

Appendix B
for the
Engineering Evaluation/Cost Analysis
Revised and Updated 2010
for the
Twins Inn Site
Arvada, Colorado



U.S EPA, Region 8

Appendix B

Cost Assumptions and RACER™ Output to Support EE/CA

Twins Inn Site

16 August 2010

Alternate Water Supply and Institutional Controls

**Alternate Water Supply and Institutional Controls
Summary of Present Value Analysis
Twins Inn Groundwater
Arvada, Colorado**

	Present Value Costs*
Capital	\$303,000
LTM	\$225,000
Periodic	\$58,000
Total	\$586,000

* 7% discount factor used, as explained in footnotes on the 'Present Value' tab. Cost rounded to nearest \$1,000.

Cost Details¹

Capital

Description in RACER	Notes	Capital Cost (2010 dollars)
Remedial Design	Calculated as 20% of total pre-markup capital cost.	\$34,414
User-Defined Estimate (Fees)	User-defined estimate for tap fees and costs for disconnect/reconnect, which are not included in the RACER database. Costs based on vendor or city quotes and were marked-up by RACER.	\$86,190
User-Defined Estimate (Pothole/Drill/Survey)	User-defined estimate for site reconnaissance, potholing of utilities, geotechnical drilling, and surveying. These costs were based on vendor quotes or engineering estimates that were then marked-up by RACER.	\$46,454
User-Defined Estimate (Service Lines)	User-defined estimate for mob/demob of field crew and installing service lines between the water main and the four businesses. Costs for service lines were based on vendor quotes or engineering estimates that were then marked-up by RACER. Includes costs for pea gravel bedding.	\$31,810
Excavation	Excavation in four locations to expose water main for tapping. Assumes no clearing or grubbing necessary prior to excavation based on aerial photographs.	\$4,766
Cleanup and Landscaping	Cleanup and landscaping in areas of trenching and excavation. Also includes asphalt repaving and curb replacement in areas of excavation or trenching within street.	\$2,856
Professional Labor Management (PLM)	Calculated as percentage of total capital cost using RACER formula. RACER PLM technology not utilized because RACER 10.3 does not recognize user-defined estimates as capital costs. Includes oversight of field work and coordination/meetings with city.	\$34,081
Institutional Controls (Implementation)	Implementation of ICs; derived from "implementation" element of ICs technology detail report from RACER	\$62,616
Sub-Total		\$303,187

LTM

Description in RACER	Notes	Unit Cost (2010 dollars)
Monitoring	Monitoring of 29 wells for VOCs. RACER cost derived for a single (unit) sampling event. Sampling frequency assumed to be annual for Years 0 through 4 and every five years at Years 9, 14, and 19. Assumes that site is closed out after Year 20.	\$34,278
Residual Waste Management	Unit cost for transportation and disposal of drummed purge water for each monitoring event.	\$5,945
Sub-Total		Not applicable

Periodic

Description in RACER	Notes	Unit Cost (2010 dollars)
Five-Year Review	Costs incur every five years and include site inspection and report generation. RACER cost derived for a single (unit) event. Assumes that site is closed out after Year 20; no costs for project close-out are included in this estimate.	\$20,821
Sub-Total		Not applicable

Close-Out Costs (periodic costs in Year 20 of project)

Description in RACER	Notes	Unit Cost (2010 dollars)
Well Abandonment	Abandonment of 29 monitoring wells.	\$25,053
Close-Out Documentation	Scoping meeting, work plan, close-out report, regulatory review meeting, and decision document.	\$38,927
Sub-Total		\$63,980

1. Refer to RACER technology cost detail reports for derivation of costs.

**Alternate Water Supply and Institutional Controls
Present Value Analysis
Twins Inn Groundwater
Arvada, Colorado**

$$PV_{total} = \sum_{t=1}^{t=n} \frac{x_t}{(1+i)^t}$$

PV = present value
t = time, year
x = annual cost
i = discount rate

Discount Rate¹ = 7.0%
Present Value = \$586,000

Year	Fiscal Year	Capital Cost ²	LTM Cost ³	Periodic Cost ⁴	Annual Cost	Discount Factor	Present Value ⁵			
							Capital Cost	LTM Cost	Periodic Cost	Total Present Value
0	2011	303,187	40,223	-	343,410	1.000	303,187	40,223	-	343,410
1	2012	-	40,223	-	40,223	0.935	-	37,592	-	37,592
2	2013	-	40,223	-	40,223	0.873	-	35,132	-	35,132
3	2014	-	40,223	-	40,223	0.816	-	32,834	-	32,834
4	2015	-	40,223	20,821	61,044	0.763	-	30,686	15,884	46,570
5	2016	-	-	-	-	0.713	-	-	-	-
6	2017	-	-	-	-	0.666	-	-	-	-
7	2018	-	-	-	-	0.623	-	-	-	-
8	2019	-	-	-	-	0.582	-	-	-	-
9	2020	-	40,223	20,821	61,044	0.544	-	21,879	11,325	33,204
10	2021	-	-	-	-	0.508	-	-	-	-
11	2022	-	-	-	-	0.475	-	-	-	-
12	2023	-	-	-	-	0.444	-	-	-	-
13	2024	-	-	-	-	0.415	-	-	-	-
14	2025	-	40,223	20,821	61,044	0.388	-	15,599	8,075	23,674
15	2026	-	-	-	-	0.362	-	-	-	-
16	2027	-	-	-	-	0.339	-	-	-	-
17	2028	-	-	-	-	0.317	-	-	-	-
18	2029	-	-	-	-	0.296	-	-	-	-
19	2030	-	40,223	20,821	61,044	0.277	-	11,122	5,757	16,879
20	2031	-	-	63,980	63,980	0.258	-	-	16,534	16,534
21	2032	-	-	-	-	0.242	-	-	-	-
22	2033	-	-	-	-	0.226	-	-	-	-
23	2034	-	-	-	-	0.211	-	-	-	-
24	2035	-	-	-	-	0.197	-	-	-	-
25	2036	-	-	-	-	0.184	-	-	-	-
26	2037	-	-	-	-	0.172	-	-	-	-
27	2038	-	-	-	-	0.161	-	-	-	-
28	2039	-	-	-	-	0.150	-	-	-	-
29	2040	-	-	-	-	0.141	-	-	-	-
TOTAL		303,000	322,000	147,000	772,000		303,000	225,000	58,000	586,000

¹ Real discount rate taken from *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 540-R-00-002, July 2000) which states "A real discount rate of 7% should generally be used for all non-Federal facility sites."

² Capital costs include design, excavation of water main, trenching and installation of service lines to four businesses, tap fees, site restoration, implementation of institutional controls, and other costs.

³ LTM costs include costs for groundwater monitoring and residual waste (purge water) management at frequencies described in the "LTM" section on the "Present Value Summary" tab.

⁴ Periodic costs consist of five-year reviews and costs for project close-out activities, such as well abandonment and amending the decision document.

⁵ First-year costs (not costs escalated over time) are used as inputs in the present worth calculation per *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 540-R-00-002, July 2000).

Phase Technology Cost Detail Report (with Markups)

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

<u>Location Modifier</u>	<u>Default</u>	<u>User</u>
	1.042	1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four

Phase Technology Cost Detail Report (with Markups)

businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Phase Technology Cost Detail Report (with Markups)

Site:

Site ID: Twins Inn
Site Name: Twins Inn, Arvada, CO
Site Type: None

Media/Waste Type

Primary: Groundwater
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

Phase Technology Cost Detail Report (with Markups)

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Jeremy Cox

Estimator Title: Environmental Engineer

Agency/Org./Office: URS Corporation

Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107

Telephone Number: 801-904-4000

Email Address: jeremy_cox@urscorp.com

Estimate Prepared Date: 06/08/2010

Estimator Signature: _____ **Date:** _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ **Date:** _____

Phase Technology Cost Detail Report (with Markups)

Phase:

Phase Type: Design Percent Method
Phase Name: Design
Description: Estimated design costs for alternative water supply under "Alternate Water Supply and Institutional Controls" alternative for Twins Inn. Uses an assumed percentage of 20% of the total capital cost for the project.

Total Capital Costs are the marked up costs for the items listed below, excluding the Professional Labor Management, Administrative Land Use Controls, and Operations and Maintenance technologies. Only the first year costs are included for cost-over-time technologies.

Phase Name	Phase Date	Design Approach	Total Capital Cost	Design %	Design Costs	Design Cost Year
Removal Action	October, 2010	Ex Situ Removal - Detailed Design On-site Treatment or Disposal	\$172,072	20.00	\$34,414	2010

Phase Technology Cost Detail Report (with Markups)

Technology: Design Costs

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
32032001	Remedial Design Professional Labor	1.00	EA	0.00	34,414.00	0.00	0.00	\$34,414.00	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$34,414.00		
Total 1st Year Technology Cost								\$34,414.00		
Total Phase Cost								\$34,414.00		

Phase Technology Cost Detail Report (with Markups)

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

<u>Location Modifier</u>	<u>Default</u>	<u>User</u>
	1.042	1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four

Phase Technology Cost Detail Report (with Markups)

businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Phase Technology Cost Detail Report (with Markups)

Site:

Site ID: Twins Inn
Site Name: Twins Inn, Arvada, CO
Site Type: None

Media/Waste Type

Primary: Groundwater
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

Phase Technology Cost Detail Report (with Markups)

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Jeremy Cox

Estimator Title: Environmental Engineer

Agency/Org./Office: URS Corporation

Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107

Telephone Number: 801-904-4000

Email Address: jeremy_cox@urscorp.com

Estimate Prepared Date: 06/08/2010

Estimator Signature: _____ **Date:** _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ **Date:** _____

Phase Technology Cost Detail Report (with Markups)

Phase:

Phase Type: Removal/Interim Action
Phase Name: Removal Action
Description: Estimated costs for alternate water supply under "Alternate Water Supply and Institutional Controls" alternative for Twins Inn.

Approach: None

Start Date: October, 2010

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

	<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
Excavation	Yes	100	0
Cleanup and Landscaping	Yes	100	0
USER DEFINED ESTIMATE (FEES)	Yes	100	0
USER DEFINED ESTIMATE (SERVICE LINES)	Yes	100	0
USER DEFINED ESTIMATE (POTHOLE/DRILL/SURVEY)	Yes	100	0

Phase Technology Cost Detail Report (with Markups)

Technology: Excavation

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
17030205	Curb/Sidewalk Excavation & Backfill, 27% Haul Spoil, 1 Mile	10.00	CY	0.00	7.86	3.94	0.00	\$118.04	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17030276	Excavate and load, bank measure, medium material, 3/4 C.Y. bucket, hydraulic excavator	156.00	BCY	0.00	3.61	1.44	0.00	\$788.14	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17030439	Standby Wheel Mounted 0.7 CY Hydraulic Excavator	16.00	HR	0.00	0.00	62.78	0.00	\$1,004.46	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17030461	On-Site Backfill for Small Excavations and Trenches, Includes Compaction	163.00	ECY	0.00	15.36	1.56	0.59	\$2,855.43	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$4,766.07		
Total 1st Year Technology Cost								\$4,766.07		

Phase Technology Cost Detail Report (with Markups)

Technology: Cleanup and Landscaping

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
17040101	Cleaning Up, site debris clean up and removal	0.10	ACR	0.00	557.59	57.27	0.00	\$61.49	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18010206	Concrete Curb, 8" x 8"	120.00	LF	3.73	6.62	0.01	0.00	\$1,242.48	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18020302	Asphalt Pavement- 6" Base Course Layer, 3" Topping	20.00	SY	41.30	4.88	2.13	0.00	\$966.15	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18050101	Area Preparation, 67% Level & 33% Slope	0.01	ACR	0.00	20.76	31.59	0.00	\$0.52	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18050404	Sodding, Average CONUS (Continental U.S.)	0.01	ACR	46,591.10	7,753.07	391.55	0.00	\$547.36	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18050408	Fertilizer, Hydro Spread	0.01	ACR	163.24	85.24	38.33	0.00	\$2.87	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18050413	Watering with 3,000-Gallon Tank Truck, per Pass	0.08	ACR	287.48	48.16	60.80	0.00	\$31.72	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18050415	Mowing	0.01	ACR	0.00	319.11	0.00	0.00	\$3.19	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$2,855.76		
Total 1st Year Technology Cost								\$2,855.76		

Phase Technology Cost Detail Report (with Markups)

Technology: USER DEFINED ESTIMATE (FEES)

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33420406	Other Utility/Service Charge	4.00	LS	0.00	0.00	0.00	1,798.20	\$7,192.80	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
33440302	Other Cost (Lump Sum)	1.00	LS	0.00	0.00	0.00	78,997.00	\$78,997.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Total Element Cost								\$86,189.80		
Total 1st Year Technology Cost								\$86,189.80		

Phase Technology Cost Detail Report (with Markups)

Technology: USER DEFINED ESTIMATE (SERVICE LINES)

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33010114	Mobilization Equipment (Soils)	1.00	LS	0.00	2,385.06	2,535.82	0.00	\$4,920.87	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33010115	Demobilize Equipment (Soils)	1.00	LS	0.00	2,385.06	2,535.82	0.00	\$4,920.87	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33061042	Pea Gravel	16.00	CY	123.93	11.39	4.76	0.00	\$2,241.22	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33231190	Trenching for Horizontal Well Installation	650.00	LF	0.00	30.34	0.00	0.00	\$19,724.01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$31,806.97		
Total 1st Year Technology Cost								\$31,806.97		

Phase Technology Cost Detail Report (with Markups)

Technology: USER DEFINED ESTIMATE (POTHOLE/DRILL/SURVEY)

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33010101	Mobilize/DeMobilize Drilling Rig & Crew	1.00	LS	0.00	5,244.75	0.00	0.00	\$5,244.75	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
33022609	Underground Utility Review prior to Intrusive Sampling	1.00	EA	0.00	22,477.50	0.00	0.00	\$22,477.50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
33220206	Survey Preparation	1.00	LS	0.00	11,238.75	0.00	0.00	\$11,238.75	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
33240101	Other Direct Costs	1.00	LS	0.00	7,492.50	0.00	0.00	\$7,492.50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$46,453.50		
Total 1st Year Technology Cost								\$46,453.50		
Total Phase Cost								\$172,072.10		

Phase Technology Cost Detail Report (with Markups)

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

<u>Location Modifier</u>	<u>Default</u>	<u>User</u>
	1.042	1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four

Phase Technology Cost Detail Report (with Markups)

Site:

Site ID: Twins Inn
Site Name: Twins Inn, Arvada, CO
Site Type: None

Media/Waste Type

Primary: Groundwater
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

Phase Technology Cost Detail Report (with Markups)

businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Phase Technology Cost Detail Report (with Markups)

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Jeremy Cox

Estimator Title: Environmental Engineer

Agency/Org./Office: URS Corporation

Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107

Telephone Number: 801-904-4000

Email Address: jeremy_cox@urscorp.com

Estimate Prepared Date: 06/08/2010

Estimator Signature: _____ **Date:** _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ **Date:** _____

Phase Technology Cost Detail Report (with Markups)

Phase:

Phase Type: Long Term Monitoring
Phase Name: Long-Term Monitoring
Description: Estimated costs for groundwater monitoring, institutional controls, and five-year reviews under "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA.

Start Date: October, 2010

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

	<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
MONITORING	Yes	100	0
Residual Waste Management	Yes	100	0
Five-Year Review	Yes	100	0
INSTITUTIONAL CONTROLS	Yes	100	0

Note: Institutional Controls are shown in the
Capital Costs section of the summary spreadsheet.

Phase Technology Cost Detail Report (with Markups)

Technology: MONITORING

Element: Groundwater

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33020401	Disposable Materials per Sample	42.00	EA	13.40	0.00	0.00	0.00	\$562.95	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33020402	Decontamination Materials per Sample	42.00	EA	17.49	0.00	0.00	0.00	\$734.72	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33020561	Lysimeter accessories, nylon tubing, 1/4" OD	750.00	LF	0.20	0.00	0.00	0.00	\$152.24	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33021509	Monitor well sampling equipment, rental, water quality testing parameter device rental	1.00	WK	0.00	0.00	0.00	374.74	\$374.74	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33021618	Testing, purgeable organics (624, 8260)	42.00	EA	0.00	0.00	0.00	158.70	\$6,665.59	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33022124	Testing, RCRA evaluations, EP toxicity analysis, metals (6010,7470)	1.00	EA	0.00	0.00	0.00	145.96	\$145.96	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220102	Project Manager	6.00	HR	0.00	184.18	0.00	0.00	\$1,105.10	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220112	Field Technician	90.00	HR	0.00	110.49	0.00	0.00	\$9,944.35	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33230614	Peristaltic Pump, Weekly Rental	1.00	WK	0.00	0.00	0.00	89.53	\$89.53	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$19,775.17		

Element: Data Management

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220102	Project Manager	7.00	HR	0.00	184.18	0.00	0.00	\$1,289.28	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Phase Technology Cost Detail Report (with Markups)

Element: Data Management

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220108	Project Scientist	43.00	HR	0.00	186.58	0.00	0.00	\$8,023.06	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220110	QA/QC Officer	3.00	HR	0.00	184.81	0.00	0.00	\$554.44	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220112	Field Technician	8.00	HR	0.00	110.49	0.00	0.00	\$883.94	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	8.00	HR	0.00	95.00	0.00	0.00	\$759.97	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	8.00	HR	0.00	104.26	0.00	0.00	\$834.09	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33240101	Other Direct Costs	1.00	LS	166.28	0.00	0.00	0.00	\$166.28	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$12,511.07		

Element: General Monitoring

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33010104	Sample collection, vehicle mileage charge, car or van	40.00	MI	0.00	0.00	0.00	0.58	\$23.20	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33022043	Overnight delivery service, 51 to 70 lb packages	180.00	LB	0.00	0.00	0.00	4.80	\$863.41	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220112	Field Technician	10.00	HR	0.00	110.49	0.00	0.00	\$1,104.93	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$1,991.54		
Total 1st Year Technology Cost								\$34,277.78		

Phase Technology Cost Detail Report (with Markups)

Technology: Residual Waste Management

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33190103	Load Drums on Disposal Vehicle	14.00	EA	0.00	7.20	2.22	0.00	\$131.84	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33190104	Load Bulk Liquid/Sludge Waste Into 55 Gallon Drums, Drums Separate	14.00	EA	0.00	67.98	32.68	0.00	\$1,409.17	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33190204	Transport 55 Gallon Drums of Hazardous Waste, Max 80 drums (per Mile)	20.00	MI	0.00	0.00	0.00	2.40	\$47.97	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33190317	Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1.00	EA	0.00	0.00	0.00	599.10	\$599.10	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33190402	DOT steel drums, 55 gal., open only, 17H	14.00	EA	137.22	0.00	0.00	0.00	\$1,921.07	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33197205	Landfill Nonhazardous Solid Waste, 55 Gallon Drum	14.00	EA	0.00	0.00	0.00	131.16	\$1,836.25	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$5,945.39		
Total 1st Year Technology Cost								\$5,945.39		

Phase Technology Cost Detail Report (with Markups)

Technology: Five-Year Review

Element: Document Review

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220102	Project Manager	8.00	HR	0.00	184.18	0.00	0.00	\$1,473.46	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220105	Project Engineer	9.00	HR	0.00	163.97	0.00	0.00	\$1,475.73	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220108	Project Scientist	7.00	HR	0.00	186.58	0.00	0.00	\$1,306.08	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220109	Staff Scientist	13.00	HR	0.00	106.62	0.00	0.00	\$1,386.04	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$5,641.32		

Element: Interviews

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220102	Project Manager	11.00	HR	0.00	184.18	0.00	0.00	\$2,026.01	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$2,026.01		

Element: Site Inspection

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220102	Project Manager	5.00	HR	0.00	184.18	0.00	0.00	\$920.91	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220105	Project Engineer	7.00	HR	0.00	163.97	0.00	0.00	\$1,147.79	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220108	Project Scientist	7.00	HR	0.00	186.58	0.00	0.00	\$1,306.08	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220109	Staff Scientist	8.00	HR	0.00	106.62	0.00	0.00	\$852.95	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$4,227.74		

Phase Technology Cost Detail Report (with Markups)

Element: Report

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220102	Project Manager	6.00	HR	0.00	184.18	0.00	0.00	\$1,105.10	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220105	Project Engineer	16.00	HR	0.00	163.97	0.00	0.00	\$2,623.53	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220108	Project Scientist	13.00	HR	0.00	186.58	0.00	0.00	\$2,425.58	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220109	Staff Scientist	26.00	HR	0.00	106.62	0.00	0.00	\$2,772.09	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$8,926.29		
Total 1st Year Technology Cost								\$20,821.35		

Phase Technology Cost Detail Report (with Markups)

Technology: INSTITUTIONAL CONTROLS

Element: Implementation

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33022037	Overnight Delivery, 8 oz Letter	64.00	EA	0.00	0.00	0.00	14.67	\$938.56	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33040671	Portable GPS Set with Mapping, 5 cm Accuracy	1.00	MO	1,090.82	0.00	0.00	0.00	\$1,090.82	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220102	Project Manager	25.00	HR	0.00	151.03	0.00	0.00	\$3,775.74	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220105	Project Engineer	30.00	HR	0.00	134.46	0.00	0.00	\$4,033.68	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220106	Staff Engineer	45.00	HR	0.00	178.17	0.00	0.00	\$8,017.63	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220110	QA/QC Officer	8.00	HR	0.00	151.55	0.00	0.00	\$1,212.38	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	82.00	HR	0.00	77.90	0.00	0.00	\$6,387.59	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	38.00	HR	0.00	85.49	0.00	0.00	\$3,248.76	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220213	Surveying - 3-man Crew	8.00	DAY	0.00	1,080.51	21.61	0.00	\$8,817.00	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220505	Attorney, Senior Associate, Real Estate	80.00	HR	0.00	233.07	0.00	0.00	\$18,645.65	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220509	Paralegal, Real Estate	64.00	HR	0.00	57.67	0.00	0.00	\$3,691.03	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33240101	Other Direct Costs	1.00	LS	359.32	0.00	0.00	0.00	\$359.32	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
33990111	Local Fees	8.00	LS	299.70	0.00	0.00	0.00	\$2,397.60	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$62,615.75		
Total 1st Year Technology Cost								\$62,615.75		
Total Phase Cost								\$123,660.27		

Phase Technology Cost Detail Report (with Markups)

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

<u>Location Modifier</u>	<u>Default</u>	<u>User</u>
	1.042	1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four

Phase Technology Cost Detail Report (with Markups)

businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Phase Technology Cost Detail Report (with Markups)

Site:

Site ID: Twins Inn
Site Name: Twins Inn, Arvada, CO
Site Type: None

Media/Waste Type

Primary: Groundwater
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

Phase Technology Cost Detail Report (with Markups)

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Jeremy Cox

Estimator Title: Environmental Engineer

Agency/Org./Office: URS Corporation

Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107

Telephone Number: 801-904-4000

Email Address: jeremy_cox@urscorp.com

Estimate Prepared Date: 06/08/2010

Estimator Signature: _____ **Date:** _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ **Date:** _____

Phase Technology Cost Detail Report (with Markups)

Phase:

Phase Type: Site Closeout
Phase Name: Project Close-Out
Description: Estimated costs for project close-out for Twins Inn site. Assumed to occur in approximately 2030.

Start Date: October, 2030

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

	<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
Site Close-Out Documentation	Yes	100	0
Well Abandonment	Yes	100	0

Phase Technology Cost Detail Report (with Markups)

Technology: Site Close-Out Documentation

Element: Meetings

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220102	Project Manager	16.00	HR	0.00	184.18	0.00	0.00	\$2,946.92	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220106	Staff Engineer	17.00	HR	0.00	217.28	0.00	0.00	\$3,693.76	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	5.00	HR	0.00	95.00	0.00	0.00	\$474.98	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	2.00	HR	0.00	104.26	0.00	0.00	\$208.52	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$7,324.19		

Element: Work Plans & Reports

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220101	Senior Project Manager	9.00	HR	0.00	243.60	0.00	0.00	\$2,192.38	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220102	Project Manager	48.00	HR	0.00	184.18	0.00	0.00	\$8,840.77	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220104	Senior Staff Engineer	5.00	HR	0.00	243.77	0.00	0.00	\$1,218.83	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220109	Staff Scientist	3.00	HR	0.00	106.62	0.00	0.00	\$319.86	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	45.00	HR	0.00	95.00	0.00	0.00	\$4,274.86	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$16,846.69		

Element: Documents

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220101	Senior Project Manager	4.00	HR	0.00	243.60	0.00	0.00	\$974.39	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220102	Project Manager	13.00	HR	0.00	184.18	0.00	0.00	\$2,394.37	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220104	Senior Staff Engineer	4.00	HR	0.00	243.77	0.00	0.00	\$975.06	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Phase Technology Cost Detail Report (with Markups)

Element: Documents

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220106	Staff Engineer	37.00	HR	0.00	217.28	0.00	0.00	\$8,039.36	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	14.00	HR	0.00	95.00	0.00	0.00	\$1,329.96	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	10.00	HR	0.00	104.26	0.00	0.00	\$1,042.61	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$14,755.75		
Total 1st Year Technology Cost								\$38,926.62		

Phase Technology Cost Detail Report (with Markups)

Technology: Well Abandonment

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33010101	Mobilize/DeMobilize Drilling Rig & Crew	1.00	LS	0.00	1,899.01	1,111.34	0.00	\$3,010.35	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220112	Field Technician	48.00	HR	0.00	110.49	0.00	0.00	\$5,303.65	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33231178	Move Rig/Equipment Around Site	29.00	EA	118.51	272.98	159.76	0.00	\$15,986.29	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33231820	Grout Continuous Borehole	81.00	CF	9.29	0.00	0.00	0.00	\$752.53	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$25,052.83		
Total 1st Year Technology Cost								\$25,052.83		
Total Phase Cost								\$63,979.45		

Estimate Documentation Report

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

<u>Location Modifier</u>	<u>Default</u>	<u>User</u>
	1.042	1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Estimate Documentation Report

Site Documentation:

Site ID: Twins Inn
Site Name: Twins Inn, Arvada, CO
Site Type: None

Media/Waste Type

Primary: Groundwater
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Jeremy Cox
Estimator Title: Environmental Engineer
Agency/Org./Office: URS Corporation
Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107
Telephone Number: 801-904-4000
Email Address: jeremy_cox@urscorp.com
Estimate Prepared Date: 06/08/2010

Estimator Signature: _____

Date: _____

Estimate Documentation Report

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ Date: _____

Estimated Costs:

<u>Phase Names</u>	<u>Direct Cost</u>	<u>Marked-up Cost</u>
Design	\$0	\$34,414
Removal Action	\$142,325	\$172,072
Long-Term Monitoring	\$62,300	\$123,660
Project Close-Out	\$29,083	\$63,979
Total Cost:		\$394,126

Estimate Documentation Report

Phase Documentation:

Phase Type: Design Percent Method
Phase Name: Design
Description: Estimated design costs for alternative water supply under "Alternate Water Supply and Institutional Controls" alternative for Twins Inn. Uses an assumed percentage of 20% of the total capital cost for the project.

Total Capital Costs are the marked up costs for the items listed below, excluding the Professional Labor Management, Administrative Land Use Controls, and Operations and Maintenance technologies. Only the first year costs are included for cost-over-time technologies.

Phase Name	Phase Date	Design Approach	Total Capital Cost	Design %	Design Costs	Design Cost Year
Removal Action	October, 2010	Ex Situ Removal - Detailed Design On-site Treatment or Disposal	\$172,072	20.00	\$34,414	2010

Total Design Cost: \$34,414

Estimate Documentation Report

Phase Documentation:

Phase Type: Removal/Interim Action

Phase Name: Removal Action

Description: Estimated costs for alternate water supply under "Alternate Water Supply and Institutional Controls" alternative for Twins Inn.

Approach: None

Start Date: October, 2010

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

	<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
Excavation	Yes	100	0
Cleanup and Landscaping	Yes	100	0
USER DEFINED ESTIMATE (FEES)	Yes	100	0
USER DEFINED ESTIMATE (SERVICE LINES)	Yes	100	0
USER DEFINED ESTIMATE (POTHOLE/DRILL/SURVEY)	Yes	100	0

Total Marked-up Cost: \$172,072

Technologies:

Estimate Documentation Report

Technology Name: Excavation (# 1)

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Estimating Method		Area / Depth	n/a
Area		0.01	AC
Depth		6	FT
Soil Type		Sand-Silt/Sand-Clay Mixture	n/a
Safety Level		E	n/a
Excavation			
<u>Secondary Parameters</u>			
Existing Cover	Soil/Gravel	Soil/Gravel	n/a
Replacement Cover	Soil/Seeding	Soil/Seeding	n/a
Sidewall Protection	Side Sloping	Side Sloping	n/a
Rise : Run	1	1	n/a
% of Excavated Material To Be Used as Backfill	38	100	%
Source of Additional Fill	Off Site	Off Site	n/a
Backfill Hauling Distance (one way)	10	10	MI
Dewatering Required	No	No	n/a
Analytical			
<u>Secondary Parameters</u>			
Primary Analytical Template	System Soil - VOCs	None	n/a
Secondary Analytical Template	None	None	n/a

Comments: Estimated costs for excavation in four locations to expose water main for tapping. Depth assumed to be six feet (the maximum depth of the water main) to allow the main to be wrapped prior to tapping per Denver Water regulations. Each of the four areas was assumed to be approximately 10 feet by 10 feet plus side sloping. Deleted RACER default seeding after excavation, which was addressed in cleanup and landscaping technology. Manually added excavation and off-site disposal of concrete curb (volume approximate), replacement and compaction of excavated soil (assumes 15% expansion upon excavation), and standby charges for excavator (assumed sixteen hours over two days during tapping for the four locations). Used RACER default values for all other parameters. Based on aerial photograph of the site, no clearing or grubbing assumed to be necessary prior to excavation.

Estimate Documentation Report

Technology Name: Cleanup and Landscaping (# 1)

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Type of Site Preparation	Cleanup and Landscape		n/a
Preparation Area		0.1	AC
Safety Level		E	n/a
Cleanup			
<u>Secondary Parameters</u>			
Cleanup Type	Area Cleanup	Area Cleanup	n/a
Cleanup Area	100	100	%
Landscaping			
<u>Secondary Parameters</u>			
Landscaping Type	Seeding	Sodding	n/a
Landscaping Area	100	10	%

Comments: Estimated costs for cleanup and landscaping in areas of trenching and excavation. Assumes approximately 4,360 sf of cleanup and approximately 436 sf of sodding in excavation areas around water main. Manually added 20 SY (estimated quantity) of asphalt repaving in areas of trenching within street and 160 LF (estimated quantity) of curb replacement for areas of excavation or trenching across existing curbs.

Technology Name: User Defined Estimate (# 1)
User Name: USER DEFINED ESTIMATE (FEES)

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Model Name		USER DEFINED ESTIMATE (FEES)	n/a
WBS Type		ECES	n/a
Selected WBS		4.05.26	n/a
Safety Level		D	n/a

Comments: User-defined estimate for tap fees and costs for disconnect/reconnect, which are not included in the RACER database. Costs based on vendor or city quotes and assume \$1,500 per business for disconnect from well water and reconnect to municipal water and a total of \$78,997 for tap fees (\$16,928 for each of three businesses requiring a 3/4" connection, and \$28,213 for one business requiring a 1" connection). RACER applied a default 19.9% markup to the disconnect / reconnect fee. The tap fees were entered into RACER as a lump sum, so no markup was applied.

Estimate Documentation Report

Technology Name: User Defined Estimate (# 2)
User Name: USER DEFINED ESTIMATE (SERVICE LINES)

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Model Name		USER DEFINED ESTIMATE (SERVICE LINES)	n/a
WBS Type		ECES	n/a
Selected WBS		4.05.26	n/a
Safety Level		D	n/a

Comments: User-defined estimate for mob/demob and installing service lines between the water main and the four businesses. Assumes total length of 650 linear feet. RACER can estimate the costs for the trenching involved in this task, but does not contain unit costs for the copper piping required by Denver Water for drinking water laterals from mains. Vendor quote / engineer's estimate entered into RACER as \$20.25 per linear foot (pre-markup) to approximate the cost averaged over the 3/4" and 1" lines. RACER applied a default 49.85% markup to the estimated unit cost. RACER unit costs for mob/demob were utilized. Also assumed that pea gravel would be used as bedding for the piping. Assumed trench length of 650 feet, width of two feet, and a thickness of approximately four inches, for a total of 433 cubic feet, or 16 cubic yards. Used RACER default pricing for the pea gravel. Assumes that the excess soil is spread over the site as part of cleanup and landscaping at no additional cost to the project.

Technology Name: User Defined Estimate (# 3)
User Name: USER DEFINED ESTIMATE (POTHOLE/DRILL/SURVEY)

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Model Name		USER DEFINED ESTIMATE (POTHOLE/DRILL/SURVEY)	n/a
WBS Type		ECES	n/a
Selected WBS		4.05.00	n/a
Safety Level		D	n/a

Comments: User-defined estimate for site reconnaissance, potholing of utilities, geotechnical drilling, and surveying. These items were not adequately defined in RACER, so vendor quotes or engineer estimates were inserted into RACER. "Other direct cost" used to represent site reconnaissance (\$5,000 before markup). "Underground utility review" was used to represent potholing of existing utilities (\$15,000 before markup). "Mobilize/demobilize drilling rig" was used to represent the geotechnical drilling (\$3,500 before markup). "Survey preparation" was used to represent the survey (\$7,500 before markup). RACER applied a default 49.85% markup to the estimated costs.

Estimate Documentation Report

Phase Documentation:

Phase Type: Long Term Monitoring
Phase Name: Long-Term Monitoring
Description: Estimated costs for groundwater monitoring, institutional controls, and five-year reviews under "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA.

Start Date: October, 2010
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markups: System Defaults

<u>Technology Markups</u>	<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
MONITORING	Yes	100	0
Residual Waste Management	Yes	100	0
Five-Year Review	Yes	100	0
INSTITUTIONAL CONTROLS	Yes	100	0

Total Marked-up Cost: \$123,660

Technologies:

Estimate Documentation Report

Technology Name: Monitoring (# 1)

User Name: MONITORING

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Model Name		MONITORING	n/a
Groundwater		Yes	n/a
Surface Soil		No	n/a
Surface Water		No	n/a
Subsurface Soil		No	n/a
Sediment		No	n/a
Soil Gas		No	n/a
Air		No	n/a
Site Distance (One-way)		20	MI
Safety Level		D	n/a
Groundwater			
<u>Required Parameters</u>			
Average Sample Depth		25	FT
Samples per Event (First Year)		29	n/a
Samples per Event (Out Years)		0	n/a
Number of Events (First Year)		1	n/a
Number of Events (Out Years)		0	n/a
Number of Years (Out Years)		0	n/a
<u>Secondary Parameters</u>			
Primary Analytical Template	System Water - VOCs	System Water - VOCs	n/a
Secondary Analytical Template	None	None	n/a
Turnaround Time	Standard (21 Days)	Standard (21 Days)	n/a
Data Package/QC	Stage 1	Stage 3	n/a
Sampling Method	Existing Wells - Low Flow Pump	Existing Wells - Low Flow Pump	n/a
Number of Wells/Day	8	8	EA
Contain Purge Water	Yes	Yes	n/a
QA/QC			
<u>Secondary Parameters</u>			
Split Samples	1: 10	1: 10	EA
Field Duplicate Samples	1: 10	1: 10	EA

Estimate Documentation Report

Technology Name: Monitoring (# 1)

User Name: MONITORING

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
QA/QC			
<u>Secondary Parameters</u>			
Rinse Blanks (per Round)	1	1	EA
Trip Blanks (per Day)	1	1	EA
Matrix Spikes/Matrix Spike Duplicates	1: 20	1: 20	EA
Data Management			
<u>Secondary Parameters</u>			
Monitoring Plan	Standard	None	n/a
Lab Data Review	Stage 3	Stage 3	n/a
Submit Data Electronically	Yes	Yes	n/a
Monitoring Reports	Standard	Standard	n/a

Comments: Estimated cost for one groundwater monitoring event at the Twins Inn site, including labor, analysis, and reporting. Assumes 29 wells are sampled for VOCs by Method 8260 and that samplers must travel approximately 20 miles to reach the site. No creation of a monitoring plan is included, since sampling will follow established protocols. Stage 3 data package from the laboratory included to enable data validation. RACER default settings used for all other parameters. The costs for monitoring events over time will be compiled in a separate present value spreadsheet.

Technology Name: Residual Waste Management (# 1)

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Safety Level		D	n/a
Non-Rad Disposal			
<u>Required Parameters</u>			
Waste Type / Condition		Non-Hazardous Drums	n/a
Total Quantity		14	Drums
Transportation Type		Truck	n/a
Truck Distance (One-way)		20	Miles

Comments: Estimated cost for transport and disposal of purge water from one monitoring event at Twins Inn site. Assumes purge water is classified as non-hazardous and is transported 20 miles for disposal. RACER default values used for all other parameters. The costs for residual waste management over time will be compiled in a separate present value spreadsheet.

Estimate Documentation Report

Technology Name: **Five-Year Review (# 1)**

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Site Complexity		Low	n/a
Document Review		Yes	n/a
Interviews		Yes	n/a
Site Inspection		Yes	n/a
Report		Yes	n/a
Travel		No	n/a
Rebound Study		No	n/a
Start Date		October-2015	n/a
No. Reviews		1	EA
Document Review			
<u>Required Parameters</u>			
5-Year Review Check List		Yes	n/a
Record of Decision		Yes	n/a
Remedial Action Design & Construction		Yes	n/a
Close-Out Report		No	n/a
Operations & Maintenance Manuals & Reports		No	n/a
Consent Decree or Settlement Records		Yes	n/a
Groundwater Monitoring & Reports		Yes	n/a
Remedial Action Required		Yes	n/a
Previous 5-Year Review Reports		Yes	n/a
Interviews			
<u>Required Parameters</u>			
Current and Previous Staff Management		Yes	n/a
Community Groups		Yes	n/a
State Contacts		Yes	n/a
Local Government Contacts		Yes	n/a
Operations & Maintenance Contractors		No	n/a
PRPs		Yes	n/a
Remedial Design Consultant		No	n/a
Site Inspection			
<u>Required Parameters</u>			

Estimate Documentation Report

Technology Name: **Five-Year Review (# 1)**

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
Site Inspection			
<u>Required Parameters</u>			
General Site Inspection		Yes	n/a
Containment System Inspection		No	n/a
Monitoring Systems Inspection		Yes	n/a
Treatment Systems Inspection		No	n/a
Regulatory Compliance		Yes	n/a
Site Visit Documentation (Photos, Diagrams, etc.)		Yes	n/a
Report			
<u>Required Parameters</u>			
Introduction		Yes	n/a
Remedial Objectives		Yes	n/a
ARARs Review		Yes	n/a
Summary of Site Visit		Yes	n/a
Areas of Non Compliance		Yes	n/a
Technology Recommendations		Yes	n/a
Statement of Protectiveness		Yes	n/a
Next Review		Yes	n/a
Implementation Requirements		Yes	n/a

Comments: Estimated unit cost for a five-year review of the remedy for the Twins Inn site. Assumes low complexity for site. Review of close-out report and O&M manuals and reports, interviews with O&M contractors and remedial design consultants, and inspection of containment / treatment systems do not apply to this alternative and were not included. RACER default values used for all other parameters. Costs over time for five-year reviews compiled in separate present value spreadsheet.

Estimate Documentation Report

Technology Name: Administrative Land Use Controls (# 1)

User Name: INSTITUTIONAL CONTROLS

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Rename Model		INSTITUTIONAL CONTROLS	n/a
Planning Documents		No	n/a
Implementation		Yes	n/a
Implementation: Start Date		2010	n/a
Monitoring & Enforcement		No	n/a
Modification/Termination		No	n/a
Type of Site		Private/Other	n/a

Implementation

Required Parameters

Modify Installation (or City) Master Plan		No	n/a
Deed Notification		Yes	n/a
Deed Notification: Number		4	EA
Deed Notification: Task Complexity		Medium	n/a
Negotiating Easements		Yes	n/a
Negotiating Easements: Number		4	EA
Negotiating Easements: Task Complexity		Medium	n/a
Restrictive Covenants		Yes	n/a
Restrictive Covenants: Number		4	EA
Restrictive Covenants: Task Complexity		Medium	n/a
Equitable Servitudes		Yes	n/a
Equitable Servitudes: Number		4	EA
Equitable Servitudes: Task Complexity		Medium	n/a
Access Control Signs		No	n/a
Utility Notification Service		Yes	n/a
Access Control Signs: Number		1	EA
Access Control Signs: Task Complexity		Low	n/a
Geographic Information Systems (GIS)/Overlay Maps		No	n/a
Develop Finding of Suitability to Transfer (FOST)		No	n/a

Comments: Estimated costs for implementing institutional controls for groundwater at Twins Inn site. Based on the site characteristics, implementation of ICs is assumed to consist of utility

Estimate Documentation Report

notification and legal activities (deed notification, negotiating easements for monitoring activities, restrictive covenants, and equitable servitudes) for four impacted properties. Assumes low complexity for utility notification and medium complexity for legal activities. Uses RACER default values for these parameters.

Estimate Documentation Report

Phase Documentation:

Phase Type: Site Closeout
Phase Name: Project Close-Out
Description: Estimated costs for project close-out for Twins Inn site. Assumed to occur in approximately 2030.

Start Date: October, 2030
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markups: System Defaults

Technology Markups

	<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
Site Close-Out Documentation	Yes	100	0
Well Abandonment	Yes	100	0

Total Marked-up Cost: \$63,979

Technologies:

Estimate Documentation Report

Technology Name: **Site Close-Out Documentation (# 1)**

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Meetings		Yes	n/a
Work Plans and Reports		Yes	n/a
Documents		Yes	n/a
Site Close-Out Complexity		Moderate	n/a
Meetings			
<u>Required Parameters</u>			
Kick Off/Scoping Meetings		Yes	n/a
Kick Off/Scoping Meetings: Number of Meetings	1	1	EA
Kick Off/Scoping Meetings: Travel		No	n/a
Review Meetings		No	n/a
Regulatory Review Meetings		Yes	n/a
Regulatory Review Meetings: Number of Meetings	1	1	EA
Regulatory Review Meetings: Travel		No	n/a
Work Plans & Reports			
<u>Required Parameters</u>			
Work Plans		Yes	n/a
Draft Work Plan		Yes	n/a
Final Work Plan		Yes	n/a
Reports		Yes	n/a
Draft Close-Out Report		No	n/a
Draft Final Close-Out Report		No	n/a
Final Close-Out Report		Yes	n/a
Progress Reports		No	n/a
Documents			
<u>Required Parameters</u>			
Draft Decision Document		Yes	n/a
Draft Final Decision Document		Yes	n/a
Final Decision Document		Yes	n/a
Long Term Document Storage		No	n/a

Comments: Estimated costs for project close-out. Assumes moderate complexity for site. Includes one scoping meeting, one regulatory review meeting, a work plan for well abandonment (abandonment is costed separately), a close-out report documenting well abandonment, and

Estimate Documentation Report

creation of a decision document to finalize site closure.

Technology Name: **Well Abandonment (# 1)**

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Safety Level		D	n/a
Abandon Wells			
<u>Required Parameters</u>			
Technology/Group Name		Well Group	n/a
Number of Wells		29	EA
Well Depth		35	FT
Well Diameter		4	IN
Well Abandonment Method		Abandon In-Place	n/a
Formation Type		Unconsolidated	n/a

Comments: Estimated costs for well abandonment as part of project close-out. Assumes 29 wells, each four inches in diameter, with an average total depth of 35 ft bgs. Wells are assumed to be abandoned in place (grouted). Uses RACER default values for all other parameters.

**Alternate Water Supply and Institutional Controls
 Summary of Present Value Analysis
 Twins Inn Soil
 Arvada, Colorado**

	Present Value Costs*
Capital	\$63,000
LTM	\$0
Periodic	\$0
Total	\$63,000

* 7% discount factor used, as explained in footnotes on the 'Present Value' tab. Cost rounded to nearest \$1,000.

Cost Details¹

Capital

Description in RACER	Notes	Unit Cost (2010 dollars)
Institutional Controls (Implementation)	Implementation of ICs; derived from "implementation" element of ICs technology detail report from RACER	\$62,616
Sub-Total		\$62,616

1. Refer to RACER technology cost detail reports for derivation of costs.

**Alternate Water Supply and Institutional Controls
Present Value Analysis
Twins Inn Soil
Arvada, Colorado**

$$PV_{total} = \sum_{t=1}^{t=n} \frac{x_t}{(1+i)^t}$$

PV = present value
t = time, year
x = annual cost
i = discount rate

Discount Rate¹ = 7.0%
Present Value = \$63,000

Year	Fiscal Year	Capital Cost ²	LTM Cost ³	Periodic Cost ⁴	Annual Cost	Discount Factor	Present Value ⁵			
							Capital Cost	LTM Cost	Periodic Cost	Total Present Value
0	2011	62,616	-	-	62,616	1.000	62,616	-	-	62,616
1	2012	-	-	-	-	0.935	-	-	-	-
2	2013	-	-	-	-	0.873	-	-	-	-
3	2014	-	-	-	-	0.816	-	-	-	-
4	2015	-	-	-	-	0.763	-	-	-	-
5	2016	-	-	-	-	0.713	-	-	-	-
6	2017	-	-	-	-	0.666	-	-	-	-
7	2018	-	-	-	-	0.623	-	-	-	-
8	2019	-	-	-	-	0.582	-	-	-	-
9	2020	-	-	-	-	0.544	-	-	-	-
10	2021	-	-	-	-	0.508	-	-	-	-
11	2022	-	-	-	-	0.475	-	-	-	-
12	2023	-	-	-	-	0.444	-	-	-	-
13	2024	-	-	-	-	0.415	-	-	-	-
14	2025	-	-	-	-	0.388	-	-	-	-
15	2026	-	-	-	-	0.362	-	-	-	-
16	2027	-	-	-	-	0.339	-	-	-	-
17	2028	-	-	-	-	0.317	-	-	-	-
18	2029	-	-	-	-	0.296	-	-	-	-
19	2030	-	-	-	-	0.277	-	-	-	-
20	2031	-	-	-	-	0.258	-	-	-	-
21	2032	-	-	-	-	0.242	-	-	-	-
22	2033	-	-	-	-	0.226	-	-	-	-
23	2034	-	-	-	-	0.211	-	-	-	-
24	2035	-	-	-	-	0.197	-	-	-	-
25	2036	-	-	-	-	0.184	-	-	-	-
26	2037	-	-	-	-	0.172	-	-	-	-
27	2038	-	-	-	-	0.161	-	-	-	-
28	2039	-	-	-	-	0.150	-	-	-	-
29	2040	-	-	-	-	0.141	-	-	-	-
TOTAL		63,000	-	-	63,000		63,000	-	-	63,000

¹ Real discount rate taken from *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 540-R-00-002, July 2000) which states "A real discount rate of 7% should generally be used for all non-Federal facility sites."

² Capital costs consist of implementing institutional controls for soil at the site.

³ There are no LTM costs associated with this alternative for soil.

⁴ There are no periodic costs associated with this alternative for soil.

⁵ First-year costs (not costs escalated over time) are used as inputs in the present worth calculation per *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA 540-R-00-002, July 2000).

Technology Detail Report (with Markups)

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

<u>Location Modifier</u>	<u>Default</u>	<u>User</u>
	1.042	1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four

Technology Detail Report (with Markups)

businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Technology Detail Report (with Markups)

Site:

Site ID: Twins Inn, Arvada, CO Soil
Site Name: Twins Inn, Arvada, CO Soil
Site Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated costs for addressing contaminated soil at Twins Inn site, consisting of costs for implementing institutional controls. Although this is a first year cost, unit costs are compiled into a separate present value spreadsheet in order to be consistent with the cost estimate for groundwater at the site.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Technology Detail Report (with Markups)

Estimator Name: Jeremy Cox

Estimator Title: Environmental Engineer

Agency/Org./Office: URS Corporation

Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107

Telephone Number: 801-904-4000

Email Address: jeremy_cox@urscorp.com

Estimate Prepared Date: 08/05/2010

Estimator Signature: _____ **Date:** _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ **Date:** _____

Technology Detail Report (with Markups)

Phase:

Phase Type: Long Term Monitoring
Phase Name: Institutional Controls
Description: Estimated costs for implementing institutional controls for contaminated soil at the Twins Inn site.

Start Date: October, 2010

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

ADMINISTRATIVE LAND USE CONTROLS

<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
Yes	100	0

Technology Detail Report (with Markups)

Technology:

Name: ADMINISTRATIVE LAND USE CONTROLS (12 months only)

Prime Markup: 100 %

Sub Markup: 0 %

Comments: Estimated costs for implementing institutional controls for contaminated soil at Twins Inn site. Based on the site characteristics, implementation of ICs is assumed to consist of utility notification and legal activities (deed notification, negotiating easements for monitoring activities, and restrictive covenants and equitable servitudes) for four impacted properties. Assumes low complexity for utility notification and medium complexity for legal activities. Uses RACER default values for these parameters.

Element: Implementation

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	SubBid Unit Cost	Extended Cost	Cost Override	Markups Applied
33022037	Overnight Delivery, 8 oz Letter	64.00	EA	0.00	0.00	0.00	14.67	\$938.56	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33040671	Portable GPS Set with Mapping, 5 cm Accuracy	1.00	MO	1,090.82	0.00	0.00	0.00	\$1,090.82	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220102	Project Manager	25.00	HR	0.00	151.03	0.00	0.00	\$3,775.74	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220105	Project Engineer	30.00	HR	0.00	134.46	0.00	0.00	\$4,033.68	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220106	Staff Engineer	45.00	HR	0.00	178.17	0.00	0.00	\$8,017.63	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220110	QA/QC Officer	8.00	HR	0.00	151.55	0.00	0.00	\$1,212.38	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	82.00	HR	0.00	77.90	0.00	0.00	\$6,387.59	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	38.00	HR	0.00	85.49	0.00	0.00	\$3,248.76	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220213	Surveying - 3-man Crew	8.00	DAY	0.00	1,080.51	21.61	0.00	\$8,817.00	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220505	Attorney, Senior Associate, Real Estate	80.00	HR	0.00	233.07	0.00	0.00	\$18,645.65	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220509	Paralegal, Real Estate	64.00	HR	0.00	57.67	0.00	0.00	\$3,691.03	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Technology Detail Report (with Markups)

Element: Implementation

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	SubBid Unit Cost	Extended Cost	Cost Override	Markups Applied
33240101	Other Direct Costs	1.00	LS	359.32	0.00	0.00	0.00	\$359.32	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
33990111	Local Fees	8.00	LS	299.70	0.00	0.00	0.00	\$2,397.60	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$62,615.75		
Total Technology Cost								\$62,615.75		

Estimate Documentation Report

System:

RACER Version: 10.3.0
Database Location: T:\Racer\Racer.mdb

Folder:

Folder Name: Twins Inn, Arvada, CO

Project:

Project ID: Twins Inn
Project Name: Twins Inn, Arvada, CO
Project Category: None

Location

State / Country: COLORADO
City: DENVER

Location Modifier

Default

User

1.042

1.042

Options

Database: System Costs
Cost Database Date: 2010
Report Option: Calendar

Description

Estimated unit costs for "Alternate Water Supply and Institutional Controls" alternative for Twins Inn EE/CA. Costs include connection of four businesses to municipal water supply, groundwater monitoring, five-year reviews, and project close-out. Costs for items not included in the RACER database were obtained from vendor quotes or engineering estimates and inserted into RACER as user-defined estimates. Also includes costs for implementing institutional controls. Unit costs are compiled into a separate present value spreadsheet to derive total costs over time.

Estimate Documentation Report

Site Documentation:

Site ID: Twins Inn, Arvada, CO Soil
Site Name: Twins Inn, Arvada, CO Soil
Site Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Volatile Organic Compounds (VOCs)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description: Estimated costs for addressing contaminated soil at Twins Inn site, consisting of costs for implementing institutional controls. Although this is a first year cost, unit costs are compiled into a separate present value spreadsheet in order to be consistent with the cost estimate for groundwater at the site.

Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.

References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Jeremy Cox
Estimator Title: Environmental Engineer
Agency/Org./Office: URS Corporation
Business Address: 756 East Winchester Street, Ste. 400
Salt Lake City, UT 84107
Telephone Number: 801-904-4000
Email Address: jeremy_cox@urscorp.com
Estimate Prepared Date: 08/05/2010

Estimator Signature: _____ **Date:** _____

Reviewer Information

Estimate Documentation Report

Reviewer Name:
Reviewer Title:
Agency/Org./Office:
Business Address:
Telephone Number:
Email Address:
Date Reviewed:

Reviewer Signature: _____ Date: _____

Estimated Costs:

<u>Phase Names</u>	<u>Direct Cost</u>	<u>Marked-up Cost</u>
Institutional Controls	\$33,732	\$62,616
<hr/>		
Total Cost:	\$33,732	\$62,616

Estimate Documentation Report

Phase Documentation:

Phase Type: Long Term Monitoring
Phase Name: Institutional Controls
Description: Estimated costs for implementing institutional controls for contaminated soil at the Twins Inn site.

Start Date: October, 2010
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markups: System Defaults

Technology Markups

ADMINISTRATIVE LAND USE CONTROLS

<u>Markup</u>	<u>% Prime</u>	<u>% Sub.</u>
Yes	100	0

Total Marked-up Cost: \$62,616

Technologies:

Estimate Documentation Report

Technology Name: Administrative Land Use Controls (# 1)

User Name: ADMINISTRATIVE LAND USE CONTROLS

<i>Description</i>	<i>Default</i>	<i>Value</i>	<i>UOM</i>
System Definition			
<u>Required Parameters</u>			
Rename Model	ADMINISTRATIVE LAND USE CONTROLS		n/a
Planning Documents		No	n/a
Implementation		Yes	n/a
Implementation: Start Date		2010	n/a
Monitoring & Enforcement		No	n/a
Modification/Termination		No	n/a
Type of Site		Private/Other	n/a

Implementation

Required Parameters

Modify Installation (or City) Master Plan		No	n/a
Deed Notification		Yes	n/a
Deed Notification: Number		4	EA
Deed Notification: Task Complexity		Medium	n/a
Negotiating Easements		Yes	n/a
Negotiating Easements: Number		4	EA
Negotiating Easements: Task Complexity		Medium	n/a
Restrictive Covenants		Yes	n/a
Restrictive Covenants: Number		4	EA
Restrictive Covenants: Task Complexity		Medium	n/a
Equitable Servitudes		Yes	n/a
Equitable Servitudes: Number		4	EA
Equitable Servitudes: Task Complexity		Medium	n/a
Access Control Signs		No	n/a
Utility Notification Service		Yes	n/a
Access Control Signs: Number		1	EA
Access Control Signs: Task Complexity		Low	n/a
Geographic Information Systems (GIS)/Overlay Maps		No	n/a
Develop Finding of Suitability to Transfer (FOST)		No	n/a

Comments: Estimated costs for implementing institutional controls for contaminated soil at Twins Inn site. Based on the site characteristics, implementation of ICs is assumed to consist of utility

Estimate Documentation Report

notification and legal activities (deed notification, negotiating easements for monitoring activities, and restrictive covenants and equitable servitudes) for four impacted properties. Assumes low complexity for utility notification and medium complexity for legal activities. Uses RACER default values for these parameters.

Appendix B

Cost Assumptions and RACER™ Output

to Support EE/CA

Twins Inn Site

31 January 2007

Unchanged in July 2010 EE/CA Update

Soil

Groundwater without Source Removal

Present Value of Future Cost

Folder: TWINS INN FEASIBILITY STUDY-R10

Project Name: GROUNDWATER REMEDIATION ALTERNATIVES

Location: DENVER, CO

Project ID: 41567516-FS-GW

Report Option: Calendar

Site Name: GW04 - Anaerobic Biorecirculation and MNA

Initial Phase Element Start Date: 1/1/2005

Site Type: Groundwater

Site ID: TIFS-GW04

Year		1	2	3	4	5	6	7	8	9	10	11	12	13
Fiscal Year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cost Type	Description													
Study	01 Pre-Design Investigation	\$ 106,589	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Design	02 Remedial Design	\$ 165,745	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Remedial Action	03 Biorecirculation (Capital)	\$ -	\$ 368,226	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Operations & Maintenance	04 Operation & Maintenance	\$ -	\$ 86,034	\$ 120,476	\$ 119,494	\$ 120,476	\$ 123,421	\$ 49,789	\$ 124,000	\$ 124,000	\$ 124,000	\$ 124,000	\$ 124,000	\$ 124,000
Remedial Action	05 Bio Performance Monitoring (Year 1 - 5) (O & M)	\$ -	\$ 55,980	\$ 96,020	\$ 96,020	\$ 96,020	\$ 96,020	\$ 40,041	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Remedial Action	06 Monitored Natural Attenuation (Years 6 - 15) (O&M)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 151,086	\$ 38,213	\$ 38,213	\$ 38,213	\$ 38,213	\$ 38,213	\$ 38,213
Remedial Action	07 Monitored Natural Attenuation (Years 16 - 50) (O&M)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Long Term Monitoring	08 Five-Year Reviews (Years 6 - 50)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 25,107	\$ -	\$ -	\$ -	\$ -	\$ 25,107	\$ -
Site Closeout	09 Site Close-out (Year 50)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Sub-Total		\$ 272,334	\$ 510,240	\$ 216,496	\$ 215,514	\$ 216,496	\$ 219,441	\$ 266,023	\$ 162,213	\$ 162,213	\$ 162,213	\$ 162,213	\$ 187,320	\$ 162,213
Real Discount	7.00%	0.9359	0.8759	0.8197	0.7671	0.7179	0.6719	0.6288	0.5885	0.5507	0.5154	0.4824	0.4514	0.4225
Nominal Discount	8.70%	0.9200	0.8463	0.7786	0.7163	0.6589	0.6062	0.5577	0.5131	0.4720	0.4342	0.3995	0.3675	0.3381
Inflation	1.70%	1.0173	1.0349	1.0528	1.0710	1.0895	1.1084	1.1275	1.1470	1.1669	1.1870	1.2076	1.2285	1.2497
Total		\$ 254,870	\$ 446,898	\$ 177,460	\$ 165,327	\$ 155,430	\$ 147,441	\$ 167,278	\$ 95,460	\$ 89,338	\$ 83,609	\$ 78,248	\$ 84,564	\$ 68,534

Database Date: Jan-03

Groundwater with Source Removal

Present Value of Future Cost

Folder: TWINS INN FEASIBILITY STUDY-R10

Project Name: GROUNDWATER REMEDIATION ALTERNATIVES

Project ID: 41567516-FS-GW

Site Name: GW04 - Anaerobic Biorecirculation and MNA

Site Type: Groundwater

Site ID: TIFS-GW04

Year		14	15	16	17	18	19	20	21	22	
Fiscal Year		2018	2019	2020	2021	2022	2023	2024	2025	2026	
Cost Type	Description										Total
Study	01 Pre-Design Investigation										\$ 106,589
Design	02 Remedial Design										\$ 165,745
Remedial Action	03 Biorecirculation (Capital)										\$ 368,226
Operations & Maintenance	04 Operation & Maintenance										\$ 619,690
Remedial Action	05 Bio Performance Monitoring (Year 1 - 5) (O & M)										\$ 480,101
Remedial Action	06 Monitored Natural Attenuation (Years 6 - 15) (O&M)	\$ 38,213	\$ 38,213	\$ 38,213							\$ 495,003
Remedial Action	07 Monitored Natural Attenuation (Years 16 - 20) (O&M)				\$ 78,647					\$ 38,213	\$ 116,860
Long Term Monitoring	08 Five-Year Reviews (Years 6 - 20)				\$ 25,107					\$ 25,107	\$ 100,428
Site Closeout	09 Site Close-out (Year 20)							\$ 65,515			\$ 65,515
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Sub-Total		\$ 38,213	\$ 38,213	\$ 38,213	\$ 103,754	\$ -	\$ -	\$ 65,515	\$ -	\$ 63,320	\$ 2,518,157
Real Discount	7.00%	0.3954	0.3700	0.3463	0.3241	0.3033	0.2839	0.2657	0.2486	0.2327	---
Nominal Discount	8.70%	0.3110	0.2861	0.2632	0.2422	0.2228	0.2049	0.1885	0.1735	0.1596	---
Inflation	1.70%	1.2713	1.2933	1.3157	1.3384	1.3616	1.3851	1.4091	1.4334	1.4582	---
Total		\$ 15,109	\$ 14,141	\$ 13,234	\$ 33,627	\$ -	\$ -	\$ 17,405	\$ -	\$ 14,734	\$ 1,749,347

Database Date: Jan-03

Present Value of Future Cost

Folder: TWINS INN FEASIBILITY STUDY-R10

Project Name: GROUNDWATER REMEDIATION ALTERNATIVES

Location: DENVER, CO

Project ID: 41567516-FS-GW

Report Option: Calendar

Site Name: GW05 - Permeable Reactive Barrier and MNA

Initial Phase Element Start Date: 1/1/2005

Site Type: Groundwater

Site ID: TIFS-GW05

Year		1	2	3	4	5	6	7	8	9	10	11	12	13
Fiscal Year		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cost Type	Description													
Study	01 Pre-Design Investigation	\$ 124,079												
Design	02 Remedial Design	\$ 179,120												
Remedial Action	03 Permeable Reactive Barrier (Capital)		\$ 350,082											
Operations & Maintenance	04 Operation & Maintenance (Year 1 - 20)(O&M)		\$ 2,548	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368
Remedial Action	05 PRB Performance Monitoring (Year 1 - 5) (O&M)		\$ 112,663	\$ 193,247	\$ 193,247	\$ 193,247	\$ 193,247	\$ 193,247	\$ 80,584					
Remedial Action	08 Monitored Natural Attenuation (Years 6 - 15) (O&M)								\$ 151,086	\$ 38,213	\$ 38,213	\$ 38,213	\$ 38,213	\$ 38,213
Remedial Action	09 Monitored Natural Attenuation (Years 16 - 20) (O&M)													
Long Term Monitoring	10 Five-Year Reviews (Years 5 - 20)								\$ 24,642					\$ 24,642
Site Closeout	11 Site Close-out (Year 20)													
Sub-Total		\$ 303,199	\$ 465,293	\$ 197,615	\$ 197,615	\$ 197,615	\$ 197,615	\$ 197,615	\$ 260,680	\$ 42,581	\$ 42,581	\$ 42,581	\$ 42,581	\$ 67,223
Real Discount	7.00%	0.9359	0.8759	0.8197	0.7671	0.7179	0.6719	0.6288	0.5885	0.5507	0.5154	0.4824	0.4514	0.4225
Nominal Discount	8.70%	0.9200	0.8463	0.7786	0.7163	0.6589	0.6062	0.5577	0.5131	0.4720	0.4342	0.3995	0.3675	0.3381
Inflation	1.70%	1.0173	1.0349	1.0528	1.0710	1.0895	1.1084	1.1275	1.1470	1.1669	1.1870	1.2076	1.2285	1.2497
Total		\$ 283,756	\$ 407,531	\$ 161,983	\$ 151,596	\$ 141,875	\$ 132,777	\$ 124,262	\$ 153,406	\$ 23,451	\$ 21,948	\$ 20,540	\$ 19,223	\$ 28,401

Database Date: Jan-03

Present Value of Future Cost

Folder: TWINS INN FEASIBILITY STUDY-R10

Project Name: GROUNDWATER REMEDIATION ALTERNATIVES

Project ID: 41567516-FS-GW

Site Name: GW05 - Permeable Reactive Barrier and MNA

Site Type: Groundwater

Site ID: TIFS-GW05

Year		14	15	16	17	18	19	20	
Fiscal Year		2018	2019	2020	2021	2022	2023	2024	
Cost Type	Description								Total
Study	01 Pre-Design Investigation								\$ 124,079
Design	02 Remedial Design								\$ 179,120
Remedial Action	03 Permeable Reactive Barrier (Capital)								\$ 350,082
Operations & Maintenance	04 Operation & Maintenance (Year 1 - 20)(O&M)	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 4,368	\$ 81,172
Remedial Action	05 PRB Performance Monitoring (Year 1 - 5) (O&M)								\$ 1,159,482
Remedial Action	08 Monitored Natural Attenuation (Years 6 - 15) (O&M)	\$ 38,213	\$ 38,213	\$ 38,213	\$ 38,213				\$ 495,003
Remedial Action	09 Monitored Natural Attenuation (Years 16 - 20) (O&M)					\$ 59,492			\$ 59,492
Long Term Monitoring	10 Five-Year Reviews (Years 5 - 20)					\$ 24,642		\$ 24,642	\$ 98,568
Site Closeout	11 Site Close-out (Year 20)							\$ 65,515	\$ 65,515
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Sub-Total		\$ 42,581	\$ 42,581	\$ 42,581	\$ 42,581	\$ 88,502	\$ 4,368	\$ 94,525	\$ 2,612,513
Real Discount	7.00%	0.3954	0.3700	0.3463	0.3241	0.3033	0.2839	0.2657	---
Nominal Discount	8.70%	0.3110	0.2861	0.2632	0.2422	0.2228	0.2049	0.1885	---
Inflation	1.70%	1.2713	1.2933	1.3157	1.3384	1.3616	1.3851	1.4091	---
Total		\$ 16,837	\$ 15,757	\$ 14,746	\$ 13,801	\$ 26,845	\$ 1,240	\$ 25,112	\$ 1,785,086

Database Date: Jan-03

