

From: DudleyDevices@aol.com [<mailto:DudleyDevices@aol.com>]

Sent: Tuesday, July 28, 2015 12:01 PM

To: Elizabeth Ingram

Subject: Revisit the Automatic Index Test Box for Kaplan turbines

Dear Ms. Ingram,

Perhaps you would like to revisit a new technology that was [first introduced in Hydro Review in 1987](#) and see how it has fared since then. I was assigned to work on the Index Test Box (ITB) project at Woodward Governor Company in 1984 when George Mittendorf, then Woodward's hydro engineering manager gave me a copy of [Lee Sheldon's 1982 article on Kaplan index testing](#) and said, "Make something that does this."

After a year-long initial development phase the first set of [field-test data was evaluated by Lee](#); no one at Woodward knew anything about index testing so because Lee's article was the recipe used, he was contacted to evaluate the test results. At that time Lee was working at Bonneville Power Administration (BPA) as a hydropower specialist. Lee said my ITB appeared to work properly and persuaded BPA managers to buy one from Woodward for further study by DOE. Woodward got a [U.S. Patent](#) to protect this new technology, and the patent attorneys put my name on it because I was the only person who knew how it worked.

Because the ITB was designed as an accessory to Woodward's new digital electronic 3-D cams, BPA's first plan was to [test the ITB at Bonneville Dam](#) because in 1980 18 of Woodward's new 3-D cams had been installed on the turbines there. Unbeknown to us, the USACE Hydro Design Center (HDC) had designed and deployed their own 3-D cam system, supplanting the Woodward 3-D cams at Bonneville using a local startup company named "Seawell," so HDC declined the offer of new equipment from Woodward.

BPA's second ITB field test was moved to PGE's Bull Run Dam in 1986. This test was completely successful, as stated in the [unbiased report by Gary Hackett](#), then the senior engineer at Portland General Electric who worked with Lee on the tests. Here's what Gary said in his report:

In summary, we feel the evaluation proved that the Woodward Index Test Box provides an accurate, relatively simple alternative to conventional methods of completing index tests on Kaplan Turbines.

BPA offered to buy ITBs for every USACE powerplant on the Columbia River in a project that would include new governors, digital, electronic 3-D cams and ITBs for all of the USACE's large Kaplans on the Columbia River in a project estimated at \$30-million worth of new business to Woodward.

HDC personnel declined this FREE equipment from BPA and started their own project to make an automatic Kaplan optimizer within HDC using DOD funds, presumably so they could steer that \$30-million project to another company in which they had a vested interest. A few years later HDC's [Automatic Kaplan Optimizer test data](#) was given to Lee to evaluate and see if it would garner the same level of funding for a project to deploy it as a substitute for my ITB. HDC's Kaplan optimizer didn't work, so the answer was, "No."

Because the government didn't buy into the ITB in 1988, Woodward managers shelved it and forgot about it. Woodward's hydro division faltered, failed and was sold to GE for \$1 because of this and other blunders and missed opportunities that had rendered the hydro division unprofitable. Had the ITB project been successful, Woodward would still have a hydro division. At the suggestion of Lee, I quit my day-job at Woodward to

startup the Actuation Test Equipment Company to resurrect the ITB project as my own enterprise. A few years later when I approached them for a partnership, much to my chagrin Woodward (and then later, GE) used their Patent (with my name on it) to block me from entering the market with threats of lawsuits. I quit talking about it and hoped they'd forget to renew the patent after its 17-year lifespan ran out. They did: GE let the patent expire in 2003.

Second-Generation ITB Purchase by USACE

As a result of their familiarity with my earlier success with the ITB in 1986 (and my name on the expired patent), HDC contacted me to acquire the ITB technology. HDC wanted to own the proven Kaplan turbine index testing device with a legacy to the original, successful device from 1988. Lee was working at HDC again in 2003 as a rehired annuitant tasked with index testing all of the Corps' large Kaplan turbines on the Columbia River as part of the Endangered Species Act Fish Mortality Lawsuit* in Portland Federal Court.

***Note on the Lawsuit**

In 1998, the 5 Native American tribes that depend on fishing in the Columbia River and a host of Environmentalist agencies (Save our Wild Salmon, National Wildlife Federation, Sierra Club, etc.) joined together in an Endangered Species Act Lawsuit in the Portland, Oregon Federal Court with the Federal Hydropower agencies as the defendants. This lawsuit is still going on, costing a billion dollars a year in the process.

Rod Wittinger, then HDC's senior mechanical engineer, said he had watched the ITB fall into disuse at Woodward and then later how it was neglected by GE Global Systems until the patent expired. The week after the patent expired (bringing the ITB technology into the public domain) Rod moved to capture the ITB for HDC; he wanted to acquire the ITB design information so HDC would own the technology. I told HDC that the Actuation Test Equipment Company was a startup to take the ITB forward as my own enterprise and refused to give up the design information while at the same time offering to sell any number of ITBs to the government at deeply discounted volume prices. When HDC insisted that they must have the source code for the ITB software due to government security regulations, I offered to sell the Software Source Code to HDC for \$750,000, but with restrictions that they had to tell everyone where they got it and that their copy could only be used in the Columbia River Basin to work on the fish mortality problem. Over the next 18 months we negotiated to a contract with provisions to protect my proprietary Intellectual Property rights and allow HDC to acquire a usable form of the ITB.

Difficult Contract Negotiations

My objective in the negotiations was to retain intellectual property rights for the pre-developed software source code that I had been working on for 11 years since I quit my job at Woodward in 1992 so it could be taken forward as a commercial product while providing it to the government as a usable tool for index testing turbines to help with the fish mortality problem.

George Williams was the first USACE Contracting Officer's Representative (COR). For 6-months, every contract version George sent to me had "grabbers" in it that would take the source code, so I rejected them all. When he complained of this, saying that he was doing me a favor – he was writing the Contract so that if the ITB project failed I wouldn't have to give the money back, I said that the ITB absolutely works as shown in earlier field tests in 1986, so that won't be a problem. George said, "Yeah, if they let you make it work." When I ask him who "they" are, he changed the subject.

Using two Sole Source Solicitations we arrived at a Contract between USACE and my Actuation Test Equipment Company to sell one ITB to HDC.

[2003-09-06 USACE ITB Solicitation #1 \(HDC\)](#)

[2003-09-12 USACE ITB Solicitation #2 \(HDC\)](#)

[2004-05-06 USACE Contract W9127N-04-D-0009 for Type-1 Optimizer \(Ebner\)](#)

After 6-months of negotiations with HDC, American Governor Company's (AGCo) Jerry Runyan, a co-worker from Woodward in 2006 called me asking about the sole source of supply solicitations. George Mittendorf, my boss at Woodward and mentor until he died a few years ago said not to talk to anyone about the contract negotiations, but AGCo found enough information about the ITB project to submit a false claim that AGCo personnel created the ITB at Woodward - back in the day: [2003-10-24 AGCo Claims ITB.pdf](#)

After 6-months of delay, Rod Wittinger, Senior Mechanical Engineer at HDC looked at AGCo's website. Seeing that there was no mention of index testing there, Rod told the COR that AGCo's claim was obviously a falsehood and to continue the negotiation with my ATECo.

A US Copyright and Special License Agreement secured my Intellectual Property rights in pre-developed computer source code and data analysis techniques.

[2004-04-04 ITB Software Copyright.pdf](#)

[2004-05-26 Special License Agreement.pdf](#)

Software Security Concerns

Four months into the contract performance period, HDC and I were at loggerheads over the software source code. In a secret meeting at HDC government personnel were discussing their security requirements and the ITB software source code. I was refusing to give up the Copyrighted, proprietary pre-developed software source code without first being paid the \$750,000 price that had been established with the contracting officer, and HDC would not let the ITB be connected to their GDACS control system without having the source code to the program to inspect, claiming security requirements. Neither of us would budge.

Dave Ebner, the new COR since negotiations resumed, suggested that HDC could just buy the software. There was plenty of money in the Contract to buy it and the price had been established. HDC engineer Ed Miska said that it wouldn't be necessary to pay me for the software; saying that HDC could simply have their Captive Supplier duplicate its functionality once HDC got an Index Test Box to inspect and reverse-engineer, and then the money could pay for that effort (this ultimately happened, and when I complained to [DOE IG it was ordered stopped](#)). For the remainder of the project, Ed made it his mission to get the software source code away from me without paying for it, and my primary task became keeping it away from him while still completing the project's goals. Ed's efforts in this regard made completing the project much more difficult, but it was ultimately successful.

ATECo's new ITB Kaplan data collection system was demonstrated successfully at two USACE dams on the Columbia River in 2005 and 2006: [2006-01-16 McNary Field Test \(Albright\)](#)

Rod Wittinger's Field Test report from this mid-December 2005 test at McNary says ATECo's ITB worked at detecting steady-state conditions but there were a few residual software bugs that needed to be fixed before the ITB was ready for unattended use. [2005-12-12 McNary Field Test \(Wittinger\)](#)

Dan Ramirez, Supervisor of HDC's Turbine Test Group report to the BPA Hydro Optimization Team that "The ITB interfaces well with existing Government equipment (GDACS) to collect the necessary data." [2006-01-25 HOT Meeting Minutes \(BPA\)](#). Subsequent testing at Ice Harbor Dam a month later verified the software fixes as stated in HDC's March 3, 2006 PowerPoint delivered to BPA's Hydro Optimization Team (HOT). The presentation claimed that the ITB's **"Results virtually identical to those obtained with COE data acq system"** and that the ITB was, **"ready for 'unattended automated' data collection."**

The ITB worked so well that HDC said they wanted to buy two more ITBs from ATECo as indicated in the HOT Meeting PowerPoint for use at Chief Joseph and Dworshak Dams, but were blocked by internal USACE politics from higher-ups in favor of buying something else from someone else (specifically, Automated Control Systems Incorporated ACSI).

HDC Claims Credit for developing the ITB

While I was still working to get the ITB ready for the first field test in December, 2005, BPA's [Tom Murphy](#) was distributing [a PowerPoint](#) presentation that claimed the ITB as a product of HDC's engineers and that in another PowerPoint claimed that the [ITB code resided in the GDACS platform](#).

Much later from FOIA requests it was learned that HDC engineer Ed Miska had removed my name from both of my test reports and then presented them to BPA as his own work product and that he had announced in the 2011 IEEE meeting in Chattanooga that HDC had developed the ITB instead of stating the truth that HDC bought it from ATECo.

In April, 2007, HDC [posted a job offer](#) that made this claim in writing, and then hired Computer Science Professor Bart Rylander away from Portland University to work on the software to duplicate the ITB. When FOIA requests to see all other ITB contracts, the response was that mine was the only ITB contract. [2008-01-03 FOIA Cover Letter \(no other ITB contract\).pdf](#)

Numerous subsequent FOIA requests have learned that HDC had been claiming for months that the ITB was successful, and that it was developed by government personnel. [2006-03 Pg14 ITB Code Running on GDACS.jpg](#)

This PowerPoint slide is wrong. The ITB software has only run on the IBM PC that HDC purchased from me with only one licensed copy of the software in it.

On [January 23, 2007](#), HDC told BPA Hydro Optimization Team that they were making a copy of the ITB by another name:

T1 optimizer (Exhibits 2-3)

Dan Ramirez reviewed a schematic line diagram showing the flow of data in T1, noting that HDC will no longer be using the term index test box. Instead they are looking at a stand-alone device or program that can be in the control room or elsewhere. They are planning to do software development in-house in FY 07 for MCN for a box to collect data and monitor for steady state. In FY 08, they will work on creating cam curves with all the data that's coming in. The first step is to collect the data; the controlling box will be a different unit.

HDC will tell you that government engineers developed the ITB (later renamed GBO) technology in-house or it was developed at government expense on another contract, but they are still having trouble making it work.

Why is it then that my ITB could be successfully demonstrated by Lee in 1986 at Bull Run Dam and again in December of 2005 at McNary Dam, and again by Dan Ramirez in February of 2006 at Ice Harbor Dam, as stated by Gary Hackett of PGE, and Rod Wittinger and Dan Ramirez of HDC in their reports that I got by FOIA requests, yet they cannot duplicate that success since then with their own test equipment?

I would like to publicize the ITB technology and present some of this history in your magazine in order to get the truth out about it and bring the ITB into the market, but HDC's claims that this automatic Kaplan index testing technology originated with government engineers has blocked me at every turn; Hydro is a small world, and word gets around.

I don't want to write an article of Corps bashing, but I wanted you to know how a newcomer to the hydro industry gets treated by the established "big-guys." An article in Hydro Review about the evolution of the Index Test Box and its utility value would certainly help the situation.

Sincerely yours,

Douglas Albright

Actuation Test Equipment