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CANBERRA ALPHA SENTRY INSTALLATION FUNCTIONAL DESIGN CRITERIA

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Abstract:

This document provides information constraining the design and installation being performed by Fluor Federal Services for Fluor Hanford Incorporated.

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Approved For Public Release

1.0 INTRODUCTION

This document provides the functional design criteria for the installation of the Canberra Alpha Sentry System at selected locations within the Plutonium Finishing Plant (PFP). The equipment being installed is identified by part number in Section 3 and the locations are given in Section 5. The design, procurement and installation are assigned to Fluor Federal Services.

2.0 STANDARDS

These standards are representative of those associated with this effort. The design must meet the requirements of HNF-PRO-1819, *PHMC Engineering Requirements*; HNF-PRO-097, *Engineering Design and Evaluation*; and HNF-PRO-331, *Work Place Air Monitoring*.

3.0 EQUIPMENT

This new equipment will replace existing continuous air monitors (CAMs) monitoring the airborne radioactive contamination at various locations within the facility. The new equipment will monitor the exact same sample points as the existing CAMs. Multiple heads are connected to an electronic monitoring unit which provides a method of evaluating the information contained in the CAMs. The following sections identify the part numbers for the Canberra Alpha Sentry System CAM heads and monitor. A sole source justification was prepared for this procurement and is attached for information.

This work will install CAMs in the locations of Section 4.0 as well as providing three (3) spare CAM heads for calibration rotation and three (3) In-Line Adapters for possible design changes.

3.1 CONTINUOUS AIR MONITOR SAMPLE HEAD

3.1.1 Canberra Alpha Sentry CAM Head

3.1.1.1 Model AS1700R

This is the CAM Head chosen to include a reduction in the sensitivity to interference from RFI/EMI sources. Canberra is required to provide confirmation that the head meets the requirements of ANSI N42.17B.

3.1.1.2 Model AS020

This is the additional part to add an alarm to the CAM Head.

3.1.1.3 Model AS070

This option provides the Head with power from a connection to 110VAC. The design will have to provide a means of connecting this to the existing CAM power source.

3.1.2 Connection Equipment

3.1.2.1 Model CA2000

This Network Tee Box provides the means of connecting the CAM Head

to the Alpha Sentry Manager (ASM). In addition, it provides the location of the address selector switch(es).

3.1.3 Attachment for In-Line/Sample Line Use

3.1.3.1 Model AS010

This In-Line Adapter provides the means of taking a sample from a sample line.

3.2 ALPHA SENTRY MONITOR

3.2.1 Alpha Sentry Manager

3.2.1.1 Model ASM1000

This version of the ASM is powered by 115 VAC power. In the design, it should (as much as possible) be powered from the same AC power as the CAMs it monitors.

3.2.1.2 Model ASM01

This is the host interface for the ASM. The host interface will be added later. This version is the RS-485 Host Computer Interface.

3.2.1.3 Model AS-MAN

This is the Alpha Sentry Operations Manual and should be part of the purchasing requirements.

4.0 WIRE RUN REQUIREMENTS

The requirements pertaining to the wire runs identified below do not replace any of the requirements of the National Electrical Code (NEC). Design shall meet all requirements of the code. Where conflicts arise, a discussion with the technical representative should resolve the issue.

4.1 2736-Z Vaults

- Power wire shall run in conduit to proper outlet boxes and be close to the CAM location. Every effort must be made to ensure the power outlet is only use for CAMs. This can be by labeling or placement of a single outlet. All power wiring must meet the current NEC requirements.
- Communication wire should run in conduit through walls. Communication wire consists of a single twisted, shielded pair of wire daisy-chained between CAMs (connecting Network Tee Boxes together).

4.2 234-5Z Locations

- Power wire shall run in conduit to proper outlet boxes and be close to the CAM location. Every effort must be made to ensure the power outlet is only use for CAMs. This can be by labeling or placement of a single outlet. All power wiring must meet the current NEC requirements.

- Communication wire should run in conduit through walls. Communication wire consists of a single twisted, shielded pair of wire daisy-chained between CAMs (connecting Network Tee Boxes together).
- Communication wire within rooms does not need to be in conduit but must be attached properly to minimize the potential for damage to the wire.

5.0 LOCATIONS

The locations given in the following sections are listed in priority order. An estimate and schedule for this work should include a breakdown by location. Some locations may be dropped from construction based on cost and schedule constraints. As identified below, this work will result in installation of six (6) ASMs, thirty-four (34) CAMs and twenty-two (22) In-Line Adapters.

5.1 2736-Z Vaults (1, 2, 3, and 4)

This installation includes three (3) ASMs in corridor 625 connected to eight (8) CAMs in vault 1, and three (3) CAMs in each of vaults 2, 3, and 4. All CAMs require In-Line Adapters.

- **ASMs Located in Corridor 625**

- *Wall Mounted*
- *Alarm contacts ganged for Power Control Room Alarm*
- *Powered from 115 VAC*

- **Heads sample same point as existing CAMs**

- *Sample tube calculations required*
- *Power from existing CAM power*
- *Vacuum tied to vacuum system used by existing CAM*
- *Convenient method of CAM change-out for calibration provided*

5.2 234-5Z Room 235B

This installation includes one (1) ASM in corridor 13 connected to seven (7) CAMs in room 235B. Five (5) CAMs require the In-Line Adapter.

- **ASM Located in Corridor 13**

- *Wall Mounted*
- *Powered from 115 VAC*

- **Heads sample same point as existing CAMs**
 - *Sample tube calculations required, as necessary*
 - *Power from existing CAM power*
 - *Vacuum tied to vacuum system used by existing CAM*
 - *Convenient method of CAM change-out for calibration provided*

5.3 234-5Z Rooms 230A, 230B, and 228C

This installation includes one (1) ASM in corridor 5 connected to two (2) CAMs in room 230A, two (2) CAMs in room 230B, and three (3) CAMs in room 228C.

- **ASM Located in Corridor 5**
 - *Wall Mounted*
 - *Powered from 115 VAC*
- **Heads sample same point as existing CAMs**
 - *Sample tube calculations required, as necessary*
 - *Power from existing CAM power*
 - *Vacuum tied to vacuum system used by existing CAM*
 - *Convenient method of CAM change-out for calibration provided*

5.4 234-5Z Room 230C

This installation includes one (1) ASM in corridor 5 connected to three (3) CAMs in room 230C.

- **ASM Located in Corridor 5**
 - *Wall Mounted*
 - *Powered from 115 VAC*
- **Heads sample same point as existing CAMs**
 - *Sample tube calculations required, as necessary*
 - *Power from existing CAM power*
 - *Vacuum tied to vacuum system used by existing CAM*
 - *Convenient method of CAM change-out for calibration provided*

Attachment

NONCOMPETITIVE PROCUREMENT JUSTIFICATION

Radiation Monitoring Sys 96 CAM Alarm replacement

(Justify clearly why competition is not feasible or in FDH or the Government's interest.)

A competitive action is not in FDH's interest because it is contrary to site standardization, it could result in a non-ALARA posture for the plant, it will jeopardize meeting the schedule of far larger and more important projects, and it would likely be unproductive, and a waste of the human resources that have been spent on the project to date.

(Use the following format and considerations to prepare a solid rationale in the "Findings" and "Conclusion" sections of the justification. Your level of detail should reflect the dollar value of the action).

a. Findings section.

- (1) (Provide a brief, general, technical description or statement of the supplies or services, including the application and particular significance or specialized character of the item or service to be purchased. Describe the unique features that comprise the item or service. If you need a specific make and model, explain why.)

General Technical Description of supplies to be purchased

The CAM system at PFP collects airborne particles onto a filter paper, checks it for radioactivity, and alarms if radioactivity is detected. CAM coverage in certain areas of PFP or during certain evolutions is required. The technical description of the system immediately follows this introduction, and so will not be repeated.

For many years, Eberline has supplied PFP with our CAM instrument needs. In the early 90's, DOE began to increase the standards and expectations for CAM instrumentation. Eberline added to their old systems incrementally, and fell behind, while Canberra chose a quantum change.

The Canberra Alpha Sentry system we propose to purchase was developed under a CRADA (Cooperative Research and Development Agreement) between Los Alamos National Laboratory and Canberra, with technical assistance from the Aerosol Laboratory at Texas A&M University. At the time it was introduced in 1992-93, the Canberra CAM had few peers. With an eye toward using the best CAM for PFP, Radiological Control purchased three Canberra CAMs in 1998/1999. The CAMs were originally intended to be installed in April 1999, to allow PFP staff to gain practice with these particular models, and to establish a firmer basis for operation in the plant.

The schedule for installation slipped, however, and we await their installation. In place of a more formal study, the Radiological Engineer for the Air Monitoring program performed investigations of the CAMs in the PFP tunnels with positive results.

There are four general areas, which favor this sole source argument:

Independently, and slightly ahead of PFP activities, Bechtel Hanford Inc. purchased a Canberra system in September of 1998, and has fully implemented it. As a result, this site has developed an established and satisfactory history of the Canberra system. The system has performed with distinction, reducing false alarms and showing a greater sensitivity and selectivity for alpha emitters than the present CAMs. The necessary attendant work by PNNL to calibrate Canberra CAMs has also been performed, and so the selection of the Canberra system will not therefore complicate or delay our work. Relevantly, the facility is advised (HSRCM 561) to "Standardization on the use of commercially available radiological instrumentation in the DOE is highly encouraged. Consequently, the interests of site consistency weigh on the side of ordering the Canberra Alpha Sentry system.

Speaking from a Radiological Health perspective, these systems have a superior selectivity and sensitivity for Plutonium than our present CAMs. Allowing a competition has an element of ALARA associated with it that can be mentioned here. Excluding less-probable suppliers, there would be only two likely competitors: Canberra and Eberline. As mentioned above, the Canberra CAM was introduced in 1993, while it's only likely competitor, the Eberline Alpha-7 CAM, is "forecasted" to begin shipping in 1999 or early 2000. Consequently, the Eberline Alpha-7 is a relatively unproven unit, from a DOE facility field perspective. The Canberra system, on the other hand, has operated at Hanford quite satisfactorily at Bechtel, has been tested at PFP, and has a spotless track record in TA-55 at Los Alamos, where it has been for a number of years. Allowing a competition between Canberra and Eberline could be viewed as non-ALARA in nature; the possible benefit is not apparent, while the risk is not quantifiable. Thus, the Radiological Health arguments favor the Canberra system.

From a production perspective, it is notable that the schedule for the coming year is very challenging, and purchasing the Canberra system will shorten the installation time. Since these instruments are more sensitive and selective than the ones we now possess, this will result in fewer times that the backside is on Airborne Respiratory Area (ARA) status, and fewer time in the ARA status as well. ARA status can negatively impact operations, and is something to be avoided. Thus production schedules support favoring the Canberra system.

Lastly, as expressed above, a great deal of effort has been invested in the Canberra System by both the plant *and* site. We invested time in this system because it appeared to be the only, standard, commercial product which fit our needs, at the time the project started. Reopening the issue and permitting a competitive bid at this time, especially where the outcome is likely anyhow, is not a prudent action. Thus, this also

suggests a sole source justification for the Canberra CAMs is appropriate.

(2) (Present market survey results. If no market survey conducted, state why. Most justifications need market survey support, these items or services do not:

- Original equipment manufacturer of computer hardware and services
- Proprietary software and source codes
- Specialized telecommunications services.)

6.0 Market Survey results (collected through web page information and telephone calls)

CAM	Major Advantages	Major Disadvantages	Cost, basic model
Canberra Alpha Sentry System	<ol style="list-style-type: none"> 1 Has many years' experience in a DOE facility (Hanford, LANL). 2 Has Hanford experience (Bechtel). 3 PFP experience. 4 Has novel 360-degree collection. 5 Superior selectivity and sensitivity. 		<p>\$ 6945/CAMs \$ 3960/ASM (8 CAMs per ASM)</p>
Eberline Model Alpha-7	<ol style="list-style-type: none"> 1. Selectivity and sensitivity appears acceptable, on the basis of World Wide Web documentation. 	<ol style="list-style-type: none"> 1 Delivery dates are "soft" and possibly unacceptably vague. 2 Lacks one-year experience in a DOE facility. 3 Lacks Hanford experience. 4 Lacks novel 360-degree collection. 	<p>\$ 7995 (needs no ASM)</p>
Eberline Model Alpha 6A-1		<ol style="list-style-type: none"> 1 ROI based algorithm. 2 Inferior selectivity and sensitivity for Pu. 3 Lacks novel 360-degree collection. 	<p>Older model, so no cost information was collected.</p>
EG&G Ortec (recently purchased by Perkin Elmer) OS3100 (and OS3100.1 for stack monitoring) Alpha Continuous Air Monitor.		<ol style="list-style-type: none"> 1. These models would be "built-to-order" – <i>none</i> are kept in stock (model number from the OS3300 Alpha/Beta CAM web page - no specifications for OS3100 were given there). Such "built to order" equipment suggests the possibility that this may not provide the commercial standardization, confidence in 	<p>Sales rep wouldn't give estimate w/o unit specifications, even when prompted requested to consider a Canberra equivalent. He did say they could go</p>

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		<p>operation, and long-term support that we ordinarily prefer in our instrumentation (setting the new owner's reputation aside).</p> <p>2. Sales rep was unaware of whether they have had any units in a DOE facility for one year.</p> <p>3. Sales rep was unaware of any whether they have any units at Hanford.</p>	<p>up to \$120,000. I was left to wonder whether they would be competitive.</p>
Victoreen Model 758 Alpha CAM (758A1A and A1C)		<p>1 Lacks one-year experience in a DOE facility.</p> <p>2 Lacks Hanford experience.</p>	RECENTLY DISCONTINUED.

- (2) (Explain why technical data packages, specifications, engineering descriptions, statements of work, or purchase descriptions suitable for competition have not been developed or are not available.)

Such descriptions and specifications could easily be developed. However the foregoing reasoning would intervene, and we would come to the same conclusions that a sole source is in the best interest of the company.

- (3) (Provide a statement of the actions, if any, you plan to remove or overcome the barriers to competition before any subsequent acquisition of the item or service.)

Barriers to competition are not being erected by the company because of this sole source purchase, nor are any reasonable actions by the company likely to effect changes that would yield a better product for a better price, at this time. The decision to sole source has been based on *plant* activities and priorities, in addition to market conditions, and vendor product offerings and delivery times. Common and prudent business practices were used in this evaluation, and have led to the conclusion that this noncompetitive action is in the *company's* best interest.

We are confident that experience gained during installation of these Alpha Monitors will indicate that the future purchases should also be Canberra CAMs. It is not only a product that is directly available in the quantities needed at this time, it is more than reasonable to assume that this item will become a defacto site-standard. In the future, however, if sufficient evidence exists to indicate otherwise, we will certainly act upon that information.

b. Conclusion section. (Provide answers to the following questions.)

- (1) (Does the proposed Seller have personnel considered leading experts in the field?

Explain.)

Yes. Canberra is a major supplier of radiological oriented equipment to the world. It was founded in 1965, specializing in integrated nuclear gamma and alpha spectroscopy instrumentation. From there, they expanded into the area under discussion, health physics, as well as other areas. Canberra now serves a very broad cross-section of the nuclear field; it is composed of 6 divisions and maintains a technically knowledgeable domestic and international sales and support staff.

- (2) (What prior experience of a highly specialized nature does the prospective Seller possess that is vital to the proposed procurement?)

Canberra developed this instrument, and can supply it in the quantity and time frame necessary to serve the objectives of PFP.

- (3) (What facilities and/or test equipment does the prospective Seller exclusively have that are specialized and vital to the procurement?)

Expeditious production of a well-tested and fully vetted system, that will solve our problems in timely fashion.

- (4) (Is competition precluded because of the existence of patent rights, copyrights, secret processes, trade secrets, technical data, or other proprietary data?)

No.

- (5) (Why can no other source make the item or provide the required service?)

Other sources can produce this item. As noted above, this is the best currently available product, which combines the following subjects

- Site consistency
- Radiological Health considerations
- Production schedules, and
- Significant plant and site time investment in the system

in a manner that is currently favorable to PFP (and the site).

- (6) (Will this noncompetitive action preclude use of the prospective Seller on future actions because of conflict of interest regulations?)

No.