FOR BOARD ACTION

Agenda Item #   6   **Meeting Date:**   **6/29/10**

SUBJECT:

Novaspect Delta V Operations Simulator

PREPARED BY:

Rob Dunnette, Manager of Power Resources

ITEM DESCRIPTION:

Process control for most Silver Lake Plant (SLP) systems is provided by a proprietary computer-based control system ("Delta V") provided by Emerson Novaspect. Historically all training the Delta V system has been "hands on" training during the normal course of operations. The downturn in the wholesale electrical marketplace and the resulting idling of SLP generation has severely limited that sort of training at a time when significant staff turnover makes training most necessary. The virtual operating conditions provided by an operations simulator will obviate the need for "hands on" training, thus allowing new operators to acquire the necessary skills during idle conditions. In addition, a simulator allows for the training and testing of an operator's response during abnormal and casualty conditions, a valuable tool not previously available to us.

The operations simulator will include all hardware, software development, sixteen operating scenarios, startup services and one year of post-startup support to applicable to SLP Unit 4 and the Mayo steamline.

FOR CAPITAL PURCHASES/BIDS/MAJOR PROJECTS:

Funding for this project is contained within the approved 2010 Power Resources Allocation budget.

UTILITY BOARD ACTION REQUESTED:

Management recommends that the Utility Board accept the proposal from Emerson Novaspect for the purchase of hardware and the development of software for a Delta V Operations Simulator for a price of $198,606.00, with terms and conditions governed by Novaspect proposal #014-RK-100510-0016547 rev 1a, Option 3, and that the Board request the Mayor and City Clerk execute the agreement.

_____   June 18, 2010

General Manager   Date

ROCHESTER PUBLIC UTILITIES

General Overview

Novaspect and Mynah are pleased to submit this proposal to Rochester Public Utilities (RPU) for a DeltaV Operator Training Solution. The primary objective is to provide a process specific dynamic simulation based operator training solution for initial training and refresher training. This solution will provide a valuable training tool for operators, operating supervisors, and other personnel at Rochester Public Utilities.

The DeltaV Operator Training Solution will provide the following:

- Improve understanding of general process concepts.
- Sharpen the understanding of operation and control theory.
- Increase knowledge of operation and control theory
- Increase knowledge of facility systems and their function and interaction with other systems.
- Provide operating experience, build confidence, and improve accuracy in normal and abnormal system operation.
- Verification of specific operating procedures.
- Facilitate recognition of and recovery from various upsets and/or malfunctions.

The Novaspect/Mynah Team has extensive experience executing simulation systems with these requirements. This solution will be a valuable tool to the operations and engineering personal at your plant due to our use of proven first principle models and simulation software that is native to the DeltaV control system.
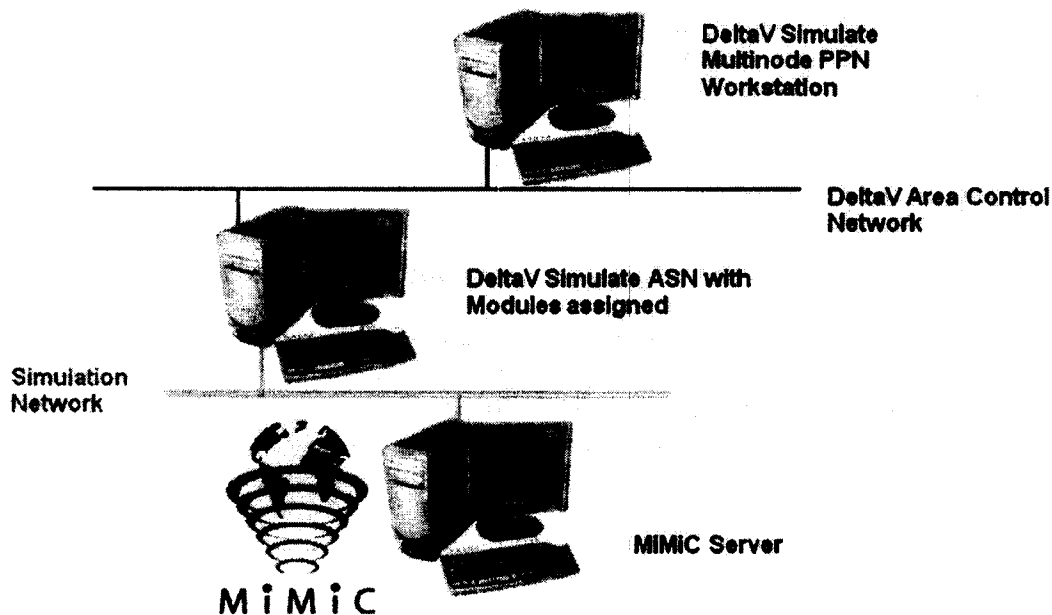
Introduction

The Simulation Solution presented in the proposal includes the following components:
- Several virtual DeltaV controllers with process specific dynamic models
- 16 Simple Scenarios
- Scenario Scoring
- Training Reports
- Functional Acceptance Testing
- Software Acceptance Testing
- On-Site Setup
- Train-the-Trainer
- Post Installation Follow-up Service
- System Support – 1 Year of Mynah Basic Technical Assistance
- System User Guide
- Three (3) Workstations w/ Dual Monitors (Option 3 – Two (2) Workstations)

- DeltaV Simulate Pro – Multi-Node Licenses
- MiMiC 3000 SIO Tag Base License (Option 2 & 3 – MiMiC 2000 SIO)
- MiMiC Operator Training Manager
- Project Management

Simulation System Architecture

This proposed solution incorporates Emerson Process Management's DeltaV Simulate control system emulation software with MYNAH Technologies' MiMiC simulation development software. Shown below is the simplified system architecture:

Process Modeling Scope

A. Base Simulation Model

The operator training system will be developed using MiMiC process simulation software. Note that the MiMiC software is the same tool Novaspect uses while performing internal and factory acceptance testing of the DeltaV systems at RPU. It will consist of a dynamic, medium fidelity process model incorporating chemical engineering first principles conservation of mass and energy which is key to get the proper response from a simulation system.

Area	Fidelity	Option 1	Option 2	Option 3
Unit 3 Boiler	Medium	X		
Unit 3 Turbine	Medium	X		
Unit 3 Generator	Low	X		
Unit 3 BMS	Low	X		
Unit 4 Boiler	Medium	X	X	X
Unit 4 Turbine	Medium	X	X	
Unit 4 Generator	Low	X	X	
Unit 4 Air Pollution Control (Scrubber & Baghouse)	Medium	X	X	X
Unit 4 BMS	Low	X	X	X
Mayo Steam Export Line	Medium	X	X	X
Water Treatment System	Low	X	X	

B. Scope Clarifications

- This simulation system includes control that currently resides in DeltaV, external systems or panel based systems that are not connected to DeltaV will not be represented or simulated.
- Turbine generator controls will be simulated to the level in which standard synchronization can occur with voltage regulation and MW control. The Basler interfaces will be simulated to the extent which the above can occur, no specific error codes or malfunction scenarios will be simulated in the Basler units.
- Combustion simulation will be represented to a level in which O2, CO, CO2, and SO2 will be modeled to a fidelity adequate for operators to identify and understand efficient and inefficient combustion. Opacity will also be modeled at a simple or low fidelity level for operators to correlate to the combustion quality. Simple representation of heat rate and thermal efficiency will also be addressed in the simulation.
- NOx will be modeled, but not specifically correlated to the combustion quality. NOx will be modeled to the extent in which the urea injection (Unit 4 Rotamix System) can be simulated.

C. Operator Training Functions

MiMiC's Operator Training Manager (OTM) module provides the ability to launch automated process excursion scenarios that impact the plant processes. This enables the trainee to learn appropriate responses to various situations that they may encounter

while controlling the plant. The operator actions taken during a scenario may be captured and performance scoring is possible if desired.

Ad-hoc training screens can also be created within MiMiC. These screens will allow the trainer to introduce "on-demand" variables into the running process and evaluate the response of the trainee.

Included in this proposal, the RPU Team will assist in developing the requirements for the following training functionality to work in conjunction with the simulation model:

Training Functionality	Quantity
Operator Training Scenarios (as specified by RPU)	16
Ad-Hoc Trainer Screens (as specified by RPU)	2

RPU has identified the following training scenarios to be generated as part of the simulation system:

Normal Operations
1. Normal boiler startup, including various auxiliaries
2. Fuel Switching – Coal to Gas, Gas to Coal
3. Combustion Optimization – Fuel to Air Tuning
4. Mayo Steam – Start, Switching, DSH Pump Operations
5. Normal TG Startup, Including Synchronization and Loading
6. Scrubber Operations – Atomizer in/out
7. Baghouse Operations – Compartment in/out, Pulse-Cleaning, Ash Handling
8. Auxiliary equipment – Start, Stop, Swap

Abnormal Operations
1. Master Fuel Trip, Including Fuel Feed Problem
2. Turbine Trip
3. Hi/Lo Water Level Trips
4. Loss of Flame Trip
5. Loss of Aux Power
6. High Opacity – Combustion Upset
7. Boiler Tube Leak
8. Loss of Fan

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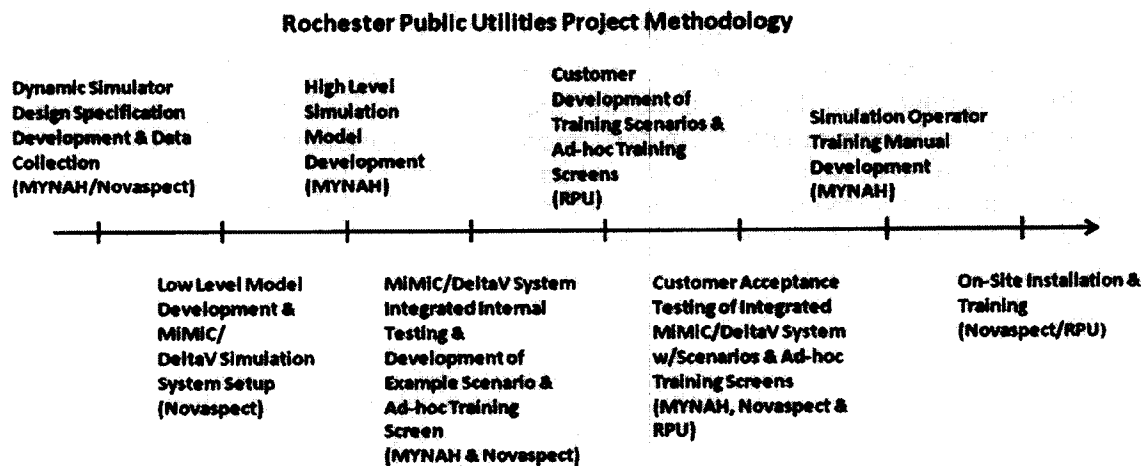
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Up-Front Design and Final Scope Definition

In addition to the information already received, the Novaspect/Mynah Team will need the following to maximize the effectiveness in finalizing the design and executing the project:

A. RPU to provide P&ID's, Process Descriptions, Operations Manuals and other technical documentation necessary to complete the simulation model. A comprehensive list will be provided upon award of contract.

B. A joint project kickoff/technical review meeting between RPU (and its designated representatives) and our RPU Team. Technical documentation and this review meeting will facilitate finalization of a Model Design Specification that will document all detail regarding technical development, roles and responsibilities, and project timeline. The estimated duration of this review is 1-2 days.

Project Methodology

The following diagram depicts the project methodology that will be followed by the Rochester Public Utilities, Novaspect and MYNAH Technologies project team. Key elements of the process are described below. In following this process, it is assumed that the Delta configuration will be utilized in its current state.

Rochester Public Utilities Project Methodology

Dynamic Simulator Design Specification Development & Data Collection (MYNAH/Novaspect)

High Level Simulation Model Development (MYNAH)

Customer Development of Training Scenarios & Ad-hoc Training Screens (RPU)

Simulation Operator Training Manual Development (MYNAH)

Low Level Model Development & MIMIC/ DeltaV Simulation System Setup (Novaspect)

MIMIC/DeltaV System Integrated Internal Testing & Development of Example Scenario & Ad-hoc Training Screen (MYNAH & Novaspect)

Customer Acceptance Testing of Integrated MIMIC/DeltaV System w/Scenarios & Ad-hoc Training Screens (MYNAH, Novaspect & RPU)

On-Site Installation & Training (Novaspect/RPU)

1. **Dynamic Simulator Design Specification Development** – Prior to beginning any work on the process model Novaspect and MYNAH work together to define the Rochester Public Utilities requirements for the simulation system via a Dynamic Simulator Design Specification. The DSDS will serve as the design basis for the project and include such things as: a definition of IO, major process equipment / units and subsystems that will be part of the simulation; objective model performance standards; definition of instructor training screens and operator training scenarios; and, Rochester Public Utilities provided technical data required to meet the project objectives. This document will be reviewed with and approved by the Rochester Public Utilities prior to beginning project work.

2. **Data Collection** – In conjunction with creating the Dynamic System Design Specification it is also imperative that Novaspect and MYNAH clearly define for Rochester Public Utilities what process and operational data will be required to complete the work. Our goal is to leave the project kickoff meeting with all required data in hand.

3. **High-Level Model Development** – Using Mimic simulation software independent of the Delta control system, MYNAH developers will create the simulation as defined in the DSDS. The simulation will be a dynamic, medium fidelity process model incorporating chemical engineering first principles conservation of mass and energy. Reaction kinetics, empirical data correlations, etc. may also be incorporated as dictated by the project.

4. **Model Acceptance Testing** – A one or two day Model Acceptance Test will be scheduled with Rochester Public Utilities to review the high-level functionality of the simulation models prior to moving into the control system integration phase. During this testing steady state performance of the simulation will be demonstrated to be in-line with what has been defined in the DSDS. In addition general process dynamics will be confirmed, but cannot be thoroughly tested without the control system configuration. The Model Acceptance Test Plan defines the procedure for conducting this review.

5. **Scenario and Ad-hoc Training Screen Development** – Mimic's Operator Training Manager (OTM) module provides the ability to launch automated process excursion scenarios that impact the running process. This enables the trainee to learn appropriate responses to various situations that he or she may encounter while controlling the plant. Ad-hoc training screens can also be created within Mimic that allows the trainer to introduce "on-demand" variables into the running process. MYNAH will be responsible for implementing these

system training elements as defined in the Dynamic Simulator Design Specification.

6. **Low-Level Model Development and Delta Simulate System Setup** – Novaspect will the lead for this phase of the project. The low-level model development involves auto-generating a simulation database using Mimic's Delta FHX utility and the completed Delta configuration database and then making modifications that enable connection of the high level Mimic models to the Delta system. In addition, Novaspect will be responsible for ensuring that the Delta Simulate System (configuration, graphics, etc.) is complete and functioning properly.

7. **Mimic/Delta System Integrated Testing** – Testing and tuning the integrated operator training system will be a joint effort of the MYNAH / Novaspect project team members. Having the individuals that create the process models working with those that understand the Delta configuration will enable us to address necessary issues as we prepare the system for final acceptance testing with Rochester Public Utilities.

8. **Factory Acceptance Testing** – The final Factory Acceptance Test with Rochester Public Utilities will require up to 5 days for completion. The DSDS and FAT plan will be the basis for this testing.

9. **On-Site Installation** – NOVASPECT will be on-site for the installation of the operator training system. This proposal has been assumes remote installation support from Mynah.

10. **Training** – Novaspect and MYNAH will provide training for Rochester Public Utilities on using and maintaining the system. This will include up to one week on-site.

Simulation Project Task Responsibilities Matrix

The tasks associated with the simulator are the similar to the tasks in the Project Execution Plan. Using similar project methodology ensures that RPU has consistent documentation, implementation, testing and final deliveries.

The following is a matrix specifies the key tasks and responsibilities that apply to the various stages of the simulation project life cycle. We will adjust as necessary to fit RPU's project needs.

Project Task	Novaspect/Mynah	RPU
Simulator Creation:	X	
Simulation Model Development	X	
DeltaV Hardware Specification	X	
DeltaV Software Licensing Specification	X	
MiMiC Software Licensing Specification	X	
Provide Process Data		X
Provide DeltaV Database		X
Project Kickoff Meeting	X	X
Create Model Design Specification	X	
Process Model Development	X	
Model Acceptance Testing	X	X
DeltaV & MiMiC HW and SW	X	
DeltaV / MiMiC System Integration	X	
Factory Acceptance Testing	X	X
On-Site Installation	X	

Simulator Deployment

Novaspect will travel to site and setup/install the system and provide instruction to plant personnel on the use of the system. We would recommend that RPU assign a person(s) to be responsible for maintaining/working with the simulator and staff. Our RPU Team has used a "train the trainer" concept in the past that has worked well for long-term customer training needs, but we are open to RPU recommendation(s) for maintaining the training system/plans.

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Financial Summary

Option 1 – Boiler 3, Boiler 4, Mayo Steam Export Line, & Water Treatment	
Simulation System Hardware and Software	$79,749.00
Novaspect/Mynah Engineering Services	$173,300.00
Simulation System Hardware, Software, and Engineering	**$253, 049.00**

Option 2 – Boiler 4, Mayo Steam Export Line, & Water Treatment	
Simulation System Hardware and Software	$74,965.00
Novaspect/Mynah Engineering Services	$161, 800.00
Simulation System Hardware, Software, and Engineering	**$236, 765.00**

Option 3 –Boiler 4 & Mayo Steam Export Line	
Simulation System Hardware and Software	$55,906.00
Novaspect/Mynah Engineering Services	$142,700.00
Simulation System Hardware, Software, and Engineering	**$198, 606.00**

Proposal Expires 60 Days from date of issue.

Payment Terms/ Invoicing Schedule

- 50% Upon Receipt of Purchase Order
- 30% Upon Completion of Model Acceptance Testing
- 20% Upon Completion of Factory Acceptance Testing

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Simulation System Bill of Materials:

Option 1 – Boiler 3, Boiler 4, Mayo Steam Export Line, & Water Treatment		
Item	Qty	Description
1	1	VX2101R103L39
		DeltaV Simulate PPN; Multi-Node; includes v10.3 DeltaV Software; English
2	1	VX2201S01
		DeltaV Simulate ASN; Multi-Node
3	1	VX2207S01
		DeltaV SimulatePRO; Multi-Node
4	3	VE2539M26L01
		Precision T3500 Minitower; English Win XP Pro; 2.53GHz (min) Dual-Core CPU; Dual 20-inch Widescreen Monitors; Ext. Spkrs; Two 160G (min) SATA Drives; RAID 1; 3G RAM; 16X (min) DVD-CDRW; Three Ethernet Ports
5	1	MM3-1103
		MiMiC 3000 SIO Tag Base License
6	1	MM3-2102
		DeltaV Simulate OPC SIO Driver Pack
7	1	MM3-3101
		Operator Training Manager
8	1	MM3-6103
		Mimic 3000 SIO TAG Advanced Modeling Objects
9	2	VE6017F0P1
		8-Port 10/100BASE-TX Ethernet Switch (Allied Telesyn AT-FS708); North American Power Cord
10	1 lot	Ethernet Cables

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Item	Qty	Description
		Option 2 – Boiler 4, Mayo Steam Export Line, & Water Treatment
1	1	VX2101R103L39
		DeltaV Simulate PPN; Multi-Node; includes v10.3 DeltaV Software; English
2	1	VX2201S01
		DeltaV Simulate ASN; Multi-Node
3	1	VX2207S01
		DeltaV SimulatePRO; Multi-Node
4	3	VE2539M26L01
		Precision T3500 Minitower; English Win XP Pro; 2.53GHz (min) Dual-Core CPU; Dual 20-inch Widescreen Monitors; Ext. Spkrs; Two 160G (min) SATA Drives; RAID 1; 3G RAM; 16X (min) DVD-CDRW; Three Ethernet Ports
5	1	MM3-1102
		MiMiC 2000 SIO Tag Base License
6	1	MM3-2102
		DeltaV Simulate OPC SIO Driver Pack
7	1	MM3-3101
		Operator Training Manager
8	1	MM3-6102
		Mimic 2000 SIO TAG Advanced Modeling Objects
9	2	VE6017F0P1
		8-Port 10/100BASE-TX Ethernet Switch (Allied Telesyn AT-FS708); North American Power Cord
10	1 lot	Ethernet Cables

Novaspect Rate Schedule
(November 1, 2009)

SERVICE DESCRIPTION	Scheduled Hourly Rate	Demand Hourly Rate
Drawing Services / Project Support Services	$85.00	
Control System Designer	$113.00	$130.00
Instrumentation Engineering	$144.00	$170.00
Valve Asset Manager / Valve Diagnostic Engineer	$144.00	$170.00
Control System Engineering (See * Note 4)	$171.00	$235.00
Control System Field Service Engineer (See * Note 4)	$190.00	$250.00
Legacy Control System Support (See * Note 6)	$212.00	$275.00
Project Manager / Lead Project Engineer	$190.00	
Custom Training Courses	$200.00	
Network Design Consulting	$200.00	
Control Loop Performance Consulting	$215.00	
Process Consulting (Steam Generation, Refining, Batch)	$242.00	

Primetime – Hourly Rate times 1 (Straight time)
    Monday - Friday, 7:00 AM to 6:00 PM (8 hour maximum)

Overtime - Hourly Rate times 1.5 (Time and one-half)
    Monday - Friday hours exceeding 8 hours but less than 12 hours
    Saturday, 7:00 AM to 6:00 PM (8 hour maximum)

Premium Time - Hourly Rate times 2 (Double time)
    Monday - Friday hours exceeding 12 hours
    Service engagements or shifts that begin outside of Primetime or Overtime
    Saturday hours exceeding 8 hours
    Sundays and Novaspect scheduled holidays

* Note 1 – A four (4) hour minimum charge (including travel time) applies to demand services.
* Note 2 – A four (4) hour minimum charge will be applied for calls canceled or re-scheduled with less than 24 hours prior notification.
* Note 3 – The appropriate multiplier applies to all minimum charges and travel time.
* Note 4 – Rates are subject to discount for large projects and Service Agreements based upon project size or services committed under a Service Agreement.
* Note 5 – For time and material engagements, Novaspect will invoice one hour for project management time for every 20 hours of engineering services provided.
* Note 6 – Legacy Control Systems are defined as Provox, RS3 or NT or pre-NT based control systems.

Technical support is available at the defined rate for the service type required. An access fee of $500.00 will be charged for technical support during Primetime hours and an access fee of $1000.00 will be charged for technical support during non-Primetime hours. Hourly charges in addition to the access fee will begin after 1 hour, at the appropriate demand rate listed above.

TRAVEL AND EXPENSE CHARGES

* Travel time is calculated portal to portal at prevailing rates.
* All travel and living expenses will be invoiced at cost plus 12% as incurred by Novaspect.
* Auto mileage will be invoiced at the IRS rates per mile.

EQUIPMENT RENTAL CHARGES

* Control system equipment is available for rental, pricing available upon request.
* Control system test equipment is available for rental (i.e. Combustion Gas Analyzer)

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The proposal to which these Terms and Conditions are attached (the "Proposal"), these Terms and Conditions and any Change Orders (as defined herein) shall constitute the entire agreement between the parties and shall collectively be referred to herein as the "Agreement."

1. **ACCEPTANCE.** ACCEPTANCE OF THIS AGREEMENT BY BUYER WITHIN 30 DAYS OF THE DATE HEREOF (OR SUCH LONGER PERIOD AS NOVASPECT, INC. ("NOVASPECT") SHALL, IN ITS SOLE DISCRETION, AGREE TO IN WRITING) CREATE A CONTRACT BETWEEN NOVASPECT AND BUYER FOR THE PERFORMANCE OF SERVICES ("SERVICES") AND THE SALE OF HARDWARE, SOFTWARE, FIRMWARE AND/OR OTHER PRODUCTS ("GOODS"), EACH AS PARTICULARLY DESCRIBED IN THE PROPOSAL. BY ACCEPTING THIS AGREEMENT WITHIN THE REQUISITE TIME PERIOD, BUYER AGREES TO ACCEPT ALL OF THE TERMS AND CONDITIONS OF THIS AGREEMENT. TO THE EXTENT BUYER'S PURCHASE ORDER OR ANY OTHER STATEMENT OF BUYER CONTAINS ANY TERMS OR CONDITIONS IN ADDITION TO OR DIFFERENT FROM THE TERMS OF THIS AGREEMENT, SUCH TERMS AND CONDITIONS ARE HEREBY REJECTED BY NOVASPECT AND HEREBY WAIVED BY BUYER AND SUCH TERMS AND CONDITIONS SHALL NOT AFFECT THIS AGREEMENT NOR BE BINDING UPON NOVASPECT ABSENT AN EXPRESS WRITTEN STATEMENT BY NOVASPECT TO THE CONTRARY. THIS AGREEMENT CONSTITUTES THE ENTIRE AGREEMENT AND UNDERSTANDING BETWEEN THE PARTIES WITH RESPECT TO THE SERVICES AND THE DELIVERY OF THE GOODS AND SUPERSEDES ANY OTHER NEGOTIATIONS, AGREEMENTS AND REPRESENTATIONS BETWEEN THE PARTIES, WRITTEN OR ORAL. NO MODIFICATION OF THIS AGREEMENT SHALL BE OF ANY FORCE OR EFFECT UNLESS IN WRITING AND SIGNED BY NOVASPECT. IN THE EVENT OF ANY CONFLICT BETWEEN THESE TERMS AND CONDITIONS AND THE PROPOSAL, THE TERMS OF THE PROPOSAL GOVERN. IN THE EVENT OF ANY CONFLICT BETWEEN ANY CHANGE ORDER AND THESE TERMS AND CONDITIONS OR THE PROPOSAL, THE TERMS OF THE CHANGE ORDER SHALL GOVERN.

2. **AGREEMENT TO MAKE PAYMENT.** Buyer shall pay to Novaspect the fees and purchase prices set forth in the Proposal, as increased or decreased pursuant to any adjustments set forth in any Change Orders (the "Payments"). Any Goods ordered other than those specifically set forth in the Proposal, including additional copies of data/documentation or non-standard data/documentation, shall be priced at Novaspect's prices then in effect.

3. **INVOICES; METHOD OF PAYMENT.** Novaspect shall issue an invoice to Buyer (an "Invoice") each month for the amount due Novaspect, as determined pursuant to the terms of the Proposal. Buyer shall pay to Novaspect the amount set forth in each Invoice within 30 days of receipt of such Invoice. Any amount, which is not paid when due shall bear interest at the rate of 1.5% per month or portion thereof from the date such amount, became due through the date on which payment is received by Novaspect. All payments shall be made without deduction or setoff to Novaspect at the address set forth in the Proposal.

4. **SECURITY.** As security for the purchase price of the Goods, Buyer hereby grants and conveys to Novaspect a purchase money security interest in the Goods. Buyer shall, upon request of Novaspect, sign any financing statements and other instruments requested by Novaspect and shall otherwise cooperate with Novaspect in any manner deemed necessary to evidence, perfect or continue such security interest. The security interest granted to Novaspect shall be terminated only upon payment in full for the Goods.

5. **SCHEDULING.** Buyer understands that any product design services to be performed by Novaspect are unique, extremely complex and involve a great degree of Buyer/Novaspect interaction. The schedule for completion of the Services and delivery of the Goods set forth in the Proposal is a good faith estimate of Novaspect. The time actually required to complete the Services and deliver the Goods will be subject to Buyer availability, Buyer's timely delivery of information described in the Proposal or otherwise requested by Novaspect, the accuracy of such information, unforeseen design issues, design changes and modifications requested by Buyer pursuant to Change Orders, and other matters which generally effect product choice or product design services. Novaspect shall use all commercially reasonable efforts to meet all schedules set forth in the Proposal. Novaspect shall have no liability to Buyer or any other party for any loss or damage arising out of any Service or Good, which is provided later than provided in the Proposal.

6. **DELIVERIES.** Novaspect shall deliver to Buyer the Goods described in the Proposal. All deliveries from Novaspect to Buyer shall be F.O.B. shipping point and title and risk of loss with respect to such deliveries shall pass to Buyer upon delivery to Buyer or representatives of Buyer including, but not limited to, any common or contract carrier, bailee, agent, or employee of Buyer. If Buyer does not accept such F.O.B. delivery, Buyer shall be responsible for all storage charges and other expenses incurred in handling and moving the Goods. Buyer shall pay transit insurance, packaging, handling, shipping and carrier costs associated with the Goods and all sales, use, excise and other taxes levied upon the Goods. Buyer's sole remedy for lost Goods, damage caused during shipment or any delay attributable to shipment shall be an action against the carrier. Buyer agrees to hold Novaspect harmless against any and all penalties, claims, demands, losses, causes of action, suits, judgments, costs and expenses, including reasonable attorneys' and paralegals' fees, of whatever nature arising out of or in connection with the shipment or storage of Goods. Novaspect reserves the right to withhold any and all deliveries in the event Buyer fails to pay any invoice in accordance with its terms or in the event Novaspect has reason to believe Buyer does not have the financial ability to pay any future invoice when due.

7. **CHANGE ORDERS.** In the event that Buyer requests any modifications to the Services or to the type or number of Goods, Novaspect shall, if commercially reasonable, prepare and deliver to Buyer a Change Order Proposal describing such modifications and the changes in the Services and/or Goods necessary to effect such modifications (a "Change Order"). The Change Order will also set forth the additional Payments, if any, and the basis upon which additional Payments will be computed and an estimate of the revised schedule for completion of the Services and delivery of the Goods. After receipt of a Buyer request, verbal or written, for modifications to the Services or to the type or number of Goods, Novaspect may elect not to continue or complete the Services or deliver Goods until Novaspect receives a written authorization to proceed with the additional scope of work. The execution of the written authorization required hereunder by Buyer shall constitute authorization from Buyer for Novaspect to proceed with the Services and delivery of the Goods as modified by the Change Order and Buyer's consent to the increase or decrease in the Payments and the revised schedule set forth in the Change Order.

8. **TERMINATION.** Buyer may, by written notice to Novaspect (a "Termination Notice"), terminate its order for Goods and Services or any portion thereof at any time. Notwithstanding the "Notices" provision hereof, a Termination Notice shall not be effective until actually received by Novaspect (the "Termination Date"). Novaspect shall cease performance of the Services and delivery of the Goods as soon as is reasonably possible following receipt of a Termination Notice. Within 15 days after receipt of a final Invoice, Buyer shall pay to Novaspect that portion of the Payments allocated to Services performed through the Termination Date, as determined by Novaspect, plus all expenses and non-cancelable commitments incurred by Novaspect prior to or in connection with such termination including, without limitation, the cost of all Goods and all processing, handling and fabrication costs incurred in connection with the Goods (collectively, the "Termination Payment"). Novaspect shall prepare a final Invoice with respect to the Termination Payment as soon as is practicable following receipt of a Termination Notice.

9. **INDEMNIFICATION.**

(a) Novaspect hereby agrees to indemnify and hold Buyer harmless from and against penalties, claims, demands, losses, causes of action, suits, judgments, costs and expenses, including reasonable attorneys' and paralegals' fees from (i) the injury or death of any employee, contractor, subcontractor, agent of or other person acting on behalf of or otherwise engaged by Novaspect (a "Novaspect Representative") caused by the negligent act or omission of a Novaspect Representative; and (ii) the injury or death of any person other than a Novaspect Representative caused by the negligent act or omission of a Novaspect Representative; provided however, Novaspect's liability set forth in the preceding clause (ii) shall be limited to the proportionate share of liability caused by the Novaspect Representative vis-a-vis all other parties contributing to the cause of such injury, sickness or death and (iii) any third party claim that the Buyer's use of the Goods or Services as permitted hereunder infringes any United States patent, copyright, trade secret or other intellectual property right. Except for any claim under section 9(a)(iii), in no event shall Novaspect's liability under this paragraph exceed the amount of $1,000,000.00.

(b) Novaspect hereby agrees to indemnify and hold Buyer harmless from and against penalties, claims, demands, losses, causes of action, suits, judgments, costs and expenses, including reasonable attorneys' and paralegals' fees from the damage to or destruction of property caused by the negligent act or omission of a Novaspect Representative in providing the Services. In no event shall Novaspect's liability under this paragraph exceed the amount of $1,000,000.00.

(c) NOTWITHSTANDING ANYTHING CONTAINED HEREIN TO THE CONTRARY, BUYER AGREES THAT NOVASPECT SHALL NOT BE LIABLE TO BUYER FOR ANY DELAY IN PERFORMANCE (UNLESS SPECIFICALLY DEFINED IN THE PURCHASE ORDER'S SCOPE OF WORK SECTION) NOR SHALL NOVASPECT'S LIABILITY IN ANY EVENT EXTEND TO INCLUDE INCIDENTAL, SPECIAL, EXEMPLARY, CONSEQUENTIAL OR PUNITIVE DAMAGES WHETHER OR NOT NOVASPECT HAS BEEN PREVIOUSLY ADVISED OF THE POSSIBILITY OF SUCH CLAIM INCLUDING, WITHOUT LIMITATION, LOSS OF TIME, LOSS OF USE, OR LOSS OF ANTICIPATED PROFITS OR REVENUE.

(d) Buyer hereby agrees to indemnify and hold Novaspect harmless from and against any and all penalties, claims, demands, losses, causes of action, suits, judgments, costs and expenses, including reasonable attorneys' and paralegals' fees, of whatever nature arising from (i) the failure of Buyer to keep, perform and observe its obligations hereunder; (ii) any injury, sickness or death of a person other than a Novaspect Representative or damage to property to the extent not caused by the negligent act or omission of a Novaspect Representative; (iii) any injury, sickness or death of a Novaspect Representative not caused by the negligent act or omission of a Novaspect Representative; (iv) the failure of Buyer to comply with and observe all present and future laws, orders, codes, regulations, ordinances, rules and decrees of each governmental agency or instrumentality which may be applicable to the Goods or Buyer's business; (v) any actual or alleged infringement of any third party's intellectual property rights to the extent arising from designs, design information, specifications, processes or formulas supplied by Buyer; and (vi) specifications, design information, processes or other information or representation supplied or made by Buyer which proves to be inaccurate or which was not supplied by Buyer but should have been under the circumstances.

10. **LIMITED WARRANTY.**

(a) Novaspect warrants that the Goods shall be fit for the purpose intended provided such purpose has been communicated to Novaspect by Buyer and provided (i) Novaspect has not indicated in a writing delivered to Buyer that it disagrees with Buyer's selection of any such Goods or (ii) the purpose intended has not been affected by (A) improper handling, storage or installation by a person other than a Novaspect Representative, (B) deterioration, corrosion or other adverse affect to the Goods arising from exposure to chemicals, fumes or other environmental variants not known to Novaspect, (C) specifications, design information, under the circumstances, (D) any alterations or repairs not approved by Novaspect or any accident affecting the Goods not caused by a Novaspect Representative or (E) abuse or improper use or maintenance of the Goods. Novaspect's Representatives' oral statements do not constitute warranties and should not be relied upon by Buyer as such. All warranty claims for the particular purpose intended shall be deemed unconditionally waived by Buyer unless Buyer shall notify Novaspect in writing of such alleged breach

Novaspect

Rochester Public Utilities – Rochester, MN
DeltaV Simulation Solution
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within one year of delivery of the Goods. Buyer shall afford Novaspect prompt and reasonable opportunity to inspect all Goods as to which any breach of warranty claim is made hereunder. If the requisite notice is provided and the Goods are not fit for Buyer's intended purpose, Novaspect will either replace or repair the Goods or adjust the matter fairly and promptly, but under no circumstances shall Novaspect be liable for any delay in performance nor shall Novaspect's liability in any event extend to include incidental, special, exemplary, consequential or punitive damages whether or not Novaspect has been previously advised of the possibility of such claim including, without limitation, loss of time, loss of use, or loss of anticipated profits or revenue. In no event shall Novaspect's liability under this paragraph exceed the amount of $1,000,000.00.

(b) EXCEPT AS EXPRESSLY SET FORTH IN PARAGRAPH (A) ABOVE, (i) NOVASPECT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY; AND (ii) BUYER'S SOLE AND EXCLUSIVE REMEDY HEREUNDER SHALL BE LIMITED TO THE WARRANTIES, IF ANY, OF THE ORIGINAL EQUIPMENT MANUFACTURER(S) OF THE GOODS.

11. **DEFAULTS.** In the event that Buyer fails to pay all or any portion of the Payments when the same is due and payable or is otherwise in default of any of its covenants hereunder or fails to comply with any of the terms or conditions hereof, or, in Novaspect's reasonable opinion, Buyer's ability to make timely Payments hereunder is impaired, or Buyer becomes insolvent or bankrupt or admits in writing its inability to pay its debts as they mature, or makes an assignment for the benefit of creditors, or bankruptcy, reorganization, arrangement or insolvency proceeding or other proceedings for any relief under any bankruptcy or similar law for the relief of debtors are instituted by or against Buyer, then in any such event Novaspect may, (a) terminate and cancel this Agreement forthwith upon written notice to Buyer, (b) require cash payment, satisfactory security, and/or other assurances before providing further Services and Goods, (c) declare the Termination Payment and all other sums payable to Novaspect hereunder to be immediately due and payable whereupon such amount shall forthwith become immediately due and payable to Novaspect, (d) if full payment for the Goods has not been received, enter upon Buyer's premises or any other place where the Goods are located and repossess all of the Goods without notice, hearing, court order or further process of law and otherwise exercise any rights as a secured party under the Uniform Commercial Code and/or (e) pursue any other remedy available to Novaspect at law or in equity.

12. **RETURN.** Novaspect shall not accept return of the Goods unless it notifies Buyer in writing to the contrary. In the event Novaspect accepts return of the Goods, neither transportation charges for the return of Goods nor any other costs or charges incurred in connection therewith shall be paid by Novaspect unless authorized in advance by Novaspect.

13. **SAFETY WARNINGS/COMPLIANCE WITH LAWS.** Buyer accepts and assumes all liability and responsibility for all safety warnings in connection with the Goods and for compliance of the Goods with all federal, state and local laws.

14. **INSTALLATION.** Buyer shall be responsible for receiving, storing, installing, starting up and maintaining the Goods (unless specifically defined in the purchase order's scope of work section). If requested by Buyer, Novaspect shall provide a quotation for services to assist Buyer in these functions.

15. **BUYER SUPPLIED DATA.** Notwithstanding anything contained herein, to the extent that Novaspect has relied upon any specifications, information or representation of Buyer, whether relating to the operating conditions of Buyer or any other state of affairs impacting the selection or design of the Goods, the provision of the Services or the preparation of the Proposal, which specification, information or representation proves to be inaccurate, Novaspect shall have no liability to Buyer or persons claiming under Buyer resulting from such inaccuracy. In the event of such inaccuracy, Novaspect and Buyer shall modify the Services and/or the selection of the Goods to accommodate the true state of affairs and shall modify the Proposal accordingly including, without limitation, adjusting the Payments and re-establishing time deadlines.

16. **SOFTWARE AND COMPUTER PROGRAMS.** Buyer acknowledges and agrees that Buyer's right to use any software or firmware constituting part of the Goods shall be governed by, and subject to the conditions of, a separate software license agreement. Buyer acknowledges and agrees that all title to the software or firmware constituting part of the Goods shall remain vested in the manufacturer of such software or firmware or the licensor thereof and shall be furnished to and used by Buyer only after execution of, and subject to, such separate license agreement. Buyer's sole and exclusive remedy with respect to any software or firmware provided hereunder shall be limited to the warranties, if any, of the manufacturer or licensor of such software or firmware. Buyer shall have no right to alter, modify, copy or prepare derivative works of any software or firmware except in accordance with such license agreement.

17. **NON-SOLICITATION.** Buyer agrees that during the execution of the Services by Novaspect, and for a period of twelve (12) months after performance of the Services, it will not hire any employee(s) of Novaspect or its project team and will not entice or counsel any such employee(s) to leave Novaspect employ. Buyer agrees that this covenant shall extend to its agents and affiliates. In the event that an employee of Novaspect is hired or leaves the employ of Novaspect in such circumstances, the buyer shall pay Novaspect, as compensation for the cost incurred by Novaspect in recruiting and training the employee, the sum equivalent to six (6) months salary for each employee hired from or leaving the employment of Novaspect.

18. **FORCE MAJEURE.** Novaspect shall not be liable for any failure to perform resulting from acts of God, war, riot, fire, explosion, accident, flood, sabotage, the shortage of or inability to obtain from anticipated sources adequate materials, components, parts or Goods, or transportation facilities, compliance with governmental requests, law, regulations, orders or actions, the breakage or failure of machinery or apparatus, national defense requirements or any other event beyond the reasonable control of Novaspect; or in the event of labor trouble, strike, lockout or injunction affecting Novaspect or its supplies, suppliers or transporters which event makes impractical the provision of the Services or the manufacture, procurement, transportation, delivery, acceptance or use of the Goods. Novaspect shall give written notice to Buyer with reasonable promptness after the occurrence of any such event.

19. **RELATIONSHIP OF PARTIES.** The relationship of the parties shall be that of independent contractors and not as partners or joint ventures. Each party is, and is intended to be, engaged in its own and entirely separate business.

20. **NOTICES.** All notices and other communications given hereunder shall be in writing and deemed to have been given when (i) personally delivered, (ii) one business day after delivery to a nationally recognized overnight courier service, (iii) upon the written confirmation of receipt following the transmission of a telecopy or (iv) three days after being mailed by certified mail, postage prepaid, to the addresses of Novaspect or Buyer as set forth in the Proposal or to such other addresses as either party may request by notice given in accordance with this paragraph.

21. **GOVERNING LAW; JURISDICTION AND VENUE/LIMITATION PERIOD.** This Agreement shall be governed by and construed in accordance with the laws of the State of Minnesota. NOVASPECT AND BUYER IRREVOCABLY AGREE THAT ALL ACTIONS OR PROCEEDINGS IN ANY WAY, MANNER OR RESPECT, ARISING OUT OF OR FROM OR RELATED TO THIS AGREEMENT OR ANY DOCUMENT, INSTRUMENT OR TRANSACTION IN CONNECTION HEREWITH SHALL BE HEARD OR LITIGATED EXCLUSIVELY IN COURTS HAVING SITUS WITHIN THE CITY OF ROCHESTER, COUNTY OF OLMSTED, STATE OF MINNESOTA. NOVASPECT AND BUYER CONSENT AND SUBMIT TO THE PERSONAL JURISDICTION OF ANY LOCAL, STATE OR FEDERAL COURT LOCATED WITHIN SAID CITY, COUNTY AND STATE AND IRREVOCABLY WAIVE ANY RIGHT TO TRANSFER OR CHANGE VENUE OF ANY SUCH ACTION OR PROCEEDING OR OBJECT TO THE JURISDICTION OF ANY SUCH COURT OVER THE PARTIES HERETO. NO ACTION OTHER THAN AN ACTION FOR UNPAID PAYMENTS UNDER THIS AGREEMENT MAY BE BROUGHT BY EITHER PARTY MORE THAN TWO YEARS AFTER THE CAUSE OF ACTION HAS ACCRUED.

22. **COLLECTION/ENFORCEMENT EXPENSES.** In addition to any other amounts due hereunder, Buyer shall reimburse Novaspect for all costs and expenses (including reasonable attorneys' and paralegals' fees and expenses) incurred by Novaspect in collecting any amount due to Novaspect or enforcing any provision of this Agreement. Novaspect shall reimburse Buyer for all costs and expenses (including reasonable attorneys' and paralegals' fees and expenses) incurred by Buyer in collecting any amount due to Buyer or enforcing any provision of this Agreement.

23. **GENERAL PROVISIONS.** Except as expressly set forth herein, any waiver by any party of its rights under this Agreement shall be in writing and signed by the party waiving such right. The failure of either party to enforce any of the provisions of this Agreement or any rights in respect thereto, or to exercise any election herein provided, shall not waive such provisions, rights or elections or subsequent breaches thereof. No course of dealing shall be deemed to constitute a continuing waiver of any breach or default or right or remedy hereunder. Buyer shall not assign its rights or obligations under this Agreement to any party without Novaspect's prior written consent. This Agreement shall be binding upon and inure to the benefit of the parties and their respective representatives, successors and permitted assigns. Except as otherwise stated herein, termination of this Agreement shall not release either party from any liability or obligation which has theretofore accrued and remains to be performed as of the date of such termination. Novaspect shall not assign its rights or obligations under this Agreement to any party without Buyer's prior written consent.

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we pledge, we deliver

RESOLUTION

BE IT RESOLVED by the Public Utility Board of the City of Rochester, Minnesota, to approve a contract agreement with Emerson Novaspect and that the Board request the Mayor and the City Clerk to execute the agreement for a Delta V Operations simulator with terms and conditions governed by Novaspect proposal #014-RK-100510-0016547 rev 1a, Option 3.

The amount of the contract agreement to be ONE HUNDERED NINETY EIGHT THOUSAND SIX HUNDRED SIX AND 00/100 DOLLARS ($198,606.00).

Passed by the Public Utility Board of the City of Rochester, Minnesota, this 29th day of June 2010.

_____
President

_____
Secretary