

KEITH SMITH

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POLLUTION CONTROL HEARINGS BOARD  
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION and  
CITIZENS AGAINST SEA-TAC EXPANSION,

Appellants,

v.

DEPARTMENT OF ECOLOGY and  
THE PORT OF SEATTLE,

Respondents.

No. PCHB 01-160

PRE-FILED DIRECT TESTIMONY OF  
KEITH SMITH

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1           1.       I have personal knowledge of the facts stated in this testimony and would be competent  
2 to testify to those facts.

3           2.       Summary and Overview of Testimony.   The Port's sampling of stormwater discharges  
4 comply with the Port's NPDES permit. The Port's NPDES Permit is a BMP-based permit;  
5 consequently, the purpose of the stormwater monitoring undertaken by the Port is to determine the  
6 effectiveness of the BMPs, not necessarily to determine compliance with numeric water quality  
7 standards. Ecology has consistently stated that implementation and monitoring of BMPs is what is  
8 necessary to comply with the permit.

9           3.       Because sampling and monitoring is done to assess compliance with BMPs, most of the  
10 sampling locations are upstream of the receiving waters and, in many instances, upstream of treatment  
11 that takes place prior to discharge. As a result, sampling results collected for the NPDES permit are not  
12 indicative of the water quality of the stormwater as it enters the receiving waters. Contrary to the  
13 contentions of ACC's consultants, there is currently no data from NPDES permit sampling to support a  
14 conclusion that the Port is discharging water that violates numeric water quality standards when it enters  
15 receiving waters.

16           4.       The Port's annual stormwater reports show that the Port's stormwater discharges are  
17 consistently "cleaner" in most instances than typical urban stormwater. The reasons for this are (1) the  
18 Port has more control over surfaces that generate stormwater than is typical in urban settings; and (2) the  
19 sampling points for many discharges are upstream of treatment that helps reduce contaminants prior to  
20 discharge.

21           5.       Preliminary data obtained from screening studies undertaken as part of the water effects  
22 ratio study show that there are no metals problems at the point where SDN1 discharges into receiving  
23 waters (Miller Creek at the Lake Reba outlet). ACC's assertions of metals problems are not supportable  
24 by the actual monitoring data. This may be due to the fact that ACC has relied on data that is not  
25 reflective of in-stream sampling.

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1           6.       The Port does not engage in heavy use of de-icing chemicals, apart from one or two days  
2 each winter. The Port has installed many BMPs specifically to address the increased biological oxygen  
3 demand created by the use of deicers.

4           Each of these points is explained in more detail below.

5           7.       Resume and Experience. I am currently employed as the Water Resource Manager for  
6 the Port of Seattle where my job responsibilities include the development and management of a  
7 comprehensive water resources management program for Seattle-Tacoma International Airport. This  
8 program includes stormwater, industrial wastewater, erosion and sediment control, NPDES permit  
9 compliance, basin planning, and, to a lesser extent, public water supply and sanitary sewer. I coordinate  
10 the airport's water team, and provide general oversight and supervision to the listed activities. I was the  
11 lead Port staff on the development of the Comprehensive Stormwater Management Plan ("SMP"), and  
12 am also working closely with the Port's Project Management Group to develop a program to implement  
13 the SMP. I have twenty years experience in water management, including stormwater management,  
14 water quality management, water supply, and planning. I have a B.S. in Geology and an M.S. in Water  
15 Resources Management from the University of Wisconsin, and I am a Registered Professional Geologist  
16 in Florida. A copy of my professional resume is attached as Exhibit A to this declaration.

17           8.       Involvement With Project. One of my professional responsibilities is to act as liaison  
18 between the Port of Seattle and the Washington State Department of Ecology with respect to the Port's  
19 NPDES permit. An associated duty is my responsibility for the preparation of the Port's annual  
20 Stormwater Monitoring Reports. As was noted above, I am lead Port staff on the development and  
21 implementation of the SMP. I also provide oversight and supervision for the Port's NPDES activities,  
22 including compliance, reporting, and developing strategies for applications for modifications, renewals,  
23 negotiations, etc.

24           9.       Materials Reviewed. I have reviewed and am familiar with the SMP, the Low  
25 Streamflow Analysis and the Summer Low Flow Impact Offset Facility Proposal prepared for the STIA  
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1 projects, the Port's NPDES permit and the §401 Certification issued by the Department of Ecology. I  
2 have also reviewed the declarations and pre-filed testimony submitted on behalf of the ACC by Peter  
3 Willing, John Strand, Greg Wingard, and William Rozeboom.

4 10. Purpose of Pre-Filed Testimony. This testimony provides my views on issues associated  
5 with the §401 Certification issued by the Washington Department of Ecology for U. S. Army Corps of  
6 Engineers Public Notice 1996-4-02325, which includes construction of a new third runway and other  
7 improvements for which a §404 permit is needed from the Army Corps of Engineers.

8 11. Stormwater Sampling Under the Port's NPDES Permit. Sampling of stormwater  
9 discharges by the Port is conducted in accordance with the requirements of the Port's NPDES permit.  
10 The NPDES Permit is a BMP-based permit, i.e., there are no effluent limitations on stormwater  
11 discharges. As a result, the purpose of the stormwater monitoring undertaken by the Port for the  
12 purpose of the NPDES permit is to determine the effectiveness of the BMPs, not necessarily to  
13 determine compliance with numeric water quality standards.

14 12. Monitoring Under the NPDES Permit. Officials at the Department of Ecology have  
15 consistently stated that, because the Port's NPDES permit is a BMP-based permit (as opposed to an  
16 effluent-limitations permit) the implementation of the required BMPs and the monitoring of those BMPs  
17 is what is required to comply with that permit. It is significant that the current monitoring and reporting  
18 regime for the Port's NPDES permit is the result of a negotiated settlement between Ecology and the  
19 Port in which Appellant Citizens Against Sea-Tac Expansion ("CASE") also participated, based on an  
20 appeal of the NPDES permit brought by CASE. The settlement of CASE's appeal resulted in Ecology  
21 issuing a minor modification to the NPDES permit, reflecting revisions to the monitoring requirements  
22 for BMPs.

23 13. Sampling Locations and Conclusions That Can Be Drawn From Sampling Data.

24 Consistent with the purpose of the stormwater sampling under the Port's NPDES permit, most of the  
25 sampling locations for the Port's stormwater discharges are upstream of the point where those  
26

1 discharges enter receiving waters. In addition, treatment occurs downstream of the sampling locations  
2 in many basins (viz., vegetated channels). Where this occurs, samples taken above these treatment  
3 facilities are not indicative of the water quality of the stormwater as it enters the receiving waters after  
4 having been subjected to that treatment.

5 14. Violations of Water Quality Criteria Are Based on Data from Receiving Water, Which Is  
6 Not What Is Produced by the Monitoring Required by the Port's NPDES Permit. The Port's NPDES  
7 permit does not require in-stream sampling. The water quality criteria contained in WAC 173-201A are  
8 applicable to in-stream (receiving waters). Based on this discrepancy, the data reflected in the Port's  
9 stormwater monitoring reports does not support the conclusion that water quality violations exist, let  
10 alone a "history of water quality violations" as was asserted by Peter Willing.

11 15. There is No Evidence In the Port's NPDES Monitoring Reports That the Port is Violating  
12 Water Quality Criteria. Assertions by Dr. Willing or Dr. Strand that the Port is violating water quality  
13 criteria are either based on incomplete data or data that was not collected in the receiving waters and  
14 therefore does not supply a valid bases for such a conclusion. There is currently no data in the NPDES  
15 monitoring reports to support the conclusion that the Port is discharging water that violates water quality  
16 standards when it enters the receiving waters. The monitoring data cited by Dr. Strand or Dr. Willing  
17 was either collected upstream of receiving waters and BMPs that are specifically employed to reduce  
18 pollutants in the water ultimately discharged to the receiving waters, or contains water from non-Port  
19 sources.

20 16. There Is No Lack of Stormwater Sampling Data. Dr. Willing asserts (§ 36) that the Port  
21 and Ecology have manipulated data in order to preclude an assessment of whether the Port is compliance  
22 with water quality criteria. This is incorrect. The Port's stormwater monitoring data is statistically  
23 summarized in annual reports, but all of the data collected by the Port is included in the appendices to  
24 those reports, as well as being reported to Ecology on an annual basis as required by the permit. In  
25 addition, discharge monitoring reports are periodically filed with Ecology as required by the permit. Mr.  
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1 Wingard also makes an inaccurate assertion that the Port is in violation of its NPDES permit based on  
2 his claim that the Port is not reporting construction discharge data in its annual reports. (Wingard, ¶ 8)  
3 In fact, the sections of the permit cited by Mr. Wingard (§§S.2.a and S.3.e) refer to operational  
4 stormwater discharges, not construction discharges. As was noted above, because the NPDES permit is  
5 a BMP-based permit, the monitoring is designed to assess the effectiveness of those BMPs, and not for  
6 the purpose of assessing compliance with water quality criteria.

7 17. The Port's Stormwater Discharges Are Cleaner than Typical Urban Stormwater. Dr.  
8 Willing asserts at p. 23 of his direct testimony that pollutant levels in the Port's stormwater are "high."  
9 This assertion is flawed in two respects. First, it is a subjective and relative judgment, that is, Dr.  
10 Willing is attempting to draw a comparison to some unstated norm against which he claims the pollutant  
11 levels are "high." Secondly, and more important is the fact that the Port's annual stormwater reports  
12 show that the Port's stormwater discharges are consistently "cleaner" in most respects than typical urban  
13 stormwater. There are two reasons for this difference: (1) the Port has more control over the surfaces  
14 that generally generate stormwater runoff, and exercises more significant management of those surfaces  
15 than typically happens in urban settings. (*See, e.g., 2001 Annual Stormwater Monitoring Report,*  
16 *Executive Summary, ¶2; Port of Seattle's Stormwater Pollution Prevention Plan*); (2) many sampling  
17 points for the Port's stormwater discharges are upstream of treatment (vegetated channels). As a result,  
18 the data is not representative of discharge into receiving waters.

19 18. The Hardness Data Reported by the Port In its Annual Stormwater Reports Is an Accurate  
20 Reflection of Conditions at the Airport. Dr. Willing correctly notes that water quality standards for  
21 metals criteria are "hardness-dependent." *See* Willing Testimony, ¶42. Dr. Willing is incorrect,  
22 however, in his assertion that "the prevailing practice of not reporting concurrent hardness values"  
23 precludes Ecology from having reasonable assurance, asserting that the increase in hardness data from  
24 24 mg/l to 56 mg/l "has the effect of lowering the acute water quality criteria."  
25  
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1           19.     The hardness value of 56mg/l used in the 2000 Annual Stormwater Report was the  
2 median of seven instream sample results from flow-weighted composites at each of four instream  
3 sampling locations, one each above and below principal Port discharges sampled during the winter of  
4 1998-1999. Dr. Willing incorrectly asserts that the “underlying data from Miller and Des Moines Creek  
5 were not made available.” In footnote (f) to Table 4, the 2000 Annual Report makes reference to the  
6 fact that the hardness value of 56 mg/l was the median of instream samples collected in 1999. The 1999  
7 Annual Report reported these data in Table 8, page 33. The 56 mg/l hardness value was used in the  
8 2000 Annual Report because it represented more recent data, and the data was obtained at locations  
9 proximal to the Port’s principal discharges.

10           20.     Dr. Willing also claims that the 56 mg/l hardness value “is an atypical high value and is  
11 therefore not conservative.” (¶42). Here again, Dr. Willing’s conclusion is at odds with the data  
12 reported in the report he cites (the 2000 Annual Stormwater Monitoring Report), and also is entirely at  
13 odds with the most recent data collected for the site specific analysis. The data used to calculate the  
14 median of 56 mg/l ranged from a low of 41mg/l to a high of 74mg/l and the median represents this range  
15 without high bias. In addition, more recent data shows instream hardness values well above 56 mg/l.  
16 The sampling done recently for the site specific water effects ratio reflects a range of 24 to 101 mg/l  
17 during up to 5 events (more than 80 total discrete samples) at the Miller and Des Moines Creek stations  
18 proximal to Port stormwater discharges. Baseflow hardness in both creeks proximal to the Port’s  
19 stormwater outfalls has ranged from 87 to 105 and 160 to 175 mg/l for Des Moines and Miller Creeks,  
20 respectively.

21           21.     Dr. Willing and Dr. Strand Assert Conclusions That Are Not Supported by the Data. For  
22 example, the stormwater discharge denominated SDN1 (cited by Dr. Willing at p. 23 of his testimony) is  
23 located upstream of several hundred feet of vegetated channels and a constructed stormwater detention  
24 facility (Lake Reba). As a result of this fact, much of the stormwater treatment that is applied to  
25 stormwater discharges from this outfall takes place downstream of the sampling location. In response to  
26

1 Condition J.2.a of the §401 Certification, the Port is conducting preliminary screening analysis of  
2 stormwater discharges as part of the preparation of a water effects ratio study. The preliminary data  
3 obtained from those samples shows that there are no metals problems at the point where the SDN1  
4 discharge enters receiving waters (Miller Creek at the Lake Reba outlet).

5 22. Similarly, Dr. Strand's contentions regarding downstream sampling done in association  
6 with WET tests are misleading. Dr. Strand states (§ 8) that sampling shows that the "influences of STIA  
7 discharges persist in the receiving waters." Dr. Strand's assertion that the Port's stormwater discharges  
8 are causing downstream metals problems is not supportable by the actual monitoring data. The annual  
9 report that Dr. Strand himself references states that "Metal concentrations were below standards at all  
10 locations sampled downstream of Port outfalls. In two cases, concentrations were lower downstream  
11 than up, indicating STIA runoff was cleaner than upstream samples." *See 1999 Annual Stormwater*  
12 *Monitoring Report* at 32.

13 23. A similar problem arises from Dr. Strand's reliance on sampling data collected at a  
14 downstream station that includes commingled runoff from the Port and the City of SeaTac (and possibly  
15 others). While such data could be used to characterize the stream at that point, inputs to those receiving  
16 waters include City of SeaTac discharges, as well as discharges from other industrial locations. As a  
17 result, they cannot be reliably used as "additional evidence of toxic metals exceedances linked to STIA  
18 stormwater discharges," based on the large component of runoff at this location that is supplied by  
19 parties other than the Port.

20 24. Conclusions Based on the Herrera Report are Speculative and Unsubstantiated. Dr.  
21 Willing relies on the report by Herrera Environmental to substantiate an assertion that the Port's  
22 stormwater discharges are responsible for metals problems in the receiving stream (Willing testimony,  
23 ¶10). What the Herrera report actually states is that the Port runoff *may* be responsible for higher copper  
24 concentrations in Des Moines Creek, and that water quality violations for zinc in the upper reaches of  
25 basin *may* be related to runoff from SeaTac airport. *See City of Des Moines Water Quality Monitoring*  
26

1 *Program, Five-Year Project Report* (Herrera Environmental Consultants, February 2001) at 54.  
2 However, the report contains no data nor quantitative analysis tying that data to any particular source,  
3 much less discharges from the airport. In other words, based on the data cited by Dr. Strand, it is  
4 impossible to point to a particular source of discharges or to conclude categorically that any particular  
5 exceedance was attributable for any of the instream metals (or other constituent) concentrations  
6 measured. Contrary to the assertions of Dr. Willing, the Port's data to date has shown overall  
7 compliance with water quality standards for dissolved copper, lead and zinc at the Lake Reba outfall, as  
8 well as at instream locations below Reba and further downstream below current construction discharges.

9 25. Use of Deicing Chemicals and the Management of Deicers. Dr. Strand's assertion (§26)  
10 that the Port has engaged in "heavy" use of deicers is inaccurate. The use of 100 gallons of deicers in  
11 one day does not constitute heavy use for an airport of this size in this climate. Similarly, Dr. Strand  
12 appropriately notes that truly "heavy" use of deicing (i.e., greater than 10,000 gallons in a single day) is  
13 limited to one to two day winter episodes. The Port has installed many BMPs to handle the biological  
14 oxygen demand ("BOD") generated by deicers. Several re-routes of stormwater runoff to the IWS have  
15 been installed in recent years specifically for the purpose of capturing deicers before they reach the  
16 creeks. The Port is also currently engaged in a multi-million dollar project to route discharge from the  
17 IWS treatment plant to the King County POTW to provide treatment for BOD caused by deicers.

18 26. IWS Improvements. Dr. Strand's statement (§29) that all of the SDS1 basin was  
19 transferred to the IWS is incorrect. Portions of the SDS1 basin were routed to IWS in 1995, 1996, and  
20 2000. The remaining portions of the SDS1 basin do not contain any industrial activities (only rooftops  
21 and parking lots remain). As a consequence of this fact, the SDS1 basin is treated as non-industrial  
22 stormwater in the application for the renewal of the Port's NPDES permit. With respect to the IWS leak  
23 detection and repair program, this program was required by Ecology under the Port's NPDES permit.  
24 Under the program, 30% of the IWS pipes were inspected, and 121 defects were found, requiring repair  
25 to about 13% of pipes. Mr. Rozeboom's assertion that the leak repairs depleted the water available for  
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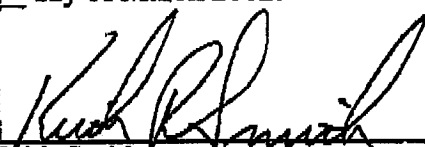
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1 impossible to link the defects that were found to potential leaks (in other words, a defect could cause  
2 leak into the system, a leak out of the system, or no leak at all).

3 27. Opinion. It is my opinion that there is reasonable assurance that the STIA Master Plan  
4 Update projects will not result in a violation of state water quality standards. This conclusion is based  
5 on my review of the project and the evidence of stormwater discharges collected by the Port, as well the  
6 most recent sampling undertaken in connection with the preparation of site-specific water quality  
7 criteria, as mandated by Condition J.2.a. of the §401 Certification.

8 I declare under penalty of perjury under the laws of the state of Washington that the foregoing is  
9 true and correct.

10 Executed at Seattle, Washington, this 7<sup>th</sup> day of March 2002.

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13 Keith Smith

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## **KEITH R. SMITH, P.G.**

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### **SUMMARY OF QUALIFICATIONS**

Twenty years experience in a variety of water resource and environmental fields, including eleven years at the management/supervisory level. Areas of expertise include regulatory programs, research programs, planning, inter-agency coordination, and policy development. Technical/management experience includes water supply/water use, water quality, stormwater management, public water supply systems, wastewater, noise, land use, solid waste, hazardous waste, and capital construction programs. Extensive experience working with elected and appointed officials at local, state, and federal levels. Licensed Professional Geologist (Florida PG No. 501).

Extensive management and supervisory experience in both union and non-union environments. Managed interdisciplinary groups of up to 54 professional, technical, and administrative personnel. Participated in management teams responsible for formulating and implementing policy on a wide variety of technical, administrative, and procedural issues. Worked directly with federal, state, and local agencies on projects and programs of local, regional, and national significance. Worked with legislative committees on statewide environmental and water policy matters. Served on many state and local advisory committees. Managed and administered grants and cooperative funding programs. Extensive experience in budget development and management. Extensive experience in contract management. Book and manuscript reviewer for professional journals.

### **PROFESSIONAL EMPLOYMENT HISTORY**

#### **Port of Seattle, Seattle, Washington**

##### **Manager, Water Resources (1999 - present)**

Responsible for the development and management of a comprehensive water resources management program for Seattle-Tacoma International Airport. Responsibilities include supervising research programs, monitoring programs, regulatory requirements, construction projects, utility programs, and inter-agency coordination. Specific accomplishments include:

- Managing the Port's Water Resources team and coordinating operation of the Port's water utility programs (public water supply, sanitary sewer, industrial wastewater, and stormwater).
- Managing the Port's water resources research and monitoring programs, including water quality studies, watershed assessment studies, and other studies associated with the Port's water resources management program.
- Developing a ten-year, 150 million-dollar capital construction program to expand and retrofit the airport's stormwater management system in order to meet current regulatory standards.
- Managing the Port's participation on two watershed management committees, including funding of research/monitoring programs and the construction of water management facilities (regional detention facilities, low flow augmentation facilities, high flow bypass facilities, restoration of stream habitats, and removal of barriers to fish passage).
- Managing and negotiating regulatory requirements associated with the airport's water resources activities. Elements include an individual NPDES permit covering the airport's Industrial Wastewater Treatment Plant and stormwater discharges. Additional elements include state and federal regulatory requirements associated with the airport's eight-year, six billion-dollar Capital Improvement Plan (Clean Water Act Section 401/404 permits), and Endangered Species Act

requirements.

- Managing inter-agency coordination associated with the Port's water resources activities. Elements include managing agreements with water supply utilities and wastewater treatment facilities, and coordinating stormwater management activities with adjacent jurisdictions.
- Negotiating disputed water rights, claims, transfers, and relinquishments with the Washington Department of Ecology. Also involved in negotiating disputed utility fees with a local jurisdiction and an agreement with a regional wastewater utility to accept discharge from the airport's Industrial Wastewater Treatment Plant. Worked with Washington Water Trust to return unused water rights to instream flows.
- Managing contracts with a variety of consultants working on water resource issues, including the development and implementation of the airport's Comprehensive Stormwater Management Plan, expansion/upgrades to water supply/wastewater/stormwater infrastructure, and water resources research studies.
- Managing an emergency response team providing 24-hour coverage to Seattle-Tacoma International Airport.
- Representing the Port of Seattle and the Washington Public Ports Association on several statewide advisory committees, including the Stormwater Policy Advisory Committee and the Water Resources Advisory Committee.

#### **Thurston County, Olympia, Washington**

##### **Director, Environmental Health Division (1998-1999)**

Directed Thurston County's environmental management programs. Managed environmental regulatory programs (drinking water, wastewater, well construction, land use, solid waste, noise, food safety), and environmental resource protection programs (groundwater, surface water, water quality, water chemistry laboratory, hazardous waste, environmental education/outreach). Specific accomplishments include:

- Supervised an interdisciplinary staff of 47 professional, technical, and administrative personnel.
- Developed and managed a multi-million dollar annual budget funded by utility fees, revenues generated by divisional programs, and grants.
- Managed the county's participation on three regional watershed management committees (Nisqually River, Deschutes River, Chehalis River). Coordinated state and local funding for development and implementation of watershed management plans.
- Managed county's participation in programs to manage/restore several Puget Sound estuaries, particularly those with extensive shellfish habitats.
- Managed agreements with several state agencies governing and funding delegated regulatory programs.
- Served as Administrative Hearings Officer for appeals of environmental regulatory decisions.
- Managed rule development activities associated with environmental regulatory programs.
- Worked with the County Commission and Board of Health on policy and management issues.
- Coordinated Divisional activities with the county's Water and Waste Management Department. Elements included participating in planning and policy issues associated with operation and expansion of county-owned water supply and wastewater systems, and the development of a regional water utility to fund all water related programs and services.
- Represented the county on local and statewide advisory committees, including the Drinking Water Advisory Committee and the Groundwater Policy Advisory Committee. Chaired the Drinking Water/Legislative committee of the state Environmental Health Directors Organization.
- Managed the development of radio and television public service advertisements for environmental programs.

#### **Oregon Department of Transportation, Salem, Oregon**

##### **Manager, Geo/Hydro Services Division (1997)**

Managed a division providing hydrologic and geotechnical services to a state transportation agency.

Services included drainage design/management, bridge hydraulics/foundation design, erosion control, site assessment/remediation, and identification/response to geologic hazards. Accomplishments include:

- Managed an interdisciplinary group of 54 professional and technical personnel in four offices throughout the state (Salem, Portland, Roseburg, Bend).
- Developed and managed a multi-million dollar divisional budget.
- Initiated discussion/negotiations with Oregon Department of Environmental Quality for coverage of agency's stormwater management activities under an NPDES permit.
- Participated in inter-agency management teams developing a statewide strategy in response to the listing of numerous salmon runs as threatened or endangered.
- Developed the Geo/Hydro Division from its inception. Successfully brought together several previously distinct units into one group providing seamless technical and professional support throughout the agency.
- Participated in management teams addressing agency organization in response to changing responsibilities and priorities. Projects included redesigning internal processes and project management in order to achieve a mandated 80% reduction in project delivery time.

**South Florida Water Management District, West Palm Beach, Florida**  
**Director, Hydrogeology Division (1991-1997)**

Managed and coordinated water resources technical support for a regional water management agency. Activities included water resource assessment studies, model development and application, water quality and quantity monitoring, database services, and field support. Lines of business supported included environmental, regulatory, planning, operations, and construction. Specific accomplishments include:

- Supervised an interdisciplinary group of 29 professional, technical, and administrative personnel.
- Developed, defended, and managed a multi-million dollar budget which included funds for personnel, contracts, intergovernmental agreements, and capital projects and equipment.
- Managed contracts, grants, and intergovernmental funding agreements covering a variety of water management issues.
- Represented the District on inter-agency committees working to coordinate regional and statewide water management activities. Served on a team that developed an MOU with another state water management district to coordinate regulatory, research, and monitoring activities in the central Florida area.
- Served on Land Selection Committee, which provided direction on purchase and management of environmentally sensitive lands. Provided staff support for Utility Advisory Committee.
- Worked with other state and federal agencies on projects and programs governing water use, water quality, underground injection control, and other programs.
- Managed an individual NPDES permit covering discharge from an aquifer storage and recovery pilot project.
- Worked closely with the District's Governing Board on policy and management issues.
- Served as Technical Coordinator of the District's Water Shortage Team.
- Participated in agency management teams guiding the development and implementation of regional water management/water supply plans.
- Coordinated cooperative projects with local governments to develop pilot projects for innovative water supply and management technologies. Worked with legislative committees on statewide water policy matters.
- Served on teams revising policies/procedures on administrative issues, including the revision of the agency's contracting and procurement activities.

**Senior Supervising Hydrogeologist (1991)**



Supervised a unit responsible for water resources assessment studies and field data acquisition programs. Specific accomplishments include:

- Supervised a staff of nine professional and technical personnel.
- Responsible for planning water resource program/project requirements, including coordinating research and monitoring programs with the needs of planning, regulatory, operations, and construction groups.
- Supervised the review and editing of Technical Publications.

#### **Senior Hydrogeologist (1989 - 1991)**

Developed and applied hydrologic models to support the development of regional Water Supply/Water Management Plans, including:

- Developed various supply and demand scenarios for a twenty year planning horizon, as well as resource constraints (minimum flows and levels) to determine areas of deficit.
- Recommended management options to meet water supply demands, including development of alternative sources, changes in operating schedules of regional water management systems, construction of additional water control structures and water storage facilities, conservation, reuse, and aquifer storage and recovery.
- Developed and applied site-specific hydrologic models. Applications included estimating canal seepage in the northeast Shark River Slough area (Everglades National Park) to support design and construction of water management facilities.

#### **Staff Hydrogeologist (1986 - 1989)**

Conducted regional water resource assessment studies. Specific responsibilities include:

- Designed and supervised field data acquisition programs including an exploratory drilling program, collection and interpretation of geophysical logs and well cuttings, design and implementation of aquifer performance tests, and design and installation of monitor networks for both water levels and water quality.
- Authored Technical Publications for the dissemination of data and results from water resource studies.

#### **St. Johns River Water Management District, Palatka, Florida**

##### **Hydrologist II (1983 - 1984)**

Responsible for rule development for the agency's water resources regulatory programs. Specific accomplishments include:

- Co-authored the agency's first district-wide water use regulatory rule. Coordinated public hearings during the rule development process. Developed the required forms, databases, and administrative procedures. Co-authored Applicant's Handbook and Basis of Review for the Water Use Program.
- Managed the public education program for the water use program. Developed and coordinated technical workshops for a variety of audiences including industry representatives, engineering firms, trade groups, elected officials, and the general public.
- Participated in other rule development programs, including well construction, surface water management, and water shortage management.

##### **Hydrologist I (1981 - 1983)**

Worked in water resource regulatory programs. Specific accomplishments include:

- Reviewed applications for water use, well construction, and surface water management permits.
- Developed technical reports recommending approval or denial of applications for Governing Board

action. Projects reviewed included agricultural uses, public water supplies, and industrial uses.

#### **EDUCATION**

- M.S., Water Resources Management, University of Wisconsin - Madison
- B.S. (Honors), Geology (Geography minor), University of Wisconsin - Oshkosh

#### **REGISTRATIONS AND AFFILIATIONS**

- Florida Professional Geologist No. 501
- American Water Resources Association (national and local chapters)
- Book and manuscript reviewer for *Journal of Ground Water* and *Journal of the American Water Resources Association*.

#### **PUBLICATIONS**

Yan, Jiansheng, Keith R. Smith, Robert M. Greenwald, P. Srinivansan, and David S. Ward, 1998. A Modular Ground Water Modeling System. In *GIS in Natural Resource Management: Balancing the Technical-Political Equation*, High Mountain Press, Stan Martin, Editor.

Yan, Jiansheng, Keith R. Smith, Robert M. Greenwald, P. Srinivansan, and David S. Ward, 1995. A Modular Ground Water Modeling System (GWZOOM): 1. Concept and System. *Advances in Model Use and Development - Proceedings of 1995 AWRA Annual Conference and Symposium*.

Yan, Jiansheng, Keith R. Smith, 1995. A Modular Ground Water Modeling System (GWZOOM): 2. System Implementation. *Advances in Model Use and Development for Water Resources - Proceedings of 1995 AWRA Annual Conference and Symposium*.

Yan, Jiansheng and Keith R. Smith, 1994. Simulation of Integrated Surface Water and Groundwater Systems-Model Formulation. *Water Resources Bulletin*, Vol. 30, No. 5.

Yan, Jiansheng and Keith R. Smith, 1993. GIS Application in Ground Water Model Development. *Proceedings of the 3rd International Workshop on Geographic Information Systems*, Vol. 1.

Smith, Keith R., 1990. A Three-Dimensional Groundwater Flow Model of Hendry County, Florida. *South Florida Water Management District Technical Publication No. 90-08*.

Smith, Keith R., and Karin M. Adams, 1988. A Groundwater Resource Assessment of Hendry County, Florida. *South Florida Water Management District Technical Publication No. 88-12*.

Smith, Keith R. and others. An Assessment of the Floridan Aquifer System in Brevard County, Florida, November 1988. *South Florida Water Management District Technical Memorandum*.

Smith, Keith R., Timothy S. Sharp, and George S. Shih, March 1988. Investigation of Water Use, Land Use, and the Groundwater Monitoring Network in Hendry County, Florida. *South Florida Water Management District Technical Memorandum*.

Multiple Authors, March 1985. Black Earth Creek: A Watershed Study With Management Options. *University of Wisconsin-Madison Institute for Environmental Studies Report No. IES 129*.