RE: 91132-N

SEQUOYAH FUELS CORPORATION

RECEIVED JUL 22 1991

July 19, 1991

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Mr. A. Bill Beach, Director
Division of Radiation Safety
and Safeguards
Region IV
U.S. NUCLEAR REGULATORY COMMISSION
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

RE: License No. SUB-1010; Docket No. 40-8027
HF Off-Gas Scrubber - Elevated Uranium MPC's

Dear Mr. Beach:

This letter provides an interim report of the recent conditions surrounding operation of Sequoyah Fuels Corporation's (SFC's) HF (hydrogen fluoride) off-gas scrubber and sampling of the scrubber exhaust for uranium. The primary concern is the detection of uranium in the HF off-gas scrubber exhaust at concentrations significantly higher than would be expected based on past experience. The following text provides a description of the problem and significant actions taken to date. Included is background information pertaining to the scrubber system, a summary of recent events and actions taken, and to implications with respect to SFC's NRC license. Finally, SFC's plan for addressing the situation is outlined. The plan is discussed in terms of short, intermediate, and long term actions to improve current conditions and prevent recurrence.

HF Scrubber System

The HF off-gas scrubber system, which includes an upstream H_2-F_2 burner, is designed to remove fluorides as hydrogen fluoride (HF). The H_2-F_2 burner converts hydrogen and fluorine to HF gas. The scrubber removes the HF gas from the air stream by absorption in water. The HF scrubber does remove some UF_6 and particulate from the gas stream, but with less efficiency. The HF scrubber was not intended, by design or function, to remove particulates from the gas stream.

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There are several gas streams that enter the HF scrubber, four of which are potentially uranium bearing. Two of these streams enter the HF scrubber from the H_2-F_2 burner and two bypass the burner. Five other gas streams enter the HF scrubber without going through the burner; each of these are from non-uranium bearing processes. Attachment 1 provides more detail with regard to the origin and composition of each of the gas streams entering the HF scrubber system.

<u>Cold Trap Off-Gas</u>

The cold traps are refrigerated systems that collect UF_6 by desubliming (solidifying) it out of a hot gas stream. There are normally three cold traps in series; primary, cleanup, and secondary. Any UF_6 that is not solidified in the cold traps is passed to the H_2-F_2 burner, then to the HF scrubber. This is likely the primary pathway for uranium to enter the HF scrubber.

The hot and cold R-11 circulating systems were modified in the summer of 1990. The new system is a simpler system to operate, uses less refrigerant, and is more efficient at solidifying UF_6 than the previous system. In fact, the current secondary cold trap system was initially being operated at such a low temperature that too much HF was being condensed with the UF_6. This caused unwanted HF to be transferred to the product cylinders during filling. To alleviate this problem SFC increased the temperature of the cold traps and also revised its procedure to "burp" or vent excess HF from secondary cold traps prior to draining to product cylinders. This caused less HF to condense which may have caused a slight increase in UF_6 passing from the cold trap to the H_2-F_2 burner. SFC has been experimenting with variations in secondary cold trap temperatures to try and determine an optimum operating condition. This has likely caused some variation in the amount of uranium released to the scrubber.

<u>HF Scrubber Sample Train</u>

The effluent from the HF scrubber is sampled prior to entering the main plant stack by passing the sample gas stream sequentially through a KOH solution, moisture trap, and two series-connected glass-fiber filters. Recent sample system modifications have included the installation of a new sample probe and new tubing. The new sample probe and sample flow rate were configured to provide as near isokinetic sampling as possible. The sample probe design and flow rate were based on recommendations in ANSI N13.1 "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities." The sample filters are stored after collection to allow transformation of radon daughters and then analyzed for gross alpha activity on a gas flow proportional detector. The results are converted to an activity concentration and compared to the MPC for natural uranium.

Several problems existed with the former sample train. First, an improperly sized probe, for the given sample flow rate, was being used to collect the sample. The probe was also improperly positioned in the gas stream. Second, the sample tubing and connections were in poor condition, apparently allowing outside air to be drawn into the sampling system instead of requiring all sampled gas to come from the scrubber exhaust. Third, the rate at which the sampled gas passes through the KOH solution may be so great as to not provide adequate contact time. Also, the first filter paper in the sampling system occasionally becomes so loaded with particulate matter that the flow rate through the filter is reduced to zero. These problems were corrected by installing the correct size sample probe, replacing tubing and connections, and increasing sample collection frequency, respectively. SFC is considering improvement of the KOH component in the near future.

Summary of Recent Events

The HF scrubber sample results increased on July 2, 1991. A value of about 310 times the MPC for natural uranium in unrestricted areas was recorded. This prompted an investigation, and subsequently, the corrective actions discussed above for the sampling system, as well as others discussed below. The air sample data collected to date is presented graphically in Figure 1. Prior to July 2, MPC values for normal operating conditions typically were in the range of 200 to 250 MPC.

Data for fenceline air samples collected daily from four locations North, South, East and West of the Main Process Building are presented in Figure 2. The filters are analyzed for gross alpha activity. No significant changes are apparent for the period of interest (July) when compared to the previous month of June.

Data for offsite environmental air samples collected weekly from six locations around the facility are presented in Figure 3. The filters are analyzed weekly for gross alpha activity. The samples are composited on a quarterly basis and analyzed for uranium, radium, and thorium.

In an effort to determine the cause(s) of the increased uranium MPC values in the HF scrubber, several troubleshooting scenarios were carried out. These varied from those corrective efforts described above for the sample train to shut-down of the plant for extended periods. More specifically, the efforts included running different portions of the plant under isolated and/or varying conditions, inspecting processes for proper operation of filtering equipment, and extensive maintenance and repair to the HF scrubber. On July 5, the plant was shutdown to allow inspection of the HF scrubber. The shutdown lasted several hours. As a result of the inspection a spray nozzle was replaced, a weld repaired, and more packing was added to the scrubber. Again in the afternoon of July 10, the plant was shutdown to allow testing and a more detailed reinspection of the HF scrubber. This shutdown lasted until the afternoon of July 12. Maintenance and repair efforts included rebuilding a circulating pump, replacing two nozzles, verifying level control calibration, inspecting distributor and support trays, upgrading recirculation liquid distribution, repair of a leaking heat exchanger, and replacing four pressure gauges. Also, several operational parameters of the HF scrubber were varied to evaluate the effect on the overall operation of the HF scrubber.

SFC License Action Level

SFC's NRC License SUB-1010, Chapter 5, identifies an action level for release of uranium via airborne effluents of 30,000 microcuries per calendar quarter. SFC is monitoring the total activity released from the HF scrubber against this action level. This action level has not yet been exceeded. If present uranium effluent levels continue, SFC expects to exceed this action level this calendar quarter. SFC will evaluate and document the significance of this condition, including any impact at the nearest residence in a written report to NRC in early August.

Planned Actions

Recognizing the current situation as one without a single, simple, obvious solution, SFC has developed a general schedule of actions to be performed in order to mitigate the situation, and ultimately, correct the condition. These actions are differentiated with respect to short, intermediate, and long term completion schedules. The primary short term actions are 1) further modification of the HF scrubber to improve water distribution over the internal packing thereby improving the operating efficiency of the HF scrubber, 2) adjustment of the UF_6 cold trap temperature to increase the efficiency of UF_6 collection in the cold traps, and 3) procurement of the services of an outside consultant(s) to evaluate the current sampling system and analytical method, make necessary recommendations for upgrades and collect an independent sample. Finally, investigation of the cause of the elevated emissions will continue.

Two intermediate term actions are planned. These are installation of a mist eliminator (demister) downstream of the HF scrubber, and clean-out of the UF_6 cold traps. The mist eliminator is being designed specifically for application to SFC's process. The general principle is that of a self-cleaning wet gas filter. Aerosol particles are trapped on a filter bed and subsequently washed to a drain. Water is added to the mist eliminator in the form of a fog to aid in washing the fiber bed. This is anticipated to greatly improve the system's capacity to remove UF_6 and uranium particulates from effluent air. Cleaning of the cold traps may improve the efficiency of operation of the cold traps and will allow for observation and correction of any condition which may be hindering their operation. It is presently contemplated that intermediate term corrective actions would be implemented by early October.

Long term actions are also being considered. These include segregation of airborne waste streams to minimize size of treatment systems and application of pollutant-specific treatment technologies. For example, uranium bearing streams might be consolidated and then passed through a KOH scrubber prior to being combined with other gas streams and discharged to the main plant stack. Also, SFC will have its stack consultant review other licensed material air emission points at the facility to ensure sampling is proper, or to identify corrective actions, where needed. Long term actions will require further examination and definition; they would likely be implemented in the calendar year 1992.

Should you have any questions, please contact me at 918/489-3207.

Sincerely,

Lee Lacey

Lee R. Lacey
Vice President
Regulatory Affairs

LRL:nv

xc: Charles J. Haughney, NRC-NMSS
Keith E. Asmussen, General Atomics

ATTACHMENT 1

GAS STREAMS ENTERING THE HF SCRUBBER

Uranium Processes

A summary of the gas streams from uranium containing processes that enter the HF scrubber is as follows:

1. H_2-F_2 Burner

   The H_2-F_2 burner pilot light is maintained with natural gas which with combustion air converts hydrogen from the cell room and excess fluorine from fluorination (from secondary cold traps) to hydrogen fluoride and combustion products (water vapor, carbon dioxide and excess air).

2. DUF_4 H_2 Burner

   The DUF_4 H_2 burner pilot light is maintained with natural gas which with combustion air converts excess hydrogen from the DUF_4 facility to combustion products (water vapor, carbon dioxide and excess air). Purge nitrogen and hydrogen fluoride in the off-gas streams are unaffected by the burner.

   Note: The DUF_4 off-gas stream is filtered by primary and secondary filters for solids removal. Primary and secondary carbon traps are utilized to remove traces of unreacted uranium hexafluoride before the hydrogen fluoride is recovered by two condensers in series operated at approximately -30°F and -90°F, respectively.

3. Hydrofluorination

   Hydrofluorination off-gases which do not contain volatile uranium compounds are filtered by primary and secondary filters for solids removal. The gases are cooled by heat exchangers that condense water vapor (reaction product) and hydrogen fluoride before entering the HF scrubber. The off-gas stream from the heat exchangers contain hydrogen fluoride, water vapor and purge nitrogen.

4. Gas Lifts - A and B-Lines Hydrofluorination

   Product uranium tetrafluoride is transferred to the gas lifts where nitrogen is utilized to elevate the product to another conveying system and also remove any entrained hydrogen fluoride. The nitrogen containing hydrogen fluoride is filtered by primary and secondary filters before entering the scrubber.

Non-Uranium Processes

A summary of the gas streams from non-uranium processes that enter the HF scrubber is as follows:

1. Hydrogen Fluoride Vaporizers (2) Vents

   When the vaporizer requires maintenance the liquid hydrogen fluoride is transferred to a storage tank. The hydrogen fluoride vapors are vented to the HF scrubber and then the vaporizers are purged with nitrogen that also enters the HF scrubber. The vaporizers are protected against overpressure with process relief systems, that when activated, vent to the HF scrubber.

2. Hydrogen Fluoride Storage Tanks Vents

   Periodically the hydrogen fluoride storage tanks are vented to affect transfer of liquid hydrogen fluoride from the transport tanker requiring SFC to lower the pressure on the receiving storage tank by venting vapors of hydrogen fluoride and nitrogen to the HF scrubber to affect the transfer. The hydrogen fluoride storage tanks are protected against overpressure with process relief systems, that when activated, vent to the HF scrubber.

3. Hydrogen Fluoride Transport Tanker Vent

   Hydrogen fluoride transport tankers are pressurized to transfer its contents to SFC's storage tanks. After transferring the hydrogen fluoride from its transport tanker, the tanker is depressurized by venting the nitrogen and hydrogen fluoride vapors to the HF scrubber.

4. Cell Room Hydrogen

   During the production of fluorine, an equal volume of hydrogen is produced. This hydrogen stream containing hydrogen fluoride is transferred to the H_2-F_2 burner. A description of the burner is in the previous section, item 1.

5. F_2 Cell Rework System Vent

   Hydrogen fluoride is vented from the electrolyte makeup tank when converting potassium bifluoride to the electrolyte containing about forty (40) percent hydrogen fluoride. The systems are also vented during transfer of electrolyte to and from fluorine cells.

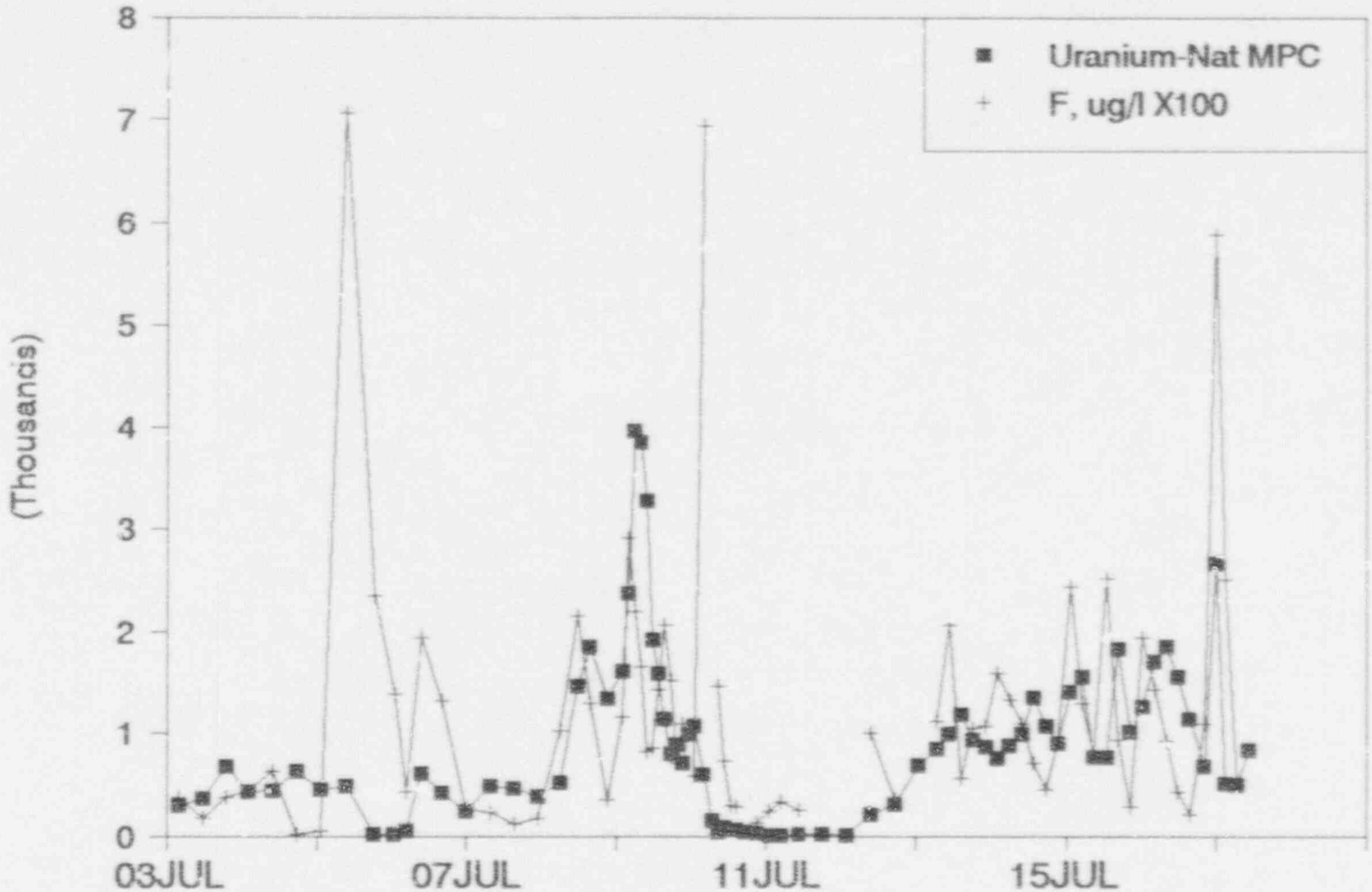

Figure 1. HF Offgas Scrubber Exhaust Sampling Results.

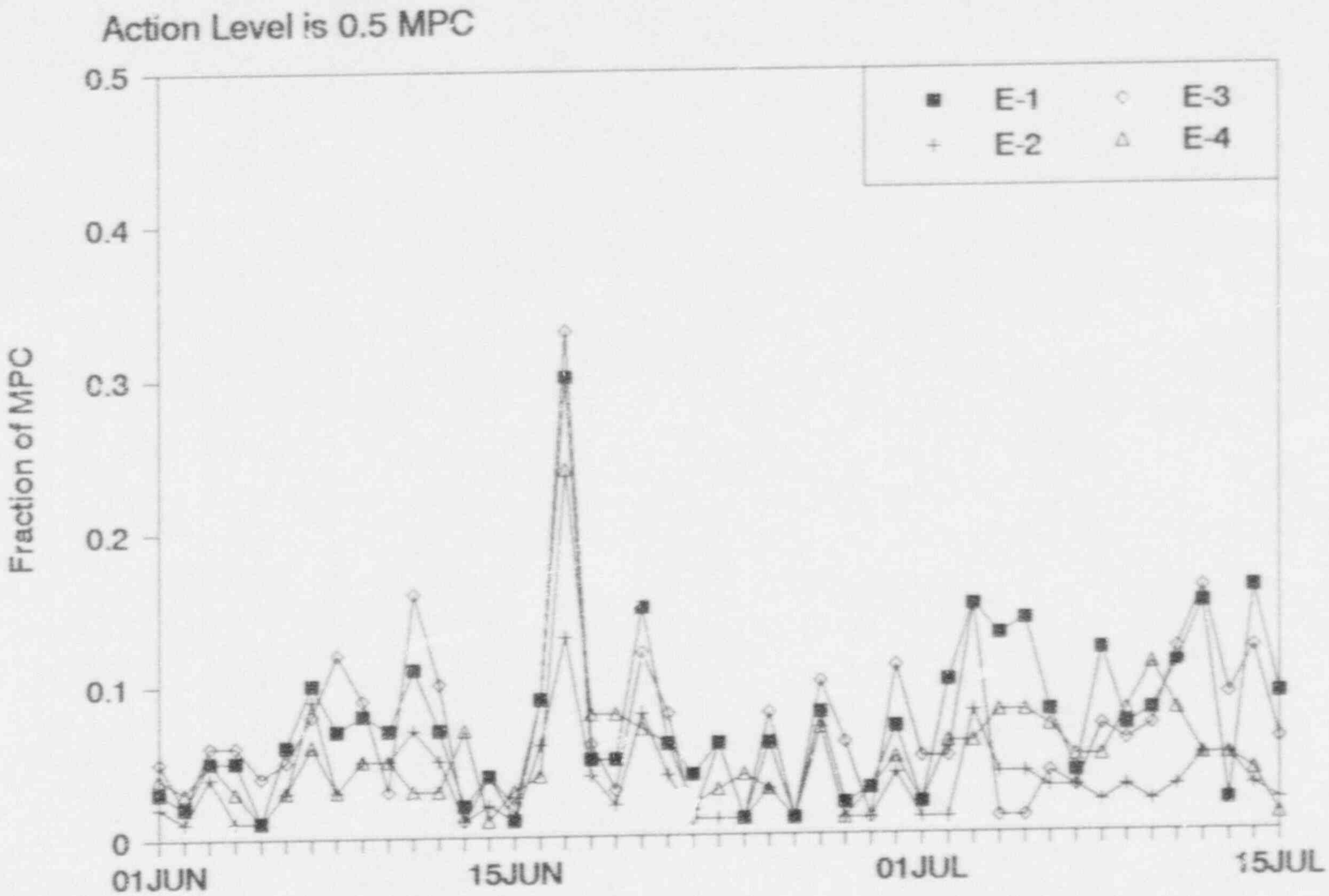

Figure 2. Fenceline Airborne Monitoring Results.

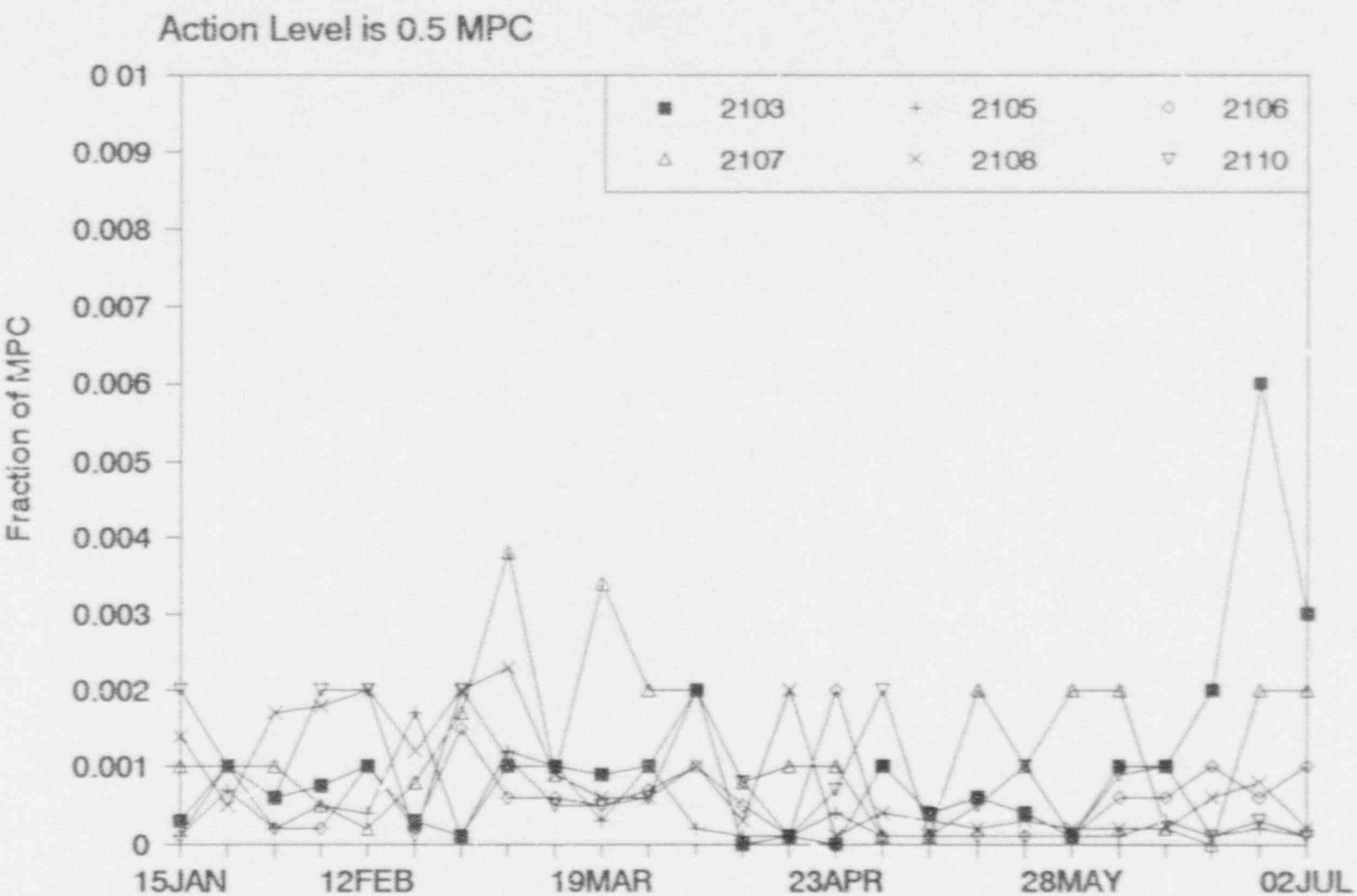

Figure 3. Environmental Airborne Monitoring Results.