



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

CORPORATE

September 21, 2005

In reply refer to: KDP-7

Mr. Joseph Masin, President
Electronic Identification Devices, LTD
P.O. Box 40227
Santa Barbara, CA 93140

RE: FOIA Request #05-047

Dear Mr. Masin:

This letter responds to your Freedom of Information Act request to the Bonneville Power Administration. In your original letter of July 28, 2005, you requested copies of documents that contain the following information:

1. Copy of the sole supplier contract(s) or agreements(s) between your agency and the vendor(s) for PIT Tags (Radio Frequency Identification Devices) used for the identification of fish, crabs, etc., if any.
2. Copies of any and all addenda to such contract(s) or agreement(s)
3. A list of all entities (organizations) to whom or on whose behalf the transponders were distributed.
4. Memoranda, affidavits, recommendations or any document used by the agency to substantiate or support the agency's decision to use the ISO 111784/85 complaint PIT tags (transponders) operating on 134.2 KHz frequency. All documents in BPA's possession responsive to each of your requests are enclosed.

If you are dissatisfied with this determination, you may make an appeal within thirty (30) days of receipt of this letter to Director, Office of Hearings and Appeals, Department of Energy, 1000 Independence Avenue SW, Washington, D.C. 20585. The envelope and the letter must be clearly marked "Freedom of Information Act Appeal."

You agreed to pay fees up to \$567.87 to process your request. You will be sent an invoice under separate cover by our accounting department for this amount. You will not be charged for the actual costs that were incurred beyond the \$567.87 estimate.

If you have any questions regarding this response, you may contact me at 503-230-7303.

Sincerely,

Christina J. Brannon
Freedom of Information Officer

Michael 9/20
I reached Carter
Stein on 9/20 he
fine w/ sending
a copy of this
letter to Joe Masia
Thanks for
your help. John Rowan

Above note is in reference to attached letter
from Pacific States Marine Fisheries Commission
regarding FOIA request # 05 041

M Coffey
9/21/05



PACIFIC STATES MARINE FISHERIES COMMISSION

45 S E 82ND DRIVE, SUITE 100, GLADSTONE, OREGON 97027-2522
PHONE (503) 650-5400 FAX (503) 650-5426

June 1997

Charles Morrill
Chairman -- PIT Tag Steering Committee
600 N. Capital Way
Olympia, WA 98504

Dave Mills
Co-Chairman -- PIT Tag Steering Committee
9317 N E Hwy 99, Ste. 1
Vancouver, WA 98665

RE: 401 kHz PIT Tag System Failure Forecast

Dear Charles and Dave,

This letter describes the failure rates of our existing 400kHz PIT tag interrogation system components and the life expectancy of this system along with associated costs. I will begin with a description of the key system components and a summary of our requirement for minimum spare parts inventory. Then, I will describe the equipment losses that we have experienced in the past and estimate future failures based upon this estimate. Finally, I will attempt to summarize these numbers with a total cost estimate. In addition, I will point out expenses that are necessary to provide infrastructure to support ANY PIT tag interrogation system on a long term basis. If you require further detail or explanation on any of this, please let me know.

The greatest uncertainty in my mind about keeping the existing system running is whether or not the parts required to keep the system running can be manufactured. I have preliminary information from the manufacturer (Aspen Electronics) that the equipment can be manufactured, but they are double checking the source of components and will have more complete information sometime next week. Aspen electronics currently has a verbal agreement with Destron Fearing to manufacture these parts.

The interrogation systems deployed at the main Snake River dams consist of various electronic components. Some of these components are high failure items. Among these are the exciter, the loop tuner (sometimes called the 'black box') and the reader card. The exciter is used to energize a pair of interrogation coils. We can usually fix a failed exciter. Sometimes the exciter is beyond repair and it is cannibalized -- that is, parts from a failed exciter are used to fix another failed exciter. The loop tuner is used to adjust the frequency of the coil to match the frequency of the PIT tags so they can be energized and read. The loop tuner is a 'potted' component. This means that the sub-components that make up the loop tuner are sealed in a resin or glue like material that makes repair of the loop tuner impossible. When the loop tuners fail, they must be discarded. The reader cards decode the analog radio signals and translate those signals into the numeric tag code that is stored in the database. Most reader cards can be repaired at the sub-component level. None of these components are currently being manufactured.

There are two other key components of the system that are no longer being manufactured, but we have found alternative equipment to replace lost functionality. These two components are the standard bus controller and the power supply. In 1995, we purchased 13 controller back-planes (PN: 7108-51071) for spare parts used to fix bad controllers. These controller back planes cost around \$2,000 each. We have exhausted our supply of these parts. Now, when a controller fails, we now install new Pro-Log controllers which cost around \$1,300 each. Excluding controllers used at the "experimental sites (e.g., Bonneville 2,

Lower Granite Separation by Code, and others), we have 28 controllers in use. Since 1995, we have replaced over half of all controllers (or controller back planes). Based upon the current failure rate, we should plan to replace six to eight controllers per year.

In order to support the interrogation systems in the field, we need to have an adequate supply of spare parts. Our operational minimum requirement for spare parts inventory on hand is:

1. 4 Controllers
2. 12 Exciters
3. 8 Loop Tuners
4. 6 Reader Cards

In 1995, 20 exciters failed and 18 were repairable -- Two of the twenty were cannibalized for parts. In 1996, 25 exciters failed 23 were repaired and three more were cannibalized for parts. So far this year, we have experienced 34 exciter failures, ten of these have been repaired, but we have cannibalized six for parts (we have a backlog of failed exciters that need to be repaired on the test bench). So, since 1995, we have lost a total of eleven exciters. We expect that we will lose more exciters this year. Based upon this accelerating failure rate, I wouldn't be surprised if we lose four or five more exciters this year and eight or ten next year.

In 1995, six loop tuners died. In 1996, eight loop tuners died. So far this year 24 loop tuners died. Aspen Electronics has indicated that they may be able to manufacture additional loop tuners for us.

In 1995 we lost eight reader cards. In 1996 we lost another eight reader cards. So far this year we have lost four reader cards. We appear to be losing reader cards at the steady rate of eight per year.

Here are some assumptions that must be considered as you analyze this information:

1. Our ability to repair malfunctioning equipment will be as good in the future as it is now.
2. Additional, required, spare parts can REALLY be manufactured.
 - Gilio Le from Aspen Electronics will source component for these spare parts and will know which parts are, in fact, obsolete, and whether or not the spare parts can be built.
3. Projected failure rates are close to actual failure rates.
4. We can repair the current spares in need of repair without cannibalizing any.
5. No new systems become operational - juvenile systems or adult systems.
6. We will deplete our operational spare parts inventory.
7. Infrastructure modifications (cat walk access and electrical conduit replacement) is required whether we transition to a new ISO based system or not.

If these assumptions are incomplete or incorrect, and we begin to lose interrogation coils faster than they can be repaired, a contingency plan should be implemented that would de-activate low priority interrogation locations and use the parts to repair other, higher priority interrogation locations. This contingency plan would be developed by consensus of the PIT Tag Steering Committee.

The following table shows equipment losses and spare parts balance through today (11-Jun-97). Please note that this information includes only equipment losses -- that is, it does not include equipment that has failed and that we have successfully repaired:

	Lost 1995/96	Spares Inventory 12/31/96	Allocated for John Day	Lost YTD	Spares Balance YTD	Spares in need of Repair
Controllers	13	16	6	0	16	12
Extenders	5	35	12	6	29	28
Loop Tuners	14	43	24	26	17	0
Reader Cards	16	66	24	0	66	33

The next table summarizes our current equipment balance and projected equipment losses for the rest of this year, 1998 and 1999. Notice that this information indicates that we have borrowed loop tuners from the John Day installation to keep the system running this year. Also notice that most of the spare parts we have now are in need of repair and this table assumes that we can repair all of these components.

	1997 YTD Balance (less John Day)	Projected Additional Losses 1997	Projected Losses 1998	Projected Losses 1999	Projected Spares Inventory 12/99
Controllers	10	2	8	8	(8)
Extenders	17	4	10	15	(12)
Loop Tuners	(7)	6	35	40	(88)
Reader Cards	42	8	8	8	18

The following table summarizes the cost to replace failed parts to keep the existing 400kHz system running through the year 1999:

Part Number	Description	Estimated Replacement Cost	Estimated Number Required	Extended Cost Estimate
Pro-Log-18	Controller	\$1,300	8	\$10,400
800-00-6-00	Exciter	\$2,800	12	\$33,600
800-02-8-01	Loop Tuner	\$325	88	\$28,600
710-00-8-00	Reader Cards	\$345	-0-	-0-
400X Upgrade	Pro-Log Controllers, High Speed Comm boards and Rocketport	\$2,250	43	\$96,750
Estimated Total Spare Parts:				\$169,350

In addition to replacement of existing system components as they fail, we also need to make some system modifications so that the existing system is easier to maintain. For example, we currently have at least four controller configurations installed at production data collection stations. One configuration is the traditional low-speed 400 kHz configuration. The second is a new, high-speed, 400X controller configuration required to support separation by code. The third configuration utilizes a general purpose interface bus (GPIB) that was initially installed at Lower Granite Experimental to support separation by code. The fourth custom configuration dedicates a portable notebook computer and a separate controller to trigger PIT tag separation slide gates from four coils (rather than two coils).

In order to make the existing system maintainable over the next several years, we recommend that a single, standard controller set up be established during the fall of 1997 for deployment in 1998. This would allow us to maintain fewer spare parts, and it would simplify trouble shooting in the event of additional problems. The standard controller setup would cost around \$950 for communications and logic boards plus \$1,300 per controller. This would establish the 400X, high speed controller as the supportable standard. Total cost of this upgrade would be approximately \$96,750 to upgrade the main sites including the new John Day facility and required spare parts.

Other activities that are required in order to make the existing system maintainable in the long run are related to facility infrastructure. For example, flex conduit that is used to provide electrical power to interrogation coils at Lower Granite Dam and Little Goose Dam is in need of replacement. The flex conduit decays in the sunlight, becomes brittle and leaks water. This is unsafe for the people that work at these facilities. If the existing 400kHz system is to be kept until the year 2000, we recommend that this conduit and the corresponding signal conduit be replaced.

Another infrastructure item that needs to be addressed for the longer term maintainability of the PIT tag interrogation system is access to coil and monitor locations. Some of the interrogation coils are accessible only by a man lift or utilizing a safety harness connected to the facility super structure and working from a precarious perch in order to fix an interrogation coil. We recommend that cat-walk access be made available to these hard to reach locations.

These last two items, replacement of the flex conduit and installation of cat-walk access are high cost items (\$250,000 - \$550,000?) and need to be coordinated with the US Army Corps of Engineers.

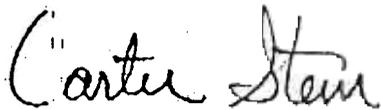
Here is the bottom line:

Minimum Spare Parts:	\$72,600
400X Controller Upgrade:	\$96,750
Conduit / Catwalk:	<u>\$250,000 - \$550,000</u>
Total:	\$419,350 to \$719,350

I hope that this letter provides the detailed information that is needed to support a decision that determines whether or not we attempt to keep the current system alive for two more years.

Once again, if you need further information or clarification on what I have presented here, please let me know.

Sincerely,



Carter Stein
PTAGIS Program Manager

Cc: PIT Tag Steering Committee
Stan Allen
Michelle Dehart - FPC
John Rowan - BPA / PTAGIS COTR



Department of Energy

Official File

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

CORPORATE

August 2, 2005

In reply refer to: KDP-7

Electronic Identification Devices, LTD
Mr. Joseph Masin, President
PO Box 40227
Santa Barbara, CA 93140

RE: FOIA #05-047

Dear Mr. Masin:

This letter confirms our phone discussion on July 28, 2005 regarding the information you requested under the Freedom of Information Act. You agreed to narrow the scope to the following:

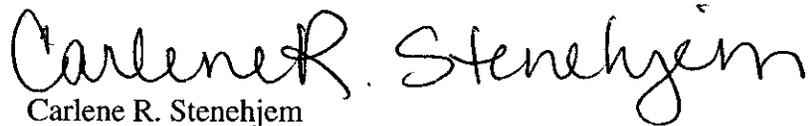
1. Copy of the sole supplier contract(s) or agreements(s) between your agency and the vendor(s) for PIT Tags (Radio Frequency identification Devices) used for the identification of fish, crabs, etc., if any.
2. Copies of any and all addenda to such contract(s) or agreement(s)
3. A list of all entities (organizations) to whom or on whose behalf the transponders were distributed.
4. Memoranda, affidavits, recommendations or any document used by the agency to substantiate or support the agency's decision to use the ISO 111784/85 complaint PIT tags (transponders) operating on 134.2 KHz frequency.

You agreed to pay up to \$567.87 process fees for your request. In order for us to consider these requests perfected and begin the 20 working day response time allowed by FOIA, we require your signed agreement to pay the fee amount estimated above. Please provide your signature on the third page of this letter indicating your agreement to pay the estimated fees and return it to us. Upon receipt, our staff will promptly begin processing these requests in the 20 working day time frame provided under the FOIA.

Mr. John Rowan, Fish and Wildlife Mitigation Project Advisor, has been designated as Authorizing Official for your request. Mr. Rowan can be reached at 503-230-4238.

Should you have any questions, you may contact me at Mail Stop DM-7 or by calling 503-230-5109.

Sincerely,

A handwritten signature in black ink that reads "Carlene R. Stenehjem". The signature is written in a cursive style with a large, prominent "C" at the beginning.

Carlene R. Stenehjem
Freedom of Information Office

RE: FOIA Request #05-047 – Fee Estimate Agreement

For BPA's official records, please sign in the space indicated below that you accept the estimation of fees contained in this letter dated Aug. 2, 2005, regarding FOIA request #s 05-047 and send back to me by return fax (503) 230-4019 or mail.

Joseph V. Masin, President
Electronic Identification Devices, LTD



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

CORPORATE

August 17, 2005

In reply refer to: KDP-7

Mr. Joseph Masin, President
Electronic Identification Devices, LTD
P.O. Box 40227
Santa Barbara, CA 93140

RE: FOIA Request #05-047

Dear Mr. Masin:

Thank you for your fax letter of Aug. 15, 2005 agreeing to pay fees to process your FOIA request. In your original letter of July 28, 2005 requesting information under the Freedom of Information Act you requested copies of documents that contain the following information:

1. Copy of the sole supplier contract(s) or agreements(s) between your agency and the vendor(s) for PIT Tags (Radio Frequency identification Devices) used for the identification of fish, crabs, etc., if any.
2. Copies of any and all addenda to such contract(s) or agreement(s)
3. A list of all entities (organizations) to whom or on whose behalf the transponders were distributed.
4. Memoranda, affidavits, recommendations or any document used by the agency to substantiate or support the agency's decision to use the ISO 111784/85 complaint PIT tags (transponders) operating on 134.2 KHz frequency.

Your agreement to pay fees was received by our office on Aug. 15, 2005 and has been logged in as FOIA #05-047. You agreed to pay fees up to \$567.87 to process your request.

Mr. John Rowan, Fish and Wildlife Mitigation Project Advisor, has been designated as Authorizing Official for your request. Mr. Rowan has 20 working days, until Sept. 13, 2005 to provide a response. Should you have any questions Mr. Rowan may be reached at Mail Stop KEWR-4 or by calling (503) 230-4238.

Sincerely,

A handwritten signature in cursive script that reads "Annie Eissler".

Annie Eissler
Freedom of Information Officer



Department of Energy

Official File

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

CORPORATE

August 22, 2005

In reply refer to: KDP-7

Mr. Joseph Masin, President
Electronic Identification Devices, LTD
P.O. Box 40227
Santa Barbara, CA 93140

RE: FOIA Request #05-047

Dear Mr. Masin:

I am writing regarding your Freedom of Information Act (FOIA) request #05-047. We are unable to meet the initial deadline for completion of this FOIA request. As permitted by statute, we will take a ten working-day extension of time in which to respond to your request. The extension will also provide us with enough time to collect and complete the review process of the materials gathered in response to your FOIA request. The new due date for this FOIA is Sept. 27, 2005.

If you have any questions, please contact me at (503) 230-5110. Thank you for your patience.

Sincerely,

A handwritten signature in cursive script that reads "Annie Eissler".

Annie Eissler
Freedom of Information Officer

bcc:

J. Rowan – KEWR-4

K. Van Leuven – TLP-4

C. Jacobson – LC-7

Official File – KDP-4 (EX 13-13, 05-047)

Aeissler:crs: 5109/8/22/05 (K:\KDP\FOIA\FOIA 2005 Letters\Ext Letters\EID Extension 05-047.doc)



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

CORPORATE

September 21, 2005

In reply refer to: KDP-7

Mr. Joseph Masin, President
Electronic Identification Devices, LTD
P.O. Box 40227
Santa Barbara, CA 93140

RE: FOIA Request #05-047

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You agreed to pay fees up to \$567.87 to process your request. You will be sent an invoice under separate cover by our accounting department for this amount. You will not be charged for the actual costs that were incurred beyond the \$567.87 estimate.

If you have any questions regarding this response, you may contact me at 503-230-7303.

Sincerely,


Christina J. Brannon
Freedom of Information Officer

MASTER CONTRACT

Mail Invoice To:

***** BLANKET MASTER CONTRACT *****

DISBURSEMENT OPERATIONS - DFRD
BPA CORPORATE OFFICE
P.O. BOX 3621
PORTLAND OR 97208-3621

Contract : 00002760
Release : 00000
Page : 1

Vendor:
DESTRON-FEARING
490 VILLAUME AVE
SOUTH ST PAUL MN 55075

Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: PROJECT 97-010-00, PIT TAG SYSTEM TRANSITION
Project :

Total Value :
Pricing Method: ESTIMATE
Performance Period: 11/17/00 - 09/30/07

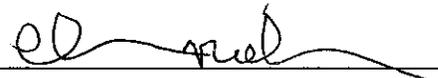
Payment Terms: % Days Net 10



Contractor Authorized Signature
Randolph K. Geissler, CEO

Printed Name/Title
27 Nov 2000

Date Signed



BPA Contracting Officer
Christopher Nielsen, Contracting Officer

Printed Name/Title
11/17/00

Date Signed

This award contains the following - TEXT ATTACHED

SUPPLY TERMS AND CONDITIONS

Terms and Conditions - Text

Scope of Work Attached

**PIT TAG SYSTEM TRANSITION
PROJECT NO. 97-010-00**

This is a new Master Agreement for the purchase of ISO PIT tags and transceiver systems in support of the Columbia River Basin PIT tag Detection System

Performance Period: November 16, 2000 through September 30, 2007
Contract Amount: Per each Task Order
Contract Total: Per each Task Order

FOB Point: Destination

Contractor's Technical Contact: Sean Casey (651) 455-1621
Contractor's Administrative Contact: Sean Casey (651) 455-1621

Government Technical Contact: John Rowan (503) 230-1621
Government Administrative Contact: Chris Nielsen (503) 230-3612

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UNIT 1 — SCHEDULE

CONTRACT TYPE (7-1) (SEP 98)(BPI 7.1)

This is an INDEFINITE-QUANTITY TYPE contract.

INDEFINITE-QUANTITY CONTRACT: ORDERING (7-5) (AUG 00)(BPI 7.2.5.1.1)

- (a) This is an indefinite-quantity contract. The Contractor shall furnish to BPA, when and if ordered, the supplies or services specified in the Schedule of Items. The quantities of supplies and services specified in the Schedule of Items are estimates only and are not purchased by this contract. Delivery or performance shall be at locations designated in orders.
- (b) Only orders placed by individuals or BPA offices designated by the Contracting Officer will be considered valid orders. If mailed, a delivery order is considered "issued" when BPA deposits the order in the mail. Orders may also be issued orally or by facsimile. Orders may also be issued electronically as an unalterable, electronic read-only formatted document transmitted via the Internet. A binding order will be formed when the Contracting Officer or his/her authorized representative transmits to the Contractor a complete and legible order that includes an order (release) number and the contract number, and receives from the Contractor a written or facsimile or electronic Internet confirmation. An order or confirmation transmitted via facsimile or the Internet will be deemed "writings."
- (c) There is no limit on the number of orders that may be issued.
- (d) All orders are subject to the Terms and Conditions of this contract. In the event of conflict between an order and this contract, the contract shall control.

MASTER AGREEMENT: BASIC TERMS (7-6) (AUG 00)(BPI 7.2.5.2.1)

- (a) **Effective Period.** This agreement is effective upon receipt and acceptance of this Agreement and continues until canceled by BPA or the Contractor in writing, or the expiration date specified within this master agreement, whichever occurs first.
- (b) **BPA's Obligation.** This agreement places no obligation on BPA to purchase a minimum amount of supplies or services. BPA is obligated only to the extent of authorized orders (releases) actually placed against this agreement. **However, BPA agrees to purchase all ISO PIT tags and transceiver systems exclusively from Destron Fearing.**
- (c) **Order Placement, Confirmation and Contract Formation.** Only orders placed by individuals specifically authorized by the Contracting Officer will be considered valid orders. Orders may also be issued orally or by facsimile. Orders may also be issued electronically as an unalterable, electronic read-only formatted document transmitted via the Internet. A binding order will be formed when the Contracting Officer or his/her authorized representative transmits to the Contractor a complete and legible order that includes an order (release) number and the contract number, and receives from the Contractor a written or facsimile or electronic Internet confirmation. An order or confirmation transmitted via facsimile or the Internet will be deemed "writings." There is no limit on the number of orders that may be issued.
- (d) **Order Numbers.** An "order number" will be the identifying number for each order placed against this agreement. Both this order number and the Master Agreement Number must be included on all correspondence, packing lists, invoices, etc.
- (e) **Delivery Tickets.** All deliveries made under this agreement shall be accompanied by a delivery ticket or sales slip which shall contain the following minimum information: (1) Name of Contractor; (2) Master Agreement Number; (3) Date of order; (4) Name of BPA employee placing order; (5) Order number; (6) Itemized list of supplies or services furnished (quantity, unit price, and extended price, less discounts; and (7) Date of delivery or shipment.

- (f) **Variation In Quantity.** No variation in the quantity of any item ordered will be accepted unless such variation has been caused by conditions of loading, shipping, or packing, or allowances in manufacturing processes, and then only to the extent, if any, specified elsewhere in this agreement or in any specific order.
- (g) **Transportation Charges.** No allowance will be made for packing, cartage, carting, or transportation charges unless specifically provided elsewhere in this agreement or unless provided at the time a specific order is placed.
- (h) **Inspection and Acceptance.** Inspection and acceptance will be at the place specified in each order for delivery or performance.
- (i) **Taxes and Duties.** The price includes all applicable Federal, State, and local taxes and duties in effect on the date a call is placed, but does not include any taxes from which BPA, the Supplier, or any specific order is exempt. Upon request of the Supplier, BPA shall furnish a Tax Exemption Certificate or similar evidence of exemption, if appropriate, with respect to any such tax not included in the price pursuant to this clause.
- (j) **Payment.**

(1) **Payment Due Date.** Payment shall be due not later than **ten (10)** calendar days after the later of the date on which BPA actually receives a proper invoice in the designated billing office or the date when the items delivered or completed services are accepted by BPA. For purposes of payment only, items will be deemed accepted not later than seven (7) working days after proper delivery. If delivered items or completed services are found defective, the provisions of this paragraph will be reapplied upon receipt of a corrected item or service.

(2) **Invoices.** Suppliers may invoice monthly or at more frequent intervals as may be agreed to by the CO. Invoices shall include:

- Supplier's name and address;
- Banking information;
- Taxpayer Identification Number;
- Invoice date;
- Master agreement number;
- Order number;
- Description of products delivered or work performed;
- Price and quantity of item(s) actually delivered or rendered identified separately by order number,
- Name and address of the person to whom payment will be made, and
- Name (where practicable), title, phone number, and mailing address of person to be notified in event of a defective invoice.

If the order is for supplies, each invoice shall also contain a reference to each delivery ticket and shall be supported by a copy of the delivery ticket. Failure to submit a proper invoice may result in a delay in payment.

(3) **Prompt Payment Act.** This agreement is subject to the provisions of the Prompt Payment Act (31 U.S.C. 3901 et seq.), and Office of Management and Budget Circular A-125.

(4) **Interest Penalty Payments.** If interest penalty payments are determined due under the provisions of the Prompt Payment Act, payment shall be made at the rates determined by the U.S. Treasury, Section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611).

PERFORMANCE PERIOD AND OPTIONS (7-7)
(SEP 98)(BPI 7.2.6)

- (a) This contract is effective on the date of award and shall run through September 30, 2007.
- (b) BPA may unilaterally extend the term of this contract by written notice to the Contractor. BPA will give the Contractor preliminary notice of its intent to extend at least 30 days before the contract expires.
- (c) **BPA reserves the right to terminate this agreement in accordance with the Termination for Convenience of BPA clause in the event new technology renders these products obsolete, health and safety issues arise or it is otherwise in the best interest of BPA.**

**SCHEDULE OF PRICES (22-51)
(SEP 98)**

The contractor shall provide all supplies/services according to the schedule below

Item No.	Description	Quantity	Unit	Unit Price
0001	Transceiver system standard model FS 1001 for detection of 134.2 kHz PIT tags in juvenile salmonids	Per Delivery Order	Each	\$ 6,000.00
0002	Transceiver system standard model FS 1001A for detection of 134.2 kHz PIT tags in adult salmonids. Note: Description same as FS 1001 units. Units satisfy requirements document (See Note 1 below).	Per Delivery Order	Each	\$ 6,000.00
0003	Portable Transceiver system model FS 2001F	Per Delivery Order	Each	\$ 1,765.95
0004	COMPONENTS:			
	Tabletop Antenna		Each	\$ 195.00
	Racket Antenna		Each	\$ 195.00
	Battery Charger Only		Each	\$ 90.00
	Power Supply Only		Each	\$ 110.00
	Cable Kit		Each	\$ 200.00
	Battery Pack		Each	\$ 87.00
0005	PIT Tags			
	Year 1, October 1, 2000 through September 30, 2001		Each	\$ 2.25
	Year 2, October 1, 2001 through September 30, 2002		Each	\$ 2.25
	Year 3, October 1, 2002 through September 30, 2003		Each	\$ 2.25
	Year 4, October 1, 2003 through September 30, 2004		Each	\$ 2.25
	Year 5, October 1, 2004 through September 30, 2005		Each	\$ 2.10
	Year 6, October 1, 2005 through September 30, 2006		Each	\$ 2.00
	Year 7, October 1, 2006 through September 30, 2007		Each	\$ 1.90

Notes

- Adult transceiver units will satisfy the attached requirements document which is also available at: <http://www.efw.bpa.gov:88/ColumbiaBasin/FishAndWildlifeProjects/BPA/FWP/198331900/APTOC/Transceiver%20Evaluation/TransceiverRequirements.doc>
- Model No. FS 1001A delivery shall be not later than 9 months after receipt of individual Delivery Order. The delivery of all other equipment shall be negotiated with each Delivery Order.
- "Super-12" tag shall be delivered commencing in year 3 (October 1, 2002)
- Pricing structure for PIT tags assumes 3 million tags purchased regionally on an annual basis. Price reductions may be negotiated if Destron Fearing's total PIT tag sales exceed these projections.

UNIT 2 — CONTRACT CLAUSES

PAYMENT AND TAXES

**ELECTRONIC FUNDS TRANSFER PAYMENT (22-20)
(SEP 98)(BPI 22.6.2)**

- Payment Method. Payments under this contract, including invoice and contract financing payments, will be made by electronic funds transfer (EFT). Contractors are required to provide its taxpayer identification number (TIN) and other necessary banking information as per paragraph (c) of this clause to receive EFT payment.
- Contractor EFT arrangement with a financial institution or authorized payment agent. The Contractor shall designate to BPA, as per paragraph (c) of this clause, and maintain at its own expense, a single financial institution or authorized payment agent capable of receiving and processing EFT using the Automated Clearing House (ACH) transfer method.

The most current designation and EFT information will be used for all payments under all BPA contracts, unless the BPA Disbursement Operations office is notified of a change as per paragraph (d) of this clause. An initial designation should be submitted after award, but no later than three weeks before an invoice or contract financing request is submitted for payment.

- (c) Submission of EFT banking information to BPA. The Contractor shall submit EFT enrollment banking information directly to BPA Disbursement Operations using either SF 3881, "ACH Vendor/Miscellaneous Payment Enrollment Form" or BPA's "Simplified Vendor Express Enrollment Form." These EFT enrollment forms are available either from the Contracting Officer (CO) or from BPA Disbursement Operations. If you have any questions or need assistance, please call the BPA "Vendor Hot Line" at (503) 230-5787. Submit completed enrollment form to the following address:

Bonneville Power Administration
Disbursement Operations, Attention: EFT
PO Box 3621
Portland, OR 97208-3621

- (d) Change in EFT information. In the event that EFT information changes or the Contractor elects to designate a different financial institution for the receipt of any payment made using EFT procedures, the Contractor shall be responsible for providing the changed information to the BPA Disbursement Operations office. BPA Disbursement Operations must be notified 30 days prior to the date such change is to become effective.
- (e) Suspension of Payment. BPA is not required to make any payment under this contract until receipt of the correct EFT payment information from the Contractor.
- (f) EFT and prompt payment. BPA shall pay no penalty on delay of payment resulting from defective EFT information. BPA will notify the Contractor within 7 days of its receipt of EFT information which it determines to be defective.
- (g) EFT and assignment of claims. If the Contractor assigns the proceeds of this contract as provided for in the Assignment of Claims clause of this contract, the assignee shall provide the assignee's EFT information required by paragraph (c) of this clause.

DISCOUNTS FOR PROMPT PAYMENT (22-10)
(SEP 98)(BPI 22.2.1)

In connection with any discount offered for prompt payment, time shall be computed from the date shown on the invoice or if no date is shown then from the date BPA receives the invoice. For the purpose of computing the discount earned, payment shall be considered to have been made on the date which appears on the payment check or the date on which an electronic funds transfer was made.

INTEREST ON AMOUNTS DUE BPA (22-13)
(SEP 98)(BPI 22.3)

- (a) Notwithstanding any other clause of this contract, all amounts that become payable by the Contractor to BPA under this contract (net of any applicable tax credit under the Internal Revenue Code (26 U.S.C. 1481)) shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in Section 12 of the Contract Disputes Act of 1978 (Public Law 95-563), which is applicable to the period in which the amount becomes due, as provided in Paragraph (b) of this clause, and then at the rate applicable for each 6-month period as fixed by the Secretary until the amount is paid.
- (b) Amounts shall be due at the earliest of the following dates:
- (1) The date fixed under this contract.
 - (2) The date of the first written demand for payment consistent with this contract, including any demand resulting from a default termination.
 - (3) The date BPA transmits to the Contractor a proposed supplemental agreement to confirm completed negotiations establishing the amount of debt.

- (4) If this contract provides for revision of prices, the date of written notice to the Contractor stating the amount of refund payable in connection with a pricing proposal or a negotiated pricing agreement not confirmed by contract modification.
- (c) Payment will be due within 30 days of the date of the invoice. The collection actions available under the Debt Collection Act of 1982 (Public Law 97-365), as amended, and the revised Federal Claims Collections Standards (4 CFR 102), will be utilized. Administrative charges and penalties will be charged in accordance with 31 U.S.C. 3717, except where prohibited or explicitly provided for by statute or regulation required by statute.

GENERAL CONTRACT ADMINISTRATION

APPLICABLE REGULATIONS (1-1) (SEP 98)(BPI 1.3.1)

Purchases made by the Bonneville Power Administration are subject to the policies and procedures outlined in the Bonneville Purchasing Instructions. The BPI is available without charge on the Internet at <http://www.bpa.gov>. Copies are available for purchase from the Head of the Contracting Activity. The public may purchase unbound copies of the BPI from the Head of the Contracting Activity - GP, Bonneville Power Administration, P.O. Box 3621, Portland, Oregon 97208. The cost is \$30.00. Subscriptions are not available.

SUBCONTRACTS (14-7) (SEP 98)(BPI 14.9)

The Contractor shall not subcontract any work without prior approval of the Contracting Officer, except work specifically agreed upon at the time of award. BPA reserves the right to approve specific subcontractors for work considered to be particularly sensitive. Consent to subcontract any portion of the contract shall not relieve the Contractor of any responsibility under the contract.

CONTRACT ADMINISTRATION REPRESENTATIVES (14-2) (SEP 98)(BPI 14.3.2)

- (a) In the administration of this contract, the Contracting Officer may be represented by one or more of the following: Contracting Officer's Representative for administrative matters, and Contracting Officer's Technical Representative, Receiving Inspector, and/or Field Inspector for technical matters.
- (b) These representatives are authorized to act on behalf of the Contracting Officer in all matters pertaining to the contract, except: (1) contract modifications that change the contract price, technical requirements or time for performance, unless delegated field modification authority (see clause 24-25); (2) suspension or termination of the Contractor's right to proceed, either for default or for convenience of BPA; and (3) final decisions on any matters subject to appeal, as provided in a disputes clause. In addition, Field Inspectors may not make final acceptance under the contract.

STOP WORK ORDER (14-14) (SEP 98)(BPI 14.12)

- (a) The Contracting Officer may order the Contractor to suspend all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of BPA.
- (b) The Contractor shall immediately comply with the Contracting Officer's order and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order.
- (c) If a stop work order is issued for the convenience of BPA, the Contracting Officer shall make an equitable adjustment in the delivery schedule or contract price, or both, if the order results in a change in the time required for, or the costs properly allocable to, the performance of any part of this contract.
- (d) A claim under this clause shall not be allowed (1) for any cost incurred more than 20 days before the Contractor notified the Contracting Officer of the basis of the claim in writing, and (2) unless the claim stating the amount of time or money requested, is asserted in writing as soon as practicable after the termination of the delay or interruption, but not later than the day of final payment under the contract.

CHANGES - FIXED-PRICE (14-8)
(SEP 98)(BPI 14.10.5.2)

- (a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract to any one or more of the following:
 - (1) Drawings, designs, or specifications when the supplies to be furnished are to be specially manufactured for BPA in accordance with the drawings, designs, or specifications.
 - (2) Method of shipment or packing.
 - (3) Place of delivery or performance.
 - (4) Description of services to be performed.
 - (5) Time of performance (i.e., hours of the day, days of the week, etc.).
 - (6) BPA-furnished property.
 - (7) Place of inspection or acceptance.
- (b) If any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, the Contracting Officer shall make an equitable adjustment in the contract price, the delivery schedule, or both, and shall modify the contract.
- (c) The Contractor must assert its right to an adjustment under this clause within 30 days from the date of receipt of the written order, but not later than final payment.
- (d) Failure to agree to any adjustment shall be a dispute under a disputes clause if one is included in this contract. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.
- (e) Constructive Changes. If the Contractor considers that a BPA action or inaction constitutes a change to the contract (constructive change), and the change is not identified as such in writing and signed by the Contracting Officer, the Contractor shall promptly notify the Contracting Officer in writing. No equitable adjustment will be made for costs incurred more than 20 days before the Contractor gives written notice of the constructive change.
- (f) Notwithstanding other provisions herein, only the Contracting Officer, or persons specifically delegated authority to do so by the Contracting Officer, are authorized to orally modify or affect the terms of this contract. Contractor response to oral direction from any other source is at its own risk of liability.

MODIFICATION COST PROPOSAL - PRICE BREAKDOWN (14-13)
(SEP 98)(BPI 14.10.5.2)

- (a) The Contractor, in connection with any proposal it makes for a contract modification, shall furnish a price breakdown, itemized as required by the Contracting Officer. The breakdown shall be in enough detail to permit an analysis of all material, labor, equipment, subcontract, and overhead costs, as well as profit, and shall cover all work involved in the modification, whether such work was deleted, added or changed. Any amount claimed for subcontracts shall be supported by similar price breakdowns from those subcontractors.
- (b) In addition, if the proposal includes a time extension, a justification thereof shall also be furnished. Notwithstanding any other provisions of this contract, it is mutually understood that the time extension for changes in the work will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of work. The contract completion dates will be extended only for those specific elements so delayed and the remaining contract completion dates for all other portions of the work will not be altered.
- (c) The proposal, together with the price breakdown and time extension justification, shall be furnished by the date specified by the Contracting Officer.

PRICING OF ADJUSTMENTS (14-12)
(SEP 98)(BPI 14.10.5.2)

When costs are a factor in any determination of a contract price adjustment pursuant to the Changes clause or any other modification in connection with this contract, such costs shall be in accordance with the contract cost principles and procedures in Part 13 of the Bonneville Purchasing Instructions which are in effect on the date of this contract.

PRICE REDUCTION FOR INACCURATE COST OR PRICING INFORMATION (12-2)
(SEP 98)(12.5.4)

BPA retains the right to reduce the contract price, including profit or fee, if the cost or pricing information submitted by the Contractor was not complete, accurate, and current at the time of final price agreement. This right applies to the contract as awarded, to any subsequent modifications, and to any data submitted by subcontractors.

EXAMINATION OF RECORDS (12-3)
(SEP 98)(BPI 12.8.8.1)

- (a) The contractor shall keep accurate and complete accounting records in support of all cost-based billings to BPA in accordance with generally accepted accounting principles and practices. The Comptroller General of the United States, the Contracting Officer, or their representatives, shall have the right to examine, audit, and reproduce any of the Contractor's pertinent records involving transactions related to this contract or any subcontract hereunder. Records includes, but is not limited to, books, documents, and other information regardless of form (e.g., machine readable data) or type (e.g. data bases, applications software, data base management software, utilities, etc.) including computations and projections related to proposing, negotiating, pricing, subcontracting, modifying or performing the contract. The purpose of such examination shall be to determine the accuracy, completeness, and currency of costs charged under the contract and/or to verify cost or pricing information submitted to BPA.
- (b) Such documents shall be available for three (3) years after final payment or, in the case of termination, three (3) years from the date of any final termination settlement. Records relating to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims have been disposed of.
- (c) The contractor shall insert a clause containing all the terms of this clause, including this paragraph (c), in other than fixed price subcontracts over \$100,000, altering the clause as necessary to identify the contracting parties and the Contracting Officer under the prime contract.

ORDER OF PRECEDENCE (14-3)
(SEP 98)(14.4.1)

Any inconsistency in this solicitation or contract shall be resolved by giving precedence in the following order: (a) the Schedule (excluding the specifications or statement of work); (b) contract clauses; (c) the specifications or statement of work; and (d) other documents, exhibits, and attachments.

STANDARDS OF CONDUCT AND BUSINESS PRACTICES

LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (3-4)
(SEP 98)(BPI 3.5.5)

- (a) As used in this clause:

"Covered Federal action" means:

- (1) The awarding of any Federal contract.
- (2) The extension, continuation, renewal, amendment, or modification of any Federal contract.

"Indian tribe" and "tribal organization" have the meaning provided in Section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) and includes Alaskan Natives.

"Influencing or attempting to influence" means making, with the intent to influence, any communication to or appearance before an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any covered Federal action.

"Local government" means a unit of government in a State and, if chartered, established, or otherwise recognized by a State for the performance of a governmental duty, including a local public authority, a special district, an intrastate district, a council of governments, a sponsor group representative organization, and any other instrumentality of a local government.

"Person" means an individual, corporation, company, association, authority, firm, partnership, society, State, and local government, regardless of whether such entity is operated for profit or not for profit. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Reasonable compensation" means, with respect to a regularly employed officer or employee of any person, compensation that is consistent with the normal compensation for such officer or employee for work that is not furnished to, not funded by, or not furnished in cooperation with the Federal Government.

"Reasonable payment" means, with respect to professional and other technical services, a payment in an amount that is consistent with the amount normally paid for such services in the private sector.

"Recipient" includes all Contractors and subcontractors. The term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Regularly employed" means, with respect to an officer or employee of a person requesting or receiving a Federal contract, an officer or employee who is employed by such person for at least 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person for receipt of such contract. An officer or employee who is employed by such person for less than 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person shall be considered to be regularly employed as soon as he or she is employed by such person for 130 working days.

"State" means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, a territory or possession of the United States, an agency or instrumentality of a State, and a multi-State, regional, or interstate entity having governmental duties and powers.

- (b) The Contractor who requests or receives from an agency a Federal contract shall file with that agency a disclosure form, OMB standard form LLL, Disclosure of Lobbying Activities, if such person has made or has agreed to make any payment using non appropriated funds (to include profits from any covered Federal action), which would be prohibited under clause if paid for with appropriated funds.
- (c) The Contractor shall file a disclosure form at the end of each calendar quarter in which there occurs any event that materially affects the accuracy of the information contained in any disclosure form previously filed by such person under Paragraph (b) of this clause. An event that materially affects the accuracy of the information reported includes--
 - (1) A cumulative increase of \$25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action;
 - (2) A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or
 - (3) A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.
- (d) The Contractor shall require the submittal of a certification, and if required, a disclosure form, by any person who requests or receives any subcontract exceeding \$100,000 under the Federal contract.
- (e) All subcontractor disclosure forms (but not certifications), shall be forwarded from tier to tier until received by the prime Contractor. The prime Contractor shall submit all disclosure forms to the Contracting Officer at the end of the calendar quarter in which the disclosure form is submitted by the subcontractor. Each subcontractor certification shall be retained in the subcontract file of the awarding Contractor.

- (f) Any person who makes an expenditure prohibited under this clause or who fails to file or amend the disclosure form to be filed or amended by this clause shall be subject to a civil penalty as provided by 31 U. S. Code 1352. An imposition of a civil penalty does not prevent the Government from seeking any other remedy that may be applicable.

DRUG-FREE WORKPLACE (3-6)
(SEP 98)(BPI 3.6.4)

- (a) The contractor agrees that with respect to all employees to be employed under this contract it will provide a drug-free workplace as described in this clause.
- (b) Definitions. As used in this clause "Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812), as from time to time amended, and as further defined in regulation at 21 CFR 1308.11-1308.15, as amended.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means a Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession or use of any controlled substance.

"Drug-free workplace" means the site(s) for the performance of work done by the contractor in connection with a specific contract at which employees of the contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

"Employee" means an employee of a contractor directly engaged in the performance of work under a Government contract. "Directly engaged" is defined to include all direct cost employees and any other contractor employees who have other than a minimal impact or involvement in contract performance.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

- (c) The Contractor, if other than an individual, shall -- within 30 calendar days after award (unless a longer period is agreed to in writing for contracts of 30 calendar days or more performance duration); or as soon as possible for contracts of less than 30 calendar days performance duration--
- (1) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;
 - (2) Establish an on-going drug-free awareness program to inform such employees about--
 - (A) The dangers of drug abuse in the workplace;
 - (B) The contractor's policy of maintaining a drug-free workplace;
 - (C) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (D) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.
 - (3) Provide all employees engaged in performance of the contract with a copy of the statement required by subparagraph (c)(1) of this clause;
 - (4) Notify such employees in writing in the statement required by subparagraph (c)(1) of this clause that, as a condition of continued employment on this contract, the employee will--
 - (A) Abide by the terms of the statement; and

- (B) Notify the employer in writing of the employee's conviction under a criminal drug statute for a violation occurring in the workplace no later than five (5) days after such conviction.
- (5) Notify the Contracting Officer in writing within ten (10) days after receiving notice under subdivision (c)(4)(B) of this clause, from an employee, or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;
- (6) Within 30 days after receiving notice under subparagraph (c)(4)(B) of this clause of a conviction, take one of the following actions with respect to any employee who is convicted of a drug abuse violation occurring in the workplace:
 - (A) Taking appropriate personnel action against such employee, up to and including termination; and/or
 - (B) Require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.
- (7) Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs (c)(1) through (c)(6) of this clause.
- (d) In addition to other remedies available to the Government, the Contractor's failure to comply with the requirements of paragraph (c) of this clause may, pursuant to BPI 3.6.3 render the contractor subject to suspension of contract payments, termination of the contract for default, and suspension or debarment.

SOCIO-ECONOMIC ISSUES

BUY AMERICAN ACT - SUPPLIES (9-3) (SEP 98)(BPI 9.1.6)

- (a) The Buy American Act (41 U.S. Code 10a-d) provides that the Government give preference to domestic source end products.

"Components" means those articles, materials, and supplies, which are incorporated directly into the end products.

"End products" means those articles, materials, and supplies to be acquired for public use under this contract.

"Domestic end product" means (1) an unmanufactured end product mined or produced in the United States or (2) an end product manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind as the products referred to in (b) (2) or (3) of this clause shall be treated as domestic. Scrap generated, collected, and prepared for processing in the United States is considered domestic.

- (b) The Contractor shall deliver only domestic end products, except those
 - (1) That BPA determines are not mined, produced or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality;
 - (2) For which BPA determines that domestic preference would be inconsistent with the public interest; or
 - (3) For which BPA determines the cost to be unreasonable.

(The foregoing requirements are administered in accordance with Executive Order No. 10582, as amended, and Part 9 of the BPI.)

NONDISCRIMINATION AND AFFIRMATIVE ACTION (10-1) (SEP 98)(BPI 10.2)

- (a) The Contractor shall not discriminate against its employees or applicants because of their race, color, religion, sex, national origin, age, status as Disabled or Vietnam Veterans, or physical or mental handicaps. The Contractor certifies

that it does not, and will not, maintain segregated facilities or accommodations on the basis of race, color, religion or national origin. Regarding any position for which an employee or an applicant is qualified, the Contractor agrees to take affirmative action to employ, train, advance in employment, and retain individuals in accordance with applicable laws and regulations including:

- (1) For nondiscrimination based on race, color, religion, sex or national origin this includes, but is not limited to, the U.S. Constitution, and Parts II and IV of Executive Order 11246, September 24, 1965 (30 FR 12319). Contractor disputes related to compliance with its obligations shall be handled according to the rules, regulations, and relevant orders of the Secretary of Labor (See 41 CFR 60-1.1).
 - (2) For nondiscrimination based on Disabled or Vietnam Veterans this includes, but is not limited to, the Vietnam Era Veterans Readjustment Assistance Act of 1972, as amended (38 U.S.C. 4012)(the Act); Executive Order 11701, January 24, 1973 (38 CFR 2675, January 29, 1973); and the regulations of the Secretary of Labor (41 CFR Part 60-250).
 - (3) For nondiscrimination based on the Handicapped this includes, but is not limited to, Section 503 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 793)(the Act); Executive Order 11758, January 15, 1974; and the regulations of the Secretary of Labor (41 CFR Part 60-741).
 - (4) For nondiscrimination based on Age this includes, but is not limited to, Executive Order 11141, February 12, 1964 (29 CFR 2477).
- (b) The Contractor shall include the terms of this clause in every subcontract or purchase order exceeding \$50,000 and shall act as specified by the Department of Labor to enforce the terms and implement remedies.

ENVIRONMENT AND SAFETY

CLEAN AIR AND WATER (15-1) (SEP 98)(BPI 15.1)

Facilities listed on the Environmental Protection Agency List of Violating Facilities shall not be used in the performance of this contract. The Contractor agrees to meet Clean Air and Water standards as identified in 42 U.S.C. 7401 et seq., Executive Order 11738, and any implementation plan described in 42 U.S.C. 1342 as well as local government with pretreatment regulations (33 U.S.C. 1317). The Contractor shall comply with all requirements of the Clean Air Act (42 U.S.C. 7414) and the Clean Water Act (33 U.S.C. 1318) relating to inspection, monitoring, entry, reports and information, and all regulations and guidelines.

INSPECTION AND WARRANTY

INSPECTION - SUPPLIES (18-2.1) (SEP 98)(BPI 18.3.1)

- (a) The Contractor shall provide and maintain a quality system covering supplies ("supplies" includes equipment, fabrication processes, raw materials, and intermediate assemblies) in accordance with Unit 4 of this contract.
- (b) BPA may inspect and test all supplies called for by the contract at any place and time. If inspection and tests are performed on the Contractors' site, the Contractor shall provide BPA reasonable facilities and assistance. Except as otherwise provided in the contract, BPA shall bear the expense of BPA inspections or tests made at other than the Contractor's or subcontractor's premises; provided that, in case of rejection, BPA shall not be liable for any reduction in the value of inspection or test samples. BPA is not obligated to perform any inspection and test for the benefit of the Contractor unless specifically set forth elsewhere in this contract. BPA will perform inspections and tests in a manner that will not unduly delay the work.
- (c) The Contractor may be charged for BPA's costs of inspection if supplies are not ready at the time specified by the contract for inspection and tests or where prior rejection makes reinspection and retesting necessary. If the Contractor fails to perform tests required by the contract, BPA may perform the tests and charge the Contractor for the costs of such.

- (d) BPA may either reject or require correction of nonconforming supplies.
- (e) If this contract provides for inspection at the factory (see Unit 4), supplies shall not be shipped until all factory tests and inspections have been made and the supplies released by BPA's Contracting Officer's Technical Representative (COTR), unless waived in writing by the Contracting Officer or an authorized representative.
 - (1) If the BPA COTR exercises BPA's right of inspection at the factory, then the materials and equipment will not be reinspected at destination other than for shipping damage and shortages; however, this will apply only to (i) those items specifically inspected at the factory, and (ii) those characteristics and attributes which are verified during factory inspection.
 - (2) Factory inspection and release for shipment shall not constitute acceptance of the contract items by BPA..
- (f) Inspections and tests by BPA do not relieve the Contractor of responsibility for defects or other failures to meet contract requirements discovered before acceptance. Lack of inspection by BPA shall not relieve the Contractor of any obligations under this contract.

ACCEPTANCE - SUPPLIES (18-3)
(SEP 98)(BPI 18.3)

Unless explicitly accepted or rejected earlier, acceptance shall occur 60 days after date of delivery. Acceptance shall be conclusive, except for latent defects, fraud, gross mistakes amounting to fraud, or as otherwise provided in this contract.

WARRANTY - SUPPLIES (18-8)
(SEP 98)(BPI 18.5)

- (a) The Contractor warrants that the supplies ("supplies" includes equipment, fabrication processes, raw or finished materials, and intermediate assemblies) conform to contract requirements. The Contractor also warrants that supplies are free of design defects (except defects in BPA-provided final designs) and defects in materials or workmanship.
- (b) The Contractor shall replace or repair any supplies which fail in operation within 12 months from the date of receipt. The Contracting Officer will give written notice of any defect or nonconformance to the Contractor within a reasonable period of time after discovery. Replacements of contract items shall be made promptly and on an FOB destination basis. BPA will install replacements at no expense to the Contractor. **Additionally, Destron Fearing will repair both juvenile and adult PIT Tag detection systems beyond the initial 12-month warranty period at no additional cost for the life of this agreement. The government agrees to pay shipping charges (both directions) incurred for the return of these units for repair.**
- (c) Supplies replaced under the provisions of this warranty shall remain the property of BPA unless the Contractor wishes to obtain ownership. In this case, the Contractor shall notify BPA of such in writing not later than the date of receipt by BPA of the replacement supplies. The Contractor is responsible for packaging and shipping costs.
- (d) The rights and remedies of BPA provided in this clause are in addition to and do not limit any rights afforded to BPA by any other clause of this contract or under applicable Federal or State law, including the Uniform Commercial Code.

TERMINATION

TERMINATION FOR THE CONVENIENCE OF BPA (20-2)
(SEP 98)(BPI 20.4)

- (a) BPA may terminate all or any part of this contract, at any time, upon written notice to the Contractor. Upon receipt or the termination notice, the Contractor shall stop work on the terminated portion of the contract.
- (b) The contract amount shall be revised as a result of termination under this clause. On fixed-price contracts the revised amount shall not exceed the pre-termination contract price plus reasonable termination expenses. On cost-reimbursement contracts it will not exceed the total of allowable and allocable costs of performance prior to termination plus termination expenses plus an adjustment of the fee on the terminated portion of the contract. No payment will be

made for anticipated profits on the terminated portion, or consequential damages, of the contract. The Contractor shall submit a settlement proposal within 30 days of the notice of termination.

- (c) The Contracting Officer may direct the disposition of material produced or acquired for the work terminated, or any completed or partially completed items.

TERMINATION FOR DEFAULT (20-3.1)

(SEP 98)(BPI 20.5)

- (a) BPA reserves the right to terminate any or all of any undelivered or unexecuted portion of this contract for cause if the Contractor fails to make any delivery, fails to prosecute the work, or to perform as scheduled, or if any of the contract terms are breached. However, the Contractor shall not be terminated for default if the failure to perform arises from causes beyond the control and without the fault or negligence of the Contractor. Examples of those causes are: (1) acts of God or of the public enemy, (2) acts of the Government in its sovereign or BPA in its contractual capacity, (3) fires, (4) floods, (5) epidemics, (6) quarantine restrictions, (7) strikes, (8) freight embargoes, and (9) unusually severe weather.
- (b) The Contracting Officer may direct the disposition of material produced or acquired for the work terminated, and the disposition of any completed or partially completed items.
- (c) BPA may acquire, under the terms and in the manner the Contracting Officer considers appropriate, supplies or services similar to those terminated, and the Contractor will be liable to BPA for any excess costs for those supplies or services, including administrative costs.

DISPUTES

APPLICABLE LAW (21-5)

(SEP 98)(BPI 21.2.12)

Irrespective of the place of performance, this contract will be construed and interpreted according to the federal common law of government contracts, as enunciated and applied by federal judicial bodies, boards of contract appeals, and quasi-judicial agencies of the Federal Government. To the extent that the federal common law of government contracts is not dispositive, the laws of the State of Oregon shall apply.

DISPUTES (21-2)

(SEP 98)(BPI 21.3.12)

Disputes arising under or related to this contract will be settled in accordance with Bonneville Purchasing Instructions, Subpart 21.3. The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any pending decision of the Contracting Officer regarding matters in dispute.

UNIT 3 — SPECIFICATIONS

Installation Services

The Bonneville Power Administration (BPA) reserves the right to complete the installation of the new stationary monitoring system in house or by contract with Destron Fearing to do the installation. If BPA exercises the option and directs Destron Fearing complete the installation, it is understood that installation of electrical and fiber optics to the perspective sites are excluded from this work. BPA reserves the right to negotiate with Destron Fearing to locate the electrical and fiber optics.

The pricing for installation shall be negotiated at the time the services are required. All travel, per diem, lodging and related expenses shall be calculated using the Federal Travel Regulations applicable at the time.

An hourly rate of \$75.00 for installation services shall remain fixed for the duration of this contract (including options). All equipment, materials, travel and related expenses shall be in addition to the total numbers of hours at the rate of \$75.00 cited above.

MASTER CONTRACT

Mail Invoice To:

***** BLANKET MASTER CONTRACT *****

DISBURSEMENT OPERATIONS - DFRD
BPA CORPORATE OFFICE
P.O. BOX 3621
PORTLAND OR 97208-3621

Contract : 00002760
Release : 00000
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
SUTH ST PAUL MN 55075

Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: PROJECT 97-010-00, PIT TAG SYSTEM TRANSITION
Project :

Total Value :
Pricing Method: ESTIMATE
Performance Period: 11/17/00 - 09/30/07
Payment Terms: % Days Net 10



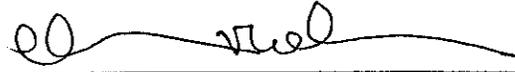
Contractor Signature

James P. Santelli

Printed Name/Title

6/25/01

Date Signed



BPA Contracting Officer

6/18/01

Date Signed

This award contains the following - TEXT ATTACHED

SUPPLY TERMS AND CONDITIONS

Contract Amendments

Title : PROJECT 97-010-00, PIT TAG SYSTEM TRANSITION

Amendment: 001

Amended Performance Period: -

Amendment Value:

Pricing Method :

**PIT TAG SYSTEM TRANSITION
PROJECT NO. 1997-010-00**

The purpose of this amendment is to incorporate the following changes to Contract No. 00002760:

1. Recognize the change of name and ownership. Company name is changed from Destron Fearing to Digital Angel Corporation.
2. The Statement of Work – Installation Services is changed to add Technician Services, labor rate is \$50.00 per hours.

All other terms and conditions remain unchanged.

BONNEVILLE
POWER ADMINISTRATION

MASTER CONTRACT

Mail Invoice To:

***** BLANKET MASTER CONTRACT *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00000
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: PROJECT 97-010-00, PIT TAG SYSTEM TRANSITION

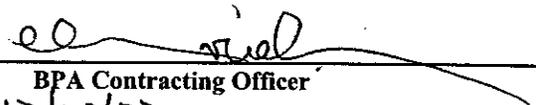
Total Value :

Pricing Method: ESTIMATE

Payment Terms: % Days Net 10

Performance Period: 11/17/00 - 09/30/07


Contractor Signature
Kevin Nicunuma, Pres.
Printed Name/Title
12-31-02
Date Signed


BPA Contracting Officer
12/23/02
Date Signed

This award contains the following - TEXT ATTACHED.

SUPPLY TERMS AND CONDITIONS

Contract Amendments

Title : ADD PATENT AND DATA RIGHTS CLAUSES AND ADD PRODUCTS TO SCHEDULE

Amendment: 003

Amended Performance Period: -

Amendment Value:

Pricing Method :

**Contract 2760, Pit Tag System Transition
Amendment 003**

The purpose of this amendment is to make the following changes to the master agreement:

- Add the modified clause 17-2, PATENT RIGHTS.
- Add clauses 17-3, RIGHTS IN DATA; 17-5, RIGHTS IN DATA--WORKS MADE FOR HIRE; and 17-6, COMMERCIAL COMPUTER SOFTWARE--RESTRICTED RIGHTS.
- Add the following items to the schedule:

Item 0006 Portable Transceiver Model FS 2001F-ISO \$2065.95/ Unit

Item 0007 FS 2001F Upgrade to FS 2001F-ISO \$700.00/Unit

Upgrade Includes:

- 1.) New analog board
- 2.) New 2 meter cable
- 3.) New antenna
- 4.) New Lithium Battery
- 5.) New Software will be loaded in the unit.
- 6.) Units will then be retested per the traveler

Note: It will be 4-5 weeks return from receipt of the units - 1 week is shipping, 1 week is burn-in

Additional clauses appear on the following pages.

**Contract 2760, Pit Tag System Transition
Amendment 003**

Clause 17-2 (modified) PATENT RIGHTS (Sep 98)(BPI 17.3.5.1)

(a) Definitions.

(1) "Invention" means any invention or discovery which is or may be patentable or otherwise protectable under title 35 of the United States Code, or any novel variety of plant which is or may be protected under the Plant Variety Protection Act (7 U.S.C. 2321, et seq.).

(2) "Made," when used in relation to any invention, means the conception or first actual reduction to practice of such invention.

(3) "Nonprofit organization" means a university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)) and exempt from taxation under section 501(a) of the Internal Revenue Code (26 U.S.C. 501(a)) or any nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

(4) "Practical application" means to manufacture, in the case of a composition of product; to practice, in the case of a process or method, or to operate, in the case of a machine or system; and, in each case under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public on reasonable terms.

(5) "Small business firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of this clause, the size standards for small business concerns involved in Government procurement and subcontracting at 13 CFR 121.3-8 and 12 CFR 121.3-12, respectively, will be used.

(6) "Subject invention" means any invention of the contractor conceived or first actually reduced to practice in the performance of work under this contract.

(7) "Government" means the federal government of the United States of America.

(b) Allocation of principal rights. The Contractor may retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 U.S.C. 203. With respect to any subject invention in which the Contractor retains title, the Federal Government shall have a non-exclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world. The Federal Government shall not exercise its rights under this paragraph for as long as the Contractor remains in business and continues to satisfactorily manufacture the subject inventions for the Government's use.

(c) Invention disclosure, election of title, and filing of patent application by contractor.

(1) The Contractor will disclose each subject invention to BPA within 2 months after the inventor discloses it in writing to Contractor personnel responsible for patent matters. The disclosure to the agency shall be in the form of a written report and shall identify the contract under which the invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding to the extent known at the time of the disclosure, of the nature, purpose, operation, and the physical, chemical, biological or electrical characteristics of the subject invention. The disclosure shall also identify any publication, sale or public use of the subject invention and whether a manuscript describing the subject invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the agency,

**Contract 2760, Pit Tag System Transition
Amendment 003**

the contractor will promptly notify BPA of the acceptance of any manuscript describing the subject invention for publication or of any sale or public use planned by the Contractor.

(2) The Contractor will elect in writing whether or not to retain title to any such subject invention by notifying BPA within 2 years of disclosure to the agency. However, in any case where publication, or sale or public use has initiated the 1 year statutory period wherein valid patent protection can still be obtained in the United States, the period for election of title may be shortened by BPA to a date that is no more than 60 days prior to the end of the statutory period.

(3) The contractor will file its initial patent application on a subject invention to which it elects to retain title within 1 year after election of title, or, if earlier, prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, sale, or public use. The Contractor will file patent applications in additional countries or international patent offices within either 10 months of the corresponding initial patent application or 6 months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications where such filing has been prohibited by a Secrecy Order. Upon the request of the BPA, the contractor will apply for a patent/title on any subject invention.

(4) Requests for extension of the time for disclosure election, and filing under subparagraphs (c) (1), (2), and (3) of this clause may, at the discretion of BPA, be granted.

(d) Conditions when the government may obtain title. If the contractor has not applied for a patent/title on a subject invention per paragraph c, the BPA shall notify the contractor 60 days prior to applying for a patent/title on the subject invention, at which time the Contractor may elect to file for a patent/title on the subject invention notwithstanding any earlier decision made by the Contractor not to file. If the Contractor elects to file, the Contractor must inform BPA of such election within 30 days of receipt of the above notice and shortly thereafter provide BPA with documentation of such filing. The Contractor will convey to BPA, upon written request, title to any subject invention -

(1) If the Contractor fails to disclose or elect title to the subject invention within the times specified in paragraph (c) of this clause, or elects not to retain title; provided, that BPA may only request title within 60 days after learning of the failure of the Contractor to disclose or elect within the specified times.

(2) In those countries in which the Contractor fails to file patent applications within the times specified in paragraph (c) of this clause; provided, however, that if the Contractor has filed a patent application in a country after the times specified in paragraph (c) of this clause, but prior to its receipt of the written request of BPA, the Contractor shall continue to retain title in that country.

(3) In any country in which the Contractor decided not to continue the prosecution of any application for, to pay the maintenance fees on, or defend in reexamination or opposition proceeding on, a patent on a subject invention.

(e) Minimum rights to contractor and protection of the Contractor right to file.

(1) The Contractor will retain a non-exclusive royalty-free license throughout the world in each subject invention to which the Government obtains title, except if the contractor fails to disclose the invention within the times specified in paragraph (c) of this clause. The Contractor's license extends to its domestic subsidiary and affiliates, if any, within the corporate structure of which the Contractor is a party and includes the right to grant sub licenses of the same scope to the extent the Contractor was legally obligated to do so at the

**Contract 2760, Pit Tag System Transition
Amendment 003**

time the contract was awarded. The license is transferable only with the approval of BPA, except when transferred to the successor of that part of the Contractor's business to which the invention pertains.

(2) The Contractor's domestic license to a subject invention may be revoked or modified by BPA to the extent necessary to achieve expeditious practical application of subject invention pursuant to an application for an exclusive license submitted in accordance with applicable provisions at 37 CFR Part 404 and agency licensing regulations (if any). This license will not be revoked in that field of use or the geographical areas in which the Contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of BPA to the extent the Contractor, its licensees, or the domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, BPA will furnish the Contractor a written notice of its intention to revoke or modify the license, and the Contractor will be allowed 30 days (or such other time as may be authorized by BPA for good cause shown by the Contractor) after the notice to show cause why the license should not be revoked or modified. The Contractor has the right to appeal, in accordance with applicable regulations in 37 CFR Part 404 and BPA regulations, if any, concerning the licensing revocation or modification of the license.

(f) Contractor action to protect the government's interest.

(1) The Contractor agrees to execute or to have executed and promptly deliver to BPA all instruments necessary to-

(A) Establish or confirm the rights the government has throughout the world in those subject inventions to which the Contractor elects to retain title, and

(B) Convey title to BPA when requested under paragraph (d) of this clause and to enable the Government to obtain patent protection throughout the world in that subject invention.

(2) The Contractor agrees to require, by written agreement, its employees, other than clerical and non-technical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters, and in a format suggested by the Contractor, each subject invention made under contract in order that the Contractor can comply with the disclosure provisions of paragraph (c) of this clause, and to execute all papers necessary to file patent applications on subject inventions and to establish the Government's rights in the subject inventions. This disclosure format should require, as a minimum, the information required by subparagraph (c)(1) of this clause. The Contractor shall instruct such employees, through employee agreements or other suitable educational programs, on the importance of reporting subject inventions in sufficient time to permit the filing of patent application prior to U.S. or foreign statutory bars.

(3) The contractor will notify BPA of any decisions not to continue the prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceeding on a patent, in any country, not less than 30 days before the expiration of the response period required by the relevant patent office.

(4) The Contractor agrees to include, within the specification of any United States patent application and any patent issuing thereon covering a subject invention, the following statement: "The invention was made with Government support under (identify the contract) awarded by U.S. Dept. of Energy, Bonneville Power Administration. The Government has certain rights in the invention."

**Contract 2760, Pit Tag System Transition
Amendment 003**

(g) Subcontracts.

(1) The Contractor will include this clause, suitably modified to identify the parties, in all subcontracts, regardless of tier, for experimental, developmental, or research work to be performed by a small business firm or domestic nonprofit organization. The subcontractor will retain all rights provided for the Contractor in this clause, and the Contractor will not, as part of the consideration for awarding the subcontract, obtain rights in the subcontractor's subject inventions.

(2) The Contractor will include in all other subcontracts, regardless of tier, for experimental, developmental, or research work, a patent rights clause.

(3) In the case of subcontractors, at any tier, BPA, the subcontractor, and the Contractor agree that the mutual obligations of the parties created by this clause constitute a contract between the subcontractor and the Federal agency with respect to the matters covered by the clause; provided, however, that nothing in this paragraph is intended to confer any jurisdiction under the Contract Disputes Act in connection with proceedings under paragraph (j) of this clause.

(h) Reporting on utilization of subject inventions. The Contractor agrees to submit, on request, periodic reports (no more frequently than annually) on the utilization of subject inventions or on efforts to obtain such utilization instigated by the Contractor or its licensees or assignees. Such reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Contractor, and such other data and information as BPA may reasonably specify. The Contractor also agrees to provide such additional reports as may be requested by BPA in connection with any march-in proceeding undertaken by BPA in accordance with paragraph (j) of this clause. As required by 35 U.S.C. 202(c)(5), BPA agrees it will not disclose such information to persons outside the Government without the permission of the Contractor.

(i) Preference for United States industry. Notwithstanding any other provision of this clause, the Contractor agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any subject invention in the United States unless such person agrees that any product embodying the subject invention or produced through the use of the subject invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by BPA upon a showing by the Contractor or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States, or that under the circumstances domestic manufacture is not commercially feasible.

(j) March-in rights. The Contractor agrees that, with respect to any subject invention in which it has acquired title, BPA has the right in accordance with the procedures in 37 CFR 401.6 and any supplemental regulations of BPA to require the Contractor, an assignee or exclusive licensee of a subject invention to grant a non-exclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Contractor, assignee, or exclusive licensee refuses such a request, that BPA has the right to grant such a license itself if BPA determines that-

(1) Such action is necessary because the Contractor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use;

(2) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Contractor, assignee, or their licensees;

**Contract 2760, Pit Tag System Transition
Amendment 003**

(3) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by the Contractor, assignee, or licensees; or

(4) Such action is necessary because the agreement required by paragraph (i) of this clause has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such agreement.

(k) Special provisions for contracts with nonprofit organizations. If the Contractor is a nonprofit organization, it agrees that-

(1) Rights to a subject invention in the United States may not be assigned without the approval of BPA, except where such assignment is made to an organization which has as one of its primary functions the management of inventions, provided that such assignee will be subject to the same provisions as the contractor;

(2) The Contractor will share royalties collected on a subject invention with the inventor, including Federal employee co-inventors (when the agency deems it appropriate) when the subject invention is assigned in accordance with 35 U.S.C. 202(e) and 37 CFR 401.10;

(3) The balance of any royalties or income earned by the Contractor with respect to subject inventions, after payment of expenses (including payments to inventors) incidental to the administration of subject inventions will be utilized for the support of scientific research or education; and

(4) It will make efforts that are reasonable under the circumstances to attract licensees of subject inventions that are small business firms, and that it will give a preference to a small business firm when licensing a subject invention if the Contractor determines that the small business firm has a plan or proposal for marketing the invention which, if executed, is equally as likely to bring the invention to practical application as any plans or proposals from applicants that are not small business firms; provided, that the Contractor is also satisfied that the small business firm has the capability and resources to carry out its plan or proposal. The decision of whether or not to give a preference in any specific case will be at the discretion of the Contractor. However, the Contractor agrees that the Secretary of Commerce may review the Contractor's licensing program and decisions regarding small business applicants. The Contractor will negotiate changes to its licensing policies, procedures, or practices with the Secretary of Commerce when the Secretary's review discloses that the Contractor could take reasonable steps to more effectively implement the requirements of this subparagraph (k)(4).

(l) The parties agree that Contractor shall exclusively retain all intellectual property rights in and to any invention that is not a subject invention unless the parties specifically agree otherwise in writing on a case-by-case basis.

(m) If the Contractor ceases to manufacture any subject invention developed under this Agreement, upon BPA's written request, the Contractor will provide all documentation necessary to allow the BPA, or its designee, to manufacture such subject invention. If the subcontractor is no longer in business, the Federal Government shall have a non-exclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.

(End of clause)

**Contract 2760, Pit Tag System Transition
Amendment 003**

Clause 17-3 RIGHTS IN DATA (Sep 98)(BPI 17.4.2.1; 17.4.3.1)

(a) Allocation of rights. Except as otherwise provided in this clause, BPA shall have the right to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so, in--

(1) All data first produced in the performance of this contract; and

(2) Data delivered under this contract (except for proprietary computer software) that constitute manuals or instructional and training material for installation, operation or routine maintenance and repair of items, components, or processes delivered or furnished for use under this contract.

(b) Copyright.

(1) Data First Produced in the Performance of the Contract. The Contractor may establish claim to copyright subsisting in any data first produced in the performance of this contract. The Contractor grants to the Government, and others acting on its behalf, a paid-up non-exclusive, irrevocable, worldwide license for all such data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.

(2) Data Not First Produced in the Performance of this Contract. The contractor should not, without prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract and which contains a copyright notice, unless the Contractor identifies such data and grants to the Government, or acquires on its behalf, a license of the same scope as set forth in subparagraph (b)(1) of this clause;

(c) Release, publication and use of data.

(1) The Contractor shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, unless otherwise expressly set forth in this contract.

(2) The Contractor agrees that to the extent it receives or is given access to data necessary for the performance of this contract which contain restrictive markings, the Contractor shall treat the data in accordance with such markings unless otherwise specifically authorized in writing by the Contracting Officer.

(d) Omitted or incorrect markings. Data delivered to BPA without a limited rights notice or a copyright notice shall be deemed to have been furnished with unlimited rights, and BPA assumes no liability for the disclosure, use, or reproduction of such data.

(e) Protection of limited rights data. If the Offeror/Contractor desires to protect data that embody trade secrets or are commercial or financial and confidential or privileged, that are specified to be delivered under this contract, the Offeror/Contractor shall identify such data to the Contracting Officer as limited rights data. The Contracting Officer may require the delivery of such limited rights data. If delivery of such data is so required, the Contractor may affix the following "Limited Rights Notice" to the data, and BPA will thereafter treat the data in accordance with such Notice:

LIMITED RIGHTS NOTICE

(a) These data are submitted with limited rights under BPA Contract No. 2760. These data may be reproduced and used by the Government with the express limitation that

**Contract 2760, Pit Tag System Transition
Amendment 003**

they will not, without written permission of the Contractor, be used for purposes of manufacture nor disclosed outside the Government; except that BPA may disclose these data outside the Government for the following purposes, if any, provided that BPA makes such disclosure subject to prohibition against further use and disclosure: data may be disclosed to others outside the government for the purpose of performing tasks or work associated with the performance of this contract or follow-on contracts.

(b) This Notice shall be marked on any reproduction of these data, in whole or in part.

(End of Notice)

(f) Subcontracting. The Contractor has the responsibility to obtain from its subcontractors all data and rights therein necessary to fulfill the Contractors obligations to BPA under this contract. If a subcontractor refuses to accept terms affording BPA such rights, the Contractor shall promptly bring such refusal to the attention of the Contracting Officer, and shall not proceed with subcontract award without further authorization.

(g) Relationship to patents. Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government.

(End of Clause)

Clause 17-5 RIGHTS IN DATA--WORKS MADE FOR HIRE. (Sep 98)(BPI 17.4.4.1)

(a) Allocation of Rights.

(1) BPA shall have--

(A) Unlimited rights, meaning the right of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose whatsoever, and to have or permit others to do so, in all data delivered under this contract, and in all data first produced in the performance of this contract, except as provided in paragraph (b) of this clause for copyright.

(B) The right to limit exercise of claim to copyright in data first produced in the performance of this contract, and to obtain assignment of copyright in such data, in accordance with subparagraph (b)(1) of this clause.

(C) The right to limit the release and use of certain data in accordance with paragraph (c) of this clause.

(2) The Contractor shall have, to the extent permission is granted in accordance with subparagraph (b)(1) of this clause, the right to establish claim to copyright subsisting in data first produced in the performance of this contract.

(b) Copyright.

(1) Data first produced in the performance of this contract.

(A) The Contractor agrees not to assert, establish, or authorize others to assert or establish, any claim to copyright subsisting in any data first produced in the performance of this contract without the prior written permission of the Contracting Officer. If a claim to

**Contract 2760, Pit Tag System Transition
Amendment 003**

copyright is made, the Contractor grants to the Government, and others acting on its behalf, a paid-up non-exclusive, irrevocable, worldwide license for all such data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.

(B) If BPA desires to obtain copyright in data first produced in the performance of this contract and permission has not been granted as set forth in subdivision (b)(1)(A) of this clause, the Contracting Officer may direct the Contractor to establish, or authorize the establishment of, claim to copyright in such data and to assign, or obtain the assignment of, such copyright to the Government or its designated assignee.

(2) Data not first produced in the performance of this contract. The Contractor shall not, without prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract and which contain a copyright notice, unless the Contractor identifies such data and grants to the Government or acquires on its behalf, a license of the same scope as set forth in subparagraph (b)(1) of this clause.

(c) Release and use restrictions. Except as otherwise specifically provided for in this contract, the Contractor shall not use for purposes other than the performance of this contract, nor shall the Contractor release, reproduce, distribute, or publish any data first produced in the performance of this contract, nor authorize others to do so, without written permission of the Contracting Officer.

(d) Indemnity. The Contractor shall indemnify BPA and its officers, agents, and employees acting for the Government against any liability, including costs and expenses, incurred as the result of the violation of trade secrets, copyrights, or right of privacy or publicity, arising out of the creation, delivery, publication or use of any data furnished under this contract; or any libelous or other unlawful matter contained in such data. The provisions of this paragraph do not apply unless BPA provides notice to the Contractor as soon as practicable of any claim or suit, affords the Contractor an opportunity under applicable laws, rules or regulations to participate in the defense thereof, and obtains the contractor's consent to the settlement of any suit or claim other than as required by final decree of a court of competent jurisdiction; nor do these provisions apply to material furnished to the Contractor by BPA and incorporated in data to which this clause applies.

(End of clause)

Clause 17-6 COMMERCIAL COMPUTER SOFTWARE--RESTRICTED RIGHTS (Sep 98)(BPI 17.4.5.1)

(a) As used in this clause, "proprietary computer software" means any computer program, computer data base, or documentation thereof, that has been developed at private expense and either is a trade secret, is commercial or financial and confidential or privileged, or is published and copyrighted.

(b) Notwithstanding any provisions to the contrary contained in any supplier's standard commercial license or lease agreement pertaining to any proprietary computer software delivered under this purchase order/contract, and irrespective of whether any such agreement has been proposed prior to or after issuance of this purchase order/contract or of the fact that such agreement may be affixed to or accompany the proprietary computer software upon delivery, the supplier agrees that BPA shall have the rights that are set forth in paragraph (c) of this clause to use, duplicate or disclose any proprietary computer software delivered under this purchase order/contract. The terms and provisions of this contract, including any commercial lease or license agreement, shall be subject to paragraph (c) of this clause and shall comply with Federal laws and the Bonneville Purchasing Instructions.

**Contract 2760, Pit Tag System Transition
Amendment 003**

(c)(1) The proprietary computer software delivered under this contract may not be used, reproduced or disclosed by BPA, except as provided in subparagraph (c)(2) of this clause or as expressly stated otherwise in this contract.

(2) The proprietary computer software may be--

(A) Used or copied for use in or with the computer or computers (or its replacements) for which it was acquired, including use at any Government installation to which such computer or computers may be transferred;

(B) Used or copied for use in or with a backup computer if any computer for which it was acquired is inoperative;

(C) Reproduced for safekeeping (archives) or backup purposes;

(D) Modified, adapted, or combined with other computer software, provided that the modified, combined, or adapted portions of the derivative software incorporating any of the delivered, proprietary computer software shall be subject to same restrictions set forth in this purchase order/contract;

(E) Disclosed to and reproduced for use by BPA support service contractors or their subcontractors, subject to the same restrictions set forth in this purchase order/contract; and

(3) If the proprietary computer software delivered under this purchase order/contract is published and copyrighted, it is licensed to BPA, without disclosure prohibitions, with the rights set forth in subparagraph (c)(2) of this clause, unless expressly stated otherwise in this purchase order/contract.

(4) To the extent feasible the supplier shall affix a Notice substantially as follows to any proprietary computer software delivered under this purchase order/contract; or, if the supplier does not, BPA has the right to do so: "Notice--Notwithstanding any other lease or license agreement that may pertain to, or accompany the delivery of, this computer software, the rights of the Government regarding its use, reproduction and disclosure are as set forth in BPA Contract No. 00002760."

(d) If any proprietary computer software is delivered under this contract with the copyright notice of 17 U.S.C. 401, it will be presumed to be published and copyrighted and licensed to the Government in accordance with subparagraph (c)(3) of this clause, unless a statement substantially as follows accompanies such copyright notice: "Unpublished--rights reserved under the copyright laws of the United States."

(End of clause)

BONNEVILLE
POWER ADMINISTRATION

MASTER CONTRACT

Mail Invoice To:

***** BLANKET MASTER CONTRACT *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00000
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: PROJECT 97-010-00, PIT TAG SYSTEM TRANSITION

Total Value :
Pricing Method: ESTIMATE
Performance Period: 11/17/00 - 09/30/07
Payment Terms: % Days Net 10

<p> _____ Contractor Signature <u>Kevin Niessma - Proc.</u> _____ Printed Name/Title <u>12-31-02</u> _____ Date Signed</p>	<p> _____ BPA Contracting Officer <u>12/31/02</u> _____ Date Signed</p>
---	---

This award contains the following - TEXT ATTACHED

SUPPLY TERMS AND CONDITIONS

Contract Amendments

Title : ADMINISTRATIVE AMENDMENT TO MODIFY CLAUSE 17-2 (A) (2)
Amendment: 004
Amended Performance Period: -
Amendment Value:
Pricing Method :

**Master Agreement 2760
Amendment 004**

The purpose of this amendment is to modify clause 17-3 paragraph (a) (2) to add the exceptions for computer hardware and firmware. The complete clause as modified follows:

Clause 17-3 RIGHTS IN DATA (Sep 98)(BPI 17.4.2.1; 17.4.3.1)

(a) Allocation of rights. Except as otherwise provided in this clause, BPA shall have the right to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so, in--

- (1) All data first produced in the performance of this contract; and
- (2) Data delivered under this contract that constitute manuals or instructional and training material for installation, operation or routine maintenance and repair of items, components, or processes delivered or furnished for use under this contract, **except for proprietary computer hardware, firmware, and software.**

(b) Copyright.

(1) Data First Produced in the Performance of the Contract. The Contractor may establish claim to copyright subsisting in any data first produced in the performance of this contract. The Contractor grants to the Government, and others acting on its behalf, a paid-up non-exclusive, irrevocable, worldwide license for all such data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.

(2) Data Not First Produced in the Performance of this Contract. The contractor should not, without prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract and which contains a copyright notice, unless the Contractor identifies such data and grants to the Government, or acquires on its behalf, a license of the same scope as set forth in subparagraph (b)(1) of this clause;

(c) Release, publication and use of data.

(1) The Contractor shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, unless otherwise expressly set forth in this contract.

(2) The Contractor agrees that to the extent it receives or is given access to data necessary for the performance of this contract which contain restrictive markings, the Contractor shall treat the data in accordance with such markings unless otherwise specifically authorized in writing by the Contracting Officer.

(d) Omitted or incorrect markings. Data delivered to BPA without a limited rights notice or a copyright notice shall be deemed to have been furnished with unlimited rights, and BPA assumes no liability for the disclosure, use, or reproduction of such data.

(e) Protection of limited rights data. If the Offeror/Contractor desires to protect data that embody trade secrets or are commercial or financial and confidential or privileged, that are specified to be delivered under this contract, the Offeror/Contractor shall identify such data to the Contracting Officer as limited rights data. The Contracting Officer may require the delivery of such limited rights data. If delivery of such data is so required, the Contractor may affix the following "Limited Rights Notice" to the data, and BPA will thereafter treat the data in accordance with such Notice:

**Master Agreement 2760
Amendment 004**

LIMITED RIGHTS NOTICE

- (a) These data are submitted with limited rights under BPA Contract No. 2760 . These data may be reproduced and used by the Government with the express limitation that they will not, without written permission of the Contractor, be used for purposes of manufacture nor disclosed outside the Government; except that BPA may disclose these data outside the Government for the following purposes, if any, provided that BPA makes such disclosure subject to prohibition against further use and disclosure: data may be disclosed to others outside the government for the purpose of performing tasks or work associated with the performance of this contract or follow-on contracts.
- (b) This Notice shall be marked on any reproduction of these data, in whole or in part.

(End of Notice)

(f) Subcontracting. The Contractor has the responsibility to obtain from its subcontractors all data and rights therein necessary to fulfill the Contractors obligations to BPA under this contract. If a subcontractor refuses to accept terms affording BPA such rights, the Contractor shall promptly bring such refusal to the attention of the Contracting Officer, and shall not proceed with subcontract award without further authorization.

(g) Relationship to patents. Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government.

(End of Clause)

MASTER CONTRACT

Mail Invoice To:

***** BLANKET MASTER CONTRACT *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00000
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3605
Fax : 503-230-4508

Attn: Sean Casey

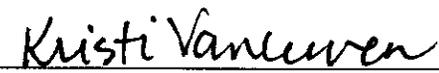
Contract Title: PROJECT 97-010-00, PIT TAG SYSTEM TRANSITION

Total Value :

Pricing Method: ESTIMATE

Payment Terms: % Days Net 10

Performance Period: 11/17/00 - 09/30/07

 _____ Contractor Signature	 _____ BPA Contracting Officer
<i>ZEKE MESIA / Chief Technology off.</i> Printed Name/Title	<i>7/21/04</i> Date Signed
<i>July 10/04</i> Date Signed	

This award contains the following - TEXT ATTACHED

SUPPLY TERMS AND CONDITIONS

Title : ADD NEW LINE ITEM FOR ORDERING 9/04 THRU 9/07

Amendment: 005

Amended Performance Period: -

Amendment Value:

Pricing Method :



COVER SHEET ATTACHMENT

**PIT Tag System Transition
Project Number 97-010-00
Master Contract No. 0002760**

This amendment is issued to incorporate a new line item into the contract as follows:

Part #: TX1400SGL for single tags or TX 1411SGL for packages of 100 tags
Description: 134.2 kHz Interim Glass Improved PIT Tag
Price: \$2.25 each tag
Availability: 9/1/04 – 9/30/07

Actual purchases of this tag will be completed thru issued Releases to this Master Contract.

In addition, Tag number TX1400ST will be available only thru 12/31/04.

All other terms and conditions remain the same.

MASTER CONTRACT

Mail Invoice To:

***** BLANKET MASTER CONTRACT *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00000
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: 503-230-3605
Fax : 503-230-4508

Attn: Zeke Mejia

Contract Title: 1983-319-00 PIT TAG SYSTEM TRANSITION

Total Value :

Pricing Method: ESTIMATE

Payment Terms: % Days Net 10

Performance Period: 11/17/00 - 09/30/07

Contractor Signature	<u>Kristi VanLeuven</u>
Printed Name/Title	<u>BPA Contracting Officer</u>
Date Signed	<u>9/22/04</u>

This award contains the following - TEXT ATTACHED

SUPPLY TERMS AND CONDITIONS

Contract Amendments

Title : CONTINUED AVAILABILITY OF SUPERTAGS

Amendment: 006

Amended Performance Period: -

Amendment Value:

Pricing Method :



COVER SHEET ATTACHMENT

PIT Tag
Project Number 1997-010
Master Contract No. 2760

This amendment is issued to change the date of availability for the Super Tags Number TX1400ST. Effective immediately, the above named model shall be made available until further notice.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Bonneville Power Administration
Fish and Wildlife Program
Attn: Program Analyst - KEWB-4
P.O. Box 3621
Portland, OR 97208

Contract : 00002760
Release : 00001
Page : 1

Vendor:
DESTRON-FEARING CORPORATION
490 VILLAUME AVE
SOUTH ST PAUL MN 55075

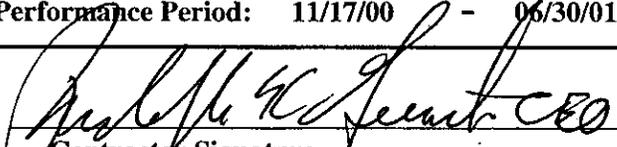
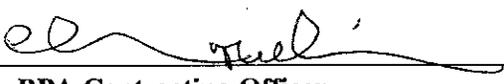
Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH
Project : 0001684

Total Value : \$198,000.00
Pricing Method: COST, NO FEE
Performance Period: 11/17/00 - 06/30/01

Payment Terms: % Days Net 10

 Contractor Signature Randolph K. Geissler, CEO Printed Name/Title 2/5/01 Date Signed	 BPA Contracting Officer 1/31/01 Date Signed
--	---

Scope of Work Attached

New Marking and Monitoring Techniques for Fish, Project No. 1983-319-00,

This purchase order provides for the manufacture, testing, and delivery of adult salmon PIT-tag detection transceiver units by Destron Fearing, to be installed in the Washington shore fish ladder at Bonneville Dam. Certain of these units will also be temporarily installed to monitor electromagnetic noise in adult fish ladders at other FCRPS projects.

<u>Item No.</u>	<u>Description</u>	<u>Qty</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
0001	Transceiver system, Model 1001A for adult salmon detection – 134 .2kHz PIT Tags	33	EA	\$6000.00	\$198,000.00

Technical and Administrative Contact

Mr. Sean Casey
Work Phone (651) 552-6580
scasey@destronfearing.com
Cell Phone (612) 202-5460

This order is placed in accordance with Contract 00002760 to manufacture, test, and deliver the subject units, effective through 2007.

Delivery:

Delivery will be coordinated with the project manager for BPA Project No. 1983-319-00, New Marking and Monitoring Techniques for Fish. Three (3) units will be delivered to National Marine Fisheries Service, Sand Point, Seattle, Washington not later than February 5, 2001. The remaining units will be delivered to Bonneville Dam not later than March 3, 2001.

Business Solutions Project (BSP) Reference:

New Marking and Monitoring Techniques for Fish
Project No. 1983-319-00
Phase Project 0001684
Work Order 00031984
Task 01

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00001
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
SUTH ST PAUL MN 55075

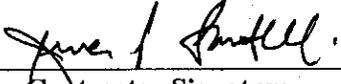
Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH
Project : 0001684

Total Value : \$198,000.00
Pricing Method: COST, NO FEE
Performance Period: 11/17/00 - 06/30/01

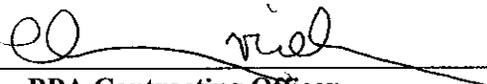
Payment Terms: % Days Net 10



Contractor Signature
James P. Santelli Vice President

Printed Name/Title
6/25/01

Date Signed



BPA Contracting Officer
6/18/01

Date Signed

Contract Amendments

Title : 1993-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH
Amendment: 001
Amended Performance Period: -
Amendment Value:
Pricing Method :

**NEW MARKING AND MONITORING TECHNIQUES FOR FISH
PROJECT NO. 1983-319-00**

The purpose of this amendment is to incorporate the new Company name on Release No.00001 as shown on the Master Agreement. New Company name is Digital Angel Corporation.

All other terms and conditions remain unchanged.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00006
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

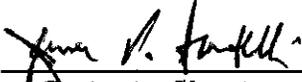
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

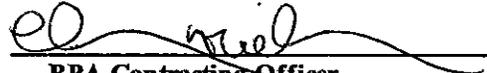
Contract Title: 2001-003-00 INSTALLATION OF ADULT PIT DETECTION SYSTEMS

Total Value : \$469,950.00
Pricing Method: COST, NO FEE
Performance Period: 07/01/02 - 10/31/02

** NOT TO EXCEED **
Payment Terms: % Days Net 10



Contractor Signature



BPA Contracting Officer

James P. Santelli

Printed Name/Title Chief Financial Officer/
7/9/02 Vice President-Finance

Date Signed

7/2/02

Date Signed

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00006
Project 2001-003-00 "Installation of Adult PIT Detection Systems"

I. Scope of Work

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for DA to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

A. Ice Harbor Adult PIT Detection. DA will assist BPA and the Corps in implementing adult PIT tag detection at Ice Harbor in the counting window. This detection system will allow for the possibility of detecting all adult fish passing through a ladder and eliminate the need for overflow detection. The responsibilities of DA, schedule, and cost for this task are defined in the attached Microsoft Project file (countwindow IHR.mpp). This plan is based on the following assumptions:

1. Four antennas will be used per counting window site.
2. The antennas (with the exception of Bonneville) will be similar to those used at McNary's Oregon-shore counting window.
3. There would be one spare antenna per counting window site.
4. One spare FS1001A would be needed at each dam.
5. All the dams have two counting window sites except Lower Granite, which has one.
6. The Exciter Cable will be included with the antenna.
7. Modifications will be made by the ACOE to make each site as optimal as possible for the antenna installation in order to minimize interference and antenna loading.
8. A composite antenna will meet the requirements of PSMFC and NMFS.
9. Each antenna will be tested in water and burned in for 1 week.
10. More than one site can be visited/tested/verified per trip (Travel).
11. PSMFC will manage the actual installation with the ACOE.
12. For purposes of this plan, a cost of \$10,000 was used for each antenna/cable assembly. This is based on the cost of the fiberglass prototype that is currently in the McNary Oregon Shore Ladder.
13. At this time it is not possible to determine what and when sites will be available for installation. Included are pre-construction, post-construction and final site visits. The schedule will be changed when this information is available.
14. The order in which the antennas are produced may also be changed to reflect dewatering schedules. It is important that these schedules be finalized as soon as possible to insure timely deliveries.

The total cost of this task presented in the attached file and funded by this contract release is \$ 252,300. Adult PIT tag detection in an alternative location at Ice Harbor is still under consideration. If that detection site is selected, another contract release will be issued to DA with a revised scope of work and funding amount.

B. Analysis of Maximum Antenna Size. DA will determine the technical feasibility and methods of driving pass-thru antenna designs up to 10' X 15'. Several antenna sizes and configurations will be designed and tested with both switch mode and sine wave drive schemes to characterize the PIT Tag response with the larger antenna configurations. This evaluation will benefit the Hi-Q Program at Bonneville Dam, Small-Stream Program and the Generation 2 FS1001A Transceiver development. In order to develop large antenna systems and provide the proper reader interface to drive and receive the PIT Tag signal, the maximum requirements for the systems needs to be identified prior to the product development phase. The results of this evaluation will be used to determine the requirements and antenna feasibilities

necessary to begin the Hi-Q PIT Program antenna development, and Generation 2 Reader Project. The completion of this program will minimize the risks and schedules for both. The responsibilities of DA, schedule, and cost for this task are defined in the attached Microsoft Project file (AntennaStudy.mpp). The specific goals for this task are:

1. Determine the maximum feasible antenna size and configurations.
2. Determine the maximum PIT Tag turn-on ranges and receive patterns for antenna sizes up to 10' X 15'.
3. Characterize driver capabilities of switch mode and sine wave drive systems.
4. Determine large antenna drive system power supply requirements.
5. Identify the PIT Tag receive signal-to-noise ratios needed for tag data recovery in future DSP based reader systems.

The total cost presented in the attached file is \$ 154,650. This contract release provides funding for the total cost of this task, which will be completed in FY02.

C. High-flow PIT Detection Systems. Options for PIT detection at the Bonneville Corner Collector are being explored by the Corps of Engineers and BPA. DA will participate in the feasibility investigation and implementation phases of installing a PIT tag system that meets the requirements for juvenile detection. The responsibilities of DA, schedule, and cost for this task are defined in the attached Microsoft Project file (HI-Q_3year.mpp). The three-year plan for this task is based on the following assumptions:

1. DA will use the FS1001A transceiver with very few modifications in order to meet the current schedule.
2. The antenna housings will be manufactured by HDR
3. DA will do the electronics/coil design and build.
4. The project may require at least 8 antennas/ transceivers using the current FS1001A technology. This may change should a decision be made to use a multiplexed system or wait for the Generation 2 FS1001A Transceiver; this will result in schedule and cost modifications.
5. 1 spare FS1001A would be needed. The Exciter Cable will not be included with the antenna.
6. Modifications will be made by the ACOE to make each site as optimal as possible for the antenna installation in order to minimize interference and antenna loading.
7. Antenna water test will be done by HDR.
8. Antenna radiation safety will be checked at the site of the antenna housings and is not included in the DA costs. DA will support this activity if needed for an additional cost of approximately \$6,000.00 to contract Hatfield and Dawson for testing.
9. All entities attending a technical meeting will sign a non-disclosure agreement with DA in order to discuss company proprietary and/ or intellectual property of future development concepts. Competitors of DA will not be involved in these meetings.

The total cost presented in the attached file is \$ 273,200. This contract release provides funding for the FY02 portion of this work, which totals \$ 63,000. Additional funds for the rest of this work will be provided by BPA in a future contract release when funds become available.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's project manager, Kim Fodrea. Additionally, coordination with the National Marine Fisheries Service, Corps of Engineers, and Pacific States Marine Fisheries Commission may be required.

BPA Project Manager
Kim Fodrea
kafodrea@bpa.gov
(503) 230-3702
PO Box 3621 KEWR-4
Portland, OR 97208-3621

III. Project Schedule

The tasks described in this statement of work by Digital Angel Corporation will be completed in the fiscal year 2002 for project 1983-319-00, New Marking and Monitoring Techniques for Fish. A detailed schedule of deadlines and milestones for the small-stream portion of this work is included in the attached schedule. Scheduling of the other tasks within this contract release will be coordinated with the BPA Project Managers. The performance period is 1 February 2002 through 31 October 2002.

IV. Budget

The total estimated cost of this work is \$ 469,950.

A. Ice Harbor Adult PIT Detection	\$ 252,300
B. Analysis of Maximum Antenna Size	\$ 154,650
C. High-flow PIT Detection Systems	\$ 63,000
Total Funded by This Contract Release	\$ 469,950

Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer. See the attached Microsoft Project files for detailed cost information for each task.

PIT Tag Detection at Fish Counting Window

ID	Resource Name	Work	Cost	Details	2002		2003
					H1	H2	H1
1	Kim Fodrea	0 hrs	\$0.00	Work			
2	PSMFC	840 hrs	\$0.00	Work	440h	400h	
	Determine Overall Requirements for Antenna System	160 hrs	\$0.00	Work	160h		
	Design to Production of Cable Assembly	320 hrs	\$0.00	Work	160h	160h	
	Site Visit- Ice Harbor	40 hrs	\$0.00	Work	40h		
	EMI Testing	160 hrs	\$0.00	Work	40h	120h	
	Travel/ Meetings	160 hrs	\$0.00	Work	40h	120h	
3	Northwest EMC	1	\$0.00	Work	0.25	0.75	
	EMI Testing	1	\$0.00	Work	0.25	0.75	
4	Plastics Subcontractor	0 hrs	\$0.00	Work			
5	Hatfield & Dawson Consulting	0	\$0.00	Work			
6	Plastics Subcontractor	0 hrs	\$0.00	Work			
7	Travel	9	\$32,500.00	Work	2.63	3.38	3
	Site Visit- Ice Harbor	2	\$7,500.00	Work	2		
	Travel/ Meetings	2	\$7,500.00	Work	0.5	1.5	
	Installation Construction Planning/Reviews, 60%, 10%	2	\$7,500.00	Work	0.13	1.88	
	Installation (Pre/Post Water) & Final Site Visits	3	\$10,000.00	Work			3
8	FS1001A	9	\$54,000.00	Work	3	6	
	Readers for Ice Harbor	9	\$54,000.00	Work	3	6	
9	NMFS	320 hrs	\$0.00	Work	200h	120h	
	Determine Overall Requirements for Antenna System	160 hrs	\$0.00	Work	160h		
	Travel/ Meetings	160 hrs	\$0.00	Work	40h	120h	
10	NMFS-Sandy/Earl	0 hrs	\$0.00	Work			
11	DA- Project Management	0 hrs	\$0.00	Work			
12	ACOE	360 hrs	\$0.00	Work	240h	120h	
	Determine Overall Requirements for Antenna System	160 hrs	\$0.00	Work	160h		
	Site Visit- Ice Harbor	40 hrs	\$0.00	Work	40h		
	Travel/ Meetings	160 hrs	\$0.00	Work	40h	120h	
13	BPA	40 hrs	\$0.00	Work	40h		
	Site Visit- Ice Harbor	40 hrs	\$0.00	Work	40h		
14	DA- Project Management/ Engineering	584 hrs	\$43,800.00	Work	180h	284h	120h
	Determine Overall Requirements for Antenna System	40 hrs	\$3,000.00	Work	40h		
	Design to Production of Cable Assembly	48 hrs	\$3,600.00	Work	24h	24h	
	Site Visit- Ice Harbor	80 hrs	\$6,000.00	Work	80h		
	Generate Site Specific PIT System Requirements	80 hrs	\$6,000.00	Work	20h	60h	
	Travel/ Meetings	40 hrs	\$3,000.00	Work	10h	30h	
	Generate Antenna Specification per Site	80 hrs	\$6,000.00	Work		80h	
	Installation Construction Planning/Reviews, 60%, 10%	96 hrs	\$7,200.00	Work	6h	90h	
	Installation (Pre/Post Water) & Final Site Visits	120 hrs	\$9,000.00	Work			120h
15	Antenna/Cable	10	\$100,000.00	Work	3.33	6.67	
	Antennas for Ice Harbor	10	\$100,000.00	Work	3.33	6.67	
16	DA- Production Tech.	288 hrs	\$0.00	Work	104h	184h	
	Design to Production of Cable Assembly	48 hrs	\$0.00	Work	24h	24h	
	Antennas for Ice Harbor	240 hrs	\$0.00	Work	80h	160h	
17	DA- Production Eng.	72 hrs	\$0.00	Work	32h	40h	
	Design to Production of Cable Assembly	48 hrs	\$0.00	Work	24h	24h	
	Antennas for Ice Harbor	24 hrs	\$0.00	Work	8h	16h	
18	DA- Technician	320 hrs	\$16,000.00	Work	240h	80h	
	Test Possible Antenna Configurations based on A	160 hrs	\$8,000.00	Work	160h		
	Design to Production of Cable Assembly	160 hrs	\$8,000.00	Work	80h	80h	
19	DA- Mech. Drafting	0 hrs	\$0.00	Work			
20	DA- Mech. Drafting (Sub)	80 hrs	\$6,000.00	Work	80h		
	Create Drawings for Antenna Production	80 hrs	\$6,000.00	Work	80h		

PIT Tag Detection at Fish Counting Window

ID	Resource Name	Type	Initial	Max. Units	Std. Rate	Accrue At	Base Calendar
1	Kim Fodrea	Work	K	100%	\$0.00/hr	Prorated	Standard
2	PSMFC	Work	P	100%	\$0.00/hr	Prorated	Standard
3	Northwest EMC	Material	N		\$0.00	Prorated	
4	Plastics Subcontractor	Work	P	100%	\$100.00/hr	Prorated	Standard
5	Hatfield & Dawson Consulting	Material	H		\$6,000.00	Prorated	
6	Plastics Subcontractor	Work	P	100%	\$100.00/hr	Prorated	Standard
7	Travel	Material	T		\$2,500.00	Start	
8	FS1001A	Material	F		\$6,000.00	Prorated	
9	NMFS	Work	N	100%	\$0.00/hr	Prorated	Standard
10	NMFS-Sandy/Earl	Work	N	100%	\$75.00/hr	Prorated	Standard
11	DA- Project Management	Work	D	100%	\$75.00/hr	Prorated	Standard
12	ACOE	Work	A	100%	\$0.00/hr	Prorated	Standard
13	BPA	Work	B	100%	\$0.00/hr	Prorated	Standard
14	DA- Project Management/ Engineer	Work	D	100%	\$75.00/hr	Prorated	Standard
15	Antenna/Cable	Material	A		\$10,000.00	Prorated	
16	DA- Production Tech.	Work	D	100%	\$0.00/hr	Prorated	Standard
17	DA- Production Eng.	Work	D	100%	\$0.00/hr	Prorated	Standard
18	DA- Technician	Work	D	100%	\$50.00/hr	Prorated	Standard
19	DA- Mech. Drafting	Work	D	100%	\$75.00/hr	Prorated	Standard
20	DA- Mech. Drafting (Sub)	Work	D	100%	\$75.00/hr	Prorated	Standard

ID	Resource Name	Work	Details	2002		2003		2004		2005		2006		2007		2008	
				H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
1	Unassigned	0 hrs	Work														
	GO- NO GO	0 hrs	Work														
	DA- Project Management	1,040 hrs	Work	192h	592h	256h											
	Review Spec. Do	40 hrs	Work	40h													
	Present Info. On	80 hrs	Work	80h													
	Provide comment	40 hrs	Work	32h													
	Technical Implem	200 hrs	Work	200h													
	Prepare Presenta	80 hrs	Work	80h													
	FS1001A-mod	40 hrs	Work	40h													
	Antenna Desig	40 hrs	Work		40h												
	Design Verifict	80 hrs	Work		80h												
	Test Prototype	40 hrs	Work		40h												
	Installation of HI-C	80 hrs	Work		80h												
	Electronic Evalua	160 hrs	Work		64h	96h											
	Analyze Data anc	80 hrs	Work		80h	80h											
	Attend FFDRWG	80 hrs	Work		80h	80h											
2	DA- Tech	840 hrs	Work	80h	760h												
	Technical Implem	200 hrs	Work	200h													
	Test and In	80 hrs	Work	40h	40h												
	Antenna Desig	160 hrs	Work		160h												
	Cable Design	40 hrs	Work	40h													
	Antenna Build	160 hrs	Work		160h												
	Cable Build	80 hrs	Work		80h												
	Design Verifict	80 hrs	Work		80h												
	Test Prototype	40 hrs	Work		40h												
3	DA- Eng.	624 hrs	Work	160h	425.6h	38.4h											
	Technical Implem	200 hrs	Work	160h	200h												
	FS1001A-mod	160 hrs	Work		160h												
	Antenna Desig	80 hrs	Work		80h												
	Design Verifict	80 hrs	Work		80h												
	Test Prototype	40 hrs	Work		40h												
	Electronic Evalua	64 hrs	Work		25.6h	38.4h											
4	DA- Software (Sub STR)	160 hrs	Work	160h													
	Software chan	160 hrs	Work	160h													
5	FS1001A	9	Work		9												
	FS1001A+	9	Work		9												
6	Antenna Coll/ Cap.	8	Work		8												
	Antenna Build	8	Work		8												
7	Travel	12	Work	1	8.8	2.2											
	Present Info. On	1	Work	1													
	Prepare Presenta	1	Work		1												
	Antenna Build	2	Work		2												
	Test Prototype	3	Work		3												
	Installation of HI-C	2	Work		2												
	Electronic Evalua	2	Work		0.8	1.2											
	Attend FFDRWG	1	Work		1												
8	Cable Prod.	8	Work		8												
	Cable Build	8	Work		8												

HI-Q_3year.mpp

HI-Q_3year

ID	Resource Name	Type	Initials	Max. Units	Std. Rate	Accrue At	Base Calendar
1	DA- Project Managemen	Work	D	100%	\$75.00/hr	Prorated	Standard
2	DA- Tech	Work	D	100%	\$50.00/hr	Prorated	Standard
3	DA- Eng.	Work	D	100%	\$75.00/hr	Prorated	Standard
4	DA- Software (Sub STR)	Work	D	100%	\$75.00/hr	Prorated	Standard
5	FS1001A	Material	F		\$6,000.00	Prorated	
6	Antenna Coil/ Cap.	Material	A		\$1,000.00	Prorated	
7	Travel	Material	T		\$2,500.00	Prorated	
8	Cable Prod.	Material	C		\$300.00	Prorated	

AntennaStudy

ID	Resource Name	Work	2002		2003		2004		2005		2006	
			H1	H2	H1	H2	H1	H2	H1	H2		
	Unassigned	0 hrs										
	Antenna Testing	0 hrs										
	Antenna Coil Form	0 hrs										
	Antenna Coil set	0 hrs										
	Tuning Circuits	0 hrs										
	Driver Circuit	0 hrs										
	Execute test	0 hrs										
1	DA- Project Management/ Engineerin	332 hrs	186h	136h								
	Technical Implementation Evaluation Mee	32 hrs	32h									
	Develop TestMatrix	80 hrs	80h									
	Selectorder Material	20 hrs	16h	4h								
	Selectorder Material	20 hrs	16h	4h								
	Selectorder Material	30 hrs	26h	4h								
	Prepare/submit test report	120 hrs	120h									
2	DA- Tech	1,272 hrs	328h	944h								
	Technical Implementation Evaluation Mee	32 hrs	32h									
	Selectorder Material	80 hrs	64h	16h								
	Build Form	80 hrs	80h									
	Selectorder Material	80 hrs	64h	16h								
	Build coil set	160 hrs	160h									
	Selectorder Material	80 hrs	64h	16h								
	Build tuning circuit	80 hrs	80h									
	Selectorder Material	120 hrs	104h	16h								
	Build mods and test analog elec	200 hrs	200h									
	Populate test matrix	200 hrs	200h									
	Analyze data	40 hrs	40h									
	Prepare/submit test report	120 hrs	120h									
3	DA- Eng.	892 hrs	416h	476h								
	Technical Implementation Evaluation Mee	32 hrs	32h									
	Design coil form	20 hrs	20h									
	Build Form	80 hrs	80h									
	Design set	20 hrs	20h									
	Build coil set	40 hrs	40h									
	Design circuit	80 hrs	80h									
	Build tuning circuit	20 hrs	20h									
	Driver design(Switch sine wave	280 hrs	144h	136h								
	Build mods and test analog elec	200 hrs	200h									
	Populate test matrix	40 hrs	40h									
	Analyze data	0 hrs										
4	DA- Software (Sub STR)	0 hrs										
5	FS1001A	0 hrs										
6	Antenna Coil/ Cap.	0 hrs										
7	Travel	0 hrs										
8	Cable Prod.	0 hrs										
9	Test Materials	0 hrs										

AntennaStudy.mpp

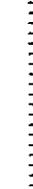
AntennaStudy

ID		Resource Name	Type	Initials	Max. Units	Std. Rate	Accrue At
1	◆	DA- Project Managemen	Work	D	100%	\$75.00/hr	Prorated
2	◆	DA- Tech	Work	D	100%	\$50.00/hr	Prorated
3	◆	DA- Eng.	Work	D	100%	\$75.00/hr	Prorated
4		DA- Software (Sub STR)	Work	D	100%	\$75.00/hr	Prorated
5		FS1001A	Material	F		\$6,000.00	Prorated
6		Antenna Coil/ Cap.	Material	A		\$1,000.00	Prorated
7		Travel	Material	T		\$2,500.00	Prorated
8		Cable Prod.	Material	C		\$300.00	Prorated
9		Test Materials	Material	T		\$500.00	Prorated

ID	Task Name	Duration	Start	Finish	Resource Names	Cost	5/19	5/26
0	AntennaStudy	86 days	Mon 6/3/02	Mon 9/30/02		\$154,650.00		
1	Antenna Testing	86 days	Mon 6/3/02	Mon 9/30/02		\$0.00		
2								
3	Technical Implementation Evaluation Meeting	4 days	Mon 6/3/02	Thu 6/6/02	DA- Project Manager	\$6,400.00		
4								
5	Develop TestMatrix	2 wks	Wed 6/5/02	Tue 6/18/02	DA- Project Manager	\$6,000.00		
6								
7	Antenna Coil Form	0 days	Tue 7/16/02	Tue 7/16/02		\$0.00		
8	Design coil form	2 wks	Wed 6/5/02	Tue 6/18/02	DA- Eng.	\$6,000.00		
9	Select/order Material	2 wks	Wed 6/19/02	Tue 7/2/02	DA- Tech, DA- Project M	\$5,500.00		
10	Build Form	2 wks	Wed 7/3/02	Tue 7/16/02	DA- Eng.[25%], DA- Tec	\$5,500.00		
11								
12	Antenna Coil set	0 days	Tue 7/30/02	Tue 7/30/02		\$0.00		
13	Design set	2 wks	Wed 6/5/02	Tue 6/18/02	DA- Eng.	\$6,000.00		
14	Select/order Material	2 wks	Wed 6/19/02	Tue 7/2/02	DA- Tech, DA- Project M	\$5,500.00		
15	Build coil set	4 wks	Wed 7/3/02	Tue 7/30/02	DA- Eng.[25%], DA- Tec	\$11,000.00		
16								
17	Tuning Circuits	0 days	Tue 7/16/02	Tue 7/16/02		\$0.00		
18	Design circuit	2 wks	Wed 6/5/02	Tue 6/18/02	DA- Eng.	\$6,000.00		
19	Select/order Material	2 wks	Wed 6/19/02	Tue 7/2/02	DA- Tech, DA- Project M	\$5,500.00		
20	Build tuning circuit	2 wks	Wed 7/3/02	Tue 7/16/02	DA- Eng.[25%], DA- Tec	\$5,500.00		
21								
22	Driver Circuit	0 days	Tue 8/6/02	Tue 8/6/02		\$0.00		
23	Driver design(Switch/sine wave drive modes)	7 wks	Wed 6/5/02	Tue 7/23/02	DA- Eng.	\$21,000.00		
24	Select/order Material	3 wks	Wed 6/12/02	Tue 7/2/02	DA- Tech, DA- Project M	\$8,250.00		
25	Build mods and test analog electronics	5 wks	Wed 7/3/02	Tue 8/6/02	DA- Eng., DA- Tech	\$25,000.00		
26								
27	Execute test	0 days	Fri 9/27/02	Fri 9/27/02		\$0.00		
28	Populate test matrix	5 wks	Wed 7/31/02	Tue 9/3/02	DA- Eng.[10%], DA- Tec	\$11,500.00		
29	Analyze data	2 wks	Wed 9/4/02	Tue 9/17/02	DA- Eng.[50%], DA- Tec	\$5,000.00		
30	Prepare/submit test report	3 wks	Mon 9/9/02	Fri 9/27/02	DA- Project Manager	\$15,000.00		

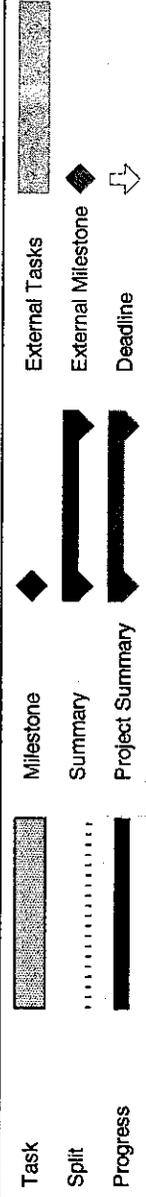
Project: AntennaStudy
Date: Wed 6/26/02

Task  Milestone  External Tasks 

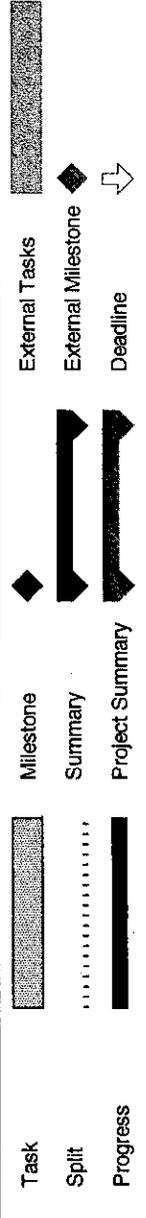
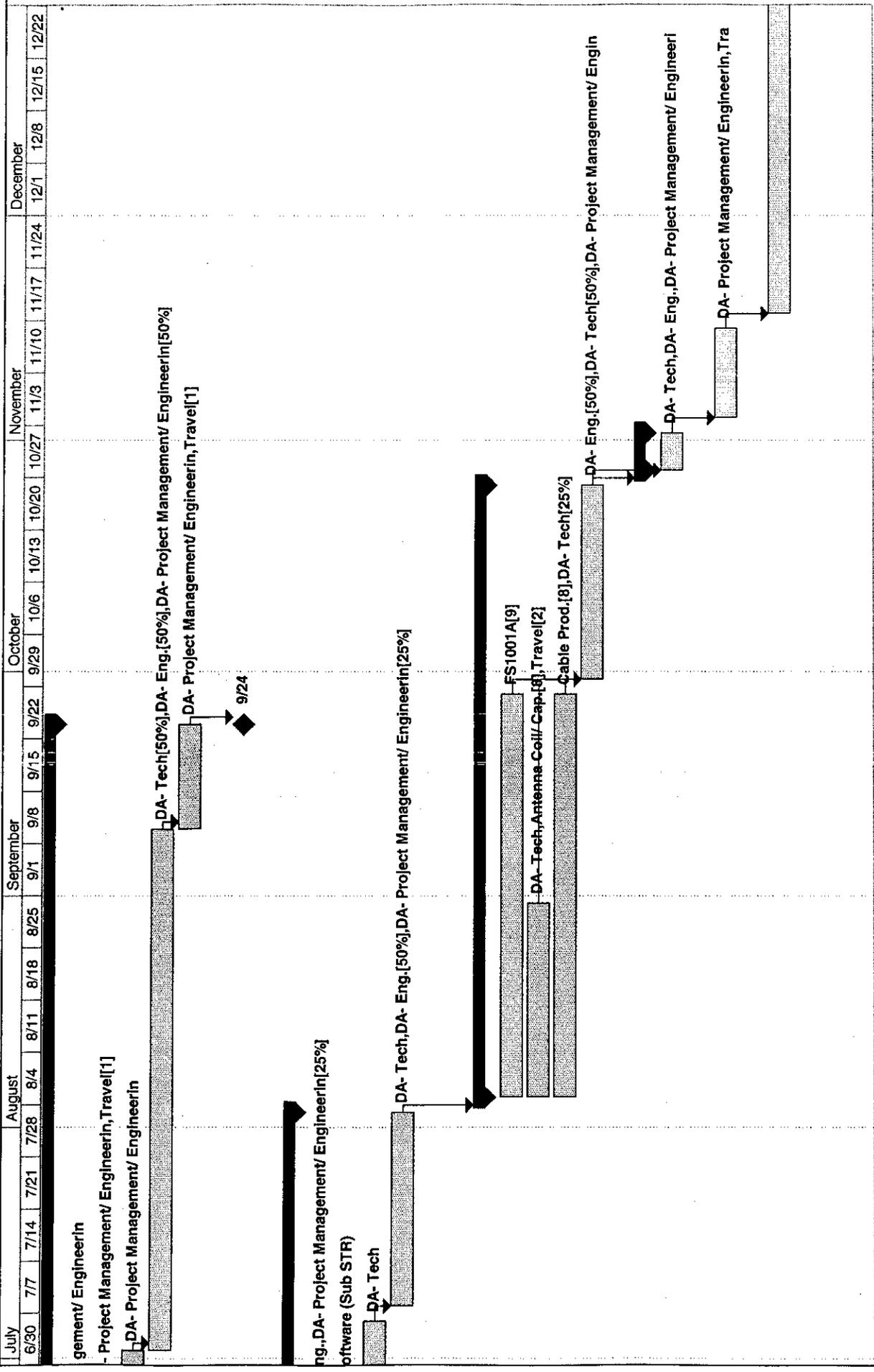
Split  Summary  External Milestone 

Progress  Project Summary  Deadline 

ID	Task Name	Duration	Start	Finish	Cost
1	HI-Q PIT Detection Initial Coordination	80 days	Tue 6/4/02	Mon 9/23/02	\$63,000.00
2	Review Spec. Doc./ Schedule	5 days	Tue 6/4/02	Mon 6/10/02	\$3,000.00
3	Present Info. On PIT Tag Technology	2 wks	Tue 6/11/02	Mon 6/24/02	\$8,500.00
4	Provide comments/ suggestion to spec./ plan	1 wk	Tue 6/25/02	Mon 7/1/02	\$3,000.00
5	Technical Implementation Evaluation	2.5 mons	Tue 7/2/02	Mon 9/9/02	\$40,000.00
6	Prepare Presentation for Electronics Approach to HI-Q	2 wks	Tue 9/10/02	Mon 9/23/02	\$8,500.00
7					
8	GO- NO GO	1 day?	Tue 9/24/02	Tue 9/24/02	\$0.00
9					
10	Prototype Development	50 days	Mon 5/27/02	Fri 8/2/02	\$50,000.00
11	FS1001A-mods	1 mon	Mon 5/27/02	Fri 6/21/02	\$15,000.00
12	Software changes per Skalski	1 mon	Mon 5/27/02	Fri 6/21/02	\$12,000.00
13	Test and Integration	2 wks	Mon 6/24/02	Fri 7/5/02	\$4,000.00
14	Antenna Design	1 mon	Mon 7/8/02	Fri 8/2/02	\$17,000.00
15	Cable Design	2 wks	Mon 5/27/02	Fri 6/7/02	\$2,000.00
16					
17	Prototype Build	60 days	Mon 8/5/02	Fri 10/25/02	\$97,400.00
18	FS1001A+	2 mons	Mon 8/5/02	Fri 9/27/02	\$54,000.00
19	Antenna Build	1 mon	Mon 8/5/02	Fri 8/30/02	\$21,000.00
20	Cable Build	2 mons	Mon 8/5/02	Fri 9/27/02	\$6,400.00
21	Design Verification Test	1 mon	Mon 9/30/02	Fri 10/25/02	\$16,000.00
22					
23	Field Test	5 days	Mon 10/28/02	Fri 11/1/02	\$15,500.00
24	Test Prototype at Pasco	5 days	Mon 10/28/02	Fri 11/1/02	\$15,500.00
25					
26	Installation of HI-Q System	2 wks	Mon 11/4/02	Fri 11/15/02	\$11,000.00
27					
28	Electronic Evaluation/ Plan	4 mons	Mon 11/18/02	Fri 3/7/03	\$21,800.00
29					
30	Analyze Data and Prepare Report	2 mons	Mon 3/10/03	Fri 5/2/03	\$6,000.00
31					

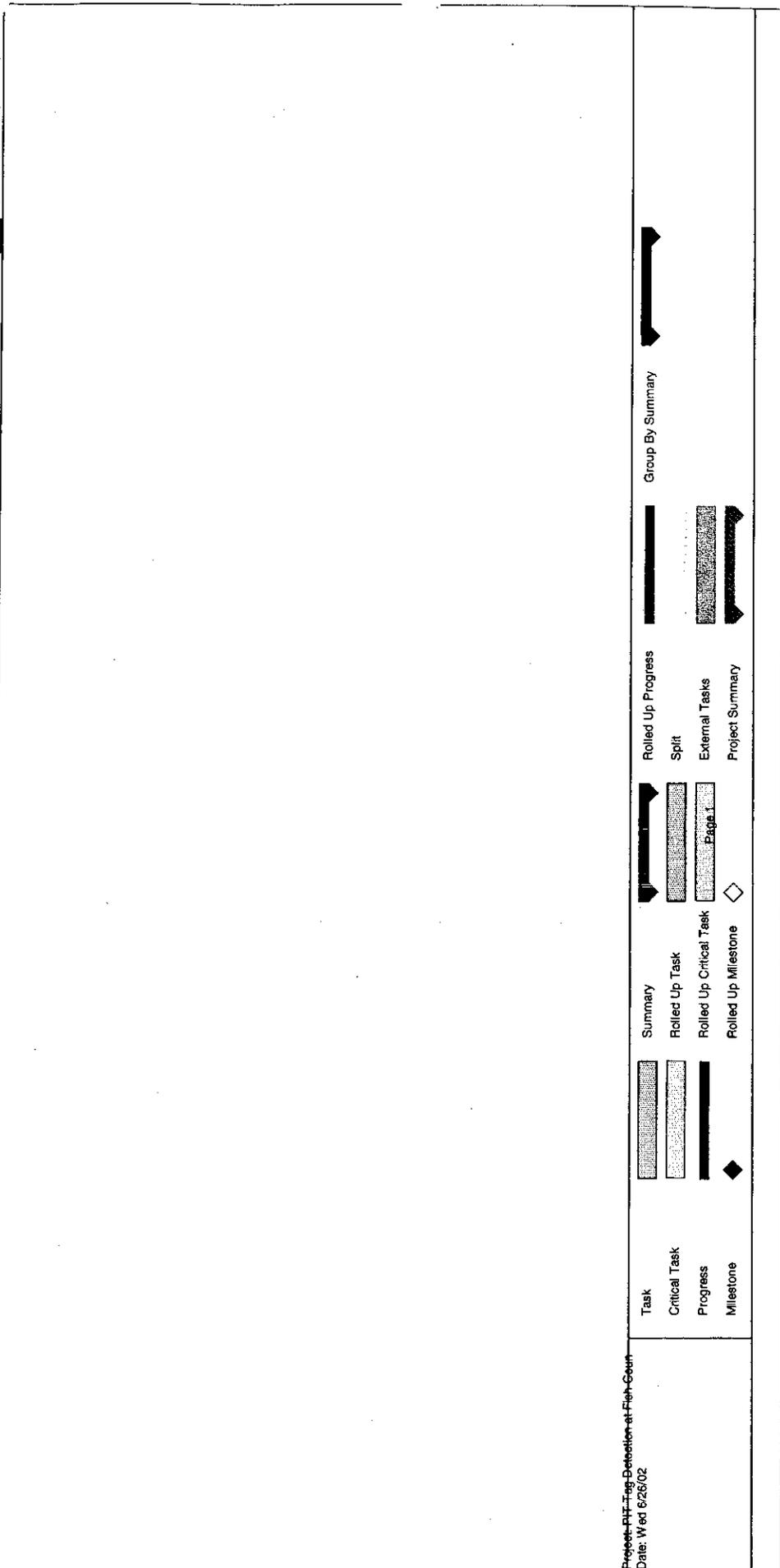


Project: HI-Q_3year
Date: Wed 6/26/02



Project: HI-Q_3year
 Date: Wed 6/26/02

ID	Task Name	Duration	Start	Finish	Cost	3rd Quarter			4th Quarter			1st Quarter			2nd Quarter		
						May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Abr
1	Total Counting Window Installation	167 days	Mon 6/3/02	Tue 1/21/03	\$252,300.00												
2	Initial Work	40 days	Mon 6/3/02	Fri 7/26/02	\$36,100.00												
3	Determine Overall Requirements for Antenna Systems	1 mon	Mon 6/3/02	Fri 6/28/02	\$3,000.00												
4	Test Possible Antenna Configurations based on McNary_OF	1 mon	Mon 6/3/02	Fri 6/28/02	\$8,000.00												
5	Design to Production of Cable Assembly	2 mons	Mon 6/3/02	Fri 7/26/02	\$11,600.00												
6	Site Visit- Ice Harbor	5 days	Mon 6/17/02	Fri 6/21/02	\$13,500.00												
7	EMI Testing	1 mon	Mon 6/24/02	Fri 7/19/02	\$0.00												
8	Counting Window	167 days	Mon 6/3/02	Tue 1/21/03	\$216,200.00												
9	Generate Site Specific PIT System Requirements	1 mon	Mon 6/24/02	Fri 7/19/02	\$6,000.00												
10	Travel/Meetings	1 mon	Mon 6/24/02	Fri 7/19/02	\$10,500.00												
11	Generate Antenna Specification per Site	1 mon	Mon 7/22/02	Fri 8/16/02	\$6,000.00												
12	Installation Construction Planning/Reviews, 60%, 100%	4 mons	Mon 6/24/02	Fri 10/11/02	\$14,700.00												
13	Create Drawings for Antenna Production	10 days	Mon 6/3/02	Fri 6/14/02	\$6,000.00												
14	Antennas for Ice Harbor	1.5 mons	Mon 6/17/02	Fri 7/26/02	\$100,000.00												
15	Readers for Ice Harbor	1.5 mons	Mon 6/17/02	Fri 7/26/02	\$54,000.00												
16	Installation (Pre/Post Water) & Final Site Visits	3 wks	Wed 1/1/03	Tue 1/21/03	\$19,000.00												



Project: PIT-Tag-Detection-at-Fish-Gear
Date: Wed 6/26/02

Task

Critical Task

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Critical Task

Rolled Up Milestone

Rolled Up Progress

Split

External Tasks

Project Summary

Group By Summary

January	February	March	April	May	June																				
12/29	1/5	1/12	1/19	1/26	2/2	2/9	2/16	2/23	3/2	3/9	3/16	3/23	3/30	4/6	4/13	4/20	4/27	5/4	5/11	5/18	5/25	6/1	6/8	6/15	6/22
DA-Project Management/Engineering, Tra																									

Project: HI-Q_3year
Date: Wed 6/26/02

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

BONNEVILLE
POWER ADMINISTRATION

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00006
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

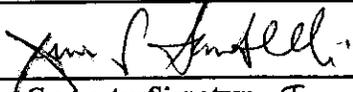
DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 2001-003-00 INSTALLATION OF ADULT PIT DETECTION SYSTEMS

Total Value : \$736,250.00
Pricing Method: COST, NO FEE
Performance Period: 07/01/02 - 10/31/03

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

 Contractor Signature James P. Santelli; VP-Finance/CFO Printed Name/Title 12/2/02 Date Signed	 BPA Contracting Officer 11/14/02 Date Signed
--	--

Contract Amendments

Title : 2001-003-00 INSTALLATION OF ADULT PIT DETECTION SYSTEMS
Amendment: 001
Amended Performance Period: - 10/31/03
Amendment Value: \$266,300.00
Pricing Method :

The purpose of this amendment is to modify the scope of work for the release, extend the period of performance and to add funds to the release. Modifications to the scope of work are detailed in the following pages.

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00006, Modification 1
Project 2001-003-00 "Installation of Adult PIT Detection Systems"

I. Scope of Work

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for DA to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

A. Ice Harbor and Lower Granite Adult PIT Detection. DA will assist BPA and the Corps in implementing adult PIT tag detection at Ice Harbor in four weirs with the vertical slot and orifice configuration. This detection system will allow for the possibility of detecting all adult fish passing through a ladder and eliminate the need for overflow detection. The responsibilities of DA, schedule, and cost for this task are defined Tables A1, and A2. This plan is based on the following assumptions:

1. Four antennas will be used per counting window site. Eight (8) antennas will be used per ladder site with four (4) vertical slot and four (4) orifice styles.
2. The antennas will be removable, similar to those used at McNary's Oregon-shore counting window.
3. There would be one spare antenna per counting window site.
4. One spare FS1001A will be provided at each site.
5. Ice Harbor has two ladders, and Lower Granite has one ladder.
6. The Exciter Cable will be included with the antenna.
7. Modifications will be made by the ACOE to make each site as optimal as possible for the antenna installation in order to minimize interference and antenna loading.
8. A composite antenna will meet the requirements of PSMFC and NMFS.
9. Each antenna will be tested in water and burned in for 1 week.
10. More than one site will be visited/tested/verified per trip (Travel).
11. PSMFC will manage the actual installation with the ACOE.
12. Two and one half months will be allowed for the production and delivery of antennas.
13. For purposes of this plan, a cost of \$12,000 was used for each vertical slot antenna/cable assembly and \$9,000 for each orifice antenna/ cable assembly. This is based on the cost of the fiberglass prototype that is currently in the McNary Oregon Shore Ladder.
14. At this time it is not possible to determine when sites will be available for installation. Included are pre-construction, post-construction and final site visits. The schedule will be changed when this information is available.
15. The order in which the antennas are produced may also be changed to reflect dewatering schedules. It is important that these schedules be finalized as soon as possible to insure timely deliveries.
16. The Installation Construction Planning/ Reviews time is an estimate, and it is understood that it could be longer. There will be no added costs from Digital Angel

Corp. if this is not correct, as the level of effort for reviewing drawings and plans will not change.

The total cost of this task presented in the attached file and funded by this contract release is \$ 557,600, which includes \$ 364,300 for Ice Harbor and \$ 193,300 for Lower Granite.

B. Analysis of Maximum Antenna Size. DA will determine the technical feasibility and methods of driving pass-thru antenna designs up to 10' X 15'. Several antenna sizes and configurations will be designed and tested with both switch mode and sine wave drive schemes to characterize the PIT Tag response with the larger antenna configurations. This evaluation will benefit the Hi-Q Program at Bonneville Dam, Small-Stream Program and the Generation 2 FS1001A Transceiver development. In order to develop large antenna systems and provide the proper reader interface to drive and receive the PIT Tag signal, the maximum requirements for the systems needs to be identified prior to the product development phase. The results of this evaluation will be used to determine the requirements and antenna feasibilities necessary to begin the Hi-Q PIT Program antenna development, and Generation 2 Reader Project. The completion of this program will minimize the risks and schedules for both. The responsibilities of DA, schedule, and cost for this task are defined in the Microsoft Project file (AntennaStudy.mpp). The specific goals for this task are:

1. Determine the maximum feasible antenna size and configurations.
2. Determine the maximum PIT Tag turn-on ranges and receive patterns for antenna sizes up to 10' X 15'.
3. Characterize driver capabilities of switch mode and sine wave drive systems.
4. Determine large antenna drive system power supply requirements.
5. Identify the PIT Tag receive signal-to-noise ratios needed for tag data recovery in future DSP based reader systems.

The total cost for this task is \$ 154,650. This contract release provides funding for the total cost of this task, which will be completed by March 2003 to allow incorporation of Hi-Q PIT design information.

C. High-flow/High-Q PIT Detection Systems. Options for PIT detection at the Bonneville Corner Collector are being explored by the Corps of Engineers and BPA. DA will participate in the early planning phase for developing electronics and will provide guidance to the Corps of Engineers for modifying the current construction plan, including rebar details, in anticipation of installing a future PIT tag detection system.

The total cost for this task as presented in Table C1 is \$ 24,000. Additional funds for the rest of the High-Q work will be provided by BPA in a future contract release when funds become available.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's project manager, Kim Fodrea. Additionally, coordination with the National Marine Fisheries Service, Corps of Engineers, and Pacific States Marine Fisheries Commission may be required.

BPA Project Manager
 Kim Fodrea
kafodrea@bpa.gov
 (503) 230-3702
 PO Box 3621 KEWR-4
 Portland, OR 97208-3621

III. Project Schedule

The tasks described in this statement of work by Digital Angel Corporation will be completed in the fiscal year 2003 for project 2001-003-00, Adult PIT Detector Installation. A detailed schedule of deadlines and milestones for this work is included in the tables. Scheduling of the tasks within this contract release will be coordinated with the BPA Project Managers. The performance period is 1 February 2002 through 31 October 2003.

IV. Budget

The total estimated cost of this work is \$ 736,250.

Tasks	Original Funding	Revised Funding Requirement	Additional Funding Necessary in Modification No. 1
A. Ice Harbor Adult PIT Detection & Lower Granite Adult PIT Detection	\$ 252,300 \$ 0	\$ 364,300 \$ 193,300	\$ 112,000 \$ 193,300
B. Analysis of Maximum Feasible Antenna Size	\$ 154,650	(no change) \$ 154,650	\$ 0
C. High-flow PIT Detection Systems	\$ 63,000	\$24,000	\$ -39,000
Total	\$ 469,950	\$ 736,250	
Total Funded by This Contract Release No. 6, Modification No. 1			\$266,300

Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

TABLE A1. Ice Harbor and Lower Granite Adult PIT Resource Requirements

Resource/ Product	Hours/ #Units	Cost	Start Date	End Date
Standard Rate: \$50.00/hr	224 hrs	\$11,200.00		
DA- Production Tech.	24 hrs	\$1,200.00	09/02/02	09/27/02
Design to Production of Cable Assy	24 hrs	\$1,200.00	09/02/02	09/27/02
DA- Technician	200 hrs	\$10,000.00	09/02/02	09/27/02
Test Possible Antenna Configurations based on McNary_OR	160 hrs	\$8,000.00	09/02/02	09/27/02
Design to Production of Cable Assy	40 hrs	\$2,000.00	09/02/02	09/27/02
Standard Rate: \$75.00/hr	912 hrs	\$65,400.00		
DA- Project Management/ Engineering	800 hrs	\$57,000.00		
Design to Production of Cable Assy	40 hrs	\$3,000.00	09/02/02	09/27/02
Ice Harbor	40 hrs	\$3,000.00	08/05/02	08/30/02
Lower Granite	40 hrs	\$3,000.00	08/05/02	08/30/02
Travel/ Meetings	40 hrs	\$3,000.00	08/05/02	08/30/02
Ice Harbor	40 hrs	\$3,000.00	09/02/02	09/27/02
Lower Granite	160 hrs	\$12,000.00	09/02/02	09/27/02
Installation Construction Planning/Reviews, 60%, 100%	160 hrs	\$12,000.00	06/17/02	10/04/02
Ice Harbor	120 hrs	\$9,000.00	01/01/03	01/21/03
Lower Granite	120 hrs	\$9,000.00	12/02/02	12/20/02
DA- Production Eng.	24 hrs	\$1,800.00		
Design to Production of Cable Assy	24 hrs	\$1,800.00	09/02/02	09/27/02
DA- Mech. Drafting (Sub)	88 hrs	\$6,600.00		
Create Drawings for Antenna Production	88 hrs	\$6,600.00	10/01/02	10/15/02
Standard Rate: \$2,500.00		\$25,000.00		
Travel	10	\$25,000.00		
Travel/ Meetings	2	\$5,000.00	08/05/02	08/30/02
Installation Construction Planning/Reviews, 60%, 100%	2	\$5,000.00	06/17/02	10/04/02
Ice Harbor	3	\$7,500.00	01/01/03	01/21/03
Lower Granite	3	\$7,500.00	12/02/02	12/20/02
Standard Rate: \$6,000.00		\$162,000.00		
FS1001A	27	\$162,000.00		
Readers for Ice Harbor	18	\$108,000.00	10/16/02	12/10/02
Readers for Lower Granite	9	\$54,000.00	10/16/02	12/10/02
Standard Rate: \$9,000.00		\$126,000.00		
Antenna/Cable-Orifice	14	\$126,000.00		
Antennas for Ice Harbor-Orifice	10	\$90,000.00	10/16/02	12/10/02

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00002
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
SUTH ST PAUL MN 55075

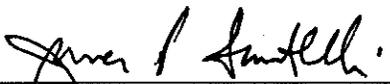
Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH
Project : 0001684

Total Value : \$651,553.00
Pricing Method: COST, NO FEE
Performance Period: 06/18/01 - 03/31/02

** NOT TO EXCEED **
Payment Terms: % Days Net 10



Contractor Signature
James P. Santelli Vice President

Printed Name/Title
6/25/01

Date Signed



BPA Contracting Officer
6/19/01

Date Signed

FY2001 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00002
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

Scope of Work

This Contract Release provides for Digital Angel Corporation to continue supporting the Bonneville Power Administration (BPA) and the National Marine Fisheries Service (NMFS) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for Digital Angel Corporation to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

- 1) Assist NMFS with evaluation of transceivers and antennas at the NMFS lab in Pasco, Washington.
- 2) Install and evaluate the transceivers in the PIT-tag detection system at the Bonneville Dam Washington-shore adult fish-passage ladder. Provide final check-out of the Bonneville Washington-shore PIT-tag detection system.
- 3) Provide support and technical guidance in monitoring the electromagnetic interference at the sites of future PIT-tag detection systems at the Bonneville Cascades Island ladder, the Bonneville Bradford Island ladder, and the McNary Oregon-shore ladder.
- 4) Provide technical support for determining the future installation sites for transceivers and antennas at the Bonneville Cascades Island ladder, the Bonneville Bradford Island ladder A- and B-branch, and the McNary Washington-shore ladder, and the McNary Oregon-shore ladder.
- 5) Provide technical support, guidance, and training to NMFS and PSMFC on operation and maintenance of the transceivers.
- 6) Participate in four (4) meetings of the Adult PIT-tag Oversight Committee.
- 7) Continue development and testing of the virtual tag and the associated hardware and software modifications.
- 8) Develop new expandable architecture for the transceiver CPU.
- 9) Support NMFS and the U.S. Fish and Wildlife Service in developing PIT-tag detection systems for small-stream applications at the Abernathy Fish Technology Center by providing labor, PIT tags, transceivers, portable readers, antenna equipment, and the associated expenses. This work is subject to approval by the Northwest Power Planning Council or cancellation by BPA before July 6, 2001. If necessary, BPA will provide written notice of cancellation and will reimburse Digital Angel Corporation for all expenses incurred for this work up to the date of the cancellation.
- 10) Provide ninety (90) Model FS1001A transceivers. Sixty-three (63) of these transceivers are subject to approval by the Northwest Power Planning Council or cancellation by BPA before July 6, 2001. If necessary, BPA will provide written notice of cancellation and will reimburse Digital Angel Corporation for all expenses incurred for this work up to the date of the cancellation.

Project Coordination

All work included in this Work Order shall be coordinated with the project managers of Bonneville Power Administration and the National Marine Fisheries Service.

BPA Project Manager

Kim Fodrea

kafodrea@bpa.gov

(503) 230-3702

PO Box 3621 KEWI-4

Portland, OR 97208-3621

NMFS Project Manager

Sandy Downing

sandy.downing@noaa.gov

(206) 526-4652

Northwest Fisheries Science Center

Seattle, WA 98112

Project Schedule

This statement of work is intended to cover all work by Digital Angel Corporation in the Fiscal Year 2001 for project 1983-319-00, new Marking and Monitoring Techniques for Fish. A detailed schedule of deadlines and milestones will be coordinated with the NMFS and BPA Project Managers following release of the contract. This statement of work covers a performance period of 1 October 2000 through 31 March 2002.

Delivery of Transceivers

Delivery of transceivers will be coordinated with the BPA and NMFS Project Managers. All transceivers will be delivered by 15 February 2002. Fifty-one (51) transceiver units will be delivered for Bonneville Dam ~~no later than 15 December 2001~~. Thirty-four (34) transceiver units will be delivered for McNary Dam ~~no later than 15 January 2002~~. Two (2) transceiver units will be delivered for PSMFC no later than 15 February 2002. Three (3) transceiver units and two (2) portable readers will be delivered for the Abernathy small-stream technology development effort by 15 October 2001. Shipping addresses will be provided upon request to the BPA Project Manager.

Handwritten signature and date: 2/15/02

Budget

The total estimated cost of this work is \$651,553.00. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00003
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
SUTH ST PAUL MN 55075

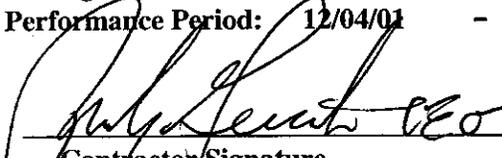
Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

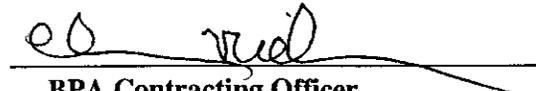
Attn: Sean Casey

Contract Title: 2001-003-00 ADULT PIT DETECTOR INSTALLATION
Project : 0003235

Total Value : \$283,950.00
Pricing Method: COST, NO FEE
Performance Period: 12/04/01 - 08/31/02

** NOT TO EXCEED **
Payment Terms: % Days Net 10


Contractor/Signature
Randolph K. Geissler
Printed Name/Title
12/10/01
Date Signed


BPA Contracting Officer
12/4/01
Date Signed

ADULT PIT-TAG DETECTION AT THE FISH COUNTING STATION OF McNARY DAM'S OREGON-SHORE LADDER

I. Purpose: This project will enhance current adult PIT tag detection efficiencies or provide an alternative design option for future adult PIT tag interrogation installations at the hydroelectric facilities on the Columbia and Snake Rivers. The need for adult interrogation is set forth in the 2000 FCRPS Biological Opinion in sections 9.6.1.3.3, 9.6.1.3.4, and 9.6.5.3.5.2. The current installation of detectors at the Bonneville Dam Washington-shore ladder has been successful in developing an extended range reader system with high detection efficiencies in the underwater orifices, but the data now indicates as many as 10% of the fish are not using the orifices. Placing detectors on top of the weirs, on the walls of vertical slots, or at the entrance and exit orifices of the fish counting windows are possible solutions to increase detection efficiencies. This project will address the low technical risk/cost approach of placing detection at the fish counting windows using the current extended range PIT Tag reader developed for the Bonneville and McNary fish ladder installations.

All fish ladders in the Columbia Basin have fish counting windows, which have either video cameras or personnel that tally the number of returning adult fish. At each counting window the ladder width and height is reduced to insure that ALL fish are funneled past the window. Although the size of the opening that the fish travel through is different from one counting window to another, in general it is always the smallest adult fish passage area that is available at all dams. With the advancement in readers and tags, pass-thru antennas up to 14 square feet in area are achievable. Figure 1 shows a typical configuration of the proposed system.

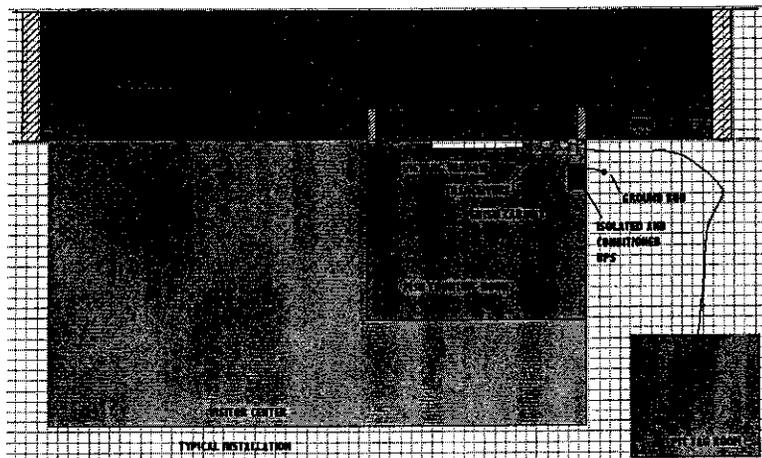


Figure 1. Typical Fish Counting Window Configuration for PIT Tag Interrogation

II. Technical Products and Services To Be Provided Under This Contract:

Reader: This project will use the FS1001A-15 or FS1001A-24 PIT Tag Transceiver System developed for the current adult ladder/orifice installations at Bonneville and McNary Dams. There is no anticipated development work needed on the transceiver. The FS1001A-24 model can provide more power to the antenna if necessary. This unit can require ventilation to dissipate heat depending on the power level, which is not a problem in this installation.

Cable: The cable/connectors that have been selected and produced for the orifice installation will be used for this project. There is the possibility of using a second cable for the antenna shield. It will be the same as the exciter cable with the exception of being a different sex. No anticipated development work on the cable assemblies. These cables have already been ordered by BPA.

Antenna Design: The antenna will be a rectangular pass-through style. There will be an aluminum C-channel shield to minimize EMI interference and radiation to reduce noise and possible health concerns. The shield will also clamp the field, resulting in a narrow dense field that will help reduce the possibility of interference from having multiple tags in the field. The antenna will be potted in place with plastic and closed cell foam filler will occupy the remaining space. The entire antenna will be sheathed in PVC, fiberglass or urethane.

A separate connector or strain relief with a wire will be attached to the shield for grounding purposes. Materials and dimensions of the antenna will be finalized upon the decision as to what size slot can be cut into the wall outside the counting window. Selection of the materials will be based on structural, environmental, and production factors. The design must be capable of adapting to different sizes without a large nonrecurring expense cost. A slip joint will lock the antenna into place. Tabs will be placed on the top edge to facilitate the removal of the antenna. As this is a new antenna construction, there will be a water test performed on each unit.

The ideal dimensions and construction technique are depicted in Figure 2.

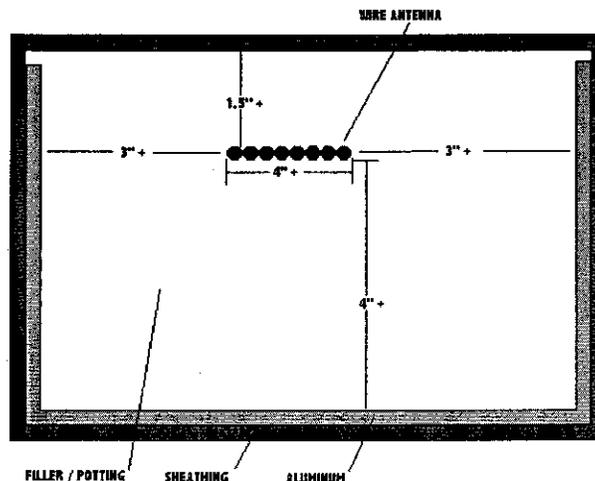


Figure 2. Antenna Construction and Ideal Dimensions

Installation: The installation of the units will consist of the components pictured in the Overview Section. A UPS (uninterruptible power supply) for isolation and filtering of the AC power will be used. This will allow the readers to operate during power outages. Since the units draw .5Amp.s in total, the goal will be to select a UPS that will run the readers for over 4 hours. Four runs of 1" rigid metallic conduit will connect the transceiver enclosure to the outside wall. Two conduits are needed for each transceiver, one for the exciter cable and one for the shield ground. Conduit bends should have a radius of 9 inches, if possible. A dedicated duplex outlet will be necessary (if not available) to plug in the UPS. A ground rod, or dedicated ground that is known to be good, will be necessary in or near the counting room. Fiber optic cable will be run to the PIT Tag room if space is not available for the computer in the counting room.

Testing:

- 1.) Antenna will be lab tested to optimize performance.
- 2.) Hatfield and Dawson will test the production antenna for radiation hazard analysis to humans. If the testing indicates a health hazard, BPA may discontinue or suspend the project.
- 3.) Installation site will be checked for EMI interference by EMC Corp.
- 4.) After the installation, the counting window and public viewing window area will be tested by Hatfield and Dawson to insure that the radiation from the antenna is safe for humans.
- 5.) Antenna performance will be tested in the dewatered ladder prior to water-up.
- 6.) Software will be developed by PSMFC to evaluate the counting window system efficiencies using the underwater orifice system detectors immediately downstream as a control factor. This software should update the data daily. This will eliminate the need for a fish test.

III. Budget: The total estimated cost of this project is \$303,600.00. The funding provided by this contract release to Digital Angel Corporation is \$213,950.00. A detailed cost estimate is provided in Figure 3. BPA will provide separate contracts/funding to Pacific States Marine Fisheries Commission and National Marine Fisheries Service in order to complete the full project.

In addition to the \$213,950.00 funds to complete the tasks listed in Section III of this statement of work, BPA will award \$70,000 to Digital Angel Corporation if this project is declared by BPA to be "highly successful". The counting window detectors are expected to detect most if not all of the fish detected by the orifice detector system plus the fish that were not detected by the orifice detection system because they passed over the weirs. The actual detection efficiency of both systems will be difficult to estimate without a direct release test, and there are no plans to perform such a test. Therefore, "highly successful" completion will be declared if the counting window detection system performs as well as or better than the 8-weir orifice detection system in the same ladder. More specifically, BPA will find the project to be "highly successful" if the following conditions are met:

1. The counting window detection system must detect at least 99 percent of the fish detected by the orifice detection system during the month of April.
2. The counting window detection system must also detect a number of fish not detected by the orifice detection system during the month of April.

The counting window system will likely detect the same percentages of fish detected by the orifice system and fish that passed over the weirs undetected by the orifice detection system. The intent of the second condition of the bonus is to provide some validation to this theory. However, a specific number of fish cannot be stated because it is unknown how many fish continually pass over the weirs at the McNary Washington-shore ladder. If these conditions are not met, Digital Angel Corporation's work under this contract task can still be considered a success. However, the \$70,000 bonus may not be awarded.

Figure 3. Detailed Project Cost Estimate

PSMFC				\$ 33,250	\$ 33,250
Site Visit- McNary Dam	8 hrs	\$	600		
EMI Testing	16 hrs	\$	1,200		
Installation Construction Planning	16 hrs	\$	1,200		
Drawings/Review	8 hrs	\$	600		
Construction	30 hrs	\$	2,250		
Installation	12 hrs	\$	900		
Testing in Water with Production Antennas	40 hrs	\$	3,000		
Electrical Subcontracter	40 hrs	\$	3,000		
Northwest EMC	1	\$	2,000		
EMI Testing	1	\$	2,000		
Electrical Contractor	2	\$	4,000		
Fiberoptic Materials	1	\$	5,000		
Antenna Water/Burn-in Testing	1	\$	7,500		
NMFS					\$ 56,400
				\$	
Pasco				48,600	
Site Visit- McNary Dam	8 hrs	\$	600		
Installation Construction Planning	80 hrs	\$	6,000		
Drawings/Review	40 hrs	\$	3,000		
Construction	360 hrs	\$	27,000		
Electrical Contractor	40 hrs	\$	3,000		
Installation	12 hrs	\$	900		
Construction Materials		\$	7,500		
Electrical and Mechanical Design Review	8 hrs	\$	600		
				\$	
Seattle				7,800	
Site Visit- McNary Dam	8 hrs	\$	600		
Drawings/Review	8 hrs	\$	600		
Testing with Feasibility Antenna	40 hrs	\$	3,000		
Testing in Water with Production Antennas	40 hrs	\$	3,000		
Electrical and Mechanical Design Review	8 hrs	\$	600		

Digital Angel Corporation			\$ 213,950
Sean Casey, Engineer			\$ 32,850
Site Visit- McNary Dam	8 hrs	\$ 600	
Installation Construction Planning	16 hrs	\$ 1,200	
Drawings/Review	8 hrs	\$ 600	
Coordination with Corps	40 hrs	\$ 3,000	
Construction	30 hrs	\$ 2,250	
Installation	12 hrs	\$ 900	
Testing with Feasibility Antenna	40 hrs	\$ 3,000	
Testing in Water with Production Antennas	40 hrs	\$ 3,000	
Radiation Analysis	24 hrs	\$ 1,800	
Proposal Document	40 hrs	\$ 3,000	
Feasibility Testing on Antenna	40 hrs	\$ 3,000	
Radiation Analysis	24 hrs	\$ 1,800	
Electrical and Mechanical Design Review	8 hrs	\$ 600	
Test and Test Report Set-up	40 hrs	\$ 3,000	
DVT Lab Test and Evaluation of Prototype Antenna	40 hrs	\$ 3,000	
Fabrication of First Antenna	12 hrs	\$ 900	
Fabrication of 3 Antennas	16 hrs	\$ 1,200	
Roger Clark, Technician			\$ 22,600
Feasibility Testing on Antenna	80 hrs	\$ 4,000	
Electrical and Mechanical Design Review	8 hrs	\$ 400	
Test and Test Report Set-up	40 hrs	\$ 2,000	
DVT Lab Testing and Evaluation of Proto Ant.	80 hrs	\$ 4,000	
Fabrication of First Article	60 hrs	\$ 3,000	
Lab Validation of the First Article	40 hrs	\$ 2,000	
Antenna Water/Burn-in Testing	120 hrs	\$ 6,000	
Installation	24 hrs	\$ 1,200	
George Johnson, Materials Expert			\$ 41,400
Installation Construction Planning	80 hrs	\$ 8,000	
Drawings/Review	80 hrs	\$ 8,000	
Fabricate 2 Antenna Models	80 hrs	\$ 8,000	
Materials Search	80 hrs	\$ 8,000	
Electrical and Mechanical Design Review	8 hrs	\$ 800	
Create Drawings for Antenna Production	40 hrs	\$ 4,000	
Fabrication of First Article	30 hrs	\$ 3,000	
Fabrication of 3 Antennas	16 hrs	\$ 1,600	
Yuri Smirnov, Engineer			\$ 3,600
Feasibility Testing on Antenna	20 hrs	\$ 1,500	
Electrical and Mechanical Design Review	8 hrs	\$ 600	
DVT Lab Testing and Evaluation of Proto Ant.	20 hrs	\$ 1,500	
Valley Machine			\$ 7,800
Feasibility Testing on Antenna	80 hrs	\$ 4,800	
Fabrication of First Article	30 hrs	\$ 1,800	
Fabrication of 3 Antennas	20 hrs	\$ 1,200	
Drafting Consultant			\$ 10,200
Drawings/Review	96 hrs	\$ 7,200	
Create Drawings for Antenna Production	40 hrs	\$ 3,000	

Plastics Subcontractor	130 hrs			\$ 21,000
Fabricate 2 Antenna Models	40 hrs	\$	4,000	
Fabrication of First Article	90 hrs	\$	9,000	
Fabrication of 3 Antennas	80 hrs	\$	8,000	
Hatfield & Dawson Consulting				\$ 12,000
Lab Radiation Analysis	1	\$	6,000	
Field Radiation Analysis	1	\$	6,000	
UPS				\$ 1,500
UPS Installation	1	\$	1,500	
Metal Materials				\$ 5,000
Fabrication of First Article	1	\$	1,000	
Antenna Water/Burn-in Testing	1	\$	1,000	
Fabrication of 3 Antennas	3	\$	3,000	
Travel				\$ 27,500
Site Visit- McNary Dam	2	\$	5,000	
Installation Construction Planning	2	\$	5,000	
Construction	1	\$	2,500	
Installation	2	\$	5,000	
Testing with Feasibility Antenna	1	\$	2,500	
Testing in Water with Production Antennas	1	\$	2,500	
Radiation Analysis in Lab	1	\$	2,500	
Radiation Analysis in Field	1	\$	2,500	
Transceivers				\$ 18,000
FS1001A	3	\$	18,000	
Plastic Materials				\$ 10,500
Fabricate 3 Antenna Models	3	\$	4,500	
Fabrication of 4 Antennas	3	\$	6,000	
Total Estimated Cost		\$	303,600	\$ 303,600 \$ 303,600

IV. Schedule: The schedule for this project is critical. In-ladder work must be completed during the scheduled ladder outage in February 2002, and the system must be operational during the fish passage season starting in March.

V. Coordination: Coordination is critical to the success of this project. Digital Angel Corporation will serve as the central point of contact for the overall project. Digital Angel Corporation will be responsible for coordinating among the NMFS, PSMFC, and Digital Angel staff contracted for the completion of the project. Digital Angel Corporation will also assist Bonneville Power Administration in coordinating with the Corps of Engineers to obtain approval and clearance to perform the work on the Corps dam. Bonneville Power Administration will be responsible for regional coordination with fisheries management agencies.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00004
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
SUTH ST PAUL MN 55075

Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 2001-003-00 ADULT PIT DETECTOR INSTALLATION
Project : 0003235

Total Value : \$31,172.00
Pricing Method: COST, NO FEE
Performance Period: 12/01/01 - 02/28/02

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

Contractor Signature

Printed Name/Title

Date Signed



BPA Contracting Officer

1/14/02

Date Signed

Scope of Work Attached

**McNary Dam
PIT Tag Antenna Installation at Fish Counting Window
Proposed Drawing List**

Work Required By This Task Order: Develop engineering and construction drawings to meet Corps requirements for two PIT-tag detectors at the McNary Dam Oregon-shore fish counting station.

Drawing List:

<u>General Drawings</u>	<u>Eng</u>	<u>CADD</u>
1. Cover Sheet with Maps and Index	3	2
 <u>Civil Drawings</u>		
2. Oregon Fish Ladder Site Plan and Elevation	1	2
3. Demolition Plan & Details	12	4
4. Detailed Site Plan and Elevation	6	4
5. West Antenna Details	32	8
6. East Antenna Details	32	8
7. Railing Plan and Details	4	4
8. Gate Lift Modifications	12	4
9. Antenna Receptor Channel and FRP Fabrications	4	2
General/Civil Subtotal	116	38

Notes:

- 1) Sheet 2 will show conduit routing to powerhouse.
- 2) Demo Plan may not show railings for clarity of members below railings. (Railing plan will show railings to be removed.)
- 3) Detailed Site Plan will show routing of conduits for power and antenna cables.
- 4) Railing plan and details will show demolition of railings and new railings (different symbology for permanent and removable)
- 5) Gate lift modification will show plates and angles supporting a boat trailer winch as well as screw to secure gate from vibrating in vertical channels.
- 6) FRP = Fiber Reinforced Plastic. FRP will be used as non-metallic blocking pieces and bullnoses at edges of pulltruded fiberglass sheets.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00005
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
SUTH ST PAUL MN 55075

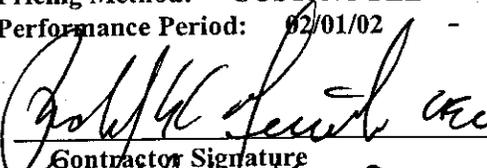
Please Direct Inquiries to:
CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKETING & MONITORING TECHNIQUES FOR FISH
Project : 0001684

Total Value : \$209,538.00
Pricing Method: COST, NO FEE
Performance Period: 02/01/02 - 10/31/02

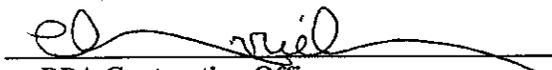
**** NOT TO EXCEED ****
Payment Terms: % Days Net 10



Contractor Signature
Robert K. Geissler, CEO

Printed Name/Title
11 MAR 2002

Date Signed



BPA Contracting Officer
3/5/02

Date Signed

FY2002 Statement of Work
Contract 00002760, Release 00005
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

I. Scope of Work

This Contract Release provides for Digital Angel Corporation to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for Digital Angel Corporation to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

A. Small-stream Detection System

As part of the small-stream detection project, it has been determined that there is a need for a PIT Tag interrogation system that can have multiple antennas (in order to span a stream) driven by a single reader. By driving one antenna at a time and switching between them, there will be a significant reduction in power consumption and cost versus using one reader for each antenna. Biologists in remote locations that are not familiar with the reader systems will do installation of most of these systems. In order to simplify the installation and adapt to changing river conditions it will be necessary for the reader to automatically tune the antenna. In order to allow for stand-alone data logging operation, it will be necessary to put the real-time clock hardware and software on the CPU card. If possible it has been requested that the reader accept sensor inputs (4-20mA). The near term goal for DA is to provide a product for the researchers that can be available in about one year. In order to fully meet the complete objectives of small stream interrogation, the integration of this technology to the new CPU development needs to occur. This design needs to be modular and flexible to fit into the new architecture.

1. Critical Requirements. In order to successfully meet the needs of the community for small-stream detection, the following critical requirements must be met.

- a. At this point in time NMFS is sourcing power systems for use in locations where AC is not available. The unit should be able to accept up to 48 VDC for power. 12 and 24-volt systems have been tried with the FS1001A, and modules are available to take it to 48 volts.
- b. The order of the multiplexing needs to be user configurable. This will allow the user to turn on antennas in the higher detection areas at a higher frequency than those in low probability locations (i.e. 1,2,3,4,2,3,1,2,3,4,2,3...). This string will be 12 locations long. The software will ignore any locations not used.
- c. Ability to have the reader tune to the antenna with minimal user setup. Auto tuning capacitor bank will be a maximum of +/- 4700 pF
- d. Store tag codes with time stamping and antenna ID. Format will be (Antenna ID) (Tag Code) (Timestamp in U.S. Mo.-Day-Year- Hours-Minutes-Seconds)
- e. Design should be maintainable and simple to setup and operate. Labeling and reader setup instructions should be on the unit.
- f. The goal should be to have the new hardware operate of the same set of environmental parameters and the FS1001 and FS1001A. The auto tuning may make this easier to achieve. The new smaller version of the FS1001A may not meet the temperature specification.
- g. Design should be broken down into building blocks that are not interdependent. This will keep us from a complete redesign of the hardware when advancing to the upgraded CPU board.
- h. The auto tuning section will also be a stand-alone system for the current users of the FS1001A.

2. Algorithms. The initial concept on the multiplexing is to allow the CPU to look at the tag signal for 10 mS (or some other predetermined time). If a tag is present, do not switch to the next antenna until the tag is read or a timeout period has expired. (I suggest we discuss the additional software to accurately determine if a tag or in-band noise is present). If a tag is not detected, then go to the next

channel. This will hopefully allow us to switch channels quicker than waiting 30-45 ms to read a tag and allow more antennas to be used in locations where fish speed is not a concern.

The concept for auto-tuning is to run a tuning setup program that is accessible through the keypad. During this setup program the reader will incrementally walk through the entire capacitor matrix and log the Phase (Roger suggests that we improve the resolution on this measurement to increase the accuracy of the tuning data), Current, Reading Efficiency (on board BJVT with electronic gain adjustment), and capacitor matrix location. This data will need to be stored in memory (TBD). Although the current may not be necessary, it is a good double check on the system. Although this setup may take quite some time, the advantage is that the reader can select the best tuning capacitor arrangement based on reading efficiency. As long as the cable and antenna do not change from what was used during the setup, the reader will quickly be able to switch the tuning real time based on the Phase. This may only take one switch of the capacitor bank if a proper algorithm can be designed.

NOTE: Digital Angel Corp. developed these algorithms and concepts for use with the FS1001A style driver/receiver/processor system at its expense. Digital Angel Corp. considers these concepts "intellectual property" and therefore the distribution of documentation will be limited to individuals entering into a Non-disclosure/ Confidentiality agreement with Digital Angel.

3. Specific Small-stream Tasks. The following tasks will be performed within the small-stream detection project.

- a. **Hardware Concept Validation.** This will include a component search for the proper type and part for the switching of the multiplexed channels and auto tuning capacitor bank. Bruce Jonnason and Brad P. will also verify the proper placement and options for the switches. After this is completed, a breadboard of 2 channels will be delivered to Digital Angel for the integration of the modifications to the FS1001A to reduce the settling time associated with the switching of the antennas. Next a breadboard of the full Multiplexer/ Auto tuning analog hardware will be built for use in the Software Implementation phase of the project.
- b. **Software Implementation.** The software is broken down into two sections: PIC controller of the new multiplexer/ auto tuning box, and the FS1001A 188 CPU/ PIC analog board. The new hardware will communicate with the FS1001A via the 232 port. The breadboard built at Digital Angel will be sent to Brad P. for initial PIC software checkout. The use of a 485 port on the current analog board will be used in place of the current serial channel; this was necessary due to speed constraints. Menu items will be created for each of the new features that can be accessed locally through the keypad or remotely through a 232 port.
- c. **Testing and Integration of Breadboard.** The software for the three processors and the hardware will be integrated at Digital Angel. Temperature testing and stress testing will be done after the system is running.
- d. **Production.** Upon completion and verification of the breadboard, the documentation for the final boards and packaging will be started. A pre-production run of 5 systems is scheduled to verify the production process. Upon completion of these systems, one will be delivered to Earl Prentice for evaluation.

B. Technical Support for Adult PIT Systems. The new PIT-tag detection systems at Bonneville and McNary will require Digital Angel's expertise during the system start-up to troubleshoot problems and optimize detection efficiency. DA will provide two weeks of technical support for trouble-shooting and optimizing the system performance at Bonneville. Similarly, DA will provide two weeks for support at McNary. Additionally, DA will provide materials for wet-testing antennas.

C. Technical Support for Bonneville Flat Plate Improvements. DA will support NMFS' efforts on the flat plate system at the Bonneville first powerhouse. More specifically, DA will perform the following tasks.

1. test a dual-coil system with 100-ft cable and FS1001A transceivers;
2. test a dual-coil system with 50-ft cable and FS1001A transceivers;
3. test a dual-nulled-coil with 100-ft cable and FS1001A transceivers;
4. test a dual-nulled coil with 50-ft cable;
5. construct new dual housing system

D. Technical Advice for future high-flow PIT detection systems. Options for PIT detection at the Bonneville Corner Collector, John Day Juvenile Bypass System, and Bonneville Juvenile Bypass System are being explored by the Corps of Engineers and BPA. DA will participate in three technical meetings in Portland, Seattle, or Pasco to discuss technical issues.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's project manager, Kim Fodrea. Additionally, coordination with the National Marine Fisheries Service, Corps of Engineers, and Pacific States Marine Fisheries Commission may be required.

BPA Project Manager

Kim Fodrea
kafodrea@bpa.gov
(503) 230-3702
PO Box 3621 KEWR-4
Portland, OR 97208-3621

III. Project Schedule

The tasks described in this statement of work by Digital Angel Corporation will be completed in the fiscal year 2002 for project 1983-319-00, New Marking and Monitoring Techniques for Fish. A detailed schedule of deadlines and milestones for the small-stream portion of this work is included in the attached schedule. Scheduling of the other tasks within this contract release will be coordinated with the BPA Project Managers. The performance period is 1 February 2002 through 31 October 2002.

III. Delivery

Delivery of equipment and materials will be coordinated with the BPA Project Manager.

IV. Budget

The total estimated cost of this work is **\$219,600**. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer. The following is a detailed cost estimate for each task.

SMALL STREAM PIT DETECTION				hours	rate	cost	subtotal
HARDWARE CONCEPT VALIDATION							\$30,800
Investigate components and circuit placement							
Brad Peterson (Engineer)		120	\$75			\$9,000	
Implement FS1001A switch settling hardware							
Yuri Smirnov (Engineer)		160	\$75			\$12,000	
Roger Clark (Technician)		40	\$50			\$2,000	
Breadboard all channels for Software development							
Roger Clark (Technician)		56	\$50			\$2,800	
Test breadboard							
Yuri Smirnov (Engineer)		40	\$75			\$3,000	
Roger Clark (Technician)		40	\$50			\$2,000	
SOFTWARE IMPLEMENTATION							\$33,000
PIC controller for mult./autotuning							
Brad Peterson (Engineer)		120	\$75			\$9,000	
188 CPU/ PIC analog board software							
STR-software (Engineering)		320	\$75			\$24,000	
TESTING AND INTEGRATION OF BREADBOARD							\$17,000
Brad Peterson (Engineer)		80	\$75			\$6,000	
Yuri Smirnov (Engineer)		80	\$75			\$6,000	
Travel to NW		2	\$2,500			\$5,000	
PRODUCTION							\$52,500
Schematic Capture/ Board Layout							
STR Subcontract- Printed Circuit Board Layout		1	\$10,000			\$10,000	
Box Design							
Roger Clark (Technician)		80	\$50			\$4,000	
Dan Johnson (Engineer)		80	\$75			\$6,000	
Drafting Subcontractor		1	\$2,000			\$2,000	
Prototype run of 5 boards							
STR Subcontract- Board House		1	\$4,500			\$4,500	
Prototype run of 5 boxes							
Production (Technician)		80	\$50			\$4,000	
Production Materials						\$500	
User Manual							
STR- Documentation (Technician)		80	50			\$4,000	
DVT test and integration							
Yuri Smirnov (Engineer)		60	\$75			\$4,500	
Roger Clark (Technician)		120	\$50			\$6,000	
Dan Johnson (Engineer)		60	\$75			\$4,500	
Travel to NW		1	\$2,500			\$2,500	
FIELD TESTING							\$10,000
Brad Peterson (Engineer)		40	\$75			\$3,000	
Roger Clark (Technician)		40	\$50			\$2,000	
Travel to NW		2	\$2,500			\$5,000	

ADULT PIT DETECTION				\$25,500	\$25,500
Testing Materials for McNary	1	\$7,500	\$7,500		
Technical Support for Bonneville Installation	80	\$75	\$6,000		
Technical Support for McNary Installation	80	\$75	\$6,000		
Technical Support for Ice Harbor Planning	40	\$75	\$3,000		
Regional Coordination APTOC	40	\$75	\$3,000		
BONNEVILLE PLAT PLATE				\$40,500	\$40,500
Test dual coil, 100-ft cable, FS1001A transceivers					
Roger Clark (Technician)	40	\$50	\$2,000		
Materials	1	\$1,000	\$2,000		
Test dual coil, 50-ft cable, FS1001A transceivers					
Roger Clark (Technician)	40	\$50	\$2,000		
Materials	1	\$1,000	\$2,000		
Test dual nulled coil, 100-ft cable, FS1001A transceivers					
Roger Clark (Technician)	40	\$50	\$2,000		
Materials	1	\$1,000	\$2,000		
Test dual nulled coil, 50-ft cable, FS1001A transceivers					
Roger Clark (Technician)	40	\$50	\$2,000		
Materials	1	\$1,000	\$2,000		
Construct dual housing system					
Roger Clark (Technician)	40	\$50	\$2,000		
Material: 4'x8' custom antenna housing, connectors, etc.		\$10,000	\$10,000		
Transceivers	2	\$6,150	\$12,300		
HIGH FLOW PIT DETECTION SYSTEMS				\$10,500	\$10,500
Participate in technical meetings with Corps					
Travel to NW	3	\$2,500	\$7,500		
Sean Casey (Engineer)	40	\$75	\$3,000		
TOTAL					\$219,500

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00005
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKETING & MONITORING TECHNIQUES FOR FISH

Total Value : \$209,538.00
Pricing Method: COST, NO FEE
Performance Period: 02/01/02 - 12/31/02

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

Contractor Signature

Printed Name/Title

Date Signed


BPA/Contracting Officer

11/1/02
Date Signed

N/A

Contract Amendments

Title : 1983-319-00 NEW MARKETING & MONITORING TECHNIQUES FOR FISH
Amendment: 002
Amended Performance Period: - 12/31/02
Amendment Value:
Pricing Method :

Contr. 2760, Release 00005, Amendment 06..
Project 1983-319-00, New Marketing and Monitoring Techniques for Fish

The purpose of this amendment is for a no cost time extension to 12/31/02. Contractor needs additional time to complete work in coordination with other BPA and Corps contractors.

All other terms and conditions remain unchanged.

BONNEVILLE
POWER ADMINISTRATION

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00005
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

MARY F. BINGAMAN
Title: CONTRACT SPECIALIST
Phone: 230-3720
Fax :

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH

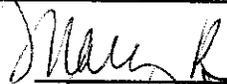
Total Value : \$219,099.43
Pricing Method: COST, NO FEE
Performance Period: 02/01/02 - 12/31/02

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

Contractor Signature

Printed Name/Title

Date Signed


BPA Contracting Officer

7/7/03
Date Signed

Contract Amendments

Title : DEOBLIGATE AND CLOSE
Amendment: 004
Amended Performance Period: -
Amendment Value: (\$500.57)
Pricing Method :

Amendment 004
Contract 2760, Release 0005

This amendment is issued to deobligate the contract amount as follows:

Previous Contract Amount:	\$219,600.00
Deobligation this Amendment:	\$ <u>(500.57)</u>
Revised Contract Amount:	\$219,099.43

All other terms and conditions remain the same.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00007
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:
DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKETING & MONITORING TECH FOR FISH

Total Value : \$376,984.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 12/31/03

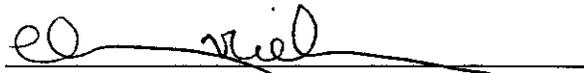
**** NOT TO EXCEED ****
Payment Terms: % Days Net 10



Contractor Signature
Kevin Niemi - Prof.

Printed Name/Title
12-31-02

Date Signed



BPA Contracting Officer
12/23/02

Date Signed

This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this release includes the development of a second-generation transceiver.

The ISO PIT Tag Readers developed for juvenile (FS1001) and adult (FS1001A) detection in the past 5 years have been designed around a specific set of requirements for installation at federal dams on the Columbia and Snake Rivers. The success of these systems has led to the increased interest and use of the tool by researchers system wide. As a result, there is the need for additional requirements to be added to the current transceiver system to expand the use of PIT Tag interrogation beyond the current level. The need for Small-Stream and Hi-Q detection, as well as possible increased efficiencies to the existing Full-Flow and Counting Window Systems, requires modifications to the existing FS1001A Transceiver system. The modular design of the FS1001 (juvenile system) led to the decrease in development time for the FS1001A (adult system). Similarly, by integrating the hardware and software in the current system (as well as the current development of hardware and software for multiplexing and auto tuning) with an upgraded CPU processor, a layer of Digital Signal Processing, and a modular packaging with a standard interface bus for additional interfaces, current and future needs of the PIT Tag community can be achieved. Although most of the additional requirements for this system are defined, a final set of requirements will be developed and jointly approved by NMFS, BPA, ACOE, and PSMFC before development begins to insure that consideration is given to current and future programs.

I. Scope of Work

This contract calls for DA to provide technical services, including all labor, travel, and associated expenses, as necessary to develop the second-generation transceiver with. An important step in developing the transceiver will be the definition of transceiver requirements and specifications early in the development of the transceivers. These requirements will be developed in coordination with regional agency representatives via the PIT tag Steering Committee.

The development of this transceiver is critical to providing detection in the Bonneville Corner Collector, which is currently under construction. Providing detection in the Corner Collector is a high priority for measuring system survival of juvenile salmonids. BPA is currently working with the Corps to develop a collaborative plan for meeting the Corner Collector detection need. Once the collaborative plan has been developed, BPA may issue a separate contract release with tasks that are specific to the development of a detection system for the Corner Collector and closely related to the transceiver development work under this contract release.

The new transceiver is expected to have the following features.

A. Modular Packaging - Using the modular concept from the current FS1001A Transceiver, the upgraded system will allow for the CPU card to control multiple Analog Cards

FY2003 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

(antenna interfaces), Fiber Optic modules (compatible with existing system), sensor cards (temp, water level), keypad, display, and future interfaces via a common bus on the back plane of an EIA style rack mount chassis. Redundant CPU cards and power supplies can be added easily where necessary. The current system has pluggable cards, but only allows for one Transceiver to be used per antenna. The new packaging will allow for 1-8 antennas to be controlled from one chassis by inserting the number of Analog Cards desired. The Analog Cards may be turned on simultaneously or one at a time for multiplexing. Hardware and software is currently under development and will be integrated into the system. When multiplexing there is a significant power reduction, which is critical for Small-Stream applications. Multiplexing is also beneficial when placing antennas in close proximity to each other to get coverage across a stream or when partitioning a large area such as the Hi-Q site at Bonneville Dam. By multiplexing the interference between adjacent coils is minimized. Having one CPU clock driving the system will also minimize digital noise and allow for precise synchronization when multiple antennas are energized at one time. This clock can also be pulse-width modulated to reduce the power consumption.

B. 32-bit CPU Processor - The CPU processor in the current system provides for the tag decoding, peripheral interfaces, communication, and memory storage. This is an 8-bit processor and does not allow for the memory expansion (10,600 tag codes only) necessary to store the tag codes with the addition of time-stamping and possible spare tag message field data to meet the needs of remote Small-Stream systems. A new 32-bit processor will have the capability of using expandable memory to suit the need of the user. Most of the current processors on the market also have built-in Ethernet and/or USB, and 232 communication interfaces that will allow Small-Stream users a standard high-speed interface instead of the current fiber optic interface. The new CPU will be responsible for communicating with the Analog Cards, Fiber Optic Modem, Sensor Cards, Keypad, and Display via a standard communication protocol. This will allow for additional interfaces such a flash memory cards, hard drives, wireless modules, etc. that is not currently possible with the FS1001A as the system through-put is at the maximum level and changes to the software can impact tag recovery performance. The selection of the processor will be done jointly with the agencies and will not exceed 50% utilization upon completion of the final requirements. The possibility of using the standard Ethernet technology may benefit PTAGIS, as readers can have an IP address and be communicated with as any device on the Internet.

C. Digital Signal Processing - The addition of a layer of digital signal processing will reduce the level of external noise and increase the signal-to-noise ratio on the analog board. The current system uses analog filtering which will pass some unwanted frequencies to the tag recovery system. By reducing the signal from unwanted frequencies and the 134.2 kHz carrier, the tag can be detected/ decoded at further distances from the antenna which will allow for increased read distances and larger antenna geometries. By minimizing the influence of the carrier on the tag signal, more current can be applied to the antenna resulting in the tag being energized and recovered at further distances from the antenna. This is critical when trying to reduce the number of antennas needed to cover large areas, as in the case of the small stream and Hi-Q applications. This may also be beneficial for existing large antennas that are present in the Full-Flow and counting window applications. Each analog card will process, decode, and

FY2003 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

provide temporary storage of the tag information. The tag information will then be sent real-time to the CPU for permanent storage, time stamping, and distribution via the communication links.

D. Auto-tuning Analog Board - The auto tuning hardware/software under development will be put on the analog board. By continuously checking the antenna for proper tuning, and correcting any deviations, there will be an O&M cost reduction and an ability to correct for environmental influences that can decrease the performance of the system. This is critical when developing larger antenna systems that tend to have a high Q factor, which results in susceptibility to environmental influences. Dynamic water loading, temperature, and structural changes are examples of common environmental influences. In multiple antenna systems, auto tuning is critical as the tuning change in one antenna can affect adjacent antennas. This will be important in small stream applications where water levels (loading) vary from one antenna to the next in an array that spans an entire stream.

A detailed task list, schedule, and cost estimate is presented in tables 1, 2, and 3. The information presented in the tables was extracted from a Microsoft Project file, which was provided by Sean Casey of DA and is available upon request.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's project manager, Kim Fodrea. Additionally, coordination with the National Marine Fisheries Service, Corps of Engineers, and Pacific States Marine Fisheries Commission will also be required.

BPA Project Manager
Kim Fodrea
kafodrea@bpa.gov
(503) 230-3702
PO Box 3621 KEWR-4
Portland, OR 97208-3621

III. Project Schedule

The overall transceiver development is expected to take three years. The tasks covered in this statement of work will be completed in the fiscal year 2003 for project 1983-319-00, New Marking and Monitoring Techniques for Fish. A detailed schedule of tasks is included in the Table 1. The performance period for this release is 1 October 2002 through 31 October 2003.

IV. Budget

The total estimated cost of this three-year project is \$1,248,185. Digital Angel Corp. will "cost-share" this project by providing 36% of the funding. The following is the anticipated yearly cost schedule.

FY2003 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>TOTAL</u>
GROSS TOTAL PROJECT COST	\$593,675	\$495,360	\$159,150	\$1,248,185
DA COST/ SHARE	\$216,691	\$180,807	\$58,090	\$455,587
NET TOTAL TO BE FUNDED BY BPA	\$376,984	\$314,553	\$101,060	\$792,598

This contract release provides for BPA's FY2003 funding in the amount of \$ 376,984. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

**TABLE 1. Generation
 2 Extended Range
 Reader
 Schedule and Cost
 Estimate**

	Duration	Start	Finish	Cost	Resources
FS1001A + New Requirements	1 day?	10/1/2002 8:00	10/1/2002 17:00	\$0.00	
Technical Summit Meeting @ DA	2 days	10/1/2002 8:00	10/2/2002 17:00	\$8,800.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Final Spec. and Requirements	1 mon	10/3/2002 8:00	10/30/2002 17:00	\$3,000.00	DA- Project Management[25%]
System Packaging/Hardware/Software Definition	1 day?	2/20/2003 8:00	2/20/2003 17:00	\$0.00	
DSP System Architecture Design	4 mons	10/31/2002 8:00	2/19/2003 17:00	\$28,000.00	DA- System Engineering (Sub)[15%],DA- Engineering[10%],DA- Software [10%],DA- Project Management[10%]
Packaging Requirements Generation	4 mons	10/31/2002 8:00	2/19/2003 17:00	\$21,200.00	DA- Engineering[20%],DA- Production- Eng. [20%],DA- Technician[10%],DA- Project Management[10%]
Hardware/ Partitioning Requirements	4 mons	10/31/2002 8:00	2/19/2003 17:00	\$25,600.00	DA- Engineering[20%],DA- Software [10%],DA- Production- Eng.[10%],DA- Project Management[10%]
Software Requirements/ Proc. Selection	4 mons	10/31/2002 8:00	2/19/2003 17:00	\$21,600.00	DA- System Engineering (Sub)[5%],DA- Software [20%],DA- Project Management[10%],PSMFC- Software[15%]
Status conference call	0.25 days	11/1/2002 8:00	11/1/2002 10:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Status conference call	0.25 days	12/2/2002 15:00	12/2/2002 17:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Status conference call	0.25 days	1/2/2003 15:00	1/2/2003 17:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Hardware/ Software Design	1 day?	2/20/2003 8:00	2/20/2003 17:00	\$0.00	
Hardware/ Software Timing Diagram	1 day?	3/20/2003 8:00	3/20/2003 17:00	\$0.00	
Hardware/ Software System Task Timing Diagram	1 mon	2/20/2003 8:00	3/19/2003 17:00	\$8,015.38	DA- System Engineering (Sub)[5%],DA- Software [20%],DA- Engineering[20%],DA- Project Management[20%]

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Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

**TABLE 1. Generation
 2 Extended Range
 Reader
 Schedule and Cost
 Estimate**

	Duration	Start	Finish	Cost	Resources
System Power and Grounding Design	1 day?	3/20/2003 8:00	3/20/2003 17:00	\$0.00	
Power and Grounding Design/ Drawing	1 mon	2/20/2003 8:00	3/19/2003 17:00	\$10,400.00	DA- Engineering[75%],DA- Technician[25%],DA- Project Management[25%]
Interconnect Design/ Selection	1 day?	6/26/2003 * 10:00	6/27/2003 10:00	\$0.00	
Select OTS/ Interconnect Design	1 mon	3/20/2003 8:00	4/16/2003 17:00	\$9,200.00	DA- Engineering[50%],DA- Technician[25%],DA- Project Management[10%]
Diagnostic Test and Hardware Design	1 mon	4/17/2003 8:00	5/14/2003 17:00	\$6,200.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	5/15/2003 8:00	6/11/2003 17:00	\$9,600.00	DA- Elect. Drafting (Sub)[50%],DA- Production- Eng.[10%],DA- Mech. Drafting (Sub)[10%],DA- Project Management[10%]
Producibility Review of Components	2 wks	6/12/2003 8:00	6/25/2003 17:00	\$1,800.00	DA- Engineering[10%],DA- Production- Eng.[10%],DA- Project Management[10%]
Design Review	0.25 days	6/26/2003 8:00	6/26/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
System Enclosure	1 day?	8/7/2003 8:00	8/7/2003 17:00	\$0.00	
Drawing for System Enclosure (options)	1 mon	6/12/2003 8:00	7/9/2003 17:00	\$10,542.50	DA- Engineering[10%],DA- Production- Eng.[25%],DA- Project Management[10%],DA- Mech. Drafting (Sub)[50%]
BOM for Enclosure	1 mon	7/10/2003 8:00	8/6/2003 17:00	\$4,200.00	DA- Production- Eng.[25%],DA- Project Management[10%]
Power Supply Hardware	1 day?	8/21/2003 10:00	8/22/2003 10:00	\$0.00	
Selection/ Power Supply Design	3 mons	3/20/2003 8:00	6/11/2003 17:00	\$18,600.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Diagn ostic Test and Hardware Design	1 mon	6/12/2003 8:00	7/9/2003 17:00	\$6,200.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	7/10/2003 8:00	8/6/2003 17:00	\$13,200.00	DA- Elect. Drafting (Sub)[50%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Producibility Review of Components	2 wks	8/7/2003 8:00	8/20/2003 17:00	\$5,100.00	DA- Engineering[25%],DA- Production- Eng.[50%],DA- Project Management[10%]
Design Review	0.25 days	8/21/2003 8:00	8/21/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech
CPU Hardware	1 day?	10/16/2003 10:00	10/17/2003 10:00	\$0.00	
Selection/ CPU Design	9 wks	3/20/2003 8:00	5/21/2003 17:00	\$16,200.00	DA- Software [25%],DA- System Engineering (Sub)[10%],DA- Project Management[10%]

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**TABLE 1. Generation
 2 Extended Range
 Reader
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	Duration	Start	Finish	Cost	Resources
Peripheral Hardware Design	9 wks	5/22/2003 8:00	7/23/2003 17:00	\$15,750.00	DA- Engineering[25%],DA- Software [10%],DA- Project Management[10%],DA- Technician[15%]
Diagnostic Test and Hardware Design	5 wks	7/24/2003 8:00	8/27/2003 17:00	\$9,000.00	DA- Engineering[20%],DA- Software [10%],DA- Project Management[10%],DA- Technician[25%]
Schematic Capture, BOM, Mech. Drawing	1 mon	8/28/2003 8:00	9/24/2003 17:00	\$21,400.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Production-Tech[50%],DA- Project Management[20%],DA- Elect. Drafting (Sub)[50%],DA- Mech. Drafting (Sub)[25%]
Producibility Review of Components	3 wks	9/25/2003 8:00	10/15/2003 17:00	\$4,645.45	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[25%],DA- Production- Tech[25%]
Design Review	0.25 days	10/16/2003 8:00	10/16/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
Analog Board	1 day?	10/16/2003 10:00	10/17/2003 10:00	\$0.00	
Driver Design Design Review and Design Checkout	2 mons	2/20/2003 8:00	4/16/2003 17:00	\$16,000.00	DA- Engineering[40%],DA- Project Management[10%],DA- Technician[25%]
Detector Design Review and Design Checkout	2 mons	4/17/2003 8:00	6/11/2003 17:00	\$20,400.00	DA- Engineering[50%],DA- System Engineering (Sub)[5%],DA- Project Management[15%],DA- Technician[25%]
Filter/ Anti-alias Filter Design	11 wks	6/12/2003 8:00	8/27/2003 17:00	\$24,750.00	DA- System Engineering (Sub)[5%],DA- Engineering[40%],DA- Technician[25%],DA- Project Management[10%]
Processor Selection and Supporting Hardware Design	3 mons	2/20/2003 8:00	5/14/2003 17:00	\$25,854.55	DA- System Engineering (Sub)[10%],DA- Software [25%],DA- Engineering[10%],DA- Project Management[25%]
Diagnostic Test and Hardware Design	3 mons	5/15/2003 8:00	8/6/2003 17:00	\$18,600.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	8/28/2003 8:00	9/24/2003 17:00	\$21,400.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Production-Tech[50%],DA- Project Management[20%],DA- Elect. Drafting (Sub)[50%],DA- Mech. Drafting (Sub)[25%]
Producibility Review of Components	3 wks	9/25/2003 8:00	10/15/2003 17:00	\$4,645.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[25%],DA- Production- Tech[25%]
Design Review	0.25 days	10/16/2003 8:00	10/16/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
Communication Interface Hardware (Fiber Optic)	1 day?	8/28/2003 10:00	8/29/2003 10:00	\$0.00	
Selection/ Primary Communication Hardware	2 wks	5/22/2003 8:00	6/4/2003 17:00	\$2,500.00	DA- Engineering[15%],DA- Technician[15%],DA- Project Management[10%],DA- Software [5%]
Form Factor Adaption Design	1 mon	6/5/2003 8:00	7/2/2003 17:00	\$4,400.00	DA- Engineering[10%],DA- Technician[25%],DA- Project Management[10%]

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**TABLE 1. Generation
 2 Extended Range
 Reader
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	Duration	Start	Finish	Cost	Resources
Schematic Capture, BOM, Mech. Drawing	1 mon	7/3/2003 8:00	7/30/2003 17:00	\$9,000.00	DA- Elect. Drafting (Sub)[15%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Producibility Review of Components	1 mon	7/31/2003 8:00	8/27/2003 17:00	\$7,200.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[10%]
Design Review	0.25 days	8/28/2003 8:00	8/28/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
Display/ Keypad/Keyboard Interface	1 day?	8/14/2003 10:00	8/15/2003 10:00	\$0.00	
Hardware Design/ Selection	2 mons	5/22/2003 8:00	7/16/2003 17:00	\$13,657.14	DA- Engineering[15%],DA- Technician[40%],DA- Software [10%],DA- Project Management[15%]
Diagnostic Test and Hardware Design	1 wk	7/17/2003 8:00	7/23/2003 17:00	\$1,100.00	DA- Engineering[10%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	2 wks	7/24/2003 8:00	8/6/2003 17:00	\$5,100.00	DA- Elect. Drafting (Sub)[25%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Producibility Review of Components	1 wk	8/7/2003 8:00	8/13/2003 17:00	\$1,800.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[10%]
Design Review	0.25 days	8/14/2003 8:00	8/14/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
Sensor Card Selection/ Design	1 day?	10/9/2003 10:00	10/10/2003 10:00	\$0.00	
Hardware Design/ Selection	2 mons	5/22/2003 8:00	7/16/2003 17:00	\$14,000.00	DA- Engineering[25%],DA- Technician[25%],DA- Software [5%],DA- Project Management[10%]
Diagnostic Test and Hardware Design	1 mon	7/17/2003 8:00	8/13/2003 17:00	\$6,200.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	8/14/2003 8:00	9/10/2003 17:00	\$10,200.00	DA- Elect. Drafting (Sub)[25%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Producibility Review of Components	1 mon	9/11/2003 8:00	10/8/2003 17:00	\$10,200.00	DA- Engineering[25%],DA- Production- Eng.[50%],DA- Project Management[10%]
Design Review	0.25 days	10/9/2003 8:00	10/9/2003 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
CPU Software Design	1 day?	1/22/2004 10:00	1/23/2004 10:00	\$0.00	
Timing Diagram	1 mon	7/17/2003 8:00	8/13/2003 17:00	\$20,385.32	DA- System Engineering (Sub)[5%],DA- Software ,DA- Project Management[20%],DA- Engineering[20%],PSMFC- Software[5%]

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**TABLE 1. Generation
 2 Extended Range
 Reader
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	Duration	Start	Finish	Cost	Resources
Implementation Flow Chart	1 mon	8/14/2003 8:00	9/10/2003 17:00	\$13,200.00	DA- Software [75%],DA- Project Management[10%],PSMFC- Software[5%]
Initial Software Code Design	2.5 mons	11/6/2003 8:00	1/14/2004 17:00	\$27,000.00	DA- Software ,DA- Project Management[10%]
Performance/ Status Report	1 wk	1/15/2004 8:00	1/21/2004 17:00	\$4,000.00	DA- Software
Design Review	0.25 days	1/22/2004 8:00	1/22/2004 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
Analog Processor Software Design	1 day?	5/20/2004 10:00	5/21/2004 10:00	\$0.00	
Timing Diagram	1 mon	9/11/2003 8:00	10/8/2003 17:00	\$21,200.00	DA- System Engineering (Sub)[5%],DA- Software ,DA- Engineering[25%],DA- Project Management[20%]
Implementation Flow Chart	1 mon	10/9/2003 8:00	11/5/2003 17:00	\$16,000.00	DA- Software
Initial Software Code Design	4 mons	1/22/2004 8:00	5/12/2004 17:00	\$36,800.00	DA- Software [75%],DA- Project Management[10%]
Performance/ Status Report	1 wk	5/13/2004 8:00	5/19/2004 17:00	\$4,000.00	DA- Software
Design Review	0.25 days	5/20/2004 8:00	5/20/2004 10:00	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
FPGA Program (Glue Logic if Necessary)	1 day?	10/23/2003 8:00	10/23/2003 17:00	\$0.00	
Analog	2 mons	5/15/2003 8:00	7/9/2003 17:00	\$18,400.00	DA- Engineering[50%],DA- Technician[25%],DA- Project Management[10%]
CPU	2 mons	8/28/2003 8:00	10/22/2003 17:00	\$18,400.00	DA- Engineering[50%],DA- Technician[25%],DA- Project Management[10%]
Status conference call	0.25 days	3/3/2003 8:00	3/3/2003 10:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Status conference call	0.25 days	5/5/2003 8:00	5/5/2003 10:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Project Management,DA- Technician,DA- Production- Tech,ACOE- Manag...
Status conference call	0.25 days	8/5/2003 8:00	8/5/2003 10:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Project Management,DA- Technician,DA- Production- Tech,ACOE- Manag...

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

**TABLE 1. Generation
 2 Extended Range
 Reader
 Schedule and Cost
 Estimate**

	Duration	Start	Finish	Cost	Resources
Status conference call	0.25 days	10/6/2003 8:00	10/6/2003 10:00	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Project Management,DA- Technician,DA- Production- Tech,ACOE- Manag...
Prototyping and System Integration	1 day?	10/1/2002 8:00	10/1/2002 17:00	\$0.00	
Interconnect Design/ Selection	1 day?	10/9/2003 10:00	10/10/2003 10:00	\$0.00	
PCB Layout (if necessary)	3 wks	6/26/2003 10:00	7/17/2003 10:00	\$6,300.00	DA- Elect. Drafting (Sub)[60%],DA- Project Management[10%]
Electrical and Producibility Review of Layout	1 wk	7/17/2003 10:00	7/24/2003 10:00	\$3,000.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
Modify BOM/ Layout per Review	1 wk	7/24/2003 10:00	7/31/2003 10:00	\$2,700.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]
Order Parts/ PCB (5 prototypes)	4 wks	7/31/2003 10:00	8/28/2003 10:00	\$3,300.00	DA- Production- Eng.[10%],DA- Project Management[5%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	8/28/2003 10:00	9/18/2003 10:00	\$5,500.00	DA- Build House[5]
Board Level Hardware Integration	1 wk	9/18/2003 10:00	9/25/2003 10:00	\$2,000.00	DA- Technician
DVT Testing at Board Level	2 wks	9/25/2003 10:00	10/9/2003 10:00	\$4,600.00	DA- Technician,DA- Project Management[10%]
System Enclosure	1 day?	9/18/2003 8:00	9/18/2003 17:00	\$0.00	
Order Parts/ Fabricate 5 units	4 wks	8/7/2003 8:00	9/3/2003 17:00	\$3,700.00	DA- Technician[15%],Materials[5]
Assemble 5 Units	1 wk	9/4/2003 8:00	9/10/2003 17:00	\$2,000.00	DA- Production- Tech
Verify Mech. Drawing and BOM	1 wk	9/11/2003 8:00	9/17/2003 17:00	\$3,200.00	DA- Production- Tech,DA- Production- Eng.[20%],DA- Project Management[20%]
Power Supply	1 day?	11/27/2003 10:00	11/28/2003 10:00	\$0.00	
PCB Layout (if necessary)	2 wks	8/21/2003 10:00	9/4/2003 10:00	\$7,800.00	DA- Engineering[15%],DA- Elect. Drafting (Sub),DA- Project Management[15%]
Electrical and Producibility Review of Layout	1 wk	9/4/2003 10:00	9/11/2003 10:00	\$3,000.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
Modify BOM/ Layout per Review	1 wk	9/11/2003 10:00	9/18/2003 10:00	\$2,700.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]
Order Parts/ PCB (5 prototypes)	4 wks	9/18/2003 10:00	10/16/2003 10:00	\$3,300.00	DA- Production- Eng.[10%],DA- Project Management[5%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	10/16/2003 10:00	11/6/2003 10:00	\$5,500.00	DA- Build House[5]
Board Level Hardware Integration	1 wk	11/6/2003 10:00	11/13/2003 10:00	\$2,000.00	DA- Technician
DVT Testing at Board Level	2 wks	11/13/2003 10:00	11/27/2003 10:00	\$4,600.00	DA- Technician,DA- Project Management[10%]
CPU	1 day?	4/14/2004 10:00	4/15/2004 10:00	\$0.00	
PCB Layout	2 wks	10/16/2003	10/30/2003	\$6,000.00	DA- Elect. Drafting (Sub)

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**TABLE 1. Generation
2 Extended Range
Reader
Schedule and Cost
Estimate**

	Duration	Start	Finish	Cost	Resources
		10:00	10:00		
Electrical and Producibility Review of Layout	2 days	10/30/2003	11/3/2003	\$3,600.00	DA- Production- Eng.,DA- Engineering,DA- Project Management
		10:00	10:00		
Modify BOM/ Layout per Review	2 days	11/3/2003	11/5/2003	\$800.00	DA- Production- Tech
		10:00	10:00		
Order Parts/ PCB (5 prototypes)	1 mon	11/5/2003	12/3/2003	\$3,300.00	DA- Production- Eng.[15%],DA- Build House[1]
		10:00	10:00		
Fabricate 5 Prototypes	3 wks	12/3/2003	12/24/2003	\$5,500.00	DA- Build House[5]
		10:00	10:00		
Board Level Hardware/ Software Integration	2 mons	12/24/2003	2/18/2004	\$24,000.00	DA- Software [25%],DA- Engineering[25%],DA- Project Management[25%],DA- Technician[25%]
		10:00	10:00		
DVT Testing at Board Level	2 mons	2/18/2004	4/14/2004	\$18,400.00	DA- Technician,DA- Project Management[10%]
		10:00	10:00		
Analog Board	1 day?	4/28/2004	4/29/2004	\$0.00	
		10:00	10:00		
PCB Layout	2 wks	10/30/2003	11/13/2003	\$6,000.00	DA- Elect. Drafting (Sub)
		10:00	10:00		
Electrical and Producibility Review of Layout	2 days	11/13/2003	11/17/2003	\$3,600.00	DA- Production- Eng.,DA- Engineering,DA- Project Management
		10:00	10:00		
Modify BOM/ Layout per Review	2 days	11/17/2003	11/19/2003	\$800.00	DA- Production- Tech
		10:00	10:00		
Order Parts/ PCB (5 prototypes)	1 mon	11/19/2003	12/17/2003	\$3,300.00	DA- Production- Eng.[15%],DA- Build House[1]
		10:00	10:00		
Fabricate 5 Prototypes	3 wks	12/17/2003	1/7/2004	\$5,500.00	DA- Build House[5]
		10:00	10:00		
Board Level Hardware/ Software Integration	2 mons	1/7/2004	3/3/2004	\$24,000.00	DA- Software [25%],DA- Engineering[25%],DA- Project Management[25%],DA- Technician[25%]
		10:00	10:00		
DVT Testing at Board Level	2 mons	3/3/2004	4/28/2004	\$18,400.00	DA- Technician,DA- Project Management[10%]
		10:00	10:00		
Primary Communication Card (Fiber Optic)	1 day?	10/27/2003	10/28/2003	\$0.00	
		10:00	10:00		
- PCB Layout (if necessary)	1 wk	8/29/2003	9/5/2003	\$3,900.00	DA- Engineering[15%],DA- Elect. Drafting (Sub),DA- Project Management[15%]
		10:00	10:00		
Electrical and Producibility Review of Layout	3 days	9/5/2003	9/10/2003	\$1,800.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
		10:00	10:00		
Modify BOM/ Layout per Review	3 days	9/10/2003	9/15/2003	\$1,620.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]
		10:00	10:00		
Order Parts/ PCB (5 prototypes)	2 wks	9/15/2003	9/29/2003	\$2,400.00	DA- Production- Eng.[10%],DA- Project Management[5%],DA- Build House[1]
		10:00	10:00		
Fabricate 5 Prototypes	3 wks	9/29/2003	10/20/2003	\$2,500.00	DA- Build House[2]
		10:00	10:00		
Board Level Hardware Integration	3 days	10/20/2003	10/23/2003	\$1,200.00	DA- Technician
		10:00	10:00		
DVT Testing at Board Level	2 days	10/23/2003	10/27/2003	\$920.00	DA- Technician,DA- Project Management[10%]
		10:00	10:00		
Display/ Keypad/Keyboard Interface	1 day?	2/19/2004	2/20/2004	\$0.00	
		10:00	10:00		
PCB Layout (if necessary)	2 wks	11/13/2003	11/27/2003	\$7,800.00	DA- Engineering[15%],DA- Elect. Drafting (Sub),DA- Project Management[15%]
		10:00	10:00		
Electrical and Producibility Review of Layout	1 wk	11/27/2003	12/4/2003	\$3,000.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
		10:00	10:00		
Modify BOM/ Layout per Review	1 wk	12/4/2003	12/11/2003	\$2,700.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]
		10:00	10:00		

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Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

**TABLE 1. Generation
 2 Extended Range
 Reader
 Schedule and Cost
 Estimate**

	Duration	Start	Finish	Cost	Resources
Order Parts/ PCB (5 prototypes)	4 wks	12/11/2003 10:00	1/8/2004 10:00	\$3,300.00	DA- Production- Eng.[10%],DA- Project Management[5%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	1/8/2004 10:00	1/29/2004 10:00	\$5,500.00	DA- Build House[5]
Board Level Hardware	1 wk	1/29/2004 10:00	2/5/2004 10:00	\$2,000.00	DA- Technician
Integration	2 wks	2/5/2004 10:00	2/19/2004 10:00	\$4,600.00	DA- Technician,DA- Project Management[10%]
DVT Testing at Board Level	2 wks	2/5/2004 10:00	2/19/2004 10:00	\$4,600.00	DA- Technician,DA- Project Management[10%]
Sensor Card	1 day?	1/16/2004 10:00	1/19/2004 10:00	\$0.00	
PCB Layout (if necessary)	2 wks	10/10/2003 10:00	10/24/2003 10:00	\$7,800.00	DA- Engineering[15%],DA- Elect. Drafting (Sub),DA- Project Management[15%]
Electrical and Producibility Review of Layout	1 wk	10/24/2003 10:00	10/31/2003 10:00	\$3,000.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
Modify BOM/ Layout per Review	1 wk	10/31/2003 10:00	11/7/2003 10:00	\$2,700.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]
Order Parts/ PCB (5 prototypes)	4 wks	11/7/2003 10:00	12/5/2003 10:00	\$3,300.00	DA- Production- Eng.[10%],DA- Project Management[5%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	12/5/2003 10:00	12/26/2003 10:00	\$5,500.00	DA- Build House[5]
Board Level Hardware	1 wk	12/26/2003 10:00	1/2/2004 10:00	\$2,000.00	DA- Technician
Integration	2 wks	1/2/2004 10:00	1/16/2004 10:00	\$4,600.00	DA- Technician,DA- Project Management[10%]
DVT Testing at Board Level	2 wks	1/2/2004 10:00	1/16/2004 10:00	\$4,600.00	DA- Technician,DA- Project Management[10%]
System Integration	1 day?	9/1/2004 10:00	9/2/2004 10:00	\$0.00	
Integrate Hardware/ Software	2 mons	4/28/2004 10:00	6/23/2004 10:00	\$48,400.00	DA- Engineering[50%],DA- Software [50%],DA- Technician,DA- System Engineering (Sub)[5%],DA- Project Management[10%]
Modify Software/ Hardware	1 mon	6/23/2004 10:00	7/21/2004 10:00	\$36,000.00	DA- Engineering[50%],DA- Software ,DA- Technician,DA- Project Management[50%]
DVT Testing	1 mon	7/21/2004 10:00	8/18/2004 10:00	\$11,600.00	DA- Engineering[20%],DA- Technician,DA- Project Management[10%]
Update Schematics/ BOM's	2 wks	8/18/2004 10:00	9/1/2004 10:00	\$10,000.00	DA- Elect. Drafting (Sub),DA- Production- Tech
Field Testing at Pasco/ Abernathy	1 day?	3/2/2005 10:00	3/3/2005 10:00	\$0.00	
Fabricate Test Antennas (PVC)	2 wks	7/21/2004 10:00	8/4/2004 10:00	\$7,000.00	DA- Production- Tech,Materials[6]
Evaluate Prototype Performance (Multiple/ Max. Size)	4 mons	8/18/2004 10:00	12/8/2004 10:00	\$62,000.00	NMFS- Engineering[25%],PSMFC- Software[50%],PSMFC-Kennewick[50%],DA- Engineering[25%],DA- Technician[50%],DA- Project Management[50%],DA- Travel[4],ACOE- HI-Q Engineer[25%]
Modify/ Optimize System/ Components	3 mons	12/8/2004 10:00	3/2/2005 10:00	\$13,600.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Update Drawings/ Schematics/ BOM's/ Software Documentation	1 mon	3/2/2005 10:00	3/30/2005 10:00	\$34,000.00	DA- Production- Tech,DA- Production- Eng.[50%],DA- Elect. Drafting (Sub)[50%],DA- Mech. Drafting (Sub)[50%],DA- Software [50%]
Production	1 day?	9/14/2005 10:00	9/15/2005 10:00	\$0.00	

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

**TABLE 1. Generation
 2 Extended Range
 Reader
 Schedule and Cost
 Estimate**

	Duration	Start	Finish	Cost	Resources
Build and Deliver 4 Production Systems (4 Coil) Transceivers	6 mons	3/30/2005 10:00	9/14/2005 10:00	\$72,800.00	DA- Production Vendor[10%],DA- Production- Eng.[10%],DA- Production- Tech[10%],Materials[100],DA- Project Management[5%]

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver Hours / Duration
Task-by-task List of Resources Units

FS1001A + Define New Requirements		
Technical Summit Meeting @ DA	240 hrs	2 days
DA- Engineering	16 hrs	
DA- System Engineering (Sub)	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Software	16 hrs	
DA- Technician	16 hrs	
DA- Project Management	16 hrs	
DA- Production- Tech	16 hrs	
Final Spec. and Requirements	40 hrs	1 mon
DA- Project Management	40 hrs	
Define System Packaging/Hardware/Software		
DSP System Architecture Design	288 hrs	4 mons
DA- Engineering	64 hrs	
DA- System Engineering (Sub)	96 hrs	
DA- Software	64 hrs	
DA- Project Management	64 hrs	
Packaging Requirements Generation	304 hrs	4 mons
DA- Engineering	128 hrs	
DA- Production- Eng.	48 hrs	
DA- Technician	64 hrs	
DA- Project Management	64 hrs	
Hardware/ Partitioning Requirements	320 hrs	4 mons
DA- Engineering	128 hrs	
DA- Production- Eng.	64 hrs	
DA- Software	64 hrs	
DA- Project Management	64 hrs	
Software Requirements/ Proc. Selection	320 hrs	4 mons
DA- System Engineering (Sub)	32 hrs	
DA- Software	128 hrs	
DA- Project Management	64 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	

Hardware/ Software Design

Hardware/ Software Timing Diagram		
Hardware/ Software System Task Timing Diagram	94.15 hrs	1 mon
DA- Engineering	32 hrs	
DA- System Engineering (Sub)	8 hrs	
DA- Software	22.15 hrs	
DA- Project Management	32 hrs	

System Power and Grounding Design

Power and Grounding Design/ Drawing	152 hrs	1 mon
DA- Engineering	80 hrs	
DA- Technician	40 hrs	
DA- Project Management	32 hrs	

Interconnect Design/ Selection

Select OTS/ Interconnect Design	136 hrs	1 mon
DA- Engineering	80 hrs	
DA- Technician	40 hrs	
DA- Project Management	16 hrs	

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
Diagnostic Test and Hardware Design	96 hrs	1 mon
DA- Engineering	40 hrs	
DA- Technician	40 hrs	
DA- Project Management	16 hrs	
Schematic Capture, BOM, Mech. Drawing	128 hrs	1 mon
DA- Production- Eng.	16 hrs	
DA- Project Management	16 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
DA- Mech. Drafting (Sub)	16 hrs	
Producibility Review of Components	24 hrs	2 wks
DA- Engineering	8 hrs	
DA- Production- Eng.	8 hrs	
DA- Project Management	8 hrs	
Design Review	28 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
System Enclosure		
Drawing for System Enclosure (options)	140.57 hrs	1 mon
DA- Engineering	16 hrs	
DA- Production- Eng.	40 hrs	
DA- Project Management	16 hrs	
DA- Mech. Drafting (Sub)	68.57 hrs	
BOM for Enclosure	56 hrs	1 mon
DA- Production- Eng.	40 hrs	
DA- Project Management	16 hrs	
Power Supply Hardware		
Selection/ Power Supply Design	288 hrs	3 mons
DA- Engineering	120 hrs	
DA- Technician	120 hrs	
DA- Project Management	48 hrs	
Diagnostic Test and Hardware Design	96 hrs	1 mon
DA- Engineering	40 hrs	
DA- Technician	40 hrs	
DA- Project Management	16 hrs	

FY2002 Statement of Work
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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
Schematic Capture, BOM, Mech. Drawing	176 hrs	1 mon
DA- Production- Eng.	40 hrs	
DA- Project Management	16 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
DA- Mech. Drafting (Sub)	40 hrs	
Producibility Review of Components	68 hrs	2 wks
DA- Engineering	20 hrs	
DA- Production- Eng.	40 hrs	
DA- Project Management	8 hrs	
Design Review	24 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
CPU Hardware		
Selection/ CPU Design	162 hrs	9 wks
DA- System Engineering (Sub)	36 hrs	
DA- Software	90 hrs	
DA- Project Management	36 hrs	
Peripheral Hardware Design	216 hrs	9 wks
DA- Engineering	90 hrs	
DA- Software	36 hrs	
DA- Technician	54 hrs	
DA- Project Management	36 hrs	
Diagnostic Test and Hardware Design	130 hrs	5 wks
DA- Engineering	40 hrs	
DA- Software	20 hrs	
DA- Technician	50 hrs	
DA- Project Management	20 hrs	
Schematic Capture, BOM, Mech. Drawing	312 hrs	1 mon
DA- Engineering	40 hrs	
DA- Production- Eng.	40 hrs	
DA- Project Management	32 hrs	
DA- Production- Tech	80 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
DA- Mech. Drafting (Sub)	40 hrs	

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Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
Producibility Review of Components	67.08 hrs	3 wks
DA- Engineering	15.45 hrs	
DA- Production- Eng.	30 hrs	
DA- Project Management	6.18 hrs	
DA- Production- Tech	15.45 hrs	
Design Review	28 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Analog Board		
Driver Design Design Review and Design Checkout	240 hrs	2 mons
DA- Engineering	128 hrs	
DA- Technician	80 hrs	
DA- Project Management	32 hrs	
Detector Design Review and Design Checkout	288 hrs	2 mons
DA- Engineering	160 hrs	
DA- System Engineering (Sub)	16 hrs	
DA- Technician	80 hrs	
DA- Project Management	32 hrs	
Filter/ Anti-alias Filter Design	352 hrs	11 wks
DA- Engineering	176 hrs	
DA- System Engineering (Sub)	22 hrs	
DA- Technician	110 hrs	
DA- Project Management	44 hrs	
Processor Selection and Supporting Hardware Design	272.73 hrs	3 mons
DA- Engineering	48 hrs	
DA- System Engineering (Sub)	48 hrs	
DA- Software	120 hrs	
DA- Project Management	56.73 hrs	
Diagnostic Test and Hardware Design	288 hrs	3 mons
DA- Engineering	120 hrs	
DA- Technician	120 hrs	
DA- Project Management	48 hrs	
Schematic Capture, BOM, Mech. Drawing	312 hrs	1 mon

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver Hours /	Duration
Task-by-task List of Resources	Units
DA- Engineering	40 hrs
DA- Production- Eng.	40 hrs
DA- Project Management	32 hrs
DA- Production- Tech	80 hrs
DA- Elect. Drafting (Sub)	80 hrs
DA- Mech. Drafting (Sub)	40 hrs
Producibility Review of Components	67.08 hrs 3 wks
DA- Engineering	15.45 hrs
DA- Production- Eng.	30 hrs
DA- Project Management	6.18 hrs
DA- Production- Tech	15.45 hrs
Design Review	28 hrs 0.25 days
DA- Engineering	2 hrs
DA- System Engineering (Sub)	2 hrs
DA- Production- Eng.	2 hrs
DA- Software	2 hrs
DA- Technician	2 hrs
DA- Project Management	2 hrs
DA- Production- Tech	2 hrs
Communication Interface Hardware (Fiber Optic)	
Selection/ Primary Communication Hardware	36 hrs 2 wks
DA- Engineering	12 hrs
DA- Software	4 hrs
DA- Technician	12 hrs
DA- Project Management	8 hrs
Form Factor Adaption Design	72 hrs 1 mon
DA- Engineering	16 hrs
DA- Technician	40 hrs
DA- Project Management	16 hrs
Schematic Capture, BOM, Mech. Drawing	120 hrs 1 mon
DA- Production- Eng.	40 hrs
DA- Project Management	16 hrs
DA- Elect. Drafting (Sub)	24 hrs
DA- Mech. Drafting (Sub)	40 hrs
Producibility Review of Components	96 hrs 1 mon
DA- Engineering	40 hrs
DA- Production- Eng.	40 hrs
DA- Project Management	16 hrs
Design Review	28 hrs 0.25 days

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver Hours / Duration

Task-by-task List of Resources	Units	Duration
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	

Display/ Keypad/Keyboard Interface		
Hardware Design/ Selection	200 hrs	2 mons
DA- Engineering	48 hrs	
DA- Software	32 hrs	
DA- Technician	85.72 hrs	
DA- Project Management	34.28 hrs	
Diagnostic Test and Hardware Design	18 hrs	1 wk
DA- Engineering	4 hrs	
DA- Technician	10 hrs	
DA- Project Management	4 hrs	
Schematic Capture, BOM, Mech. Drawing	68 hrs	2 wks
DA- Production- Eng.	20 hrs	
DA- Project Management	8 hrs	
DA- Elect. Drafting (Sub)	20 hrs	
DA- Mech. Drafting (Sub)	20 hrs	
Producibility Review of Components	24 hrs	1 wk
DA- Engineering	10 hrs	
DA- Production- Eng.	10 hrs	
DA- Project Management	4 hrs	
Design Review	28 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Sensor Card Selection/ Design		
Hardware Design/ Selection	208 hrs	2 mons
DA- Engineering	80 hrs	
DA- Software	16 hrs	
DA- Technician	80 hrs	

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
DA- Project Management	32 hrs	
Diagnostic Test and Hardware Design	96 hrs	1 mon
DA- Engineering	40 hrs	
DA- Technician	40 hrs	
DA- Project Management	16 hrs	
Schematic Capture, BOM, Mech. Drawing	136 hrs	1 mon
DA- Production- Eng.	40 hrs	
DA- Project Management	16 hrs	
DA- Elect. Drafting (Sub)	40 hrs	
DA- Mech. Drafting (Sub)	40 hrs	
Producibility Review of Components	136 hrs	1 mon
DA- Engineering	40 hrs	
DA- Production- Eng.	80 hrs	
DA- Project Management	16 hrs	
Design Review	28 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
CPU Software Design		
Timing Diagram	221.13 hrs	1 mon
DA- Engineering	32 hrs	
DA- System Engineering (Sub)	8 hrs	
DA- Software	160 hrs	
DA- Project Management	13.13 hrs	
Implementation Flow Chart	144 hrs	1 mon
DA- Software	120 hrs	
DA- Project Management	16 hrs	
Initial Software Code Design	280 hrs	2.5 mons
DA- Software	240 hrs	
DA- Project Management	40 hrs	
Performance/ Status Report	40 hrs	1 wk
DA- Software	40 hrs	
Design Review	28 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver Hours /	Duration
Task-by-task List of Resources	Units
DA- Software	2 hrs
DA- Technician	2 hrs
DA- Project Management	2 hrs
DA- Production- Tech	2 hrs

Analog Processor Software Design		
Timing Diagram	224 hrs	1 mon
DA- Engineering	40 hrs	
DA- System Engineering (Sub)	8 hrs	
DA- Software	160 hrs	
DA- Project Management	16 hrs	
Implementation Flow Chart	160 hrs	1 mon
DA- Software	160 hrs	
Initial Software Code Design	384 hrs	4 mons
DA- Software	320 hrs	
DA- Project Management	64 hrs	
Performance/ Status Report	40 hrs	1 wk
DA- Software	40 hrs	
Design Review	28 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
FPGA Program (Glue Logic if Necessary)		
Analog	272 hrs	2 mons
DA- Engineering	160 hrs	
DA- Technician	80 hrs	
DA- Project Management	32 hrs	
CPU	272 hrs	2 mons
DA- Engineering	160 hrs	
DA- Technician	80 hrs	
DA- Project Management	32 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	

FY2002 Statement of Work
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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	
Status conference call	30 hrs	0.25 days
DA- Engineering	2 hrs	
DA- System Engineering (Sub)	2 hrs	
DA- Production- Eng.	2 hrs	
DA- Software	2 hrs	
DA- Technician	2 hrs	
DA- Project Management	2 hrs	
DA- Production- Tech	2 hrs	

Prototyping and System Integration

Interconnect Design/ Selection		
PCB Layout (if necessary)	84 hrs	3 wks
DA- Project Management	12 hrs	
DA- Elect. Drafting (Sub)	72 hrs	
Electrical and Producibility Review of Layout	40 hrs	1 wk
DA- Engineering	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
Modify BOM/ Layout per Review	36 hrs	1 wk
DA- Production- Eng.	16 hrs	

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

Task-by-task List of Resources	Hours / Units	Duration
DA- Project Management	4 hrs	
DA- Elect. Drafting (Sub)	16 hrs	
Order Parts/ PCB (5 prototypes)	24 hrs	4 wks
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks
DA- Build House	5	
Board Level Hardware Integration	40 hrs	1 wk
DA- Technician	40 hrs	
DVT Testing at Board Level	88 hrs	2 wks
DA- Technician	80 hrs	
DA- Project Management	8 hrs	
System Enclosure		
Order Parts/ Fabricate 5 units	24 hrs	4 wks
DA- Technician	24 hrs	
Materials	5	
Assemble 5 Units	40 hrs	1 wk
DA- Production- Tech	40 hrs	
Verify Mech. Drawing and BOM	56 hrs	1 wk
DA- Production- Eng.	8 hrs	
DA- Project Management	8 hrs	
DA- Production- Tech	40 hrs	
Power Supply		
PCB Layout (if necessary)	104 hrs	2 wks
DA- Engineering	12 hrs	
DA- Project Management	12 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
Electrical and Producibility Review of Layout	40 hrs	1 wk
DA- Engineering	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
Modify BOM/ Layout per Review	36 hrs	1 wk
DA- Production- Eng.	16 hrs	
DA- Project Management	4 hrs	
DA- Elect. Drafting (Sub)	16 hrs	
Order Parts/ PCB (5 prototypes)	24 hrs	4 wks
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	

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Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks
DA- Build House	5	
Board Level Hardware Integration	40 hrs	1 wk
DA- Technician	40 hrs	
DVT Testing at Board Level	88 hrs	2 wks
DA- Technician	80 hrs	
DA- Project Management	8 hrs	
CPU		
PCB Layout	80 hrs	2 wks
DA- Elect. Drafting (Sub)	80 hrs	
Electrical and Producibility Review of Layout	48 hrs	2 days
DA- Engineering	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Project Management	16 hrs	
Modify BOM/ Layout per Review	16 hrs	2 days
DA- Production- Tech	16 hrs	
Order Parts/ PCB (5 prototypes)	24 hrs	1 mon
DA- Production- Eng.	24 hrs	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks
DA- Build House	5	
Board Level Hardware/ Software Integration	320 hrs	2 mons
DA- Engineering	80 hrs	
DA- Software	80 hrs	
DA- Technician	80 hrs	
DA- Project Management	80 hrs	
DVT Testing at Board Level	352 hrs	2 mons
DA- Technician	320 hrs	
DA- Project Management	32 hrs	
Analog Board		
PCB Layout	80 hrs	2 wks
DA- Elect. Drafting (Sub)	80 hrs	
Electrical and Producibility Review of Layout	48 hrs	2 days
DA- Engineering	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Project Management	16 hrs	
Modify BOM/ Layout per Review	16 hrs	2 days
DA- Production- Tech	16 hrs	

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

Task-by-task List of Resources	Hours / Units	Duration
Order Parts/ PCB (5 prototypes)	24 hrs	1 mon
DA- Production- Eng.	24 hrs	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks
DA- Build House	5	
Board Level Hardware/ Software Integration	320 hrs	2 mons
DA- Engineering	80 hrs	
DA- Software	80 hrs	
DA- Technician	80 hrs	
DA- Project Management	80 hrs	
DVT Testing at Board Level	352 hrs	2 mons
DA- Technician	320 hrs	
DA- Project Management	32 hrs	
Primary Communication Card (Fiber Optic)		
PCB Layout (if necessary)	52 hrs	1 wk
DA- Engineering	6 hrs	
DA- Project Management	6 hrs	
DA- Elect. Drafting (Sub)	40 hrs	
Electrical and Producibility Review of Layout	24 hrs	3 days
DA- Engineering	9.6 hrs	
DA- Production- Eng.	9.6 hrs	
DA- Project Management	4.8 hrs	
Modify BOM/ Layout per Review	21.6 hrs	3 days
DA- Production- Eng.	9.6 hrs	
DA- Project Management	2.4 hrs	
DA- Elect. Drafting (Sub)	9.6 hrs	
Order Parts/ PCB (5 prototypes)	12 hrs	2 wks
DA- Production- Eng.	8 hrs	
DA- Project Management	4 hrs	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks
DA- Build House	2	
Board Level Hardware Integration	24 hrs	3 days
DA- Technician	24 hrs	
DVT Testing at Board Level	17.6 hrs	2 days
DA- Technician	16 hrs	
DA- Project Management	1.6 hrs	
Display/ Keypad/Keyboard Interface		
PCB Layout (if necessary)	104 hrs	2 wks

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver	Hours /	Duration
Task-by-task List of Resources	Units	
DA- Engineering	12 hrs	
DA- Project Management	12 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
Electrical and Producibility Review of Layout	40 hrs	1 wk
DA- Engineering	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
Modify BOM/ Layout per Review	36 hrs	1 wk
DA- Production- Eng.	16 hrs	
DA- Project Management	4 hrs	
DA- Elect. Drafting (Sub)	16 hrs	
Order Parts/ PCB (5 prototypes)	24 hrs	4 wks
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks
DA- Build House	5	
Board Level Hardware Integration	40 hrs	1 wk
DA- Technician	40 hrs	
DVT Testing at Board Level	88 hrs	2 wks
DA- Technician	80 hrs	
DA- Project Management	8 hrs	
 Sensor Card		
PCB Layout (if necessary)	104 hrs	2 wks
DA- Engineering	12 hrs	
DA- Project Management	12 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
Electrical and Producibility Review of Layout	40 hrs	1 wk
DA- Engineering	16 hrs	
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
Modify BOM/ Layout per Review	36 hrs	1 wk
DA- Production- Eng.	16 hrs	
DA- Project Management	4 hrs	
DA- Elect. Drafting (Sub)	16 hrs	
Order Parts/ PCB (5 prototypes)	24 hrs	4 wks
DA- Production- Eng.	16 hrs	
DA- Project Management	8 hrs	
DA- Build House	1	
Fabricate 5 Prototypes	0 hrs	3 wks

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver Hours / Task-by-task List of Resources	Units	Duration
DA- Build House	5	
Board Level Hardware Integration	40 hrs	1 wk
DA- Technician	40 hrs	
DVT Testing at Board Level	88 hrs	2 wks
DA- Technician	80 hrs	
DA- Project Management	8 hrs	
System Integration		
Integrate Hardware/ Software	688 hrs	2 mons
DA- Engineering	160 hrs	
DA- System Engineering (Sub)	16 hrs	
DA- Software	160 hrs	
DA- Technician	320 hrs	
DA- Project Management	32 hrs	
Modify Software/ Hardware	480 hrs	1 mon
DA- Engineering	80 hrs	
DA- Software	160 hrs	
DA- Technician	160 hrs	
DA- Project Management	80 hrs	
DVT Testing	208 hrs	1 mon
DA- Engineering	32 hrs	
DA- Technician	160 hrs	
DA- Project Management	16 hrs	
Update Schematics/ BOM's	160 hrs	2 wks
DA- Production- Tech	80 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
Field Testing at Pasco/ Abernathy		
Fabricate Test Antennas (PVC)	80 hrs	2 wks
DA- Production- Tech	80 hrs	
Materials	6	
Evaluate Prototype Performance (Multiple/ Max. Size)	1,312.93 hrs	4 mons
DA- Engineering	160 hrs	
DA- Technician	320 hrs	
DA- Project Management	320 hrs	
DA- Travel	4	
Modify/ Optimize System/ Components	208 hrs	3 mons
DA- Engineering	80 hrs	
DA- Technician	80 hrs	
DA- Project Management	48 hrs	

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 2. Generation-2 Transceiver Hours / Duration
Task-by-task List of Resources Units

Update Drawings/ Schematics/ BOM's/ Software Documentation	480 hrs	1 mon
DA- Production- Eng.	80 hrs	
DA- Software	80 hrs	
DA- Production- Tech	160 hrs	
DA- Elect. Drafting (Sub)	80 hrs	
DA- Mech. Drafting (Sub)	80 hrs	
Build and Deliver 4 Production Systems (4 Coil) Transceivers	336 hrs	6 mons
DA- Production- Eng.	96 hrs	
DA- Project Management	48 hrs	
DA- Production- Tech	96 hrs	
DA- Production Vendor	96 hrs	
Materials	100	

FY2002 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00007
Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

TABLE 3. Resource Rates	Rate*	Startup Fee
DA- Engineering	\$75.00/hr	\$0.00
DA- System Engineering (Sub)	\$125.00/hr	\$0.00
DA- Production- Eng.	\$75.00/hr	\$0.00
DA- Software	\$100.00/hr	\$0.00
DA- Technician	\$50.00/hr	\$0.00
DA- Project Management	\$75.00/hr	\$0.00
DA- Production- Tech	\$50.00/hr	\$0.00
DA- Elect. Drafting (Sub)	\$75.00/hr	\$0.00
DA- Mech. Drafting (Sub)	\$75.00/hr	\$0.00
DA- Travel	\$2,500.00	\$0.00
DA- Build House	\$1,000.00	\$500.00
DA- Production Vendor	\$75.00/hr	\$0.00
Materials	\$500.00	\$0.00
PSMFC- Kennewick	\$0.00/hr	\$0.00
PSMFC- Software	\$0.00/hr	\$0.00
PSMFC- Management	\$0.00/hr	\$0.00
NMFS- Engineering	\$0.00/hr	\$0.00
NMFS- Biologist	\$0.00/hr	\$0.00
NMFS- Management	\$0.00/hr	\$0.00
ACOE- Manager	\$0.00/hr	\$0.00
ACOE- Hi-Q Engineer	\$0.00/hr	\$0.00

*A rate of \$0.00/hr indicates where the noted resource will be needed, as shown in Table 1, but that resource's funding is not included in this contract release.

**BONNEVILLE
POWER ADMINISTRATION**

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00007
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

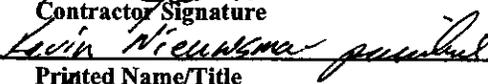
Attn: Sean Casey

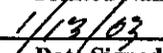
Contract Title: 1983-319-00 NEW MARKETING & MONITORING TECH FOR FISH

Total Value : \$376,984.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 12/31/03

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10



Contractor Signature


Printed Name/Title


Date Signed



BPA Contracting Officer


Date Signed

This award contains the following - TEXT ATTACHED.

SERVICE FIXED PRICE T&CS

Contract Amendments

Title : MODIFY PROJECT SCHEDULE TO CONFORM TO NEW START DATE
Amendment: 001
Amended Performance Period: -
Amendment Value:
Pricing Method :

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

The purpose of this amendment is to modify Table 1, the project schedule. The following Table 1 is substituted in its entirety for the Table 1 on the original Release 00007.

TABLE 1. Generation 2 Extended Range Reader Schedule and Cost Estimate

	<u>Duration</u>	<u>Start</u>	<u>Finish</u>	<u>Cost</u>	<u>Resources</u>
FS1001A + New Requirements	1 day?	1/4/2003	1/4/2003	\$0.00	
Technical Summit Meeting @ DA	2 days	12/4/2003	1/5/2003	\$8,800.00	PSMFC- Kennewick, PSMFC- Software, PSMFC- Management, NMFS- Engineering, NMFS- Biologist, NMFS- Management, DA- Engineering, DA- System Engineering (Sub), DA- Production- Eng., DA- Software, DA- Technician, DA- Project Management, DA- Production- Tech, ACOE- Manag...
Final Spec. and Requirements	1 mon	1/6/2003	2/2/2003	\$3,000.00	DA- Project Management[25%]
System Packaging/Hardware/Software Definition	1 day?	5/26/2003	5/26/2003	\$0.00	
DSP System Architecture Design	4 mons	2/3/2003	5/25/2003	\$28,000.00	DA- System Engineering (Sub)[15%], DA- Engineering[10%], DA- Software [10%], DA- Project Management[10%]
Packaging Requirements Generation	4 mons	2/3/2003	5/25/2003	\$21,200.00	DA- Engineering[20%], DA- Production- Eng. [20%], DA- Technician[10%], DA- Project Management[10%]
Hardware/ Partitioning Requirements	4 mons	2/3/2003	5/25/2003	\$25,600.00	DA- Engineering[20%], DA- Software [10%], DA- Production- Eng.[10%], DA- Project Management[10%]
Software Requirements/ Proc. Selection	4 mons	2/3/2003	5/25/2003	\$21,600.00	DA- System Engineering (Sub)[5%], DA- Software [20%], DA- Project Management[10%], PSMFC- Software[15%]
Status conference call	0.25 days	2/4/2003	2/4/2003	\$1,100.00	PSMFC- Kennewick, PSMFC- Software, PSMFC- Management, NMFS- Engineering, NMFS- Biologist, NMFS- Management, DA- Engineering, DA- System Engineering (Sub), DA- Production- Eng., DA- Software , DA- Technician, DA- Project Management, DA- Production- Tech, ACOE- Manag...
Status conference call	0.25 days	3/7/2003	3/7/2003	\$1,100.00	PSMFC- Kennewick, PSMFC- Software, PSMFC- Management, NMFS- Engineering, NMFS- Biologist, NMFS- Production- Eng., DA- Engineering, DA- System Engineering (Sub), DA- Management, DA- Software , DA- Technician, DA- Project Management, DA- Production- Tech, ACOE- Manag...

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	Duration	Start	Finish	Cost	Resources
Status conference call	0.25 days	4/7/2003	4/7/2003	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Hardware/ Software Design	1 day?	5/26/2003	5/26/2003	\$0.00	
Hardware/ Software Timing Diagram	1 day?	6/23/2003	6/23/2003	\$0.00	
Hardware/ Software System Task Timing Diagram	1 mon	5/26/2003	6/22/2003	\$8,015.38	DA- System Engineering (Sub)[5%],DA- Software [20%],DA- Engineering[20%],DA- Project Management[20%]
System Power and Grounding Design	1 day?	6/23/2003	6/23/2003	\$0.00	
Power and Grounding Design/ Drawing	1 mon	5/26/2003	6/22/2003	\$10,400.00	DA- Engineering[75%],DA- Technician[25%],DA- Project Management[25%]
Interconnect Design/ Selection	1 day?	9/29/2003	9/30/2003	\$0.00	
Select OTS/ Interconnect Design	1 mon	6/23/2003	7/20/2003	\$9,200.00	DA- Engineering[50%],DA- Technician[25%],DA- Project Management[10%]
Diagnostic Test and Hardware Design	1 mon	7/21/2003	8/17/2003	\$6,200.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	8/18/2003	9/14/2003	\$9,600.00	DA- Elect. Drafting (Sub)[50%],DA- Production- Eng.[10%],DA- Mech. Drafting (Sub)[10%],DA- Project Management[10%]
Producibility Review of Components	2 wks	9/15/2003	9/28/2003	\$1,800.00	DA- Engineering[10%],DA- Production- Eng.[10%],DA- Project Management[10%]
Design Review	0.25 days	9/29/2003	9/29/2003	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
System Enclosure	1 day?	11/10/200	11/10/2003	\$0.00	
Drawing for System Enclosure (options)	1 mon	9/15/2003 ³	10/12/2003	\$10,542.50	DA- Engineering[10%],DA- Production- Eng.[25%],DA- Project Management[10%],DA- Mech. Drafting (Sub)[50%]
BOM for Enclosure	1 mon	10/13/200 ³	11/9/2003	\$4,200.00	DA- Production- Eng.[25%],DA- Project Management[10%]

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	Duration	Start	Finish	Cost	Resources
Power Supply Hardware	1 day?	11/24/2003	11/25/2003	\$0.00	
Selection/ Power Supply Design	3 mons	6/23/2003	9/14/2003	\$18,600.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Diagnostic Test and Hardware Design	1 mon	9/15/2003	10/12/2003	\$6,200.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	10/13/2003	11/9/2003	\$13,200.00	DA- Elect. Drafting (Sub)[50%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Producibility Review of Components	2 wks	11/10/2003	11/23/2003	\$5,100.00	DA- Engineering[25%],DA- Production- Eng.[50%],DA- Project Management[10%]
Design Review	0.25 days	11/24/2003	11/24/2003	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech
CPU Hardware	1 day?	1/19/2004	1/20/2004	\$0.00	
Selection/ CPU Design	9 wks	6/23/2003	8/24/2003	\$16,200.00	DA- Software [25%],DA- System Engineering (Sub)[10%],DA- Project Management[10%]
Peripheral Hardware Design	9 wks	8/25/2003	10/26/2003	\$15,750.00	DA- Engineering[25%],DA- Software [10%],DA- Project Management[10%],DA- Technician[15%]
Diagnostic Test and Hardware Design	5 wks	10/27/2003	11/30/2003	\$9,000.00	DA- Engineering[20%],DA- Software [10%],DA- Project Management[10%],DA- Technician[25%]
Schematic Capture, BOM, Mech. Drawing	1 mon	12/1/2003	12/28/2003	\$21,400.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Production- Tech[50%],DA- Project Management[20%],DA- Elect. Drafting (Sub)[50%],DA- Mech. Drafting (Sub)[25%]
Producibility Review of Components	3 wks	12/29/2003	1/18/2004	\$4,645.45	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[25%],DA- Production- Tech[25%]
Design Review	0.25 days	1/19/2004	1/19/2004	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng.
Analog Board	1 day?	1/19/2004	1/20/2004	\$0.00	
Driver Design Design Review and Design Checkout	2 mons	5/26/2003	7/20/2003	\$16,000.00	DA- Engineering[40%],DA- Project Management[10%],DA- Technician[25%]

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	Duration	Start	Finish	Cost	Resources
Detector Design Review and Design Checkout	2 mons	7/21/2003	9/14/2003	\$20,400.00	DA- Engineering[50%],DA- System Engineering (Sub)[5%],DA- Project Management[15%],DA- Technician[25%]
Filter/ Anti-alias Filter Design	11 wks	9/15/2003	11/30/2003	\$24,750.00	DA- System Engineering (Sub)[5%],DA- Engineering[40%],DA- Technician[25%],DA- Project Management[10%]
Processor Selection and Supporting Hardware Design	3 mons	5/26/2003	8/17/2003	\$25,854.55	DA- System Engineering (Sub)[10%],DA- Software [25%],DA- Engineering[10%],DA- Project Management[25%]
Diagnostic Test and Hardware Design	3 mons	8/18/2003	11/9/2003	\$18,600.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	12/1/2003	12/28/2003	\$21,400.00	DA- Engineering[25%],DA- Production- Eng [25%],DA- Production- Tech[50%],DA- Project Management[20%],DA- Elect. Drafting (Sub)[50%],DA- Mech. Drafting (Sub)[25%]
Producibility Review of Components	3 wks	12/29/2003	1/18/2004	\$4,645.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[25%],DA- Production- Tech[25%]
Design Review	0.25 days	1/19/2004	1/19/2004	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng.
Communication Interface Hardware (Fiber Optic)	1 day?	12/1/2003	12/2/2003	\$0.00	
Selection/ Primary Communication Hardware	2 wks	8/25/2003	9/7/2003	\$2,500.00	DA- Engineering[15%],DA- Technician[15%],DA- Project Management[10%],DA- Software [5%]
Form Factor Adaption Design	1 mon	9/8/2003	10/5/2003	\$4,400.00	DA- Engineering[10%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	10/6/2003	11/2/2003	\$9,000.00	DA- Elect. Drafting (Sub)[15%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Producibility Review of Components	1 mon	11/3/2003	11/30/2003	\$7,200.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[10%]
Design Review	0.25 days	12/1/2003	12/1/2003	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng.

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	<u>Duration</u> 1 day?	<u>Start</u> 11/17/2003	<u>Finish</u> 11/18/2003	<u>Cost</u> \$0.00	<u>Resources</u>
Display/ Keypad/Keyboard Interface					
Hardware Design/ Selection	2 mons	8/25/2003	10/19/2003	\$13,657.14	DA- Engineering[15%],DA- Technician[40%],DA- Software [10%],DA- Project Management[15%]
Diagnostic Test and Hardware Design	1 wk	10/20/2003	10/26/2003	\$1,100.00	DA- Engineering[10%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	2 wks	10/27/2003	11/9/2003	\$5,100.00	DA- Elect. Drafting (Sub)[25%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Productibility Review of Components	1 wk	11/10/2003	11/16/2003	\$1,800.00	DA- Engineering[25%],DA- Production- Eng.[25%],DA- Project Management[10%]
Design Review	0.25 days	11/17/2003	11/17/2003	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng.
Sensor Card Selection/ Design	1 day?	1/12/2004	1/13/2004	\$0.00	
Hardware Design/ Selection	2 mons	8/25/2003	10/19/2003	\$14,000.00	DA- Engineering[25%],DA- Technician[25%],DA- Software [5%],DA- Project Management[10%]
Diagnostic Test and Hardware Design	1 mon	10/20/2003	11/16/2003	\$6,200.00	DA- Engineering[25%],DA- Technician[25%],DA- Project Management[10%]
Schematic Capture, BOM, Mech. Drawing	1 mon	11/17/2003	12/14/2003	\$10,200.00	DA- Elect. Drafting (Sub)[25%],DA- Production- Eng.[25%],DA- Mech. Drafting (Sub)[25%],DA- Project Management[10%]
Productibility Review of Components	1 mon	12/15/2003	1/11/2004	\$10,200.00	DA- Engineering[25%],DA- Production- Eng.[50%],DA- Project Management[10%]
Design Review	0.25 days	1/12/2004	1/12/2004	\$1,100.00	PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng.
CPU Software Design	1 day?	4/26/2004	4/27/2004	\$0.00	
Timing Diagram	1 mon	10/20/2003	11/16/2003	\$20,385.32	DA- System Engineering (Sub)[5%],DA- Software ,DA- Project Management[20%],DA- Engineering[20%],PSMFC- Software[5%]
Implementation Flow Chart	1 mon	11/17/2003	12/14/2003	\$13,200.00	DA- Software [75%],DA- Project Management[10%],PSMFC- Software[5%]
Initial Software Code Design	2.5 mons	2/9/2004	4/18/2004	\$27,000.00	DA- Software ,DA- Project Management[10%]

Contract 0002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	Duration	Start	Finish	Cost	Resources
Performance/ Status Report Design Review	1 wk 0.25 days	4/19/2004 4/26/2004	4/25/2004 4/26/2004	\$4,000.00 \$1,100.00	DA- Software PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
Analog Processor Software Design Timing Diagram	1 day? 1 mon	8/23/2004 12/15/2000	8/24/2004 1/11/2004	\$0.00 \$21,200.00	DA- System Engineering (Sub)[5%],DA- Software ,DA- Engineering[2.5%],DA- Project Management[20%]
Implementation Flow Chart	1 mon	1/12/2004	2/8/2004	\$16,000.00	DA- Software
Initial Software Code Design	4 mons	4/26/2004	8/15/2004	\$36,800.00	DA- Software [75%],DA- Project Management[10%]
Performance/ Status Report Design Review	1 wk 0.25 days	8/16/2004 8/23/2004	8/22/2004 8/23/2004	\$4,000.00 \$1,100.00	DA- Software PSMFC- Software,PSMFC- Kennewick,PSMFC- Management,NMFS- Engineering,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manager,ACOE- HI-Q Eng..
FPGA Program (Glue Logic if Necessary)	1 day?	1/26/2004	1/26/2004	\$0.00	
Analog	2 mons	8/18/2003	10/12/2003	\$18,400.00	DA- Engineering[50%],DA- Technician[25%],DA- Project Management[10%]
CPU	2 mons	12/1/2003	1/25/2004	\$18,400.00	DA- Engineering[50%],DA- Technician[25%],DA- Project Management[10%]
Status conference call	0.25 days	6/6/2003	6/6/2003	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Technician,DA- Project Management,DA- Production- Tech,ACOE- Manag...
Status conference call	0.25 days	8/8/2003	8/8/2003	\$1,100.00	PSMFC- Kennewick,PSMFC- Software,PSMFC- Management,NMFS- Engineering,NMFS- Biologist,NMFS- Management,DA- Engineering,DA- System Engineering (Sub),DA- Production- Eng.,DA- Software ,DA- Project Management,DA- Technician,DA- Production- Tech,ACOE- Manag...

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	Duration	Start	Finish	Cost	Resources
Status conference call	0.25 days	11/8/2003	11/8/2003	\$1,100.00	PSMFC- Kennewick, PSMFC- Software, PSMFC- Management, NMFS- Engineering, NMFS- Biologist, NMFS- Production- Eng., DA- Software ,DA- Project Management, DA- Technician, DA- Production- Tech, ACOE- Manag...
Status conference call	0.25 days	1/9/2004	1/9/2004	\$1,100.00	PSMFC- Kennewick, PSMFC- Software, PSMFC- Management, NMFS- Engineering, NMFS- Biologist, NMFS- Production- Eng., DA- Software ,DA- Project Management, DA- Technician, DA- Production- Tech, ACOE- Manag...
Prototyping and System Integration	1 day?	1/4/2003	1/4/2003	\$0.00	
Interconnect Design/ Selection	1 day?	1/12/2004	1/13/2004	\$0.00	
PCB Layout (if necessary)	3 wks	9/29/2003	10/20/2003	\$6,300.00	DA- Elect. Drafting (Sub)[60%], DA- Project Management[10%]
Electrical and Producibility Review of Layout	1 wk	10/20/2003	10/27/2003	\$3,000.00	DA- Production- Eng.[40%], DA- Engineering[40%], DA- Project Management[20%]
Modify BOM/ Layout per Review	1 wk	10/27/2003	11/3/2003	\$2,700.00	DA- Elect. Drafting (Sub)[40%], DA- Production- Eng.[40%], DA- Project Management[10%]
Order Parts/ PCB (5 prototypes)	4 wks	11/3/2003	12/1/2003	\$3,300.00	DA- Production- Eng.[10%], DA- Project Management[5%], DA- Build House[1]
Fabricate 5 Prototypes	3 wks	12/1/2003	12/22/2003	\$5,500.00	DA- Build House[5]
Board Level Hardware Integration	1 wk	12/22/2003	12/29/2003	\$2,000.00	DA- Technician
DVT Testing at Board Level	2 wks	12/29/2003	1/12/2004	\$4,600.00	DA- Technician, DA- Project Management[10%]
System Enclosure	1 day?	12/22/2003	12/22/2003	\$0.00	
Order Parts/ Fabricate 5 units	4 wks	11/10/2003	12/7/2003	\$3,700.00	DA- Technician[15%], Materials[5]
Assemble 5 Units	1 wk	12/8/2003	12/14/2003	\$2,000.00	DA- Production- Tech
Verify Mech. Drawing and BOM	1 wk	12/15/2003	12/21/2003	\$3,200.00	DA- Production- Tech, DA- Production- Eng [20%], DA- Project Management[20%]
Power Supply	1 day?	3/1/2004	3/2/2004	\$0.00	
PCB Layout (if necessary)	2 wks	11/24/2003	12/8/2003	\$7,800.00	DA- Engineering[15%], DA- Elect. Drafting (Sub), DA- Project Management[15%]

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	<u>Duration</u>	<u>Start</u>	<u>Finish</u>	<u>Cost</u>	<u>Resources</u>
Electrical and Producibility Review of Layout	1 wk	12/8/2003	12/15/2003	\$3,000.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
Modify BOM/ Layout per Review	1 wk	12/15/2003	12/22/2003	\$2,700.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]
Order Parts/ PCB (5 prototypes)	4 wks	12/22/2003	1/19/2004	\$3,300.00	DA- Production- Eng.[10%],DA- Project Management[5%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	1/19/2004	2/9/2004	\$5,500.00	DA- Build House[5]
Board Level Hardware Integration	1 wk	2/9/2004	2/16/2004	\$2,000.00	DA- Technician
DVT Testing at Board Level	2 wks	2/16/2004	3/1/2004	\$4,600.00	DA- Technician,DA- Project Management[10%]
CPU					
PCB Layout	1 day?	7/18/2004	7/19/2004	\$0.00	
Electrical and Producibility Review of Layout	2 wks	1/19/2004	2/2/2004	\$6,000.00	DA- Elect. Drafting (Sub)
	2 days	2/2/2004	2/6/2004	\$3,600.00	DA- Production- Eng.,DA- Engineering,DA- Project Management
Modify BOM/ Layout per Review	2 days	2/6/2004	2/8/2004	\$800.00	DA- Production- Tech
Order Parts/ PCB (5 prototypes)	1 mon	2/8/2004	3/7/2004	\$3,300.00	DA- Production- Eng.[15%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	3/7/2004	3/28/2004	\$5,500.00	DA- Build House[5]
Board Level Hardware/ Software Integration	2 mons	3/28/2004	5/23/2004	\$24,000.00	DA- Software [25%],DA- Engineering[25%],DA- Project Management[25%],DA- Technician[25%]
DVT Testing at Board Level	2 mons	5/23/2004	7/18/2004	\$18,400.00	DA- Technician,DA- Project Management[10%]
Analog Board					
PCB Layout	1 day?	8/1/2004	8/2/2004	\$0.00	
Electrical and Producibility Review of Layout	2 wks	2/2/2004	2/16/2004	\$6,000.00	DA- Elect. Drafting (Sub)
	2 days	2/16/2004	2/20/2004	\$3,600.00	DA- Production- Eng.,DA- Engineering,DA- Project Management
Modify BOM/ Layout per Review	2 days	2/20/2004	2/22/2004	\$800.00	DA- Production- Tech
Order Parts/ PCB (5 prototypes)	1 mon	2/22/2004	3/2/2004	\$3,300.00	DA- Production- Eng.[15%],DA- Build House[1]
Fabricate 5 Prototypes	3 wks	3/2/2004	4/11/2004	\$5,500.00	DA- Build House[5]
Board Level Hardware/ Software Integration	2 mons	4/11/2004	6/6/2004	\$24,000.00	DA- Software [25%],DA- Engineering[25%],DA- Project Management[25%],DA- Technician[25%]
DVT Testing at Board Level	2 mons	6/6/2004	8/1/2004	\$18,400.00	DA- Technician,DA- Project Management[10%]
Primary Communication Card (Fiber Optic)					
PCB Layout (if necessary)	1 day?	1/30/2004	1/31/2004	\$0.00	
Electrical and Producibility Review of Layout	1 wk	12/2/2003	12/9/2003	\$3,900.00	DA- Engineering[15%],DA- Elect. Drafting (Sub),DA- Project Management[15%]
Modify BOM/ Layout per Review	3 days	12/9/2003	12/14/2003	\$1,800.00	DA- Production- Eng.[40%],DA- Engineering[40%],DA- Project Management[20%]
	3 days	12/14/2003	12/19/2003	\$1,620.00	DA- Elect. Drafting (Sub)[40%],DA- Production- Eng.[40%],DA- Project Management[10%]

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	<u>Duration</u>	<u>Start</u>	<u>Finish</u>	<u>Cost</u>	<u>Resources</u>
Order Parts/ PCB (5 prototypes)	2 wks	12/19/2000	1/2/2004	\$2,400.00	DA- Production- Eng. [10%], DA- Project Management [5%], DA- Build House [1]
Fabricate 5 Prototypes	3 wks	1/2/2004	1/23/2004	\$2,500.00	DA- Build House [2]
Board Level Hardware Integration	3 days	1/23/2004	1/26/2004	\$1,200.00	DA- Technician
DVT Testing at Board Level	2 days	1/26/2004	1/30/2004	\$920.00	DA- Technician, DA- Project Management [10%]
Display/ Keypad/Keyboard Interface PCB Layout (if necessary)	1 day? 2 wks	5/24/2004 2/16/2004	5/25/2004 3/1/2004	\$0.00 \$7,800.00	DA- Engineering [15%], DA- Elect. Drafting (Sub), DA- Project Management [15%]
Electrical and Producibility Review of Layout	1 wk	3/1/2004	3/8/2004	\$3,000.00	DA- Production- Eng. [40%], DA- Engineering [40%], DA- Project Management [20%]
Modify BOM/ Layout per Review	1 wk	3/8/2004	3/15/2004	\$2,700.00	DA- Elect. Drafting (Sub) [40%], DA- Production- Eng. [40%], DA- Project Management [10%]
Order Parts/ PCB (5 prototypes)	4 wks	3/15/2004	4/12/2004	\$3,300.00	DA- Production- Eng. [10%], DA- Project Management [5%], DA- Build House [1]
Fabricate 5 Prototypes	3 wks	4/12/2004	5/3/2004	\$5,500.00	DA- Build House [5]
Board Level Hardware Integration	1 wk	5/3/2004	5/10/2004	\$2,000.00	DA- Technician
DVT Testing at Board Level	2 wks	5/10/2004	5/24/2004	\$4,600.00	DA- Technician, DA- Project Management [10%]
Sensor Card PCB Layout (if necessary)	1 day? 2 wks	4/20/2004 1/13/2004	4/23/2004 1/27/2004	\$0.00 \$7,800.00	DA- Engineering [15%], DA- Elect. Drafting (Sub), DA- Project Management [15%]
Electrical and Producibility Review of Layout	1 wk	1/27/2004	2/3/2004	\$3,000.00	DA- Production- Eng. [40%], DA- Engineering [40%], DA- Project Management [20%]
Modify BOM/ Layout per Review	1 wk	2/3/2004	2/10/2004	\$2,700.00	DA- Elect. Drafting (Sub) [40%], DA- Production- Eng. [40%], DA- Project Management [10%]
Order Parts/ PCB (5 prototypes)	4 wks	2/10/2004	3/9/2004	\$3,300.00	DA- Production- Eng. [10%], DA- Project Management [5%], DA- Build House [1]
Fabricate 5 Prototypes	3 wks	3/9/2004	3/30/2004	\$5,500.00	DA- Build House [5]
Board Level Hardware Integration	1 wk	3/30/2004	4/6/2004	\$2,000.00	DA- Technician
DVT Testing at Board Level	2 wks	4/6/2004	4/20/2004	\$4,600.00	DA- Technician, DA- Project Management [10%]
System Integration Integrate Hardware/ Software	1 day? 2 mons	12/5/2004 8/1/2004	12/6/2004 9/26/2004	\$0.00 \$48,400.00	DA- Engineering [50%], DA- Software [50%], DA- Technician, DA- System Engineering (Sub) [5%], DA- Project Management [10%]
Modify Software/ Hardware	1 mon	9/26/2004	10/24/2004	\$36,000.00	DA- Engineering [50%], DA- Software, DA- Technician, DA- Project Management [50%]
DVT Testing	1 mon	10/24/2000	11/2/2004	\$11,600.00	DA- Engineering [20%], DA- Technician, DA- Project Management [10%]
Update Schematics/ BOM's	2 wks	11/2/2000	12/5/2004	\$10,000.00	DA- Elect. Drafting (Sub), DA- Production- Tech
		4	4	0	

Contract 00002760, Release 00007, Amendment 001

Table 1 - Project Schedule

Project 1983-319-00 "New Marking and Monitoring Techniques for Fish"

	Duration	Start	Finish	Cost	Resources
Field Testing at Pasco/ Abernathy	1 day?	6/5/2005	6/6/2005	\$0.00	
Fabricate Test Antennas (PVC)	2 wks	10/24/2004	11/7/2004	\$7,000.00	DA- Production- Tech, Materials[6]
Evaluate Prototype Performance (Multiple/ Max. Size)	4 mons	11/21/2004	3/13/2005	\$62,000.00	NMFS- Engineering[25%], PSMFC- Software[50%], PSMFC- Kennewick[50%], DA- Engineering[25%], DA- Technician[50%], DA- Project Management[50%], DA- Travel[4], ACOE- HI-Q Engineer[25%]
Modify/ Optimize System/ Components	3 mons	3/13/2005	6/5/2005	\$13,600.00	DA- Engineering[25%], DA- Technician[25%], DA- Project Management[10%]
Up date Drawings/ Schematics/ BOMs/ Software Documentation	1 mon	6/5/2005	7/3/2005	\$34,000.00	DA- Production- Tech, DA- Production- Eng. [50%], DA- Elect. Drafting (Sub)[50%], DA- Mech. Drafting (Sub)[50%], DA- Software [50%]
Production	1 day?	12/18/2005	12/19/2005	\$0.00	
Build and Deliver 4 Production Systems (4 Coil) Transcievers	6 mons	7/3/2005	12/18/2005	\$72,800.00	DA- Production Vendor[10%], DA- Production- Eng. [10%], DA- Production- Tech[10%], Materials[100], DA- Project Management[5%]

CONTRACT 2760, RELEASE 00007 PAYMENT TERMS AND
CONDITIONS

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UNIT 1 — SCHEDULE

!G!CONTRACT TYPE (7-1)
(SEP 98)(BPI 7.1.9)

This is a fixed price type contract.

SCHEDULE OF PRICES (22-51)
(SEP 98)

The contractor shall provide all supplies/services according the project schedule shown in the scope of work.

SCIENTIFIC AND TECHNICAL INFORMATION REPORTING REQUIREMENTS (14-15)
(SEP 98)(BPI 14.14.1)

- (a) The Contractor shall prepare scientific and technical information developed as a result of this contract in accordance with the required report format for publications. A 50 to 300 word abstract (summary) of the report must also be provided. The Contractor shall coordinate with the Contracting Officer's Technical Representative (COTR) for preparation and transmittal of the electronic copy of the required deliverables. Recognized electronic document interchange formats include HTML, Postscript, and PDF.
- (b) The COTR shall forward electronic form DOE F 241.1 plus two (2) paper copies of the final report to the BPA Library.

UNIT 2 — CONTRACT CLAUSES

PAYMENT AND TAXES

BASIS OF PAYMENT -- PROGRESS PAYMENTS (22-3) (SEP 98)(BPI 22.1.3)

- (a) Progress payments. BPA shall make progress payments as the work proceeds based on the stage or percentage of work accomplished. The Contractor shall furnish a breakdown of the work as a percentage of the total contract price, in such detail as required by the CO. The contractor will periodically update the progress payment schedule to reflect the actual progress of the project.
- (b) Title to all material and work covered by progress payments shall pass to BPA at the time of payment. This shall not be construed as--
 - (1) Relieving the Contractor from the sole responsibility for all work upon which payments have been made or the restoration of any damaged work; or
 - (2) Waiving the right of BPA to require the fulfillment of all of the terms of the contract.
- (c) Partial Payments. Unless otherwise specified, payment shall be made after acceptance of any portion of the work delivered or rendered for which a price is separately stated in the contract.
- (d) Final Payment. BPA shall pay the amount due the Contractor under this contract after completion and acceptance of all work and after presentation of a release of all claims against BPA arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of any assignee if the Contractor's claim to amounts payable under this contract has been assigned.

CONTRACT CEILING LIMITATION (22-7) (SEP 98)(BPI 22.1.3)

- (a) The Contractor agrees to use its best efforts to perform the work specified in the Schedule and all obligations under this contract within the contract ceiling. The contract ceiling includes all estimated costs (both direct and indirect) and any fee allowance. If this is a cost-sharing contract, the contract ceiling includes both BPA's and the Contractor's share of the cost.
- (b) Notification of CO. The Contractor shall notify the CO in writing at the first indication that the total cost for the performance of this contract, exclusive of any fee, will be either greater or substantially less than had been previously estimated.
- (c) Revised Estimate. As part of the notification, the Contractor shall provide the CO a revised estimate of the total cost of performing this contract.
- (d) Contract Ceiling.
 - (1) BPA is not obligated to reimburse the Contractor for costs incurred in excess of the contract ceiling specified in the Schedule or, if this is a cost-sharing contract, the estimated cost to BPA specified in the Schedule; and
 - (2) The Contractor is not obligated to continue performance under this contract (including actions under the Termination clause of this contract) or otherwise incur costs in excess of the contract ceiling specified in the Schedule, until the CO notifies the Contractor in writing that the contract ceiling has been increased.

- (e) No notice, communication, or representation, or from any person other than the CO, shall affect this contract's contract ceiling.
- (f) If this contract is terminated or the contract ceiling is not increased, BPA and the Contractor shall negotiate an equitable distribution of all property produced or purchased under the contract, based upon the share of costs incurred by each.

BONNEVILLE
POWER ADMINISTRATION

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00007
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

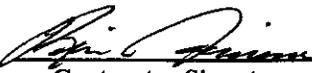
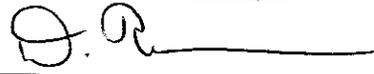
DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH

Total Value : \$691,537.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 09/30/04

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

 Contractor Signature	 BPA Contracting Officer
<u>Kevin Niemann Pres Rep div.</u> Printed Name/Title	<u>9/30/03</u> Date Signed
<u>10/22/03</u> Date Signed	

This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS

Contract Amendments

Title : AMEND PERFORMANCE PERIOD AND BUDGET TO COVER FY04 WORK
Amendment: 002
Amended Performance Period: 01/01/03 - 09/30/04
Amendment Value: \$314,553.00
Pricing Method :

Contract 00002760, Release 00007
Digital Angel Corporation
Project 1983-319-00 - New Marking and Monitoring Techniques for Fish
Amendment 002

The purpose of this amendment is to extend the period of performance to 9/30/2004 and to add funds in the amount of \$314,533.00.

All other terms and conditions remain the same.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00006
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

MARY F. BINGAMAN
Title: CONTRACT SPECIALIST
Phone: 230-3720
Fax :

Attn: Sean Casey

Contract Title: 2001-003-00 INSTALLATION OF ADULT PIT DETECTION SYSTEMS

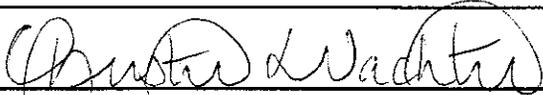
Total Value : \$736,250.00
Pricing Method: COST, NO FEE
Performance Period: 07/01/02 - 10/31/03

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

~~Contractor Signature~~

~~Printed Name/Title~~

~~Date Signed~~


BPA Contracting Officer

05/13/2003
Date Signed

Contract Amendments

Title : ADMINISTRATIVE AMENDMENT - ACCOUNTING CHANGE TO CAPITAL
Amendment: 002
Amended Performance Period: -
Amendment Value:
Pricing Method :

Official
CC: KEWB

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00007
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: 503-230-3605
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING & MONITORING TECHNIQUES FOR FISH

Total Value : \$792,597.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 09/30/05

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

Contractor Signature

Zeke Mesia / CTO

Printed Name/Title

NOV 15 / 04

Date Signed

Kristi VanLeuven

BPA Contracting Officer

10/29/04

Date Signed

This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS

Title : 1983-319-00 NEW MARKING AND MONITORING SYSTEMS-DIGITAL ANGEL 05

Amendment: 003

Amended Performance Period: - 09/30/05

Amendment Value: \$101,060.00

Pricing Method :



COVER SHEET ATTACHMENT

**New Marking and Monitoring Techniques for Fish Tag Development
Project Number 1983-319-00
Contract No. 2760, Release 7, Amendment 03**

This amendment is issued to authorize and extension in the period of performance and FY 05 Funds. Funding in the amount of \$101,060 is added to this release. In addition, the following reporting requirements are added to the terms and conditions.

Quarterly Progress Reports: The Contractor must submit quarterly reports that coincide with the Federal fiscal year, i.e. December 31, March 31, June 30, and September 30 of each year. These quarterly reports are due to the COTR no later than two weeks after the end of the quarter.

Annual Report: The Contractor must submit an Annual Report due no later than 30 days after the end of the annual performance period.

Final versions of annual/technical reports should be submitted electronically, preferably as a *portable document format (pdf)* file, in one of the following ways:

1. Upload on-line (60MB maximum file size). The form with instructions for uploading files is located at: <http://www.efw.bpa.gov/cgi-bin/FW/publications.cgi>.
2. Copy to a CD or other portable storage device for mail or hand delivery (recommended for non-pdf files and documents over 60MB).
3. Attach to an email (for documents under 5MB).

Other periodic reports (monthly, quarterly, etc.) should be submitted either by email or, for large documents, by CD.

All other terms and conditions remain the same.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00008
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

CHRISTOPHER NIELSEN
Title: CONTRACT SPECIALIST
Phone: 503-230-3612
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKETING AND MONITORING TECHNIQUES FOR FISH

Total Value : \$599,623.00
Pricing Method: COST, NO FEE
Performance Period: 01/01/03 - 10/31/03

** NOT TO EXCEED **
Payment Terms: % Days Net 10

Contractor Signature

BPA Contracting Officer

Printed Name/Title

Date Signed

Date Signed

Note: This release was voided on 12/31/02
and not issued to the
contractor.

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00009
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

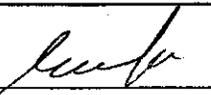
KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: 503-230-3605
Fax : 503-230-4508

Attn: Zeke Mejia

Contract Title: 1983-319-00 BONNEVILLE CORNER COLLECTOR PIT-TAG DETECTION SYSTEM

Total Value : \$1,470,914.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 09/30/05

** NOT TO EXCEED **
Payment Terms: % Days Net 10

<p> _____ Contractor Signature ZEKE MEJIA _____ Printed Name/Title may 17 / 05 _____ Date Signed</p>	<p> _____ BPA Contracting Officer 5/12/05 _____ Date Signed</p>
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This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS
Title : 1983-319-00 NEW MARKING AND MONITORING TECHNIQUES-DIGITAL ANGEL
Amendment: 003
Amended Performance Period: - 09/30/05
Amendment Value: \$524,000.00
Pricing Method :



COVER SHEET ATTACHMENT

**New Marking and Monitoring Techniques
B2CC PIT Tag System
Project Number 1983-319-00
Contract No. 2760, Release 9, Amendment 3**

This amendment is issued to authorize additional funds for this project and incorporate the attached Statement of Work and Project Plan into the Release. The period of performance is also extended to 9/30/05.

General (Description of work only. See details in accruals sheet)

Cost (\$k) Hours

Coordinate Contractors with ACOE & Fisheries

Total 0 0

Flume Structure Development & Fabrication

Cost (\$k) Hours

Select Housing/Skid Plate Design Contractor
Select HVAC Contractors
Design Housings and Skid Plate with ACOE
Contract Fabricator
Test Fabrication Techniques for Strength & Water Tight Seal
Test Materials Effects

Total \$0.00 0

St Paul Work

Cost (\$k) Hours

Modify St Paul Test Bed (adjustable Ant)
Wire Test
Antenna Size Tests
Modify St Paul Test Bed (Shield)
Conduct Base Line Tests
Receiver & Driver Board Turn & Build
Integrate DSP, Receiver, & Driver
Verify System Integration
Develop Auto Tune System
Optimize DSP & Analog Circuitry

Total \$0.00 0

Bonneville Work

Materials Test Existing Concrete Columns
Grade Test Site
Purchase & Setup Testing Tent
Build Test Antenna with Shield
Noise Tests
Optimize DSP & Analog Circuitry for Local Noise
Preliminary FCC Compliance Check

Total \$0.00 0

Additional Equipment

A.

Work Element Title: Manage and Administer Projects (119)
Work Category: Planning and Coordination
Work Element Name (ID): Manage and Administer Projects (119)

Work Element Description:
 Conduct necessary testing of PIT tag system and keep Columbia Basin fisheries community informed of progress of B2CC flume project

Milestone	Start Date	End Date	Description
Conduct testing	1/31/2005	6/30/2005	As required of PIT tag system
Present for review and comment			Present all pertinent aspects of system design concept and performance to Columbia Basin fisheries community for review and comment

Deliverable Specification
 Test results

Budget Estimate
 \$86,112

B.

Work Element Title: Produce Designs
Work Category: Planning and Coordination
Work Element Name (ID): Produce Design and/or Specifications (175)

Work Element Description:
 Design of various components related to the PIT tag system

Milestone	Start Date	End Date	Description
Design antenna and equipment housings	1/31/2005	6/30/2005	Design antenna and equipment housings relating to the PIT tag system
Design air conditioning or ventilation system	1/31/2005	6/30/2005	As required
Design "skid plate"	1/31/2005	6/30/2005	Design skid plate to protect antenna housings and meet necessary hydraulic and structural requirements of the B2CC flume.
Design antenna and electronics	1/31/2005	6/30/2005	Design

Deliverable
 Designs for antenna and equipment housings, AC or vent systems, skid plate, antenna and electronics

PROJECT: BONNEVILLE CORNER COLLECTOR: Project: 00002760-00009

Budget with schedule and monthly accruals.												
Task	Hrs.	Rate \$/hr.	Matl.	Sub-total	Total	Schedule	1/31/2005	2/28/2005	3/31/2005	4/30/2005	5/31/2005	6/30/2005
General Proj. Management					86112.1							
Sr.Project Engineer(BP)	511	120		61320			6120	14400	14400	12000	7200	7200
Travelling	1	1		24792.1			3,226	3,160	4406.4	4000	5000	5000
	0	0		0								
Flume Struct.Develop./Fabric.					72912.5							
Contractor	0			0				1312.5		50000		
Mechanical Engineer	1			51312.5								
Sr.Electrical Engineer(BP)	0			0								
Electrical Engineer	180	120		21600			4800	4800	4800	2400	2400	2400
Applications Engineer				0								
Materials		1		0								
		0		0								
St. Paul Work					340975.4							
Contractor(Ant. Test bed)				0								
Mechanical Engineer(GJ)	152	120		18240			6240	5400	3000	3600	0	0
Electronics Engineer(RF)	620	120		74400			6600	14400	15000	19200	9600	9600
Electronics Engineer(CP)	470	100		47000			0	8000	15000	8000	8000	8000
Applications Engineer(Sr. Eng.(ZM)	717	120		86040			3840	3600	3000	25500	25500	25500
Equipments	0	1		31548.94					31548.94			
Materials.	1	1		55594.46					6490.15	1916.65	7326	
Travelling	0	1		27252					3252	4000	10000	10000
Bonneville Work					20000							
Contractors	0	1		0								
Electronics Engineer(RF)	0	120		0			0	0	0	0	0	0
Sr.Electronics Eng. (BP)	87	120		10400			0	0	0	4800	5600	5600
Applications Engineer	80	120		9600			0	0	0	4800	4800	4800
Materials.		1		0								
Total				520000	520000		30825.89	94933.97	100897.49	140216.7	85426	67700

Item	Qty	Cost (\$k)
Spectrum Analyzer, Portable W TG - Agilint 8560E Used	1	
Analog Scope, Portable - TEK 7550	1	
Digital Scope, Portable - LeCroy ?????	1	
LCR Meter, Portable - Quadteck	1	
Miss Wire, meters, etc		
	Total	0.0

Project Totals

General	86112.1
Flume Structure Development & Fabrication	\$72,912.50
St Paul Work	\$340,975.40
Bonneville Work	\$24,000.00

Total Project Cost	Totals	\$524,000.00
---------------------------	---------------	---------------------

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00009
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: 503-230-3605
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 BONNEVILLE CORNER COLLECTOR PIT-TAG DETECTION SYSTEM

Total Value : \$946,914.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 06/30/05

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

Contractor Signature

Printed Name/Title

Date Signed

Zeke Mejia
ZEKE MEJIA

NOV 15 / 04

BPA Contracting Officer

Date Signed

Kristi VanLeuven
KRISTI VANLEUVEN

10/29/04

This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS

Title : EXTEND PERFORMANCE PERIOD

Amendment: 002

Amended Performance Period: - 06/30/05

Amendment Value:

Pricing Method :

The following schedule from Release 9 was modified in order to synchronize with the Corps' updated schedule. Many of the tasks in the original schedule have already been completed and are shown in gray. Revised finish dates for the uncompleted tasks are shown in the far right column.

Table 1. Revised Schedule Details for Release 00009

Task Name	Cost	Material Cost	Original Start Date	Original Finish Date	New Finish Date
H/C Project Plan	\$1,130,374		01/06/03	06/30/04	
Phase 1 - Feasibility/Evaluation of System Options and Protocol Concept	\$54,175		01/06/03	09/11/03	
TEST BED DESIGN AND CONSTRUCTION	\$259,916		01/06/03	01/28/03	
Analog-Digital Converter/DSP Test Bed (3 units, two to antenna evaluation, one for DSP studies)	\$17,916	\$2,700	01/08/03	01/28/03	
Select and Purchase DSP Development Kits	\$5,300	\$3,000	01/08/03	01/21/03	
Design and build 16-bit A-to-D front end for DSP Slant/Ki	\$6,416	\$1,200	01/10/03	01/21/03	
Setup and Integration	\$5,000	\$0	01/22/03	01/28/03	
Software - Raw Data Output	\$8,000	\$0	01/06/03	01/15/03	
Raw data read out application and firmware	\$4,000	\$0	01/06/03	01/15/03	
Analog-to-digital Converter/DSP Test Bed Integration and Test	\$4,000	\$0	01/06/03	01/10/03	
TAG	\$39,090		01/06/03	03/21/03	
Evaluate PIT Tag Construction Improvement	\$15,100	\$0	01/06/03	03/12/03	
Prepare Mass Models of Tag Options	\$3,700	\$0	01/06/03	01/31/03	
Test and Evaluate Turn-on of Mass Models	\$3,600	\$0	02/20/03	02/26/03	
Test and Evaluate Signal of Die Options	\$3,600	\$0	02/27/03	03/05/03	
Prepare a Report and Recommendations to Corps/BPA	\$4,200	\$0	03/06/03	03/12/03	
PIT Tag code compression study	\$23,990	\$0	01/06/03	03/21/03	

Firmware Development (assume software tools provided)	\$6,000	\$0	01/22/08	02/18/08
Breadboard and Evaluate Analog Driver Options/ Performance (3)	\$18,500	\$0	02/19/08	04/08/08
Antenna Driver/Detector hardware/software integration and test support	\$2,550	\$0	04/09/08	04/15/08
Antenna Driver design refinement - schematic updates	\$1,920	\$0	04/06/08	04/09/08
Antenna Driver layout (Part of Driver/Receiver Matrix board)	\$2,180	\$0	04/10/08	04/16/08
Analog front end design evaluation/support	\$145,764	\$0	04/06/08	06/17/08
Demodulator/detector anti aliasing filter	\$19,300	\$0	04/16/08	05/06/08
Antenna Input Interface Breadboard and Evaluate Pre Demodulator Hardware Options (4)	\$81,300	\$0	04/08/08	02/18/08
Demodulator/Detector Stage Breadboard and Evaluate Design Options (4)	\$28,300	\$0	04/06/08	02/20/08
Filter/Anti-Aliasing Filter Design	\$8,600	\$0	04/06/08	04/08/08
Determine the Specifications for Input to DSP Section	\$6,000	\$0	04/09/08	04/22/08
Develop Design/Design Options	\$2,400	\$0	04/23/08	04/23/08
Design Review	\$6,300	\$0	04/24/08	02/05/08
Breadboard Filter	\$10,000	\$0	02/07/08	02/20/08
Evaluate and Make Changes as Necessary to Meet DSP Requirements	\$4,100	\$0	02/21/08	03/05/08
Analog Front End printed circuit board prototype	\$1,920	\$0	02/21/08	02/26/08
Analog Front End Design Refinement - schematic updates	\$2,180	\$0	02/27/08	03/05/08
Analog Front end printed circuit board layout (Part of Driver/Receiver Matrix board)	\$69,600	\$0	05/07/08	06/17/08
Integration of Analog Front End Options	\$22,500	\$0	05/07/08	05/27/08
Integrate Input Interface, Democ/Det, and Filter	\$16,800	\$0	05/28/08	06/17/08
Evaluate Performance and Make Necessary Changes				

Perform Lab Testing and Modify Software Hardware Hardware to Optimize Performance of Options	\$22,200	\$0	07/02/03	07/22/03
Prepare a Report and Recommendations to Corps/ BPA to Determine Go/No Go	\$300	\$0	07/23/03	07/23/03
Basic System Board Checkout	\$2,880	\$0	07/17/03	07/24/03
Testing and Evaluation of System Determine Maximum Possible Performance	\$38,075	\$0	07/24/03	09/08/03
System Performance Evaluation with Large Scale Antenna and Tags at Anechoic Chamber	\$25,875	\$0	07/24/03	08/14/03
Determine Maximum Antenna Size for Desired Reading Efficiency Throughout Entire Antenna	\$10,000	\$0	08/14/03	08/28/03
Characterize Reading Matrix for Antenna Sizes Desired by Corps. If necessary may be scaled assumes 2	\$1,000	\$0	08/28/03	09/04/03
Prepare a Report for Corps/ BPA	\$1,200	\$0	09/04/03	09/08/03
MEETING WITH CORPS/ BPA IN PORTLAND. PHASE KGO NO GO	\$6,180	\$0	09/08/03	09/17/03
Phase 2- Field Testing and Evaluation	\$395,796		09/11/03	04/02/04
TAG	\$4,100		09/11/03	12/04/03
Fabricate PIT Tags (in Larger Vessel if necessary) for testing (100)	\$4,100	\$0	09/11/03	12/04/03
ANTENNA	\$34,100		09/11/03	10/21/03
Meeting With Corps to Discuss the Design of the Test Site	\$4,500	\$0	09/17/03	09/16/03
Write Requirements for Full Scale Test Site (Shield Antenna Electrical and Rebar at a Minimum)	\$4,500	\$0	09/16/03	09/23/03
Write/ Draft Antenna Requirements for Bull for Antennas to Corps	\$12,000	\$0	09/23/03	10/07/03
Meeting with Corps to Review Test Site Design	\$4,300	\$0	10/07/03	10/16/03
Write test procedure	\$9,000	\$0	10/07/03	10/21/03
TEST SITE/ANTENNA CONSTRUCTION/ BONN. DESIGN BEGINS	\$14,000		10/10/03	9/30/04

Electrical Design Update	\$66,090	\$4,000	09/17/03	10/21/03	
Electrical Design w/component selection	\$4,200	\$0	09/17/03	09/18/03	
Coordination w/Mechanical Engineering	\$800	\$0	09/17/03	09/15/03	
Milestone Schematic Review (Digital Angel Sign-off)	\$680	\$0	09/15/03	09/16/03	
Component Procurement (Qty 10, \$500 components est. per board)	\$5,960	\$5,000	09/16/03	09/30/03	
Component placement/Footprint build	\$1,360	\$0	09/30/03	10/02/03	
Printed Circuit Board Layout	\$2,720	\$0	10/01/03	10/07/03	
Milestone Layout Design Review (Dependent on fixed printed circuit board by ME)	\$790	\$0	10/07/03	10/08/03	
Printed Circuit Board Fabrication (Qty 10) (This assumes 5 day turn)	\$5,200	\$5,000	10/08/03	10/13/03	
Printed circuit board Assembly at Logic (Qty 10 proto units)	\$4,500	\$2,250	10/13/03	10/20/03	
Basic System Board Checkout	\$2,880	\$0	10/14/03	10/21/03	
Integration and Test (Buy: Temulator \$2495 each Spectrum Digital)	\$10,620	\$2,500	12/22/03	01/05/04	
Software Design Refinement	\$6,400	\$0	10/27/03	12/22/03	
DSP algorithm implementations	\$2,000	\$0	10/27/03	11/10/03	
Antenna driver firmware	\$4,000	\$0	11/10/03	11/24/03	
Detector Decoder Firmware	\$2,000	\$0	11/24/03	12/08/03	
Raw data and PIT reader applications	\$2,000	\$0	12/08/03	12/22/03	
Full system integration and Test with printed circuit board system and Power Supplies	\$30,480	\$0	01/05/04	01/30/04	
Antenna, electronics, power supply integration	\$12,000	\$3,000	01/05/04	01/12/04	10/30/04
Analog and DSP technical approach matrix evaluation for PIT tag reading	\$8,000	\$0	01/12/04	01/19/04	10/30/04
Performance analysis	\$7,600	\$0	01/19/04	01/26/04	8/15/04
Evaluation and final report	\$2,880	\$0	01/26/04	01/30/04	8/15/04
FIELD TESTING AND EVALUATION OF HI-Q SYSTEM	\$134,650	\$0	01/02/04	04/02/04	
System Set-up, Evaluation and Modifications	\$27,500	\$0	01/02/04	01/23/04	10/30/04

The following is the Corps' updated construction schedule. Digital Angel will work cooperatively with the Corps' staff and their schedule so long as it falls within this current contractual scope of work.

PROTOTYPE CONSTRUCTION SCHEDULE			
	Begin Date	End Date	Work Task Description
1	2/17/2004	2/19/2004	Award and NTP
2	2/19/2004	2/19/2004	Pre-construction conference
3	2/19/2004	6/7/2004	Mobilize, site work, install power, excavate pit, sheet pile, building walls, etc.
4	2/19/2004	6/7/2004	Antenna Fabrication
5	6/7/2004	6/13/2004	Ship antenna to Bonneville
6	6/13/2004	7/13/2004	Install antenna, construct building, etc.
7	7/13/2004	10/11/2004	Digital Angel to test electronics
8	7/13/2004	8/15/2004	Go/No-Go Decision from BPA as informed by Digital Angel testing
9			
10 FINAL IN-CHANNEL CONSTRUCTION SCHEDULE			
	Begin Date	End Date	Work Task Description
11	7/16/2004	8/15/2004	Advertise
12	8/15/2004	8/16/2004	Bid opening
13	8/16/2004	8/21/2004	Award (must have Go/No-Go decision from BPA & funding)
14	8/21/2004	8/23/2004	NTP
15	8/30/2004	12/20/2004	Antenna #2 fabrication
16	8/23/2004	8/31/2004	Mobilize
17			Remove riprap from riverside and install riverside sheet piling (restrict to night operations only)
18	9/1/2004	9/15/2004	Begin excavation down to the existing channel invert on the land side
19	9/1/2004	9/15/2004	Demolish walls of existing 30 ft channel sections
20	9/16/2004	9/30/2004	
21	10/1/2004	10/8/2004	Saw cut slots in slabs for sheet piling and remove concrete (this can be started before the walls are demolished and then finished when the walls are gone). Also saw cut entire slab and prepare pieces to be removed
22	10/9/2004	10/13/2004	Install structural steel sheet pile bracing system
23	10/14/2004	10/28/2004	Install the rest of the sheet piling to form coffer dam (land side area and under demolished slabs)
24	10/29/2004	11/1/2004	Attach structural steel bracing system to sheet piling and bolt sheet piling to remaining slabs
25	11/2/2004	11/9/2004	Install dewatering bulkheads or sand bags in the existing channel sections that will be left in place (contractor designed-bracing strut will be designed to carry both the compressive loads from the sheet pile wall as well as expected hydrostatic loads from a bulkhead)
26	11/2/2004	11/9/2004	Place sealing mechanisms between concrete and sheet piling
27	11/2/2004	11/9/2004	Inject grout underneath existing/remaining slabs at sheet pile interface to prevent water intrusion

28	11/10/2004	11/12/2004	Demolish slabs
29	11/13/2004	11/15/2004	Cut sheet piling to be flush with existing slab inverts
30	11/13/2004	11/20/2004	Excavate down to final grade (Approximate El. 11.5 ft. to 12.0 ft.)
31	11/21/2004	11/28/2004	Place slab reinforcing bars, formwork, and slab concrete (may be underwater)
32	11/29/2004	11/30/2004	Place foundation "rat" slab of unreinforced concrete
33	12/1/2004	12/2/2004	Dewater construction areas
34	12/3/2004	12/7/2004	Install antenna supports
35	11/4/2004	12/4/2004	Demolish Prototype test building and prepare antenna #1 to be removed (DA testing to end)
36	12/5/2004	12/13/2004	Install Antenna #1 (grout underneath antenna once set into correct position)
37	12/20/2004	12/27/2004	Transport antenna #2 to Bonneville
38	1/3/2005	1/8/2005	Install Antenna #2 (grout underneath antenna once set into correct position)
39	12/14/2004	12/21/2004	Install wall and reinforcing bars (both GFRP and steel) - site # 1
40	1/10/2005	1/17/2005	Install wall and reinforcing bars (both GFRP and steel) - site # 2
41	12/22/2004	12/24/2004	Install system to brace the aluminum shield so that it doesn't deform during placement of the non-magnetic grout and concrete - site # 1
42	1/26/2005	1/28/2005	Install system to brace the aluminum shield so that it doesn't deform during placement of the non-magnetic grout and concrete - site # 2
43	12/27/2004	1/5/2005	Install wall formwork - site # 1
44	1/18/2005	1/25/2005	Install wall formwork - site # 2
45	1/6/2005	1/9/2005	Place non-magnetic grout and concrete - site # 1
46	1/29/2005	2/1/2005	Place non-magnetic grout and concrete - site # 2
47	1/10/2005	1/11/2005	Remove shield bracing system as necessary - site # 1
48	2/2/2005	2/3/2005	Remove shield bracing system as necessary - site # 2
49	1/12/2005	1/14/2005	Install top of aluminum shield and inject foam filler into ceiling voids - site # 1
50	2/4/2005	2/6/2005	Install top of aluminum shield and inject foam filler into ceiling voids - site # 2
51	1/15/2005	1/22/2005	Install counterfort rebar - site # 1
52	2/4/2005	2/11/2005	Install counterfort rebar - site # 2
53	1/23/2005	1/26/2005	Place counterfort formwork - site # 1
54	2/12/2005	2/15/2005	Place counterfort formwork - site # 2
55	1/27/2005	1/30/2005	Place concrete for walls and counterforts - site # 1
56	2/16/2005	2/19/2005	Place concrete for walls and counterforts - site # 2
57	1/31/2005	2/2/2005	Strip forms from walls and counterforts - site # 1
58	2/20/2005	2/22/2005	Strip forms from walls and counterforts - site # 2
59	2/3/2005	2/10/2005	Install precast concrete struts - site # 1
60	2/20/2005	2/27/2005	Install precast concrete struts - site # 2
61	1/31/2005	2/7/2005	Remove sheet piling from riverside and landside areas, leaving the piling underneath the new structure - site # 1
62	2/16/2005	2/23/2005	Remove sheet piling from riverside and landside areas, leaving the piling underneath the new structure - site # 2
63	2/8/2005	2/15/2005	Backfill behind new walls and counterforts up to finish elevation - site # 1
64	2/28/2005	3/14/2005	Backfill behind new walls and counterforts up to finish elevation - site # 2
65	2/8/2005	2/10/2005	Install debris deflectors - site # 1
66	2/28/2005	3/2/2005	Install debris deflectors - site # 2

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00009
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

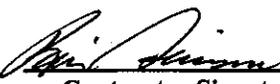
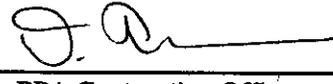
DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 BONNEVILLE CORNER COLLECTOR PIT-TAG DETECTION SYSTEM

Total Value : \$946,914.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 09/30/04

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

 Contractor Signature	 BPA Contracting Officer
 Printed Name/Title	9/30/03 Date Signed
 Date Signed	

This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS

Contract Amendments

Title : AMEND PERFORMANCE PERIOD AND BUDGET
Amendment: 001
Amended Performance Period: - 09/30/04
Amendment Value: \$431,092.00
Pricing Method :

1

Contract 00002760, Release 00009
Digital Angel Corporation
1983-319-00 Bonneville Corner Collector Pit-Tag Detection System
Amendment 001

The purpose of this amendment is to extend the period of performance to 9/30/2004 and to add funds in the amount of \$431,092.00.

All other terms and conditions remain the same.

BONNEVILLE
POWER ADMINISTRATION

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00009
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

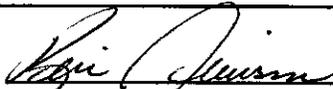
DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 1983-319-00 BONNEVILLE CORNER COLLECTOR PIT-TAG DETECTION SYSTEM

Total Value : \$515,822.00
Pricing Method: FIRM FIXED PRICE
Performance Period: 01/01/03 - 10/31/03

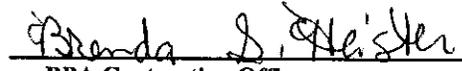
**** NOT TO EXCEED ****
Payment Terms: % Days Net 10



Contractor Signature
Kevin Nieuwsma - President

Printed Name/Title
1/9/03

Date Signed



BPA Contracting Officer
11/6/03

Date Signed

This award contains the following - TEXT ATTACHED

SERVICE FIXED PRICE T&CS

Scope of Work Attached

Statement of Work - Contract 2760, Release 00009
Bonneville Corner Collector Pit Tag Detection System
[Project 1983-319-00, New Marking and Monitoring Techniques for Fish]

Project 1983-319-00 is the Mainstem/Systemwide project for developing new PIT tag detection systems, including the development of a PIT tag detector for the new Bonneville Corner Collector. The juvenile bypass systems at Bonneville currently have PIT detection, which is critical to reach survival estimates and Biological Opinion performance measurements. However, when the Bonneville corner collector becomes operational, most of the fish that would have been detected in the bypass system will pass via the corner collector. Therefore, having detection in the new Bonneville Corner Collector is critical to reach survival estimates, which are critical to measuring progress toward performance standards in the 2005 NMFS Biological Opinion check-in. Additionally, showing progress toward the development of this technology is part of the 3-year check-in.

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology in the federal Columbia and Snake River hydroelectric projects. More specifically, this release includes the development of a PIT-tag detection system for the Bonneville Corner Collector, commonly referred to as Hi-Q PIT.

I. Scope of Work

This contract calls for DA to provide technical services, including all labor, travel, and associated expenses necessary to develop the Bonneville Corner Collector PIT detection system electronics. This contract release in combination with Release No. 7 for the transceiver development and with the Corps of Engineers structural design and construction efforts will result in the fully functional prototype system.

A. Phase 1 - Feasibility Evaluation of Options. In this phase Digital Angel will be investigating a wide range of PIT tag, antenna, analog electronics, digital electronics, and digital signal processor (DSP) techniques to maximize the performance of the PIT Tag system for the Hi-Q program. Initial electronics investigations will be performed with breadboard prototypes of the antenna driver and analog front-end portions of the Hi-Q system. The DSP algorithms will be coded and tested on a DSP Starter Kit for the candidate DSP part fitted with a custom analog-to-digital converter board connected to the DSP Starter Kit via an expansion bus. After initial investigations of a wide variety of approaches to the antenna drivers, analog front-end, detector/decoder, and PIT tag decoding, the most promising approaches will be selected for printed circuit board prototyping with a laboratory antenna. This final evaluation stage in Phase I will provide the foundation for the selection of the overall technical approach to a large-scale system integration and test in Phase II. Phase I consists of the following tasks.

1. Test Bed Design and Construction. Digital Angel and subcontractor Logic will build several DSP based detector/decoder platforms in Phase I. One of those platforms will be used to evaluate the various DSP algorithms for tag decoding. The others will be used in the development of the analog electronics and antennae. A pick-off from the antenna or analog front end will generate, via the analog digital converter and DSP platform, raw digital data that can be provided to a PC for analysis. This approach can also provide the ability to evaluate the signal at different stages of the signal processing. The key to the development of the entire system is to maximize the signal to noise ratio going to the DSP. The proof of concept development board will be critical in evaluating which methods to go forward with. The test

bed will utilize lab power supplies for flexibility to adapt to all electronic concepts for testing. The Test Bed hardware will also be used to characterize the noise at the proposed Hi-Q antenna sites at Bonneville Dam for use in developing the Analog Hardware and DSP algorithms.

2. Tag Construction Enhancement Investigation. In order to maximize the performance of the Pit Tag System for the Hi-Q application, Digital Angel will investigate a new proprietary construction technique and die modulation. A test matrix using mass models (not form fit) with different die configurations will be evaluated on the Test Bed to determine the possible performance improvement. Promising units will be further testing during the final integration in Phase 1. Note: If the tag proves to be of benefit, the continued development and production phases would take 2-3 years.

3. Tag Decoding Compression Enhancement Investigation. Another opportunity for overall system improvement is to reduce the time required to decode and identify a tag. A reduced identification time will reduce collisions, by decreasing the probability that two unidentified tags will be sensed simultaneously, and increase the identification throughput and therefore capture percentage of tags passing through the system.

An approach to decreasing the detection/identification time for the tags would be to use the 24-bit trailer at the end of the 128-bit tag string. This trailer is presently not allocated in the ISO 11785 standard. The idea is to compress and store the tag information in this trailer in such a way that the information can be decompressed without the loss of any information. If this can be accomplished, the compression/decompression decoding approach can be run simultaneously with a standard decoding algorithm giving the decoder multiple chances to decode the tag in one 128-bit cycle. The result would then be a reduction in the average tag reading time. One possible approach is described below.

Based on the current fish density numbers that have been distributed, it does not appear that anti-collision circuitry needs to be added to the tag at this point. This could be a consideration after the evaluation of the installed system.

4. Antenna. The first step in the antenna development will be to meet with the Corps to determine the system requirements, detailed responsibilities of team members, possible test site options, and approaches that are feasible to implement the pass-thru designs. Through testing and analysis it has been determined that the pass-thru design is optimal in the generation of the field and in the coupling of the tag to the field for antennas with large footprints. It is critical to begin the conceptual development of the possible implementations of the pass-thru antenna into the current structure as soon as possible. This can include concepts for antennas in and out of the flow.

Based on the performance results in Phase 1, a decision to have antennas in or out of the flow may be made. It is assumed that the Corps will be responsible for all structural, construction, and fabrication issues surrounding the development of the antenna, shielding, and implementation into the Hi-Q structure. Digital Angel will be responsible for the electrical, internal antenna and shielding dimensional specifications. Digital Angel and the Corps team will work together to resolve the environmental and structural issues that can impact the performance of the PIT Tag system.

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In Phase 1, Digital Angel will investigate antenna options that will include single/multiple excitation and receive antenna configurations. Initially the antenna options will be investigated using small-scale models with the Test Bed. Based on the test results with these models, the Corps and Digital Angel will determine which approaches to go forward with in further development. The selected designs will then be constructed in large scale for testing at a facility with a large RF room. This testing will be critical in determining optimizing the electrical parametrics for large antenna geometries. Data collected from the test will be reviewed by the Corps and Digital Angel to determine the most promising option/s or if further investigations are necessary.

5. Reader/Transceiver. The Hi-Q prototype reader system, funded under Release 7, will be comprised of the following circuitry: 1) Driver Circuitry; 2) Analog Front End (Antenna Interface, Demodulator, Filter) Circuitry; 3) Digital Signal Processor and Analog-digital-converter; and 4) Independent Power Supplies.

6. Exciter Driver Analysis. Digital Angel will investigate two square-wave and one sign-wave driver approaches. Each of the approaches can be addressed using different components available off-the-shelf and also using custom circuitry. Each approach will be optimized and tested for use in the Hi-Q system. Stability, integrity of the output, and drive capability are key factors in evaluating the approaches.

Logic will provide the necessary microcontroller/software for controlling the driver, auto-tuning (if necessary), diagnostics, and interface to the rest of the system. The circuitry for the best design of each approach that can meet the Hi-Q needs will be implemented on the matrix printed circuit board. This hardware will be further evaluated during the System Integration and Test at the end of Phase 1.

7. Analog Front End Design Evaluation/Support. A critical component to the system is to provide a distortion-free signal from either the drive or receive antennae to the DSP section at a voltage compatible with the A/D converter. The design team has identified options for the antenna input interface and demodulator section. The receiver hardware developed for the 2001F-ISO portable transceiver and driver from the FS1001A stationary transceiver will be used as a baseline.

Enhancements of the current hardware as well as new innovative ideas for interfacing and demodulating the tag signal from the antenna to the DSP section will be investigated. These concepts include: 1) Up-conversion; 2) Adaptable Peak Detection (2 methods); 3) Discrete Component Interface; 4) Transformer coupling (Currently used, investigate improvements). These options will be evaluated on the Test Bed using test equipment such as a network analyzer, and the raw data output of the converter/DSP hardware. Viable circuitry will be selected for placement on the matrix printed circuit board for the system integration at the end of Phase 1.

8. Digital Signal Processor (DSP) Analysis. The output of the analog front-end electronics will connect to a high performance analog-to-digital converter. A digital signal processor will process the digital data from the analog-to-digital converter and determine if a tag is present. The first step in the detector development will be the selection of the analog-to-digital converter, the sample rate and the resolution will be the main factors. The sample rate required

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is dependant upon the analog electronics so the team will select analog-to-digital converters that are compatible with the analog electronics under investigation. The system will likely require a converter with at least 16 bits of resolution. A high performance DSP will be selected to process the digital data with a variety of algorithms. Digital Angel/ Logic will purchase a development kit for the DSP and interface the analog-to-digital converter to that board to provide the digital detecting and decoding engine of the system. The team will pay special attention to the interface between the analog electronics and the converter. A key to success will be to avoid loading the analog signal so an SMA type connector and cable will be used. An off-the-shelf Digital Angel PIT tag reader system will be used to provide a source of real life signals to the DSP detector/decoder platform during the algorithm evaluations. The task of isolating the frequencies of interest that determine whether a "1" or "0" has been transmitted is the primary challenge of the digital detector/decoder platform. The science of digital communications has provided many ways to isolate signals of interest. Three of these approaches will be discussed. The RF receiver and analog front end will convert the signal from the antennae into a low voltage analog signal which is then processed to determine if a tag is present. Along with reducing the signal amplitude, the analog front end will demodulate the signal down to the baseband to relax the sampling requirements of the analog-to-digital converter. The last analog stage, an anti-aliasing filter, will be inserted between the analog front end and the converter. A high speed, high-resolution analog to digital converter will sample the signal to create the digital input to the DSP. The different approaches diverge at this point. One approach is to take a Fast Fourier Transformation, or some other time to frequency domain transformation, and then compare the amount of energy near the "0" frequency and near the "1" frequency. Another approach is to implement very high order finite impulse response (FIR) filters at both the "0" and "1" frequencies. The magnitude of the output of each filter is then compared. Various hybrids of the two methods will also be investigated, such as filtering out the excitation frequency before computing the fast fourier transformation. We will first evaluate the simplest approaches and move to more complicated techniques as needed.

9. Noise Cancellation, Error Detection, and Error Correction. The DSP will also provide the system a means minimize errors, detect errors, and possibly correct errors. The previous section discussed the various approaches to extracting the tag information from the RF signal. The only noise that affects the decoding algorithms running on the DSP is the noise at and around the "0" and "1" signal frequencies. The signal processing approaches, as discussed above, attempt to eliminate all of the signal components that are not at the two frequencies of interest. Noise at the frequencies of interest, e.g. background noise, will be addressed with cancellation techniques such as taking the baseline sample when no tags are present and subtracting this baseline sample from the current sample. This is intended to eliminate any constant noise sources from the environment.

The ability to detect errors is critical to the system. The CRC provides the system with fundamental error detection. If any of the bits in the data are corrupted the computed CRC will be different from the CRC on the tag. This validates that what we are reading is actually a tag and not random noise. In Phase 1 the team will also investigate Error Correction. For example, adding a certain amount of redundancy to the tag in the 24-bit trailer may allow a limited amount of error correction using standard communications techniques. Any amount of

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error correction will have a big benefit to the system in that it may be able to validate that a tag was present without having to wait for it to retransmit the entire 128-bit sequence.

10. System Integration and Test. In this phase the Digital Angel team will select the most promising approaches identified in the Proof-of-Concept phase and build a large-scale prototype system that will be tested at an anechoic chamber facility in Minneapolis. The large-scale prototype will be used do performance analysis on a matrix of technical approaches to the antenna, analog electronics, and DSP functions of the system. Results of this testing will be documented and a report will be issued to the Corps and BPA. This information will be the basis for a Go- No Go decision, implementation approach, and/or further development.

B. Phase 2 - Field Test Prototype and Evaluation. Based on the results from the Phase 2 prototype analysis, the best electronic solutions will be evaluated at a test site provided by the Corps of Engineers. The test site may be something already in existence or may need to be fabricated. Ideally, the test site will need to allow for the flexibility of easily modifying antennas, introducing water, and accommodating shielding options. This site is critical as it will be the first opportunity to integrate a system with all the major components. It will allow the design team to identify any issues with the entire system to make the installation phase as simple as possible. Other benefits include:

1. Testing of Antenna structure/housing prior to the installation to reduce risk.
2. Expedite the development of the system by working in a controlled environment.
3. Allow for the ease of modifications.
4. Provide a platform for further development or refinement of the system during the water-up or construction period.
5. Provides a jump-off point prior to construction if there is inadequate performance or if technical issues arise.
6. The site can be used for additional proof of principle concepts that are beyond the current schedule such as: tag improvements, algorithm enhancements and the possibility of adding anti-collision circuitry to the tag and reader to improve the performance of the Hi-Q system.

Digital Angel will support the Corps in the design of the test site and provide the electrical specifications necessary. Digital Angel and the Corps will team to develop the electrical and mechanical antenna specifications. Testing will be done on all system components based on the Corps, BPA and Digital Angel recommendations from Phase 1. Also testing will be done for E and H field noise immunity. Hatfield and Dawson will be subcontracted by Digital Angel to verify the system is in compliance with human exposure guidelines. Pit Tag models from Phase 1 will be placed in glass (not form-fit) if approved by the BPA. Electronic options recommended by the Corps and BPA from Phase 1 will be optimally laid out on printed circuit boards. Lab power supplies will be replaced with appropriate off-the-shelf power supplies. DSP algorithm development will continue based on Phase 1 recommendations. A report of the test results will be presented to the BPA for a "Go - No Go" decision on whether to proceed with the installation phase.

C. Phase 3. Installation at Bonneville Dam. The installation phase of this development may involve one or more options. This budget assumes that electronics assemblies for two sites will be built. The BPA may decide to use more or less sites based on the evaluation of the Phase 2 options, at

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which time contract modifications would be necessary. Digital Angel will support the Corps and/or its subcontractors in the design/assembly of the antenna systems for installation. Digital Angel will also provide on-site support during the construction and evaluation activities as needed. PIT tags with the enhancements selected in Phase 2 will be produced in adequate quantities for fish testing. In the case of the tag construction enhancement, the tags may be in 18mm glass. The electronic option(s) selected during the performance of this contract release will be documented and mechanically packaged. System refinements and improvements may occur throughout the Testing and Evaluation effort.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's project manager, Kim Fodrea. Additionally, coordination with the National Marine Fisheries Service, Corps of Engineers, and Pacific States Marine Fisheries Commission will be required.

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III. Project Schedule

The overall transceiver development is expected to take 19 months. The tasks funded in this statement of work will be completed in the fiscal year 2003 for project 1983-319-00, New Marking and Monitoring Techniques for Fish. A detailed schedule of tasks is included in the Table 1. The performance period for this release is 1 January 2002 through 31 October 2003.

IV. Budget

The total estimated cost of this project is \$946,914. The anticipated monthly cost schedule is shown in Table 2.

This estimated schedule of costs has been adjusted for tasks that overlap with tasks necessary for and included in the transceiver contract release 00009. The overlapping tasks include: the exciter driver analysis for the reader, analog front-end design and evaluation, and digital signal processing. These tasks are reflected in the task list and schedule for releases 7 and 9. The overlap funding, shown in Table 1, is not included in the budget for this contract release 00009 in order to avoid a duplication of funding.

This contract release provides for BPA's FY2003 funding in the amount of \$ 515,822. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

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Table 1. Schedule of Estimated Costs (including cost sharing from rel 7 & 9 overlapping tasks)

FY03	Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	TOTAL FY03
Hi- Q - Contract 2760 Release 9 Proposal	\$138,922	\$83,644	\$78,114	\$57,233	\$44,273	\$33,353	\$67,842	\$28,823	\$67,419	\$599,623
Transceiver Contract 2760 Release 7	\$11,500	\$24,440	\$62,100	\$26,620	\$28,220	\$39,695	\$44,055	\$48,130	\$76,610	\$361,370
Overlap between release 7 & 9	\$0	\$6,300	\$7,350	\$13,640	\$14,510	\$19,110	\$19,115	\$22,060	\$26,840	\$128,925
BPA Share of Overlap	\$0	\$4,095	\$4,778	\$8,866	\$9,432	\$12,422	\$12,425	\$14,339	\$17,446	\$83,801
Hi- Q - Contract 2760 Release 9 Contract FY03	\$138,922	\$79,549	\$73,337	\$48,367	\$34,842	\$20,932	\$55,417	\$14,484	\$49,973	\$515,822

FY04	Oct-04	Nov-04	Dec-04	Jan-04	Feb-04	Mar-04	Apr-04	May-04	Jun-04	TOTAL FY04
Hi- Q - Contract 2760 Release 9 Proposal	\$80,604	\$20,025	\$39,837	\$93,287	\$66,841	\$36,003	\$72,462	\$71,403	\$34,386	\$514,848
Transceiver Contract 2760 Release 7	\$93,835	\$78,005	\$126,748	\$71,912	\$57,202	\$44,497	\$44,849	\$45,745	\$35,495	\$598,288
Overlap between release 7 & 9	\$22,080	\$11,170	\$35,050	\$24,595	\$5,600	\$0	\$1,980	\$13,860	\$14,520	\$128,855
BPA Share of Overlap	\$14,352	\$7,261	\$22,783	\$15,987	\$3,640	\$0	\$1,287	\$9,009	\$9,438	\$83,756
Hi- Q - Contract 2760 Release 9 Contract FY04	\$66,252	\$12,765	\$17,055	\$77,300	\$63,201	\$36,003	\$71,175	\$62,394	\$24,948	\$431,092

Total \$946,914

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Table 2. Tasks & Schedule Details for Release 00009 (cost sharing for overlapping tasks from release 7 not included).

Task Name	Cost	Materials Cost	Resource Name	Start	Finish
Hi-Q Project Plan	\$1,130,371.67			01/06/03	06/30/04
Phase 1- Feasibility/ Evaluation of System Options and Proof of Concept	\$541,175.00			01/06/03	09/11/03
TEST BED DESIGN AND CONSTRUCTION	\$25,916.00			01/06/03	01/28/03
Analog Digital Converter/ DSP Test Bed (3 units – two for antenna evaluation, one for DSP studies)	\$17,916.00	\$2,700.00	Logic-Electrical Engineer \$100/Hr.[10%]	01/08/03	01/28/03
Select and Purchase DSP Development Kits	\$3,800.00	\$3,000.00	Logic-Sr. Electrical Eng. \$120/Hr.[20%], Logic-printed circuit board Tech \$85/Hr.[50%].	01/08/03	01/21/03
Design and build 16-bit A-to-D front end for DSP Starter Kit	\$6,416.00	\$1,200.00	Logic-Electrical Tech \$75/Hr.[20%] Digital Angel Engineering Tech. \$50/Hr., Digital Angel Engineer \$75/Hr.	01/10/03	01/21/03
Setup and integration	\$5,000.00	\$0.00	Logic-Software Engineer \$100/Hr.[63%] Logic-Electrical Engineer	01/22/03	01/28/03
Software- Raw Data Output	\$8,000.00	\$0.00	\$100/Hr.[40%], Logic-Software Engineer	01/06/03	01/15/03
Raw data read out application and firmware	\$4,000.00	\$0.00	\$100/Hr.[60%]	01/06/03	01/15/03
Analog-to-digital Converter /DSP Test Bed integration and Test	\$4,000.00	\$0.00		01/06/03	01/10/03
TAG	\$39,090.00			01/06/03	03/21/03
Evaluate Pit Tag Construction Improvement	\$15,100.00	\$0.00	Digital Angel Proto Tag Production \$5.00/Unit[100], Digital Angel Engineering Tech. \$50/Hr.[25%], Digital Angel Proj. Manager \$75/Hr.[10%]	01/06/03	03/12/03
Prepare Mass Models of Tag Options	\$3,700.00	\$0.00	Digital Angel Engineer \$75/Hr.[120%]	01/06/03	01/31/03
Test and Evaluate Turn-on of Mass Models	\$3,600.00	\$0.00	Digital Angel Engineer \$75/Hr.[120%]	02/20/03	02/26/03
Test and Evaluate Signal of Die Options	\$3,600.00	\$0.00	Digital Angel Engineer \$75/Hr.[120%]	02/27/03	03/05/03
Prepare a Report and Recommendations to Corps/ BPA	\$4,200.00	\$0.00	\$75/Hr.[120%], Digital Angel Proj.	03/06/03	03/12/03

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<u>PIT Tag code compression study</u>		<u>\$23,990.00</u>	<u>\$0.00</u>	Manager \$75/Hr.[20%]	<u>01/06/03</u>	<u>03/21/03</u>
Lossless compression algorithm implementation and modeling		\$9,600.00	\$0.00	Logic-Sr. Software Eng. \$120.00/Hr.[67%] Digital Angel Proj. Manager \$75/Hr.[25%], Logic-System Engineer \$120/Hr.	01/06/03	01/24/03
Generate Tag file for die erasable programmable memory Decompression demonstration with analog-digital converter and DSP kit with off-the-shelf reader (assume 6 weeks to get custom tags)		\$5,550.00	\$0.00	Logic-Sr. Software Eng. \$120.00/Hr.[11%], Digital Angel Proto Tag Production \$5.00/Unit[1,000]	01/27/03	01/31/03
		\$8,840.00	\$0.00		02/03/03	03/21/03
<u>ANTENNA</u>		<u>\$108,200.00</u>			<u>01/06/03</u>	<u>05/07/03</u>
<u>Meeting with the Corps Structural Eng. to Discuss Requirements, Antenna Designs, Approach, Responsibilities, Schedule</u>		<u>\$4,300.00</u>	<u>\$0.00</u>	Digital Angel Proj. Manager \$75/Hr., Travel[1]	<u>01/06/03</u>	<u>01/08/03</u>
<u>Support Antenna Structural with Corps Antenna Evaluation of Scaled Models on Test Bed</u>		<u>\$12,700.00</u>	<u>\$0.00</u>	Digital Angel Proj. Manager \$75/Hr.[20%], Travel[1]	<u>01/09/03</u>	<u>05/07/03</u>
		<u>\$39,200.00</u>	<u>\$0.00</u>		<u>01/09/03</u>	<u>03/10/03</u>
Lab Evaluation of Small Scaled Models of Antenna Options (6)		\$23,400.00	\$0.00	Digital Angel Proj. Manager \$75/Hr.[20%], Digital Angel Engineer \$75/Hr.[50%], Digital Angel Engineering Tech. \$50/Hr.[70%], Electronic Components \$100/ unit[24]	01/09/03	02/19/03
Prepare a Report and Recommendations to Corps/ BPA		\$7,200.00	\$0.00	Digital Angel Engineer \$75/Hr., Digital Angel Proj. Manager \$75/Hr.[20%] Digital Angel Proj. Manager \$75/Hr., Digital Angel Engineer	02/20/03	03/05/03
Meeting with Corps/ BPA to Determine Go- No Go on Options Testing/Evaluation of Corps Approved Antenna Options- Large Scale		\$8,600.00	\$0.00	\$75/Hr., Travel[2]	03/06/03	03/10/03
		<u>\$47,100.00</u>	<u>\$0.00</u>		<u>03/11/03</u>	<u>04/28/03</u>
Mock-up Viable Large Scale Antenna Options		\$18,600.00	\$0.00	Electronic Components \$100/ unit[100], Digital Angel Engineering Tech.	03/11/03	03/24/03

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	\$50/Hr.[110%].				
	Digital Angel Engineer \$75/Hr.[50%],Digital Angel Proj. Manager \$75/Hr.[20%] Digital Angel Engineering Tech. \$50/Hr.[120%],Digital Angel Engineer \$75/Hr.[120%]. Anechoic Chamber Rental[20] Digital Angel Engineer \$75/Hr.[50%],Digital Angel Proj. Manager \$75/Hr.[50%] Digital Angel Proj. Manager \$75/Hr., Travel[1]			03/25/03	04/14/03
Test Large Scale Antennas at Anechoic Chamber	\$22,500.00	\$0.00			
Prepare a Report and Recommendations to Corps/ BPA Meeting with the Corps Structural Eng. To Discuss Test Results and Planning (Go- No Go)	\$6,000.00	\$0.00		04/15/03	04/28/03
	\$4,900.00	\$0.00		04/29/03	05/02/03
READER	\$249,024.00			01/06/03	06/20/03
Kick off Meeting and Review of Project Plan	\$2,720.00	\$0.00		01/07/03	01/07/03
Exciter Driver Analysis	\$36,080.00	\$0.00		01/06/03	04/15/03
Driver board digital design-- microprocessor control and diagnostics	\$4,920.00	\$0.00		01/08/03	01/21/03
Firmware Development (assume software tools provided) Breadboard and Evaluate Analog Driver Options/ Performance (3)	\$6,000.00	\$0.00		01/22/03	02/18/03
	\$18,500.00	\$0.00		02/19/03	04/08/03

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Antenna Drive/Detector hardware/software integration and test support	\$2,560.00	\$0.00	Logic-Software Engineer \$100/Hr.[40%],Logic-Sr. Electrical Eng. \$120/Hr.[20%]	04/09/03	04/15/03
Antenna Driver design refinement -- schematic updates	\$1,920.00	\$0.00	Logic-Sr. Electrical Eng. \$120/Hr.[50%] Logic-printed circuit board Tech \$85/Hr.[50%],Logic-Sr. Electrical Eng. \$120/Hr.	01/06/03	01/09/03
Antenna Driver layout (Part of Driver/Receiver Matrix board) Analog front end design evaluation/support -- demodulator/detector, anti-aliasing filter	\$2,180.00	\$0.00		01/10/03	01/16/03
Antenna Input Interface-Breadboard and Evaluate Pre Demodulator Hardware Options (4)	\$145,764.00	\$0.00	Logic-Sr. Electrical Eng. \$120/Hr.[20%] Digital Angel Proj. Manager \$75/Hr.[20%],Digital Angel Engineering Tech. \$50/Hr.[120%], Digital Angel Engineer \$75/Hr.[120%] Digital Angel Engineering Tech. \$50/Hr.,Digital Angel Engineer \$75/Hr., Digital Angel Proj. Manager \$75/Hr.[10%]	01/06/03	06/17/03
Demodulator/ Detector Stage-Breadboard and Evaluate Design Options (4)	\$19,800.00	\$0.00		04/16/03	05/06/03
Filter/ Anti-Aliasing Filter Design	\$31,800.00	\$0.00		01/08/03	02/18/03
Determine the Specifications for Input to DSP Section	\$28,300.00	\$0.00	Digital Angel Engineer \$75/Hr.[200%]	01/06/03	02/20/03
Develop Design/ Design Options	\$3,600.00	\$0.00	Digital Angel Engineer \$75/Hr.	01/06/03	01/08/03
Design Review	\$6,000.00	\$0.00	Digital Angel Engineer \$75/Hr.[200%],Digital Angel Proj. Manager \$75/Hr.[200%] Digital Angel Engineering Tech. \$50/Hr.[120%],Digital Angel Engineer \$75/Hr.[25%]	01/23/03	01/22/03
Breadboard Filter	\$2,400.00	\$0.00		01/23/03	01/23/03
Evaluate and Make Changes as Necessary to Meet DSP Requirements	\$6,300.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr.[120%],Digital Angel Engineer \$75/Hr.	01/24/03	02/06/03
Analog Front End printed circuit board prototype	\$10,000.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr.,Digital Angel Engineer \$75/Hr.	02/07/03	02/20/03
Analog Front-end Design Refinement -- schematic updates	\$4,100.00	\$0.00		02/21/03	03/05/03
Analog Front-end printed circuit board Layout (Part of Driver/Receiver Matrix board)	\$1,920.00	\$0.00	Logic-Sr. Electrical Eng. \$120/Hr.[50%] Logic-printed circuit board Tech \$85/Hr.[50%],Logic-Sr. Electrical Eng.	02/21/03	02/26/03
	\$2,180.00	\$0.00		02/27/03	03/05/03

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 Bonneville Corner Collector Pit Tag Detection System
 [Project 1983-319-00, New Marking and Monitoring Techniques for Fish]

Integration of Analog Front End Options	\$39,300.00	\$0.00	\$120/Hr.	05/07/03	06/17/03
Integrate Input Interface, Demod./Det., and Filter	\$22,500.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr.[120%], Digital Angel Engineer \$75/Hr.[120%], Digital Angel Proj. Manager \$75/Hr.[50%]	05/07/03	05/27/03
Evaluate Performance and Make Necessary Changes	\$16,800.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr., Digital Angel Engineer \$75/Hr., Digital Angel Proj. Manager \$75/Hr.[20%]	05/28/03	06/17/03
DSP Analysis	\$60,160.00	\$0.00	Logic-System Engineer \$120/Hr.[35%]	01/06/03	05/23/03
Program Management and Monthly Reviews	\$33,600.00	\$0.00	Logic-System Engineer \$120/Hr.[13%], Logic- Sr. Ind Designer \$120.00/Hr.[13%], Logic-Sr. Mechanical Engineer \$120.00/Hr.[13%], Logic-Sr. Electrical Eng. \$120/Hr.[13%]	01/06/03	05/23/03
Review System Requirements (based on existing documentation provided at or before kickoff)	\$480.00	\$0.00		01/08/03	01/08/03
Update Product Requirement Specification (Approx 10 page document)	\$960.00	\$0.00	Logic-System Engineer \$120/Hr.	01/09/03	01/09/03
DSP algorithm evaluation with off-the-shelf portable PIT tag reader	\$25,120.00	\$0.00		01/10/03	03/13/03
Code DSP algorithms	\$16,320.00	\$0.00		01/10/03	02/06/03
fast fourier transformation signal isolation	\$4,800.00	\$0.00	Logic-Sr. Software Eng. \$120.00/Hr.[25%]	01/10/03	02/06/03
Impulse Response Filters	\$4,800.00	\$0.00	Logic-Sr. Software Eng. \$120.00/Hr.[25%]	01/10/03	02/06/03
Noise Cancellation Algorithm	\$6,720.00	\$0.00	Logic-Sr. Software Eng. \$120.00/Hr.[35%] Logic-Sr. Software Eng. \$120.00/Hr.[25%], Logic-Electrical Engineer \$100/Hr.[25%]	01/10/03	02/06/03
Evaluate PIT tag read time performance of DSP reader	\$8,800.00	\$0.00		02/14/03	03/13/03

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Meeting with Corps/ BPA- Status Report	\$4,300.00	\$0.00	Digital Angel Proj. Manager \$75/Hr., Travel[1]	06/18/03	06/20/03
SYSTEM INTEGRATION AND TEST	\$112,465.00			06/18/03	09/08/03
Driver/Receiver Matrix Board Fab and Debug	\$28,910.00	\$5,000.00	Equipment Rental- Network Analyzer[1] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%] Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%] Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-Electrical Tech \$75/Hr.[25%] Logic-Electrical Engineer \$100/Hr.[50%]	06/18/03	07/21/03
Milestone: Schematic Review (Digital Angel Sign-off)	\$680.00	\$0.00		06/18/03	06/18/03
Component Procurement (Qty10, components est. per board)	\$7,960.00	\$7,000.00		06/19/03	07/02/03
Component placement/Footprint build	\$1,360.00	\$0.00		07/03/03	07/04/03
Printed circuit board Layout Finalized – combine layout sections from Analog Front-end and Driver board efforts	\$2,720.00	\$0.00		07/04/03	07/09/03
Milestone: Layout Design Review	\$790.00	\$0.00		07/10/03	07/10/03
Printed circuit board Fabrication (Qty 10) (This assumes 5 day turn)	\$4,400.00	\$4,200.00		07/11/03	07/16/03
Printed circuit board Assembly at Logic (Qty 10 proto units)	\$6,000.00	\$4,200.00		07/16/03	07/21/03
Proof of Concept- Integration	\$37,480.00	\$0.00		06/18/03	07/24/03
Use Evaluation Board and Integrate with the Analog Front End/ Driver Options	\$11,800.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr., Digital Angel Engineer \$75/Hr.[50%] Logic-System Engineer \$120/Hr.[50%]	06/18/03	07/01/03
Perform Lab Testing and Modify Software/ Hardware to Optimize Performance of Options	\$22,200.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr., Digital Angel Engineer \$75/Hr., Logic-System Engineer \$120/Hr.[50%]	07/02/03	07/22/03
Prepare a Report and Recommendations to Corps/ BPA to determine Go- No Go	\$600.00	\$0.00	Digital Angel Proj. Manager \$75/Hr.	07/23/03	07/23/03

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(Project 1983-319-00, New Marking and Monitoring Techniques for Fish)

Basic System Board Checkout Testing and Evaluation of System- Determine Maximum Possible Performance	\$2,880.00	\$0.00	Logic-Electrical Engineer \$100/Hr.[40%], Logic-Associate Electrical Engineer \$80/Hr.[40%]	07/17/03	07/24/03
System Performance Evaluation with Large Scale Antenna and Tags at Anechoic Chamber	\$38,075.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr.[150%], Digital Angel Engineer \$75/Hr.[150%], Anechoic Chamber Rental[15]	07/24/03	09/08/03
Determine Maximum Antenna Size for Desired Reading Efficiency Throughout Entire Antenna	\$25,875.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr., Digital Angel Engineer \$75/Hr.	08/14/03	08/14/03
Characterize Reading Matrix for Antenna Sizes Desired by Corps (if necessary, may be scaled, assumes 2) Prepare a Report for Corps/ BPA	\$10,000.00	\$0.00	Digital Angel Engineering Tech. \$50/Hr.[20%], Digital Angel Engineer \$75/Hr.[20%]	08/14/03	08/28/03
MEETING WITH Corps/ BPA IN PORTLAND- PHASE 1 (GO- NO GO)	\$1,000.00	\$0.00	Digital Angel Proj. Manager \$75/Hr.	08/28/03	09/04/03
	\$1,200.00	\$0.00	Digital Angel Proj. Manager	09/04/03	09/08/03
	\$6,480.00	\$0.00	\$75/Hr., Digital Angel Engineer	09/08/03	09/11/03
	\$6,480.00	\$0.00	\$75/Hr., Logic-System Engineer \$120/Hr.	09/08/03	09/11/03
Phase 2- Field Testing and Evaluation	\$395,796.67	-		09/11/03	04/02/04
TAG	\$4,100.00			09/11/03	12/04/03
Fabricate PIT Tags (in Larger Vessel if necessary) for testing (100)	\$4,100.00	\$0.00	Digital Angel Proto Tag Production \$5.00/Unit[100], Digital Angel Proj. Manager \$75/Hr.[10%]	09/11/03	12/04/03
ANTENNA	\$34,100.00			09/11/03	10/21/03
Meeting With Corps to Discuss the Design of the Test Site	\$4,300.00	\$0.00	Digital Angel Proj. Manager \$75/Hr., Travel[1]	09/11/03	09/16/03
Write Requirements for Full Scale Test Site (Shield, Antenna, Electrical, and Rebar at a Minimum)	\$4,500.00	\$0.00	Digital Angel Engineer \$75/Hr.[50%], Digital Angel Proj. Manager \$75/Hr.	09/16/03	09/23/03

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Write/ Draft Antenna Requirements for Build of Antennas to Corps	\$12,000.00	\$0.00	Subcontractor- Mech. Drafting[50%], Digital Angel Engineer \$75/Hr.[50%], Digital Angel Proj. Manager \$75/Hr.	09/23/03	10/07/03
Meeting with Corps to Review Test Site Design	\$4,300.00	\$0.00	Digital Angel Proj. Manager \$75/Hr., Travel[1] Digital Angel Engineer \$75/Hr.[50%], Digital Angel Proj. Manager \$75/Hr.	10/07/03	10/10/03
Write test procedure	\$9,000.00	\$0.00		10/07/03	10/21/03

TEST SITE/ANTENNA CONSTRUCTION/ BONN. DESIGN BEGINS (Corps)

	\$14,000.00		Digital Angel Proj. Manager \$75/Hr.[25%], Travel[2]	10/10/03	01/02/04
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READER

\$208,946.67

Systems Engineering and Reviews-Program Management, Coordination, and Reporting
 Electronics Printed Circuit Board/ Mechanical Design
 Antenna Driver boards (5 units)

	\$12,480.00	\$0.00	Logic-System Engineer \$120/Hr.[20%]	09/11/03	12/11/03
	\$165,986.67	\$11,500.00		09/11/03	01/05/04
	\$47,986.67	\$2,500.00		09/11/03	01/05/04

Electrical Design (w/component selection)

\$4,200.00

	\$0.00	\$0.00	Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-Electrical Engineer \$100/Hr.[75%]	09/11/03	09/18/03
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Coordination w/ Mechanical Engineering

\$13,000.00

	\$0.00	\$0.00	Logic-Electrical Engineer \$100/Hr.[50%], Digital Angel Proj. Manager \$75/Hr.[50%], Subcontractor- Mech. Drafting	09/11/03	09/25/03
	\$0.00	\$0.00	Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%],	09/25/03	09/26/03

Milestone: Schematic Review (Digital Angel Sign-off)

\$680.00

	\$1,960.00	\$1,000.00	Logic-System Engineer \$120/Hr.[25%]	09/26/03	10/10/03
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Component Procurement (Qty 5, \$200 components est. per board)

\$1,360.00

	\$0.00	\$0.00	Logic-Associate Electrical Engineer \$80/Hr.[15%]	10/10/03	10/14/03
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Component placement/Footprint build
 Printed Circuit Board Layout

\$2,720.00

	\$0.00	\$0.00	Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech	10/13/03	10/17/03
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 Bonneville Corner Collector Pit Tag Detection System
 [Project 1983-3]9-00, New Marking and Monitoring Techniques for Fish

Milestone: Layout Design Review (Dependent on fixed printed circuit board by ME)				\$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%] Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-Electrical Tech \$75/Hr.[25%], Logic-Electrical Engineer \$100/Hr.[50%]	10/17/03	10/20/03
Printed Circuit Board Fabrication (Qty 5) (This assumes 5 day turn)	\$790.00	\$0.00		Logic-Electrical Engineer \$100/Hr.[4%] Logic-Electrical Tech \$75/Hr.[75%] Logic-Electrical Engineer \$100/Hr.[33%], Logic-Associate Electrical Engineer \$80/Hr.[33%] Logic-Sr. Electrical Eng. \$120/Hr.[20%], Logic-Electrical Engineer \$100/Hr.[60%], Logic-Software Engineer \$100/Hr.[60%]. Logic-Electrical Tech \$75/Hr.[15%], Digital Angel Engineer \$75/Hr., Digital Angel Proj. Manager \$75/Hr.[50%]	10/20/03 10/28/03	10/28/03 11/04/03
Printed Circuit Board Assembly at Logic (Qty 5 proto units)		\$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	10/29/03	11/03/03
Basic System Board Checkout	\$1,440.00	\$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	10/29/03	11/03/03
Integration and Test	\$12,886.67	\$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	12/22/03	01/05/04
Analog Front End board (10 units) Coordination w/ Mechanical Engineering	\$39,890.00 \$800.00	\$5,000.00 \$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	09/11/03 09/11/03	01/05/04 09/15/03
Milestone: Schematic Review (Digital Angel Sign-off) Component Procurement (Qty 5, \$200 components est. per board) Component placement/Footprint build	\$680.00 \$1,960.00 \$1,360.00	\$0.00 \$1,000.00 \$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	09/15/03	09/16/03
Printed Circuit Board Layout	\$2,720.00	\$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	09/16/03 09/30/03	09/30/03 10/02/03
Milestone: Layout Design Review (Dependent on fixed printed	\$790.00	\$0.00		Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%]	10/01/03	10/07/03
				Logic-Sr. Electrical Eng.	10/07/03	10/08/03

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Bonneville Corner Collector Pit Tag Detection System
[Project 1983-319-00, New Marking and Monitoring Techniques for Fish]

circuit board by ME)				\$120/Hr.[25%],Logic-Electrical Tech \$75/Hr.[25%],Logic-Electrical Engineer \$100/Hr.[50%]	10/08/03 10/13/03 10/13/03	10/13/03 10/27/03
Printed Circuit Board Fabrication (Qty 10) (This assumes 5 day turn)	\$3,200.00	\$3,000.00		Logic-Electrical Engineer \$100/Hr.[8%] Logic-Electrical Tech \$75/Hr.		
Printed Circuit Board Assembly at Logic (Qty 10 proto units)	\$6,000.00	\$0.00		Logic-Electrical Engineer \$100/Hr.[33%],Logic-Associate Electrical Engineer \$80/Hr.[33%] Logic-Sr. Electrical Eng. \$120/Hr.[40%],Logic-Software Engineer \$100/Hr., \$100/Hr., Logic-Electrical Engineer \$100/Hr.,Logic-Electrical Tech \$75/Hr.[20%]		
Basic System Board Checkout	\$1,440.00	\$0.00		Logic-Sr. Electrical Eng.		10/14/03 10/17/03
Integration and Test	\$9,240.00	\$0.00		Logic-Sr. Electrical Eng.		12/22/03 01/05/04
Analog-to-digital converter /DSP board (10 units) Electrical Design Update	\$50,210.00 \$33,090.00	\$6,500.00 \$4,000.00		Logic-Sr. Electrical Eng. \$120/Hr.[25%],Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer		09/11/03 09/11/03 09/18/03 09/15/03
Electrical Design (w/component selection) Coordination w/ Mechanical Engineering	\$4,200.00 \$800.00	\$0.00 \$0.00		Logic-Sr. Electrical Eng. \$120/Hr.[75%] Logic-Electrical Engineer \$100/Hr.[50%] Logic-Electrical Engineer		09/11/03 09/11/03
Milestone: Schematic Review (Digital/Angel Sign-off) Component Procurement (Qty 10, \$500 components est. per board) Component placement/Footprint build	\$680.00 \$5,960.00 \$1,360.00	\$0.00 \$5,000.00 \$0.00		\$100/Hr.[25%],Logic-Sr. Electrical Eng. \$120/Hr.[25%],Logic-System Engineer \$120/Hr.[25%] Logic-Associate Electrical Engineer \$80/Hr.[15%] Logic-printed circuit board Tech \$85/Hr. Logic-printed circuit board Tech \$85/Hr., Logic-Electrical Engineer \$100/Hr.[0%] Logic-Sr. Electrical Eng.		09/15/03 09/16/03 09/30/03 10/02/03
Printed Circuit Board Layout	\$2,720.00	\$0.00		Logic-Sr. Electrical Eng.		10/01/03 10/07/03
Milestone: Layout Design Review (Dependent on fixed printed circuit board by ME)	\$790.00	\$0.00		\$120/Hr.[25%],Logic-Electrical Tech \$75/Hr.[25%],Logic-Electrical Engineer		10/07/03 10/08/03

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Printed Circuit Board Fabrication (Qty 10) (This assumes 5 day turn)									10/08/03	10/13/03
Printed circuit board Assembly at Logic (Qty 10 proto units)	\$5,200.00	\$5,000.00							10/13/03	10/20/03
	\$4,500.00	\$2,250.00								
Basic System Board Checkout	\$2,880.00	\$0.00							10/14/03	10/21/03
Integration and Test (Buy 1 emulator at \$2495 each Spectrum Digital)	\$10,620.00	\$2,500.00							12/22/03	01/05/04
Software Design Refinement	\$16,400.00	\$0.00							10/27/03	12/22/03
DSP algorithm implementations	\$6,400.00	\$0.00							10/27/03	11/10/03
Antenna driver firmware	\$2,000.00	\$0.00							11/10/03	11/24/03
Detector Decoder Firmware	\$4,000.00	\$0.00							11/24/03	12/08/03
Raw data and PIT tag reader applications	\$4,000.00	\$0.00							12/08/03	12/22/03
Full system integration and Test with printed circuit board system and Power Supplies	\$30,480.00	\$0.00							01/05/04	01/30/04
antenna, electronics, power supply integration	\$12,000.00	\$3,000.00							01/05/04	01/12/04
Analog and DSP technical approach matrix evaluation for PIT tag reading	\$8,000.00	\$0.00							01/12/04	01/19/04
Performance analysis	\$7,600.00	\$0.00							01/19/04	01/26/04

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Evaluation and final report	\$0.00	\$2,880.00	Logic-System Engineer \$120/Hr.[50%],Logic-Sr. Software Eng. \$120.00/Hr.[50%]	01/26/04	01/30/04
FIELD TESTING AND EVALUATION OF HI-Q SYSTEM		\$134,650.00		01/02/04	04/02/04
System Set-up, Evaluation and Modifications	\$0.00	\$27,500.00	Digital Angel Engineering Tech. \$50/Hr.,Digital Angel Proj. Manager \$75/Hr.,Travel[3],Electronic Components \$100/ unit[50] Digital Angel Engineering Tech. \$50/Hr.[120%],Digital Angel Engineer \$75/Hr.[60%],Digital Angel Proj. Manager \$75/Hr.[120%],Travel[12] Digital Angel Engineering Tech. \$50/Hr.,Digital Angel Engineer \$75/Hr.,Digital Angel Proj. Manager \$75/Hr.,Travel[5]	01/02/04	01/23/04
Characterize Reading Matrix With Antenna Options Selected by Corps/ BPA	\$0.00	\$53,400.00	Digital Angel Engineering Tech. \$50/Hr.[120%],Digital Angel Engineer \$75/Hr.[60%],Digital Angel Proj. Manager \$75/Hr.[120%],Travel[12] Digital Angel Engineering Tech. \$50/Hr.,Digital Angel Engineer \$75/Hr.,Digital Angel Proj. Manager \$75/Hr.,Travel[5]	01/30/04	02/20/04
Test for E and H- Field System Noise Immunity for Selected Options	\$6,000.00	\$42,500.00	Digital Angel Engineer \$75/Hr.[25%],Digital Angel Proj. Manager \$75/Hr.	02/20/04	03/12/04
Prepare a report for Corps/ BPA	\$0.00	\$11,250.00	Digital Angel Engineer \$75/Hr.[25%],Digital Angel Proj. Manager \$75/Hr.	03/12/04	04/02/04
MEETING WITH Corps/ BPA IN PORTLAND (GO- NO GO)		\$13,980.00	Digital Angel Proj. Manager \$75/Hr.,Logic-Sr. Electrical Eng. \$120/Hr.,Digital Angel Engineer \$75/Hr.,Travel[3]	04/02/04	04/07/04
Phase 3- Installation and Evaluation at Bonneville		\$179,420.00		04/05/04	06/30/04
TAG		\$22,200.00		04/07/04	06/30/04
Fabricate Tag Models (Maybe in 18mm Form Factor) 3000	\$0.00	\$22,200.00	Digital Angel Proj. Manager \$75/Hr.[20%],Digital Angel Proto Tag	04/07/04	06/30/04

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 [Project 1983-319-00, New Marking and Monitoring Techniques for Fish]

		Production \$5.00/Unit[3,000]		
ANTENNA/ INSTALLATION (ASSUMES 2 SITES)	\$23,000.00	04/07/04	06/30/04	
Support Corps Antenna/ Structure Construction	\$23,000.00	\$0.00	\$75/Hr.[50%], Travel[2]	06/30/04
READER	\$42,940.00	04/07/04	06/30/04	
Systems Engineering and Reviews	\$5,760.00	04/07/04		06/30/04
Program Management, Coordination, and Reporting	\$5,760.00	04/07/04	Logic-System Engineer \$120/Hr.[10%]	06/30/04
Electrical Design Update	\$17,380.00	04/07/04		04/15/04
Minor schematic changes	\$800.00	04/07/04	Logic-Electrical Engineer \$100/Hr.[20%] Logic-Electrical Engineer \$100/Hr.[25%], Logic-Sr. Electrical Eng. \$120/Hr.[25%], Logic-System Engineer \$120/Hr.[25%]	04/14/04
Milestone: Schematic Review (Digital Angel Sign-off)	\$680.00	04/14/04		04/15/04
Software Design Refinement Third Pass	\$12,000.00	04/07/04		04/21/04
DSP algorithm implementations	\$4,000.00	04/07/04	Logic-Software Engineer \$100/Hr.[50%]	04/21/04
Antenna driver firmware	\$2,000.00	04/07/04	Logic-Software Engineer \$100/Hr.[25%]	04/21/04
Detector Decoder Firmware	\$4,000.00	04/07/04	Logic-Software Engineer \$100/Hr.[50%]	04/21/04
Raw data and PIT tag reader applications hardware/software integration	\$2,000.00	04/07/04	Logic-Software Engineer \$100/Hr.[25%]	04/21/04
	\$7,800.00	04/21/04		05/06/04
hardware/software integration and Debug w/ Power Supplies	\$6,400.00	04/21/04	Logic-Electrical Engineer \$100/Hr.[40%], Logic-Software Engineer \$100/Hr.[40%] Logic-Electrical Engineer \$100/Hr.[50%], Logic-Mechanical Engineer \$100/Hr.[50%], Logic-Electrical Tech \$75/Hr.	05/05/04
Electronics mechanical Assy. (assume Dig Angel does mechanical build)	\$1,400.00	\$0.00		05/06/04
TESTING AND EVALUATION PHASE	\$77,300.00	04/05/04	06/04/04	
Logic- Support and Documentation	\$20,400.00	\$4,000.00		05/20/04

Statement of Work - Contract 2760, Release 00009
Bonneville Corner Collector Pit Tag Detection System
(Project 1983-319-00, New Marking and Monitoring Techniques for Fish)

Field Test Support to Dig Angel at River (assume \$2000 travel expense each)	\$12,800.00	\$4,000.00	Logic-System Engineer \$120/Hr., Logic-Software Engineer \$100/Hr.	05/06/04	05/13/04
Field Test Documentation	\$3,600.00	\$0.00	Logic-System Engineer \$120/Hr.[75%]	05/13/04	05/20/04
<u>Logic-Implementation at Dam</u>	<u>\$28,000.00</u>	<u>\$0.00</u>	Digital Angel Proj. Manager \$75/Hr., Digital Angel Engineer \$75/Hr., Travel[2]	04/07/04	05/27/04
Program Management, Team Coordination, and Reporting-Field test Evaluation by Digital Angel	\$17,000.00	\$0.00	Logic-Mechanical Engineer \$100/Hr.[50%], Digital Angel Proj. Manager \$75/Hr.[50%], Subcontractor- Mech. Drafting[50%]	05/13/04	05/27/04
Minor Design Updates Prototype	\$7,000.00	\$0.00	Logic-Electrical Engineer \$100/Hr.[50%]	04/07/04	04/14/04
Mechanical Updates -- Digital Angel	\$5,000.00	\$0.00	Logic-Electrical Engineer \$100/Hr.	04/07/04	04/14/04
Electrical Schematic Fixes (if necessary)	\$2,000.00	\$0.00	Digital Angel Proj. Manager \$75/Hr.[50%], Digital Angel Engineer \$75/Hr.[20%], Travel[4]	04/07/04	04/14/04
Orcad Schematics, Gerbers for Printed Circuit Board, Assembly Drawing for Printed Circuit Board, Bill of Materials	\$4,000.00	\$0.00		04/14/04	04/21/04
Digital Angel Support	\$28,900.00	\$0.00		04/05/04	06/04/04
<u>MEETING WITH Corps/BPA TO DISCUSS PERFORMANCE AND TESTING</u>	\$13,980.00	\$0.00	Digital Angel Proj. Manager \$75/Hr., Digital Angel Engineer \$75/Hr., Logic-Sr. Electrical Eng. \$120/Hr., Travel[3]	06/07/04	06/09/04

**CONTRACT 2760, RELEASE 00009 PAYMENT TERMS AND
CONDITIONS**

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UNIT 1 — SCHEDULE

CONTRACT TYPE (7-1)
(SEP 98)(BPI 7.1.9)

This is a fixed price type contract.

SCHEDULE OF PRICES (22-51)
(SEP 98)

The contractor shall provide all supplies/services according the project schedule shown in the scope of work.

SCIENTIFIC AND TECHNICAL INFORMATION REPORTING REQUIREMENTS (14-15)
(SEP 98)(BPI 14.14.1)

- (a) The Contractor shall prepare scientific and technical information developed as a result of this contract in accordance with the required report format for publications. A 50 to 300 word abstract (summary) of the report must also be provided. The Contractor shall coordinate with the Contracting Officer's Technical Representative (COTR) for preparation and transmittal of the electronic copy of the required deliverables. Recognized electronic document interchange formats include HTML, Postscript, and PDF.
- (b) The COTR shall forward electronic form DOE F 241.1 plus two (2) paper copies of the final report to the BPA Library.

UNIT 2 — CONTRACT CLAUSES

PAYMENT AND TAXES

BASIS OF PAYMENT -- PROGRESS PAYMENTS (22-3) (SEP 98)(BPI 22.1.3)

- (a) Progress payments. BPA shall make progress payments as the work proceeds based on the stage or percentage of work accomplished. The Contractor shall furnish a breakdown of the work as a percentage of the total contract price, in such detail as required by the CO. The contractor will periodically update the progress payment schedule to reflect the actual progress of the project.
- (b) Title to all material and work covered by progress payments shall pass to BPA at the time of payment. This shall not be construed as--
 - (1) Relieving the Contractor from the sole responsibility for all work upon which payments have been made or the restoration of any damaged work; or
 - (2) Waiving the right of BPA to require the fulfillment of all of the terms of the contract.
- (c) Partial Payments. Unless otherwise specified, payment shall be made after acceptance of any portion of the work delivered or rendered for which a price is separately stated in the contract.
- (d) Final Payment. BPA shall pay the amount due the Contractor under this contract after completion and acceptance of all work and after presentation of a release of all claims against BPA arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of any assignee if the Contractor's claim to amounts payable under this contract has been assigned.

CONTRACT CEILING LIMITATION (22-7) (SEP 98)(BPI 22.1.3)

- (a) The Contractor agrees to use its best efforts to perform the work specified in the Schedule and all obligations under this contract within the contract ceiling. The contract ceiling includes all estimated costs (both direct and indirect) and any fee allowance. If this is a cost-sharing contract, the contract ceiling includes both BPA's and the Contractor's share of the cost.
- (b) Notification of CO. The Contractor shall notify the CO in writing at the first indication that the total cost for the performance of this contract, exclusive of any fee, will be either greater or substantially less than had been previously estimated.
- (c) Revised Estimate. As part of the notification, the Contractor shall provide the CO a revised estimate of the total cost of performing this contract.
- (d) Contract Ceiling.
 - (1) BPA is not obligated to reimburse the Contractor for costs incurred in excess of the contract ceiling specified in the Schedule or, if this is a cost-sharing contract, the estimated cost to BPA specified in the Schedule; and
 - (2) The Contractor is not obligated to continue performance under this contract (including actions under the Termination clause of this contract) or otherwise incur costs in excess of the contract ceiling specified in the Schedule, until the CO notifies the Contractor in writing that the contract ceiling has been increased.

- (e) No notice, communication, or representation, or from any person other than the CO, shall affect this contract's contract ceiling.
- (f) If this contract is terminated or the contract ceiling is not increased, BPA and the Contractor shall negotiate an equitable distribution of all property produced or purchased under the contract, based upon the share of costs incurred by each.

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00010
Page : 1

Vendor:
DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

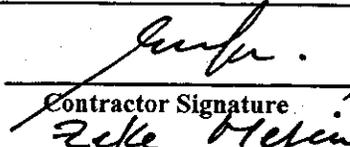
MARY F. BINGAMAN
Title: CONTRACT SPECIALIST
Phone: 230-3720
Fax :

Attn: Sean Casey

Contract Title: 1983-319-00 NEW MARKING AND MONITORING TECHNIQUES FOR FISH

Total Value : \$196,250.00
Pricing Method: COST, NO FEE
Performance Period: 06/01/03 - 09/30/03

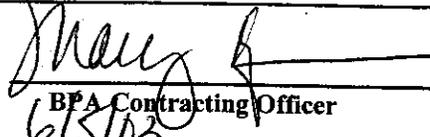
**** NOT TO EXCEED ****
Payment Terms: % Days Net 10



Contractor Signature
Zeki Hefin

Printed Name/Title
June 8/03

Date Signed



BPA Contracting Officer
6/5/03

Date Signed

Scope of Work Attached

Contract 2760, Release 010
Statement of Work, Budget, and Work Statement
PIT-TAG ENHANCEMENT STUDY
BPA Project 1983-319-00, New Marking and Monitoring Techniques for Fish

The PIT-tag enhancement study is aimed at the enhancement of the present PIT-tag while maintaining its actual size. The positive outcome of this development will enable that single detection systems may have large area of detection (larger antennas) which will help other studies such as the High Q project. Recently Digital Angel has developed the Super-12 PIT-tag, which now is in production after two years of development. This tag has provided a great improvement compared to the present PIT tag used in the river, and such improvement made it possible to have detection systems with antennas of more than 48 inches diameter. This new Super-12 tag development has opened new visions to explore the possibilities of having PIT tag detection systems with antenna sizes in the range of 15 X 15 feet area

This study will concentrate in maximizing the low magnetic field sensitivity of the PIT-tag while maintaining its existing size. Because of this challenge Digital Angel will investigate every aspect of the design (except the ASIC), which will include encapsulation and encapsulation materials, antenna core materials, wires and optimal assembly techniques for long time stability.

OBJECTIVE: Evaluate all design parameters of the PIT-tag applying new concepts to the study with the objective of maximizing its performance while maintaining the same physical size of the tag. A secondary objective but important will be the encapsulation evaluation centered in other materials such as bio-compatible plastics whose results may help future developments for bio-sensors addition to the PIT-tag.

RESULTS EXPECTED: Report that indicates the best PIT tag enhancement options including samples made manually, known as "Laboratory Prototypes".

PROJECT PERIOD: May to September 2003

BUDGET: 196,250.00

MAIN TASKS OF THE STUDY

For this study Digital Angel will use in-house and sub-contract personnel. The sub-contract personnel will be mainly for providing the necessary information of the characteristics for the materials needed with specific samples as required for the application. The sub-contractors will also deliver specific prototype molded parts or different antenna cores with different materials of investigation interest. The subcontractors will be selected on a competitive basis or sole-sourced with justification. Digital Angel personnel will do all the tests of the final assemblies including verification, changes, optimization and performance.

1. The encapsulation: Different bio-compatible plastics materials.

The encapsulation materials will play an important part of the study as an effective encapsulation technique will provide the greatest space for the electronic module assembly which is the limiting factor in the enhancement.

2. The Antenna cores: Various alloys besides ferrite types.

For the antenna cores we typically use ferrite materials, but the investigation will also include different alloys with less coercivity and greater permeability.

3. The antenna wires and winding processes.

The antenna winding techniques also play an important part and this will be studied in close correlation with the antenna cores.

4. Sealing for the encapsulation with liquid compounds, micro-flame, and laser.

The sealing of the PIT tag is also very important for the reliability. Different methods will be tested including the use of laser sealing especially for glass encapsulation.

5. Performance tests with large antennas including optimization.

The final best performing prototypes will undergo all qualifying tests of the present transponders which includes extreme and medium temperature cycles, vibration in X, Y and Z axis, shock and pressure.

6. Reliability tests: Temperature, vibration, shock, pressure and leakage.

The performance tests and optimization work will be done on large antennas of various sizes under conditions that represent the real field conditions.

Test Program				\$69,750	7/24 - 9/24					
Preliminary tests of full assembled prototypes										
Materials research Sr. Materials Eng.	40	\$100		\$4,000				\$1,000	\$2,000	\$1,000
Electrical Engineer	160	\$75		\$12,000				\$4,000	\$4,000	\$4,000
Testing: Vibration, temperature, shock, seal test, pressure. Subcontract to environmental testing company (4 weeks at \$2500)										
			\$10,000	\$10,000				\$3,000	\$4,000	\$3,000
Performance and optimization testing in large antenna array										
Electrical Engineer	250	\$75		\$18,750				\$6,250	\$6,250	\$6,250
Final report and documentation										
Electrical Engineer	200	\$75		\$15,000				\$5,000	\$5,000	\$5,000
Project Management				\$30,000	5/15 - 9/30					
Chief Technology Officer	300	\$100		\$30,000			\$6,000	\$8,000	\$8,000	\$8,000
Travel				\$16,000	5/15 - 9/30					
Includes Airfare, Car Rental, Per Diem (assume 8 trips at \$2000)										
		\$16,000		\$16,000				\$4,000	\$8,000	\$4,000
						Estimated Accruals				
						6/30/03	7/31/03	8/31/03	9/30/03	
Total Budget				\$196,250		\$196,250	\$15,000	\$100,450	\$48,750	\$31,250

POWER ADMINISTRATION

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWE-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00011
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

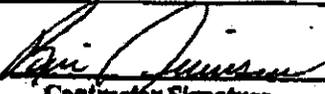
MARY F. BINGAMAN
Title: CONTRACT SPECIALIST
Phone: 230-3720
Fax :

Attn: Sean Casey

Contract Title: 2001-003-00 ADULT PIT DETECTOR INSTALLATIONS

Total Value : \$284,000.00
Pricing Method: COST, NO FEE
Performance Period: 07/01/03 - 04/30/04

** NOT TO EXCEED **
Payment Terms: t Days Net 10

	
Contractor Signature	BPA Contracting Officer
Kevin Niemi - Pres. P&I Division	7/2/03
Printed Name/Title	Date Signed
7/2/03	
Date Signed	

Scope of Work Attached

Contract 0002760
Release 011
Adult PTT Detector Installations

This release is issued in accordance with the terms and conditions of Contract 0002760 and the attached Statement of Work and Budget. In addition, the following limitations apply:

SCHEDULE OF ITEMS

SETTING THE ACCRUAL LIMITATION (SPENDING CAP) 22.101 (May 03)

With this new contract, BPA acknowledges the 10-month statement of work and budget submitted by the Contractor. The 10-month budget is \$284,000 for the period July 1, 2003, through April 30, 2004. Nevertheless, pursuant to this new contract, BPA's obligation extends only to funds authorized. BPA is authorizing funds by setting a Fiscal Year 2003 contract Spending Cap of \$172,000 for the period July 1, 2003 through September 30, 2003. BPA expects the Contractor to perform, according to the statement of work, within this FY03 Spending Cap through the period ending September 30, 2003. If the Contractor's total actual and forecasted expenditures are expected to exceed the FY03 Spending Cap before September 30, 2003, the Contractor must give notice, in writing, to the Contracting Officer for authorization for additional funds in accordance with the attached Clause, 22.100, Accrual Limitation (Spending Cap). If the notice is given prior to September 30, 2003, BPA may, but is not obligated to, authorize additional funds by increasing the amount of the FY03 Spending Cap. By October 1, 2003, BPA shall authorize additional funds by establishing a subsequent Spending Cap equal to the amount in the 12-month budget not previously distributed. Similarly, if the notice is given that a subsequent Spending Cap may be exceeded, BPA may, but is not obligated to, authorize additional funds by increasing the amount of any subsequent Spending Cap. The Contractor is not authorized to accrue expenses under the contract that exceed the FY03 Spending Cap or any subsequent Spending Cap without prior written approval of the Contracting Officer. BPA will not reimburse the Contractor for any expenditure exceeding a designated Spending Cap without prior written authorization.

22.100 ACCRUAL LIMITATION (Spending Cap)

Notwithstanding contract clause 22.7:

- (a) The Contractor agrees to use its best efforts to perform the work specified in the Schedule and all obligations under this contract within the FY03 Accrual Limitation (Spending Cap) or any subsequently established Spending Caps.
- (b) For purposes of determining if and when the:
- **FY03 Spending Cap** will be exceeded, the Contractor shall include all actual and forecasted expenditures under this contract, both direct and indirect, for the period beginning October 1, 2002 through September 30, 2003, whether or not already invoiced or paid.
 - **Subsequent Spending Cap** will be exceeded, the Contractor shall include all actual and forecasted expenditures under this contract, both direct and indirect for the period beginning October 1, 2003 through the end of the performance period, whether or not already invoiced or paid.

- (c) **Notification of CO.** The Contractor shall continuously monitor its expenditures and compare them against the FY03 Spending Cap (or any subsequent Spending Cap) to ensure the established limitation is not exceeded. The Contractor shall notify the CO, in writing, as early as possible if the sum of the actual and forecasted expenditures is expected to exceed the FY03 Spending Cap (or any subsequent Spending Cap).
- (d) **Notification Requirements:**
- **FY03 Spending Cap:** If the Contractor anticipates that the FY03 Spending Cap will be exceeded prior to September 30, 2003, as part of the notification, the Contractor shall indicate to the CO the reasons its expected expenditures will exceed the FY03 Spending Cap and the amount of the adjustment to the FY03 Spending Cap needed to continue performance through September 30, 2003.
 - **Subsequent Spending Cap:** If the Contractor anticipates that any Subsequent Spending Cap will be exceeded prior to the end of the performance period, as part of the notification, the Contractor shall indicate to the CO the reasons its expected expenditures will exceed the Subsequent Spending Cap and the amount of the adjustment to the Subsequent Spending Cap needed to continue performance through the end of the performance period.
- (e) **Accrual Limit.**
- BPA is not required to reimburse the Contractor for costs incurred in excess of the FY03 Spending Cap or any subsequent Spending Cap.
 - The Contractor is not obligated to continue performance under this contract (including actions under the Termination clause of this contract) or otherwise incur expenses in excess of the FY03 or any subsequent Spending Cap until the CO notifies the Contractor in writing that the limitation has been increased. Any costs incurred by the Contractor in excess of the FY03 or Subsequent Spending Cap are at the contractor's risk, as the costs may not be reimbursed by BPA.
- (f) Only the CO has the authority to adjust or modify the FY03 or any Subsequent Spending Cap. No notice, communication, or representation from any person, other than the CO, shall affect the limitation in this contract.

**FY2003-2004 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00011
BPA Project 2001-003-00 "Adult PIT Detector Installations"**

I. Scope of Work

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for DA to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

- A. Bonneville Dam Vertical Slot Adult PIT Detection.** DA will assist BPA and the Corps in implementing adult PIT tag detection at Bonneville Dam in the vertical slots at 2 locations (Washington Shore and Bradford Island). This detection system will allow for the possibility of detecting all adult fish passing through the Bonneville ladders and supplement or replace the existing detection system. This new detection system is expected to increase detection efficiencies. This plan is based on the following assumptions:
1. Detection systems will be installed at two locations on the Bonneville ladders.
 2. Four antennas will be used per ladder site.
 2. The antennas will be similar to those used at McNary's Oregon-shore counting window and will all be identical.
 3. There would be 2 spare antennas constructed and on site.
 4. One spare modified FS1001A would be needed and on site.
 5. The Exciter Cable will be included with the antenna.
 6. Modifications will be made by the ACOE to make each site as optimal as possible for the antenna installation in order to minimize interference and antenna loading.
 8. The antenna will meet the requirements of PSMFC and the Corps.
 9. One antenna will be pressure tested by PSMFC personnel.
 10. PSMFC will manage the actual installation of electronics under a separate contract from BPA.
 11. For purposes of this plan, a cost of \$16,000 was used for each antenna/cable assembly. This cost estimate is based on the cost of the smaller antennas that are currently in the Lower Granite and Ice Harbor Dam ladders with integrated shields, which includes the following for each antenna assembly.
 - a. Copolymer Antenna Housing \$5,000
 - b. Aluminum Shield Assembly \$4,600
 - c. Potting Compound \$4,900
 - d. Connector/Cable Assembly \$600
 - e. Shipping Container \$500
 - f. Shipping \$400
 12. DA will obtain approval of antenna design drawings from the Corps of Engineers prior to ordering the antenna/cable assembly.
 13. At this time it is not possible to determine the exact location of the antenna installations and when sites will be dewatered and available for installation. Included are pre-construction, post-construction, and final site visits. The schedule will be updated if necessary when this information is available.

14. The order in which the antennas are produced may also be changed to reflect dewatering schedules. It is important that these schedules be finalized as soon as possible to insure timely deliveries. The estimated design and production lead time is 4-6 months after contract is issued.
15. Due to the large dimensions of the antenna, modifications to the receive circuitry in the FS1001A reader will be necessary.
16. Antenna cost includes shipping.
17. Accruals assume the commitment to purchase the readers and antennas per schedule and 50% down for advance material purchases.
18. Budget and schedule assume Corps of Engineers fulfills their obligations to BPA under the Corp/BPA PIT-tag Funding Agreement, which states that the Corps is responsible for all infrastructure design and construction work. In the event that the Corps is unable to perform the work necessary to complete construction, the BPA Project Manager will notify DA to stop work on this contract.
19. Contract is issued by July 11, 2003. Delays beyond this date impact ability to procure materials with long lead-times, which could cause a budget increase for expediting.
20. DA may use a subcontractor to perform some of the work within this statement of work.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's Project Manager, Kim Fodrea. Additionally, coordination with the Corps of Engineers and Pacific States Marine Fisheries Commission will be required.

BPA Project Manager
Kim Fodrea
kafodrea@bpa.gov
(503) 230-3702
PO Box 3621 KEWR-4
Portland, OR 97208-3621

Changes to the contractual statement of work, including scope, schedule, and budget will be coordinated with the BPA Contracting Officer.

III. Project Schedule

A detailed schedule for this work is included in Figure 1. The performance period for this contract release is 1 July 2003 through 30 April 2004.

IV. Budget

The total estimated cost of this work is \$284,000 with FY03 accruals estimated at \$172,000 and FY04 accruals estimated at \$112,000. A detailed cost estimate is included in the attached schedule. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

Figure 1. Task-level Cost Estimate and Schedule.

<u>Task/Deliverables</u>	<u>Labor (Hrs)</u>	<u>Rate</u>	<u>Materials</u>	<u>Qty</u>	<u>Cost/Unit</u>	<u>Subtotal</u>	<u>Schedule</u>
Pit Tag Transceiver (FS1001A with modifications)				9	\$6,000	\$54,000	1/1/2004
Antenna and Integrated Shield/Connector/Cable (5 per ladder, includes 1 spare) (Part #s Bonn Ant 9 and Bonn Ant 11)				10	\$16,000	\$160,000	1/1/2004
FS1001A/Antenna Engineering							7/14/2003-4/30/2004
Antenna Design, FS1001A Modifications, System Test and Integration.							7/15/2003-8/31/2003
Engineer	160	\$75				\$12,000	
Technician	160	\$50				\$8,000	
Materials for 2 Antenna Designs Aluminum/Wire/Wood Forms			\$1,500	2		\$3,000	7/15/2003-8/31/2003
Antenna Model Fabrication							7/15/2003-8/31/2003
Technician	300	\$50				\$15,000	
Travel (Airfare, Parking, Per Design Coordination Meetings Site Visits)				3	\$2,000	\$6,000	7/15/2003-8/31/2003
				4	\$2,000	\$8,000	1/1/2004-2/28/2004
Site Surveys, Installation Support							
Engineer	80	\$75				\$6,000	1/1/2004-2/28/2004
Project Management and ACOE Coordination	160	75				\$12,000	7/14/2003-4/30/2004
Total Funded by This Contract Release						\$284,000	\$284,000

Figure 2. Task-level Monthly Accrual Estimates.

Task/Deliverables	Estimated Accrual Schedule									
	7/31/2003	8/31/2003	9/30/2003	10/31/2003	11/30/03	12/31/2003	1/31/2004	2/28/2004	3/31/2004	4/30/2004
FX Tag Transceiver (FS1001A with modifications)						\$54,000				
Antenna and Integrated Shield/Connectors/Cable (1x per ladder, includes 1 spare) (Part #s from Ant. 9 and from Ant. 11)		\$40,000	\$40,000			\$40,000				
FS1001A/Antenna Engineering										
Antenna Design, FS1001A Modifications, System Test and Integration										
Engineer	\$9,000	\$3,000								
Technician	\$2,000	\$4,000	\$2,000							
Materials for 2 Antenna Designs Aluminum/Wire/Wood Forms		\$3,000								
Antenna Model Fabrication										
Engineering Technician	\$7,500	\$7,500								
Travel (Airfare, Parking, Per Diem) Design Coordination Meetings Site Visits	\$3,000	\$3,000		\$2,000		\$2,000	\$2,000	\$2,000		
Site Surveys, Installation Support		\$1,000	\$1,000		\$1,000	\$1,000	\$1,000	\$1,000		
Engineer										
Project Management and ACOR Coordination	\$2,000	\$2,000	\$2,000		\$2,000				\$2,000	\$2,000
Total	\$21,500	\$63,900	\$85,000	\$2,000	\$3,000	\$97,000	\$3,000	\$3,000	\$2,000	\$2,000
Accrual by Fiscal Year	FY03: \$172,000		FY04: \$112,000							

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00011
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

DAVID B. THATCHER
Title: CONTRACT SPECIALIST
Phone: 503-230-3457
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 2001-003-00 ADULT PIT DETECTOR INSTALLATIONS

Total Value : \$396,000.00
Pricing Method: COST, NO FEE
Performance Period: 07/01/03 - 04/30/04

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

_____ Contractor Signature	<u>Vasilia Plizoni</u> BPA Contracting Officer
_____ Printed Name/Title	<u>6/8/03</u> Date Signed
_____ Date Signed	

Contract Amendments

Title : UNILATERAL AMENDMENT TO ADD REMAINING BALANCE
Amendment: 001
Amended Performance Period: -
Amendment Value: \$112,000.00
Pricing Method :

Master Agreement 2760-Release 11
Project No. 2001-003-00 – Adult Pit Detector Installations
Amendment No. 001

This contract is hereby amended as follows:

- Pursuant to Contract Clause at 22.101 – Setting the Accrual Limitation (Spending Cap), this amendment adds the remaining contract balance of **\$112,000** for the budget/performance period of **October 1, 2003** through **April 30, 2004**.

The Statement of Work, budget, work schedule and all other terms and conditions remain the same.

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

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Page : 1

Vendor:

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490 VILLAUME AVE
S ST PAUL MN 55075

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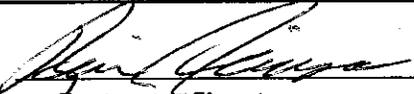
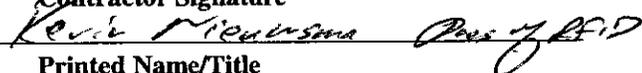
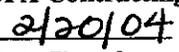
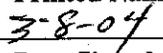
KRISTI J. VAN LEUVEN
Title: SUPERVISORY CONTRACT
Phone: (503) 230-3605
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: 2001-003-00 ADULT PIT DETECTOR INSTALLATIONS

Total Value : \$396,000.00
Pricing Method: COST, NO FEE
Performance Period: 07/01/03 - 04/30/05

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

 _____ Contractor Signature	 _____ BPA Contracting Officer
 _____ Printed Name/Title	 _____ Date Signed
 _____ Date Signed	

Title : SCHEDULE MODIFICATION CONTR 2760-11 PROJ 2001-003-00
Amendment: 002
Amended Performance Period: 07/01/03 - 04/30/05
Amendment Value:
Pricing Method : FIRM FIXED PRICE

Scope of Work Attached

FY2003-2004 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00011
BPA Project 2001-003-00 "Adult PIT Detector Installations"

I. Scope of Work

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for DA to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

A. Bonneville Dam Vertical Slot Adult PIT Detection. DA will assist BPA and the Corps in implementing adult PIT tag detection at Bonneville Dam in the vertical slots at 2 locations (Washington Shore and Bradford Island). This detection system will allow for the possibility of detecting all adult fish passing through the Bonneville ladders and supplement or replace the existing detection system. This new detection system is expected to increase detection efficiencies. This plan is based on the following assumptions:

1. Detection systems will be installed at two locations on the Bonneville ladders.
2. Four antennas will be used per ladder site.
2. The antennas will be similar to those used at McNary's Oregon-shore counting window and will all be identical.
3. There would be 2 spare antennas constructed and on site.
4. One spare modified FS1001A would be needed and on site.
5. The Exciter Cable will be included with the antenna.
6. Modifications will be made by the ACOE to make each site as optimal as possible for the antenna installation in order to minimize interference and antenna loading.
8. The antenna will meet the requirements of PSMFC and the Corps.
9. One antenna will be pressure tested by PSMFC personnel.
10. PSMFC will manage the actual installation of electronics under a separate contract from BPA.
11. For purposes of this plan, a cost of \$16,000 was used for each antenna/cable assembly. This cost estimate is based on the cost of the smaller antennas that are currently in the Lower Granite and Ice Harbor Dam ladders with integrated shields, which includes the following for each antenna assembly.
 - a. Copolymer Antenna Housing \$5,000
 - b. Aluminum Shield Assembly \$4,600
 - c. Potting Compound \$4,900
 - d. Connector/Cable Assembly \$600
 - e. Shipping Container \$500
 - f. Shipping \$400
12. DA will obtain approval of antenna design drawings from the Corps of Engineers prior to ordering the antenna/cable assembly.
13. At this time it is not possible to determine the exact location of the antenna installations and when sites will be dewatered and available for installation. Included are pre-construction, post-construction, and final site visits. The schedule will be updated if necessary when this information is available.

14. The order in which the antennas are produced may also be changed to reflect dewatering schedules. It is important that these schedules be finalized as soon as possible to insure timely deliveries. The estimated design and production lead time is 4-6 months after contract is issued.
15. Due to the large dimensions of the antenna, modifications to the receive circuitry in the FS1001A reader will be necessary.
16. Antenna cost includes shipping.
17. Accruals assume the commitment to purchase the readers and antennas per schedule and 50% down for advance material purchases.
18. Budget and schedule assume Corps of Engineers fulfills their obligations to BPA under the Corp/BPA PIT-tag Funding Agreement, which states that the Corps is responsible for all infrastructure design and construction work. In the event that the Corps is unable to perform the work necessary to complete construction, the BPA Project Manager will notify DA to stop work on this contract.
19. Contract is issued by July 11, 2003. Delays beyond this date impact ability to procure materials with long lead-times, which could cause a budget increase for expediting.
20. DA may use a subcontractor to perform some of the work within this statement of work.

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's Project Manager, Kim Fodrea. Additionally, coordination with the Corps of Engineers and Pacific States Marine Fisheries Commission will be required.

BPA Project Manager
Kim Fodrea
kafodrea@bpa.gov
(503) 230-3702
PO Box 3621 KEWR-4
Portland, OR 97208-3621

Changes to the contractual statement of work, including scope, schedule, and budget will be coordinated with the BPA Contracting Officer.

III. Project Schedule

A detailed schedule for this work is included in Figure 1. The performance period for this contract release is 1 July 2003 through 30 April 2004.

IV. Budget

The total estimated cost of this work is \$284,000 with FY03 accruals estimated at \$172,000 and FY04 accruals estimated at \$112,000. A detailed cost estimate is included in the attached schedule. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

Figure 1. Task-level Cost Estimate and Schedule.

<u>Task/ Deliverables</u>	<u>Labor (Hrs)</u>	<u>Rate</u>	<u>Materials</u>	<u>Qty</u>	<u>Cost/ Unit</u>	<u>Subtotal</u>	<u>Schedule</u>
Pit Tag Transceiver (FS1001A with modificaitons)				9	\$6,000	\$54,000	1/1/2004
Antenna and Integrated Shield/Connector/Cable (5 per ladder, includes 1 spare) (Part #s Bonn Ant 9 and Bonn Ant 11)				10	\$16,000	\$160,000	1/1/2004
FS1001A/Antenna Engineering							7/14/2003-4/30/2004
Antenna Design, FS1001A Modifications, System Test and Integration.							7/15/2003-8/31/2003
Engineer	160	\$75				\$12,000	
Technician	160	\$50				\$8,000	
Materials for 2 Antenna Designs Aluminum/Wire/Wood Forms			\$1,500	2		\$3,000	7/15/2003-8/31/2003
Antenna Model Fabrication Technician	300	\$50				\$15,000	7/15/2003-8/31/2003
Travel (Airfare, Parking, Per Design Coordination Meetings Site Visits				3	\$2,000	\$6,000	7/15/2003-8/31/2003
				4	\$2,000	\$8,000	1/1/2004-2/28/2004
Site Surveys, Installation Support Engineer	80	\$75				\$6,000	1/1/2004-2/28/2004
Project Management and ACOE Coordination	160	75				\$12,000	7/14/2003-4/30/2004
Total Funded by This Contract Release						\$284,000	\$284,000

Figure 2. Task-level Monthly Accrual Estimates.

Task/ Deliverables	Estimated Accrual Schedule									
	7/31/2003	8/31/2003	9/30/2003	10/31/2003	11/31/03	12/31/2003	1/31/2004	2/28/2004	3/31/2003	4/30/2003
Pit Tag Transceiver (FS1001A with modificaitons)						\$54,000				
Antenna and Integrated Shield/Connector/Cable (six per ladder, includes 1 spare) (Part #s Bonn Ant 9 and Bonn Ant 11)		\$40,000	\$80,000			\$40,000				
FS1001A/Antenna Engineering										
Antenna Design, FS1001A Modifications, System Test and Integration.										
Engineer	\$9,000	\$3,000								
Technician	\$2,000	\$4,000	\$2,000							
Materials for 2 Antenna Designs Aluminum/Wire/Wood Forms		\$3,000								
Antenna Model Fabrication Engineering Technician	\$7,500	\$7,500								
Travel (Airfare, Parking, Per Diem) Design Coordination Meetings Site Visits	\$3,000	\$3,000		\$2,000		\$2,000	\$2,000	\$2,000		
Site Surveys, Installation Support Engineer		\$1,000	\$1,000		\$1,000	\$1,000	\$1,000	\$1,000		
Project Management and ACOE Coordination	\$2,000	\$2,000	\$2,000		\$2,000				\$2,000	\$2,000
Total	\$23,500	\$63,500	\$85,000	\$2,000	\$3,000	\$97,000	\$3,000	\$3,000	\$2,000	\$2,000
Accrual by Fiscal Year	FY03: \$172,000			FY04: \$112,000						

BONNEVILLE
POWER ADMINISTRATION

REQUISITION

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00012
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: (503) 230-3605
Fax : 503-230-4508

Attn: Sean Casey

Contract Title: PI 200100300 ADULT PIT DETECTOR INSTALLATIONS

Total Value : \$95,200.00
Pricing Method: ESTIMATE
Performance Period: 07/01/04 - 09/30/04

**** NOT TO EXCEED ****
Payment Terms: % Days Net 10

Contractor Signature

ZEKE MEZIA

Printed Name/Title

7/10/04

Date Signed

Kristi VanLeuven

BPA Contracting Officer

7/21/04

Date Signed

FY2004 Statement of Work
Digital Angel Corporation, Contract 00002760, Release 00012
Bonneville Dam Vertical Slot Adult PIT Detection
Project 2001-003-00 "Installation of Adult PIT Detection Systems"

I. Scope of Work

This Contract Release provides for Digital Angel Corporation (DA) to continue supporting the Bonneville Power Administration (BPA) in developing, manufacturing, and installing passive integrated transponder (PIT) tag technology for application in the federal Columbia and Snake River hydroelectric projects. More specifically, this contract calls for DA to provide technical services, including all labor, travel, and associated expenses, for the following tasks:

1. FS1001A Transciever (already in master contract)
BBA Price is \$6,000 each
2. McNary Counting Window Antenna-West
Price is \$12,000 each (includes cable and shipping-ground)
3. Engineering Support:
Travel - \$2,500/Trip (same as previous proposals)
Labor - \$75/Hour (in master contract)

II. Project Coordination

Digital Angel will coordinate all work included in this Work Order with the Bonneville Power Administration's Project Manager, Kim Fodrea. Additionally, coordination with the Corps of Engineers and Pacific States Marine Fisheries Commission will be required.

BPA Project Manager
Kim Fodrea
kafodrea@bpa.gov
(503) 230-3702
PO Box 3621 KEWR-4
Portland, OR 97208-3621

Changes to the contractual statement of work, including scope, schedule, and budget will be coordinated with the BPA Contracting Officer.

III. Project Schedule

The performance period for this contract release is 1 July 2004 through 30 September 2004.

IV. Budget

The total estimated cost of this work is **\$95,200**. Any additions to the scope of work and associated cost are subject to the approval of BPA's Project Manager and Contracting Officer.

<u>FS1001A</u>	Qty. 4	Total: \$24,000
<u>McNary Antenna-West</u>	Qty. 4	Total: \$48,000
<u>Engineering Support:</u>		
Travel (4 Trips @ \$2,500 Per Trip)	Qty. 4	Total: \$10,000
Labor		
4 Trips x 24 hours/each @\$75/Hour	Qty. 96 Hours	Total: \$7,200
Drawing Reviews-80 Hours @\$75/Hour	Qty. 80 Hours	Total: <u>\$6,000</u>
TOTAL		\$95,200

RELEASE

Mail Invoice To:

***** CONTRACT RELEASE *****

Program Analyst - KEWB-4
Bonneville Power Admin. - PBL
P. O. Box 3621
Portland OR 97208-3621

Contract : 00002760
Release : 00013
Page : 1

Vendor:

DIGITAL ANGEL CORPORATION
490 VILLAUME AVE
S ST PAUL MN 55075

Please Direct Inquiries to:

KRISTI J. VAN LEUVEN
Title: CONTRACT SPECIALIST
Phone: 503-230-3605
Fax : 503-230-4508

Attn: Zeke Mejia

Contract Title: PI PIT-TAG ENHANCEMENT STUDY: PHASE II

Total Value : \$176,500.00

Pricing Method: ESTIMATE

Performance Period: 07/01/04 - 04/30/05

** NOT TO EXCEED **

Payment Terms: % Days Net 10

Contractor Signature

Zeke Mejia
ZEKE MEJIA, Chief Tech. Officer

Printed Name/Title

Sept. 5/04

Date Signed

Kristi Van Leuven

BPA Contracting Officer

9/9/04

Date Signed



COVER SHEET ATTACHMENT

**Pit Tag Enhancement Study Phase II
Project Number 1983-319
Contract No. 2760, Release 13**

This release is issued to authorize work as detailed in the attached Statement of Work. The amount authorized for this release shall not exceed \$176,500 as provided in the attached budget. In addition, the contractor agrees to the spending cap as provided below. The period of performance of this release is from 7/1/04 thru April 30, 2005.

Along with the terms and conditions of the master contract (2760) the following terms and conditions apply to this release (13).

SPENDING CAP AMOUNT 22-105 (August 2004)

BPA acknowledges the 10-month statement of work and budget submitted by the Contractor. The 10-month budget is \$127,000 for the period 7/1/04 thru 9/30/04. BPA is also setting a Spending Cap of \$49,500 for the period October 1, 2004 through April 30, 2005. The Contractor shall not exceed the Spending Cap pursuant to clause 22.100, Spending Cap Limitation.

SPENDING CAP LIMITATION 22-100 (October, 2003)

Notwithstanding contract clause 22-7:

- (a) The Contractor agrees to use its best efforts to perform the work specified in the Schedule and all obligations under this contract within the established Spending Cap.
- (b) For purposes of determining if and when the Spending Cap will be exceeded, the Contractor shall include all actual and forecasted expenditures under this contract, both direct and indirect, for the period October 1 through September 30 of the years shown in the Schedule, whether or not already invoiced or paid.
- (c) The Contractor shall continuously monitor its expenditures to ensure the Spending Cap is not exceeded. The Contractor shall notify the CO, in writing, as early as possible if the sum of the actual and forecasted expenditures is expected to exceed the Spending Cap. The Contractor shall indicate to the CO the reasons its expected expenditures will exceed the Spending Cap and the amount of the adjustment to the Spending Cap needed to continue performance through September 30.
- (d) BPA is not required to reimburse the Contractor for costs incurred in excess of the Spending Cap. Any costs incurred by the Contractor in excess of the



COVER SHEET ATTACHMENT

Spending Cap are at the contractor's risk. The Contractor is not obligated to continue performance under this contract (including actions under the Termination clause of this contract) or otherwise incur expenses in excess of the Spending Cap until the CO notifies the Contractor in writing that the Spending Cap has been increased.

- (e) Only the CO has the authority to adjust or modify the Spending Cap. No notice, communication, or representation from any person, other than the CO, shall affect the limitation in this contract.

Attachments to this Release:
Statement of Work
Budget

PROJECT: PIT- TAG ENHANCEMENT STUDY: PHASE II

OBJECTIVE:

Primary. To convert the present interim tag in manufacture (glass encapsulated) for this year to the technology used in the super-12 tag which is the unitary core technology. The unitary core technology provides automation in manufacture with its dedicated machine and at the same time will optimize the antenna design for expected better performance and general reliability.

Secondary. To convert the present interim tag to a larger size which may be plastic encapsulated in the future. This secondary project is only for evaluation and is to check the merit of this tag format, which may give better performance. For testing this tag will be housed in a larger glass.

RESULTS EXPECTED:

Milestone 1. October 2004: Hand manufactured samples for all three types, provided the unitary cores are compatible to the super-12 technology.

Milestone 2. March 2005: 5,000 pieces of the best performance tag that can be manufactured in the super 12 machine.

PROJECT PERIOD: July 2004 to April 2005.

PROJECT RISKS: Some ferrite core suppliers may not have the technology presently used in the super-12 tag. New materials and suppliers present a great risk in manufacturing.

FUNDING REQUESTED: \$ 176,000.00

EXECUTIVE SUMMARY:

The initial Tag Enhancement Project: Phase I, which was initiated last year, had as its **main objective** to maximize the performance of the tag while maintaining the same physical size. **The secondary objective** was to evaluate plastic encapsulation materials which may help in the future for bio-sensors addition to the PIT-tag.

The main objective achievement gave as a result a better performance tag which in turns enabled the High Flow project to meet the tag detection requirement. This new transponder called interim tag is in the initial pre-production phase at this time. The manufacturing process is semi-automated, not in the technology of the super-12 which is fully automated assembly.

This continuation in development of the Tag Enhancement Project called Phase II, has a **primary objective to convert the interim tag to the technology of the super-12,** this will maximize the antenna sensitivity and can be produced automated in its dedicated custom machine. The secondary objective is to convert the interim tag to a larger

Budget with schedule and monthly accruals

Estimated accruals

Task	Hrs	Rate	\$	Matl	Sub-total	Total	Schedule	7/31/2004	8/30/2004	9/31/2004	10/30/2004	11/31/2004	12/31/2004	1/1/2005
Unitary Core Design.						\$26,500	7/04-8/04							
Mechanical design for two types														
Mechanical Eng.	120	\$75			\$9,000			\$6,000	\$3,000					
Analysis of Materials & Supplier														
Electrical Engineer	100	\$75			\$7,500			\$4,500	\$3,000					
Sr. Material Eng.	100	\$100			\$10,000			\$4,000	\$6,000					
Prototype mold manufacture						\$60,000	7/04-9/04							
Supplier 1 - Two model				\$20,000					\$10,000	\$10,000				
Supplier 2- Two model				\$20,000					\$10,000	\$10,000				
Supplier 3- Two model				\$20,000	\$60,000				\$10,000	\$10,000				
Antenna Winding						\$5,000	9/04-10/04							
Sub-contract					\$5,000				\$2,000	\$3,000				
Assemble first prototype Tags						\$10,000	9/04-11/04							
Sub-contract					\$10,000				\$3,500	\$6,500				
S-12 Machine Changes						\$20,000	10/04-11/04							
Sub-contract					\$20,000					\$10,000	\$10,000			
Testing						\$17,000	09/04-11/04							
At manufacturing														
Electrical Engineer	100	\$75			\$7,500				\$3,500	\$4,000				
At DA office large antennas	120	\$75			\$9,500				\$6,500	\$3,000				
Summary report						\$6,000	07/04-01/05							
Electrical Eng.	80	\$75			\$6,000									\$6,000
Project Management						\$20,000								
Chief Technology Officer	200	\$100			\$20,000			\$4,000	\$4,000	\$7,000	\$1,000	\$1,000	\$1,000	\$2,000
Travel						\$12,000								
Incl: Airfare, Car rental, per diem					\$12,000			\$2,000	\$3,000	\$5,000	\$2,000			
TOTAL						\$176,500		\$20,500	\$49,000	\$57,500	\$16,000	\$24,500	\$1,000	\$8,000

FY04 Cost: \$127,000

FY05 Cost: \$ 49,500