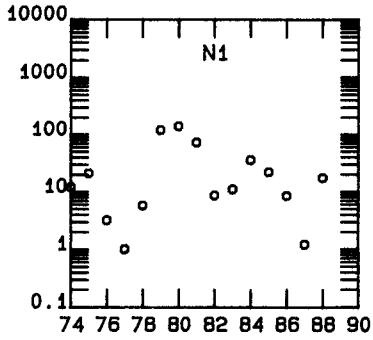
East River Water Column Mercury (ug/l)
NYC DEP Harbor Survey 1974-1988



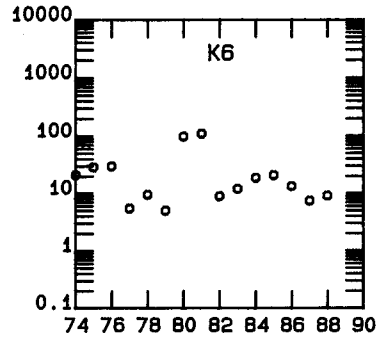
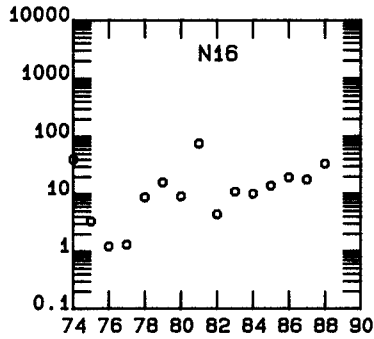
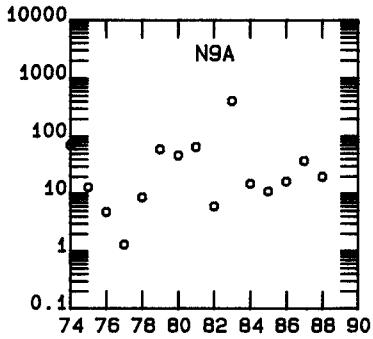
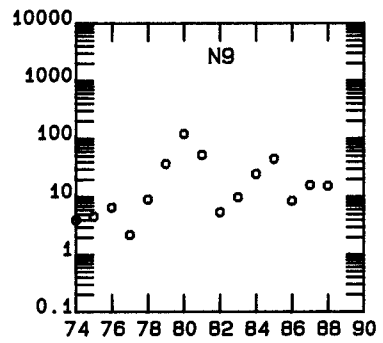
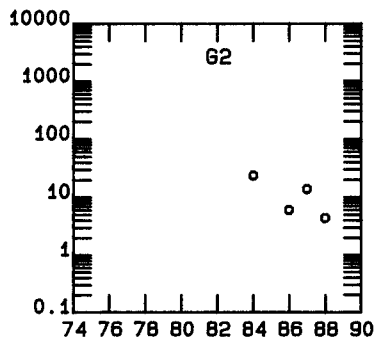
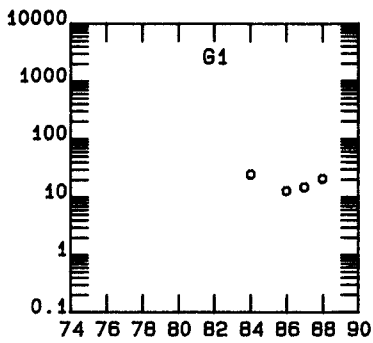
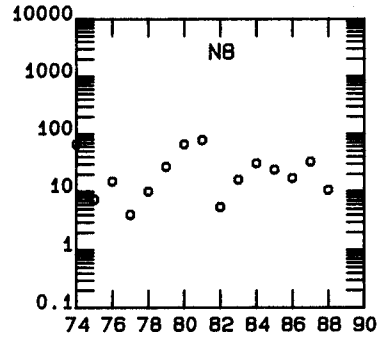
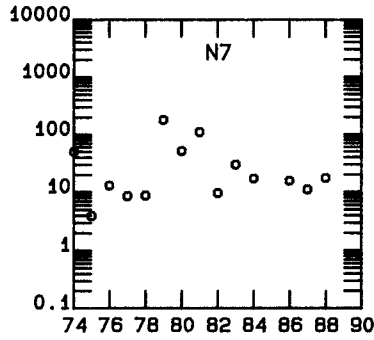
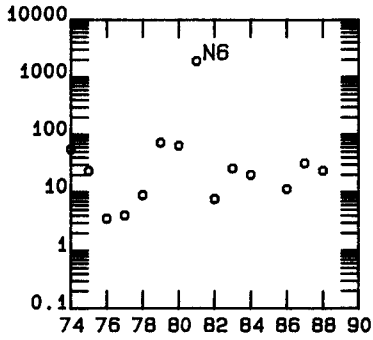
Outer East River Water Column Mercury (ug/l)
NYC DEP Harbor Survey 1974-1988



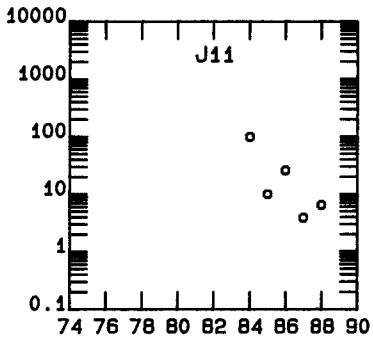
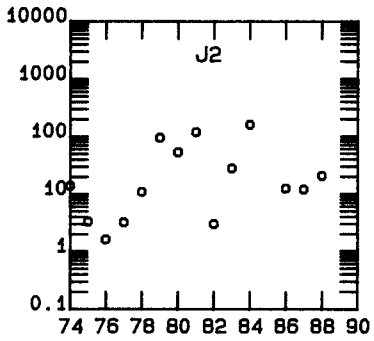
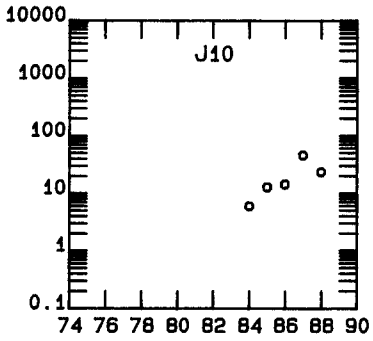
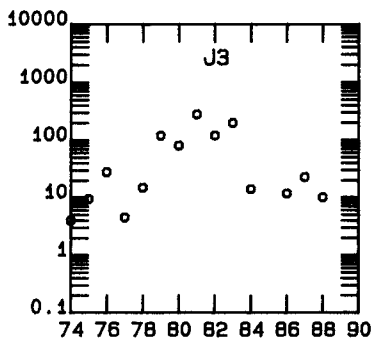
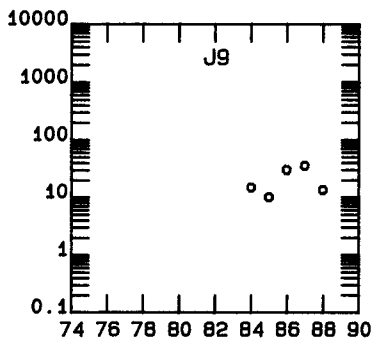
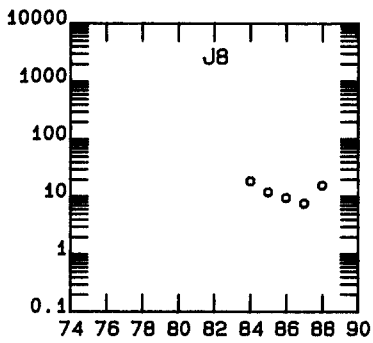
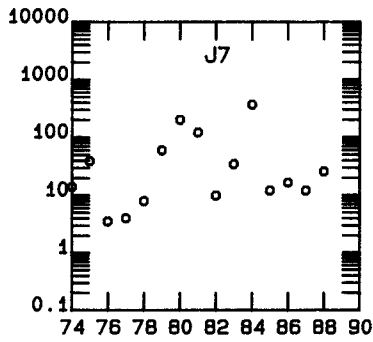
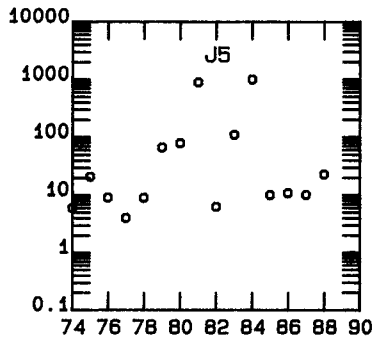
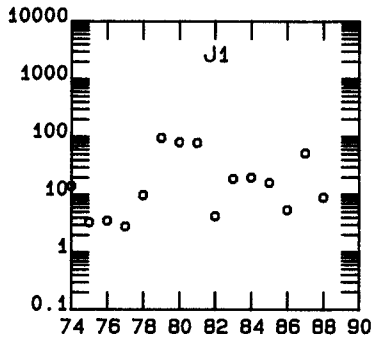
Hudson River Water Column Nickel (ug/l)
NYC DEP Harbor Survey 1974-1988



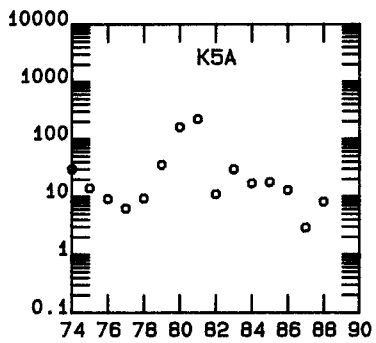
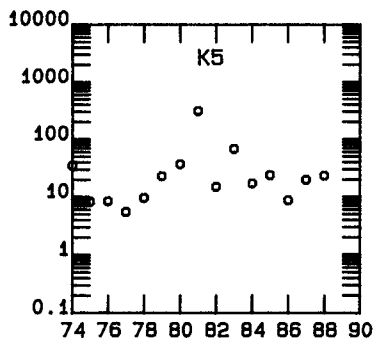
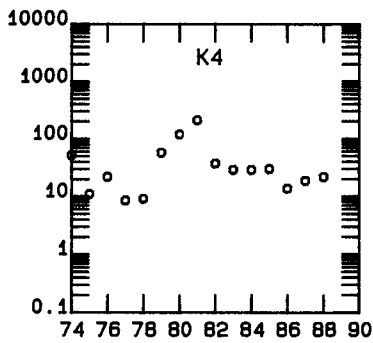
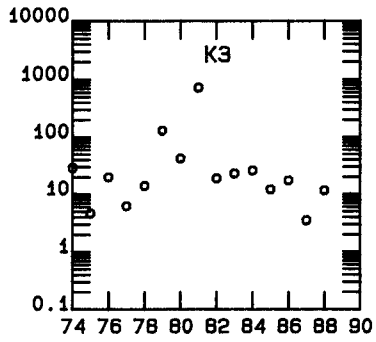
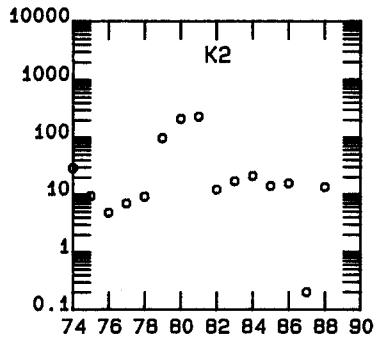
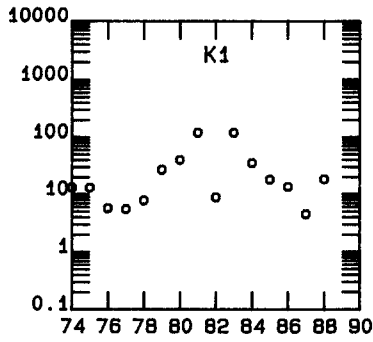
Inner and Outer Harbor Water Column Nickel (ug/l)
NYC DEP Harbor Survey 1974-1988



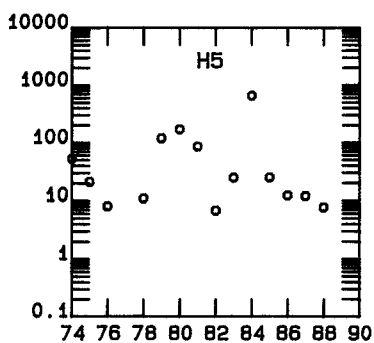
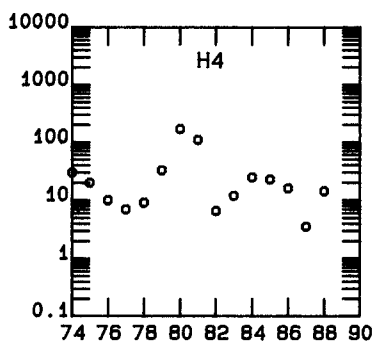
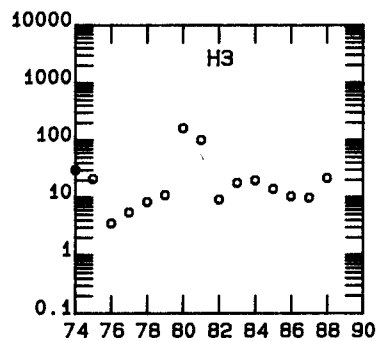
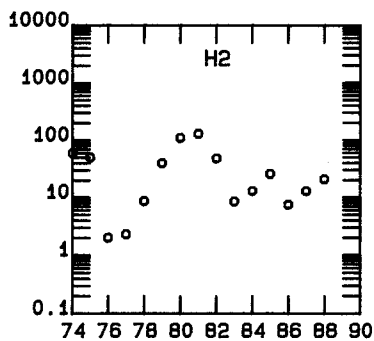
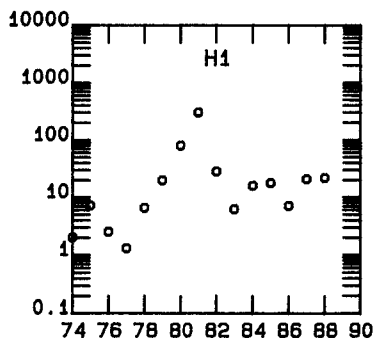
Jamaica Bay Water Column Nickel (ug/l)
NYC DEP Harbor Survey 1974-1988



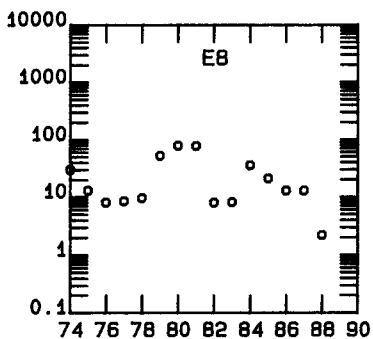
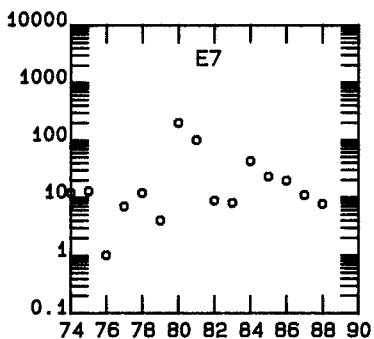
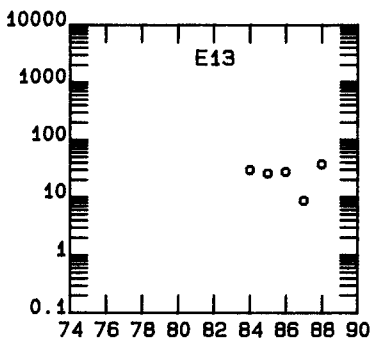
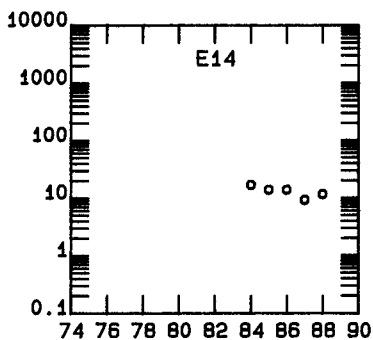
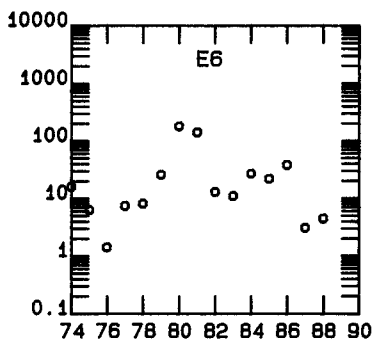
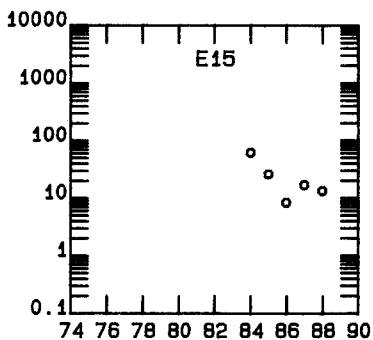
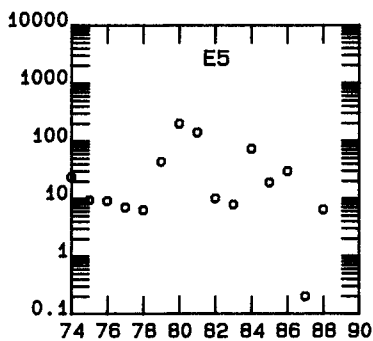
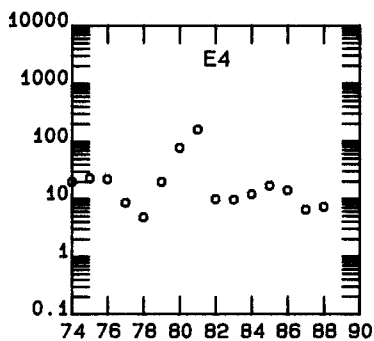
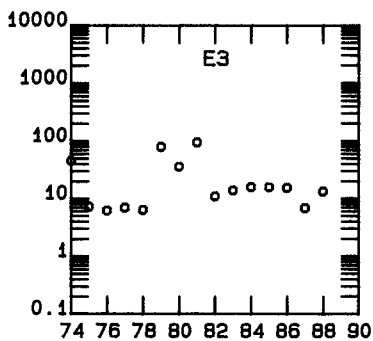
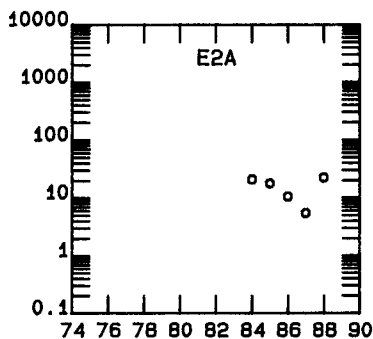
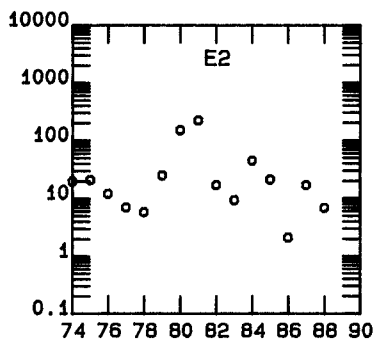
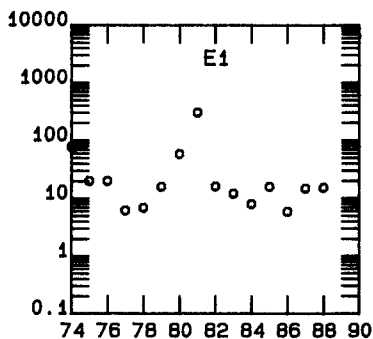
Kills - Raritan Bay Water Column Nickel (ug/l)
NYC DEP Harbor Survey 1974-1988



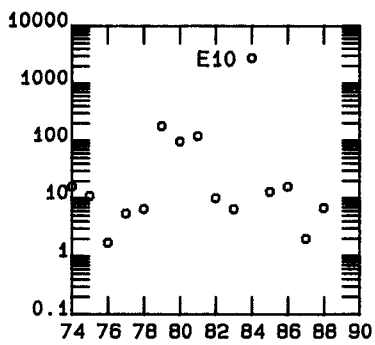
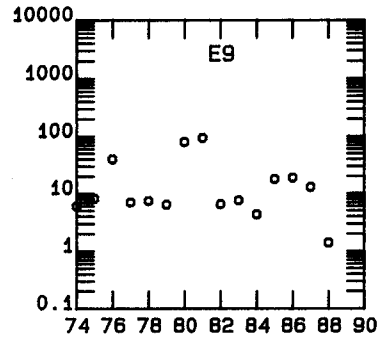
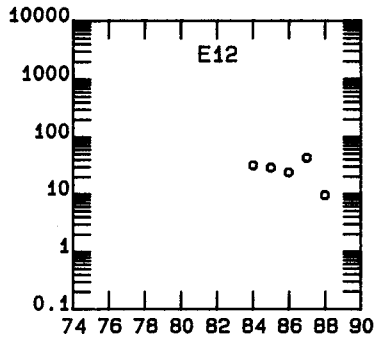
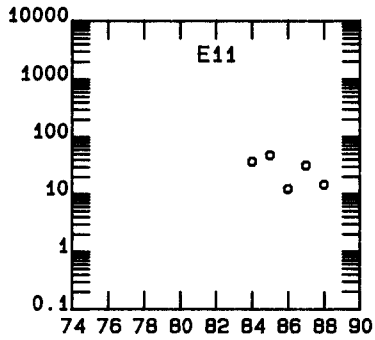
Harlem River Water Column Nickel (ug/l) NYC DEP Harbor Survey 1974-1988



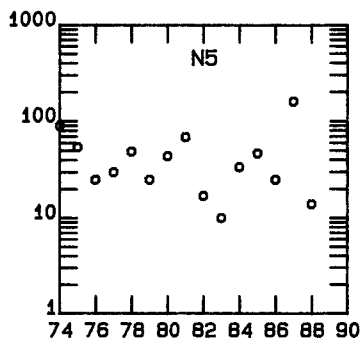
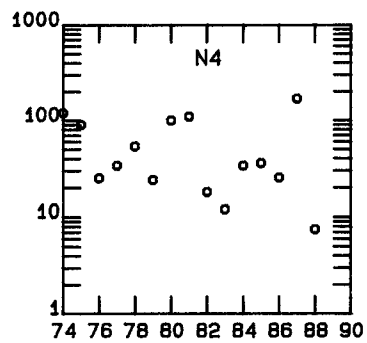
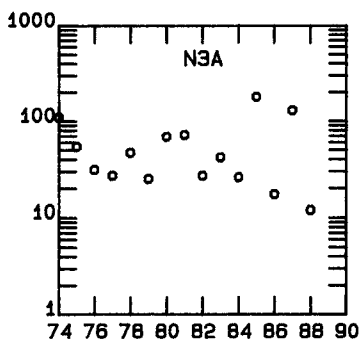
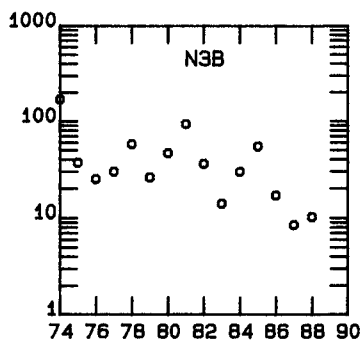
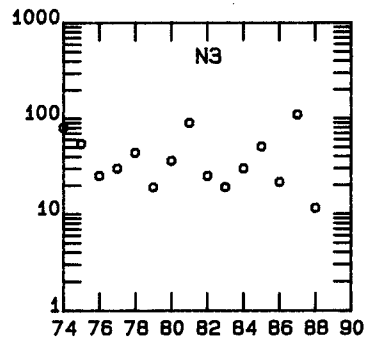
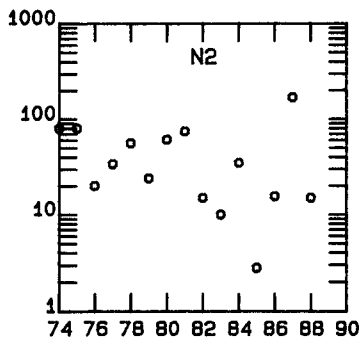
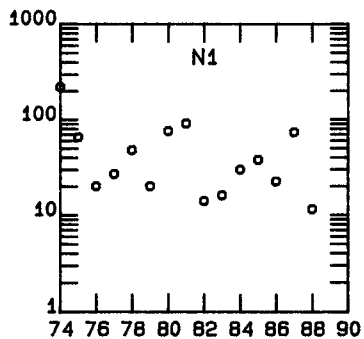
East River Water Column Nickel (ug/l)
NYC DEP Harbor Survey 1974-1988



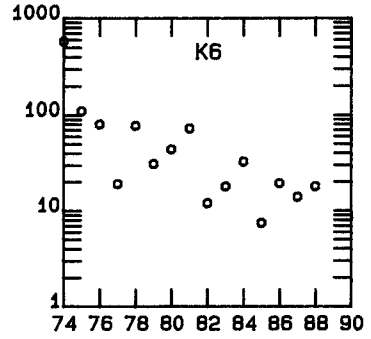
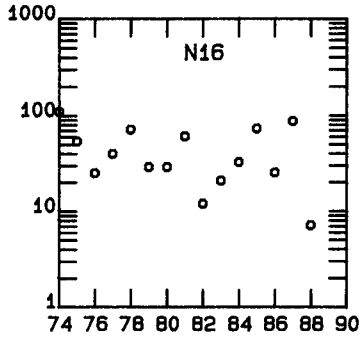
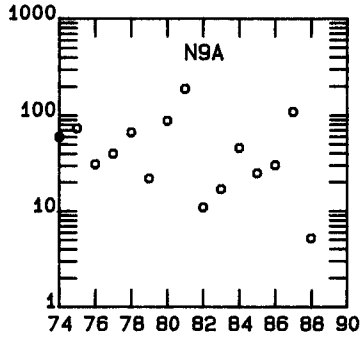
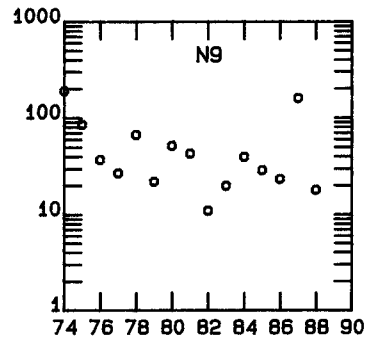
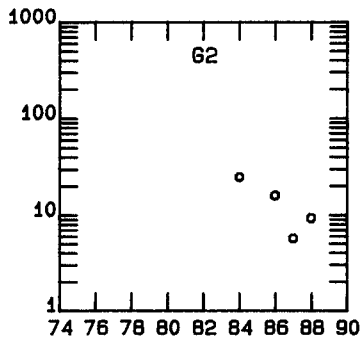
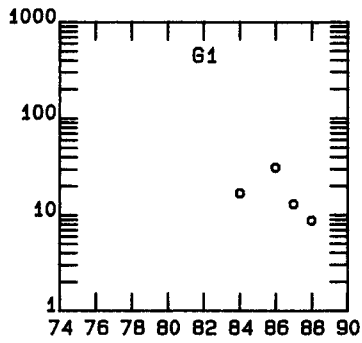
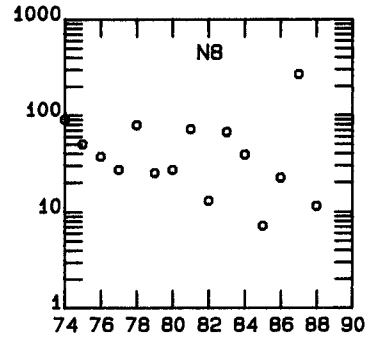
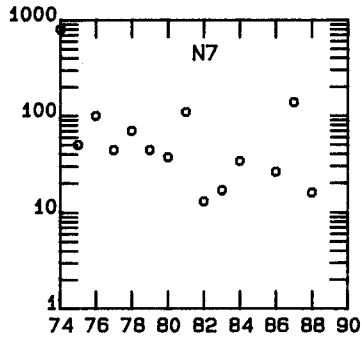
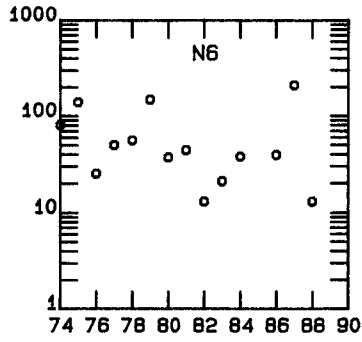
Outer East River Water Column Nickel (ug/l)
NYC DEP Harbor Survey 1974-1988



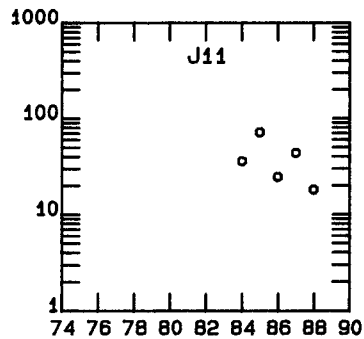
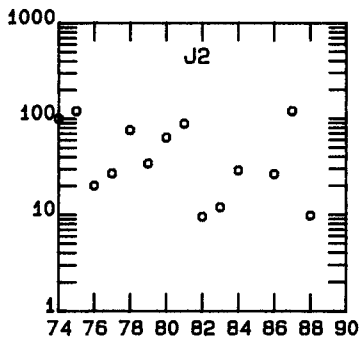
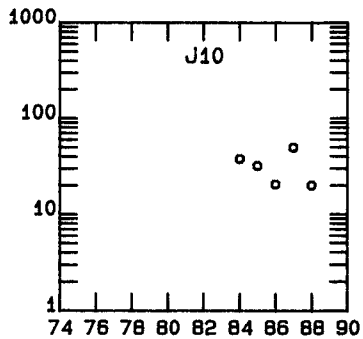
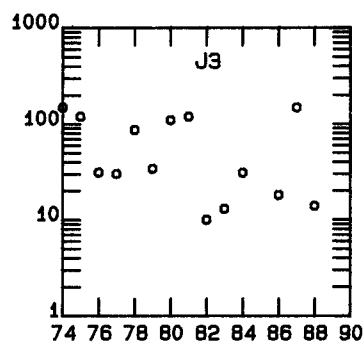
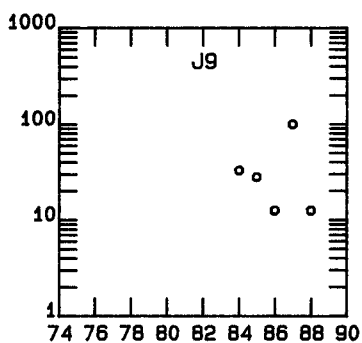
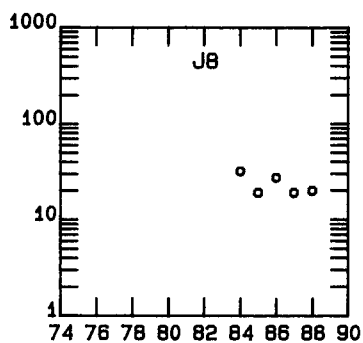
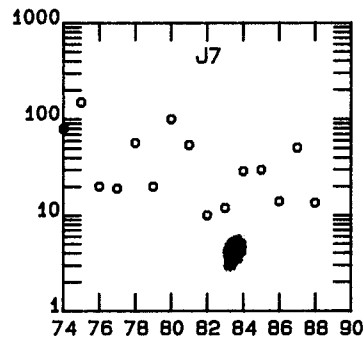
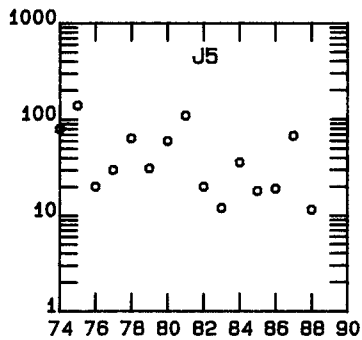
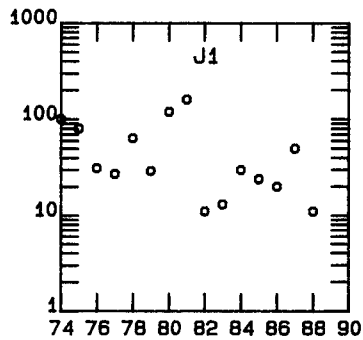
Hudson River Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



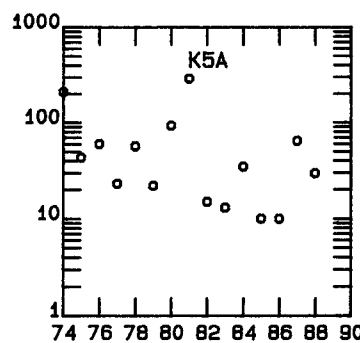
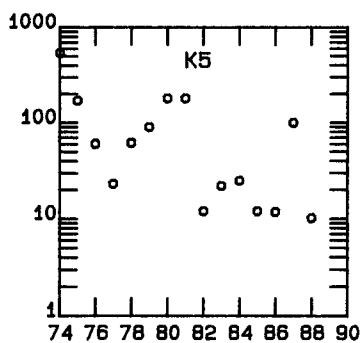
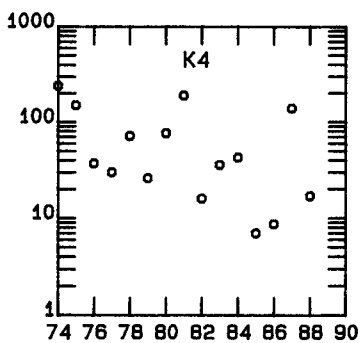
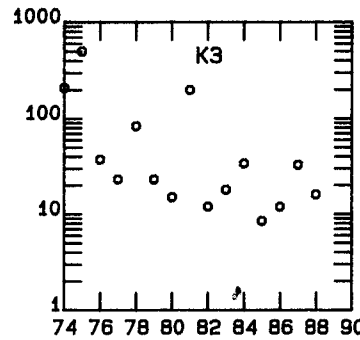
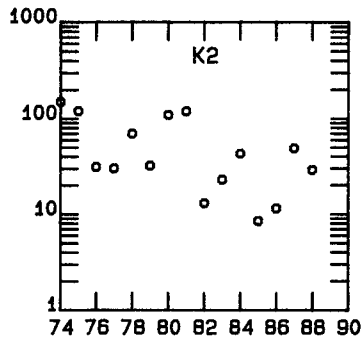
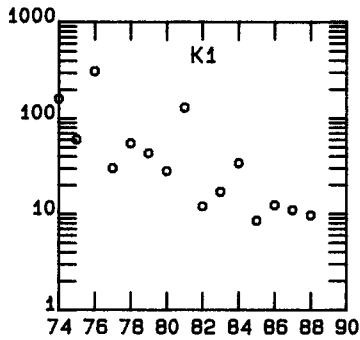
Inner and Outer Harbor Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



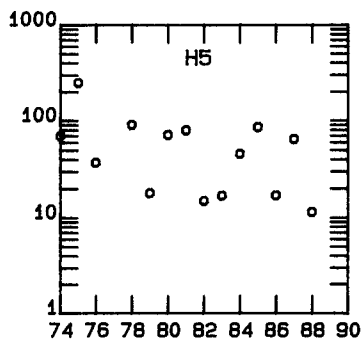
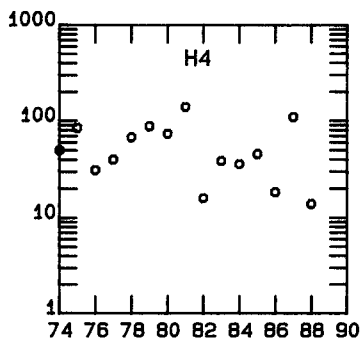
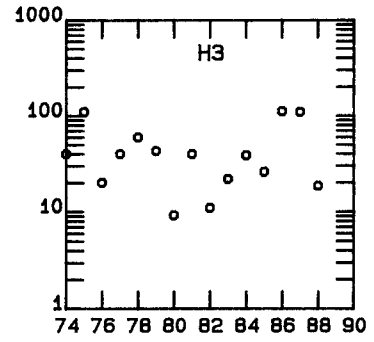
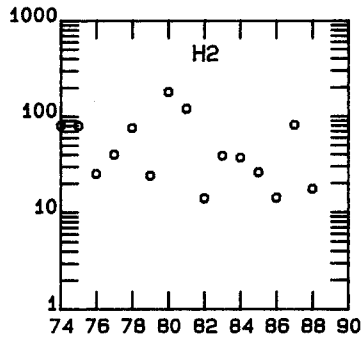
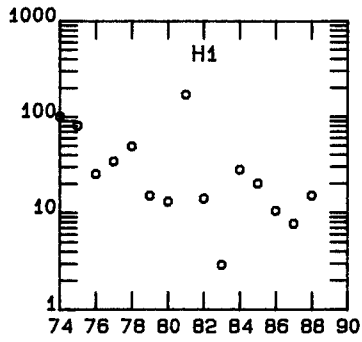
Jamaica Bay Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



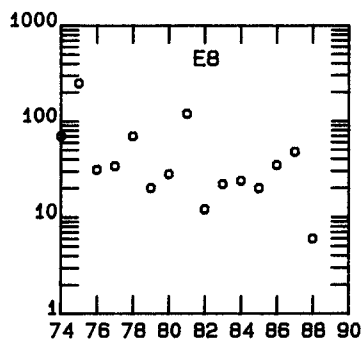
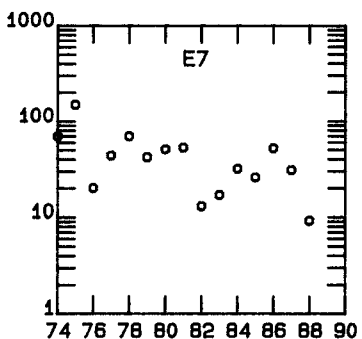
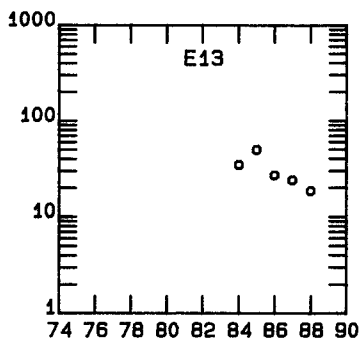
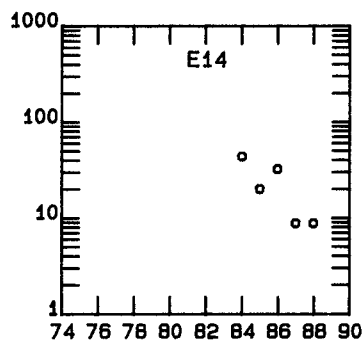
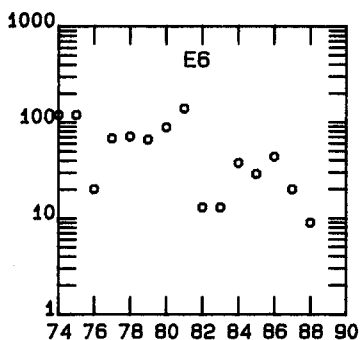
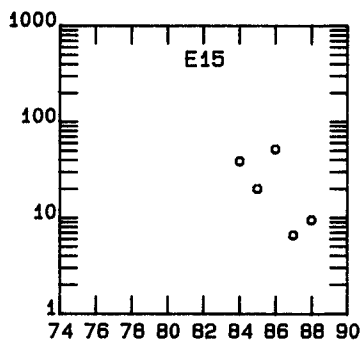
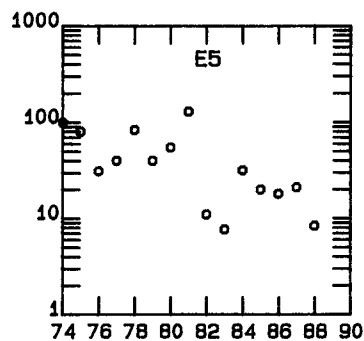
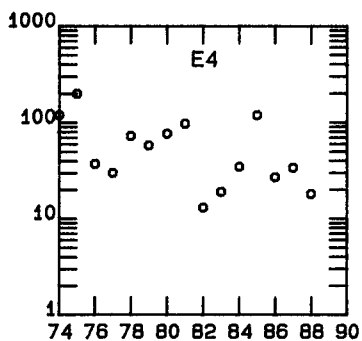
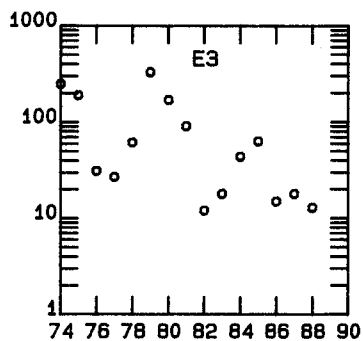
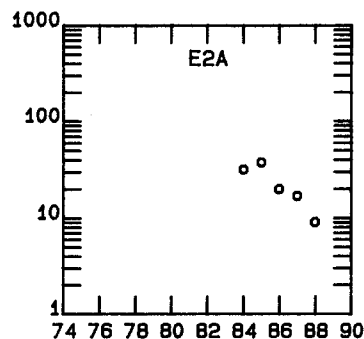
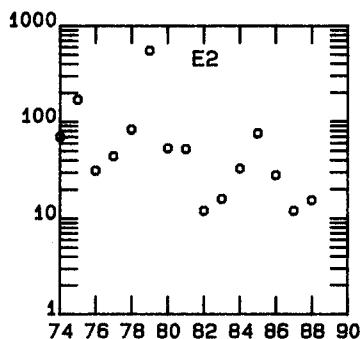
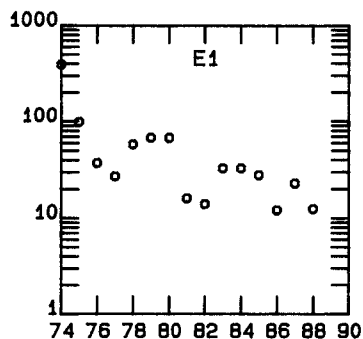
Kills - Raritan Bay Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



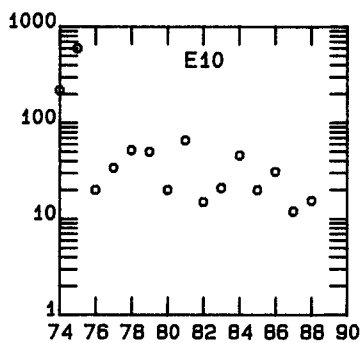
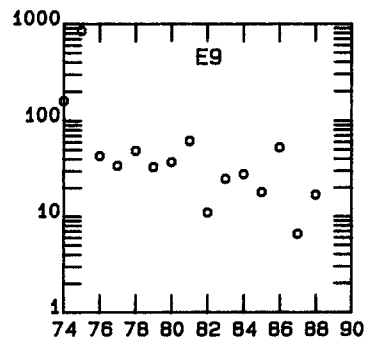
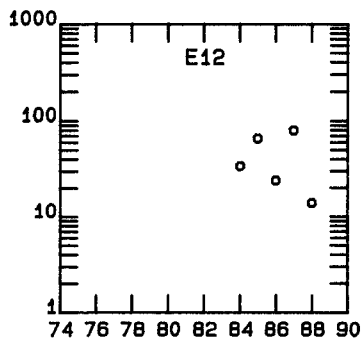
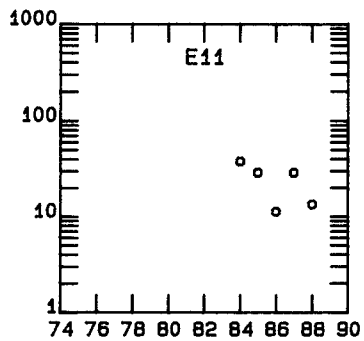
Harlem River Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



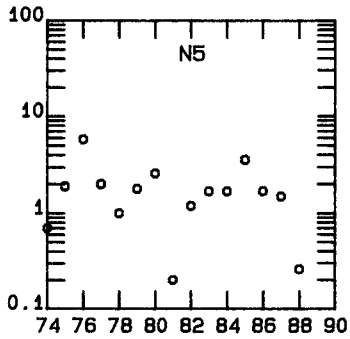
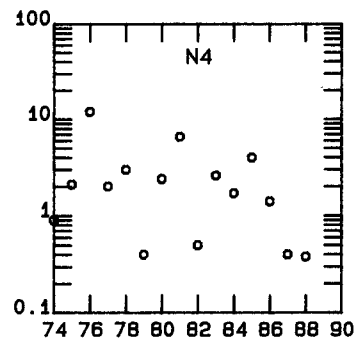
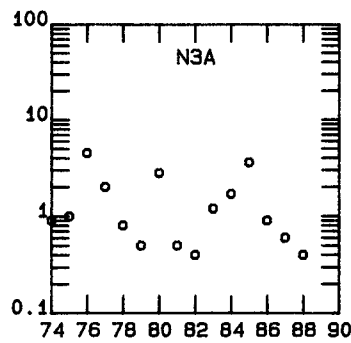
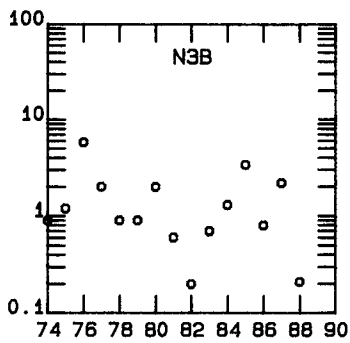
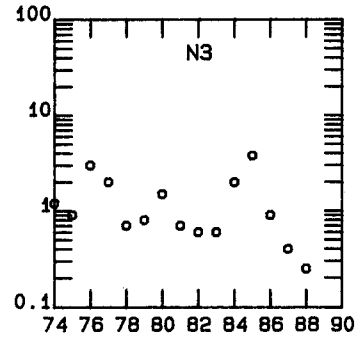
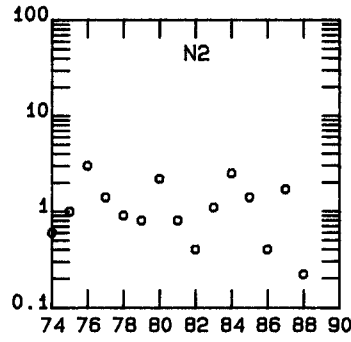
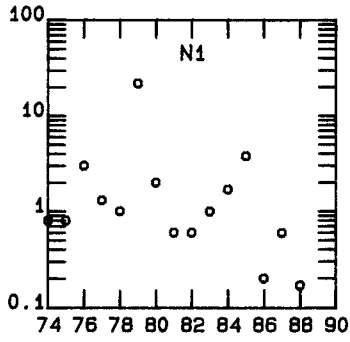
East River Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



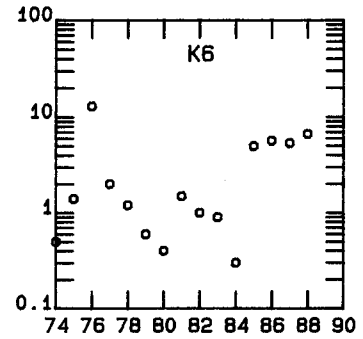
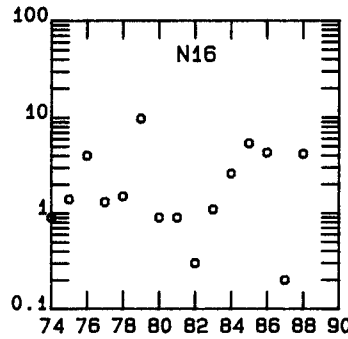
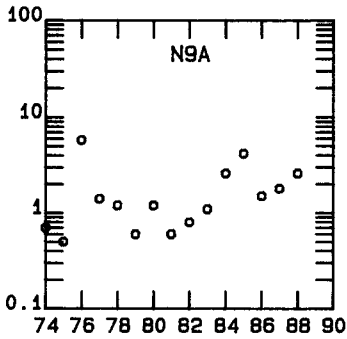
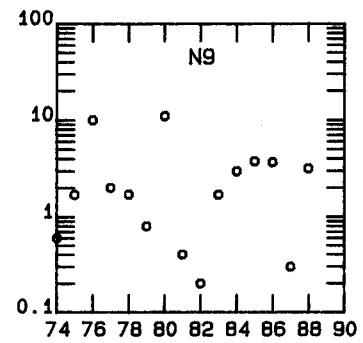
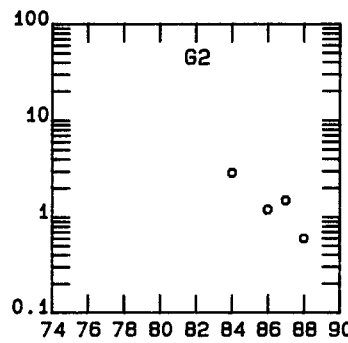
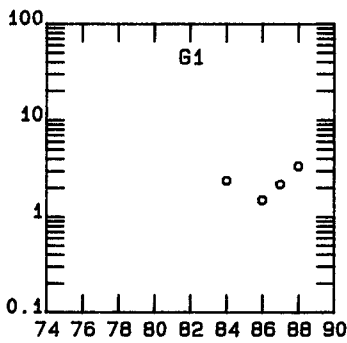
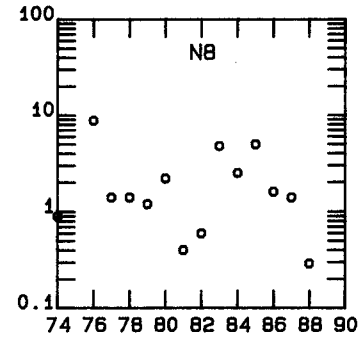
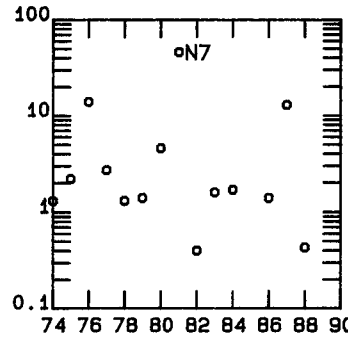
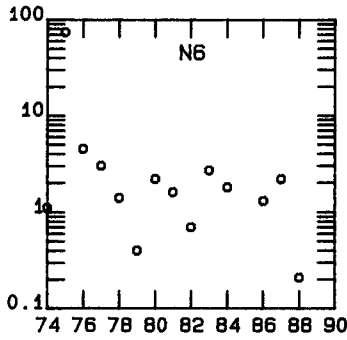
Outer East River Water Column Lead (ug/l)
NYC DEP Harbor Survey 1974-1988



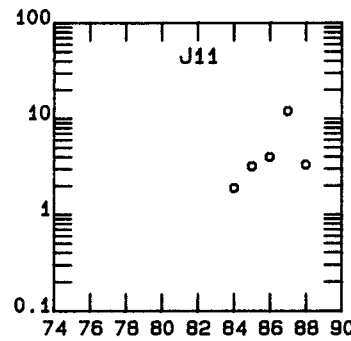
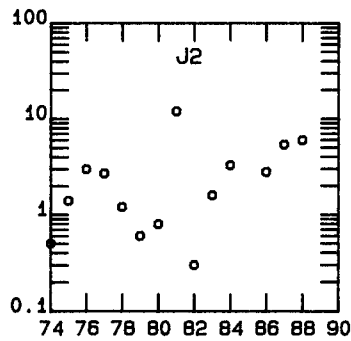
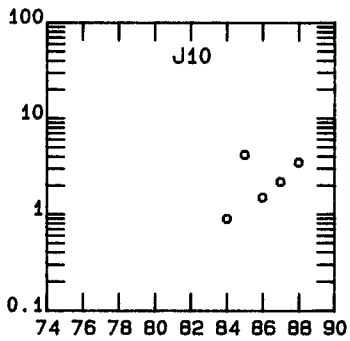
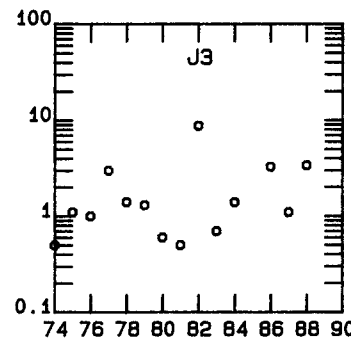
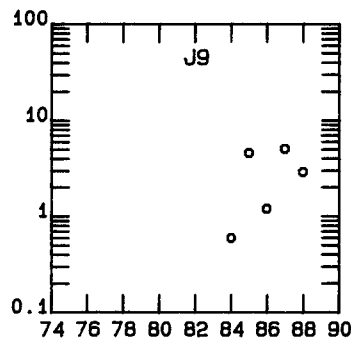
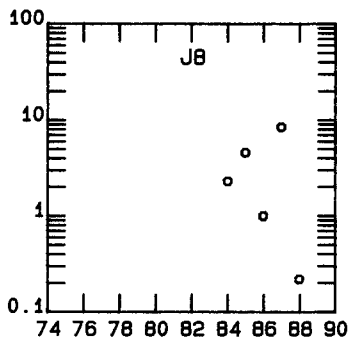
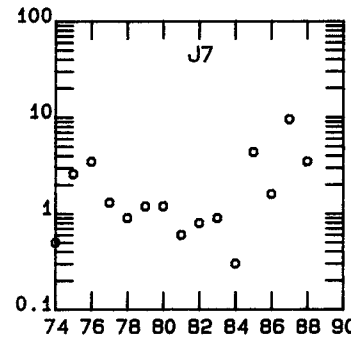
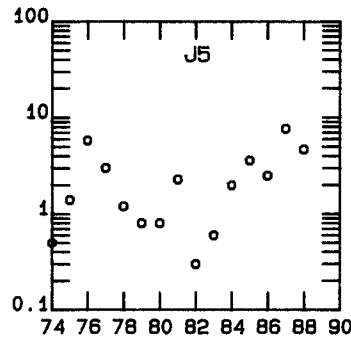
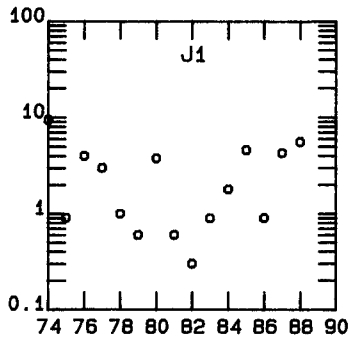
Hudson River Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



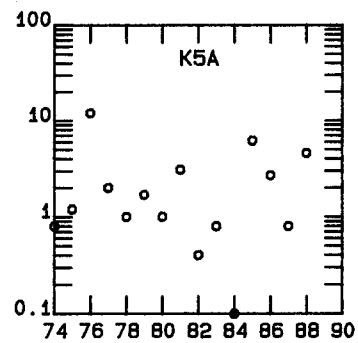
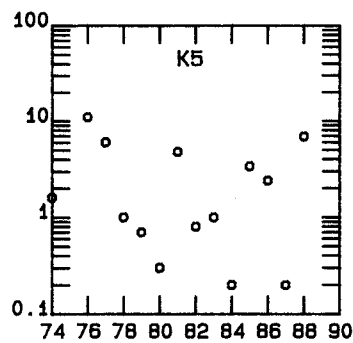
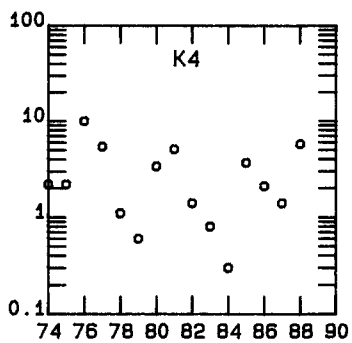
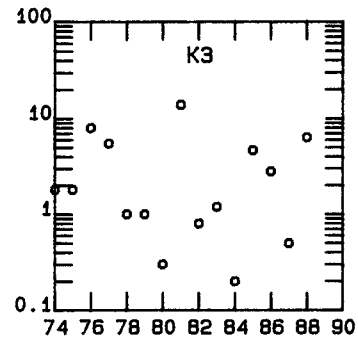
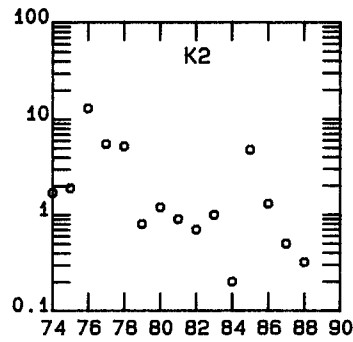
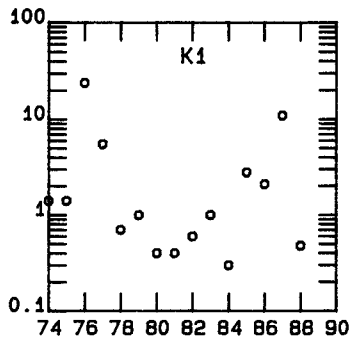
Inner and Outer Harbor Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



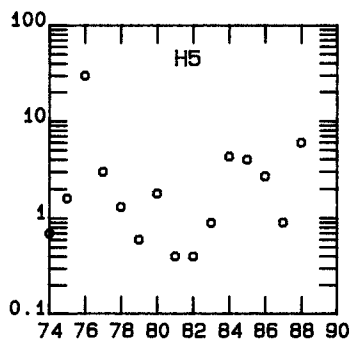
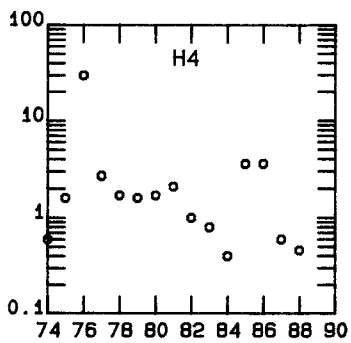
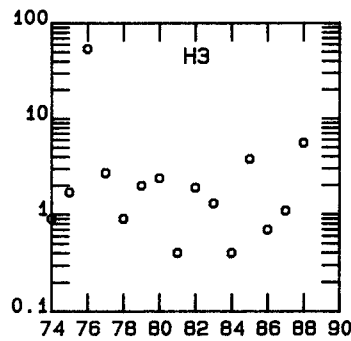
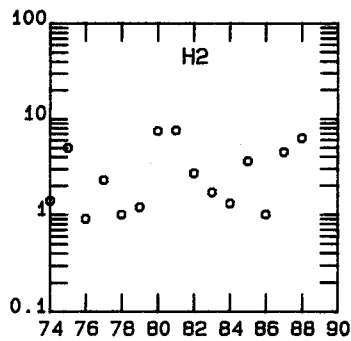
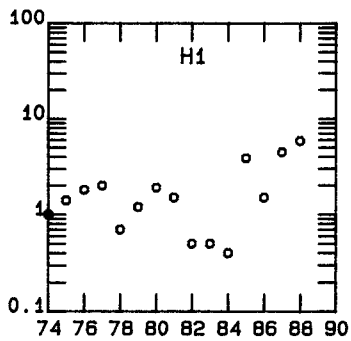
Jamaica Bay Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



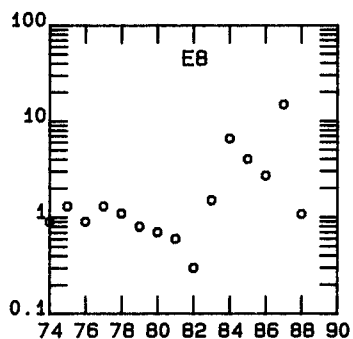
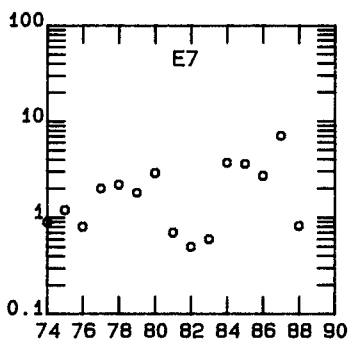
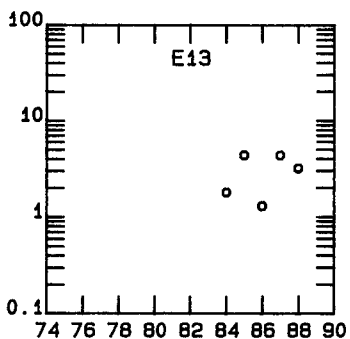
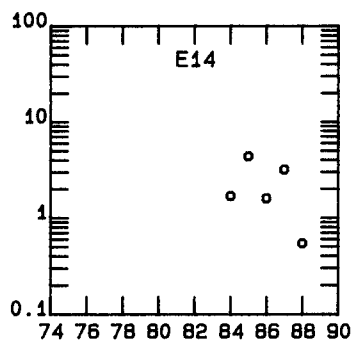
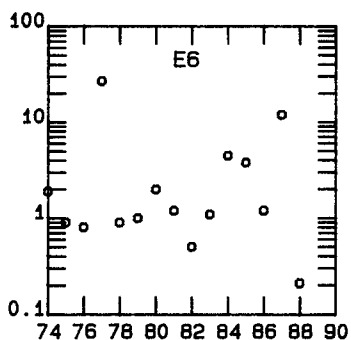
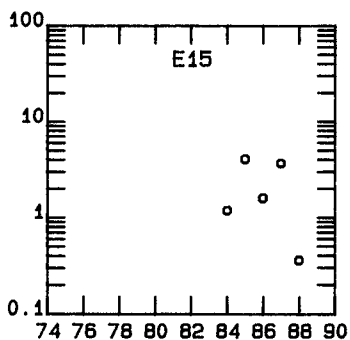
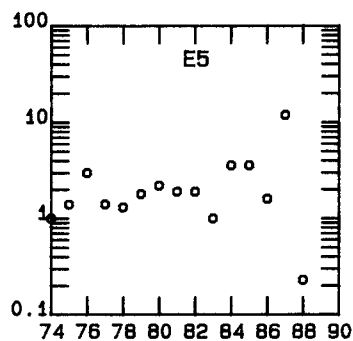
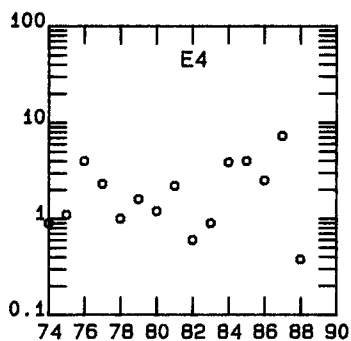
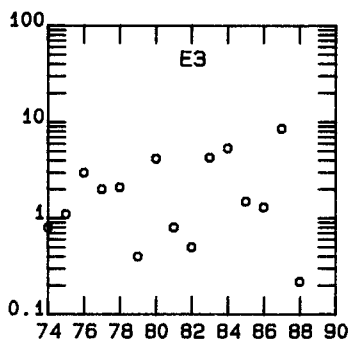
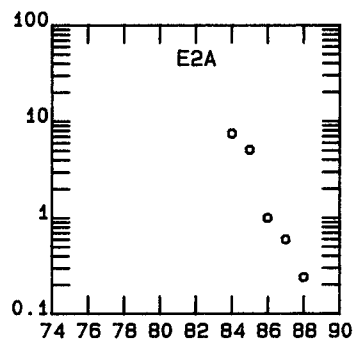
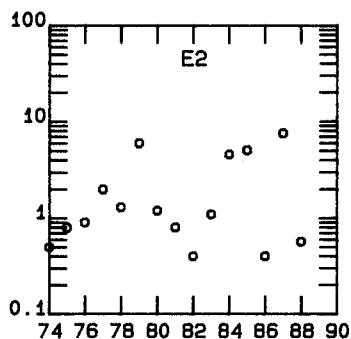
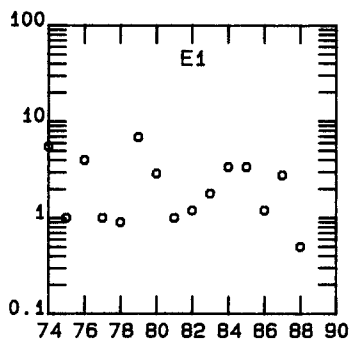
Kills - Raritan Bay Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



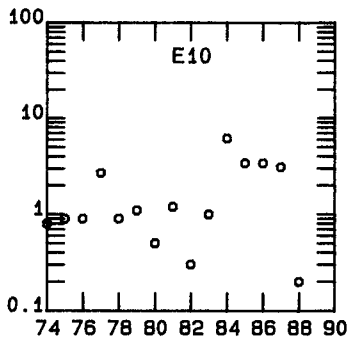
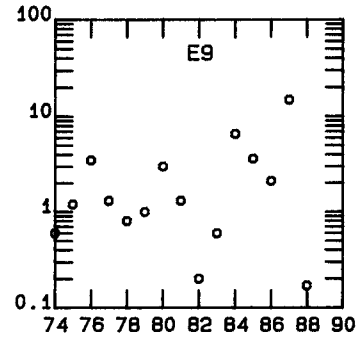
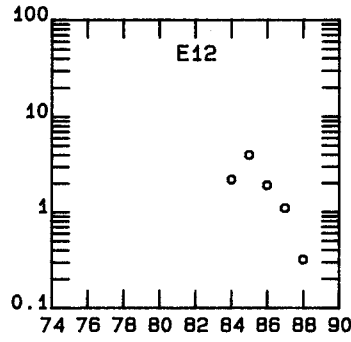
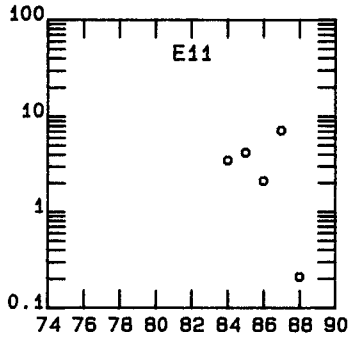
Harlem River Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



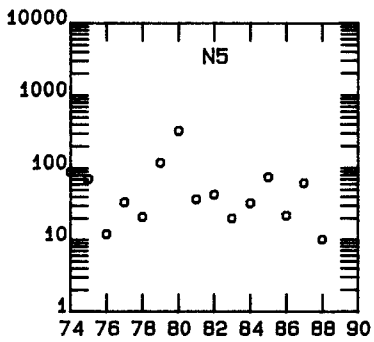
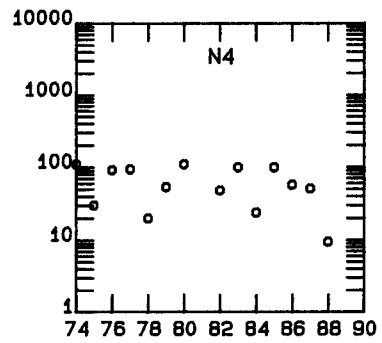
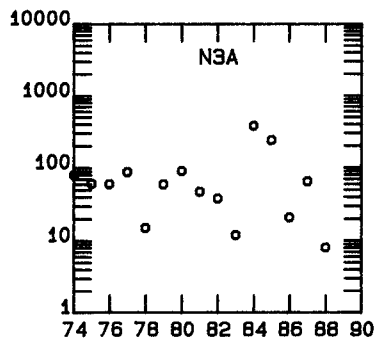
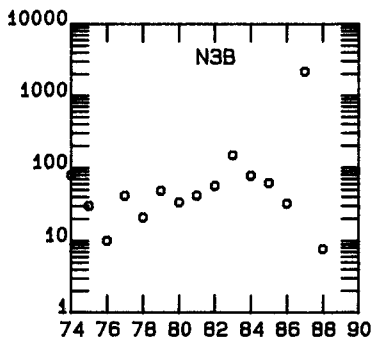
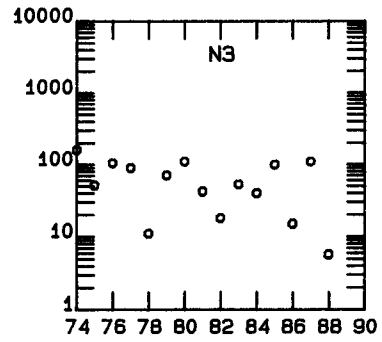
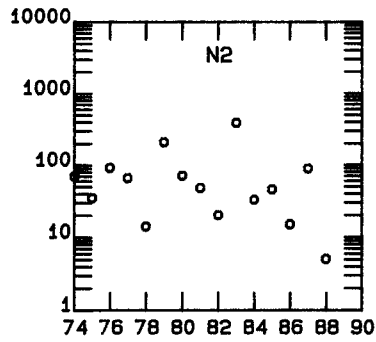
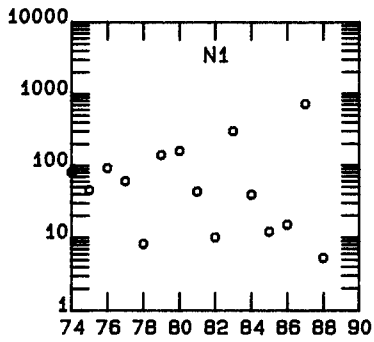
East River Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



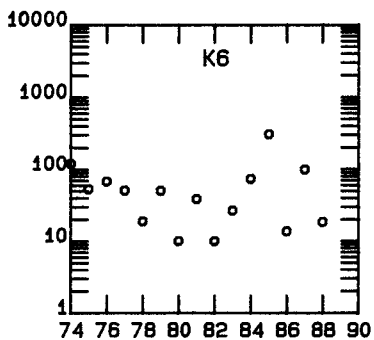
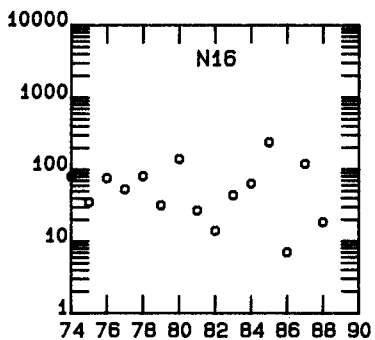
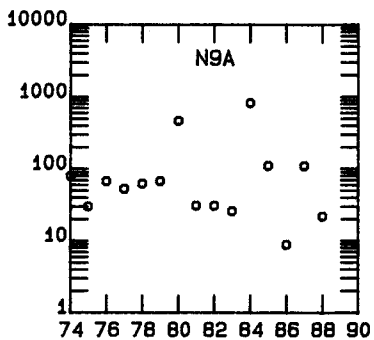
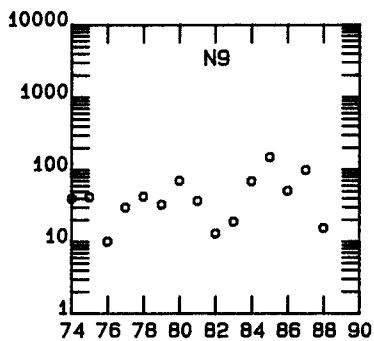
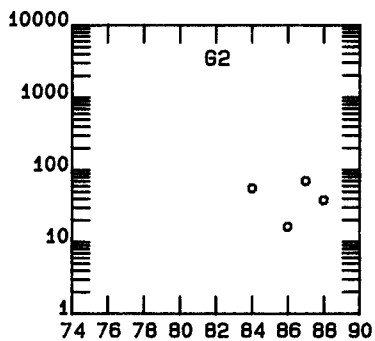
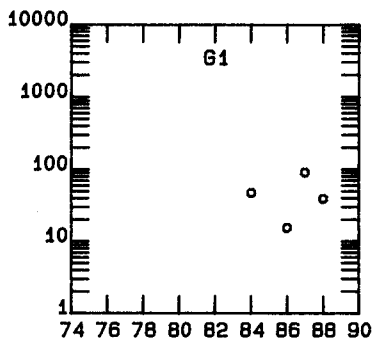
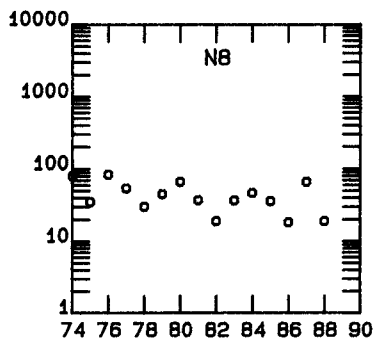
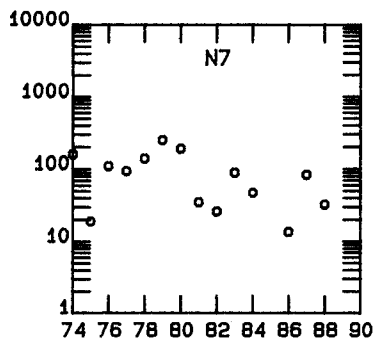
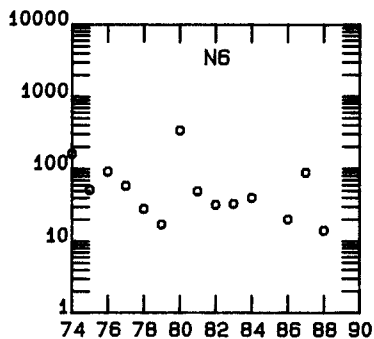
Outer East River Water Column Cadmium (ug/l)
NYC DEP Harbor Survey 1974-1988



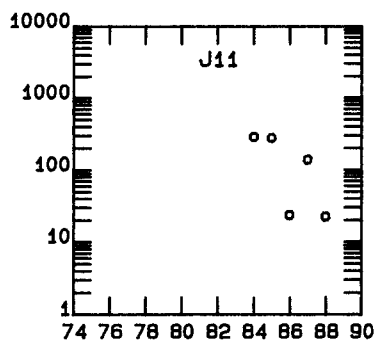
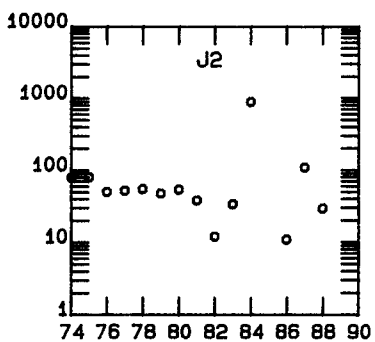
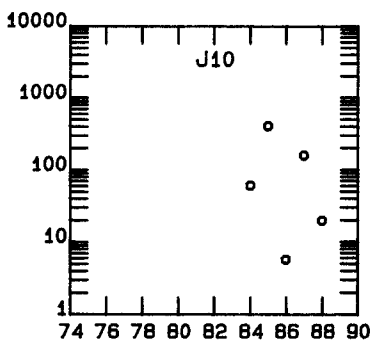
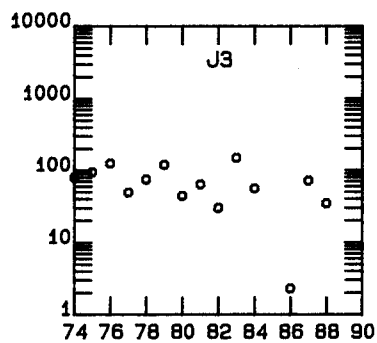
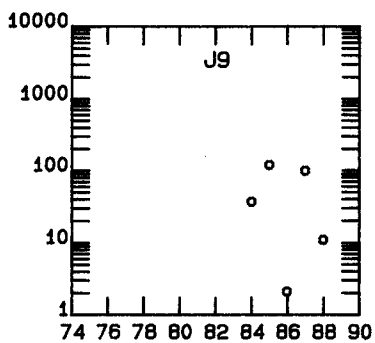
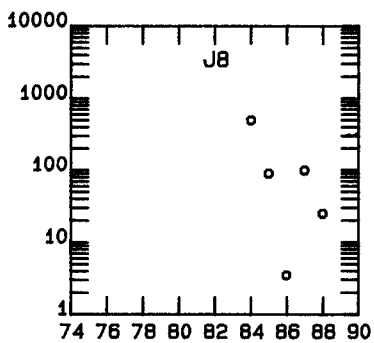
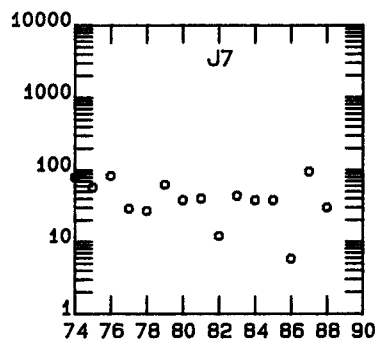
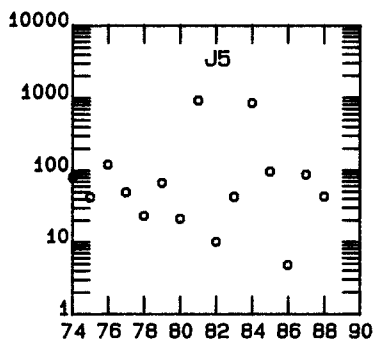
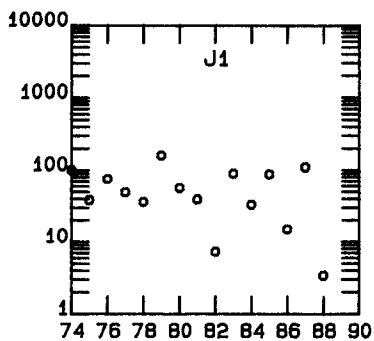
Hudson River Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988



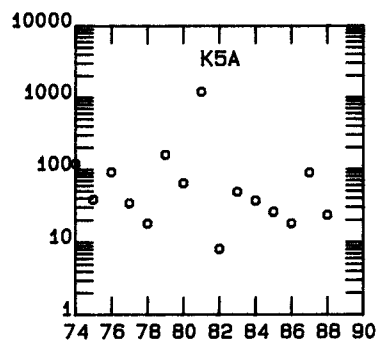
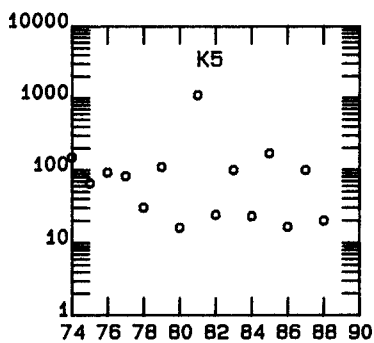
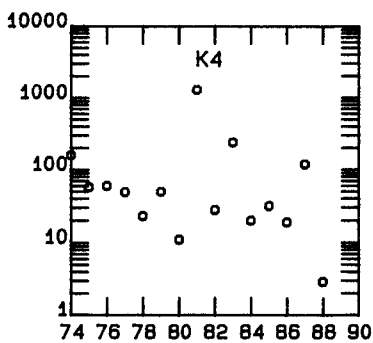
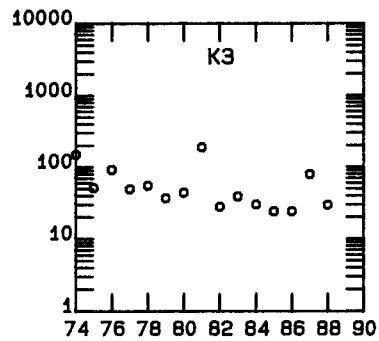
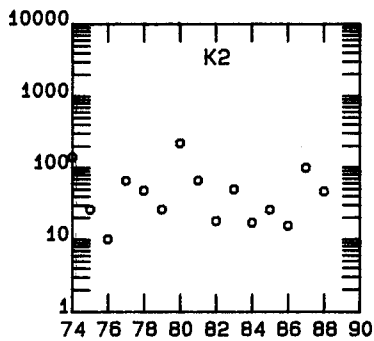
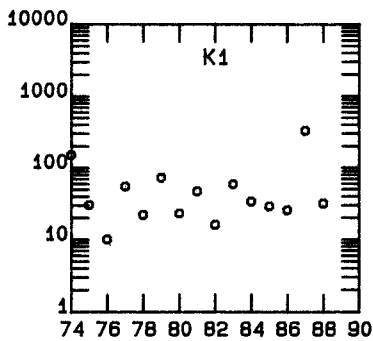
Inner and Outer Harbor Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988



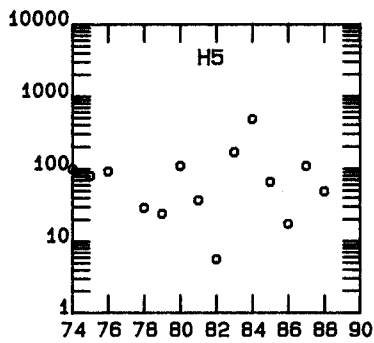
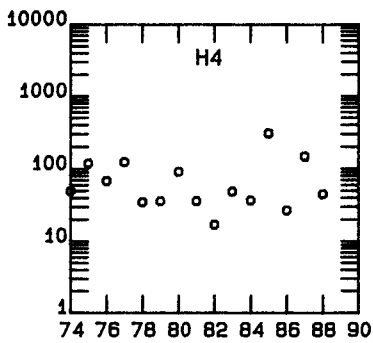
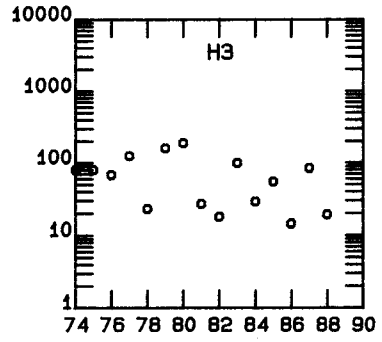
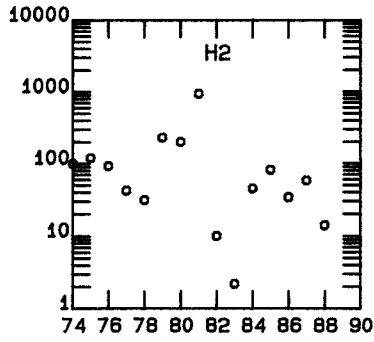
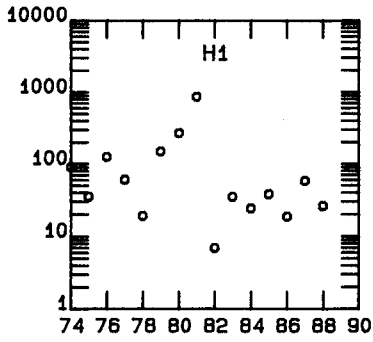
Jamaica Bay Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988



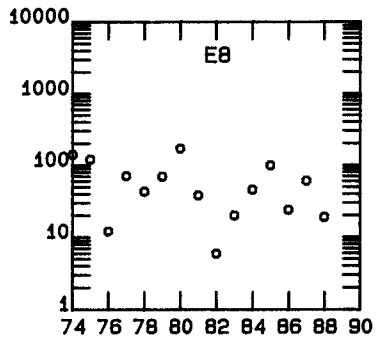
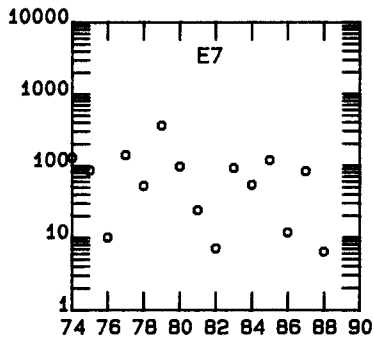
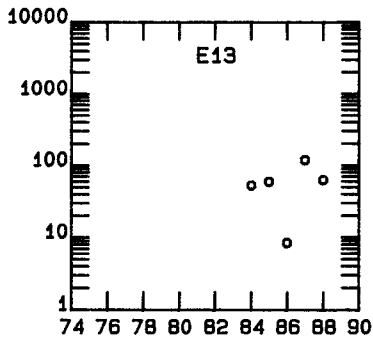
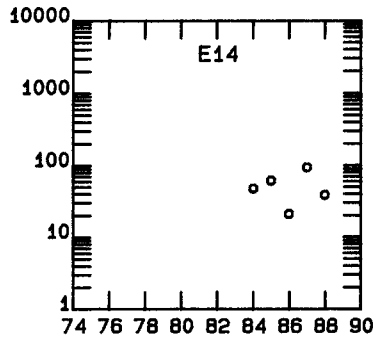
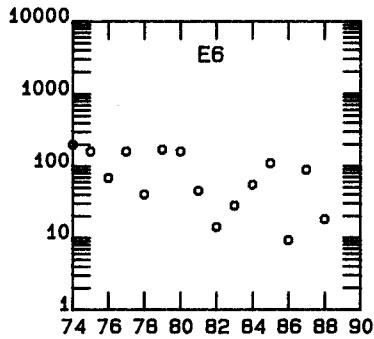
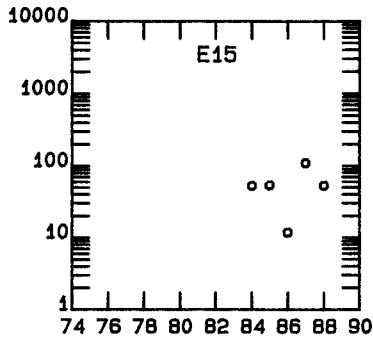
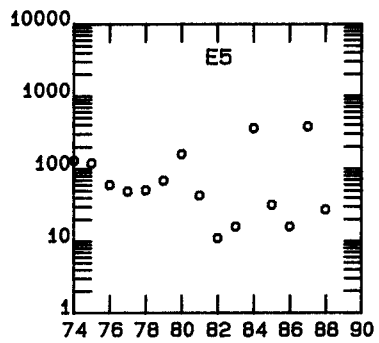
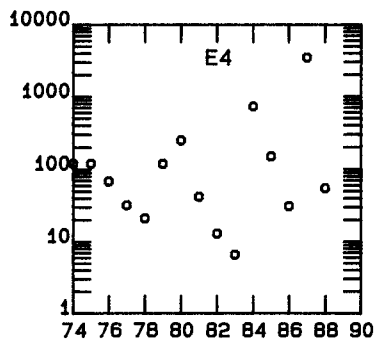
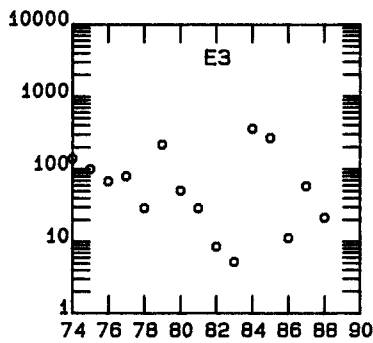
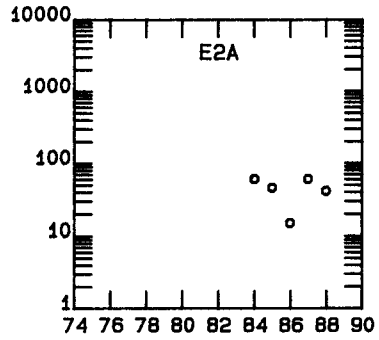
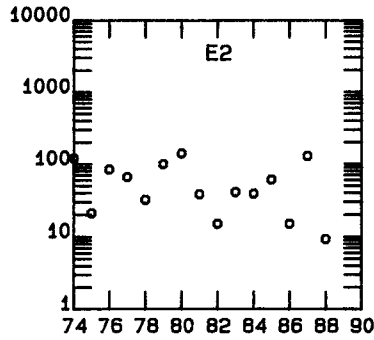
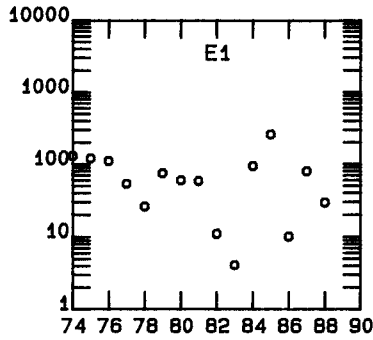
Kills - Raritan Bay Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988



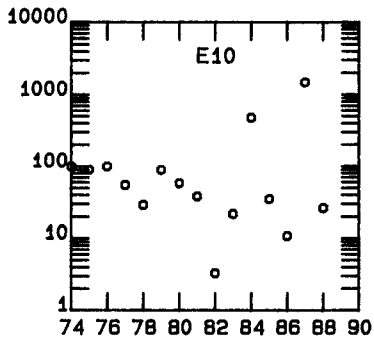
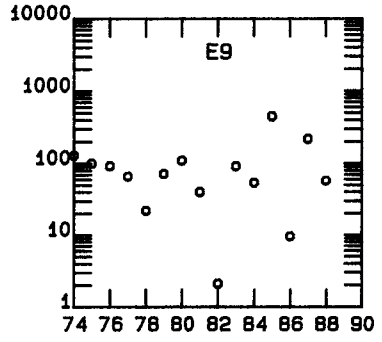
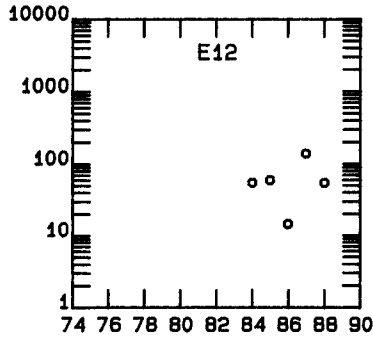
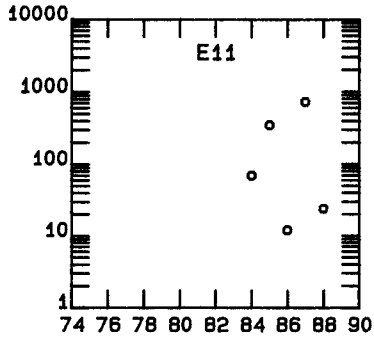
Harlem River Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988

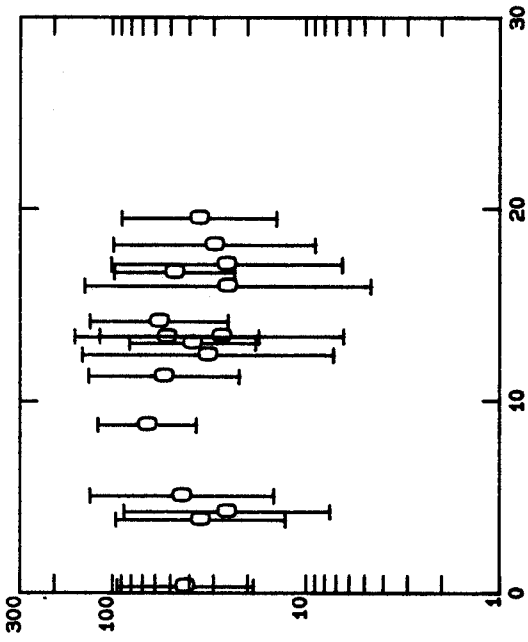


East River Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988

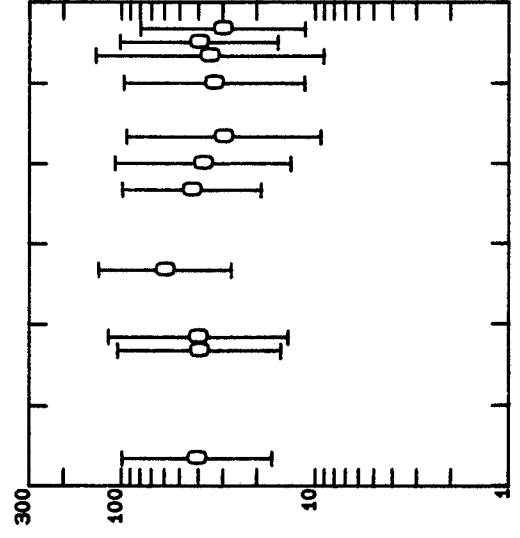


Outer East River Water Column Zinc (ug/l)
NYC DEP Harbor Survey 1974-1988

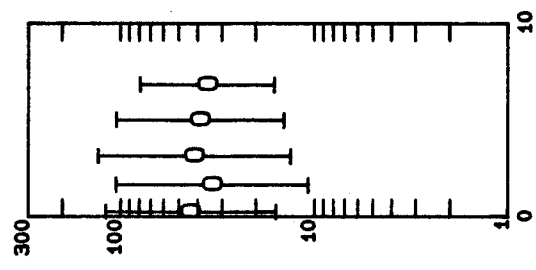




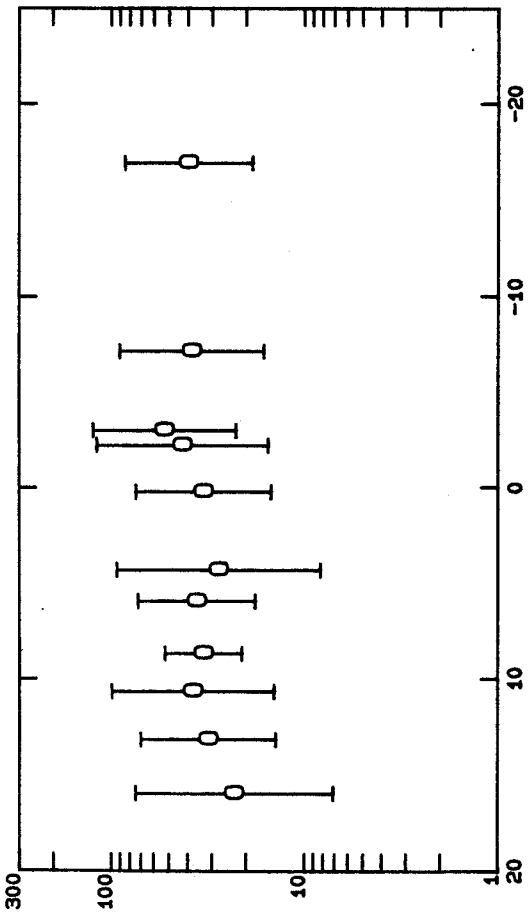
EAST RIVER



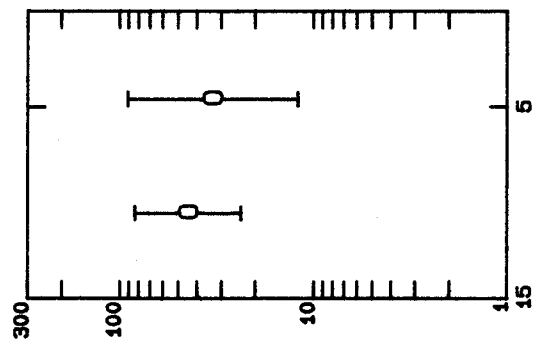
CONEY ISLAND
JAMAICA BAY TRANSECT



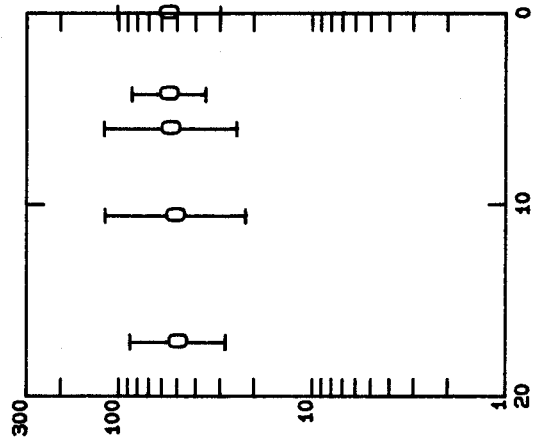
HARLEM
RIVER



HUDSON, UPPER AND LOWER BAY, OCEAN



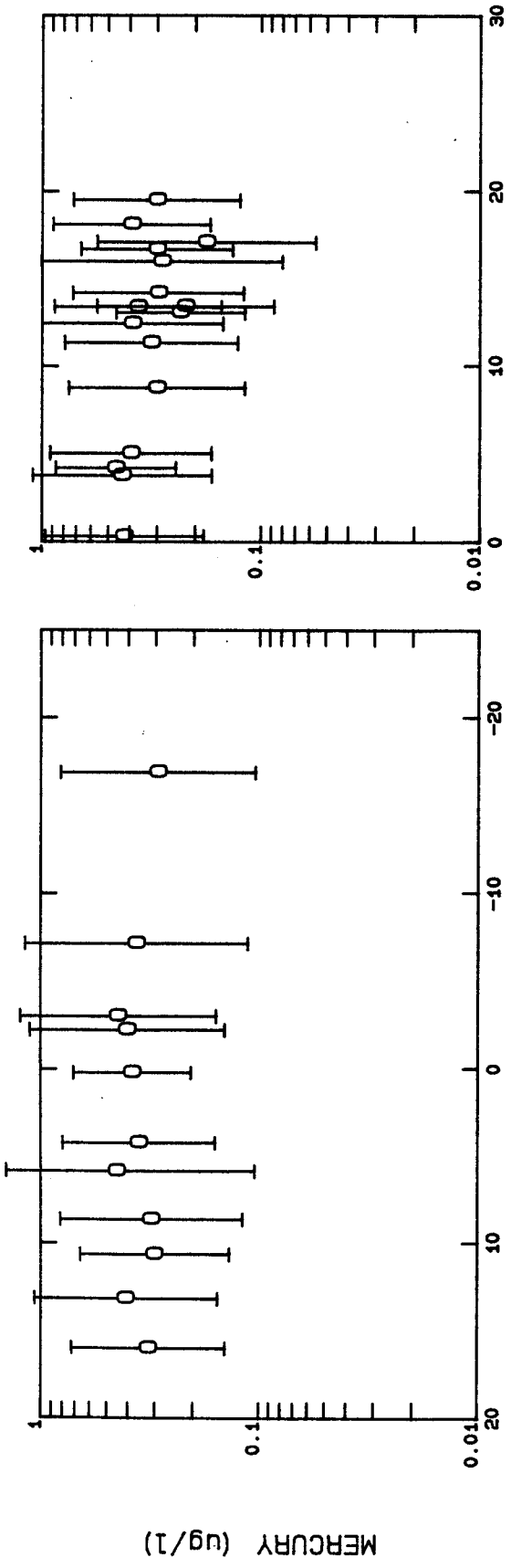
RARITAN BAY



KILLS

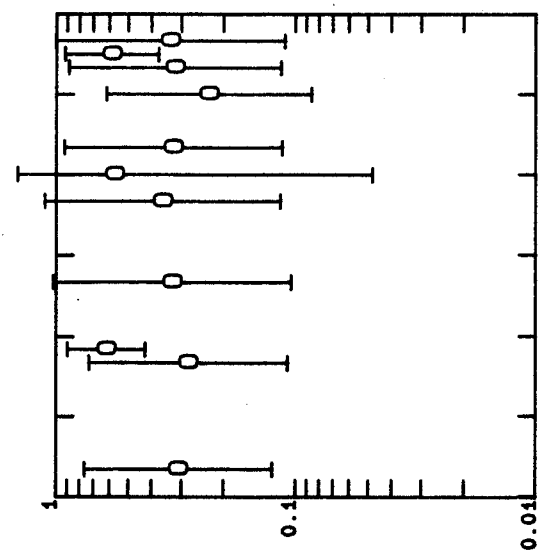
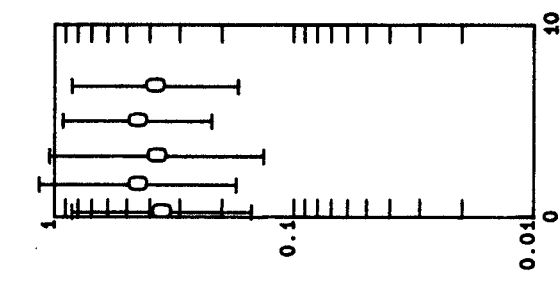
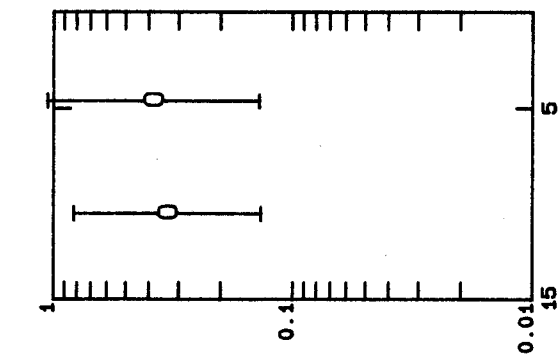
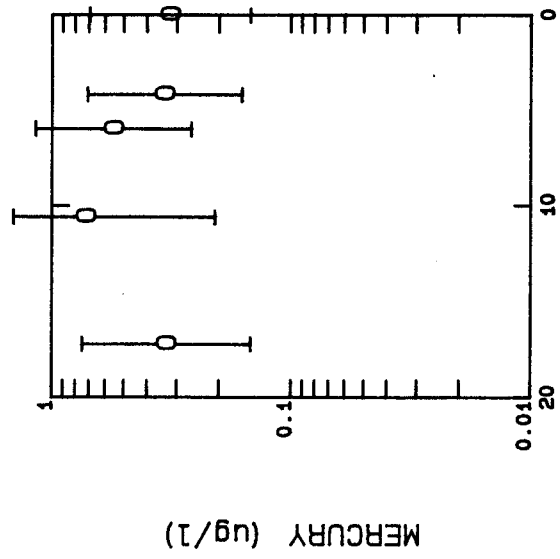
COPPER (ug/l)

COPPER (ug/l)

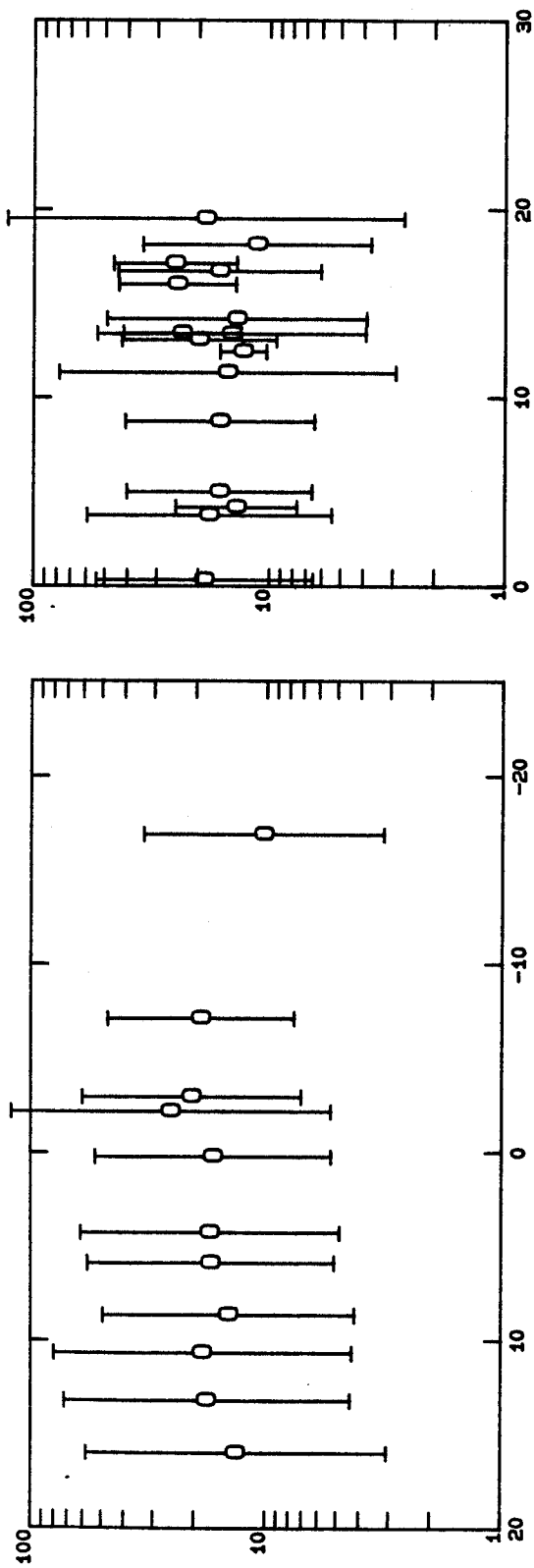


HUDSON, UPPER AND LOWER BAY, OCEAN

HUDSON RIVER



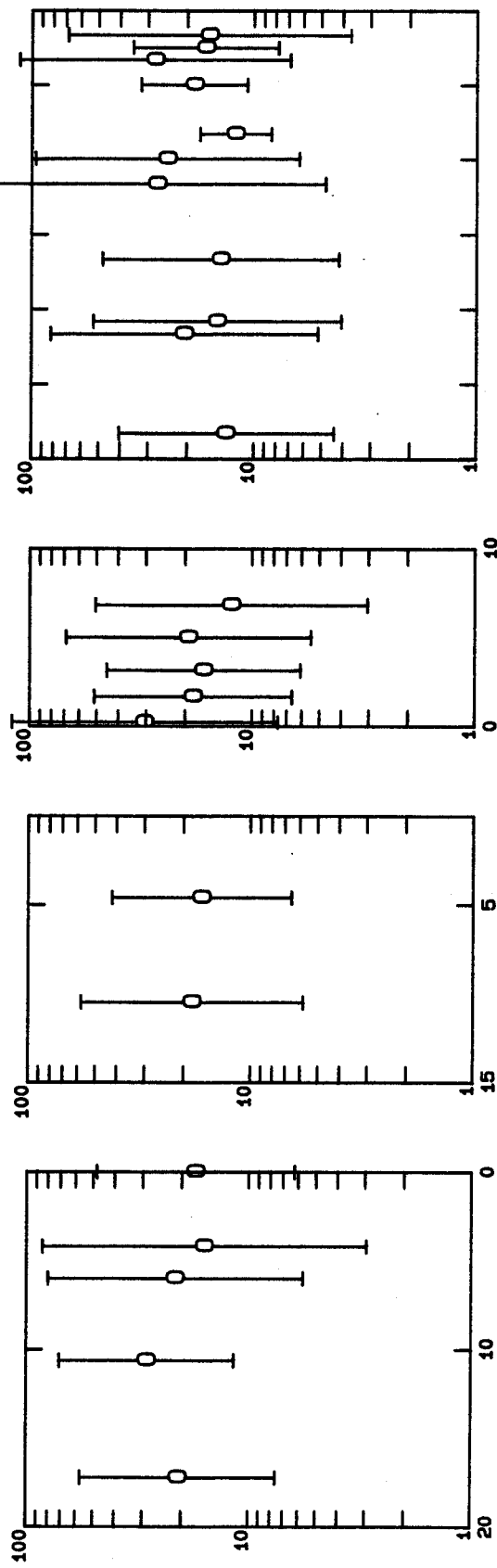
NICKEL (ug/l)



HUDSON, UPPER AND LOWER BAY, OCEAN

EAST RIVER

NICKEL (ug/l)

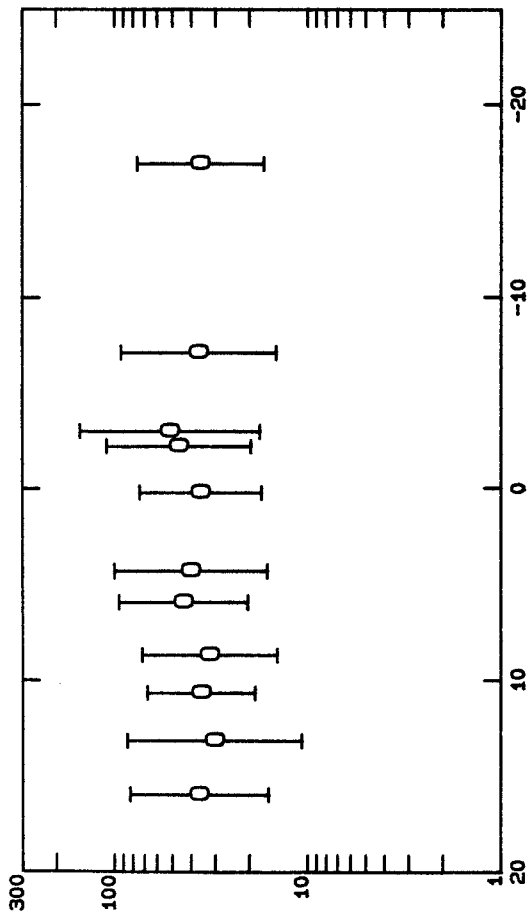


KILLS

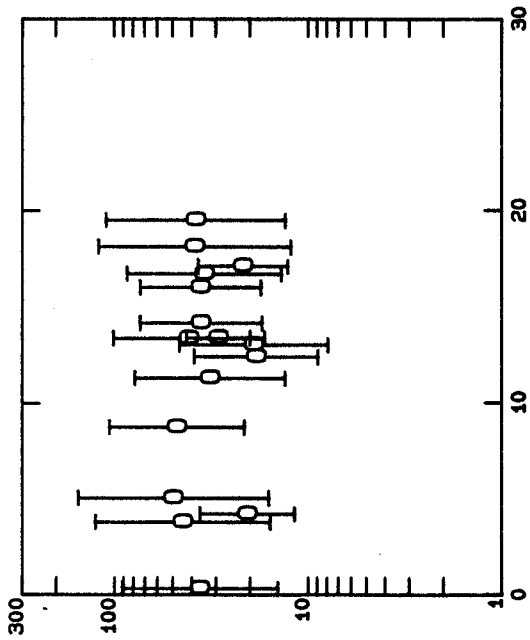
RARITAN BAY

HARLEM RIVER

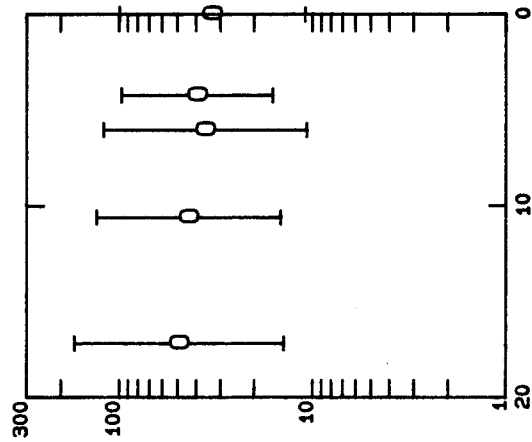
CONEY ISLAND JAMAICA BAY TRANSECT



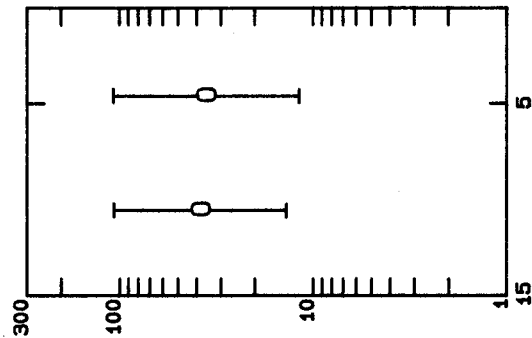
HUDSON, UPPER AND LOWER BAY, OCEAN



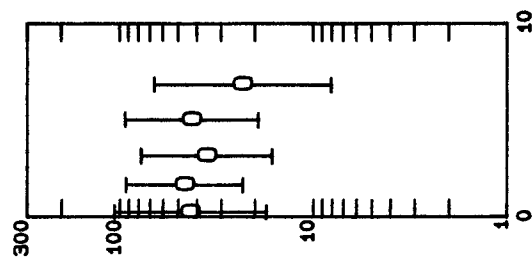
EAST RIVER



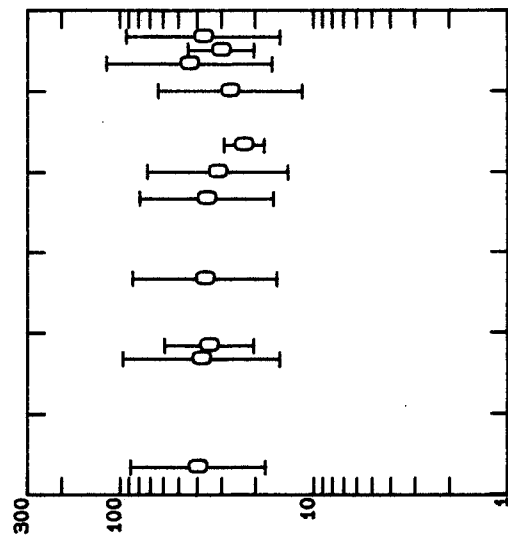
KILLS



RARITAN BAY



HARLEM RIVER



CONEY ISLAND JAMAICA BAY TRANSECT

LEAD (ug/l)

LEAD (ug/l)