PCi

Porter Consultants, Inc.

Radiological Protection and Environmental Services

125 Argyle Road
Ardmore, PA 19003-3201

Phone (610) 896-5353
FAX (610) 642-7804

PCI-TR-402

Decontamination and Decommissioning Plan for Quehanna, PA Site

Revision 2

March 26, 1996

Prepared for:

PA DER,BRP

Prepared by:

John Sykes III
Radiological Health Physicist

Reviewed by:

Margaret A. Reilly, CHP

and

Sydney W. Porter, Jr., CHP
President

A/1

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Decontamination and Decommissioning Plan for Quehanna, PA Site

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 Summary

1.1.1 The license for the material to be removed under this Decontamination and Decommissioning project is in the name of PermaGrain Products, Inc., 4789 West Chester Pike, Newtown Square, PA 19073. The affected license number is 37-17860-02 (material is stored at the PermaGrain Products Main Plant, 115 Reactor Road, Karthaus, PA 16845). PermaGrain Products, Inc. also maintains an NRC license for a large ^{60}Co irradiator facility. This later license will not be affected by the subject activities.

1.2 Description of Site & Facilities

1.2.1 The Quehanna Site is located at 115 Reactor Road, Karthaus, PA in the Quehanna Wild Area of the Moshannon State Forest approximately 21 air miles Northeast of Clearfield, PA at 41°13'18"N 78°14'10"W[1] (see Attachment 8.1). The affected Quehanna structures consist of a hot cell complex, a waste water treatment plant with associated underground storage tanks & plumbing, a fan room containing the cell ventilation system, an overhead hot cell transport system and associated laboratories. The structures were used primarily for the construction of thermoelectric generators containing ^{90}Sr. This facility is tenanted by PermaGrain Products, Inc., the facility licensee, who operates a large ^{60}Co pool irradiator.

1.2.2 An excellent site description and description of the operations which took place at the site, circa 1964, was prepared by Martin Marietta [Martin 1964]. Much of the following information and many of the attached figures were derived from that report. Also, most of the observations in that report are still valid. The subject report is available upon request.

1.2.3 The contaminated structures within the Quehanna Facility consist of the following [Canberra 1993] (refer to Attachment 8.2):

- Waste water treatment plant, located south of the main facility (see Attachment 8.3).

---

1 NAD83 horizontal datum.

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

- Waste water holding tanks buried below ground adjacent to the waste water treatment plant.

- Chemistry and decontamination laboratories, used for storage of contaminated materials and equipment. Including isolated ventilation system.

- Hot cells and isolation rooms. A sixth cell is located directly below Cell 1 (see Attachment 8.4).

- Fan room and ventilation system located directly below the hot cells (see Attachment 8.5).

- Stationary overhead transport system, situated over Cells 3 and 4 (see Attachment 8.6).

- Miscellaneous areas including service area floor, overhead crane, laundry room, utilities trench in Operations area.

1.2.4 Characterization consisted of making direct radiation measurements of all structures and equipment, and of sampling water, soils and air for contaminants. Results showed that, with few exceptions, all components are contaminated. The principle radiological contaminant is ^{90}Sr, although ^{60}Co was also detected. Contamination levels range from low (<1,000 dpm/100 cm^2) in the suspect waste tanks to very high (>1,000,000 dpm/100 cm^2) in the hot cell ventilation ducts. The residual levels depend primarily upon whether or not systems had been partially decontaminated during earlier decommissioning. Even if decontamination has been attempted, release criteria were rarely achieved, since fixing contamination in place (i.e., painting over contamination) was a common practice thirty years ago. The ventilation system has been operated continuously since cell use began. Consequently, no decontamination has been attempted, and this system exhibits the highest levels of removable contamination at the site. Contact beta dose rates approach 4 rad/hour in these ducts. As stated, the predominant contaminant within these structures is ^{90}Sr, a high energy beta emitter. Total body external exposures are generally not a problem, although protection from eye and skin beta doses must be considered. An exception to this condition is Cell 1, where approximately 2,800 curies of ^{60}Co, is stored. The presence of these sources

results in exposure rates as high as 400 R/hr within the cell (with possible shine in adjacent areas).

1.2.5 A series of possible remedial actions were identified and evaluated with respect to applicable criteria. Several actions were rejected as not viable because of regulatory constraints or infeasibility. The remaining were rated individually in light of the evaluation criteria. Further study indicated that the preferred action is actually a combination of options that includes in-place decontamination using mechanical methods, removal, volume reduction and disposal. The plan may also require on-site storage of waste because of the unavailability of appropriate waste disposal sites.

1.2.6 A worst case cost estimate, assuming removal and disposal of all pertinent components without volume reduction or decontamination, was developed. The cost was estimated at $4.4 M. The recommended option, presumably utilizing the optimum balance of decontamination, removal, volume reduction and disposal, is estimated to cost $3.5 M.

1.2.7 The remedial action is estimated to require at least one year on site, since PermaGrain will continue operations in other portions of the facility.

2.0 DESCRIPTION OF PLANNED DECOMMISSIONING ACTIVITIES

2.1 Decommissioning Objectives, Activities, Tasks and Schedules

2.1.1 Decommissioning Objectives, Activities and Tasks

2.1.1.1 Objectives

The primary objective of this project is to decontaminate and release the affected facilities and structures for unrestricted use and to terminate the radioactive materials storage license, 37-17860-02 (see section on radioactive waste). However, other licensed activities (e.g., the PermaGrain operation) are expected to continue at the site. The operational objective is to meet the U.S. Nuclear Regulatory Commission's *Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination*

Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

of Licenses for Byproduct, Source, or Special Nuclear Material [NRC 1993]. NRC approval for exemptions to these guidelines will be requested on a case by case basis.

Environmental contamination (e.g., soil, ground or surface water) was not found during the characterization study. However, if contaminated soil is found during the removal process, the U.S. Nuclear Regulatory Commission's *Current Guidelines on Acceptable Levels of Contamination in Soil and Groundwater in Property to be Released for Unrestricted Use* [NRC 1992] will be used as the basic criteria for release (see section 4.2, below, for further information).

One final objective of this project is to develop/utilize innovative technologies for radioactive waste volume reduction, in part, as a demonstration of the Commonwealth of Pennsylvania's leadership role as the site State for the Appalachian Low-Level Radioactive Waste Compact. Due to this factor, specific decontamination procedures will not be specified at this time, instead, bidders for the decontamination effort will be encouraged by financial & other incentives to reduce the volume of radioactive waste generated over "traditional" D&D methods.

2.1.1.2 Activities

The major activities (not necessarily in chronological order) are:

a. Removal of sources from hot cells, general housekeeping, preparation of area for work — ^{60}Co sources must be removed from cells prior to start of work (it may be possible to find a broker for these sources, otherwise temporary storage for them will have to be found), area needs a general clean up and removal of extraneous equipment before D&D effort can begin.

PCi
Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

b. HVAC study & fabrication/installation of a temporary/new system prior to hot cell system work, if deemed to be necessary.

c. Gross decontamination of hot cell ventilation system and other high specific activity areas — this is necessary to prevent re-contamination of other systems during the remaining work, ensure proper operation of exhaust ventilation system before proceeding.

d. Decontamination/removal of the Stationary Overhead Transport System (SOTS) — one of the most highly contaminated systems involved.

e. Decontamination of hot cells and isolation rooms — structural integrity of the building must be assured if large amounts of concrete must be removed, removal of contaminated equipment from hot cells could also be a problem.

f. Decontamination of Operations and Service areas — includes Operations Area Trench, Chemistry Lab, Decon Room, etc.

g. Final decontamination/removal of hot cell ventilation system — this must be performed after areas being exhausted are released for unrestricted use, a temporary ventilation system will most likely be needed during this phase.

h. Decontamination/removal of waste water treatment system (above ground facilities) — a temporary exhaust ventilation system (with HEPA filters) will be needed during this phase.

i. Decontamination/removal of underground waste water storage tanks (& associated piping if necessary) — includes removal of any contaminated soil if found.

2.1.1.3 Tasks

a. Removal of sources from hot cells, general housekeeping, preparation of area for work

(1) The area in and about the hot cells requires some general housekeeping prior to initiation of work in the area. Also, some large equipment (including some ^{60}Co sources in storage) needs to be removed from the area to allow the D&D work to proceed.

(2) The area will then need to be prepared to prevent the possibility of contamination getting into the un-affected areas of the facility (especially those used by PermaGrain for normal operations). This will likely include building temporary partitions (walls) and enclosures around the hot cells or other areas to be worked on, installation of temporary ventilation equipment, etc. Since PermaGrain operations will continue during the D&D project, great care will be exercised not to impact their operations, especially by unplanned release of radioactive material out of the areas being worked on.

(3) Independent dress-out and personnel decontamination facilities will need to be installed specifically for the D&D effort. Either a temporary facility may be constructed or a trailer(s) obtained for this purpose. In either case the appropriate utilities must be provided (electricity, hot & cold running water, heat, air conditioning). Additionally, it is expected that both administrative and support facilities will be needed (e.g., office, laboratory and storage areas with utilities as needed).

b. HVAC study & temporary/new system prior to hot cell system work.

(1) The HVAC system is one of the most contaminated systems at the Quehanna site. In our opinion, prior to performing the D&D of the site, the HVAC system will either have to be replaced by a temporary HVAC system or at least be partially decontaminated to prevent cross contamination of less contaminated areas later on (e.g., if the HVAC system was left to the end of the project, systems already cleaned-up would likely be re-contaminated when the HVAC system was shut-down and decontaminated).

(2) As part of the initial site preparation, therefore, the HVAC system will have to be studied and the advantages and disadvantages of temporarily replacing or partial decontamination of the system considered. Of course, if the system is decontaminated, it will have to be shut-down and a temporary system will have to be used during the decontamination, therefore, it may be just as easy to replace the HVAC system prior to the start of the project (this decision will be made prior to starting the project). On the other hand, if the system is replaced for the duration of the project, a more sophisticated, semi-permanent replacement system will be required (with appropriate radiation monitoring included).

c. Gross decontamination of hot cell ventilation system and other high specific activity areas

(1) In our opinion, to prevent the cross-contamination of other less contaminated areas of the facility, the HVAC system and certain other highly-contaminated systems will need at least partial decontamination to reasonable levels before attempting to decontaminate the rest of the facility. In addition to the HVAC system some other systems which may need such separate attention may include the SOTS and some of the contaminated equipment located in the hot cells.

(2) If the above equipment was isolated and at least partially decontaminated, minor cross-contamination of other less contaminated areas (hot cell walls, floors & ceilings) would not create significant additional problems (e.g., The cells have already been painted to lock contamination in place. New contamination would be limited, for the most part, to the surface of the paint. After decontamination of the cells, re-contamination, if it occurred, would be on bare rough concrete, requiring much greater effort to decontaminate).

d. Decontamination/removal of the Stationary Overhead Transport System (SOTS)

(1) Regardless of whether the above partial decontamination is performed, the SOTS is one of the most highly contaminated systems involved. Therefore, decontamination (or disassembly) of this system would be a high priority. As this system is no longer used, disassembly appears to be the decontamination method of choice. If the structural steel in the SOTS could be decontaminated (e.g., by Walnut Shell blasting, etc.), it could be recycled, lowering the volume of radioactive waste generated. The supporting structure, is mostly sheet-metal and concrete block, therefore, volume reduction techniques would likely be limited to shredding and/or compacting the material for disposal (other techniques suggested by the contractor would be evaluated by the Radiation Protection Committee).

(2) The degree of contamination in this system would, undoubtedly, require tenting, etc. to completely encapsulate the system prior to disassembly/decontamination. For this and other tasks a portable HEPA ventilation system (of approx. 2,000 cfm or greater) would be provided to maintain a negative pressure in the "tent", filter radioactive material out of the air during the work in progress and to allow for proper radio-

logical monitoring of the air released (e.g., the discharge of the portable HEPA system would be monitored).

(3) Finally, dose rates, especially beta dose rates, are likely to be high in this system. Therefore, supplemental shielding and careful application of ALARA principles will be required.

e. Decontamination of hot cells and isolation rooms

(1) Again, a filtered, monitored ventilation system must be provided for this work. Tasks include disassembly and decontamination or disposal of equipment located in the hot cells. Following this, the cells themselves will be decontaminated to acceptable levels. This would likely include removing any metal lining and scrabbling the concrete sufficient to allow release. Other techniques would possibly include walnut shell blasting of structural steel and disassembly and decontamination or disposal of the manipulator systems, etc. The structural integrity of the building must be assured if large amounts of concrete must be removed.

(2) It should be noted that the radiation levels in Hot Cell #1 (up to 400 R/hr) due to the presence of 2,000 — 3,000 Ci of ^{60}Co in the cell will require careful consideration of the techniques to be used, including the use of remote handling tools.

(3) To accomplish the above safely will require construction of temporary facilities to act as "air-locks" for entry/egress from the cells, installation of supplementary HEPA exhaust ventilation, etc. to ensure the total encapsulation of the work area. Dose rates (especially beta dose rates) could be high in these facilities, requiring careful consideration of supplemental shielding and other

ALARA principles. It may be possible to reactivate the manipulator system and perform much of the work remotely.

f. Decontamination of Operations and Service areas

(1) This work is pretty straight-forward. The areas will need to be isolated from occupied areas and provided with supplemental HEPA exhaust during the decontamination.

(2) Decontamination methods in these areas would involve wiping and removal of the paint from the walls, floors and ceilings; decontamination/disassembly of the equipment contained in these rooms (see Decon Room Inventory, Attachment 8.7), and scrabbling of the concrete surfaces to remove embedded contamination. Some disassembly of the utilities (e.g., drain lines and exhaust ventilation system) will also likely be needed in these areas. Note that the Operations Area Trench has only low-level contamination, such extreme measures may not be needed in that area.

g. Final decontamination/removal of hot cell ventilation system

(1) First, the hot cell ventilation system will need to be shut-down and isolated (this will likely involve the installation of temporary HEPA exhaust, if the hot cell ventilation system was not replaced by a new system as mentioned in section a., above).

(2) Next the system will need to be "tented" to prevent the spread of contamination (tent will also require HEPA exhaust ventilation). It is likely that the system will be disassembled and disposed of as radioactive waste. Dose rates, especially beta dose rates, will likely be high. Therefore, supplemental shielding and applica-

tion of ALARA principles will be necessary during the work on this system.

h. Decontamination/removal of waste water treatment system (above ground facilities)

(1) The waste water treatment system is co-located in a separate building with PermaGrain's domestic heating/hot water boiler. Therefore, some temporary provisions for domestic heat/hot water may be needed during this phase of the D&D. Also, a temporary exhaust ventilation system (with HEPA filters) for the waste water treatment building will be needed during this phase (as well as tenting for ingress/egress to the building). Due to the nature of the building and the problem with the boiler (a temporary boiler may be needed), it is likely that the work on the waste water treatment facility and the underground storage tanks (see next section) will need to be performed in the summer months.

(2) The effort for the waste water treatment system will likely involve disassembly of the system, cutting-up the tanks and pipes and disposing of the same as radioactive waste. However, alternative technologies, for example in-situ decontamination and release for unrestricted use and/or metal recycling will also be examined for feasibility.

i. Decontamination/removal of underground waste water storage tanks (& associated piping if necessary)

(1) Based on the characterization survey, it appears that what contamination exists in these tanks is limited, both in quantity and concentration. However, the tanks and their associated piping will likely be removed, since they are no longer used and to allow sufficient surveys to be per-

formed to ensure that the adjacent soil has not become contaminated.

(2) Due to the outdoor location of the system and the low contamination levels involved, no precautions other than restricting the (excavation) work area and continuous down-wind monitoring will be needed during their removal. Soil sampling will be performed during the excavation and tank/piping removal. If any contaminated soil is discovered during the removal of the tanks and piping, it will be remediated to the levels proposed in the accompanying Technical Report [PCI 1995]. Due to the nature of the excavation necessary for this phase of the project, verification surveys will need to be performed promptly following the removal (the NRC will be invited to perform any inspection or sampling they desire) so that the excavation can be promptly back-filled for safety.

2.1.2 Description

Since specific tasks depend on the innovative technologies to be used by the contractor, they will be developed and submitted by the successful bidder and added to a latter revision of this document. A description and analysis of the tasks will also be provided at that time.

2.1.3 Procedures

The decontamination and decommissioning project shall be performed utilizing written procedures prepared for the project. These procedures shall be reviewed by the contractor's Radiation Safety Officer, and be approved by the Radiation Safety Committee prior to implementation. Procedures shall be tracked utilizing standard document control methods (e.g., a document control procedure shall be developed and followed). Procedures shall include the following areas: employee training, radiation safety & ALARA, effluent monitoring, instrument calibration, personnel monitoring, access control to work areas, sampling and laboratory analysis of samples, environmental monitoring, specific operational tasks to be performed, radioactive waste management, transportation of radioactive samples & waste, verification sampling and

surveys, interim storage of radioactive waste, an Emergency Plan for accidental/unmonitored releases, etc.

2.1.4 Schedules

Bidders will be required to submit a schedule for the activities and tasks to be performed. Critical pathways will be identified and related activities specified in the schedule (PERT or Critical Pathways Charts will be utilized). The time to accomplish specific activities and tasks will be specified. This schedule shall be reviewed and approved by the Radiation Safety Committee prior to the commencement of any work involving the radioactive materials.

2.2 Decommissioning Organization and Responsibilities

The Commonwealth of Pennsylvania will establish an administrative and technical organization for the D&D project which includes PermaGrain Products, Inc. and the contractor. A diagram of the interim organization is enclosed as Attachment 8.8. Oversight of the D&D project shall remain in the hands of the Radiation Safety Committee.

2.3 Training

All personnel working in Radiologically Controlled Areas[2] of the project shall receive an eight hour, site specific training program (this program may be reduced to four hours for personnel holding a current OSHA 40-hr "HAZWOPER" certificate). This program shall emphasize the nature of beta radiation, protection from high-level beta radiation and beta dosimetry & measurements as well as internal exposure concepts. It will also include principles and practices of radiation protection, radioactivity measurements standardization, monitoring techniques and instruments, mathematics and calculations basic to the use and measurement of radioactivity, and biological effects of radiation. Supervisory personnel will, additionally, be qualified by appropriate academic training and experience. HP technicians will be required to meet the qualifications of a senior technician in accordance with ANSI N-3.1.

PPI ancillary employees and personnel working under License No. 31-17860-01 will be informed of radiation hazards and appropriate precautions associated with the remediation work.

---

2 Airborne Radioactivity Areas, Contamination Areas, Radiation Areas, etc.

2.4 Contractor Assistance

An experienced Decontamination and Decommissioning contractor will provide the personnel and management for this project. The selection of the contractor will be based on: proven technical competence with previous D&D projects, especially in the area of dealing with high-level contamination; innovative technology for radioactive waste volume reduction; and lastly on cost. The contractor will be expected to handle all aspects of the D&D under the above listed project management, with the end result of producing a number of radioactive waste containers, appropriate for eventual disposal at an appropriate low-level radioactive waste facility.

3.0 DESCRIPTION OF METHODS USED FOR PROTECTION OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY

3.1 Facility Radiological History Information [Reilly 1994]

In June 1955 Governor Leader signed into law several pieces of legislation which paved the way for construction of a Curtiss-Wright research facility at Quehanna. The Commonwealth looked on the project as a contributor to the local economy. The Commonwealth acquired the real estate before the advent of Curtiss-Wright. The core area was sold to Curtiss-Wright, and the balance leased to them. Early plans for the facility had it becoming, among other things, an establishment for the development of nuclear jet engines. They also planned to do research in nucleonics, metallurgy, ultrasonics, electronics, chemicals and plastics. In 1958 the Atomic Energy Commission issued a license to C-W to operate a swimming pool research reactor at the facility. The facility also included hot cells, laboratories and support features. Some licensed isotope work was done, beginning in 1956.

In 1960 C-W donated the facility to Penn State. The University planned to use the reactor for training and research. They, in turn, leased the hot cells to Martin-Marietta.

Beginning in the summer of 1962, Martin used the hot cells to manufacture several prototype thermoelectric generators known as SNAP-7 generators. SNAP stands for Systems for Nuclear Auxiliary Power. The power source was very high specific activity ^{90}Sr in the form of strontium titanate. Their possession license was in the range of megacuries. The feed material was strontium carbonate which was dissolved and reacted to the titanate. The average shipment of feed material was 140 kCi. In 1967 Martin terminated its lease, and vacated the facility after a partial decontamination. Licensable quantities of ^{90}Sr stayed behind as structural contamination. In 1967 Penn State gave its interest in Quehanna back to the Commonwealth. The Commonwealth

then leased the facility to NUMEC, a subsidiary of Atlantic-Richfield. The swimming pool which once housed the reactor was used for a large ^{60}Co irradiator, in excess of a million curies. Projects included food irradiation, sterilization, and other applications of intense gamma radiation. Early work in the irradiation of impregnated hardwood was also carried out. Hot cell work involving irradiated mixed oxide fuel was also done by ARCO. They were also the licensee for the ^{90}Sr contamination in the structures.

In 1978 a group of ARCO employees bought out the wood irradiation process, including the irradiator and related equipment. The new company was PermaGrain Products, Inc. (PPI).

The Quehanna facility and the surrounding real estate are owned by the Commonwealth, and administered by the Department of Conservation and Natural Resources Bureau of Forestry. PermaGrain leases the facility from Forestry. PPI is the USNRC licensee for their own material, as well as the "caretaker" for the material left behind by previous tenants.

3.2 Ensuring that Occupational Radiation Exposures are "As Low As is Reasonably Achievable" (ALARA)

The licensee and the Commonwealth of Pennsylvania are committed to ALARA. Administrative dose limits (both external and internal) will be established for the D&D project. Bid submittals from potential contractors will be required to include an ALARA program in their submission. The quality and completeness of the ALARA program submitted will be part of the basis for judging the technical competence of the bidders (due to the cost of radioactive waste disposal, the bid award will be very heavily weighted on the technical competence of the bidder as well as the proposed radioactive waste volume reduction techniques proposed).

3.3 Health Physics Program

The Health Physics Program for the Decontamination and Decommissioning project will be a separate set of procedures, reviewed and approved by the Radiation Safety Committee. These procedures will account for airborne radioactivity, high contamination levels, high beta dose rates and expanded radiological surveys needed during the project. Additional sections will include: an expanded ALARA program, effluent monitoring, instrument calibration, personnel monitoring, access control to work areas, procedures for sampling and analysis of samples, shipment of radioactive samples and radioactive waste, establishment of an environmental monitoring program, procedures for verification surveys following decontamination and an Emergency Plan.

Specific procedures will either be written by the licensee/Commonwealth administrative team or be required of the contractor awarded the bid. All procedures must be approved by the Radiation Safety Committee prior to implementation.

3.4 Environmental Monitoring

With the location of the site in the middle of a State Forest, environmental concerns will be high, even if there is no target population within several miles. Therefore, an Environmental Monitoring Program will be established to ensure that no releases exceeding regulatory limits occur during the D&D project. This Environmental Monitoring Program shall consist of:

3.4.1 An operational stack monitor which records all controlled radioreleases to the atmosphere.

3.4.2 Continuous air samplers located at selected locations[3] to document the controlled/uncontrolled radioreleases to the atmosphere.

3.4.3 Environmental dosimeters (TLDs) located at selected locations[3].

3.4.4 Periodic surface soil and surface water sampling in selected locations.

3.4.5 Periodic vegetation samples during the growing season.

3.5 Radiation Safety Committee Membership

3.5.1 President, PPI

3.5.2 Vice President, Special Services, PPI

3.5.3 Radiation Safety Officer, PPI

3.5.4 DCNR Beta Consultant

3.5.5 DEP/BRP HP/Engineer

---

[3] Selected based on prevailing wind direction and other factors.

3.6 Radiation Safety Committee Operations

3.6.1 The RSC shall be Chaired by the President of PPI. Specific responsibilities include scheduling meetings of the RSC and maintaining records of the meetings.

3.6.2 The Chairman shall be the final authority in matters before the RSC.

3.6.3 Meetings may be conducted by conference calls. Where approval signatures are required, such may be provided by facsimile.

3.6.4 A quorum of the RSC shall consist of the Chairman, and any two other members, except in matters involving beta hazards. In this case a quorum shall consist of the Chairman, the Beta Consultant, and any one other member.

3.6.5 Issues requiring a meeting of the RSC include:

* Review and approval of the Radiation Safety Manual
* Review and approval of Radiation Work Permits
* Resolution of stop-work orders issued by Licensee's RSO

3.7 Duties and Responsibilities of the Radiation Safety Committee

3.7.1 Review and Approval of the project Radiation Safety Manual, and revisions thereto. This Manual will include bioassay and personnel dosimetry. Actual onsite remediation work can not begin until the Radiation Safety Manual is approved by the RSC.

3.7.2 Review and approval of each Radiation Work Permit. The work covered by the RWP can not begin until the RWP is approved by the RSC.

3.7.3 Investigate and resolve matters surrounding stop-work orders issued by the Licensee's RSO.

3.8 Duties and Responsibilities of the Licensee's Radiation Safety Officer

3.8.1 Participate in the deliberations of the Radiation Safety Committee as a full member.

3.8.2 Represents the (RSC) at the work site on a day-to-day basis, to assure that operations are in accordance with the project Radiation Safety Manual, USNRC regulations, or good health physics practices.

3.8.3 Maintains the authority to stop work not in accordance with the project Radiation Safety Manual, USNRC regulations, or good health physics practices.

3.8.4 Maintains records personnel dosimetry for licensees workers associated with the project.

3.8.5 Maintains records of radioeffluents

3.9 Contractor Personnel

Contractor personnel will be used to perform the D&D project. Additionally, the contractor will be required to provide health physics personnel (a Radiation Safety Officer and HP Technicians). These personnel will operate utilizing the above mentioned procedures under the jurisdiction of the licensee.

3.9.1 Qualifications of the Contractor's Radiation Safety Officer

3.9.1.1 Past service as an RSO on a decontamination/remediation project involving the handling of kilocurie quantities of energetic gamma emitters.

3.9.1.2 Past Service as an RSO on a decontamination/remediation high specific high energy beta emitters.

3.9.2 Duties and Responsibilities of the Contractor's Radiation Safety Officer

3.9.2.1 Manages and directs the day to day onsite radiation protection operations of the Contractor during the project.

3.9.2.2 Assures that the work of the project is conducted in accordance with the project Radiation Safety Manual, USNRC regulation, and good health physics practice.

3.9.2.3 Maintains records including for example: personnel dosimetry and bioassay data, calibration records for survey instruments, executed Radiation Work Permits, environmental monitoring results.

3.10 Radioactive Waste Management

3.10.1 Nature & Volume[4] of Waste Anticipated

It is anticipated that approximately 7,800 ft^3 of dry radioactive waste will be generated by this project. This waste will consist of structural steel, concrete and soil contaminated with ^{90}Sr[5] and house waste from the D&D project (protective clothing, plastic, wood, paper, cardboard, etc.). Aggressive volume reduction (incineration at an offsite facility specifically licensed for that activity, decontamination & recycling of structural steel, etc.) may reduce this to 4,000 ft^3, however, from our past experience, the larger volume should be anticipated.

3.10.2 Importance of Volume Reduction

Due to the anticipated cost of radioactive waste disposal (either at Barnwell or Envirocare, if possible), the contract for decontamination will include incentives for aggressive and innovative volume reduction techniques. If the waste can not be disposed of at any of the existing sites, this becomes even a higher priority. A contingency plan for temporary storage of radioactive waste pending disposal will be prepared in the unlikely event that a permanent disposal site can not be acquired during the project.

3.10.3 Disposal of Radioactive Waste, Termination of License

It is currently anticipated that the radioactive waste generated by this project will be disposed of at either the Barnwell, SC site or the

---

4 Uncompacted.

5 Minor quantities of ^{60}Co may also be present in some of the radioactive waste.

Envirocare of Utah site. Contingency plans for temporary storage of waste pending disposal will be developed in case another change to the current radioactive waste disposal situation precludes disposal at one of these facilities. Assuming that the waste is accepted at one of these two sites, following shipment of the radioactive waste from the site, a comprehensive survey shall be performed to verify that decontamination to the levels presented in this plan, has been accomplished. Note that due to the nature of some of the work anticipated (e.g., excavation and removal of underground storage tanks) that some of the close-out survey will parallel the ongoing work. Additional details of the final close-out survey are presented below.

4.0 PLANNED FINAL RADIATION SURVEY

4.1 Limits for Release of Facilities & Equipment for Unrestricted Use

Residual contamination levels (limits) for facilities and equipment will be based on the NRC Guidelines [NRC 1993]. NRC approval for exemptions to the Guidelines will be requested on a case-by-case basis. Requests for exceptions to the limits contained in those guidelines shall be based on:

4.1.1 Whether or not the facility and/or equipment is presently used by the current licensee, or would affect the structural integrity of a building still in use by the current licensee, or be detrimental to health and safety systems still in use by the current licensee. In such cases, the contractor will provide the following items of information for request for NRC approval for exemptions to the Guidelines.

4.1.1.1 Documentation of the levels and extent of such contamination, and an estimate of total residual activity.

4.1.1.2 Specific reasons why the release limits could not be met.

4.1.1.3 A safety analysis of the risks of leaving the contamination in situ,

4.1.1.4 Costs involved in <u>not</u> leaving facility/equipment/soil in place.

4.1.1.5 Proposals for future removal of the contamination (e.g., upon permanent termination of all licensed activities in the facility affected).

4.1.2 The termination survey for the release of facilities and equipment for unrestricted use will be conducted in accordance with NUREG/CR-5849. The survey shall be performed by the remediation contractor. The survey shall include affected as well as unaffected areas to demonstration of contamination control during remediation. The survey plan shall be subject to approval by the RSC and NRC.

4.2 Environmental Levels of Contamination

4.2.1 General

Environmental (soil & groundwater) residual contamination levels are be based on the NRC Guidelines [NRC 1992] for the first meter of soil depth (e.g., 5 pCi/g for ^{90}Sr and 8 pCi/g for ^{60}Co). These levels will also be utilized for the second meter of soil unless the NRC is asked to rule on an exemption request for 2,500 pCi/g ^{90}Sr and 20,000 pCi/g ^{60}Co. NRC approval for exemptions to these guidelines will be requested on a case-by-case basis.

4.2.2 Sampling Criteria

As the risks from soil contamination are based on agricultural use of the land, two factors must be considered. First, this site is located within the confines of a State Forest. Agricultural use of this land (other than for forestry products and hunting) is not likely in the foreseeable future and, in fact, could be even more limited by formal agreement by the Commonwealth. Second, the dose rate is dependent upon a fairly large area of uniform contamination. Dose to the maximally exposed member of the general public decreases rapidly if the contamination area is reduced. For this reason, it is proposed that the limits in Para 5.2.1 be allowed to be averaged over not more than 100 m^2. Furthermore, if a series of 10 × 10 ft squares are used for sampling (a 3 × 3 array of 10 ft squares constitutes slightly less than 100 m^2) then it is proposed that one or two samples in the array could exceed the average by up to three times, as long as the average for all samples is ≤ the average limit.

Averaging techniques will be in accordance with Ref. 7.8 (NUREG-CR-5849).

4.2.3 Sampling below 1 Meter Depth - later (from Contractor)

4.2.4 Sampling Regime

1.) Section off an area 30 × 30 ft.

2.) Divide the area into 9 - 10 × 10 ft squares.

3.) Core the center of each square sampling from 0 - 1 ft, 1 - 2 ft, 2 - 3 ft, etc. (this example is for the top meter of soil).

4.) Compare the maximum sample value and the average of all 27 cores to the following table:

4.2.5 Soil Contamination Limits for Quehanna Project

Nuclide	Soil Average[1,3]	Soil Maximum[2,3]
^{90}Sr	5 pCi/g	15 pCi/g
^{60}Co	8 pCi/g	24 pCi/g

1 Averaged over no greater than 100 m^2.
2 No single sample out a 100 m^2 by 1 m thick grid may exceed the maximum (this assumes > 25 representative samples per 100 m^2 by 1 m thick grid volume).
3 Averaging technique will be in accordance with NUREG-CR-5849, Section 8.5

4.2.6 Requests for NRC approval for exemptions to the soil release guidelines will include the items listed in Plan Section 4.1.1.1 (revised) through Section 4.1.1.4.

5.0 FUNDING

The Pennsylvania legislature has appropriated $5.201 million for the whole project including design & closeout survey costs. Uncertainty exists as to the final disposal costs, however, the Commonwealth of Pennsylvania will be the host state for the Appalachian Compact, therefore disposal can be assured once the sitting & construction process is completed.

6.0 PHYSICAL SECURITY PLAN AND MATERIAL CONTROL AND ACCOUNTING PLAN PROVISIONS IN PLACE DURING DECOMMISSIONING

As no special nuclear material is involved in this Decontamination and Decommissioning, no special security or accountability plan is required.

7.0 REFERENCES

7.1 Canberra Nuclear Services Division. Radiological Characterization of the Quehanna, Pennsylvania Site. Schaumberg, IL: Nuclear Services Division, Canberra Industries, Inc.; 1993.

7.2 Martin Marietta. Radioisotope Pilot Plant Safety Evaluation. Available from: PA DER, BRP, Harrisburg, PA; 1964.

7.3 Reilly, M. Quehanna Lore, Harrisburg, PA: PA DER BRP; 1994.

7.4 U.S. Nuclear Regulatory Commission. Current Guidelines on Acceptable Levels of Contamination in Soil and Groundwater in Property to be Released for Unrestricted Use. Washington, DC: U.S. Nuclear Regulatory Commission; 1992.

7.5 U.S. Nuclear Regulatory Commission. Guidelines for the Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material. Washington, DC: U.S. Nuclear Regulatory Commission; 1993.

7.6 U.S. Nuclear Regulatory Commission. Standard Format and Content of Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70. Regulatory Guide 3.65. Washington, DC: U.S. Nuclear Regulatory Commission; 1989.

7.7 Yu, C.; et al. Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD Version 5.0. Argonne, IL: Argonne National Laboratory; 1993.

7.8 U.S. Nuclear Regulatory Commission. Manual for Conducting Radiological Surveys in Support of License Termination. NUREG-CR-5849. U.S. Nuclear Regulatory Commission; 1993.

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

8.0 ATTACHMENTS

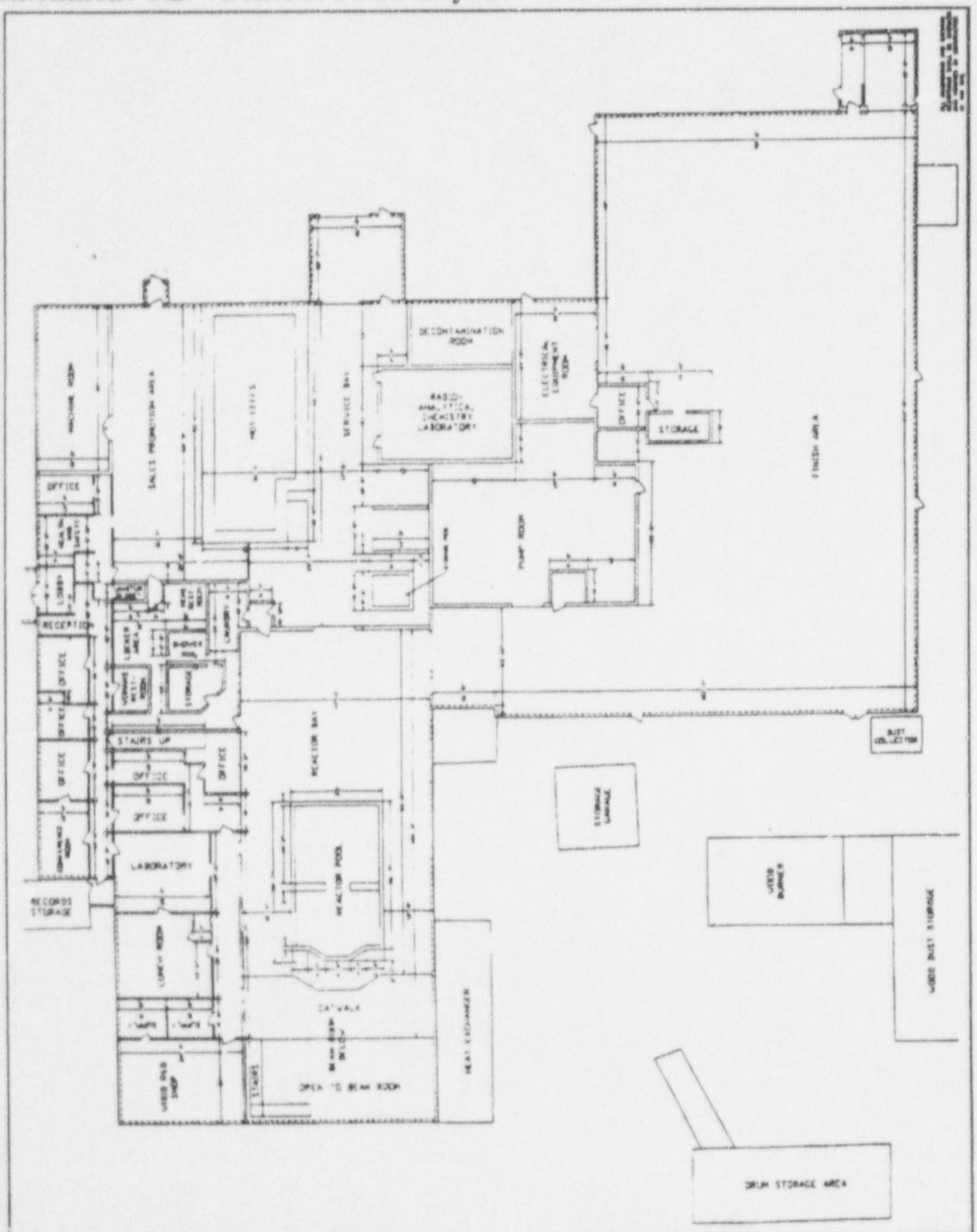
8.1 Map of Quehanna Area (1 page)
8.2 Facilities Diagram (1 page)
8.3 Waste Treatment Plant Schematic (1 page)
8.4 Plan View of Hot Cells (1 page)
8.5 Basement Floor Plan of the Quehanna Nuclear Pilot Plant (1 page)
8.6 Diagram of SOTS (1 page)
8.7 Decon Room Inventory as of 3/6/92 (3 pages)
8.8 Proposed Licensee Organization (1 page)
8.9 Response to Nuclear Regulatory Commission Items to be Addressed in Remediation Plan, PermaGrain Products, Inc.(4 pages)
8.10 Data From PA DER, BRP — William Kirk (1 page)

Attachment 8.1: Map of Quehanna Area

PCi
Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Decontamination and Decommissioning Plan for Quehanna, PA Site

Attachment 8.2: General Plant Layout



Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Attachment 8.3: Waste Water Treatment Plant Schematic

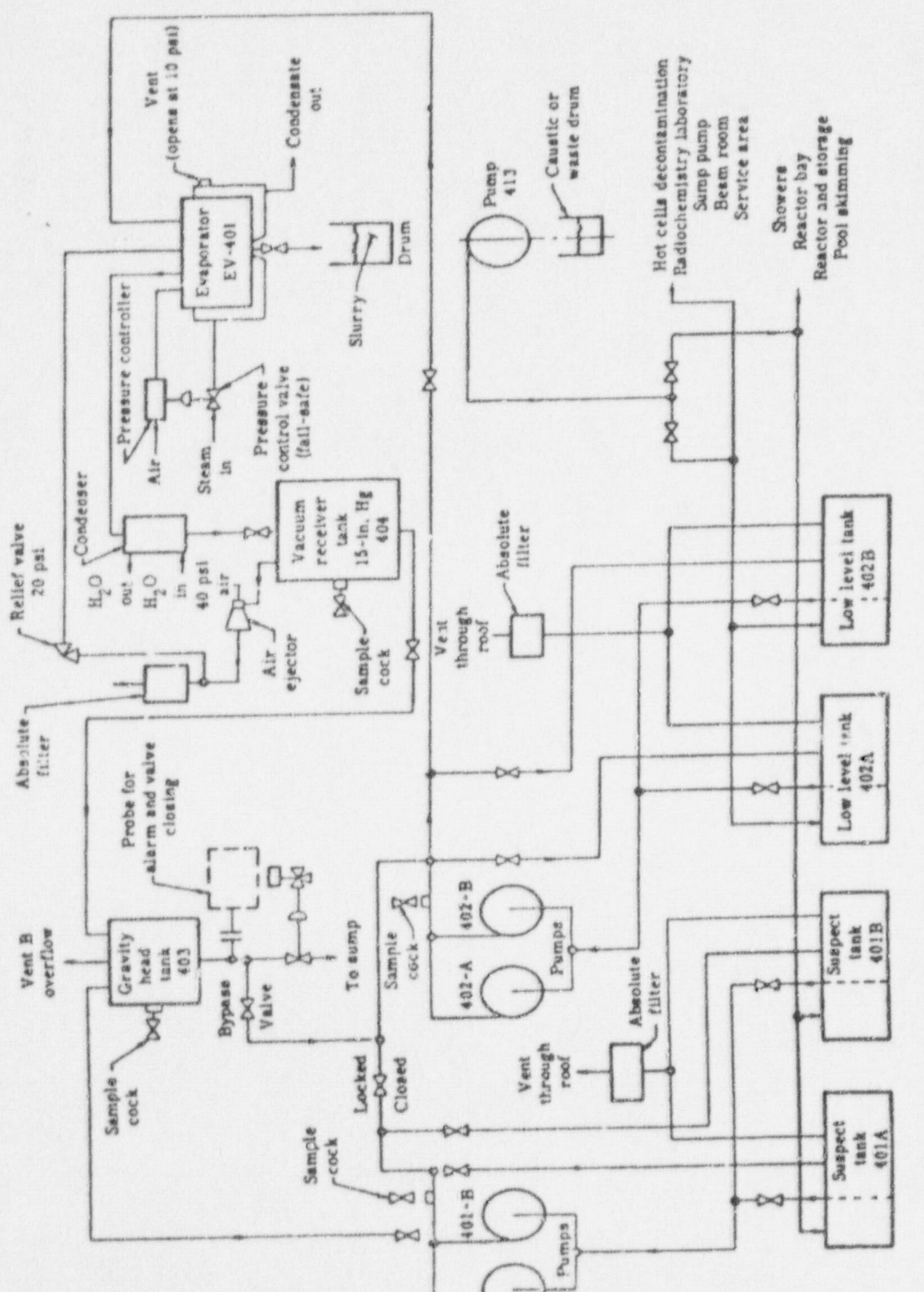


Figure 7.2 Waste Treatment Plant

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Attachment 8.4: Plan View of Hot Cells

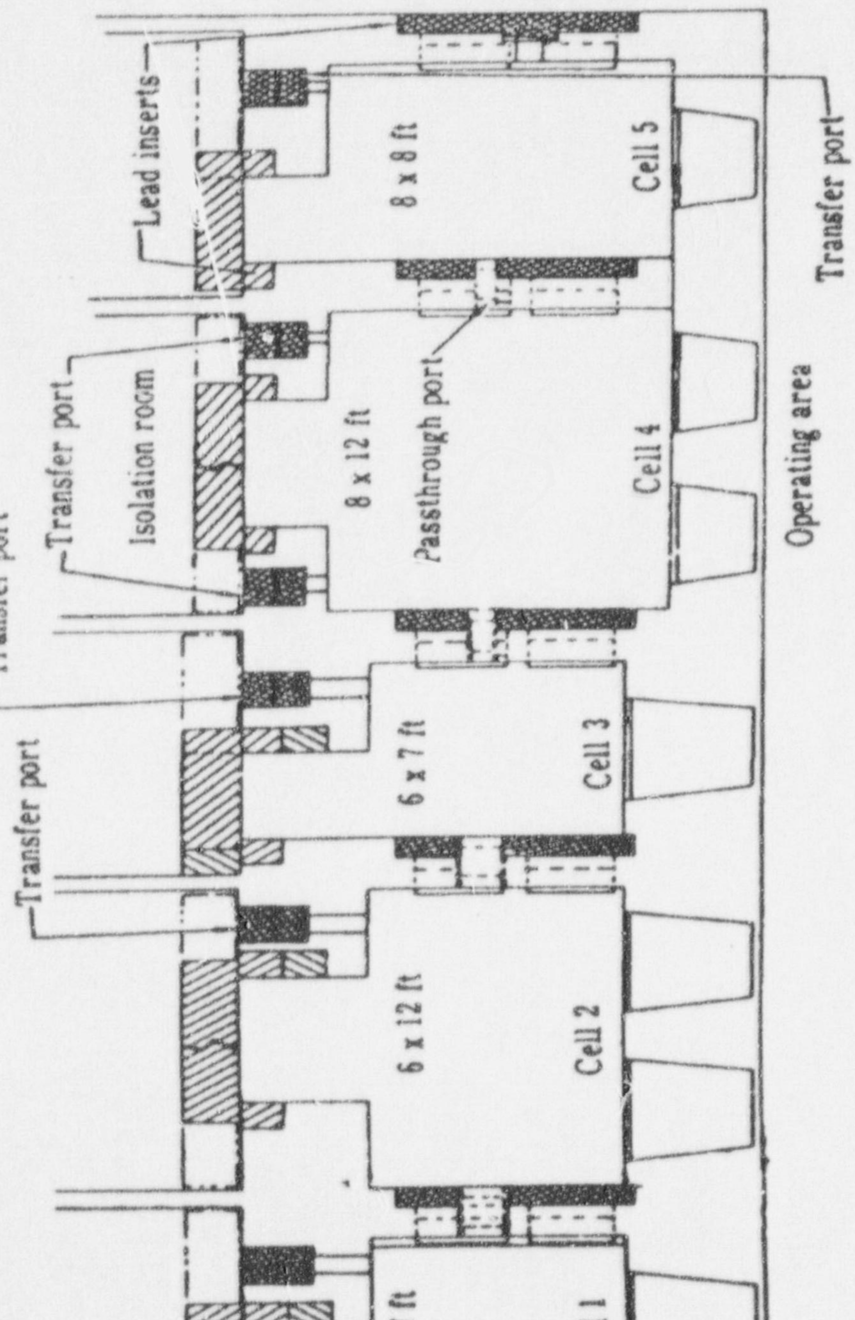


Figure 5.4 Plan View of Hot Cells

Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Decontamination and Decommissioning Plan for Quehanna, PA Site

Attachment 8.5: Basement Floor Plan of Quehanna Nuclear Pilot Plant

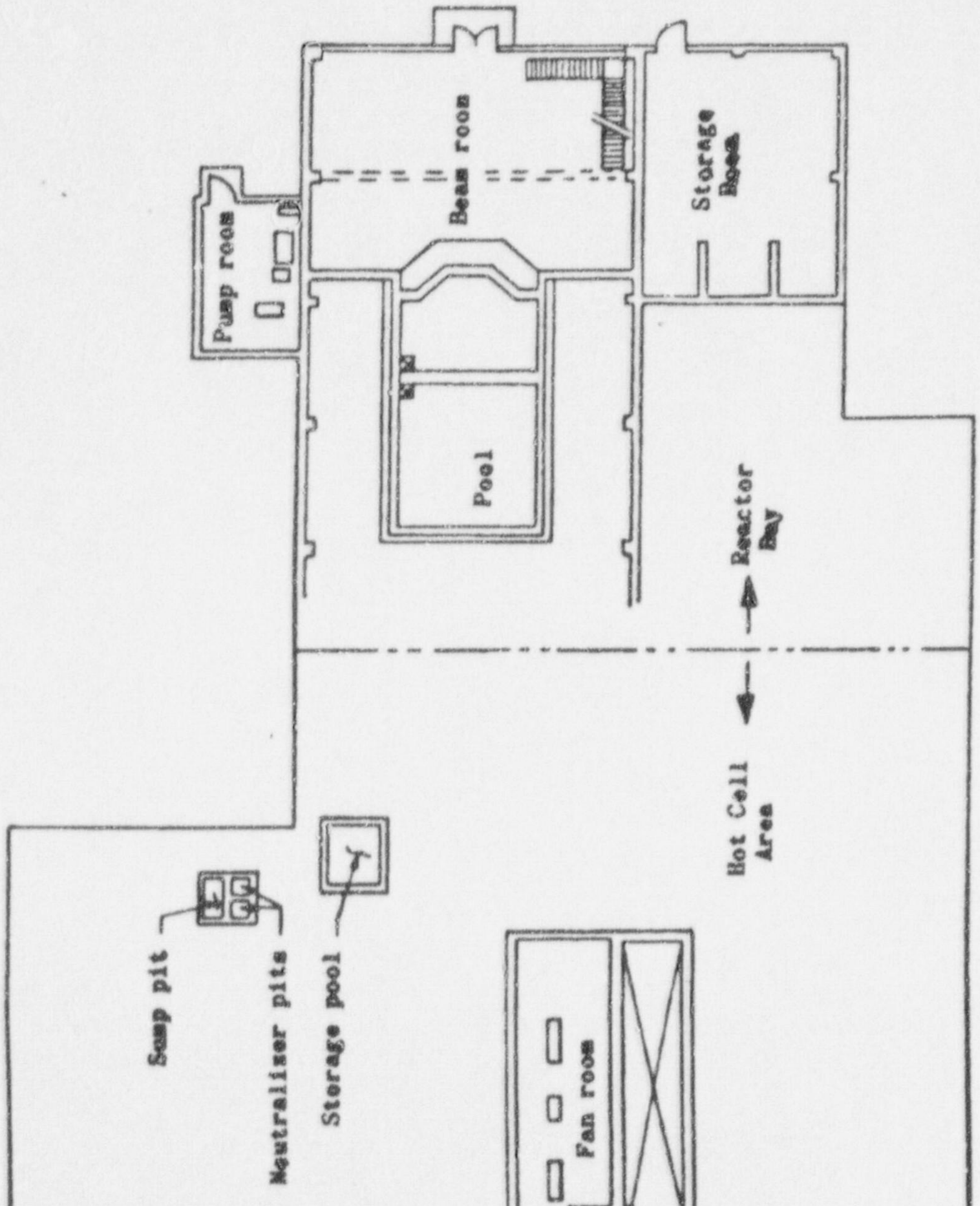


Figure 5.2. Basement Floor Plan of the Quehanna Nuclear Pilot Plant

Attachment 8.6: Diagram of SOTS

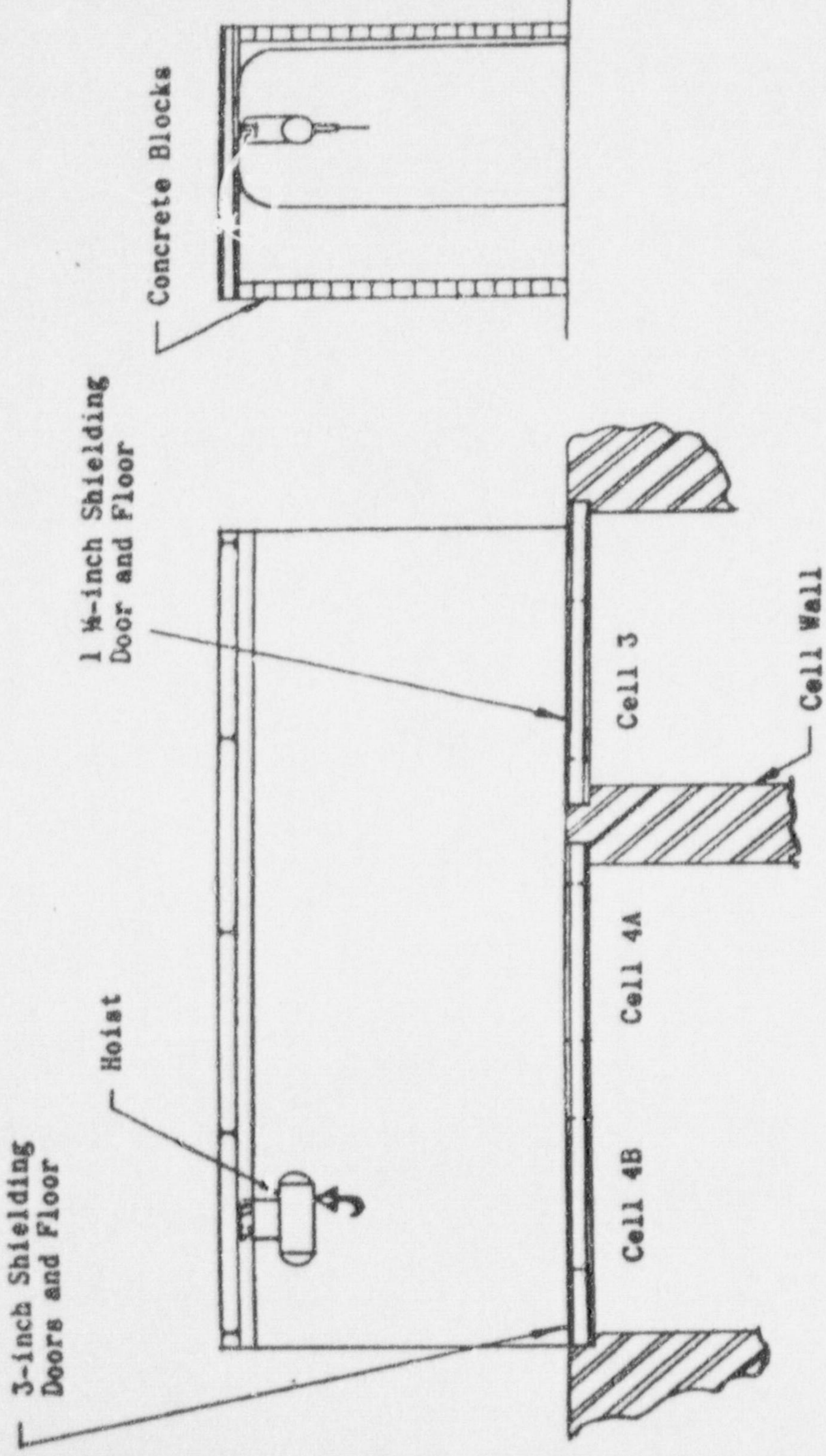


Figure 9.5 Stationary Overhead Transfer System

Attachment 8.7: Decon Room Inventory

3/6/92

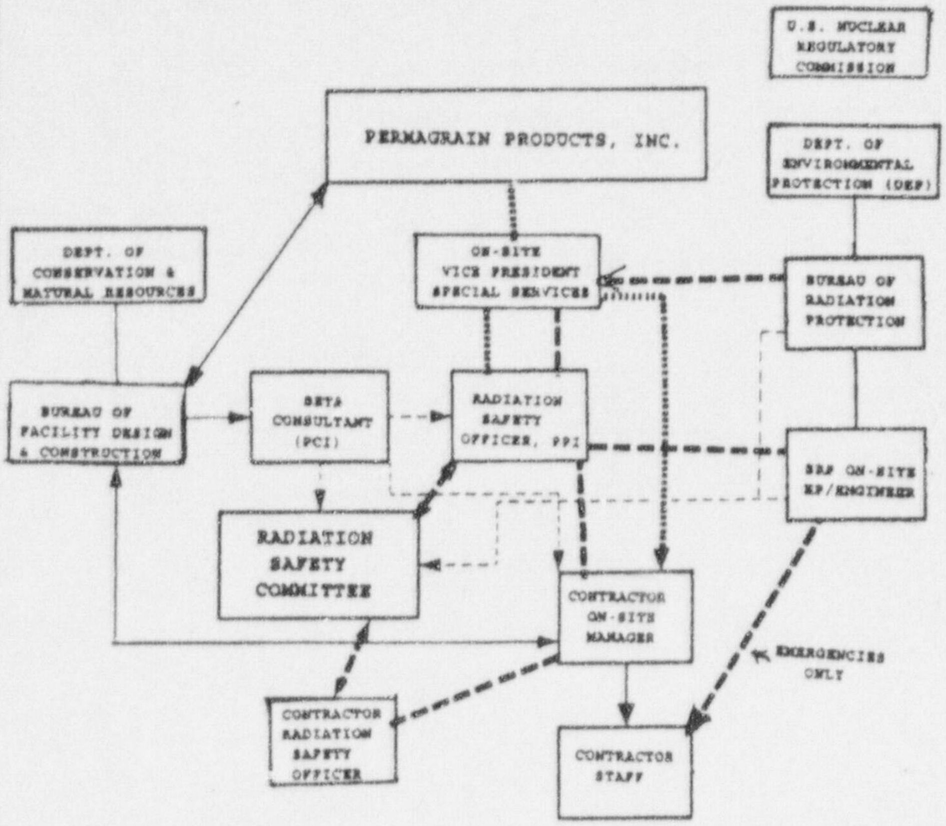
1) 7 stacked 55 gal drums, 5 extra drum lids
2) 3 shelf carts with miscellaneous parts 3' × 2' × 2'
3) tool box cart with lead bricks 3' × 3' × 2'
4) AECL cask Model F144 (3400 lbs) 2.5' × 2.5' × 5'
5) lead pig 1' × 1' × 1'
6) storage pig 2' high × 1.5' diameter
7) storage pig 1.5' high × 1' diameter
8) small pig 1' high × 4" diameter
9) pig with handle 6" high × 6" diameter
10) 5 bags miscellaneous components (each 1 cu ft)
11) 30 gal drum with debris
12) 3 sheets cardboard metal plate 4' × 4' square
13) metal rack u-shaped 2' × 4' × 1' shelf
14) fume hood 8' high × 6' × 3' (sink inside)
15) 33 gal garbage pail on top of hood
16) large case (tagged empty) N603 4' high × 2.5' diameter
17) pallet with 2 casks marked empty 3' × 1.5' diameter and spare motor (1 cu ft)
18) empty 55 gal drum
19) empty pig 1.5' high
20) full 55 gal drum
21) fiberboard drum (approximately 50 gal)
22) cask 3.5' high × 1' diameter tagged empty
23) small pig 6' high × 3" diameter
24) cinder blocks 16" × 8" × 4" (20 blocks)
25) miscellaneous wrapped parts (lab trays, etc.) 2' × 2' × 3'
26) another 55 gal drum presumed empty
27) 30 gal fiberboard drum (empty)
28) cask transfer truck
29) plastic trash can (20 gal)
30) 2 drum lids (55 gal)
31) bag of lead wool 50 lbs
32) 2 bags Insulation 5 cu ft total
33) steel cable, rigging clamps
34) large rectangular duct section 8' × 2' × 2'
35) 2 cardboard boxes 2' × 1.5' × 1.5'
36) 3 full 33 gal trash bags with disposable clothing
37) 20 gal fiberboard container with powdery material
38) filter with wood frame 2' × 2' × 6"
39) large cask tagged empty 3.5' high × 2' diameter (with sliding tray)

40) large 1" diameter steel crane cable 30' length
41) poly bag with debris 3' × 2' × 2'
42) another 2' × 2' × 3' wrapped item
43) 10' aluminum step ladder
44) 2 large casks, each 3.5' high × 3' diameter, each on 6" high × 4' × 4' pallet
45) large link chain 20' length
46) 4 - 5 gal buckets (plastic)
47) tagged empty cask 3' high × 2.5' diameter standing on 8 cinder blocks
48) one large poly bag (50 gal) with debris
49) 2 large cardboard boxes, each 3' × 2' × 2', containing metal parts
50) equipment cart 3' high × 3' × 2' with air sampler and 1' × 2' × 1' cardboard box with cans and bottles of liquid
51) 3 cardboard boxes 2' × 2' × 1.5' with jars, rusting cans, many unlabeled
52) metal base with remote manipulator, total dimensions 8' × 3' × 2'
53) hose approximately 20' length × 2" diameter
54) 5 gal jug "hot" cell oil
55) 3 - 4 wrapped 6 - 8' long tubes (4" diameter)
56) floor buffer machine
57) shelf 6' × 5' × 1' supporting manipulator arm
58) 2 manipulator arms 20 cu ft each
59) metal lift mechanism (appliance mover?) 8' high, base 4' × 4' on wheels
60) wash bucket 2' × 1' × 1.5'
61) tool box 6' × 6' × 3'
62) equipment cart with tracer lab counting system (system 3' × 2' × 3')
63) cylindrical metal component 2.5' long × 1' diameter
64) I-beam 6' long × 8" × 4"
65) motor and assembly for overhead crane 1' × 5' long × 3' wide, (attached to I-beam noted In Item 64?)
66) aluminum duct work in poly bag 3' × 2' diameter
67) vacuum cleaner 3' high × 1.5' diameter with hoses
68) heavy motor wrapped in plastic 2.5' high × 3' × 1.5'
69) large floor monitor with metal roller at bottom 1' wide × 6" diameter with 4.5' handle
70) pump and filter assembly (heavy motor with filter?) same as Item 68
71) part of fume hood box 4' × 3' × 3' (hollow box) wrapped In poly
72) cardboard box 2' × 2' × 2.5'
73) wooden part of glove box 3' × 3' × 6" deep
74) control panel box, metal 3.5' × 1.5' × 4' high
75) work table, 3' × 3' table top, on metal frame stand 4' high
76) 2 cu ft miscellaneous debris wrapped in poly
77) large fume hood, single piece 7' high × 3' × 4'
78) Inside hood: 2 - 3' × 1' × 2' cardboard boxes

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

79) inside shower: mill lathe 7' high × 4' × 5'
80) metal frame 5' × 5' with 2 inner boxes 1' deep
81) large conical shaped item 4' diameter, 2' deep, metal
82) wooden box 8' × 2' × 2' with poly wrapped components
83) large circular cover for Item 81
84) large (metal?) drum 3' diameter × 4'
85) wrapped long cylinder 1' diameter × 6' long
86) overhead crane on I-beam, crane wrapped in poly 2' × 3' × 2'
87) cardboard box 1.5' × 1.5' × 1' with paper wipes
88) crate with miscellaneous metal parts 1.5' × 1.5' × 1.5'

Attachment 8.8: Proposed Licensee/Commonwealth Organization



Quehanna Decommissioning Organizational Structure

Legend

Radiation Safety Authority

Advisory

Fiscal/Administrative

Operational Control

PCi
Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Attachment 8.9: Response to NRC Items to be Addressed in Remediation Plan, PermaGrain Products,Inc.

(19 Items in Enclosure 3 to NRC Letter to PermaGrain dated October 31, 1993)

1. The source of slightly elevated ^{90}Sr levels in the sump water is unknown. Canberra's conclusion that the waste tank integrity had been retained was based on visual observation of the stainless steel tanks and the absence of contamination in soils and the adjacent ground water well. The location of boreholes was dictated by physical constraints such as overhead utilities and the reluctance to place the drilling rig directly over the tanks. The sump pump-out line is located near the suspect tanks on the northeast corner of the underground pad, although its location has no relation to any discussion of possible leakage. It is difficult to determine ground water flow since much of this area is fill material. It is suspected that the flow direction is down.

   In any case, as the tanks are unearthed, the soil will be characterized for ^{90}Sr. Remediation, if required, will be as per our approved D & D Plan.

   Applicable Sections of D & D Technical Report are 3.6.3 and 4.2.

2. The fifth underground holding Tank is #411, and is clearly identified in Drawing #40 entitled, "Plumbing and Piping Pool and Pump Room, Section and Miscellaneous Details" (of the 60 Ralph Parsons Company site drawings of the Curtiss-Wright Corporation Research Reactor at Quehanna, PA, dated 9/20/56).

   This Tank #411 is an integral part of the Reactor Pool Water purification/drain system. It is connected to both the bottom of the Reactor Pool and the bottom of the Reactor Fuel Storage Pool Area by 6 inch diameter piping. This tank drains via a 6 inch line to a pump in the Reactor Pool Pump Room. Since this Tank #411 is not connected to the Hot Cell/Sr-90 Water Purification/Storage System, it will <u>not</u> be characterized or remediated as part of this D & D Plan. These issues will be addressed as part of License 37-17-860-01. Further details of Tank #411 and the water it contains can be found in Porter Consultants, Inc. Technical Report 413 entitled, "Initial Investigation and Characterization of Quehanna Site Tank #411".

3. The sump is located beneath the grating and is shown in the upper left corner of Figure 8. It was determined to be contaminated and is included in the assessment.

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Attachment 8.9: Response to NRC Items to be Addressed in Remediation Plan, PermaGrain Products,Inc. (continued)

(19 Items in Enclosure 3 to NRC Letter to PermaGrain dated October 31, 1993)

4. Canberra checked rip-rap, it is clean. Meeker run also checked, it is clean. A rag/sponge will be run up the pipe ~3 feet from either accessible end. Interior surfaces of each end of the pipe will also be surveyed for fixed contamination. If the gross beta/gamma is <acceptable contamination limits, this item will be completed.

5. Item complete as per NRC Item description.

6. These items were characterized for water activity and fixed beta/gamma as per Attachment 8.10. Since there is no significant contamination, the item is complete.

7. The pump room is part of the old reactor complex which is currently used by PPI. Thus it will not be remediated at this time. The use of the 2 inch line is unknown.

   The pump room pumps circulate reactor pool water, and have been sampled continuously since 1967. Since they have shown no significant contamination in all this time, the pumps and piping in the loop may be considered clean unless there is an external gamma reading, exceeding $50 \mu R/hr$ above background.

   The pipes on both accessible ends (for at least three feet) will be smeared and surveyed for fixed contamination.

   The pond was added by PermaGrain about fifteen years ago. Results in Attachment 8.10 show no significant contamination in the pond. The rip-rap and Reactor Run were characterized by Canberra.

8. The old cooling tower was removed in 1970. The tower was used for clean cooling water only (pool water). Documentation exists that shows no significant pool water contamination over the life of the pool. On 8/23/95, five smears were taken of the cooling tower drain pit and inside associated piping. Two gamma surveys were taken with a calibrated Ludlum Model 19 micro R meter adjacent to each smear location. These smears, as well as gamma survey results of the associated piping show no significant contamination. This item is complete.

PCi Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Attachment 8.9: Response to NRC Items to be Addressed in Remediation Plan, PermaGrain Products,Inc. (continued)

(19 Items in Enclosure 3 to NRC Letter to PermaGrain dated October 31, 1993)

9. Decon room and Chem lab exhaust: Figure 39 shows background levels on exhaust duct downstream of filters, which are located below the duct in the box housing. Decon room, Figure 46 shows background readings downstream of the filters at the exhaust fan. Fan Room piping, Figure 51, is shown to be contaminated and is included in the assessment. Survey results on the Auxiliary System duct surface, downstream of the filters, showed no contamination (results omitted from final report but available). Vent systems on Mezzanine, Figures 95 & 96. The area downstream of the filters was entered and smeared. The smears of the vent system plenum showed no significant contamination (^{90}Sr, ^{60}Co and gross and alpha betas). Refer to Attachment 8.10. This item is complete.

10. This is the HVAC system for the clean operation areas. Smears of the area since 1973 have shown no contamination. A micro R meter survey of the area on 5/3/95 indicated no readings above ambient background.

11. The "locked room" is in fact Cell 6 and was characterized as shown in Figure 85 of the Canberra Report.

12. The pool is currently used for settling solids (non-radioactive) and for can cleaning. The area was smeared by Canberra. A micro R meter survey of the pool and cover on May 3, 1995 showed no readings above ambient background. The interior surfaces of the Storage Pool will be included in the Termination Survey.

    The deionizer tanks and associated piping have not been characterized. The tanks have not been utilized by PPI. This is an open item which must be adjudicated.

13. This is an uncontrolled area utilized for cleaning and storage. It is not a separate room. The wall on the drawing no longer exists. Canberra smeared the general area, and found no contamination.

    This item is complete with the clear understanding that the entire area must be gridded and resurveyed as part of the D & D.

Attachment 8.9: Response to NRC Items to be Addressed in Remediation Plan, PermaGrain Products,Inc. (continued)

(19 Items in Enclosure 3 to NRC Letter to PermaGrain dated October 31, 1993)

14. There were indeed two smears slightly over 200 dpm/100 cm^2. Remediation of these two spots would be trivial in the overall scope of this project, but we will add a man-hour or two to the estimate.

15. Covered in Item 12, above.

16. This was a temporary lean-to, open on four sides, with no piping or drains. The site was paved over many years ago. Soil samples are needed in this area. This is an open item.

17. The pallet truck was smeared and checked for gamma with a micro R meter. No activity above background was found. This item is complete.

18. The termination survey will include all systems and areas not currently utilized by PPI.

19. a. PPI Letter (enclosed) certifies that remediation of the reactor area would cause significant disruption to current operations.

    b. The amount of radiocontamination in the reactor pool and associated systems is unknown. Because the poolwater is tested for radiocontamination daily, it is unlikely that there is massive contamination. However, complete characterization is not possible until all sources are removed from the pool, and the pool and associated piping are all drained.

    c. The D & D successful bidder will provide means to restrict access to the contaminated areas, as well as preventing unnecessary contamination spread.

    d. At the end of the PPI contract with Pa State, PPI is responsible for characterization and remediation of the ^{60}Co in the pool area. Any other needed remediation will be the responsibility of the Commonwealth of Pennsylvania (this statement assumes that the ^{60}Co inventory in the hot cells is not the property of PPI).

PCi
Porter Consultants, Inc.
125 Argyle Road
Ardmore, PA 19003-3201
Phone (610)896-5353
FAX (610)642-7804

Decontamination and Decommissioning Plan for Quehanna, PA Site

Attachment 8.10: Data from PA DER, BRP - William Kirk

Analytic Results from Samples Collected at PPI Facility on May 9, 1995

Water Samples - pCi/L (95%CE)

Location	Gross Beta	Gross Alpha	^{90}Sr	^{60}Co
W. Neutralizer Pit	13.5(1.7)[2]	0.19(1.5)[2]	-0.1(0.27)[1]	0.0(0.0)[1]
W. Neut.Pit Inlet/out	0.12(.62)[1]	0.0(0.28)[1]	0.19(0.29)[1]	0.0(0.0)[1]
E. Neutralizer Pit	11.7(1.8)[2]	-2.3(1.35)[1]	0.46(0.28)	0.0(0.0)[1]
Gamma Pool	1.01(1.23)[1]	-0.37(0.34)[1]	0.66(0.34)	0.0(0.0)[1]
Pond Outfall	1.9(1.4)[1]	-2.6(1.4)[1]	0.61(0.31)	0.0(0.0)[1]

Smears - pCi/smear (95%CE)

Location	Gross Beta	Gross Alpha	^{90}Sr	^{60}Co
Vent System Plenum	0.36(0.64)[1]	1.3(0.4)	0.15(0.3)[1]	0.0(0.0)[1]
Vent System Plenum	0.67(0.65)[1]	0.10(0.30)[1]	0.29(0.31)[1]	0.0(0.0)[1]

Fixed Contamination Survey

The sides of the pits and the above water inlets were beta/gamma surveyed, and no reading above background were noted. A Ludlum Model 19 μR meter was utilized for gamma and a pancake tube GM probe was utilized for beta.

Notes: 1. Below MDL
2. Being further investigated. Thought to be ^{40}K or other natural source.