

Todd Stevenson

SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEM  
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30

1. REQUISITION NUMBER: REQ-4200-10-0038  
PAGE OF: 1 | 10  
2. CONTRACT NO.: GS-23F-0339K  
3. AWARD EFFECTIVE DATE: 09/30/2010  
4. ORDER NUMBER: CPSC-F-10-0124  
5. SOLICITATION NUMBER: CPSC-Q-10-0088  
6. SOLICITATION ISSUE DATE: 07/22/2010

7. FOR SOLICITATION INFORMATION CALL: Renita Smith  
8. NAME: Renita Smith  
9. TELEPHONE NUMBER: (No collect calls)  
10. OFFER DUE DATE/LOCAL TIME:

9. ISSUED BY: CONSUMER PRODUCT SAFETY COMMISSION  
DIV OF PROCUREMENT SERVICES  
4330 EAST WEST HWY  
ROOM 517  
BETHESDA MD 20814  
CODE: FMPS  
10. THIS ACQUISITION IS:  
 UNRESTRICTED OR  SET ASIDE:  
% FOR:  
 SMALL BUSINESS  EMERGING SMALL BUSINESS  
 HUBZONE SMALL BUSINESS  SOLE SOURCE  
NAICS:  
SIZE STANDARD:  
 SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS  8(A)

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED  
 SEE SCHEDULE A  
12. DISCOUNT TERMS: Net 30  
13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)  
13b. RATING:  
14. METHOD OF SOLICITATION:  
 RFQ  IFB  RFP

15. DELIVER TO: CONSUMER PRODUCT SAFETY COMMISSION  
DIRECTORATE FOR LABORATORY SCIENCES  
10901 DARNESTOWN ROAD  
GAITHERSBURG MD 20878  
CODE: LS  
16. ADMINISTERED BY: CONSUMER PRODUCT SAFETY COMMISSION  
DIV OF PROCUREMENT SERVICES  
4330 EAST WEST HWY  
ROOM 517  
BETHESDA MD 20814  
CODE: FMPS

17a. CONTRACTOR/OFFEROR: ARCADIS US INC  
630 PLAZA DRIVE  
SUITE 100  
HIGHLANDS RANCH CO 80129  
CODE: 0  
FACILITY CODE:  
17b. PAYMENT WILL BE MADE BY: CONSUMER PRODUCT SAFETY COMMISSION  
DIVISION OF FINANCIAL SERVICES  
4330 EAST WEST HWY  
ROOM 522  
BETHESDA MD 20814  
CODE: FMPS

17c. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER  
18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED  SEE ADDENDUM

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	DUNS Number: [REDACTED] Contractor shall design, fabricate and deliver to the Consumer Product Safety Commission, Laboratory, one high energy consumer product containment test cell. Services shall be in accordance with GSA Schedule GS-23F-0339K, the attached Statement of Work and contractor's letters dated September 13, 2010 and September 22, 2010. Continued ... (Use Reverse and/or Attach Additional Sheets as Necessary)				

25. ACCOUNTING AND APPROPRIATION DATA: 0100A10DPS-2010-2401300000-EXHR004200-31180  
26. TOTAL AWARD AMOUNT (For Govt. Use Only): \$60,500.00

27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4, FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA  ARE  ARE NOT ATTACHED.  
 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA  ARE  ARE NOT ATTACHED.

28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 1 COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.  
 29. AWARD OF CONTRACT REF. OFFER DATED YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR: Robert Sharpe for David Proffitt  
31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER): Kim Miles

30b. NAME AND TITLE OF SIGNER (Type or print): Senior Engineer  
30c. DATE SIGNED: 9/30/10  
31b. NAME OF CONTRACTING OFFICER (Type or print): Kim Miles  
31c. DATE SIGNED: 9-30-10

18 ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
0001	Design - High Energy Consumer Product Containment Test Cell  **Upon acceptance of the design, the contractor shall receive payment for Line Item 0001, \$30,250.00.	1	EA	30,250.00	30,250.00
0002	Fabrication - High Energy Consumer Product Containment Test Cell  The total amount of award: \$60,500.00. The obligation for this award is shown in box 26.	1	EA	30,250.00	30,250.00

32a. QUANTITY IN COLUMN 21 HAS BEEN  RECEIVED  INSPECTED  NOTED. ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE \_\_\_\_\_ 32c. DATE \_\_\_\_\_ 32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE \_\_\_\_\_

32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE \_\_\_\_\_ 32f. TELEPHONE NUMBER OF AUTHORIZED GOVERNMENT REPRESENTATIVE \_\_\_\_\_  
 32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE \_\_\_\_\_

33. SHIP NUMBER \_\_\_\_\_ 34. VOUCHER NUMBER \_\_\_\_\_ 35. AMOUNT VERIFIED CORRECT FOR \_\_\_\_\_ 36. PAYMENT  COMPLETE  PARTIAL  FINAL 37. CHECK NUMBER \_\_\_\_\_  
 PARTIAL  FINAL

38. S/R ACCOUNT NUMBER \_\_\_\_\_ 39. S/R VOUCHER NUMBER \_\_\_\_\_ 40. PAID BY \_\_\_\_\_

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT \_\_\_\_\_ 42a. RECEIVED BY (Print) \_\_\_\_\_  
 41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER \_\_\_\_\_ 41c. DATE \_\_\_\_\_ 42b. RECEIVED AT (Location) \_\_\_\_\_  
 42c. DATE REC'D (YY/MM/DD) \_\_\_\_\_ 42d. TOTAL CONTAINERS \_\_\_\_\_

## STATEMENT OF WORK

### Technical Requirements for High Energy Consumer Product Containment System

Background: The US Consumer Product Safety Commission (CPSC) has a need for an indoor use mobile test chamber designed to contain the energy, components from a catastrophic failure, and safely vent steam from a one cubic foot pressurized container. Due to space limitations, the Test Chamber shall have a approximate free and clear internal dimension of 4' x 4' x 6'. The external dimensions shall not exceed 4'-6" x 4'-6" x 6'-6". This contract includes the design, fabrication and delivery of the containment system to the CPSC Laboratory in Gaithersburg/Rockville, MD.

#### Technical Requirements:

1. Internal Dimensions: 4'x4'x 6' high, + 2", -0" in each direction.
2. Totally enclosed with floor, roof, three walls, and one wall with an access door (front of unit).
3. Access Door: The access door shall provide a free and clear 24" wide x 48" tall opening when opened. The corners of the opening may have a radius up to 2". Substantial hinges and door latches shall be provided.
4. Two 10" diameter transparent view ports. The view ports shall be designed to permit replacement of the glazing material. The view ports shall be centered on the side walls with the centerline 36" above the chamber floor/bottom.
5. One nominally 2" threaded sealable port centered on each side and back walls, 6" above the floor/bottom. These ports will be used for data, power, and/or control circuits.
6. Vent: The Test Chamber shall be provided with a shielded top located vent to allow for the venting of steam during the worse case design criteria event. The vent shall be designed to prevent the direct exit of shrapnel from a catastrophically failed tested component. The vent exit shall opening shall be oriented in the up direction.
7. Stability: The unit shall remain stable and be designed to preclude tip-over when the door is opened 90 degrees and 200 pound weight is suspended from the far edge of the door.
8. Mobility: The unit shall be designed for transport using a standard width pallet jack such as a U-Line H-1483 (load capacity 5,500 lbs) unit. If the test chamber has a total weight greater than 2000 lbs, then a U-Line H-1483 shall be provided with the test chamber.

9. The chamber shall be provided with four (4) 1" diameter threaded sealable through ports located 6" on center, 6" from each of the rear vertical corner seams. The holes shall be located 12", 18", 24", and 30" above the floor.

10. The chamber shall be designed to withstand, without permanent structural damage, the catastrophic failure incident of a one cubic foot pressure vessel/container, including worse case shrapnel, filled ½ with water and ½ with steam pressurized to 50 psig. The chamber vent system shall be designed to safely vent the steam produced during the catastrophic failure of the pressure vessel. For design purposes, the pressure shall be considered to be centered in the chamber within 2" of center, in any direction, and positioned vertically anywhere between 6" and 36" above the floor. For design purposes, the chamber shall withstand, without permanent structural damage, 100 of the catastrophic failure incidents described in paragraph 10 above. The pressure vessel shall be assumed to be a 5 lbm base unit and a 1 lbm top unit. The catastrophic failure shall be assumed to be the separation of the top unit from the base unit while under 50 psig steam pressure in a random direction. The pressure vessel shall be assumed to be a cylinder, 12" in diameter.

11. Documentation:

Submit Design Calculations, signed and sealed by a registered professional engineer. The design package shall include:

- calculations /analysis supporting the thickness of the test chamber walls, floor and roof/top, and that no internal bracing is required.
- calculations/analysis supporting the size and characteristics of bolted fittings and joints
- calculations/analysis supporting the size, configuration, and placement of welded joints and fittings
- calculations/analysis supporting the size and configuration of the vent structure/fitting
- calculations/analysis supporting the tip-over/stability requirements
- calculations/analysis supporting the design of the viewports and the thickness and material specified for the glazing material. Each view port shall be designed to withstand the full energy and blast from the design pressure vessel failure.
- calculations/analysis supporting the door hinge and latching materials and selection
- calculations indicating the total completed weight of the structure

Submit detailed drawings of the test chamber for review and approval prior to manufacturer.

12. Mail the Design/Analysis package and the drawings for review/approval to:

US CPSC Laboratory Attn: Scott Snyder  
10901 Darnestown Road  
Gaithersburg, MD 20878

13. Ship the unit, and pallet jack, if required, to:

US CPSC Laboratory  
10901 Darnestown Road  
Gaithersburg, MD 20878

End of Statement of Work

**LC 1B CONTRACTOR'S NOTE - DELIVERIES TO THE CPSC LABORATORY SITE,  
GAITHERSBURG, MARYLAND**

**Delivery Address:**

Directorate for Laboratory Sciences  
U.S. Consumer Product Safety Commission  
10901 Darnestown Rd. (MD route 28)  
Gaithersburg, MD 20878  
301-424-6421, x101 (main reception)x1 (Director's Office)

The Consumer Product Safety Commission (CPSC) Laboratories are located in Gaithersburg, MD. The entrance to the Laboratory site is protected by a security gate, which is normally closed during business hours. If the gate is closed, use the intercom box at the gate to request entry. **All visitors must report to Building B**, which is adjacent to the main parking lot.

Deliveries may not be left outside any building or loading dock, unless specifically directed by appropriate CPSC staff. All deliveries shall be considered "inside deliveries" to the appropriate building in accordance with the instructions below. When scheduling deliveries, the purchase order number shall always be referenced and all packages shall clearly display the Purchase Order Number on the outside of the cartons and/or packages and include the packing slip.

**ATTENTION GOVERNMENT VENDOR:**

**A. DELIVERY INSTRUCTIONS**

**1. DELIVERY INSTRUCTION FOR SMALL ITEMS**

Small packages may be delivered to Building B. Deliveries should be made between 9:00 a.m. and 4:00 p.m. on Monday through Friday (except holidays). Deliveries outside these hours require prior arrangements.

**Contacts:**

Sondra Adkins, Administrative Officer, 301-424-6421 x101  
Andrew Stadnik, Lab Director, 301-424-6421 x1  
Jim Hyatt, Division Director, 301-424-6421 x116

**2. DELIVERY INSTRUCTIONS FOR LARGE OR HEAVY ITEMS:**

Large or heavy items must be delivered directly to the appropriate building, after checking in at Building B. Deliveries of large or heavy items should be scheduled 24 hours in advance and should be made between 9:00 a.m. and 3:00 p.m. on Monday through Friday (except holidays). Contact information is the same as above.

### 3. SAMPLE STORAGE FACILITY

Deliveries should be made between 9:00 a.m. and 4:00 p.m. on Monday through Friday (except holidays).

**Contacts:**

Terry Parks, Sample Custodian, 301-424-6421 X 156

Ralph King, Sample Custodian, 301-424-6421 x 155

Iris Parks, Director, Division of Administrative Services, 301-504-7078

### **B. BILLING INSTRUCTIONS:**

Pursuant to the Prompt Payment Act (P.L. 97-177) and the Prompt Payment Act Amendments of 1988 (P.L. 100-496) all Federal agencies are required to pay their bills on time, pay interest penalties when payments are made late, and to take discounts only when payments are made within the discount period. To assure compliance with the Act, vouchers and/or invoices shall be submitted on any acceptable invoice form which meets the criteria listed below. Examples of government vouchers that may be used are the Public Vouchers for Purchase and Services Other Than Personal, SF 1034, and Continuation Sheet, SF 1035. At a minimum, each invoice shall include:

1. The name and address of the business concern (and separate remittance address, if applicable).
2. Taxpayer Identification Number (TIN).
3. Invoice date (use of invoice number in addition to invoice date is prudent but not required).
4. The contract or purchase order number (see block 2 of OF347 or block 4 of SF1449 on page 1 of this order), or other authorization for delivery of goods or services.
5. Description, price and quantity of goods or services actually delivered or rendered.
6. Shipping cost terms (if applicable).
7. Payment terms.
8. ACH Vendor information which includes: the Financial Institution, routing transit number, and depositor account number. In addition please specify whether account is a checking account or savings account.
9. Other substantiating documentation or information as specified in the contract or purchase order.
10. Name, title, phone number and mailing address of responsible official to be notified in the event of a deficient invoice.

**ORIGINAL VOUCHERS/INVOICES SHALL BE SENT TO:**

Accounting Officer  
Div. of Financial Services, Room 522  
U.S. Consumer Product Safety Commission  
4330 East-West Hwy  
Bethesda, MD 20814

Invoices not submitted in accordance with the above stated minimum requirements will not be processed for payment. Deficient invoices will be returned to the vendor within seven days or sooner. Standard forms 1034 and 1035 will be furnished by CPSC upon request of the contractor.

Inquiries regarding payment should be directed to the Finance Office at 301-504-7172 or 301-504-7130.

**C. PAYMENT**

Payment will be made as close as possible to, but not later than, the 30<sup>th</sup> day after receipt of a proper invoice as defined in "Billing Instructions," except as follows:

When a time discount is taken, payment will be made as close as possible to, but not later than, the discount date. Discounts will be taken whenever economically justified. Otherwise, late payments will include interest penalty payments. Inquiries regarding payment should be directed to the Accounting Officer at (301) 504-7203 or 301-504-7130 or at the following address:

Accounting Officer  
Div. of Financial Services, Room 522  
U.S. Consumer Product Safety Commission  
4330 East-West Hwy  
Bethesda, MD 20814

Complaints related to the late payment of an invoice should be directed to Deborah Peebles Hodge, Director, Division of Financial Services at the same address (above).

**D. INSPECTION & ACCEPTANCE PERIOD**

Unless otherwise stated in the Statement of Work or Description, the Commission will ordinarily inspect all materials/services within three (3) working days after the date of receipt. The CPSC contact person will transmit disapproval, if appropriate. If other inspection information is provided in the Statement of Work or Description, it is controlling.

**E. ALL OTHER INFORMATION RELATING TO THE PURCHASE ORDER**

Contact: Jim Hyatt – Project Officer at 301-424-6421 ext.116  
Renita Smith – Division of Procurement Services (301) 504-7045

### **From the West (Fairfax County/Northern Virginia)**

Take 495 Capital Beltway to Maryland

At the 270/495 divide, bear left to take 270 North.

Take Rt 270 north toward Frederick, Maryland

At Rt. 270, exit 6 go west on Darnestown Rd./Rt. 28

At the 3<sup>rd</sup> traffic light, turn left on Darnestown Road.

Continue west to the traffic light at the Key West Blvd. intersection. Turn left.

Pass straight through the traffic light at Muddy Branch Road.

The second right turn has a sign "U.S. Consumer Product Safety Commission Laboratory."

Turn right and proceed to the parking lot.

Report to the lobby of the second building, Building B.

### **From CPSC Headquarters**

From the main entrance of Bethesda Towers, turn left on East-West Highway, then right on Wisconsin Ave. (route 355 North).

After passing the National Institutes of Health and Pooks Hill Road, take I-270 North (Frederick), which is the second left after Pooks Hill Road.

Take exit 6 go west on Darnestown Road (route 28).

At the 3<sup>rd</sup> traffic light, turn left on Darnestown Road.

Continue west to the traffic light at the Key West Boulevard intersection. Turn left.

Pass straight through the traffic light at Muddy Branch Road. Stay in the right lane, which ends just after our entrance.

The second right turn has a sign "U.S. Consumer Product Safety Commission Laboratory."

Turn right and proceed to the parking lot.

Report to the lobby of the second building, Building B.

## F. PROCESSING INSTRUCTIONS FOR REQUESTING OFFICES

The Purchase Order/Receiving Report (Optional Form 347 or Standard Form 1449) must be completed at the time the ordered goods or services are received. Upon receipt of the goods or services ordered, each item should be inspected, accepted (partial or final) or rejected. The Purchase Order/Receiving Report must be appropriately completed, signed and dated by the authorized receiving official. In addition, the acceptance block shall be completed (Blocks 32 a, b & c on the SF 1449 and column G and page 2 of the OF 347). The receiving report shall be retained by the requesting office for confirmation when certifying invoices.

## G. PROPERTY/EQUIPMENT PURCHASES

In the case of Purchase Orders/Receiving Reports involving the purchase and receipt of property/equipment, a copy of the Purchase Order/Receiving Report must also be immediately forwarded directly to the Property Management Officer in the Division of Administrative Services. The transmittal of Purchase Orders/Receiving Reports to the property management officer is critical to the integrity and operation of CPSC's Property Management System. Receiving officials should also forward copies to their local property officer/property custodian consistent with local office procedures.

## H. Directions to the U.S. Consumer Product Safety Commission Laboratory

### **From the East – Silver Spring/Prince Georges County**

Take the Beltway, Rt. 495, outer loop, toward Baltimore , Bethesda, Frederick.  
Take Rt 270 north toward Frederick, Maryland  
At Rt. 270, take exit 6 and go west on Darnestown Rd./Rt. 28  
At the 3<sup>rd</sup> traffic light, turn left on Darnestown Road.  
Continue west to the traffic light at the Key West Blvd. intersection. Turn left.  
Pass straight through the traffic light at Muddy Branch Road.  
The second right turn has a sign "U.S. Consumer Product Safety Commission Laboratory."  
Turn right and proceed to the parking lot.  
Report to the lobby of the second building, Building B.

### **From the North, Frederick, Maryland**

Take Rt. 270 south to exit 6 west, Darnestown Rd/Rt 28.  
Turn right at the light.  
At the second traffic light turn left on Darnestown Road.  
Continue west to the traffic light at the Key West Blvd. intersection, turn left.  
Pass straight through the traffic light at Muddy Branch road.  
The second right turn has a sign "U.S. Consumer Product Safety Commission Laboratory."  
Turn right and proceed to the parking lot.  
Report to the lobby of the second building, Building B.



Renita Smith  
Directorate for Laboratory Sciences  
10901 Darnestown Rd.  
Gaithersburg, MD 20878

ARCADIS  
4915 Prospectus Drive  
Suite F  
Durham  
North Carolina 27713  
Tel 919.544.4535  
Fax 919.544.5690  
[www.arcadis-us.com](http://www.arcadis-us.com)

Subject:  
CPSC Energy Containment Cell Solicitation # CPSC-Q-10-0088 Modified

Technology

Dear Ms. Smith:

ARCADIS is pleased to submit this revised quote in response to your specifications for the Energy Containment Cell. The design team is composed of ARCADIS and other professional members experienced and qualified to provide a safe design.

Date:  
September 22, 2010

Our initial quote and proposal was submitted on August 25. In a letter from CPSC dated September 9, we were asked to answer 3 technical questions and to address a potential scope revision. We submitted that material in a letter dated September 13. This letter includes a final proposed cost based on the scope and assumptions detailed in that September 13 letter.

Contact:  
David Proffitt

Phone:  
919-544-4535

Email:  
[David.Proffitt@arcadis-us.com](mailto:David.Proffitt@arcadis-us.com)

The cost for the equipment outlined in the RFQ and detailed in Volume 1 of the proposal is \$60,500. This includes design, fabrication, and delivery to your facility. A progress payment of 50% will be required after the design has been approved by CPSC and the remaining balance will be due once delivery of all components occurs. Please feel free to contact Bobby Sharpe (919-544-4535) with any technical questions and Van Sands (720-344-3792) for contractual questions. We are looking forward to a successful working relationship to fully satisfy your research facility needs.

Sincerely,

ARCADIS

David Proffitt  
Associate Vice President

Copies:  
Andrew Murphy, Senior Vice President  
Bobby Sharpe, PE

Imagine the result



Kim Miles  
Consumer Product Safety Commission  
Division of Procurement Services, Rm. 517  
4330 East West Highway  
Bethesda, MD 20814

ARCADIS  
4915 Prospectus Drive  
Suite F  
Durham  
North Carolina 27713  
Tel 919.544.4535  
Fax 919.544.5690  
[www.arcadis-us.com](http://www.arcadis-us.com)

Subject:  
CPSC Containment Cell Request for Quotation CPSC-Q-10-0088 – Revised

Technology

Dear Ms. Kim Miles:

Date:  
September 13, 2010

ARCADIS is pleased to submit this letter in response to your deficiency letter dated September 9, 2010. We will repeat and respond to the four topics outlined in the letter.

Contact:  
David Proffitt

1. Verify that the unit will be all welded construction and that the welders are qualified for the welding processes anticipated for assembly.  
RESPONSE: The unit will be constructed of carbon steel with continuous full seam welds at all joints. The size and type of the welds will be determined based on the calculations in the design phase of the project. All welders are experienced and trained on the equipment and welding processes needed for successful fabrication of the containment chamber. All welders that would be working on this project will be certified to AWS D1.1 Welding Procedures. Their certificates are available upon request.
2. Where will the containment test cell be fabricated and can CPSC staff observe fabrication?  
RESPONSE: The unit will be fabricated by Shickel Corporation in Bridgewater, VA. CPSC staff will be allowed to observe the fabrication process. Adherence to Shickel's safety procedures and necessary PPE will be required by all visitors.
3. Please provide detailed information on how walls/ceiling/floor will be joined. The walls/ceiling/floor panels will be joined with continuous full seam welds. Depending on the final wall thickness and final cell design, some joints may be bent (or "broke") to form the corner joints. See also the response to Question 1.

Phone:  
919-544-4535  
Email:  
[David.Proffitt@arcadis-us.com](mailto:David.Proffitt@arcadis-us.com)

Imagine the result

What design changes, if any, are required for the chamber to withstand an explosive propane event where the chamber was filled with an explosive concentration of propane (>LEL, <UEL) an an ignition occurred. Can a blow out panel, if required, be incorporated into the roof structure? If so, what is the costs and schedule impact.

RESPONSE: ARCADIS would need to know more details about the scenario that created this environment to generate an accurate proposal and cost. For example, the vent for the containment system presented in our original proposal did not have any means of sealing gases in the chamber. Thus, the combustible gases would be continuously leaking out of the vent prior to the explosion and could create a safety issue. No information has been given about where the unit will be installed or the air/fuel ratio of the combustible mixture. An explosion vent or blowout panel would be a cost effective way of rapidly relieving the pressures and protecting the cell.

Something similar to

[http://www.bsbsystems.com/explosion\\_vents/explosion\\_vents.html](http://www.bsbsystems.com/explosion_vents/explosion_vents.html)

could be incorporated into the design. This style of relief vent would need to be protected from shrapnel that could easily puncture it under the original catastrophic failure scenario. We will have to review the expected deflagration pressures, containment cell structural design, and explosion vent specification which will add time to the design phase of the project. Additional fabrication costs will include the addition of a flange on the top of the cell to mount the vent as well as exhaust additions and/or modifications. Additional structural reinforcement of the cell and door will likely be needed. For budgeting purposes we have assumed:

General cell dimensions and shape are the same as before

Additional structural strength will be required

Unit will be used and installed outside of the building for safely relief of pressures

No additional ducting of the exhaust will be required (safety)

The relief will be mounted on the top of the cell and take up all available space

The original relief will be mounted to the side of the chamber

The original vent will not be sealed by an explosion panel

A steel blank-off plate will be provided for the explosion panel when combustible mixtures are not being used

Material will be painted carbon steel

A sacrificial explosion vent panel and one spare will be provided.

The budgetary cost for the design and fabrication of the containment cell based on the above assumptions is \$60,500. An additional two weeks of design and

ARCADIS

Ms. Kim Miles  
September 13, 2010

fabrication time should be allowed over the schedule outlined in our original quotation.

Please feel free to contact Bobby Sharpe (919-544-4535) with any technical questions and Van Sands (720-344-3792) for contractual questions. We are looking forward to a successful working relationship to fully satisfy your research facility needs.

Sincerely,

ARCADIS



David Proffitt  
Associate Vice President

Copies:

Bobby Sharpe, PE