Report to the Director on the Fermilab Environment
CY1996

1.0 Introduction

The goal of the Fermilab Environmental Monitoring Program is to assist Laboratory management in decision-making by providing data relevant to impacts of Laboratory operations. Line organizations have the responsibility to recognize and understand the environmental aspects of their operations, and to conduct their work in an environmentally sound manner.

Monitoring and surveillance are critical elements of an effective environmental protection program. Fermilab has established and implemented comprehensive environmental monitoring and surveillance programs[1] to ensure compliance with legal and regulatory requirements imposed by Federal, State, and local agencies and to provide for the measurement and interpretation of the impact of Fermilab operations on the public and the environment. The surveillance and monitoring activities are selected to be responsive to both routine and unplanned releases of penetrating radiation and liquid or airborne effluents. The location and frequency of samples are based on established routines, operational considerations, and historic levels of pollutants found in each location. The primary factor in choosing sampling locations is to assign higher priorities to those locations with the greatest potential for adverse impacts.

To evaluate the effects of Fermilab operations on the environment, samples of effluents and environmental media collected on the site and at the site boundary are analyzed and compared to applicable guidelines and standards. The status of environmental protection activities and the progress on environmental restoration and corrective action activities are discussed in this report. There were no abnormal occurrences that had an impact on the public, the environment, the facility or its operation in CY1996[2].

2.0 1996 Laboratory Highlights

After a five year hiatus, the operation of the Fixed Target Area resumed in CY1996. Experiments were run in the Neutrino, Meson and Proton Beamlines and beam also continued to be targeted in the Antiproton Area. This constituted the last major run of the Fermilab 800 GeV fixed-target program. This run is anticipated to terminate in mid-September 1997.

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[1] Details of the Fermilab environmental program can be found in the Fermilab Environmental Monitoring Strategy (FMS).

[2] Supporting data are available upon request from the Fermilab ES&H Section in electronic or paper form.

2.1 Significant Environmental Accomplishments

This year an onsite meteorological station was utilized to collect local weather information instead of using O'Hare Airport data as in previous years. The input of local wind speeds and directions resulted in a decrease in estimates of the dose equivalent due to Fermilab radioactive air emissions.

Fermilab made significant progress in closing out its Tiger Team findings and upgrading its compliance posture. During FY 1996, an additional 40% of the Tiger Team tasks were closed out, leaving less than 7% remaining open by the end of FY 1996. Closure of many remaining Tiger Tasks was achieved by illustrating that the drivers for these tasks were not contained in the Necessary & Sufficient set of standards. This resulted in an estimated cost avoidance for implementation of $289K in materials and service (M & S) and 39 person/years. The annual estimated cost avoidance for on-going effort is $59K in M & S and 16 FTE's.

An environmental database consisting of two major components, the Fermilab Environmental Monitoring Plan (FEMP) and the Fermilab Environmental Database (FED) is available on the ES&H server. The FED contains specific environmental data and is cross-referenced with the FEMP in order to provide continuity between monitoring results and the Fermilab environmental monitoring program. This computer database will eventually be made accessible to a more general constituency and will allow us to keep specific information in a format that will allow easier retrieval.

Progress was made in reducing the waste streams at the Lab. We attained a contract for servicing parts washing stations, which allows solvent to be re-used rather than recycled. This means that the solvent is used twice before any further processing is necessary. The volume of solvent used is no longer considered a waste stream, and therefore reduces our volume of waste generated significantly. In addition, it removes the potential for contamination of the solvents from a source external to the Lab, because the solvents used in the baths are virgin material rather than recycled.

A field fire burned approximately 50 to 75 acres in the northeast quadrant of the site. Portions of two National Environmental Research Park (NERP) experiments were affected. High winds complicated the fire fighting efforts. The cause was formally cited as being of "undetermined origin."

A record-setting seventeen inches of rain fell in a 24 hour period July 17-18, 1996 causing flooding at Fermilab and throughout the Chicagoland area.

3.0 Environmental Monitoring and Surveillance

The goal of the Fermilab Environmental Monitoring Program is to assist Laboratory management in decision-making by providing data relevant to impacts that Fermilab operations have on the surrounding environment. The Environmental Monitoring Program consists of effluent monitoring to confirm compliance with permits, generally at a particular point, and environmental surveillance, conducted at various locations to intercept the pathway of potential pollutants to receptors such as plants, animals or members of the public. We collect environmental data for reporting purposes or whenever it is necessary or useful in conducting the business of the Laboratory.

The pathways available for movement of radioactive materials and chemicals from Fermilab operations to the public are the atmosphere, surface water and groundwater. Environmental surveillance consists of collecting and analyzing samples of various media and measuring penetrating radiation. Samples are collected and radiation is measured from areas within the site boundaries.

Ground and surface waters are sampled at locations near operating areas, potential contamination sources and along potential transport pathways. In addition to air and water surveillance, samples of soil are collected and radiation is measured to determine the effectiveness of effluent controls and to ascertain whether there is any build-up of radioactive materials as a result of long-term operations.

Surface water, air, groundwater, soil, and sediment samples are monitored for radionuclide concentrations. Surface waters are also monitored for potential chemical constituents. While levels of penetrating radiation are measurable near operational areas on the site, the levels decrease rapidly with distance from the source. External penetrating radiation and airborne emissions are normally below instrument detection levels and must be estimated at the site boundary, to provide information about the maximum potential radiation doses to off-site populations. The results of the environmental surveillance program are interpreted and compared with environmental standards where applicable. The Fermilab Environmental Monitoring Strategy, which is maintained by the ES&H Section, provides more details.

3.1 Air

The potential for public exposure to air pollution from Fermilab is very low. We have applied for and received an air pollution permit issued under the Clean Air Act, including a "National Emissions Standards for Hazardous Air Pollutants" or NESHAPs element, which covers airborne radionuclides.

Airborne radionuclides are normally released to the atmosphere from target stations operating in the Fixed Target and in the Antiproton Source areas.

Monitoring is conducted at targeting areas where air transport is considered to be a significant contributor to the overall transport of radioactive materials offsite. The Magnet Debonding Oven at the Industrial Complex is also a small source of airborne radionuclides.

The radiation doses potentially received offsite by the public are calculated from environmental surveillance of the onsite sources. The dose for the air pathway is calculated using a Gaussian plume computer simulation model called CAP-88PC. This model was created by U.S. EPA to predict the movement of airborne radionuclides and is required by regulations governing hazardous air pollutants at 40 CFR 61. Maximum calculated concentrations offsite are predicted to be below the level that can be detected by monitoring.

Fermilab is not a significant source of chemical air pollution. Our permits cover emissions caused by open burning, operation of various boilers and total organic emissions from vapor degreasing operations. Estimated pollutant levels are calculated based on the knowledge of the processes that generate them and the characteristics of individual pollutants.

3.1.1 Radioactive Air Emissions

During Calendar Year 1996 protons were focused onto numerous targets in the Fixed Target Area as well as the Antiproton Source Area. Airborne radionuclides ^{11}C, ^{13}N and ^{41}Ar were identified in emissions from AP0 and monitored beamline stacks. Tritium (H-3) was emitted from the Debonding Oven. The total releases from the AP0 stack in the Anti-Proton Area; the stacks in the Fixed Target Area (M05, NM2, NW8, ME6, TSB spur, PW8, and PB4); and the Magnet Debonding Oven resulted in an estimated total released activity of approximately 21 Curies. These releases were well within the limits of our current air pollution permit application on file with the Illinois Environmental Protection Agency (IEPA). The application states that our total releases will average no greater than 100 Ci/year with a maximum of 900 Ci/year. These measurements were taken at the sources, and no detectable levels of radionuclides reach the site boundaries.

CAP-88PC computer modeling results showed the maximum dose equivalent potentially delivered to a member of the public at the site boundary to be 0.0128 mrem. The increase in estimated dose equivalent over last year (0.00225 mrem) is due to the resumption of the operation of the Fixed Target Beamlines in addition to continued operation of the Anti-Proton Area. Emissions for CY1996 are still well below the Environmental Protection Agency (EPA) standard of 10 mrem/year to a member of the public and also much less than the EPA's continuous monitoring threshold of 0.1 mrem/year.

The estimated collective dose equivalent delivered to the public within a 50 mile radius through radioactive air emissions from Fermilab was 3.69×10^{-2} person-rem, compared to 1.19×10^{-2} person-rem reported for CY1995. Fermilab's CY1996 Radionuclide Air Emissions Annual Report was submitted to DOE in June 1997.

3.1.2 Non-Radioactive Air Emissions

Illinois Environmental Protection Agency (IEPA) approved our request to register as a "Non-Major (Air Pollution) Source Based Upon Actual Emission Levels". The acceptance of this request allowed us to delay submittal of a Federally Enforceable State Operating Permit (FESOP) or Clean Air Act Permit Program (CAAPP) application until January 25, 1997. Meanwhile, USEPA legislation increased the nitrogen oxide threshold which seemed to further exempt Fermilab from the requirement to prepare a Federally Enforceable State Operating Permit (FESOP) application. We requested a Clean Air Act permit revision to document that exemption. The IEPA responded on November 25, 1996, agreeing that the level of emissions at the Laboratory do not warrant the issuance of a FESOP. There were no instances of non-compliant emissions in CY1996. The Annual Air Emission Report for Fermilab was submitted to the Illinois Environmental Protection Agency (IEPA) in April 1997. Operations were reviewed again this year to ensure that permitted equipment continued to operate and be maintained in accordance with permit conditions.

3.2 Penetrating Radiation

Operation of the Fermilab accelerator and associated beamlines produces ionizing radiation such as muons. Beamlines and experiments are designed so that most of the muons range out under the ground surface, however some emerge above the surface and present a small potential for radiation dose. Storage of radioactive materials onsite results in another potential exposure to ionizing radiation. These sources of penetrating radiation are monitored throughout the site with emphasis on source locations. Dose estimates incorporate the extremely conservative assumptions that a single individual would be exposed for an entire year precisely at the site boundary. Effective dose equivalents obtained due to natural causes (i.e., cosmic rays, terrestrial sources and indoor radon, etc.) average approximately 300 mrem/year.

During the CY96-97 run, the potential muon sources were the Fixed Target MC, NC, NT, PB, and ME beamlines and the Collider C0 beam Absorber and AP0 target. The effective dose equivalent due to their operation was estimated to be 0.013 mrem/year from the C0 Beam Absorber, 0.55 mrem/year from the MC beamline, 0.068 mrem/year from the NC beamline, 0.972 mrem/year from the NT beamline, 0.004 from the PC beamline, and 0.161 from the PB beamline at their respective nearest site boundary locations. These estimates were calculated

from the number of protons delivered to these locations and mrem/proton measurements made at the site boundary.
Radioactive material stored at the Railhead accounted for no measureable dose equivalent rate at the site boundary in CY1996. This was due to the reduction of radioactive material storage and improved shielding of remaining radioactive items. Consequently, the maximum radiation dose to an individual at the nearest offsite house was not measureable in CY1996.

3.3 Surface Waters

Fermilab discharges liquid effluent to surface water bodies and to publicly owned treatment works in Batavia and Warrenville. Fermilab holds an NPDES (National Pollutant Discharge Elimination System) permit to discharge commingled non-process, non-contact cooling water and stormwater runoff to surface waters through outfalls to Kress, Indian and Ferry Creeks. Due to the presence of the RCRA-permitted (Resource Conservation and Recovery Act) Hazardous Waste Storage Facility onsite, the permit also addresses stormwater discharges from designated solid waste management units (SWMUs). A Stormwater Pollution Prevention Plan is frequently modified to reflect changes that occur as part of the RCRA Facility Investigation (RFI) of the SWMU sites. The Lab also continues to maintain a Stormwater Pollution Prevention Plan in conjunction with our NPDES permit to construct the Fermilab Main Injector.

A NPDES pre-treatment permit allows us to release a treated effluent from the Central Utility Building regeneration process to the City of Batavia sanitary sewer system. In addition to the monitoring required by our NPDES permits, samples of surface water are taken annually from selected bodies of water onsite and analyzed for radionuclides. We sample surface waters on the basis of their potential for contamination. Chemical and physical parameters are not normally monitored in surface waters because Laboratory policies are designed to direct effluents into the sanitary sewers. Maximizing allowable discharges to the sanitary systems limits the opportunity for contamination.

3.3.1 Radioactive Releases to Surface Water

Numerous sumps located throughout the site collect and drain water from building footings and from under beamline tunnels in the Tevatron enclosure and the Experimental Areas. Water collected by these sumps often contains detectable concentrations of radionuclides (primarily tritium, ^{3}H) that have been leached by rainwater from radioactive soil near beam targets and absorbers or released accidentally to sumps from beamline cooling water systems. Surface water monitoring conducted during CY1996 showed tritium concentrations to be less than the Department of Energy Derived Concentration Guides for allowable radionuclide releases to surface waters (2000 pCi/ml). Only one of twenty-eight

samples taken from onsite ditches, ponds and creeks showed a detectable level of < 1 pCi/ml of tritium.

The effluent from the Central Utility Building regeneration process was sampled prior to each discharge and analyzed for accelerator-produced radionuclides during CY1996. Approximately 0.59 mCi of tritium and 1.34 mCi of beryllium-7 were released to the sanitary sewer during the year.

3.3.2 Non-Radioactive Releases to Surface Water

Monitoring for non-radiological chemical constituents in surface water consisted of NPDES permit parameters this year.

3.3.2.1 Cooling Water System

Our NPDES permit for the cooling water system requires that water temperature and pH be monitored at all three outfalls and reported to the IEPA on a monthly basis. Chlorine concentration is recorded for the Kress and Indian Creek outfalls. During 1996, the permit limit for total chlorine (0.05 mg/l) was exceeded six times in Indian Creek[3]. No other parameters were exceeded during the year. Plans for a dechlorination process were initiated and an application for a "Permit to Construct" was approved by the IEPA. The equipment was installed and is operational. Three personnel in the Facility Engineering Services Section Operations Group successfully passed the IEPA "K" Operators examination to operate the dechlorination equipment.

3.3.2.2 Releases to Sanitary Sewers

The pretreatment permit for the Central Utility Building regeneration effluent requires the collection and analysis of composite process effluent samples for metals. Radionuclides are analyzed as well in order to confirm that no significant amounts of radionuclides are released. These samples were conservatively taken at the process release point rather than at the site boundary where Fermilab actually discharges to the municipal sewers, and where concentrations would be greatly diluted. The heavy metal analytical results were submitted to the IEPA. During CY1996, samples from the process effluent were never in exceedance of the Batavia Sanitary Sewage Ordinance Discharge Limits or the Department of Energy Derived Concentration Guide for radionuclide releases.

This year Fermilab developed internal criteria for the discharge of wastewater to sanitary sewers, detailing both the general and specific limits for discharge of waste streams to the sanitary sewer. These limits were set to ensure that

[3] These exceedances of permitted discharge concentrations were later found to be partially due to naturally high levels of manganese in the surface water. Manganese interferes with the colorimetric analysis for chlorine, yielding higher concentrations than the actual level.

pollutant concentrations in effluents at the site boundary remain within allowable concentration limits imposed by municipal ordinances and permit conditions. This allows the Lab maximal usage of the sanitary sewers for waste disposition thus minimizing the unnecessary handling of various waste streams as regulated waste. Sampling stations have been placed at site boundary locations to monitor sewer discharges to each municipality. Analytical results are compared to municipal discharge limits to track compliance.

3.4 Groundwater

Forty-three wells were sampled during the year for various radionuclides or chemical species. The applicable regulatory limits for groundwater are water quality standards published by the state. Class I groundwater is considered to be a resource and is highly protected. The water that is located in or near the dolomite aquifer 50 to 70 feet below ground surface of Fermilab is generally considered to be Class I groundwater. Water in the overlying till is usually considered to be Class II water and has less stringent standards.

Fermilab continued to identify and analyze groundwater issues associated with a proposed construction project (Neutrinos at Main Injector, or NuMI), which would necessitate construction within the dolomite aquifer.

3.4.1 Radionuclides

Tritium was detected in two of five shallow Central Utility Building Tile Field wells at approximately 17 feet below ground level (approximately 43 feet above the Class I groundwater level). The detected concentrations of < 1 pCi/ml of tritium are much less than the Department of Energy groundwater concentration guide and the Illinois' Class I groundwater standard for tritium both of which are 20 pCi/ml.

Samples from all five angled monitoring wells drilled into the Neutrino berm (four grouped closely in the vicinity of the Neutrino Target Area and one further upstream) contained tritium in measurable concentrations, though most remained less than the Illinois Class I groundwater standard of 20 pCi/ml for tritium. These wells are finished in the till, and vary from approximately 30 to 50 feet above the level of the Class I groundwater. Tritium levels in groundwater samples from one of the monitoring wells (S-1087) that was screened below the bathtub area of the Neutrino Fixed Target Beamline increased from <5 pCi/ml to as high as 80 pCi/ml. This well monitors groundwater located midway between the bottom of the bathtub and the Class I groundwaters located approximately 70 feet below ground surface. Concentrations of tritium have fluctuated at this well since April 1995. Recovery data seem to indicate that well construction may be causing this increase and fluctuation. This year saw the completion of a study to characterize the hydrogeology at two areas along the Neutrino Fixed Beamline in order to determine the source of the increased tritium levels in the

groundwater samples. The purpose of this project was to gain a better understanding of the transport mechanisms for tritium within the glacial deposits and the upper bedrock. It also will extend our monitoring network beyond its current capabilities from within the glacial deposits to the Class I groundwater in the vicinity of this area of soil activation. Piezometers (groundwater monitoring devices) were installed at NS1 and NS2 Service Buildings to determine the vertical and horizontal groundwater flow gradients. Three monitoring wells were installed in the upper dolomite down-gradient of NS1 and NS2. A new technology in drilling was utilized in this project to provide undisturbed core material for better characterization and analysis of the geological environment beneath these locations. Sampling of the newly developed wells along the Neutrino beam lines was begun in December 1996. Water samples from all three wells were analyzed, and the levels of tritium in all were below the detection limit (< 1 pCi/ml). Continued monitoring of groundwater flow parameters (gradient and direction) indicates that they are very stable. As a result of this project, the remaining 45 degree angled wells have been removed from the routine sampling schedule. The four angled wells in the vicinity of the Neutrino Target Area will be removed and closed according to state guidelines as soon as possible after the 1997 shutdown. Closing these wells will remove a potential source of tritium soil contamination in the activated areas adjacent to beamlines. The wells will be replaced with a new system, designed and installed to eliminate construction concerns. The new monitoring system will be capable of sampling groundwater in the glacial deposits at the same elevation.

Analytical results from six other wells onsite showed measureable concentrations of tritium in CY1996: Well 12, Well 24B, Well 39, Well 43, Well 45, and Well 68. Fermilab analysis of replicate samples yielded less than 1 pCi/ml of tritium[4]. Well 55, in which measureable but < 1 pCi/ml was detected in CY1995, showed no measureable tritium concentrations in samples taken this year. No other accelerator-produced radionuclides were found in detectable concentrations in Fermilab wells sampled during 1996.

3.4.2 Chemicals

Water samples from the wells used to monitor an old perforated pipe field within the Main Ring continued to yield measurable levels of chloride, total chromium and hexavalent chromium in CY1996. Measured chromium concentrations were less than 2% of the IEPA Class II groundwater standards. Chloride concentrations in the vicinity of the Central Utility Building Tile Field continued to significantly exceed the chloride standard for Class II groundwater. Samples for these analyses were collected from seven monitoring wells finished

[4] An investigation that included a review of subsequent analysis, process knowledge, and quality assurance has led us to believe that the results originally reported by our vendor were false positives.

in the glacial till (from 15 to 40 feet below ground level and 20 to 45 feet above the aquifer). A Phase II Workplan for this area is part of the RFI (RCRA Facility Investigation), and will further address any remediation needed at this location.

4.0 A Summary of Compliance With Specific Environmental Regulations

Underground Storage Tanks
IEPA granted clean closure for Site 38 (Old Fuel Service Center) on January 17, 1996, after a review of the reports detailing the actions the Laboratory had undertaken to remove the underground fuel storage tanks and to remediate the hydrocarbon contamination that was encountered. No further remediation or monitoring efforts are required.

Department of Transportation
The U.S. Department of Transportation (DOT) held the "first-ever" inspection of the Lab's compliance with DOT regulations on December 5 and 6, 1996. The focus of the inspection was hazardous material shipping procedures, including packaging and preparation of shipping papers. No non-compliances were found and the inspectors complimented the Fermilab program. Four recommendations issued in the inspection report were promptly addressed with corrective actions.

The Endangered Species Act of 1973
No compliance issues were identified in CY1996.

Executive Order 11988, "Floodplain Management"
No compliance issues were identified in CY1996.

Executive Order 11990, "Protection of Wetlands"
Evaluation of Fermilab activities in wetlands is accomplished through the NEPA review process. No new compliance issues were identified in CY1996.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
In CY1996, the use of pesticides and herbicides at Fermilab was handled in accordance with FIFRA.

The Migratory Bird Treaty Act
There were no compliance issues identified in CY1996.

National Environmental Policy Act (NEPA)
Fermilab met these requirements by implementing a program of reviewing all of its activities for NEPA compliance. The Fermilab Environment, Safety, and Health Manual (FESHM) Chapter 8060 was revised to clarify requirements for NEPA project reviews, concentrating efforts on the most significant projects and streamlining the review process.

National Historic Preservation Act (NHPA), Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
Compliance with these Acts was accomplished through the NEPA review process that included an evaluation of all proposed land-disturbing projects in CY1996 to assess any potential impacts on historic resources. No compliance issues were identified in CY1996.

Resource Conservation and Recovery Act of 1976 (RCRA)
As a condition of our RCRA Part B permit, the IEPA has required Fermilab to undertake a RCRA Facility Investigation (RFI). The purpose of the RFI is to investigate whether hazardous constituents have been released to the environment from identified solid waste management units (SWMUs) located onsite. In addition to requiring the reporting of newly identified SWMUs, the RCRA also requires IEPA be notified of any changes to a previously identified SWMU.

In early 1995, the IEPA was notified that the Railhead Storage Yard might contain lead contamination not originally identified and that Fermilab planned to investigate this concern. In 1996, Fermilab conducted an evaluation of the environmental impact resulting from the storage of lead (e.g., bricks) and lead-containing materials (e.g., Nevis shielding blocks) at the Railhead. It was suspected that past storage practices led to a potential for lead contamination. Seventy-one sediment and soil samples were collected for analysis. Seven of the samples had lead concentrations in excess of 400 ppm (a commonly used remediation standard). The consultant's report detailing the results of the lead soil contamination in the BSS Railhead Area was submitted to the IEPA. The report indicated that four areas within the Railhead Area had contamination in excess of the remediation standard. The Nevis shielding blocks had been stored in three of these areas. The IEPA responded by requesting that we prepare a sampling plan to determine the rate and extent of lead contamination and submit the results to the agency by May 15, 1997. Nearly two-thirds of the shield blocks were reused in the KTeV shielding. Because the remaining blocks are now under roof, they do not present an ongoing environmental hazard.

The State asked for similar "rate and extent" studies for the CUB tile field, and the Village Machine Shop, and determined that four solid waste management units that were identified and characterized last year will require no further investigation.

The State also provided guidance on permanent closure of the Meson Hill "landfill". We were directed to submit a plan for closure to the IEPA by April 15, 1997. This plan was approved and is currently being implemented.

The USEPA conducted a RCRA inspection of Fermilab September 25-26 1996. It included a review of waste manifests, annual reports, training records, the contingency plan, the closure plans, the Part B permit, and operating records. Satellite waste accumulation areas and the Hazardous Waste Storage Facility were also visited. No deficiencies were cited.

Safe Drinking Water Act

Fermilab provides drinking water to its employees through two Fermilab-operated public water supplies and a satellite supply connected to the City of Warrenville public water supply. Full jurisdiction for Fermilab's public water supplies was transferred from the Illinois Environmental Protection Agency (IEPA) to the Illinois Department of Public Health (IDPH) this year. Initially, this involved an IDPH review of our existing monitoring program which determined that our program was compliant with their regulations.

During CY1996 the action level for lead in drinking water was exceeded in samples from the distribution system for the Main Site public water supply. While not a compliance issue, this required additional sampling, distribution of educational materials describing the hazards of lead in drinking water, and the development of a corrosion control plan. The Lab completed a corrosion control plan to address high lead levels in drinking water and it was submitted to the IDPH in January 1997.

Benzene levels that were slightly elevated over the drinking water standard were found in the water from a semi-private well at Hazardous Waste Storage Facility (HWSF). Activated charcoal and micron filters were installed to remove traces of benzene and particulate matter from the water supply for the emergency shower and eye wash station. Subsequent analyses indicated that the filters were operating properly. The source of the contamination appeared to be along the line from the well, which is approximately 50 yards long. The well water is not contaminated, nor is the water to the house located at Site 55. The water line to the HWSF was rerouted and replaced in mid-CY1997.

SARA TITLE III or Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA)

Under these regulations Fermilab is required to provide the EPA, state, and local officials with an annual accounting of hazardous chemicals and extremely hazardous chemicals used or stored onsite in quantities greater than a given threshold. Reportable materials present at Fermilab were Freon R-11, Trimethylbenzene, Halon and ethylene glycol. An estimated 167 pounds of Halon 1301 was released to the environment as a result of flooding of the Casey's Pond pumphouse fire protection system during a power outage. It was necessary to add 600 pounds of Freon R-11 to two chillers at the Central Utility

Building to make up for refrigerant lost as fugitive emissions over the last two years. Even though over a two year period this represents an acceptable leak rate by EPA standards, the Lab continues to work for the replacement of these units. A reported 7020 pounds of Trimethylbenzene in scintillation oil were recycled and nearly 1000 pounds of ethylene glycol in water were sent for treatment and disposal at offsite regulated facilities. The SARA Title III Report was submitted to the EPA in CY1996. Our inventory of these materials was also submitted to state and local emergency services and disaster agencies in early CY1997.

Toxic Substance Control Act (TSCA)
The application of TSCA requirements to Fermilab involves the regulation of polychlorinated biphenyls (PCBs) and asbestos. A plan is underway for twenty-four transformer sites located at service buildings around the Main Ring to be remediated for PCB contamination of soil. A remediation agreement was arrived at jointly by Fermilab and the U.S. EPA. The contamination occurred as a consequence of past (pre-TSCA) sampling procedures in which transformer oil containing 2-5% PCBs was drained onto the ground as part of a sampling procedure to verify that dielectric properties had not deteriorated. There was no suitable shutdown to allow further transformer yard cleanups in 1996, though more are planned in the future.

An earlier study conducted at two service buildings showed that historic spills may have occurred in the "truck lanes" between Main Ring Road and the transformer yards and service buildings during the transfer of oil between transformers and tanker trucks. Soil sampling to identify any contaminated areas was initiated in the fall of 1995 and completed in May 1996. The first round of analytical results indicated that measurable contamination (>1 ppm) existed at seventeen of the twenty-two areas investigated. Two additional areas were characterized in a previous study. The contamination at ten buildings exceeded the remedial action criterion (10 ppm) for nonrestricted access areas. While most were small spills, relatively large areas were affected at three buildings. Complete remediation for these sites was conducted in July and August of 1996. Post-cleanup samples confirmed attainment of the cleanup objective.

In January 1995, in preparation for shipping forty-four large, high-voltage Linac capacitors to the warehouse for storage as spares, the manufacturer was contacted to verify the nature of the dielectric oil. Contrary to an earlier report, the manufacturer stated that the units probably contained PCBs. Sampling confirmed that the oil was 100% PCB. The surplus capacitors were labeled, dated, and moved to the Fermilab Hazardous Waste Storage Facility to await shipment for offsite disposal. The 176 capacitors that remained in use were added to the site inventory and labeled during the February 1995 shutdown. A

plan was devised in May 1995 to remove the remaining capacitors. Sampling of Linac Gallery floors to ensure that no PCBs had migrated out of the cabinets from weeping capacitors was begun in 1995 and completed in 1996. One small area required cleanup, but all samples taken in the corridor were within regulatory limits. In August of 1996, forty-four PCB capacitors in two stations were removed for disposal, two unneeded stations were dismantled and disposed of, and one station was decontaminated and refitted with new capacitors. This work brought the total number of remaining PCB capacitors down to half of the original number, one hundred and ten. Cleanup and capacitor replacement at the five remaining operational stations requires a lengthy shutdown and is planned for 1998.

Twelve PCB transformers that were retrofilled with non-PCB oil during 4th quarter 1995 were sampled in CY1996. Notification was sent to the USEPA for reclassification of nine of the transformers from PCB to non-PCB. The remaining three were retrofilled a second time on March 15, 1996, sampled and concentrations were verified to be below 50 ppm. Notification has been sent to USEPA to reclassify these transformers as non-PCB. An onsite Commonwealth Edison-owned PCB transformer was replaced with a non- PCB transformer in CY1996. Samples were also collected from unlabeled pole-mounted transformers on site. Seven PCB-contaminated pole-mounted transformers were replaced with non-PCB transformers. Three other transformers were tested and found to be less than 50 ppm.

5.0 Conclusion

The operations at Fermilab during CY1996 had no significant adverse impact on the environment or on public safety.