**Roya C. Kambin**
Project Manager
Marketing Business Unit

**Chevron Environmental Management Company**
6101 Bollinger Canyon Road
San Ramon, CA 94583
Tel (925) 790-6270
RKLG@chevron.com

October 14, 2011

**RECEIVED**

*2:13 pm, Oct 17, 2011*

Alameda County
Environmental Health

Mr. Jerry Wickham
Alameda County Health Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

**RE: Revised Remedial Design**
4191 First Street, Pleasanton, California
Fuel Leak Case No.: RO0000361

Dear Mr. Wickham,

I declare under penalty of perjury that to the best of my knowledge the information and/or recommendations contained in the attached report is/are true and correct.

If you have any questions or need additional information, please contact me at (925) 790-6270.

Sincerely,

Roya Kambin
Union Oil of California – Project Manager

Attachment
Revised Remedial Design

ARCADIS U.S., Inc.
2000 Powell Street
Suite 700
Emeryville
California 94608
Tel 510 652 4500
Fax 510 652 4906
**www.arcadis-us.com**

ENVIRONMENT

Jerry Wickham, PG, CEH, CHG
Senior Hazardous Materials Specialist
Alameda County Environmental Health Services
1131 Harbor Bay Parkway Suite 250
Alameda, California 94502

Subject:
**Revised Remedial Design**
Unocal Site 7376
4191 First Street
Pleasanton California
Alameda County Fuel Leak Case No. RO0000361

Date:
October 14, 2011

Contact:
Katherine Brandt

Phone:
510.596.9675

Email:
Katherine.Brandt
@arcadis-us.com

Our ref:
B0047296.0001

Dear Mr. Wickham:

ARCADIS, on behalf of Union Oil of California (Chevron), has prepared this letter to present a revised remedial design for the above referenced site. This letter has been prepared pursuant to the telephone conversation between Ms. Katherine Brandt and Mr. David Evans of ARCADIS and Mr. Jerry Wickham of the Alameda County Environmental Health Services (ACEH) on September 28, 2011. The purpose of the phone conversation was to discuss design challenges identified in Antea Group's (Antea) Revised Remedial Action Plan (Revised RAP), dated March 2, 2011. The Revised RAP was approved by the ACEH on March 17, 2011. Specifically, the design challenges discussed include the following:

- Miscalculation of the soil vapor extraction (SVE) radius of influence (ROI) and subsequent challenges with the SVE vapor well layout
- Concerns regarding the purpose of the groundwater extraction and treatment (GWET) system and the incorporation of air sparge (AS)
- Electrical and natural gas limitations
- Access limitations and phased approach for implementation
- GWET as a contingency

Each of the discussion topics as well as revised remedial design is presented below.

**Soil Vapor Extraction and Treatment**

This section includes a discussion of the technical challenges with the ROI as presented within the Revised RAP as well as an amended ROI and SVE well field layout.

**Radius of Influence**

Graphical representation of ROI is typically presented on a log normal basis. The ROI as presented in the Revised RAP had both the vacuum and distance in a normal scale which resulted in a ROI of 12 feet. As a result the ROI presented with the Revised RAP underestimates the influence of both the shallow and deep SVE wells.

ARCADIS recalculated the ROI using results from observation wells with screen intervals similar to the SVE well. The ROI was based on a curve fit of observed wellhead vacuums measured at the observation wells versus radial distance from the SVE well. The ROI is defined as the radial distance from the wellhead where 0.1 inches of water column (in. W.C.) would be observed. SVE ROIs for shallow wells ranged from 31 to 54 feet. Conservatively a log average ROI of 30 feet was used for design purposes. SVE ROIs for deep wells ranged from 18 to 27 feet.

Conservatively a log average ROI of 20 feet was used for design purposes. The revised design ROI for the shallower zone (sands/gravels) and deeper zone (finer grained soil) is 30 feet and 20 feet, respectively. Revised graphical ROI determinations for shallow and deep wells are presented with Attachment 1.

The proposed screen intervals were based on an evaluation of the available soil and groundwater analytical data and photo ionization data (PID) presented on boring logs. In addition, existing SVE well CWB-2 will be incorporated into the SVE system. The screen interval for the various wells is presented below.

- Shallow SVE wells screened from 20-30 ft bgs (VE-1A, VE-2A, VE-5A)
- Deep SVE wells screened from 35-45 ft bgs (VE-1B, VE-2B, VE-3, VE-4, VE-5B, VE-6, VE-7)
- Existing SVE well, CWB-2 is screened from 48-60 ft bgs.

### Well Layout

Utilizing the revised ROI, the SVE well field layout was amended resulting in a reduction of SVE wells from 29 to 11 (3 shallow SVE wells and 8 deep wells). The revised well field layout including projected ROI is presented as Figure 1.

## Groundwater Extraction and Treatment

This section includes a discussion of the technical challenges with the selection of GWET to address separate phase impacts.

### Separate Phase Hydrocarbons

As indicated within the Revised RAP, the purpose of the GWET system is to address separate phase hydrocarbons (SPH) at the site. However, SPH has not been observed at the site since 2006. Furthermore, the GWET as designed is unlikely to have any beneficial effects on dissolved phase impacts and may in fact result in the elongation of the dissolved phase plume with the addition of GWE-2.

### Air Sparge

Lithology at this site appears conducive to AS. AS has a higher probability of success at addressing dissolved phase impacts in proximity to MW-5. Therefore, ARCADIS is proposing the incorporation of three AS wells into the system. Conservatively, a 10 foot ROI for AS was assumed. The screen interval is proposed to be 80 to 82 feet bgs but will be modified if fine grained sediments are encountered at a shallower depth. The AS well field layout including projected ROI is shown on Figure 1.

## Electrical and Natural Gas Limitations

This section includes a discussion of the electrical and natural gas limitations at the site.

### Limitations

The Revised RAP did not take into consideration the available electric and gas utilities at the site. Three phase power is not available and currently, less than 200 amps of single phase 240 volt are available. There is not an on-site natural gas

supply available. However, there is a natural gas pipeline located off-site (under 1st Street). ARCADIS has confirmed sufficient natural gas pressure (3 pounds per square inch [PSI]) and British thermal units per hour (BTUH [750,000 BTUH]) can be supplied to the site as supplemental fuel for a thermal catalytic (Thermox) oxidizer.

## Equipment Selection, Power Requirements, and Compound Location

The following sections describe the revised abatement equipment and compound location.

### Abatement Equipment

The oxidizer proposed within the Revised RAP (500 standard cubic feet per minute [SCFM] Thermox) was based operation of 28 SVE wells. As discussed above only 11 wells are necessary and proposed to address impacts to soil. Therefore, a 250 SCFM Thermox is proposed to abate extracted vapors. A comparably sized positive displacement (PD) or rotary claw blower will be utilized to extract vapor.

### Power Requirements

An upgraded electrical service will be required. As indicated above, 3 phase power is not available. To satisfy the power requirements, the service will need to be upgraded to 400 amps of single phase 240 volt to satisfy equipment requirements.

### Compound Location

After reviewing site maps and performing a site reconnaissance, ARCADIS has determined the system compound will need to be relocated. The location proposed in the Revised RAP would block a driveway and is in the area containing air and water for customers. Final compound location is pending further review.

## Access Limitations and Phased Approach for Implementation

The following sections describe our access limitations to onsite and offsite properties.

**Access Limitations**

Onsite

Access to the 76 station was established in 2010 and is unrestricted.

Offsite

*4183 First Street (Parcel 094-0110-047-03)*

- Access is limited to monitoring and sampling and SVE conveyance piping.

An amended access agreement will be necessary for additional intrusive work (i.e. well installation).

*Public right-of-way (Parcel 094-0100-048-00 and 094-0110-046-00)*

- Access is limited to monitoring and sampling (MW-5 through MW-9)
- 5 borings (3 vapor extraction wells, 1 observation well, and 1 groundwater monitoring well)
- Installation of a remediation system as approved by ACEH.

An amended access agreement will be necessary for all work proposed within the Revised Remedial Design.

**Phased Approach for Implementation**

The duration for obtaining access to offsite properties is unknown. Therefore, ARCADIS proposes a phased approach for implementation which includes the installation of onsite infrastructure with the subsequent installation of offsite infrastructure as access allows.

## GWET as a Contingency

As indicated above, the purpose of the GWET is unclear. Therefore, ARCADIS will include GWET as a contingency if SPH is observed. Infrastructure associated with the GWET system, with the exception of GWE-2, will be added to the overall system

design. In addition, ARCADIS will apply for a discharge permit with the Dublin San Ramon Service District.

If you have any questions or comments regarding the contents of this letter please contact Ms. Katherine Brandt of ARCADIS at 510.596.9675 or by email at Katherine.Brandt@arcadis-us.com.

Sincerely,

ARCADIS U.S., Inc.

Katherine Brandt
Certified Project Manager

David W. Lay, PG
Vice President

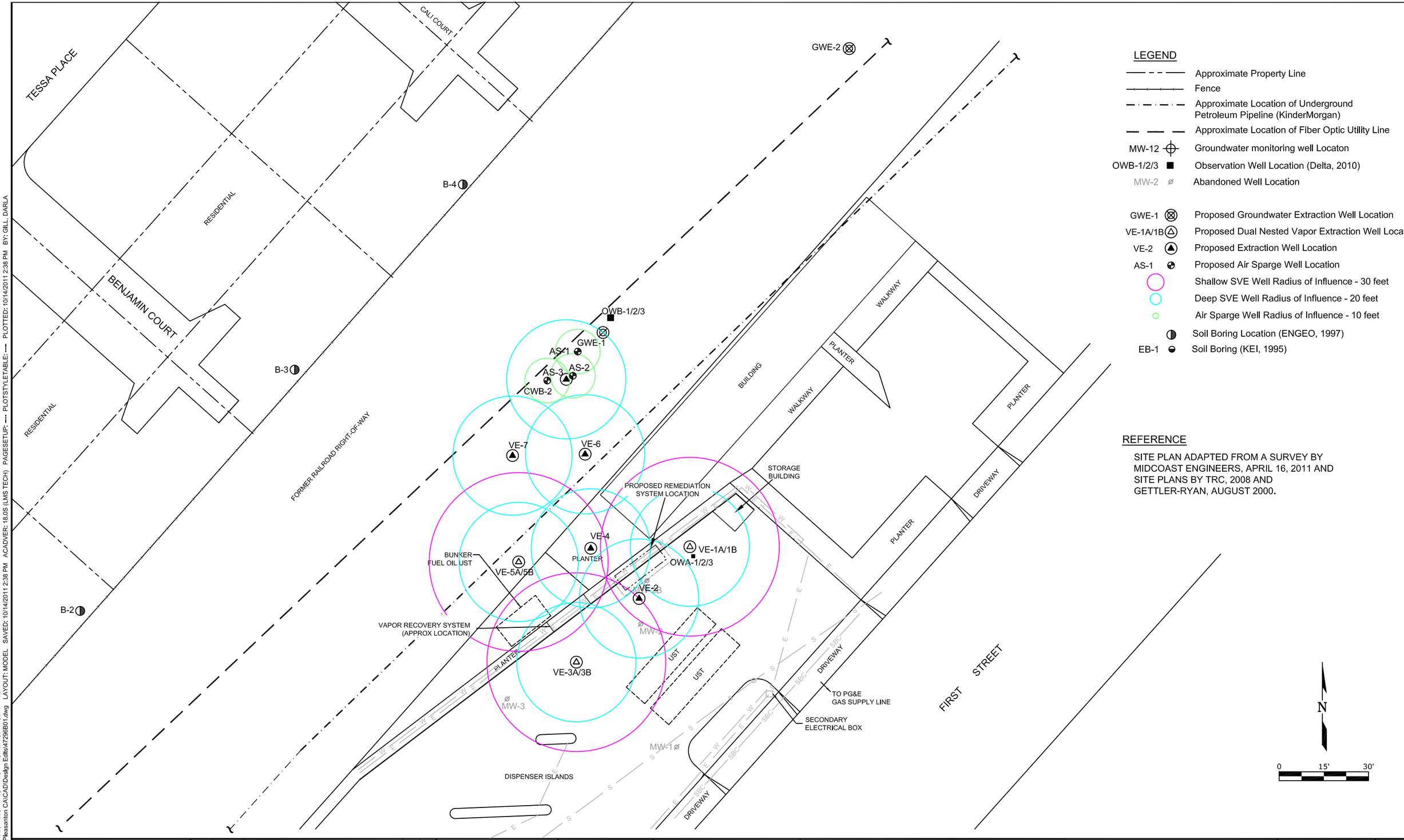
PROFESSIONAL GEOLOGIST
DAVID LAY
No.8545
STATE OF CALIFORNIA

Enclosures:

| | |
|---|---|
| Figure 1 | Site Plan with SVE Well Layout |
| Attachment 1 | Graphical ROI Determination |

Copies:

Roya Kambin, Union Oil of California
Danielle Stefani, Livermore Pleasanton Fire Department
Cheryl Dizon (QIC 8021), Zone 7 Water Agency
Les Hausrath, Wendel, Rosen, Black & Dean
Christine Noma, Wendel, Rosen, Black & Dean
Rory MacNeil, Alameda County Public Works
Donna Drogos, Alameda County Environmental Health Services
De L Liu and Na Li
Henry O. Armour
CD & PWS Enterprises, Inc.
Mr. Bill Borgh, ConocoPhillips Company




## LEGEND

- Approximate Property Line
- Fence
- Approximate Location of Underground Petroleum Pipeline (KinderMorgan)
- Approximate Location of Fiber Optic Utility Line
- MW-12 — Groundwater monitoring well Locaton
- OWB-1/2/3 — Observation Well Location (Delta, 2010)
- MW-2 — Abandoned Well Location
- GWE-1 — Proposed Groundwater Extraction Well Location
- VE-1A/1B — Proposed Dual Nested Vapor Extraction Well Location
- VE-2 — Proposed Extraction Well Location
- AS-1 — Proposed Air Sparge Well Location
- Shallow SVE Well Radius of Influence - 30 feet
- Deep SVE Well Radius of Influence - 20 feet
- Air Sparge Well Radius of Influence - 10 feet
- Soil Boring Location (ENGEO, 1997)
- EB-1 — Soil Boring (KEI, 1995)

## REFERENCE

SITE PLAN ADAPTED FROM A SURVEY BY MIDCOAST ENGINEERS, APRIL 16, 2011 AND SITE PLANS BY TRC, 2008 AND GETTLER-RYAN, AUGUST 2000.

CITY: DIV/GROUP: DB: LD: PIC: PM: TM: LYR:ON=*;OFF=*REF* G:\AProject\Chevron - Pleasanton CA\CAD\Design Edits\472965\01.dwg LAYOUT: MODEL SAVED: 10/14/2011 2:38 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 10/14/2011 2:38 PM BY: GILL, DARLA

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

| No. | Date | Revisions | By | Ckd |
|---|---|---|---|---|

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Professional Engineer's Name
MICHAEL P. FLEISCHNER
Professional Engineer's No.
C65705 EXP. 09/30/2013
State CA | Date Signed | Project Mgr. KAB
Designed by DDG | Drawn by MTH | Checked by DDG

ARCADIS U.S., INC.

76 SERVICE STATION NO. 2707376 • 4191 FIRST STREET PLEASANTON, CALIFORNIA

CONSTRUCTION DOCUMENTS

# SITE MAP WITH PROPOSED WELL LOCATIONS

GENERAL

ARCADIS Project No. B0047296.000100003

Date OCTOBER 14, 2011

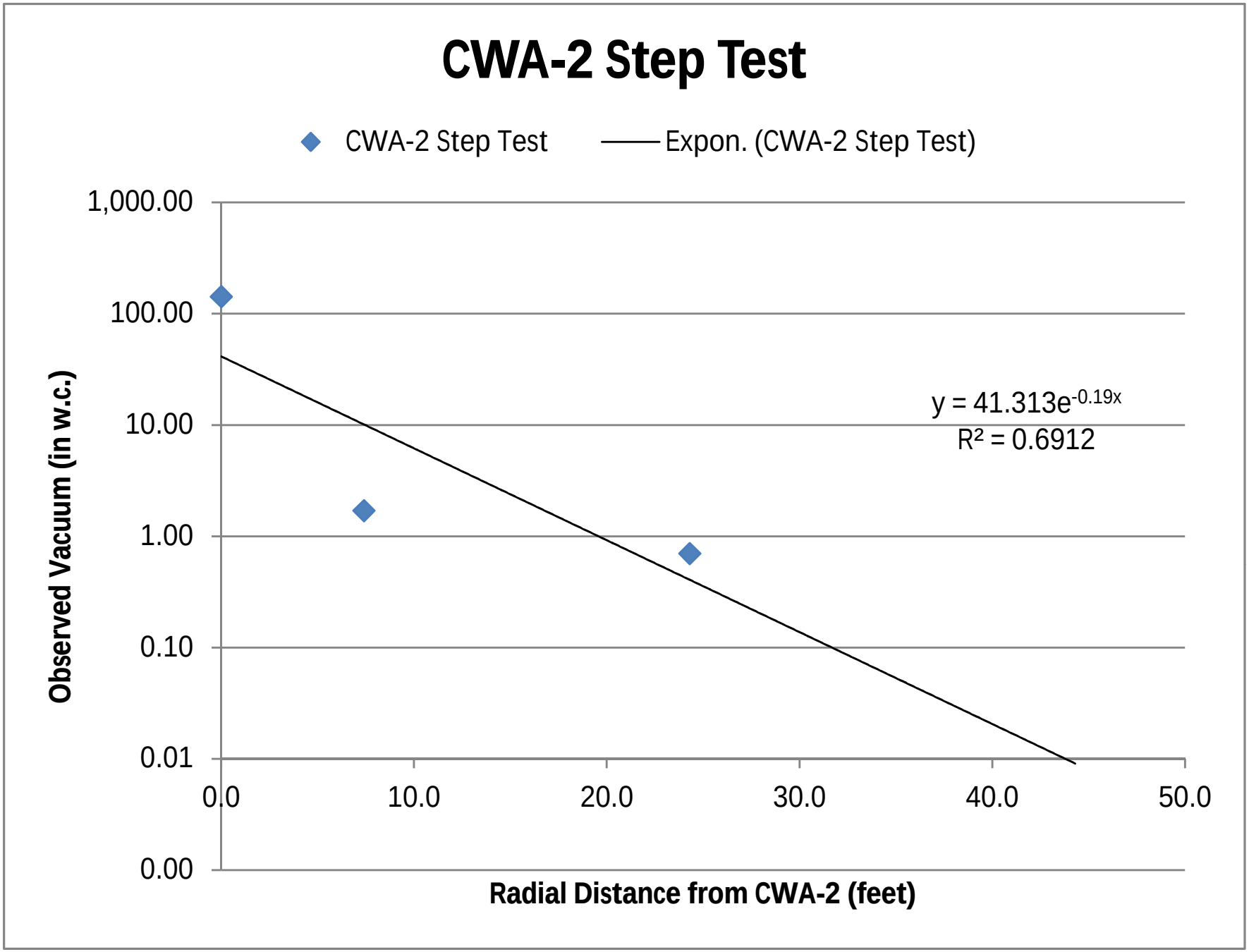
ARCADIS
100 MONTGOMERY STREET
SUITE 300
SAN FRANCISCO, CALIFORNIA
94104

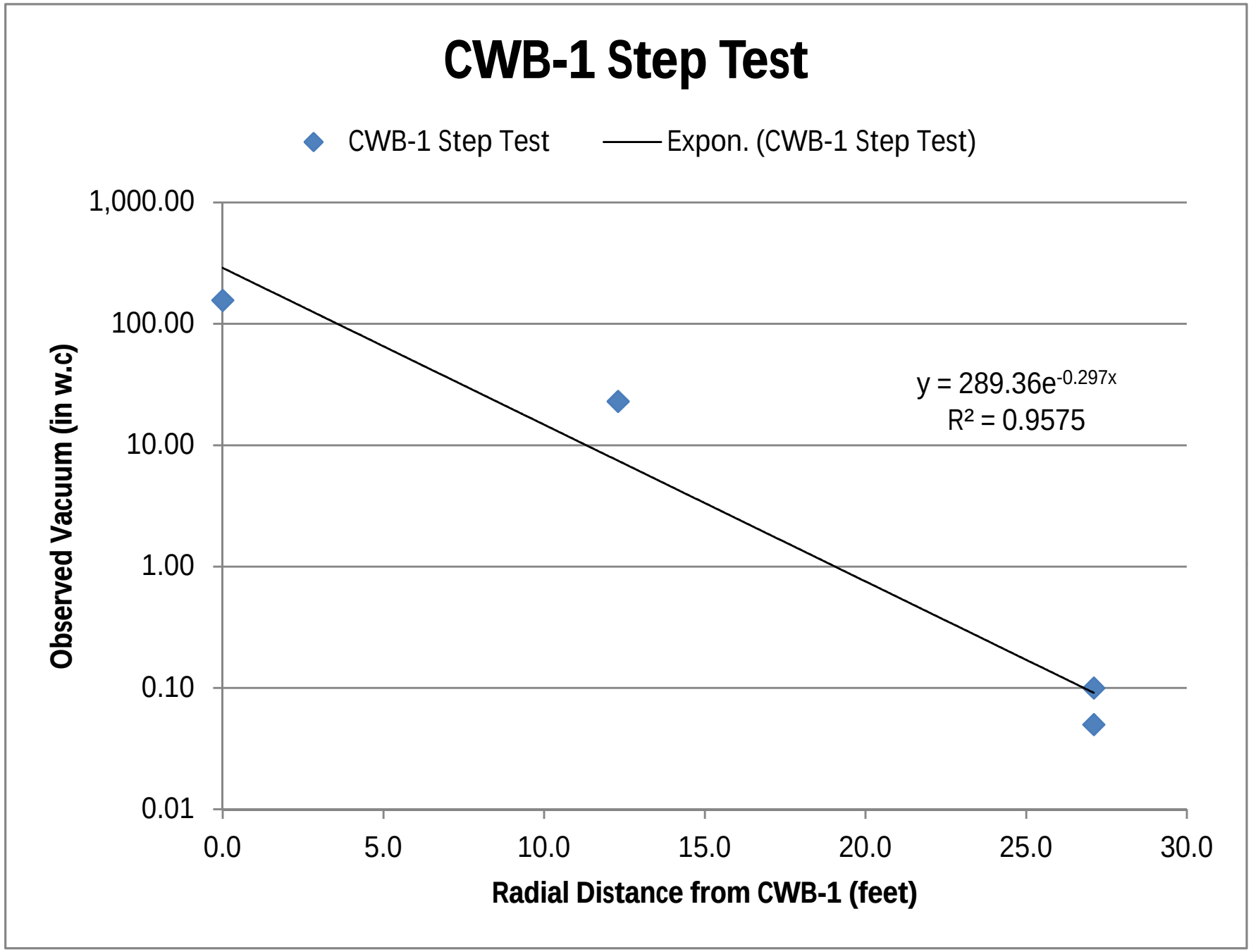
1

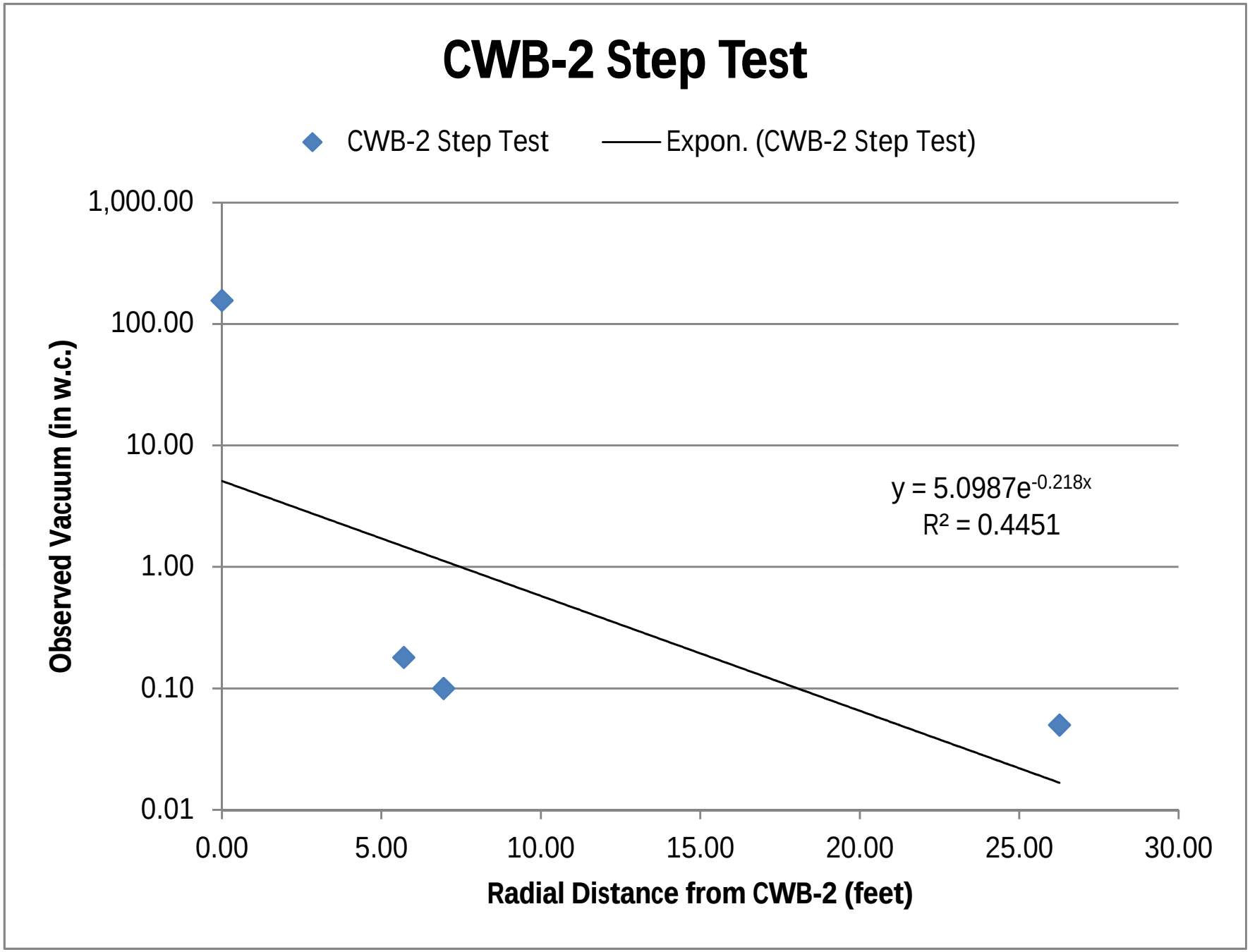
ARCADIS

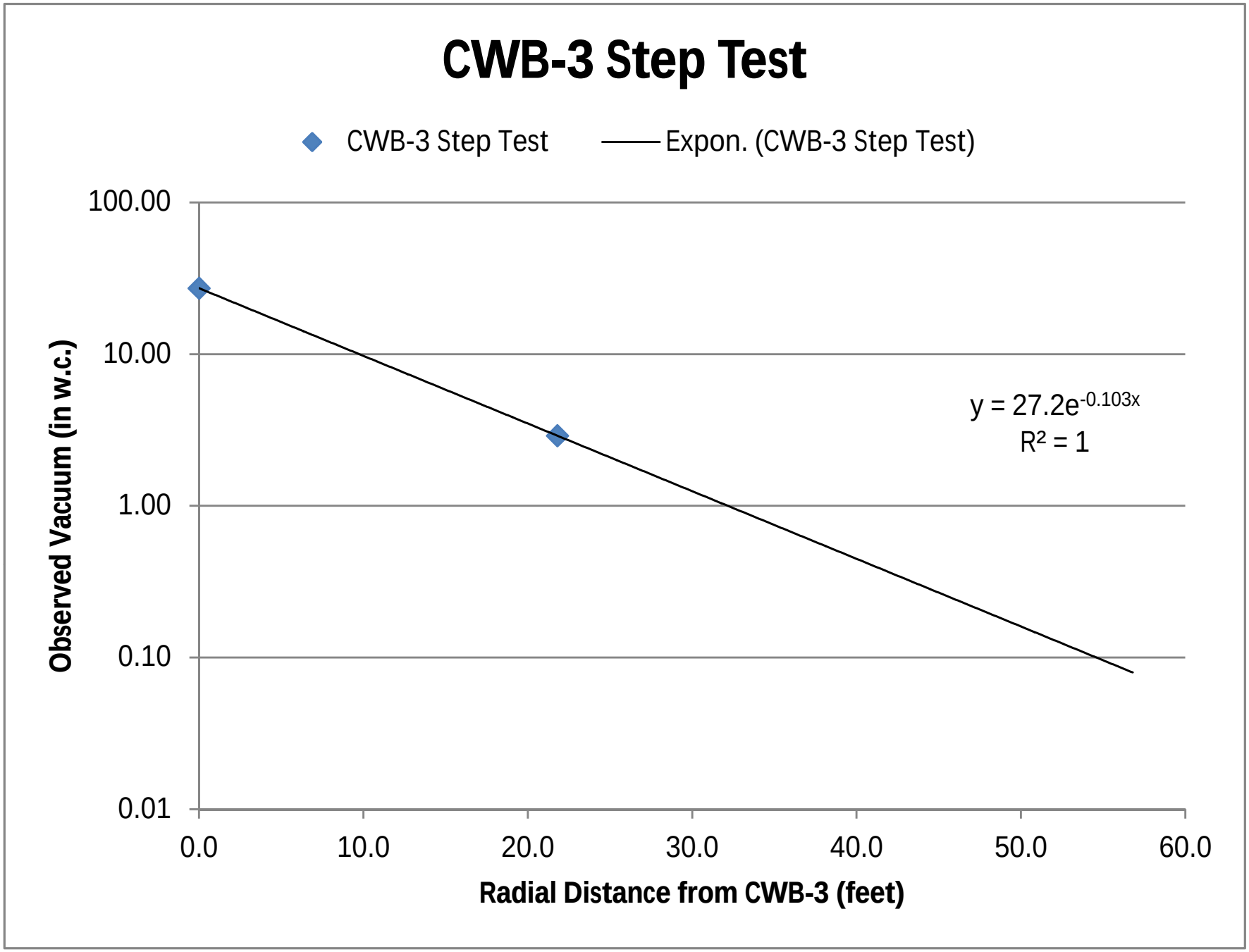
**Attachment 1**

Graphical ROI Determination


CWA-2 Step Test
CWA-2 Step Test
Expon. (CWA-2 Step Test)
1,000.00
100.00
10.00
1.00
0.10
0.01
0.00
Observed Vacuum (in w.c.)
y = 41.313e-0.19x
R² = 0.6912
0.0
10.0
20.0
30.0
40.0
50.0
Radial Distance from CWA-2 (feet)


CWB-1 Step Test
CWB-1 Step Test
Expon. (CWB-1 Step Test)
1,000.00
100.00
10.00
1.00
0.10
0.01
Observed Vacuum (in w.c)
y = 289.36e-0.297x
R² = 0.9575
0.0
5.0
10.0
15.0
20.0
25.0
30.0
Radial Distance from CWB-1 (feet)


CWB-2 Step Test
CWB-2 Step Test
Expon. (CWB-2 Step Test)
1,000.00
100.00
10.00
1.00
0.10
0.01
Observed Vacuum (in w.c.)
y = 5.0987e-0.218x
R² = 0.4451
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Radial Distance from CWB-2 (feet)


CWB-3 Step Test
CWB-3 Step Test
Expon. (CWB-3 Step Test)
100.00
10.00
1.00
0.10
0.01
Observed Vacuum (in w.c.)
y = 27.2e-0.103x
R² = 1
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Radial Distance from CWB-3 (feet)