ORIGINAL

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, and THE PORT OF SEATTLE, Respondents.	PCHB No. 01-160 PORT OF SEATTLE'S MEMORANDUM IN OPPOSITION TO ACC'S MOTION FOR SUMMARY JUDGMENT REGARDING THE ABSENCE OF A WATER RIGHT FOR THIRD RUNWAY § 401 CERTIFICATION **ORAL ARGUMENT REQUESTED**

The Port of Seattle's (Port) NPDES permit and 401 Certification require it to collect, detain, treat, and slowly release stormwater generated at the Master Plan Update (MPU) project area to mitigate impacts that would otherwise occur to area streams, including impacts to stream flows and water quality. Appellant Airport Communities Coalition (ACC) argues that the Port must obtain a water right before it can comply with these conditions. Specifically, ACC argues that the Port must obtain a water right because the required stormwater management is not "typical." ACC's Motion for Partial Summary Judgment (ACC Brief) at 11. ACC's position is unsupported by stormwater regulations, the water code or other relevant law. While stormwater discharges have been comprehensively regulated in this state since at least 1987, a water right has never been required to manage stormwater in Washington or anywhere else. Applicable law and sound environmental policy demand that ACC's position be rejected, and that summary judgment be granted in favor of the Port on this issue.

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I. FACTUAL BACKGROUND

A. Effects of Development on Stormwater.

The natural hydrologic cycle is disturbed when undeveloped land is replaced with impervious surfaces. Declaration of Paul Fendt (Fendt Dec.), ¶5 (Attachment 1). When rain falls on these surfaces, it runs off the ground rather than seeping into it, a process referred to as infiltration. *Id.* The rainwater then moves directly to surface water bodies, causing three distinct effects. *Id.*, ¶6.

First, stormwater runoff flows directly to surface water, where the increased water volumes and velocity can erode stream banks and damage stream channels. *Id.* These are known as peak flow effects. Second, because the rainwater runs off immediately after a storm, it does not infiltrate the ground and recharge groundwater. *Id.* Thus, groundwater levels are reduced, and groundwater seepage to surface water decreases. Consequently, stream levels may drop during the dry summer months, causing low flow effects. Finally, contaminants in the rainwater will not be removed during the normal filtering process, causing water quality effects. *Id.*

The Port's Master Plan Update (MPU) projects are no exception to these phenomena. Construction of the Third Runway and other projects associated with the MPU will result in significant amounts of new impervious surface. *Id.*, ¶ *10.* Unless these effects are mitigated, this new impervious surface could cause problems with water quality, peak flows, and low flows. *Id.*, ¶ *9-10.*

B. Applicable Requirements of the Port's NPDES Permits/401 Certification.

The 401 Certification imposes several conditions designed to prevent these stormwater impacts. First, it requires the Port to comply with two water quality permits: the NPDES General Stormwater Permit for Construction Activity #SO3-00491, which the Department of Ecology (Ecology) issued on April 4, 2001; and NPDES Permit No. WA-002465-1, which Ecology issued to the Port on February 20, 1998 and modified on May 29, 2001. *See* Attachment 2. Second, sections H, I, J, and K of the 401 Certification require the Port to meet additional conditions, including compliance with a Comprehensive Stormwater Management Plan and an integrated plan for mitigation of low flow impacts.

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The Port's NPDES permit requires it to select and implement Best Management Practices (BMPs) described in approved stormwater management manuals. *See* Exhibit G to Declaration of Paul S. Fendt (submitted in support of Port of Seattle's Memorandum Opposing ACC's Motion for Stay), condition S12.B.5. Both Ecology and King County have adopted stormwater manuals. Fendt Dec., ¶ 7-8. These manuals list a menu of BMPs designed to protect water quality and "reduce hydrologic disruption" by controlling the rate at which runoff is released. *Id.* BMPs for both peak and low flows consist of delaying stormwater so it is released to surface water at approximately the same time and rate as it would have been released before development occurred. *Id., ¶ 6.*

The stormwater manuals describe specific techniques and technologies that can be used to achieve these goals. For flow control, the manuals strongly encourage infiltration because it most closely resembles natural conditions, where stormwater moves through soils and recharges groundwater, eventually discharging to surface water. *Id., ¶ 24-25.* However, infiltration cannot be used at some facilities where, for example, soils do not drain well. *Id.* Where infiltration is not possible, the stormwater manuals require the delay and controlled release of stormwater collected in detention facilities, such as ponds or underground vaults. *Id.*

C. How the Port Plans to Meet These Stormwater Requirements.

As explained in detail in paragraphs 11-21 of the Fendt Declaration, the Port will infiltrate stormwater wherever soil conditions and other site constraints allow. Elsewhere, the Port will collect stormwater in catch basins, which will convey the stormwater to detention ponds and vaults. Stormwater will be released from these detention facilities vaults at carefully prescribed rates to mitigate for peak flow and low flow impacts.[1] For peak flow impacts, stormwater will be detained for up to three months. Approximately 9% of the total volume of detained stormwater will be stored several additional months, and released during the dry months to mitigate for low flow impacts.

[1] The attached Declaration of Donald E. Weitkamp (Attachment 3) describes the affected streams and their biological characteristics and provides his opinion that the stormwater management system required of the Port, including the treatment methods and high and low flow mitigation efforts, provide "reasonable assurance that the Master Plan Update projects will not cause significant adverse impact to fish and aquatic biota." Weitkamp Dec., ¶ 19.

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II. LEGAL ARGUMENT

A. Standard for Summary Judgment.

The Port agrees with ACC's recitation of the legal standard governing summary judgment. Since there are no genuine issues of material fact, and the issue is purely one of law, the Board should resolve this matter on summary judgment. This brief demonstrates that no water right is required to implement the stormwater management plan required by the 401 Certification. The Port is therefore entitled to summary judgment in its favor on this issue. *See, e.g., In re Matter of Appeals from Water Rights Decisions of the Department of Ecology*, PCHB Nos. 96-8 *et al.* (Order on Motions for Summary Judgment) (July 17, 1996) at 2 (where there were no genuine issues of material fact, Board granted summary judgment to non-moving party who prevailed on the law).

B. The PCHB Lacks Authority to Review Ecology's Decision that a Water Right Permit is Not Required.

ACC's motion should be denied because the Board lacks jurisdiction to decide whether a water right is required to implement the low flow mitigation plan required by the 401 Certification. As an administrative tribunal, the Board is vested with only those specific powers conferred by statute. *Okanogan Wilderness League, Inc. v. Twisp*, 133 Wn.2d 769, 788, 947 P.2d 732 (1997); *Inland Foundry v. Spokane County Air Pollution Control Auth.*, 98 Wn. App. 121, 124, 989 P.2d 102 (1999). The legislature has granted the Board authority to review permits, penalties, and other regulatory orders issued by Ecology. RCW 43.21B.110(1); RCW 90.48.260. The Board does not have jurisdiction, however, to determine whether Ecology should require a water right. *Peterson v. Department of Ecology*, PCHB No. 77-15, at 6 (1977) (PCHB lacks original jurisdiction to determine whether a water right shall issue).

ACC contends that the 401 Certification fails to require the Port to obtain a water right to implement the Port's low flow mitigation plan. Notably, the 401 Certification is silent on the issue of water rights. Thus, there is no "regulatory order" or "permit" currently pending to give the Board jurisdiction over whether a water right should be required. ACC's contention is, therefore, either that Ecology failed to enforce the water code, or that Ecology failed to act on the water rights issue. In

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either case, the Board has no jurisdiction to rule. Whether an agency properly exercises its discretion to enforce a statute is not subject to review. *See Heckler v. Chaney*, 470 U.S. 821, 831 (1985) (agency decisions not to enforce statutes are presumed to be unreviewable) (Attachment 4) and *National Electrical Contractors Ass'n v. Riveland*, 138 Wn.2d 9, 30 (1999) (decisions associated with exercising enforcement powers are discretionary and unreviewable, citing *Heckler*).

Furthermore, the Board lacks jurisdiction to hear a claim that Ecology failed to act. *Weyerhaeuser v. Tacoma Pierce County Health Department*, PCHB 99-067 Order on Motions to Dismiss, ¶ XX (September 23, 1999) (failure to revoke solid waste permit); *Ortman v. Ecology*, PCHB 99-115 (Order Granting Summary Judgment and Dismissal) (Feb. 15, 2000) (failure to act on NPDES permit application).[2] Such claims can be reviewed only in Superior Court. *See Hillis v. Department of Ecology*, 131 Wn.2d 373, 381 (1997) (failure to process a water right application construed as a "failure to act" claim under APA). Accordingly, under the limited jurisdiction granted the Board pursuant to RCW 43.21.110, the Board lacks jurisdiction to resolve this issue.

Even if the Board were to consider the water rights question for the limited purpose of making a "tentative determination" regarding the need for such a right,[3] the Board should give substantial weight to Ecology's decision that a water right is not required. Ecology is the agency to which the legislature has given the responsibility for considering the legal and policy issues raised by the water code's requirement that water rights be obtained. As the Board noted in its stay order, whether a water right is required for implementation of the Port's stormwater management plan is an issue of first impression. The Superior Court is responsible for determining finally, not merely tentatively, whether a water right is required under Washington law. In that forum, Ecology's decisions are reviewed under a more deferential standard than the *de novo* standard typically applied by the

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[2] In an analogous line of cases the Shorelines Hearings Board has similarly been deemed to lack jurisdiction to hear appeals of a local government decision not to require a shoreline permit. *Putnam v. Carroll*, 13 Wn. App. 201, 204-5, 534 P.2d 132 (1975); *Wells v. Whatcom County*, SHB N0. 98-054 (1998). *Cf. Carkeek v. Seattle*, 53 Wn. App. 277, 280 (mandamus action cannot lie to compel exercise of agency discretion to enforce Land Use Code).

[3] *See Rettkowski v. Department of Ecology,* 122 Wn.2d 219, 227-30 (1993); *Public Util. Dist. No. 1 of Pend Oreille County v. Department of Ecology,* PCHB Nos. 97-177, 98-043, 98-044 (Amended Summary Judgment), October 15, 1998.

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Board.[4] For that reason, the Board should use caution in deciding whether to substitute its judgment for Ecology's on the water rights question.

C. Managing Stormwater as Required by Federal and State Water Quality Laws Does Not Require a Water Right.

1. The Port's Stormwater System Consists of Facilities and Practices that are Commonly Used and are Consistent with Stormwater Regulatory Requirements.

ACC contends that the Port's management of stormwater constitutes an appropriation of water for a beneficial purpose, and therefore requires a water right permit. ACC's position is novel and, if accepted, would create an administrative nightmare. Since statehood, landowners have had both the right and the obligation to manage stormwater on their property.[5] Since 1987, the Clean Water Act has required dischargers of certain industrial and construction-related stormwater to obtain an NPDES Permit.[6] 33 U.S.C §1342(p). Yet to the Port's knowledge, a water right has never been issued or required in Washington for the management of stormwater.

Since 1994, the Port's stormwater discharges have been comprehensively regulated by its NPDES permit. The Port has constructed a sophisticated system for managing its stormwater to comply with this NPDES permit. That system consists of the collection, detention, treatment and slow release of stormwater. The major modification of its NPDES permit, and the 401 Certification under appeal here, have added additional stormwater management requirements. The proposed system, however, like the existing one, consists primarily of the collection, detention, treatment and slow release of stormwater. The underlying requirement is that stormwater discharges comply with water quality standards, including the protection of characteristic uses.

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[4] The Administrative Procedure Act (APA) provides that review of a claim that an agency failed to perform a duty required by law may be granted only if the court determines that the action is unconstitutional, outside the statutory authority of the agency, or arbitrary and capricious. RCW 34.05.570(4)(c). *See Hillis*, 131 Wn. 2d at 383. Under the APA standard of review, such decisions of Ecology are not subject to reversal absent a clear showing of abuse. *Jensen v. Department of Ecology*, 102 Wn.2d 109, 113, 685 P.2d 1068, 1070-01 (1984); *Schuh v. Department of Ecology*, 92 Wn.2d 306, 314, 596 P.2d 285 (1979).

[5] Under the common enemy doctrine, landowners may, with limited exceptions, dispose of rainwater and snowmelt on their property in any way they see fit. *E.g., Currens v. Sleek*, 138 Wn.2d 858, 861, 983 P.2d 626 (1999).

[6] This Board discussed the development of the stormwater management program in *Save Lake Sammamish v. Department of Ecology*, PCHB No. 95-141 (Order Granting Partial Summary Judgment) (June 27, 1996).

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The Port designed its proposed system in accordance with Ecology's Stormwater Management Manual for Western Washington (Ecology 2001) and King County's Surface Water Design Manual. Fendt Dec., ¶ 8. These manuals require that the predevelopment hydrologic cycle be maintained to the extent feasible. In other words, one of the basic objectives of managing stormwater is to avoid or minimize adverse impacts caused by changes in flow in area surface waters. Additions of impervious surfaces cause the twin effects of higher peak flows during the wet season, and reduced low flows during the dry season. Although early stormwater management programs focused on controlling peak flows and water quality, mitigating low flow impacts has become increasingly important. Declaration of Steven J. Swenson (Swenson Dec.), ¶ 8-10 (Attachment 4) and Declaration of Edward O'Brien ¶ 14-15 (Attachment 5). Ecology's 2001 Stormwater Manual requires that projects "employ On-site Stormwater Management BMP's to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible...to reduce hydrologic disruption of developed sites." *See* Attachment 6 at 2-25.

The stormwater management system the Port has proposed to satisfy Ecology's requirements meets this objective by collecting stormwater generated onsite and routing as much of it as possible through filter strips designed to remove pollutants. Fendt Dec., ¶ 11. From there, this stormwater will infiltrate into soils and slowly move through the soil column, eventually emerging as seeps that will flow into Miller and Walker Creeks. *Id.* The portion of stormwater that cannot be infiltrated will be routed into bioswales and then detention vaults or ponds, where it will be treated. *Id.*, ¶ 12. The detained stormwater will then be carefully released to area streams to avoid damaging high flows. *Id.*

In addition, a portion of the detained stormwater will be held for release to area streams during low flow periods. *Id.* Through state of the art hydrologic modeling, the Port identified reductions in flow that would occur in area streams during low precipitation periods. *Id.*, ¶ 14. The anticipated flow reductions are very small (stream depth reductions of less than 0.4 inches in Walker Creek and 0.1 inches in Des Moines Creek). *Id.*, ¶ 15. Less than 10% of the collected stormwater will be retained to mitigate these low flow impacts. *Id.*, ¶ 19.

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This is, without a doubt, a sophisticated stormwater management system. Certainly, the precision with which hydrologic changes have been identified and mitigation water delivered goes beyond the usual stormwater management system. However, the underlying objectives, as well as the systems and facilities to be used, are exactly the same as those used across the state. Swenson Dec., ¶ 20. Thousands of stormwater management sites operating in Washington use detention and slow release of collected stormwater. *Id.*, ¶ 8. Similarly, infiltration is common. *Id.*, ¶ 12. These systems attempt to replicate pre-development hydrologic conditions, just as the Port's does. *Id.*

To the Port's knowledge, not one of these systems has a water right, nor has Ecology ever contemplated requiring a stormwater permittee, subject to the panoply of requirements in Ecology's stormwater regulations and manuals, to also obtain a water right. Fendt Dec., ¶ 28; Swenson Dec., ¶ 21. This is not surprising. The whole point of stormwater regulations and permits is to manage precipitation that falls unavoidably onto one's property to minimize its impact, comply with water quality standards, and mimic predevelopment hydrologic conditions. As explained more fully below, what is missing from stormwater management, but is required by the water code, is a "use" of water. Managing stormwater in a manner that does not put the water to some "use" simply does not trigger the requirement for a water right. If, for example, the Port was proposing to collect its stormwater and use it for irrigation, it would need to obtain a water right.[7] But where, as here, no such use is proposed, a water right is not required. A system that merely mimics natural conditions does not "use" water.

ACC concedes that stormwater management does not require a water right, as long as it is "typical." Not surprisingly, in light of this concession, ACC argues that the stormwater management required of the Port "is not a typical stormwater detention project" because of 1) the length of time stormwater will be detained; 2) the type of treatment to be used; and 3) the "precise, prolonged and exacting release rates." ACC Brief at 11.

[7] Similarly, if the Port was proposing to use water from another water body to augment stream flows – as Battle Mountain Gold did for its mine project – it would have to obtain a water right to do so.

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ACC provides no support for its position that atypical stormwater management requires a water right, but typical stormwater management does not. ACC cites to no provision in the water code that supports this distinction, nor to any explanation as to what kind of stormwater management is typical and what is not. ACC's position also demonstrates a faulty understanding of the stormwater system required of the Port and of stormwater management in general. The attached declarations of Paul Fendt and Steve Swenson explain, in detail, why ACC's allegations that the Port's stormwater management system is atypical are without merit.

First, with regard to the duration of stormwater detention, Mr. Fendt explains that many "typical" stormwater facilities store stormwater for prolonged periods. Fendt Dec., ¶ 27-28. One such facility, a "wetpond," detains stormwater indefinitely. *Id.*, ¶ 28. Likewise, management for high flows, which ACC agrees is "typical" stormwater management, often requires lengthy detention in ponds or vaults. *Id.*, ¶ 32. Indeed, stormwater in the Miller Creek basin will be detained for three months or more after large storm events to avoid peak flow impacts, mitigation for which ACC acknowledges is part of "typical" stormwater management. *Id.*, ¶ 29-31. All of the vaults and ponds, whether detaining stormwater to avoid high flow or low flow impacts, will detain water for long periods. *Id.* As Mr. Swenson explains, "it is common for many systems to use 'wet' or 'extended detention' ponds or vaults that may result in stormwater runoff being detained for weeks or months." Swenson Dec., ¶ 18.

Second, the type of treatment being required is standard. Mr. Swenson and Mr. Fendt state that the filtering and settling required of the Port are common treatment techniques. Swenson Dec., ¶ 19; Fendt Dec., ¶ 34.

Third, ACC argues that the carefully prescribed release rates from detention facilities are abnormal. This is also incorrect, as Mr. Swenson notes that "it is not at all uncommon to design stormwater detention facilities to meet precise and exacting discharge limitations." Swenson Dec., ¶ 20.

The declarations of Mr. Fendt and Mr. Swenson make clear that the stormwater management system required of the Port uses exactly the kinds of facilities and systems used in typical

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stormwater management systems. The objectives of the Port's system are the same as for any stormwater system: to comply with water quality standards and avoid adverse impacts from hydrologic changes. Detention times, treatment methods and release rates are all within normal bounds. Therefore, even under ACC's interpretation of the water code, the Port does not need a water right to manage its stormwater.

As long as it rains in western Washington, this system will provide a reliable and permanent supply of stormwater. The Port is required, under the 401 Certification, which is also an administrative order under Ch. 90.48 RCW, to manage its stormwater in a manner that complies with water quality standards. A water right is not required nor is it necessary to ensure that this system will be implemented.

2. Management of Stormwater is Not a Beneficial Use of Water.

Throughout the water code, the legislature links the requirement to obtain a water right to the "use," "utilization," or "appropriation" of water. *See, e.g.*, RCW 90.03.010 ("all waters within the state belong to the public, and any right thereto, or to the *use* thereof, shall be hereafter acquired only by appropriation for a beneficial use and in the manner provided and not otherwise"); RCW 90.03.250 ("[a]ny person ... hereafter desiring to *appropriate* water for a beneficial use shall make an application to the department for a permit to make such appropriation, and shall not *use* or divert such waters until he has received a permit from the department"); and RCW 90.03.260 ("[e]ach application for permit to appropriate water shall set forth ... the nature and amount of the proposed *use*, ... and the time for the complete application of the water to the proposed *use*") (emphasis added).

The legislature does not consider the control of stormwater for protection of water quality and water quantity a "use" or "appropriation" of water. Rather, the legislature regards this as water "management." It drew the distinction between these two concepts in Chapter 90.54 RCW, the Water Resources Act, which provides in part as follows:

> Utilization and management of the waters of the state shall be guided by the following declaration of fundamentals:
> ...

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> 2. *Uses* of water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state, are declared to be beneficial.
>
> ...
>
> 11. Water *management* programs, including but not limited to, water quality, flood control, drainage, erosion control and storm runoff are deemed to be in the public interest.

RCW 90.54.020(11) (emphasis added). The water management programs the legislature describes in this subsection – water quality, flood control, drainage, erosion control and storm runoff – are exactly the ones the Port will undertake when it collects, detains, treats, and then releases stormwater. Furthermore, these water management programs can be carried out *only* by capturing stormwater and regulating its movement, including the time at which it is discharged to surface water. The legislature could have chosen to treat these activities as a use of water for a beneficial purpose, but it wisely chose not to.

By referring to these activities as "management" rather than "use" of water, the legislature demonstrated that it recognizes the difference between these and traditional beneficial uses. Its avoidance of the terms "use," "utilization," and "appropriation" – terms it used elsewhere in the water code when discussing the actions that trigger the need for a water right – reveals that the legislature did not intend to require a water right for water management programs.

When the legislature uses different terms in the same statutory scheme, it is presumed to do so intentionally. Furthermore, the different terms reflect a difference in legislative intent. *E.g., Simpson Investment Co. v. Department of Revenue,* 141 Wn.2d 139, 3 P.3d 741 (2000) (legislature intended different meanings for "financial business" and "financial institution" when it used them in same statute); *Cazzanigi v. General Electric Credit Corp.,* 132 Wn.2d 433, 446, 938 P.2d 819 (1997); and *Wells v. Western Washington Growth Management Hearings Bd.*, 100 Wn. App. 657, 671, 997 P.2d 405 (2000) (legislature intended different meanings for "matter" and "issue" when it used them in same statute). The legislature deliberately chose a different word, "management," to refer to the handling of stormwater. Nowhere in the water code has it used the word "management" when

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describing those activities that trigger the need for a water right permit. Accordingly, the water code does not require a water right for stormwater management.[8]

The Board stated in its stay order that while the legislature distinguished water use and water management, it did not expressly exempt water management from the requirement to obtain a water right. However, where the legislature describes two different activities – use and management – and then expressly requires a water right for one (use) while remaining silent on the other (management), the most reasonable conclusion is that it did not intend to require a water right to manage stormwater.

ACC argues that if a distinction existed between stormwater management and water use, it would be exploited by "prospective water users around the state [who] would simply install stormwater basins to obtain unregulated water for irrigation, industrial and other purposes." ACC Brief at 12. ACC's argument is unfounded. The legislature has recognized that managing stormwater to control its water quality and stream flow impacts does not require a water right. It has not authorized the use of stormwater for any other purpose. If stormwater were captured and used for some purpose other than mitigating its impacts – for example, if a farmer used stormwater for irrigation – that usage would clearly require a water right. But there is no such proposal here. The Port merely intends to comply with the terms of its NPDES permit and the 401 Certification.

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[8] The legislature has provided further support for this conclusion by acquiescing in Ecology's interpretation that stormwater management does not require a water right. As explained above, if ACC's interpretation of the law were correct, Ecology would need to issue a water right permit to every person who manages stormwater in this state. However, Ecology has never issued such a permit, nor required anybody to seek one. Moreover, the legislature does not seem at all troubled by this, as it likely would be if Ecology and stormwater dischargers had been disregarding the law for years. The only reasonable conclusion to be drawn from the legislature's acquiescence is that it never intended to require water rights for stormwater management.

The legislature is presumed to be aware that Ecology has been interpreting the water code *not* to require a water right permit for stormwater management. This interpretation is long-standing, and despite having had numerous opportunities to change or clarify the law, the legislature has taken no action on this issue. Its failure to do so amounts to acquiescence in the prevailing interpretation of the law. *E.g., In re Sehome Park Care Center, Inc.*, 127 Wn.2d 774, 780, 903 P.2d 443 (1995) (court accords great weight to contemporaneous construction of statute by agency charged with its enforcement, especially when the legislature has silently acquiesced in that interpretation over a long period).

Although the legislature has not changed the water code to require water right permits for stormwater management, it has recently amended the code in other respects. For example, see RCW 90.03.255 (enacted 1996 and amended 1997) and RCW 90.03.265 (enacted 2000). This is particularly strong evidence that the legislature approves of Ecology's interpretation that the water code does not require a water right to manage stormwater. *E.g., Green River Community College v. Higher Education Personnel Board*, 95 Wn.2d 108, 118, 622 P.2d 826 (1980) (agency interpretation is even more persuasive if legislature amends statute in some other particular without disturbing the administrative interpretation); and *Colasurdo v. Waldt*, 49 Wn. App. 257, 262, 752 P.2d 920 (1987) (same).

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3. Applying the Water Code to Stormwater Management Would Make No Sense and Serve No Purpose.

A close look at the criteria in the water code helps to explain why the legislature chose not to require a water right for stormwater management. Two of the four criteria considered when issuing a water right – availability and impairment – make no sense applied to stormwater management. Moreover, issuance of a water right for such management would not further the central purpose of the permitting system, which is to protect senior rights.

Ecology can issue a water right permit only if it determines that water is "available." *See* RCW 90.03.290. Ordinarily, this requires an assessment of the quantity of unappropriated water in a surface water body or aquifer. When the water subject to the permit is all the rainfall that falls on a facility, however, it would be meaningless to ask whether water is physically available, because the answer will always be yes.

RCW 90.03.260 requires an applicant for a water right to set forth the "nature and *amount* of the proposed use" of water. (Emphasis added). Ecology then determines whether water is available in the amount requested, and, if so, it issues a permit "stating the *amount* of water to which the applicant shall be entitled." *See* RCW 90.03.290 (emphasis added). The quantity of water is relevant not only during the application process, but also when determining the extent of any water right actually granted. *See Department of Ecology v. Grimes*, 121 Wn.2d 459, 468, 852 P.2d 1044 (1993).

It is impossible to predict the amount of rain that will fall and consequently impossible to quantify the total amount of water that will be "used" in stormwater management. Therefore, the Port or any other stormwater manager required to apply for a water right would have no basis for quantifying the amount of water sought.[9] The amount of stormwater to be managed is the amount that falls from the sky. Since it is not possible to accurately quantify the amount, the Port would simply have to choose an arbitrary figure, and hope that actual rainfall did not exceed that number.[10]

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[9] ACC contends that the Port quantified the amount of water that would be permitted when it calculated the water necessary for low flow mitigation. The quantity of water authorized for use under the water right, however, would not equal the amount of water needed to mitigate low flow impacts. As explained below in Section II.B.4, if a water right were required it would have to be for the total quantity of stormwater that is managed. This is obviously a much larger and much less predictable amount than the quantity of water necessary to mitigate low flow impacts.

[10] ACC has also argued that the water code allows annual variability in the amount of water used. The code provides that a water right will not necessarily be relinquished if a portion of it is temporarily unused. *See* RCW 90.14.160.

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Whatever number was selected would bear little or no relationship to the amount actually managed in a given year. Requiring a water right when it is impossible to predict the amount of water to be "used" is at odds with one of the principal objectives of the water rights permitting system, which is to quantify water rights so the total amount of water subject to valid rights is known.

Before issuing a water right Ecology also must determine that the "*appropriation* thereof ... will not impair existing rights." RCW 90.03.290 (emphasis added). Stormwater management systems are mitigation measures, however, that do not appropriate water. Instead, they serve to replicate natural conditions that may be affected by development activities. As explained above, impervious surfaces and other alterations of natural conditions disrupt the normal hydrologic cycle. These disruptions include reducing base flows, which could impair existing rights.

Stormwater management systems are designed in part to mitigate this consequence of development, by routing stormwater so it reaches streams at the same time and in the same amounts it would have absent the development. In other words, by design stormwater management systems do not cause impairment. They prevent it.[11]

Finally, the "first in time, first in right" principle could not be enforced against a person managing stormwater. This principle is the foundation of the prior appropriation system. *See* A. Dan Tarlock, Law of Water Rights and Resources at §5:15 (Release #12, 7/00) ("The essence of a priority system is that prior rights are superior to subsequent ones") (Attachment 7). However, there is no way to enforce priorities of water rights as between a person managing stormwater and a senior water right holder. This is because stormwater *must* be collected, detained, treated, and released at specific times to comply with water quality laws.

However, nothing in the code allows a person to use *more* water than is permitted. Since the Port could only guess at the amount of rain that would fall from year to year, the actual rainfall during some future year would very likely exceed the permitted amount. Under ACC's theory, the Port would not be allowed to manage this extra amount in heavy precipitation years. This illustrates the absurdity of applying the water permitting criteria to stormwater management.

[11] ACC argues that a water right would prevent impairment "by others" of the instream flows in Des Moines, Miller and Walker Creeks. ACC Brief at 9. The Port does not understand how a water right obtained by the Port could have any effect on actions others might take after stormwater is released to these streams.

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4. If a Water Right Permit is Required for this Project, One Will Be Required for All Projects that Manage Stormwater.

In an attempt to limit the adverse precedential effect of its position, ACC argues that "typical" stormwater management is not a beneficial use of water and does not require a water right. ACC's position on this issue is inconsistent with its argument that the Port's project requires a water right. No doubt ACC recognizes that requiring a water right for all stormwater management would lead to disastrous results, and therefore it claims that "typical" stormwater management projects do not make "beneficial uses" of water. In doing so, ACC draws a distinction where none exists. Since all stormwater management involves the collection or diversion of stormwater for purposes deemed beneficial by the water code, ACC's arguments would require that a water right be obtained for any type of stormwater management, whether or not low flow impacts were addressed.

The phrase "beneficial use," just like the term "appropriate," is a term of art under the Water Code. The legislature has defined "beneficial use" at least twice, using expansive language both times. RCW 90.14.031(2) defines the term this way:

> "Beneficial use" shall *include, but not be limited to,* use for domestic water, irrigation, fish, shellfish, game and other aquatic life, municipal, recreation, industrial water, generation of electric power, and navigation.

(Emphasis added). The definition in RCW 90.54.020(1) is similar:

> Uses of water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, *and all other uses compatible with the enjoyment of the public waters of the state*, are declared to be beneficial.

(Emphasis added). Both of these definitions enumerate specific uses that have been deemed beneficial. However, they make very clear that other uses not listed in the statute also qualify as beneficial. This approach is consistent with that of other western states, which have found that beneficial use is an "evolving concept." *See* 2 R. Beck, Water and Water Rights at 12-27 (2000 ed.) (Attachment 9); *see also Neubert v. Yakima-Tieton Irr. Dist.*, 117 Wn.2d 232, 814 P.2d 199 (1991) (acknowledging that frost protection is a beneficial use, although not expressly mentioned in the water

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code) and *Knight v. Ecology*, PCHB Nos. 94-61 et al. (Final Findings of Fact, Conclusions of Law and Order) (April 16, 1995) at 9 (suggesting that fire fighting is a beneficial use, although not expressly mentioned in the water code).

All of the objectives the Port will meet by managing its stormwater are "beneficial uses" under state law. As explained above, those "uses" are protection of water quality, prevention of peak flows, and prevention of low flows. Each of these has been expressly recognized, either in Washington or other western states, as a beneficial use of water. *See, e.g.,* Nev. Rev. Stat. § 533.437 (authorizing appropriation of water "to avoid the pollution or contamination of a water source") (Attachment 10), cited in 2 R. Beck, Water and Water Rights at 12-23 n. 102 (Attachment 9); *Pueblo West Metro. Dist. v. Southeastern Colorado Water Conservancy Dist.*, 689 P.2d 594, 603 (Colo. 1984) (flood control is beneficial use) (Attachment 11); and RCW 90.54.020(1) (fish and wildlife maintenance and preservation of environmental and aesthetic values are beneficial uses).

Although none of the Port's "uses" of stormwater is specifically enumerated in state statute, each of them supports "fish, shellfish, game and other aquatic life" and promotes "fish and wildlife maintenance and enhancement" by keeping the water clean and its levels neither too high nor too low. *See* RCW 90.14.031(2) and 90.54.020(1). By preventing flooding, low flows, and pollution, stormwater management also helps ensure "preservation of environmental and aesthetic values." *See* RCW 90.54.020(1). In addition, the protection of water quality, avoidance of floods, and maintenance of minimum stream flows are "compatible with the enjoyment of the public waters of the state," the standard in RCW 90.54.020(1) for recognizing other, unnamed uses as beneficial. Therefore, all three objectives of the Port's stormwater management plan constitute "beneficial uses."

The consequences of requiring water right permits of all persons who manage stormwater would be devastating. According to Ecology's website, there were 7040 applications for water right permits and/or changes pending at the end of 2000. (Attachment 12). Since ACC's argument would add to that number everything from large developments, such as shopping centers and office parks, to small subdevelopments, the number of water rights applications would increase absurdly. Under ACC's proposal, while applicants waited for Ecology to make permitting decisions, precipitation

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falling on existing impervious surfaces would go unmanaged, which would undoubtedly create flooding, erosion, and water quality problems, as well as countless violation of stormwater permits. Proposed projects could not be constructed until a water right issued, virtually stopping new construction. The Board should not assume that the legislature intended such a result, especially given the definitions of "use" and "management" discussed above.

5. This Board's Prior Cases Do Not Require the Port to Obtain a Water Right to Manage Its Stormwater.

ACC also argues, incorrectly, that prior rulings by this Board require the Port to obtain a water right to manage stormwater to protect aquatic resources. All of these earlier Board decisions involve proposals to withdraw groundwater for an undisputed beneficial use. In each case, the applicant proposed mitigation for the impact of its water use, and these mitigation proposals were the subject of these decisions. *See L.G. Design, Inc. v. Ecology*, PCHB Nos. 96-20 and 96-25 (1997); *Auburn School District v. Ecology*, PCHB No. 96-91 (1996); *Black River Quarry v. Ecology*, PCHB No. 96-56 (1996); and *Manke Lumber Co. v. Ecology*, PCHB No. 96-102 (1996). In citing these cases, ACC confuses two very different issues: first, whether an applicant for a consumptive water right can claim mitigation credit for water "saved" from vegetation loss, septic recharge, or capture of stormwater runoff; and second, whether stormwater management requires a water right. The Board rulings that ACC cites address only the first of these two issues. This case, however, presents only the second issue.

In each case cited by ACC, the Board ruled that no mitigation credit could be claimed because the applicant was not offering any new water to mitigate for the amount to be withdrawn. With regard to stormwater runoff, for example, the Board wrote that if the applicant had not created new impervious surfaces the stormwater would "naturally recharge the system and benefit the base flows of streams. No credit is merited nor authorized under the Water Code for returning to nature what originally belonged to it." *See Black River Quarry, Inc. v. Ecology*, PCHB No. 96-56 (Final Findings of Fact, Conclusions of Law and Order) (Nov. 15, 1996).

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Here, the question is not whether the Port may claim mitigation credit for stormwater that runs off impervious surfaces. The question is whether the Port's management of stormwater pursuant to the terms of its NPDES permit and 401 Certification requires a water right in the first place. The Board cases that ACC relies upon would be relevant only if (a) the Port were proposing to use water for a beneficial use, (b) its proposed water usage impaired other users, and (c) it proposed to use stormwater as mitigation water for this impairment. Since the Port is not proposing a use of water, the cases ACC cites are not pertinent.

ACC also cites the Board's decision in *Okanogan Highlands Alliance v. Ecology*, PCHB Nos. 97-146 *et al.* (Summary Judgment on Stipulated Issues Nos. 20, 21 and 22) (Oct. 23, 1998). There, the Board considered whether the project proponent, Battle Mountain Gold Company (BMG), needed a water right to appropriate water from a pit lake filled with inflowing groundwater, and with surface water diverted from a nearby creek. BMG intended to release water from boreholes in the pit lake to mitigate streamflow impacts the project would have on area creeks. Appellant Okanogan Highlands Alliance (OHA) argued that BMG's release of water through the boreholes was a "diversion," and that the water would serve a beneficial purpose by enhancing stream flows. Thus, OHA argued, BMG needed a water right.

The Board ruled in OHA's favor. Its decision focused on the need for BMG to document its priority to use pit lake water so that others could not establish senior rights:

> Water right changes should be issued to clearly record the right and priority of water necessary to implement the plan. Since this water would be derived from existing rights held by Battle Mountain Gold Company, granting these rights will relate back to the rights subject to review in this proceeding and the commitment of those rights to serve the post-reclamation mitigation plan. It is not necessary, therefore, for additional rights to be obtained prior to construction and operation. Nor is it unlawful to approve the new and changed water rights and the mitigation plan under the Water Code and [W]ater Resources Act prior to the issuance of any necessary water right changes.

See Summary Judgment on Stipulated Issues Nos. 20, 21 and 22 (Oct. 23, 1998).

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ACC reads the Board's decision as establishing a bright-line rule that water rights are always required to implement stream flow mitigation plans. This overly simplistic interpretation of the Board's ruling ignores significant differences between the projects proposed by BMG and by the Port. The Board's decision in the BMG case reflected a very real concern: that another person might seek to appropriate water from the pit lake. If BMG did not establish its priority to divert water from the lake, someone else easily could have established a more senior right to the water BMG intended to use for mitigation purposes. Without a dependable source of water, BMG would not be able to meet its mitigation obligation.

In this case, there is no risk that anyone else will establish a senior right to the water that will serve as mitigation water because the Port will not divert water from a lake or other water body. Instead, it will collect and detain stormwater unavoidably generated on its property, and will release that same water to the area streams. To establish a senior right to this water, another person would somehow have to intercept the stormwater before the Port began managing it, a physically impossible feat. In short, the need that existed in the BMG case – to establish a right to water so a continual mitigation supply could be guaranteed – simply does not exist where detained stormwater will serve as the mitigation source.

Finally, BMG proposed a classic diversion from a surface water body, the 300-feet deep pit lake. The Port concedes that if it were proposing to withdraw groundwater or divert surface water for streamflow mitigation, it would have to obtain a water right. In such a case, the Port would be competing with and possibly impairing existing rights. Here, however, the Port is simply trying to replicate natural conditions that otherwise might be affected by its development.

III. CONCLUSION

For the reasons stated above, the Port is not required to obtain a water right to mitigate its low flow impacts with detained stormwater. ACC's motion should be denied, and summary judgment should be granted in favor of the Port.

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RESPECTFULLY SUBMITTTED this 14th day of January, 2002.

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POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, and THE PORT OF SEATTLE, Respondents.	PCHB No. 01-160 DECLARATION OF PAUL FENDT IN SUPPORT OF PORT'S OPPOSITION TO ACC'S MOTION FOR PARTIAL SUMMARY JUDGMENT

PAUL FENDT declares as follows:

1. I am over the age of 18, make this declaration based on personal knowledge, and am competent to testify to the facts stated herein.

Stormwater Management Experience

2. I graduated from the University of North Dakota with a degree in Geological Engineering in 1981. I was licensed as a Professional Engineer (Civil) by the State of Washington in January 1991 and the State of Florida in February 1990. I have been employed by Parametrix, Inc. for the past 11 years. A copy of my curriculum vitae is attached to this declaration as Exhibit A.

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3. I have more than 18 years of stormwater engineering and planning experience, encompassing a broad range of stormwater and surface water projects. I have significant experience with hydrologic and hydraulic modeling (HEC-1, WaterWorks, HEC-2, HEC-RAS), NPDES stormwater permits, erosion control on streams and lake shores, comprehensive storm and surface water plans, and preparation of drainage and stormwater ordinances. I have worked extensively with the Department of Ecology's Stormwater Manuals and with King County's Surface Water Design Manual.

4. I have been the project manager for stormwater management for the Port of Seattle's Master Plan Update (MPU) projects for the past four years. I was the principal author of the Port of Seattle's Comprehensive Stormwater Management Plan and a principal author of the Low Stream Flow Analysis and Summer Low Flow Impact Offset Facility Proposal ("Low Flow Analysis") (December 2001). (A copy of the Low Flow Analysis is attached to this Declaration as Exhibit B.) As such, I am very familiar with the stormwater management facilities and systems required by the Department of Ecology for the MPU projects.

Impacts of Development on Stormwater

5. New development, which generally consists of constructing new impervious surfaces and clearing land can, if unmitigated, profoundly affect natural flow and water quality conditions in streams and other receiving waters. The purpose of stormwater management is to provide an integrated approach to mitigating water resource impacts caused by development. Stormwater management consists of a complex analysis of hydrology and hydraulics and the coordination and design of stormwater management best management practices (BMPs).

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6. Generally, the construction of new impervious surfaces prevents infiltration of precipitation that causes two flow-related impacts: first, increased runoff, which can cause flooding and damage stream channels, leading to erosion and damage to aquatic habitat (high or "peak" flow impacts); and second, decreased infiltration and recharge to groundwater, which can in turn diminish baseflows in streams (low streamflow impacts). Impervious surfaces also accumulate pollutants from impervious area that are "washed off" by precipitation into surface waters. Surface water management systems typically include a combination of BMPs that address different components of the natural hydrologic cycle. Both peak and low flow stormwater management consist of delaying stormwater so it is released to streams at approximately the same time and rate it would have discharged to the streams before the impervious surface was constructed. For example, infiltration and detained stormwater mitigate lost groundwater recharge. Detention facilities can mitigate both peak flow and low flow impacts by collecting runoff generated by impervious surfaces and slowly releasing water to the stream during times of lower stream flow. Water quality BMPs, such as filter strips and wetponds, remove particulates and pollutants much as natural streamside vegetation "filters" runoff before it runs into the stream.

Stormwater Management in Washington

7. In Washington, stormwater management is subject to a complex set of federal, state and local regulatory requirements. Certain stormwater discharges, e.g., those from large industrial or construction sites, require an NPDES permit under the Clean Water Act. In Washington, stormwater NPDES permits are issued by the Department of Ecology (Ecology). Typically, a stormwater NPDES permit requires the preparation of a site-specific stormwater management plan, usually referred to as a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must incorporate

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BMPs appropriate to the site. A full menu of BMPs is described in stormwater manuals developed by Ecology and local governments. The Port has obtained an NPDES permit for its stormwater discharges, and has prepared a SWPPP as required by the permit.

8. The stormwater manual prepared by Ecology is referred to as the Stormwater Management Manual for Western Washington (the "Ecology Manual") (Ecology 2001). King County has also developed a stormwater manual which is referred to as the King County Surface Water Design Manual. (King County 1998) Both of these manuals provide standards and guidance for hydrologic modeling, stormwater management, and a menu of BMPs to control impacts from development. The King County and Ecology Manuals were used as guidance for analyzing and mitigating impacts from the MPU projects, as described in the Comprehensive Stormwater Management Plan (SMP)(Parametrix 2001).

MPU Stormwater Impacts

9. The MPU project will add a total of approximately 106, 6, and 128 acres of new impervious surface to the Miller, Walker, and Des Moines Creek drainages, respectively. New impervious surface will change the hydrology and stormwater runoff patterns of land draining from Seattle-Tacoma International Airport (STIA). During rainstorms, increased volumes of stormwater will drain to Miller, Walker and Des Moines Creeks that, if unmitigated, would cause peak flows in the stream to increase. Stream flows in the summertime during periods of low rainfall will also be reduced if left unmitigated.

10. The Port's NPDES permit requires the Port to develop appropriate facilities and systems to capture, detain, treat and release stormwater generated at the MPU to address these impacts. The water quality certification issued by Ecology for the MPU project adds additional

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stormwater mitigation requirements. Following is a general description of the stormwater management system developed by the Port to comply with Ecology's regulatory requirements.

11. Rain that falls on the third runway will run off from the new pavement across 75 feet of gently sloping infield grass to newly constructed catch basins. The infield grassy areas are referred to as "filter strips," an approved water quality BMP that removes particulates from stormwater before it is collected in the aforementioned catch basins. Precipitation that falls directly on the filter strips, along with some of the runoff from the impervious areas, infiltrates into the ground. Much of this pervious area surrounding the third runway is new embankment material, which is several feet thick and wide. The rainfall and runoff that infiltrates into the new embankment has been modeled, as described in the Low Streamflow Analysis, to determine the rate and volume at which this stormwater moves through the embankment and flows to Miller and Walker Creeks (there is little new embankment in Des Moines Creek basin). In Miller Creek, there is sufficient water infiltrated into the new embankment to fully mitigate the low flow impacts of new impervious area.

12. Stormwater runoff from the runway that does not infiltrate into the ground or embankment will be collected in catch basins that convey the stormwater to detention facilities including ponds and vaults. Stormwater collected in the detention facilities will be slowly released at carefully developed flow rates, as required by Ecology's and King County's continuous flow analysis methods, to avoid peak flow impacts. As described below, detention times up to 89 days are possible when the stormwater management facility is filled to the design level. In addition, some of the stormwater collected in the vaults will be detained for a slightly longer period of time and slowly released to Walker and Des Moines Creeks during the summer months when it is anticipated that the MPU projects will periodically reduce low summer flows.

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13. The purpose of mitigating high flow and low flow impacts is the same – to mimic pre-development conditions, to maintain streamflows to protect aquatic habitat and aquatic organisms, and to ensure that water quality standards will be met.

14. In developing the MPU stormwater management plan, it was necessary to determine how the proposed development and its new impervious surfaces would affect volumes and flow rates of stormwater and, correspondingly, flows in affected streams. Both high flow and low flow impacts were calculated using state of the art computer modeling. The modeling process is described in detail in paragraphs 8 - 24 of my declaration and the SMP and in the Low Flow Analysis attached thereto, which was filed in opposition to ACC's motion for stay.

15. It is important to understand that the projected low flow impacts to be mitigated are minimal. The Low Flow Analysis shows that the predicted change in water depth during low flow conditions caused by MPU projects is 0.4 inches and 0.1 inches for Des Moines and Walker Creeks, respectively. There is no predicted change to flow depth in Miller Creek.

The Port's Stormwater Management Plan Controls for Peak Flow, Low Flow, and Water Quality Impacts.

16. Peak flow impacts resulting from new and existing impervious surface will be mitigated by capturing all stormwater runoff and detaining it in 344.1 acre-feet of stormwater detention storage. As described above, the detained peak flow stormwater will be released over time at prescribed rates so as to avoid erosion, scouring and habitat damage associated with uncontrolled stormwater discharges.

17. Low flow impacts from new impervious surfaces will be offset by three methods: (1) seepage of infiltrated stormwater from the new third runway embankment (Miller and Walker Creeks); (2) detention of stormwater in underground vaults and release of stored stormwater during

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the summer low flow season (Des Moines and Walker Creeks); and (3) retirement of existing water uses (Miller Creek). The paragraphs below describe the first and the second methods in greater detail.

18. The first method by which low flow impacts will be mitigated is the infiltration of stormwater into the third runway embankment. The infiltrated stormwater will move through the embankment relatively slowly, and some of it will emerge as seeps that will, in turn, flow into Walker and Miller Creek. It is anticipated that the maximum flow of infiltrated stormwater will reach Miller Creek in July, or approximately six to seven months after maximum precipitation. Because this seepage will reduce the overall low flow impact of the MPU project on Walker Creek, and mitigate these impacts altogether in Miller Creek, less mitigation water will be needed through releases from other detention facilities.

19. The second method for offsetting low flow impacts is detention and release of collected stormwater. Low flow impacts in Des Moines Creek and Walker not mitigated by seepage from the embankment will be mitigated by retaining a small portion (32.0 acre-feet, or approximately 9% of the total collected volume of detained stormwater – 376.1 acre/feet) and releasing it to area streams during low flow periods. Detained stormwater will be discharged continuously into the affected streams during the normal low stream flow period for each of the streams. This slow release of detained water will replicate the timing and amount of storm water base flow that came from the soil before project construction. The amount of low flow releases has been determined based on site-specific hydrologic modeling, which predicts the impact on area streams from the construction of the MPU improvements.

20. Stormwater from the airport runways is treated using BMPs listed in the Ecology and King County manuals. The primary components of the treatment system are filter strips and

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bioswales. Filter strips allow stormwater runoff to sheet flow over large grassy areas. Flow velocity is slowed by the grass, thereby enhancing the settling of particulates. The vegetation also traps particles. Some stormwater infiltrates into the ground, further filtering the particles. Metals and organic compounds are removed as these pollutants bind to the organic material in the soil. Bioswales are grassy, flat-bottomed swales that receive runoff after it has been collected in a detention facility. Although flow depths and path lengths are typically greater than for filter strips, the pollution removal mechanisms are the same. Vaults and ponds also treat stormwater by allowing for additional settling and removal of particulates.

21. In my opinion, the stormwater management system for STIA described above and in the SMP and Low Streamflow Analysis reports will adequately mitigate the peak flow, low flow, and water quality impacts of the proposed MPU projects. In addition, existing stormwater impacts from built areas at STIA and surrounding developed areas recently acquired by the Port will be retrofit with new stormwater management systems to mitigate existing stormwater impacts in the streams surrounding STIA.

Managing Low Flow Impacts is Part of Washington's Stormwater Management Regimes

22. The Airport Communities Coalition (ACC) asserts that managing stormwater so as to avoid low flow impacts is unusual and unprecedented. This is not consistent with my understanding of Washington's stormwater regulatory requirements, nor is it consistent with my professional experience.

23. Ecology's 2001 Stormwater Manual recognizes that creation of impervious surfaces diminishes base flows, and that the objectives of stormwater management include mitigating this impact. The Ecology Manual contains the following requirements and statements:

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"Stormwater Controls for New Development and Redevelopment ... (must) seek to achieve no net detrimental change in natural surface runoff and infiltration." (Page 1-7);

"...changes in natural hydrology ... (cause) reduced stream flows and wetlands water levels..." (Page 1-17);

"Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible ... to reduce the hydrologic disruption of developed sites."(Page 2-25);

"Based upon gross level applications of continuous runoff modeling and assumptions concerning minimum flows needed to maintain beneficial uses, watersheds must retain the majority of their natural vegetation cover and soils, and developments must meet the Flow Control Minimum Requirement of this chapter, in order to avoid significant natural resource degradation in lowland streams." (underline added) (Page 2-25);

"Stormwater treatment facilities shall be selected in accordance with the process identified in Chapter 4 of Volume I" (Page 2-27)

Step 1 under "Select Flow Control BMPs and Facilities" in Chapter 4 of Volume I requires that one should "determine whether you can infiltrate." (Page 4-2)

It is clear from the Ecology Manual that maintaining natural hydrology, mitigating low flow impacts, and utilizing infiltration are essential objectives of stormwater management and that low flow impacts and mitigation should be considered when developing a stormwater management plan.

Infiltration and Detention are the Preferred Methods of Controlling Stormwater Flows

24. Infiltration is listed in Ecology's Manual as the preferred stormwater flow control method because it most closely resembles natural recharge conditions. When stormwater is infiltrated, it is collected and allowed to move through the soil so it recharges groundwater and reduces the potential for low flow impacts. Infiltration is not an appropriate stormwater management technique in all areas, such as sites where the soils have poor infiltration characteristics or high water tables. In these instances, especially locations where low flow reduction could cause adverse impacts, alternate low flow mitigation is needed. One such alternative is the collection and detention of runoff, which is then slowly released to avoid flow impacts. This is the alternative required by Ecology to mitigate impacts – both high flow and low flow – in Walker and Des Moines Creek.

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25. Infiltration (when feasible for the site as described above) and controlled release from designed control structures are meant to accomplish exactly the same objective. Both are intended to hold a large volume of stormwater for a period of time, and slowly release it to area surface water bodies. When water is released through control structures, such as an orifice plate in a pipe, the water is directly released to surface water. When water is "released" from a pond or vault via infiltration, it leaks through the soil and gradually travels to a seep or surface water body, such as a stream.

26. Infiltration is not feasible in the Walker Creek and Des Moines Creek watersheds at the locations where low flow mitigation is needed. This is due primarily to the poor infiltration characteristics of the soil. Instead, this stormwater will be detained in vaults and ponds and then be released to the streams at approximately the same time and in approximately the same amount that the natural system would have provided water to the stream (natural hydrologic systems are very complex and it is difficult to exactly mimic natural flow patterns). This delayed release is an appropriate surrogate for infiltration systems, which also result in delayed release.

Retention of Stormwater is a BMP of Stormwater Management

27. In addition to flow controls described above, the Ecology Manual requires that BMPs designed to reduce pollutant concentrations be applied to all new development and redevelopment. Prolonged detention and infiltration are two of these treatment BMPs, but there are many more, and several of these require lengthy detention of collected stormwater. Wetponds, wetvaults, and constructed wetlands are all Ecology-approved BMPs that can be used for water quality mitigation (the Port is not using these water quality BMPs because these techniques attract wildlife, which is dangerous at an airport). Each of these techniques relies on a permanent pool of stored water to provide stormwater treatment.

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28. Water in a wetpond, for example, is displaced by new stormwater coming into the wetpond, but a permanent pool of water is always left in the pond. The permanent pool of water in the wetpond can only leave the pond by infiltration, evaporation, or transpiration, and this loss must be continually replaced by additional stormwater to maintain the design pool depth. Wetponds, wetvaults, and constructed wetlands have been allowed for stormwater management for several years and many have been constructed. To my knowledge, a water right has not been required for this commonly used stormwater management facility which permanently retains stormwater. In fact, to my knowledge, a water right has never been required in Washington to manage stormwater.

Even the Port's Peak Flow Plan Detains Stormwater for Extended Periods

29. ACC asserts that storing stormwater for delayed release to mitigate low streamflow impacts requires a prolonged detention period that is inconsistent with typical stormwater management plans. However, several of the Port's peak flow stormwater facilities will detain stormwater for more than 50 percent of the year, and can take up to three months to drain after a design storm event.

30. To meet peak flow control requirements, several of these detention facilities have very low prescribed flow release rates. This means that the ponds and vaults detain stormwater for much of the year to avoid peak flow impacts. The following table shows that three proposed peak flow ponds (one from each watershed) will be storing stormwater more than 62 percent of the time. Contrary to popular perception, it rains on average about 13 percent of the time at Sea-Tac Airport (source: Perrich 1992). That means about 50 percent or more of the time in an average year, the peak flow detention facilities listed below will have stormwater stored for slow release beyond the duration

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of the storm event. Thus, the proposed peak flow ponds or vaults store water for a significant portion of the year.

Facility	Percent of Time with Stormwater in Storage
Miller Creek	
SDW1B Pond	73%
Walker Creek	
SDW2 Pond	66%
Des Moines Creek	
SDS3 Vault	62%

31. ACC also asserts that the Port's stormwater management system is different from typical systems because of its "precise, prolonged and exacting release rates." However, the release rates apply not only to low flow mitigation, but also to peak flow mitigation. When the ponds or vaults collect water from the design storm, the amount of time that it takes to release the detained stormwater is considerable precisely because the release rate is exacting, precise and prolonged. As explained above, this is because the goal of the stormwater management system is to mimic predevelopment conditions. Therefore, stormwater release rates are carefully prescribed so that streamflows do not exceed the levels experienced before the development occurred. For example, when detention Pond SDW1B (located in the Miller Creek basin) is filled to its design level (53.6 acre-feet), it will take 89 days to discharge all of the water, *assuming no additional runoff enters the pond during this period.* In Walker Creek and Des Moines Creek for the facilities in the table above, the discharge time is 17 days and 15 days, respectively.

32. The new (2001) Ecology stormwater Manual requires the use of "continuous flow modeling" instead of the previously preferred "event modeling" whenever the receiving waters are biologically significant. Continuous flow modeling will, in most cases, result in significantly greater detention times for peak flow control purposes. There are no standards in either the Ecology Manual

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or the King County Manual that require the discharge of detained stormwater within a certain time period. In fact, the manuals allow permanent storage of stormwater in wetponds and continual refilling of these ponds to replace water lost through evaporation or infiltration. In my opinion, the Port's stormwater management system, including the low streamflow mitigation, does not unnaturally delay the release of stormwater beyond the time required to mitigate stormwater impacts from MPU projects.

Treatment of Stormwater is Required and Often Involves Lengthy Detention Periods

33. Stormwater treatment is a required BMP under the Ecology and King County stormwater manuals. When impervious surfaces are constructed, they are typically used by motor vehicles or industrial activity. The activities commonly generate pollutants, such as zinc or copper, that are collected on the impervious surfaces. These collected pollutants are "washed off" by precipitation and discharged by stormwater into surface waters. The purpose of water quality BMPs is to remove these pollutants before they can be discharged into surface waters, where they can harm fish and other aquatic organisms. One mechanism by which these systems work is through particulate removal, where pollutants that are attached to particulates are settled out of the stormwater in pools of still water.

34. Typical settling facilities identified in the stormwater treatment BMPs include bodies of deep (up to eight feet), still water, also known as wetponds or wetvaults, where suspended particulates are allowed to settle when the movement and turbulence of water can no longer provide the energy to keep these particulates suspended. Wetponds are typically located after detention ponds, with grassy slopes, three to eight feet deep, with a "baffle" or other means to prevent water flowing into the pond from stirring up settled particulates.

AR 005111

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35. The pool of water in a wetpond (or wetvault or constructed wetland) is filled and maintained by stormwater runoff from the project site. This is intended to be a permanent pool of water for use exclusively to remove pollutants from stormwater runoff. Thus, treatment may require lengthy or even indeterminate detention periods. Wetponds, wetvaults, and constructed wetlands, all approved Ecology and King County stormwater BMPs, have been constructed throughout the region absent, to my knowledge, a water right. Each of these facilities *permanently* requires a pre-determined amount of stormwater runoff for the purpose of mitigating runoff impacts from development.

Conclusion

36. The Port's proposal for managing stormwater to meet the requirements of its NPDES permit and the Water Quality Certification follows the approach and intent of the Ecology and King County Stormwater Manuals. The Port has selected and applied BMPs in a manner consistent with the Manuals. Stormwater detention will be provided to mitigate the impacts of new impervious surface on peak flows as well as for low flow impacts. Low flow mitigation has been provided in a manner that is consistent with the intent of the Manuals to "achieve no net detrimental change in natural surface runoff and infiltration." Where infiltration is infeasible, alternate and approved low flow mitigation has been provided.

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

DATED this 14 day of January 2002 at KIRKLAND, Washington.

PAUL FENDT

MARTEN BROWN INC.
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I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

DATED this 11 day of January 2002 at KIRKLAND, Washington.

PAUL FENDT

AR 005114

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EX. A

Paul S. Fendt, P.E.

Bachelor of Science, Geological Engineering
Registered Professional Engineer in Washington and Florida

Paul Fendt has more than 18 years of stormwater engineering and planning experience. His project experience includes a broad range of stormwater and surface water projects, including hydrologic and hydraulic modeling (HEC-1, WaterWorks, HEC-2, HEC-RAS), NPDES stormwater permits, erosion control on creeks and lake shores, comprehensive storm and surface water plans, and preparation of drainage ordinances and environmental impact statements.

Prior to joining Parametrix, Mr. Fendt was the manager of the Polk County, Florida, Surface Water Management Plan (SWMP). His other job responsibilities included the preparation of applications for environmental permits related to wetlands and surface water protection, public drainage project design, stormwater detention facility design, and reports on county projects related to stormwater, wetlands, permitting and flooding.

Sea-Tac Airport Master Plan Update and On-Call Stormwater Services – Port of Seattle, WA

Mr. Fendt is Parametrix Project Manager providing environmental services to the Port of Seattle in support of the Master Plan Update EIS, SEPA and permitting process, and on-call services to support the Sea-Tac Airport stormwater program. The Master Plan Update project, which includes a new third runway and many redevelopment projects, will require extensive environmental mitigation of wetland, stream, and stormwater impacts. Parametrix is responsible for wetland delineations and other field work and obtaining the permits needed to implement the Master Plan projects, including Section 404 and 401 approvals for wetland impacts, HPA for instream work, and several local permits. Parametrix is conducting studies and preparing design plans for the mitigation required projects, including:

- A large wetland mitigation project at a 69-acre site in Auburn.
- Relocation of approximately 1,000 feet of Miller Creek.
- Restoration of a 200-foot-wide buffer along 6,500 feet of Miller Creek.
- Fish passage improvements along Miller Creek.

Mr. Fendt is also responsible for development of a comprehensive stormwater management plan for the Master Plan projects and is conducting hydrologic modeling and stormwater treatment analyses in support of stormwater detention and treatment facility design. On-call stormwater support has included updating of the airport stormwater conveyance maps and hydraulic models, field investigations of drainage and water quality problems, design of stormwater improvements, preparation of stormwater pollution prevention plans for construction activities, monitoring of stormwater runoff for the airport NPDES construction permit, and numerous other activities to support the environmental and stormwater management programs at Sea-Tac Airport. The contract has included 91 tasks to date.

Valley Creek Estuary Restoration – Port of Port Angeles, WA

Project Hydrologist for design and permitting of a new, man-made 4-acre marine estuary in downtown Port Angeles. The new estuary and associated park is a centerpiece for the downtown Port Angeles re-development program. The project consists of converting an existing log-sort yard and tight-lined 84-inch-diameter culvert into a combination of a park, marsh, beach, and mud-flat estuary.

Design and Operation of Stormwater Treatment System – Port of Seattle, WA
Parametrix staff designed two movable stormwater treatment systems to treat up to 500 gpm stormwater per unit from a 40-acre parking lot construction site. The systems were designed to reduce turbidity and were operational within two weeks. Alum was used as the coagulant. Additionally, our staff also managed the procurement and assembly of rental equipment and were responsible for the operation and staffing of the units, which are operated two shifts a day, 7 days a week, when required by weather conditions.

Butter Creek Engineering Analysis – Lewis County, WA
Parametrix will provide an engineering analysis of revetment repair and actions taken in response to flooding along lower Butter Creek. Responsibilities will include document review, scheduling interviews, and site visits.

Sammamish River Habitat Improvements – City of Redmond, WA
Parametrix was selected by the City of Redmond to design habitat enhancements for the Sammamish River through downtown Redmond. The river was channelized for flood control with little consideration of habitat and aesthetics. Mr. Fendt is the Project Manager and Fluvial Geomorphologist for the habitat enhancement planning and design effort. Habitat enhancements include modifying the channel geometry with benches and meanders, adding emergent wetland habitat, enhancing channel substrate, removing exotic vegetation, and replanting the riparian corridor with native plants to improve wildlife habitat. Project planning has included public workshops and meetings with affected agencies, including the Army Corps of Engineers, Washington Department of Ecology, Washington Department of Fish and Wildlife, the Muckleshoot Tribe, and King County. Construction was completed in the summer of 1997.

On-Call Small Stormwater Projects Program – City of Redmond, WA
Provides on-call services for the City's Stormwater Management Division. Projects include small project designs to solve neighborhood flooding problems, drainage studies to identify alternatives for solving flooding problems, surveying easements for stormwater facility maintenance, basin planning assistance, and spill response. The key to the success of the project has been our rapid turnaround preparing work authorizations.

Dredge Island Stormwater Sampling Program – Lavaca Bay Superfund Site, Point Comfort, TX
Mr. Fendt designed and implemented a stormwater runoff collection program on a contaminated dredge spoil island in Lavaca Bay on the South Texas coast. Automated stormwater samplers were installed to collect water and sediment associated with stormwater runoff. Using the results of the six-month program, sediment and contaminant loading will be calculated. The collection system includes lined collection channels and pre-fabricated channels and flumes and collect runoff, transport sediment, and measure flows. The samplers have been programmed to trigger a sampling program when a pre-determined flow rate is measured. Grain size distribution of the sampled storm sediments will be determined to correlate storm intensity and sediment yield.

Stormwater Pollution Prevention Plan (SWPPP) – Port of Vancouver, WA
Project Manager for the completion of an SWPPP for the Port's facilities on the Columbia River. The plan includes a number of Best Management Practices (BMPs) and identifies potential stormwater treatment alternatives.

Strandley Environmental Services – Seattle City Light, Purdy, WA
Project Engineer for a multi-disciplined Superfund site cleanup. A PCB contaminated stream flowing through the project site required assessment and design of a new cleanup project. The project includes removing PCB contaminated soils from the creek while minimizing site disturbance. Stream habitat will be restored using log weirs, deflector logs, and large woody debris from the adjacent remediation areas. Will direct field oversight and field placement of new stream habitat features during construction.

South Prairie Creek Flood Study – Pierce County, WA
The Pierce County Public Works Department is proposing to improve South Prairie Road, with safety improvements that include widening the road and straightening several curves. To improve drainage and public safety in an emergency, the road, which is partially constructed in the South Prairie Creek floodplain, will be raised above the existing 100-year flood elevation of South Prairie Creek. Concerns about potential floodplain impacts from the proposed road improvements prompted the preparation of a new flood study for the potentially affected portion of South Prairie Creek.

A computer simulation of the floodplain was prepared, using the hydraulic backwater model HEC-2. Two HEC-2 models of South Prairie Creek were prepared: the first was created using the input parameters from the original Federal Emergency Management Agency (FEMA) floodplain study; the second model was prepared by supplementing the original study with new channel cross sections. The new model with added cross sections was then checked and used as the basis for comparing impacts from the proposed road improvements. The proposed road improvements were added to the new study and compared to determine flood elevations and impacts from the new road.

Clover Island Redevelopment Stormwater Management Plan – Port of Kennewick, WA
The Port of Kennewick, Washington is proposing redevelopment of Clover Island as part of its future expansion plans. The plans include redevelopment of existing developed areas, expansion of water-dependent businesses, and expansion of the island with new development. A Conceptual Stormwater Management Plan (SWMP) for Clover Island Redevelopment was prepared. The plan included measures for reducing existing stormwater runoff impacts from existing Port facilities. Alternatives for controlling runoff from newly developed areas included biofiltration swales and constructed wetlands.

87th Street Extension Burnt Bridge Creek Flood Study – City of Vancouver, WA
The proposed 87th Street extension contemplated by the City of Vancouver requires a new Burnt Bridge Crossing. To ensure that the crossing will cause no floodplain impacts, Parametrix prepared a flood study of the creek using HEC-2. There was limited existing data available for completing the study, and the existing FEMA study was flawed. Working with the County and City, Parametrix prepared a hydraulic model that determined flood elevations and allowed for bridge design that mitigated potential impacts.

Kalauao Stream Flood Study – Department of the Navy, Oahu, HI
Sediment and debris collecting at the mouth of Kalauao Stream raised concerns about potential house flooding and property damage near the mouth of the stream. Parametrix prepared a study to: (1) determine the current extent of the 100-year floodplain; (2) determine the probable causes of flooding and factors that have changed flood patterns since development along the lower stream banks; (3) develop and compare alternatives for controlling flooding and limiting flood damage; and

(4) make recommendations for action (or no action) to limited flood damage. Several flood control alternatives were considered, and action recommendations were made, including reconstruction of the gas and sewer lines crossing the stream and causing floodplain impacts.

Woodland Creek – Pierce County, WA
Prepared a conceptual regional stormwater reduction plan to reduce potential peak flows. The project included hydraulic modeling (compared HEC-1 against WaterWorks modeling program) and predesign of regional stormwater management ponds to reduce peak flows generated from increased development of the watershed.

Canyon Creek – Pierce County, WA
Prepared a conceptual regional stormwater reduction plan to reduce potential peak flows. Similar in scope to the Woodland Creek project with its own specific design criteria.

Southwest Harbor Project – Port of Seattle, WA
Prepared a site stormwater management assessment and mitigation plan for the proposed expansion of container facilities and site remediation for existing tenants. The project included recommended Best Management Practices (BMPs) for source reduction as well as alternatives for stormwater treatment, such as wet ponds and biofiltration swales.

Storm and Surface Water Master Planning Study – City of Camas, WA
Prepared a storm and surface water management plan for a new industrial area. The project includes hydrologic modeling and pre-design of regional stormwater management ponds to mitigate potential impacts from development of the industrial area. Stormwater management planning will be concurrent with wetlands management planning to develop an integrated approach to water resource planning.

Stormwater Improvements – U.S. Navy SUBASE Bangor, Kitsap County, WA
Concept study and design of stormwater improvements for the industrial and vehicle maintenance area at the Bangor base. A stormwater pollution prevention plan (SWPPP) includes a number of source control options for reducing stormwater runoff contact with pollutants. Because of the extensive vehicle maintenance activity at the site, oil/water separators have been included as a stormwater treatment option. The project included modeling the existing storm sewer system, investigating sources of oily discharges, and preparing drawings of the existing storm sewer system.

East Texas Hydrologic Study – Confidential Client
Conducting a hydrologic analysis and model of an interconnected lake system in eastern Texas. The project includes the interpretation of rainfall data, development of a continuous hydrologic model for the watershed, stream gaging, automated sampling, and the use of GIS for determining hydrologic parameters for the model. The results will be used to determine annual pollutant loading in the system.

Waiawa Stream Sediment Removal and Wetland Enhancement – U.S. Navy, Oahu, HI
Prepared a hydrologic study and conceptual engineering design of a wetland enhancement and sediment removal facility to reduce sediment load to Pearl Harbor. The project includes a detailed study of rainfall and stream flow conditions, sediment loads, and wetland hydrology. The conceptual design of the proposed wetland includes removal of suspended sediments in constructed wetlands and enhancement of existing wetland habitat and function.

Lake Park Condominiums Drainage Plan Review – City of Kirkland, WA
Reviewed the drainage plans for a condominium development proposed in Kirkland. The review included potential hydrologic impacts to wetlands, flooding impacts, and flood stages on Lake Kirkland (Forbes Lake). Stormwater mitigation measures were proposed for basin build-out on Lake Kirkland. The Forbes Lake drainage basin was also modeled for existing and basin build-out to determine 100-year flood stages on Forbes Lake.

Aberdeen Sawmill Stormwater Plan – Weyerhaeuser, Aberdeen, WA
Prepared a hydrologic analysis of a sawmill site which included analyzing rainfall records determining return frequencies for different storm durations; estimating runoff volumes and contaminant concentrations; and evaluating stormwater control and treatment alternatives.

Kitsap County Stormwater Management Ordinance – Kitsap County, WA
Prepared a stormwater management ordinance for the County. The Ordinance has heavy emphasis on inspection, maintenance, and enforcement of stormwater systems and construction. The ordinance approval process included a multidisciplinary technical advisory committee review. The ordinance was written to comply with the Stormwater Management Manual for the Puget Sound Basin.

Utilities Comprehensive Plan – Grays Harbor County, WA
Managed storm and surface water portion of the County utilities comprehensive plan. The plan includes water resource protection, facilities improvements, and basin planning concepts. The project has an emphasis in public participation and economic development.

Fitzgerald Road Culvert Replacement – Polk County, FL
Prepared the design and specifications for replacement of culverts in a high, unstable road fill. Existing culverts had been blocked and failed due to bank slumping, causing a back-up that threatened the road and a downstream mobile home park. The design required the use of level pool routing models, riser sizing with trash skimmers, and tightline culverts down the backslope. The project was constructed, and the structure has experienced a significant storm event (between a 10- and 25-year storm) with no further problems.

Lyon Creek 100-year Flood Study – Canaan Apartment, Lake Forest Park, WA
Managed determination of the 100-year flood plain of Lyon Creek for an apartment complex in Lake Forest Park (North Seattle area). Mitigation for proposed flood plain encroachments were included in the final project report.

Derby Ditch – Lake Jessie, Polk County, FL
Developed the conceptual design for a stormwater detention facility in a 400-acre urbanized drainage basin to provide water quality enhancement of runoff to a recreational lake chain. The system will provide treatment of approximately one-third of the contributory drainage basin to the lake.

Amendment to Polk County Flood Protection and Surface Water Management Ordinance – Polk County, FL
Prepared for adoption of a major revision and subsequent amendment to the Polk County, Florida, Flood Protection and Surface Water Management Ordinance. The ordinance also provided for the protection of wetlands and water resources. Responsibilities as program manager included

preparation of map amendments and revisions, interpretation of Flood Insurance Rate Maps, and county compliance with the National Flood Insurance program.

Comprehensive Growth Management Plan – Polk County, FL
Prepared and presented the drainage sub-element of the infrastructure element of the County's Comprehensive Growth Management Plan. Provided technical assistance in the preparation of the Conservation (surface water, wetlands, floodplains, groundwater sub-elements), infrastructure (potable water, aquifer recharge), and land use (wetland, floodplain overlays) elements.

Mill Creek Erosion Control – City of Kent, WA
Comprehensive study and preliminary design to reduce erosion in an unstable urban canyon damaged by high flows. Project elements included the following: inventory and prioritization of erosion problems; surveying; hydrologic and hydraulic modeling; and bioengineering and engineering designs for stabilization of streambanks and slopes.

Luther Burbank Park Erosion Control Project – King County Parks Department, WA
King County's Luther Burbank Park on Lake Washington was experiencing accelerated shoreline erosion. Mr. Fendt led Parametrix's investigation of the historical rates of erosion and determined probable causes of the shoreline erosion problems. An innovative combination of engineering design alternatives and recommended operation and use modifications were developed to control the erosion rate while also maintaining the natural, recreational, and aesthetic values of the park.

Madsen Creek Interceptor Environmental Analysis – Metro, Renton, WA
Conducted reconnaissance of streambank and side slope erosion sites in an unstable canyon subjected to increased peak stormflows from urbanization. Evaluated alternatives to reconstruct the sewer interceptor pipe in Madsen Creek Canyon. Identified bioengineering and engineering alternatives for stabilization and erosion control including riprap, gabions, live cribwalls, live staking, and branch packing.

Inspection and Maintenance Manuals for Tyee Pond and Miller Creek Regional Detention Facilities – Port of Seattle, WA
Paul managed the development of inspection and maintenance manuals for two stormwater detention facilities (Tyee Pond and Miller Creek Regional Detention Facility) located on Port of Seattle property to help facilitate the transfer of responsibilities for the facilities from King County to the Port of Seattle. The inspection and maintenance manuals are intended to be working documents that could be used by the field crew responsible for inspecting and maintaining the facilities. In addition, the manuals will serve as documentation of facility maintenance in compliance with State and Local stormwater regulations. Manual development included researching standard inspection and maintenance procedures used by King County and others; conducting interviews with County employees familiar with the operation and maintenance of the facilities; gathering information relevant to the proper functioning of the facilities, such as as-built diagrams and specific equipment operation manuals; evaluation of current facility conditions and operation; development of an inspection and maintenance schedule; and development of inspection and maintenance checklists to be used in the field.

King County Regional Justice Center EIS – King County, WA
Analyzed stormwater quality and quantity discharge on four alternative sites for both pre- and post-development conditions. Developed recommendations for stormwater management facilities to comply with the King County Surface Water Design Manual.

Black River Transfer Facility EIS Stormwater Management – City of Renton, Tukwila, WA
Prepared the conceptual design of a stormwater management system for a regional waste transfer site, and included the preparation of an EIS document for impacts to water. The project required analysis of stormwater quantity and quality discharges, wetlands, and floodplains. The proposed stormwater management facilities were designed for compliance with the King County Surface Water Design Manual.

Indian Summer EIS – Private Developer, Olympia, WA
Reviewed stormwater impacts for a new residential subdivision. The review included an analysis of proposed stormwater management techniques, including filtration facilities. BMPs for erosion control and stormwater discharging to significant wetland resources were also reviewed, and additional mitigation measures were proposed.

Lake Marion Creek – Polk County, FL
Prepared a land acquisition proposal submitted to Florida Water Management Districts under the Save Our Rivers (SOR) acquisition program. The proposal recommends the purchase of an 18,000-acre watershed, nearly one-half of which contains a variety of wetland types. The remainder is relict sand dunes, noted for their high aquifer recharge potential. The watershed is a major tributary to the Kissimmee River, which is the upper watershed of the Florida Everglades. The project was "A" listed, and negotiations are presently underway for purchase of several tracts.

Hillsboro Light Rail Extension – Metro, Portland, OR
Mr. Fendt was the task manager for hydraulic and hydrologic analysis of eight proposed light-rail stream crossings. The proposed alignment was on an existing rail line. Each crossing was assessed for potential floodplain impacts and new crossings were designed to mitigate potential impacts.

Bear Creek Habitat Assistance – City of Redmond, WA
Parametrix has been retained by the City of Redmond to assist with review of the proposed lower Bear Creek Habitat Restoration Plan. The Army Corps of Engineers is preparing the project plans, with participation by the City. Responsibilities include assisting the City with defining project goals, providing technical review and analysis, and participating in team meetings. Technical elements include engineering, floodplain analysis, fish passage and use, and habitat planting review.

State vs. Spath – Olympia, WA
Parametrix will provide expert testimony in support of WSDOT litigation.

EX. B

LOW STREAMFLOW ANALYSIS AND SUMMER LOW FLOW IMPACT OFFSET FACILITY PROPOSAL

SEATTLE-TACOMA INTERNATIONAL AIRPORT MASTER PLAN UPDATE IMPROVEMENTS

Prepared for

PORT OF SEATTLE
Seattle-Tacoma International Airport
17900 International Boulevard, Suite 402
Seattle, Washington 98188

Prepared by

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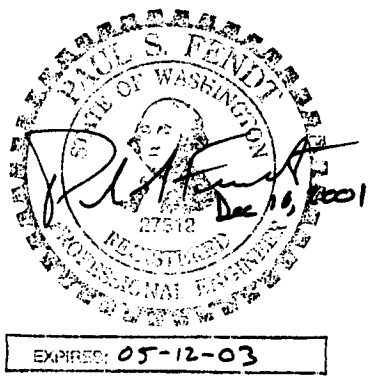
Bellevue, Washington 98004

Pacific Groundwater Group
2377 Eastlake Avenue East
Seattle, Washington 98102

December 2001
556-2912-001 (28B)

CERTIFICATE OF ENGINEER

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



Paul S. Fendt, P.E.

(affix seal here)

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ACRONYMS AND ABBREVIATIONS

APHA	American Public Health Association
ASTM	American Society for Testing and Materials
BFW	bankfull width
B-IBI	Benthic Index of Biotic Integrity
BMPs	Best Management Practices
BOD	biological oxygen demand
°C	degrees Celsius
cf	cubic feet
cfd	cubic feet per day
cfs	cubic feet per second
CIP	capital improvement project
cm	centimeters
DBH	diameter at breast height (4.5 ft from the ground)
DNR	Department of Natural Resources
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ET	evapotranspiration
ft	feet
GIS	geographic information system
GPS	global positioning system
HSPF	Hydrologic Simulation Program – FORTRAN
IWS	Industrial Wastewater System
LWD	large woody debris
m	meter
mg/l	milligrams per liter
mm	millimeter
NEPL	North Employee Parking Lot
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
PAM	polyacrylamide
PIT	Pilot Infiltration Test

Port	Port of Seattle
RCU	riparian condition unit
SMP	Stormwater Management Plan
SSHEAR	Salmonid Screening, Habitat Enhancement, and Restoration
STIA	Seattle-Tacoma International Airport
SWPPP	Stormwater Pollution Prevention Plan
UEBEM	Urban Stream Baseline Evaluation Methodology
USFS	United States Forest Service
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WFPB	Washington Forest Practices Board

EXECUTIVE SUMMARY

This report presents the analyses performed to estimate the timing and volume of discharges to local receiving streams and wetlands during low-flow periods from Seattle-Tacoma International Airport (STIA) considering improvements defined in the Port of Seattle's Master Plan Update. This report also presents a Flow Impact Offset Facility Plan, which is the Port's proposal to offset impacts to flows in the receiving waters during annual low-streamflow periods, typically experienced in late summer/early fall. The plan is based on a detailed evaluation of the hydrologic impacts of the proposed third runway embankment and associated non-hydrologic impacts (cessation of water use and removal of septic tanks on properties purchased by the Port) on streamflow in Miller, Walker, and Des Moines Creeks. This report is submitted in response to condition I.1 of the Water Quality Certification (#1996-4-02325 [Amended – 1]) issued by the Washington State Department of Ecology (Ecology) on September 21, 2001. The report builds upon previous reports by Earth Tech (December 2000), Pacific Groundwater Group (June 2000, August 2001), and Parametrix (December 2000, July 2001). Earth Tech, Pacific Groundwater Group, Aqua Terra, HNTB, Foster Wheeler, and Parametrix prepared analyses presented in this report, and Hydrocomp contributed technical review of modeling analyses. Ecology was consulted during the development of the plan to ensure that agency concerns are addressed in this report.

Impacts to streamflow in the three streams were evaluated using a suite of modeling tools. The Hydrologic Simulation Program – FORTRAN (HSPF) was used to develop overall stormwater models of STIA (existing conditions and proposed conditions), as described in the *Comprehensive Stormwater Management Plan* (SMP) (Parametrix 2000a, 2001a). These models were also used to evaluate stormwater flows and volumes in the low-flow analysis. The hydrologic properties of the proposed third runway embankment were modeled using a combination of Hydrus and a finite-difference Slice model. Hydrus was used to simulate the movement of water between the root zone and water table in the proposed embankment, and the Slice model was used to simulate the movement of water through the saturated portion of the proposed embankment. Results of the Hydrus and Slice modeling were incorporated back into the HSPF model to estimate the post-construction flows. By comparing these results to the pre-project conditions, the impacts of the proposed embankment on streamflows were determined. Non-hydrologic impacts were then included in the impacts analysis. Statistical analyses of model output, precipitation, and streamflow data for the available period of record predicted a net low-flow impact to be mitigated during the low-flow offset period. The flow offset to be provided is 0.11 cubic feet per second (cfs) in Walker Creek and 0.08 cfs in Des Moines Creek. The project impact in Miller Creek was completely offset by seepage from the third runway embankments.

The Port's proposal to offset impacts to low streamflow is to detain excess stormwater runoff during the winter and release it to the streams during the predicted annual low-streamflow periods. Vault sizes for the volume of water required to offset the predicted impacts were determined by calculating the volume necessary to fulfill the required mitigation during the 92-day mitigation period for each year in the period of record (1949 to 1995), and selecting the year requiring the largest vault volume as the "worst case" scenario. The resulting volumes of stormwater (18.5 acre-ft[1] for Walker Creek and 13.5 acre-ft for Des Moines Creek) were incorporated into supplemental

[1] A 19.0 acre-ft vault was used for the concept design.

stormwater vaults in each watershed. These volumes of stormwater will be collected during the rainy season, stored, and discharged during the annual low-flow periods at rates equal to the predicted impact in each stream. Several considerations are proposed to be included in the design of these vaults to allow the management of stormwater discharges to offset the predicted low-flow impacts. Additional considerations in the design and operation of the proposed stormwater vaults to improve the water quality of discharges will also be included. An analysis of the availability of stormwater required to fill the vaults showed that even during the driest years in the period of record, enough water can be collected and stored to offset the impacts to streamflow during the annual low-streamflow period.

Key goals and objectives (performance standards) of the proposed Flow Impact Offset Facility include:

- Provide flow at the rates required to offset the predicted impacts of the proposed embankment for the entire annual low-streamflow period each year (approximately 92 days from late July through the end of October).

- Operate and maintain the facility to maintain water quality during the annual low-streamflow periods.

- Design the facility and its operation, monitoring, and maintenance plan so that an adaptive management strategy can be applied.

As stated in Ecology's *Stormwater Management Manual for Western Washington* (Ecology 2001), the objective of stormwater management is to "control the quantity and quality of stormwater produced by new development and redevelopment such that they comply with water quality standards and contribute to the protection of beneficial uses of the receiving waters." Ecology has determined that stormwater management activities in Washington do not require a water right. Since the Port's proposal to offset flow impacts to the receiving waters consists of stormwater management activities, a water right is not required for the Flow Impact Offset Facility.

1. INTRODUCTION

1.1 PURPOSE

The purpose of this report is to evaluate impacts to streamflows in Miller, Walker, and Des Moines Creeks resulting from construction projects included in the Master Plan Update for Seattle-Tacoma International Airport (STIA), and to propose a Flow Impact Offset Facility to mitigate potential impacts during summer low-streamflow periods. Placement of new impervious surfaces and embankment fill, combined with removal of septic tanks and cessation of existing water uses in the embankment area, will impact the timing and amount of groundwater flows to the streams. While these impacts vary seasonally, they are expected to be most significant during late summer/early fall, when streamflows are typically at their lowest. This document presents the analysis that was completed to determine the impacts (both positive and negative) to streamflows, and to propose a facility and management/operation plan to offset those impacts during the annual low-streamflow periods.

1.2 ORGANIZATION OF REPORT

This report is organized into six sections. Section 1 contains an introduction. Section 2 describes the analysis undertaken to determine the impacts to streamflows in each stream. Surface water modeling, embankment modeling, and the effects of "non-hydrologic" impacts are discussed. The proposal for the Flow Impact Offset Facility is described in Section 3, including discussions of vault sizing, water quality management, performance standards, and a pilot program. Section 4 contains the Operation and Maintenance Plan for the Flow Impact Offset Facility. Section 5 contains the monitoring plan, addressing both operation of the facility and its impacts to the streams. References are listed in Section 6.

Ten appendices containing additional technical information are included. Appendix A is contained in Volume 2, and Appendices B through J are located in Volume 1 behind the main text. Appendix A provides HSPF modeling information and data, including low-flow review of the HSPF model calibration, land use tables, and HSPF input files. The technical report describing the embankment modeling analysis is contained in Appendix B. Appendix C provides information on infiltration into the embankment. Data used in the assessment of the non-hydrologic impacts is provided in Appendix D. Appendix E contains HEC-RAS modeling results and stream cross-section field survey data. Concept drawings of the reserved stormwater system (vaults, routing, discharge locations, etc.) are contained in Appendix F. Appendix G presents additional information on physical habitat monitoring protocol in streams. A memorandum on low streamflow fish behavior is provided in Appendix H. Appendix I contains information on the determination of low-flow quantity impacts and mitigation. The HSPF input files for the low-flow vault sizing are provided in Appendix J.

1.3 RELATIONSHIP TO OTHER DOCUMENTS

This report, which replaces and updates the *Low Streamflow Analysis* prepared by Earth Tech, Inc. in December 2000 (Earth Tech, Inc. 2000) and the *Low Flow Analysis Flow Impact Offset Facility Proposal* prepared by the Port of Seattle in July 2001 (Port of Seattle 2001a), is referred to in

Sections 6.2.1 and 7.7.5 of the *Comprehensive Stormwater Management Plan, Master Plan Update Improvements, Seattle-Tacoma International Airport* (SMP; Parametrix, Inc. 2000a, 2001a).

The Clean Water Act Section 401 water quality certification was issued by the Department of Ecology on August 10, 2001, and amended on September 21, 2001, subsequent to the submittal of the July 2001 Low Flow Analysis/Flow Impact Offset Facility Proposal (Water Quality Certification #1996-02325 [Amended - 1]). The amended certification required the submittal of a revised Low Flow Analysis/Flow Impact Offset Facility Proposal addressing a number of issues listed in Section I of the amended certification. Additional model runs were required to address some of these issues. During the additional modeling, some errors in data handling were detected. While corrections of these errors do not change the modeling approach, the underlying assumptions, or the calibration, they do impact the results of the modeling analysis. Discussions were held between the Port, its consultants, Ecology, and King County to discuss the errors and their resolution, which are summarized below:

1. Different models were used to simulate different parts of the hydrology of the embankment area. This required data to be transferred back and forth between the different models. In one data transfer, a conversion factor (from daily to hourly flows) was inadvertently applied twice. The result was that modeled flow from the embankment was 1/24 of what it should have been. This error was corrected by applying the conversion factor once in the revised modeling.

2. In another data transfer, an incorrect file ("daily AGWO") was used, where another file ("hourly AGWI") should have been used. This error was corrected by transferring the correct file.

3. When the original model was developed, a number of alternatives to model the impervious areas tributary to the filter strips on top of the proposed embankment were considered. With the change implemented in No. 2 above, a more direct way to model this area became possible. In the original modeling, rainfall on the pervious area was "scaled up" to address the impervious area and flow to the filter strips. In the revised modeling, flow to the filter strips will be calculated based on the "AGWI" and "SURO" time series data.

4. In the original modeling, a two-dimensional version of the Hydrus model was used to calculate one-dimensional (vertical) flows through the proposed embankment. Since the revised modeling results in more water flowing through the embankment, a one-dimensional version of Hydrus was used because it is better able to simulate the more varied saturation conditions.

5. In the original modeling, infiltration from infiltration basins was not simulated because it was negligible. In the revised modeling, more water is available to the infiltration basins; therefore, this flow is no longer negligible. The revised modeling will simulate and document this flow, which will be routed to the groundwater component of the HSPF modeling.

6. In the original modeling, all groundwater from pervious areas in the SDS5, SDS6, and SDS7 basins was inadvertently routed to Des Moines Creek in the pre-developed

conditions model. In the post-developed conditions model, groundwater from these areas was correctly routed to Walker Creek. This error was corrected by routing the groundwater in these areas to Walker Creek in the pre-developed conditions model.

An additional revision to the modeling was discussed with Ecology and King County, but was not incorporated into the revised model. This revision involved routing the "seepage to till" component of the embankment flow directly to the stream. The group concluded that the existing approach was a more accurate way to model this flow component.

1.4 PROJECT DESCRIPTION

The Port's proposal is to collect excess stormwater during the rainy season, store it in underground vaults, and release the stored water continuously into each stream during the designated summer low-streamflow period at a rate equivalent to the calculated summer low-streamflow impact to that stream from planned Port projects. The summer low-streamflow impacts in each stream were determined through detailed modeling analyses. The summer low-streamflow periods were determined through statistical analyses of modeled streamflow from the calibrated HSPF models and consultations with biologists on the effects of low-streamflow periods on stream biology.

The facility, as designed, consists of two stormwater vaults (one vault providing water to offset flow impacts in Walker Creek and one vault providing water to Des Moines Creek). Each of these vaults stores stormwater during the rainy season to be released during the summer low-streamflow periods with features that are unique to low-flow vaults. The extra features consist of additional outlets and controls, floating discharge structures to maintain constant discharge rates, varying configurations to manage sediments, and additional water quality management features (ventilation to facilitate aeration, provisions for filtration and mechanical aeration of discharges, and oil/water separation, as appropriate). Generally, water will be collected beginning in January of each year, and discharged from late July through October (with discharges continuing through November depending on the availability of water). Annual facility maintenance will take place in December of each year.

2. LOW STREAMFLOW ANALYSIS

2.1 APPROACH

2.1.1 Introduction

The low-streamflow analysis approach included the determination of the critical low-streamflow periods for each stream, determination of existing streamflow magnitudes (target streamflows), and the determination of impacts to each stream resulting from construction projects in the Master Plan Update for STIA. The evaluations of the summer low-streamflow periods and rates are described in Sections 2.1.2 and 2.1.3. A detailed modeling analysis was used to determine the impacts to streamflows during the summer low-streamflow periods. Modeling tools used include the calibrated Hydrologic Simulation Program – FORTRAN (HSPF; EPA 1997) models for Miller, Walker, and Des Moines Creeks. HSPF model calibration is described in Section 2.2, and detailed HSPF model and calibration information is contained in Appendices A and B (Volumes 2 and 3) of the SMP (Parametrix 2000a, 2001a). The impacts of the proposed third runway embankment were modeled using a combination of Hydrus (Simunek et al. 1999) and Slice models. The embankment modeling is described in Section 2.3, and the complete embankment modeling report (Pacific Groundwater Group 2001) is contained in Appendix B. Non-hydrologic impacts, including cessation of water withdrawals and removal of septic tank discharges, are described in Section 2.4. The total net summer low-streamflow impacts are summarized in Section 2.5.

2.1.2 Determination of Summer Low-Streamflow Period

Determination of the low-streamflow period for each stream was done by analyzing modeled streamflow from the calibrated HSPF model for each stream, which used 1994 (existing) land use conditions. This determination is summarized below, and supporting information is provided in Appendix I.

The 7-day low-flow period for each year (using 1994 flow conditions) in the 47-year period of record (1949 to 1995) for each stream was determined at points of compliance near the airport (200th Street in Des Moines Creek, SR 509 in Miller Creek, and at the outlet of the wetland near Des Moines Memorial Drive in Walker Creek). The 7-day low flow was selected as an indicator of persistent dry season flow. For example, summer low streamflows tend to decrease gradually; therefore, a shorter low-streamflow period is unlikely to result in significantly lower average flows or target flows. In addition, consultation with biologists concluded that summer low flows with durations of less than 2 weeks do not affect the carrying capacity of the streams or cause behavioral changes in salmonids (Appendix H).

The occurrences of the annual 7-day low-flow periods were plotted and a bar graph showing the distribution of the summer low-flow periods by date was developed for each stream. The summer low-streamflow period for each stream was selected to include all the historical 7-day low-flow occurrences.

2.1.3 Existing Summer Low Streamflows

The magnitude of existing summer low streamflow (target streamflow) in each stream was determined through analysis of the 7-day low-flow periods under existing (1994) conditions described above. The annual 7-day low flows for each stream were ranked, and recurrence intervals were determined based on this ranking using a cumulative density function (see Appendix I for supporting information). The 7-day low flow with a 2-year (50 percent) recurrence interval was selected as the streamflow target in each stream. The 2-year, 7-day low flow was selected because the magnitude of the estimated impact to 7-day low flows generally decreases with greater recurrence interval (i.e., the estimated reduction in the 7-day, 2-year-frequency low-flow rate is greater than that for the 7-day, 10-year-frequency low-flow rate). Therefore, providing mitigation equivalent to the 7-day, 2-year-frequency impact will provide mitigation sufficient to mitigate the more extreme summer low-streamflow events. Based on this analysis, the existing summer low streamflows (target streamflows) (7-day, 2-year frequency) were determined to be 0.33 cfs for Des Moines Creek, 0.77 cfs for Walker Creek, and 0.73 cfs for Miller Creek.

2.2 HSPF MODEL CALIBRATION

2.2.1 Overall Model

The computer program HSPF was used to simulate continuous watershed hydrology and to design stormwater detention facilities for the Port's Master Plan Update at STIA. Because the airport encompasses three watersheds, separate HSPF models for Miller, Walker, and Des Moines Creeks were developed. Hydrological modeling using HSPF requires the calibration of many parameters that describe the different hydrologic processes. These processes include:

- Rainfall runoff from pervious and impervious surfaces.
- Infiltration of rainfall to soils.
- Soil moisture accounting.
- Flow of groundwater from soils to streams.
- Loss of groundwater to deep aquifers.

Each of these physical processes is controlled by several parameters. The calibration process adjusts model parameters to achieve a close match between recorded streamflows and simulated streamflows for a period when streamflow data are available. Calibration of the HSPF models used for Miller, Walker, and Des Moines Creek watersheds is described in detail in Appendix B (Volume 3) of the SMP (Parametrix 2000a, 2001a).

2.2.2 Low-Flow Review

The overall HSPF model calibration effort did not focus specifically on low-streamflow periods. The low-flow analysis consisted of review of data from water-years 1991 through 1996, with the low-flow period considered to be June through November. This section summarizes the results of the overall HSPF model calibration for Miller, Walker, and Des Moines Creek watersheds as related to the low-flow analysis. Detailed information on the low-flow calibration review is provided in Appendix A.

2.2.2.1 Miller Creek Low Streamflow

Two streamflow gages located in the Miller Creek watershed were used in the low-streamflow analysis calibration review (Figure 2-1). One of these streamflow gages was located near the mouth of Miller Creek, and the other was located further upstream at the Miller Creek detention facility.

Average simulated and observed streamflows for each 7-day low-flow period during 1991 through 1996 are listed in Table 2-1 for the gage near the mouth and Table 2-2 for the gage at the Miller Creek detention facility. In general, the observed 7-day low flows exceeded the predicted 7-day low flows at both gages, particularly for the gage located at the Miller Creek detention facility.

Table 2-1. Miller Creek at the mouth, 7-day low flows for water-years 1991 through 1996.

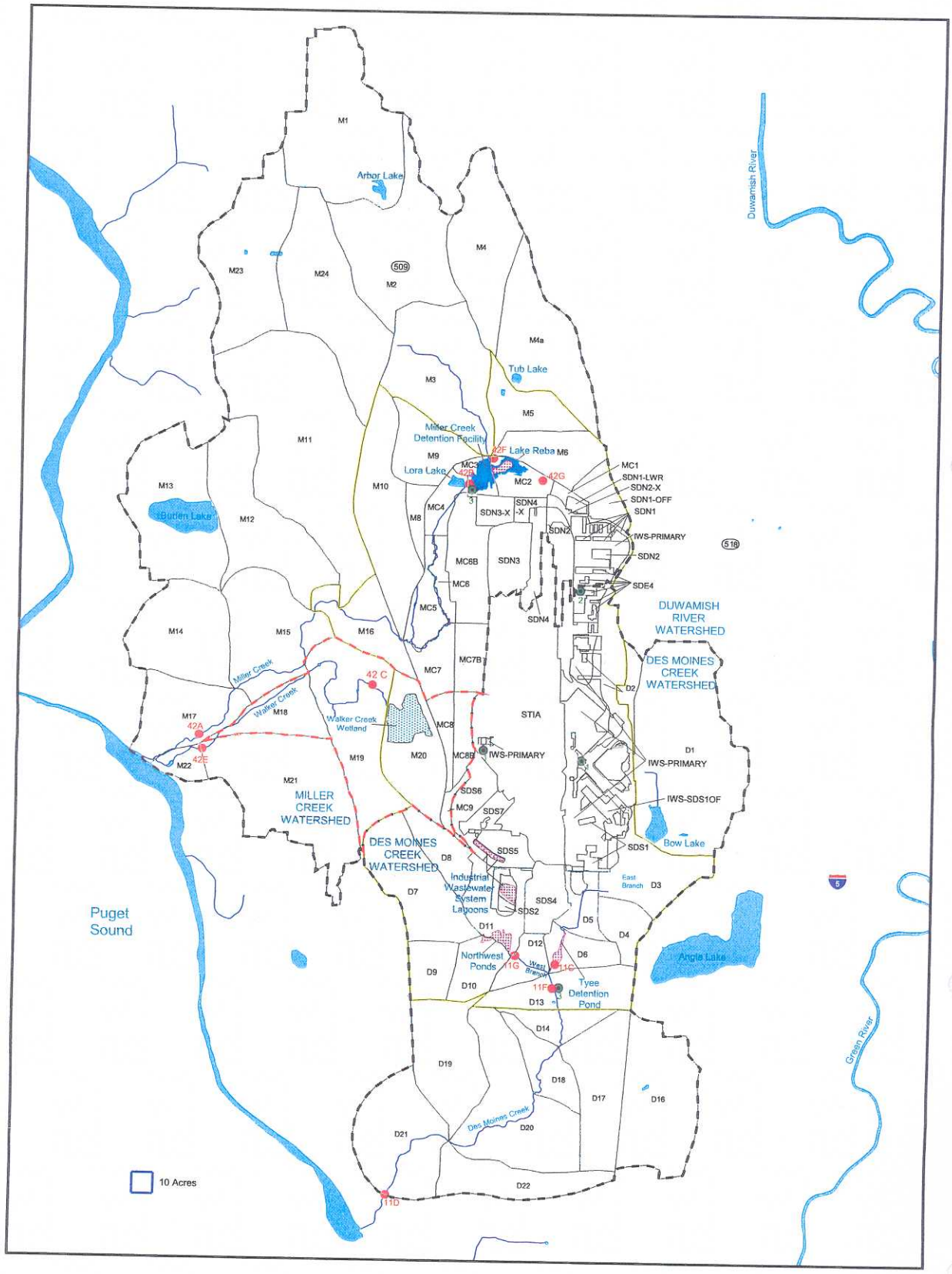
Water-Year	Observed Average Flow (cfs)	Calibrated Average Flow (cfs)	Difference (cfs)
1991	1.348	1.749	-0.401
1992	1.457	1.390	0.067
1993	1.639	1.300	0.339
1994	1.361	1.100	0.261
1995	1.500	1.661	-0.161
1996	2.762	2.138	0.624
Average Difference	**2.517**	**2.335**	**0.182**

Table 2-2. Miller Creek at the detention facility, 7-day low flows for water-years 1991 through 1996.

Water-Year	Observed Average Flow (cfs)	Calibrated Average Flow (cfs)	Difference (cfs)
1991	0.400	0.150	0.250
1992	0.127	0.124	0.004
1993	0.190	0.110	0.080
1994	0.000	0.090	-0.090
1995	0.183	0.137	0.045
1996	0.263	0.189	0.074
Average Difference	**0.291**	**0.200**	**0.091**

2.2.2.2 Walker Creek Low Streamflow

Two streamflow gages located in the Walker Creek watershed were used in the low-streamflow calibration review (see Figure 2-1). One of these streamflow gages was located near the mouth of Walker Creek, and the other was located further upstream near a wetland.



Parametrix, Inc. Sea-Tac Airport Stormwater Management Plan/556-2912-001(28) 6/00 File: K:\Gis\2912\Arcview\rrseatac-apdxa_may2001.apr
Source: Roads based on King County data. Water bodies derived from USGS hypsography data. Detention boundaries are approximate.
Note: Subbasin boundaries shown outside of STIA area are for illustration and reference only.
STIA subbasins assume existing (1994) conditions.

N

1000 0 1000 2000 Feet

1:36,000

- Roads
- Existing (1994) Drainage Subbasins
- STIA Area (see note)
- Constructed Water Features
- IWS Drainage Area
- Subwatershed Boundary
- Watershed Boundary
- Rivers
- Water Bodies
- Detention Facilities (existing)
- Precipitation Gaging Stations:
  - Type 1 - National Weather Service (Gage relocated 1996)
  - Type 2 - POS Rainfall Monitoring
  - Type 3 - King County Rainfall Monitoring
- Streamflow
  - King County Gaging Stations:
  - 42A - Miller Ck @ SW 175th Pl & 12th Ave SW
  - 42B - Miller Ck @ Lake Reba/RDF Outlet
  - 42C - Walker Ck @ 171st Pl
  - 42E - Walker Ck @ 12th Ave SW
  - 42F - Miller Ck @ SR518
  - 42G - Miller Ck @ East Branch
  - 11D - Des Moines Ck near mouth
  - 11F - Des Moines Ck @ Golf Course
  - 11C - Des Moines Ck @ Tyee Pond
  - 11G - Des Moines Ck @ NW Ponds

Figure 2-1
Map of Basins with Gage Locations

Average simulated and observed streamflows for each 7-day low-flow period are listed in Table 2-3 (1993 through 1996) for the gage near the mouth and Table 2-4 (1991 through 1996) for the gage near the wetland. In general, with the exception of 1995, the observed 7-day low flows exceeded the predicted 7-day low flows at both gages.

Table 2-3. Walker Creek at the mouth, 7-day low flows for water-years 1993 through 1996.

Water-Year	Observed Average Flow (cfs)	Calibrated Average Flow (cfs)	Difference (cfs)
1993	1.502	0.923	0.579
1994	0.987	0.833	0.154
1995	0.915	1.077	-0.163
1996	1.719	1.287	0.432
Average Difference	**1.281**	**1.030**	**0.250**

Table 2-4. Walker Creek near wetland, 7-day low flows for water-years 1991 through 1996.

Water-Year	Observed Average Flow (cfs)	Calibrated Average Flow (cfs)	Difference (cfs)
1991	1.208	0.786	0.422
1992	1.098	0.682	0.416
1993	0.800	0.666	0.134
1994	0.670	0.614	0.056
1995	0.256	0.750	-0.494
1996	0.896	0.870	0.026
Average Difference	**0.656**	**0.725**	**-0.069**

2.2.2.3 Des Moines Creek Low Streamflow

Two streamflow gages located in the Des Moines Creek watershed were used in the low-streamflow calibration review (see Figure 2-1). One of these streamflow gages was located near the mouth of Des Moines Creek, and the other gage (11c) was located further upstream.

Average simulated and observed streamflows for each 7-day low-flow period are listed in Table 2-5 (1992 through 1996) for the gage near the mouth and Table 2-6 (1991 through 1996) for gage 11c. In general, the observed 7-day low flows were close to the predicted 7-day low flows at the gage near the mouth, while the observed 7-day low flows at gage 11c exceeded the predicted 7-day low flows.

2.2.2.4 Summary

Low-streamflow analysis calibration review was performed for two gage locations in Miller, Walker, and Des Moines Creeks. Results generally indicated that calibrated low flows at the mouth of each stream were fairly good, while calibrated low flows at the upstream gages typically showed lower flows than observed flows. Groundwater conditions in each of the watersheds are somewhat speculative and may account for these discrepancies at the upstream gage locations.

Table 2-5. Des Moines Creek at the mouth, June through November 7-day low flows for water-years 1992 through 1996.

Water-Year	Observed Average Flow (cfs)	Calibrated Average Flow (cfs)	Difference (cfs)
1992	0.585	0.904	-0.318
1993	1.205	0.900	0.305
1994	0.600	0.700	-0.100
1995	1.284	1.000	0.284
1996	1.268	1.411	-0.144
Average Difference	**1.089**	**1.003**	**0.086**

Table 2-6. Des Moines Creek at gage 11c, June through November 7-day low flows for water-years 1991 through 1996.

Water-Year	Observed Average Flow (cfs)	Calibrated Average Flow (cfs)	Difference (cfs)
1991	0.300	0.100	0.200
1992	0.172	0.090	0.082
1993	0.133	0.100	0.033
1994	0.046	0.100	-0.054
1995	0.300	0.100	0.200
1996	0.301	0.100	0.201
Average Difference	**0.195**	**0.100**	**0.095**

2.3 EMBANKMENT MODELING

This section summarizes the modeling analysis done to estimate impacts of the proposed third runway embankment on streamflows in Miller and Walker Creeks. The complete report is included in Appendix B.

The third runway embankment will be constructed in the Miller and Walker Creek watersheds; therefore, this analysis was not conducted for Des Moines Creek. Impacts to the streamflows in Miller and Walker Creeks from the embankment were estimated to determine the overall impacts of the runway project. The HSPF models alone are not capable of accurately simulating groundwater flows of this type; therefore, additional modeling tools (Hydrus and Slice) were used to simulate flow through the proposed embankment in the Miller and Walker Creek watersheds. The embankment modeling expanded on a previous modeling effort (Pacific Groundwater Group 2000).

The approach used in areas to be covered by the embankment included: (1) calculating the recharge from the HSPF models using regional parameters; (2) modeling the variable saturated vertical flow within the fill using Hydrus; (3) modeling saturated, quasi-horizontal flow at the bottom of the embankment using Slice; (4) integrating the Slice results across the fill embankment; and (5) incorporating the results back into the Miller and Walker Creek HSPF models. This section summarizes steps two through four. Specific tasks included:

- Compiling model input, including:
  - Fill thickness and areal extent.
  - Hydrogeologic data for the fill area.
  - Embankment geometries as represented by three hydrogeologic cross-sections.
- Calculating daily flux into the fill based on recharge estimates.
- Calculating daily flux through the fill using Hydrus models.
- Calculating daily flux through the embankment drain layer and the underlying till using Slice models applied to each basin.

Existing geographic information system (GIS) coverages were used to determine pre-fill topography, "built" (post-construction) topography, and pavement distribution for the third runway. Fill thickness was calculated by subtracting GIS coverages of pre-fill topography from the "built" topography. Thicknesses ranged up to 160 ft, and were discretized into 20-ft sections for the Hydrus model.

Although the Des Moines Creek basin was not included in the analysis (because only a very small amount of runway embankment is in the Des Moines Creek basin), its boundaries were used to define the southern extent of the Walker Creek basin. Impervious areas comprised 36 and 38 percent of the modeled fill areas in Miller and Walker Creek basins, respectively.

Precipitation on the modeled fill area was used to calculate hourly runoff (SURO) from impervious surfaces (runway and taxiways) and hourly infiltration (AGWI) into pervious areas with a generic application of HSPF. Pervious areas were modeled as grass on flat outwash. This approach was selected, with agreement from Ecology and King County, to take advantage of HSPF's superior evapotranspiration (ET) and runoff modeling capabilities. For pervious areas, the generic HSPF model yielded hourly volumes of water that infiltrate beyond the bottom of the root zone (AGWI) and therefore constitute groundwater recharge. That calculation was applied to filter strips and other pervious areas. A separate calculation then estimated the extent to which runoff from impervious surfaces would also infiltrate, or conversely, runoff from, the filter strips. The total amount of infiltration into filter strips (a portion of AGWI and SURO) and other pervious areas (AGWI only) was then used as input to the Hydrus models. Calculated runoff was accounted for but not used in groundwater modeling.

Hydrus simulates the vertical spreading of recharge fronts as they are predicted to move downward through the proposed embankment fill. Hydrus models were set up to simulate a total of 12 vertical profiles of varying thicknesses for the proposed embankment (eight in the Miller Creek watershed and four in the Walker Creek watershed). Model timesteps were optimized by Hydrus, which were typically on the order of 0.1 day. The models were run for water-years 1984 through 1994, with only the last 4 water-years comprising the test period. Hydrus results indicated that substantial lagging and dampening (spreading) of seasonal recharge is likely within the fill, with the amount of lagging and dampening increasing with increasing fill thickness. Discharge at the bottom of the fill is predicted to occur throughout the year. Hydrus output was used as recharge input to the Slice models.

Three finite-difference Slice models were developed to simulate horizontal and vertical groundwater flow within the embankment drain layer and existing soils below the embankment. Slice configurations were based on subsurface data contained in available geotechnical and hydrogeologic reports and from the pre-fill and "built" topography of the third runway area. Slice alignments were located based on the availability of subsurface data describing the range of hydrogeologic and fill conditions in the embankment area. The Slice models were used to accumulate recharge in the shallow water table aquifer and move it downgradient to the Miller Creek or Walker Creek wetlands under the "built" conditions.

Slice 1 is located through the thickest portion of the fill embankment. Slice 2 is located near the northern end of the proposed third runway and represents an intermediate fill thickness. Slices 1 and 2 are both located in the Miller Creek basin. Slice 3 is located in the Walker Creek basin and represents an intermediate fill thickness. Locations and cross-sections of each Slice are provided in Appendix B.

Model results show that the lagtime (seasonal delay) between drain recharge peaks and drain outflow peaks is controlled by the width of fill along the groundwater flowpath represented by a slice, and are also likely influenced by the varying spatial distribution and timing of recharge inflow along each slice.

Groundwater discharge quantities for Miller and Walker Creeks were calculated by multiplying unit-width flow quantities from each representative Slice model by an effective basin length. The effective basin length associated with each slice depends on the length of the basin with characteristics similar to the slice (i.e., thickness and lateral extent). This process integrated the Slice results over the entire length of the embankment.

Estimated annual maximum drain outflows from the fill in the Walker Creek basin for the test period ranged from approximately 1,500 to 3,500 cubic feet per day (cfd). Maximum integrated fill seepage rates from below the embankment in the Walker Creek basin range from approximately 2,200 to 2,400 cfd in the 4-year test period. Estimated annual maximum drain outflows from the fill in the Miller Creek basin for the test period range from approximately 8,000 to 18,000 cfd. Integrated fill seepage rates from below the embankment in the Miller Creek basin range from approximately 7,000 to 16,000 cfd. All results of the embankment modeling analysis are discussed in detail in Appendix B.

2.4 NON-HYDROLOGIC IMPACTS

The following subsections describe non-hydrologic impacts, including cessation of water withdrawals and removal of septic tank discharges. Additional supporting information for the non-hydrologic impacts is provided in Appendix D.

2.4.1 Cessation of Water Withdrawals

Based on assumptions regarding residential and farm property uses of water rights described in the SMP (Parametrix, Inc. 2000a, 2001a), it was concluded that historic irrigation season consumption totaled 0.042 cfs within the Miller Creek buy-out area. Table 2-7 summarizes the withdrawal estimates following consultation with former owners.

Table 2-7. Updated estimate of historic Miller Creek water withdrawals.

Parcel	Last Name	Available Pumping Rate (gpm)	Acres	Months of Use Per Year	Estimated Pumping Rate (gpm)	Updated Usage Estimate (cfs)	Comments from Owner Consultations
068R	Genzale	2.5	4	5	0.52	0.001	4 acres, 2.5 gpm June to mid-October
185R	Berry	5	1	6	1.25	0.003	Less than 1 acre, summer only
244R	Randall	5	0.5	6	1.25	0.003	Only in summer/garden
097R	Smith	20	0.6	4	3.33	0.007	Pump 4 months for orchard, lawn and garden
311R	Rhoton	5	1.7	6	1.25	0.003	Water in summer - unknown quantity
316R	Roullard	0	0.25			0.000	1940-1960 maximum, 1990's no water usage
050R	Eisiminger	0	0.75			0.000	None to very little
246R	Galando	0	3.5			0.000	Unknown - doesn't remember pumping water
093R	Raffo	0				0.000	
055R	Mason	0				0.000	Municipal water
060R	Vacca	0				0.000	Municipal water
061R	Vacca	0				0.000	Municipal water
143R	Brate	0	1			0.000	Water right not used
182R	Illes	0	1			0.000	Water right not used
253R	Kobela	0	0.5			0.000	Water right not used
298R	Warner	0				0.000	Water right not used
302R	Lopez	0				0.000	Water right not used
062R	Scarsella	0	1.2			0.000	Water right not used
142R	Wind of the Willows	0	0.75			0.000	Water right not used
214R	Kamp	20		6	5	0.011	
321R	Beaudin	20		6	5	0.011	
088R	Goodmansen					0.000	
322R	Longridge	4.5		6	1.12	0.003	
TOTAL						**0.042**	

2.4.2 Removal of Septic Tank Discharges

Many of the residential properties in the buy-out area within Miller and Walker Creek watersheds were served by active septic systems during the pre-project conditions in 1994. These septic systems received water imported from outside of the watershed through water districts and discharged effluent through drain fields that recharge groundwaters that contribute flows to the

streams. Within the buy-out area, available records show that there were 41 residences actively served by septic systems in the Walker Creek basin, and there were 236 residences actively served by septic systems in the Miller Creek basin. Table 2-8 summarizes septic system counts for the pre-project condition analysis.

Table 2-8. Active buy-out area septic systems under pre-project conditions.

	Miller Creek	Walker Creek	Total
Residences with septic systems	249	42	291
Inactive systems (served by sewer)	13	1	14
Active septic systems	236	41	277

Based on consultation with water districts serving the buy-out area, it was concluded that winter residential water consumption averaged approximately 975 cf per month, while summer consumption averaged approximately 1,450 cf per month. The flow effectively discharged from each septic system to groundwater was estimated to equal 90 percent of the average winter water consumption, or 878 cf per month. Consistent with the hydrologic modeling of the Walker and Miller Creek basins for the SMP, approximately 30 percent of this recharge would be lost to the deeper aquifer and not available for discharge to the stream; therefore, the effective rate of base flow contribution to a stream from a residential septic system in 1994 was estimated to be 70 percent of the 878-cf-per-month septic-system discharge, or 614 cf per month.

Applying this recharge rate to the 41 active septic systems in Walker Creek produces an average daily contribution to streamflow of 0.0100 cfs. For the 236 active septic systems in Miller Creek, the resulting average daily contribution would be 0.0574 cfs.

2.4.3 Summary of Non-Hydrologic Impacts

For Miller Creek, the combined non-hydrologic impacts to low streamflows from Port projects includes a 0.06-cfs reduction (rounded from 0.0574) from discontinued septic tank discharges, and a 0.04-cfs increase (rounded from 0.042) in low flows due to cessation of water withdrawals. The net non-hydrologic impact for Miller Creek is a 0.02-cfs reduction in low streamflows. For Walker Creek, the non-hydrologic impact to low streamflows from Port projects is a 0.01-cfs reduction from discontinued septic tank discharges.

2.5 SUMMARY OF NET IMPACTS TO CREEKS

2.5.1 Summary of Flow Impacts

The net effects to flow during the summer low-streamflow periods were determined by comparing the modeled streamflow before project construction to modeled streamflow after project construction, with non-hydrologic impacts included as appropriate. Based on the analyses described in Sections 2.1 through 2.4, total net summer low-streamflow impacts that the Port proposes to offset throughout the summer low-streamflow periods are shown in Table 2-9. The net flow impact results are summarized in Sections 2.5.1.1 through 2.5.1.3 for each stream.

Table 2-9. Total net summer low-streamflow impacts.

Stream	Hydrologic Impact (cfs)	Non-Hydrologic Impact (cfs)	Total Net Streamflow Impact (cfs)
Miller Creek	+0.03	-0.02	+0.01
Walker Creek	-0.10	-0.01	-0.11
Des Moines Creek	-0.08	0.00	-0.08

2.5.1.1 Miller Creek Summary

HSPF was used to evaluate the change in low streamflow from 1994 to 2006 conditions. The Miller Creek HSPF modeling information and data, including land use tables and HSPF input files, are provided in Appendix A. Groundwater basin boundaries for Miller Creek were located to allocate the groundwater flow contributions (Appendix A).

In Miller Creek, the analysis of low streamflows needed to account for the effects of discharges from the proposed runway embankment to fully account for future post-project conditions. In areas where embankment is proposed, the quantity of precipitation infiltrating into the embankment was calculated using the 2006 condition HSPF model. The recharge was then input to the Hydrus and Slice models, which simulated the spreading of recharge fronts vertically through the embankment and laterally through the underdrain layer. Output from the Hydrus and Slice models was then input back into the HSPF model to determine the quantity and timing of discharge from the underdrain layer and the effects on contributions to low streamflows in Miller Creek. The embankment fill modeling using the Hydrus and Slice technique is described in Section 2.3, and the complete embankment modeling report (Pacific Groundwater Group 2001) is contained in Appendix B.

To assess the low-streamflow impacts in Miller Creek, the pre- and post-project conditions were modeled for 1991 through 1994. This period was selected as a representative dry period in the precipitation record during which stream gage data is available for Miller Creek. Output from the HSPF model was analyzed to determine the annual 7-day low streamflows for each of the 4 years. To determine the impact between 1994 low streamflows and 2006 flows, the 1994 and 2006 7-day low-flow values were plotted by their probability positions corresponding to the same probability positions of the years 1991 through 1994 in the 1994 pre-project condition (the full period of record [1949 to 1995] was simulated to determine the 50^{th} percentile 7-day low flow). The separation of the 1994 and 2006 plot positions at the 50 percent probability was used as the low-flow impact requiring mitigation. The 1994 condition 50^{th} percentile 2-year, 7-day low streamflow is 0.73 cfs, and the corresponding 2006 condition 50^{th} percentile low streamflow is 0.76 cfs. Therefore, in Miller Creek, the estimated low-streamflow hydrologic impact due to the Port's projects, including effects of discharge from the embankment, is an increase of 0.03 cfs.

Combining the non-hydrologic impact (-0.02 cfs, as described in Section 2.4) with the hydrologic impact results in a total net summer low-streamflow increase of 0.01 cfs for the Miller Creek basin. Since there is not a reduction in low flows, no low-flow mitigation is proposed. However, monitoring and contingency measures described in Section 5 will apply in Miller Creek.

2.5.1.2 Walker Creek Summary

HSPF was used to evaluate the change in low streamflow from 1994 to 2006 conditions. The Walker Creek HSPF modeling information and data, including land use tables and HSPF input files, are provided in Appendix A. Groundwater basin boundaries for Walker Creek were located to allocate the groundwater flow contributions (Appendix A).

In Walker Creek, the analysis of low streamflows needed to account for the effects of discharges from the proposed runway embankment to fully account for future post-project conditions. In areas where embankment is proposed, the quantity of precipitation infiltrating into the embankment was calculated using the 2006 condition HSPF model. The recharge was then input to the Hydrus and Slice models, which simulated the spreading of recharge fronts vertically through the embankment and laterally through the underdrain layer. Output from the Hydrus and Slice models was then input back into the HSPF model to determine the quantity and timing of discharge from the underdrain layer and the effects on contributions to low streamflows in Walker Creek. The embankment fill modeling using the Hydrus and Slice technique is described in Section 2.3, and the complete embankment modeling report (Pacific Groundwater Group 2001) is contained in Appendix B.

To assess site low-streamflow impacts in Walker Creek, the pre- and post-project conditions were modeled for 1991 through 1994. This period was selected as a representative dry period in the precipitation record during which stream gage data is available for Walker Creek. Output from the HSPF model was analyzed to determine the annual 7-day low streamflows for each of the 4 years. To determine the impact between 1994 low streamflows and 2006 flows, the 1994 and 2006 7-day low-flow values were plotted by their probability positions corresponding to the same probability positions of the years 1991 through 1994 in the 1994 pre-project condition (the full period of record [1949 to 1995] was simulated to determine the 50^{th} percentile 7-day low flow). The separation of the 1994 and 2006 plot position at the 50 percent probability was used as the low-flow impact requiring mitigation. The 1994 condition 50^{th} percentile 2-year, 7-day low streamflow is 0.77 cfs, and the corresponding 2006 condition 50^{th} percentile low streamflow is 0.67 cfs. Therefore, in Walker Creek, the estimated low-streamflow impact due to the Port's projects, including the effects from discharge from the embankment, is 0.10 cfs.

The combined hydrologic and non-hydrologic impact to low streamflows is the sum of the 0.10-cfs hydrologic reduction and a 0.01-cfs reduction from discontinued septic system discharges, for a total reduction of 0.11 cfs. This flow rate equates to the magnitude of offset flow that will be provided during the low-streamflow period for Walker Creek.

2.5.1.3 Des Moines Creek Summary

HSPF was used to evaluate the change in low streamflow from 1994 to 2006 conditions. The Des Moines Creek HSPF modeling information and data, including land use tables and HSPF input files, are provided in Appendix A. Groundwater basin boundaries for Des Moines Creek were located to allocate the groundwater flow contributions (Appendix A).

In Des Moines Creek, 2006 land use conditions ("post-project") were modeled for the full 1949 to 1995 period of record. The 7-day low flow for each year was selected and ranked, and the

streamflow with a 2-year recurrence interval was determined. In Des Moines Creek, the 2-year post-project summer low streamflow is 0.26 cfs[2]. The impact to streamflow from proposed Port projects is the difference between this flow and the existing pre-project 2-year, 7-day summer low streamflow described above, as determined from the modeled 1994 ("existing") land use conditions (0.33 cfs[2]). The difference between 1994 and 2006 flows is 0.08 cfs[2]. This flow rate is the magnitude of offset that will be provided during the summer low-streamflow period for Des Moines Creek.

2.5.2 Summary of Water Level Impacts

If not mitigated, one impact of reduced streamflow during the summer low-rainfall season would be reduced water depth in the project area streams. To determine the estimated flow depth changes during low-flow periods before and after construction of Master Plan Update projects, a HEC-RAS model was prepared. Detailed HEC-RAS modeling information and associated field survey data are provided in Appendix E.

The HEC-RAS model was used to predict the water depth in the streams at different flow rates. Rating curves (flow rate versus flow depth) were developed for Miller, Walker, and Des Moines Creeks (Figures 2-2, 2-3, and 2-4). These curves were used to predict the water depth for flows before (1994) and after (2006) construction to determine the potential impacts to the stream from flow reduction during low-flow periods (if not mitigated).

The HEC-RAS model was developed using representative surveyed cross-sections from Miller, Walker, and Des Moines Creeks. The sections were repeated in the model at gradually higher elevations (moving downstream to upstream) corresponding to the measured stream profile. Downstream water depths were calculated by the model using the normal depth routine. Flow rates for each stream correspond to the general range of flows from the lowest modeled by the HSPF model to the greatest 7-day low flow during the period of rainfall record. Channel roughness was assumed to range from 0.025 to 0.035 based on observation of channel characteristics.

The estimated average change in water depths between the 1994 and 2006 2-year, 7-day low flows are summarized in Table 2-10. In addition, the corresponding estimated average change in stream widths between the 1994 and 2006 2-year, 7-day low flows are summarized in Table 2-10. The magnitude of these water depth and width changes are graphically illustrated, to scale, in Figure 2-5.

Table 2-10. Changes in average water depths and widths between the 1994 and 2006 2-year, 7-day low flows (not accounting for low flow mitigation).

Creek	Total Net Streamflow Impact (cfs)	Depth		Width	
		Average change (ft)	Average change (mm)	Average change (ft)	Average change (mm)
Miller	+0.01	+0.00	0	+0.02	+6
Walker	-0.11	-0.01	-3	-0.10	-30
Des Moines	-0.08	-0.03	-9	-0.33	-101

[2] Actual values are 0.334 (1994) and 0.257 (2006), for a difference of 0.077, which was rounded to 0.08.

Figure 2-2: Flow Rate Versus Depth Curve for Miller Creek

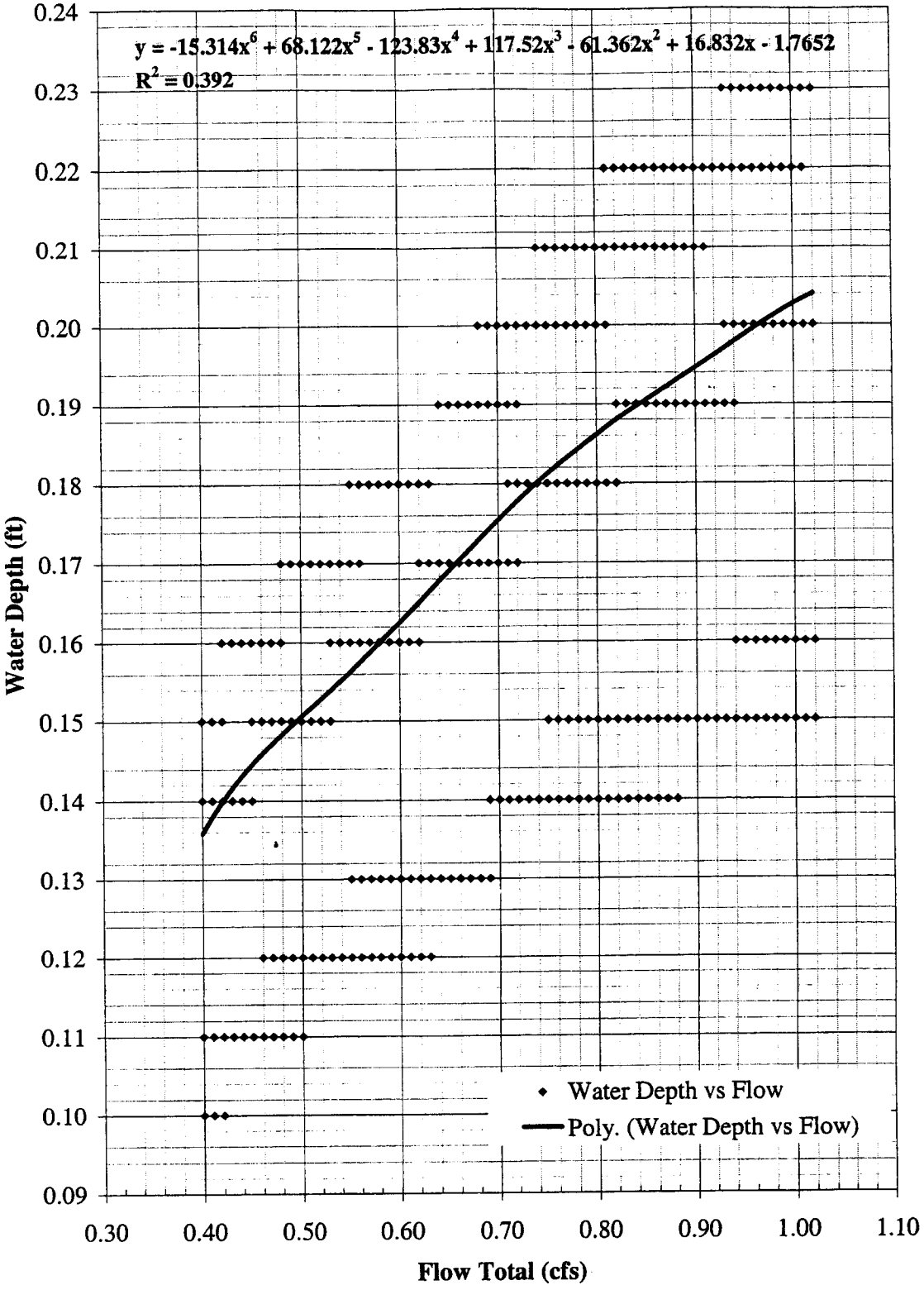


Figure 2-3: Flow Rate Versus Depth Curve for Walker Creek

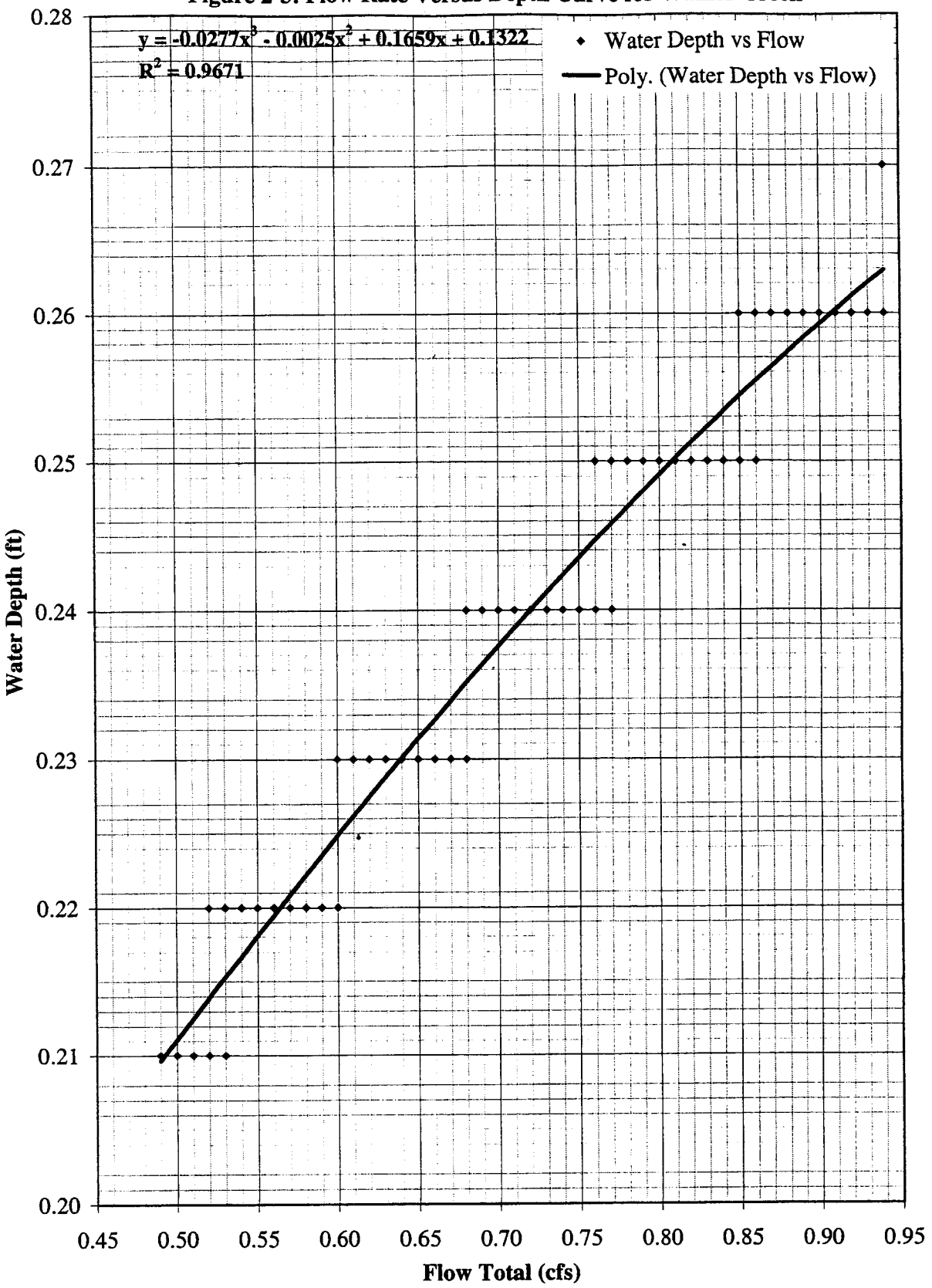
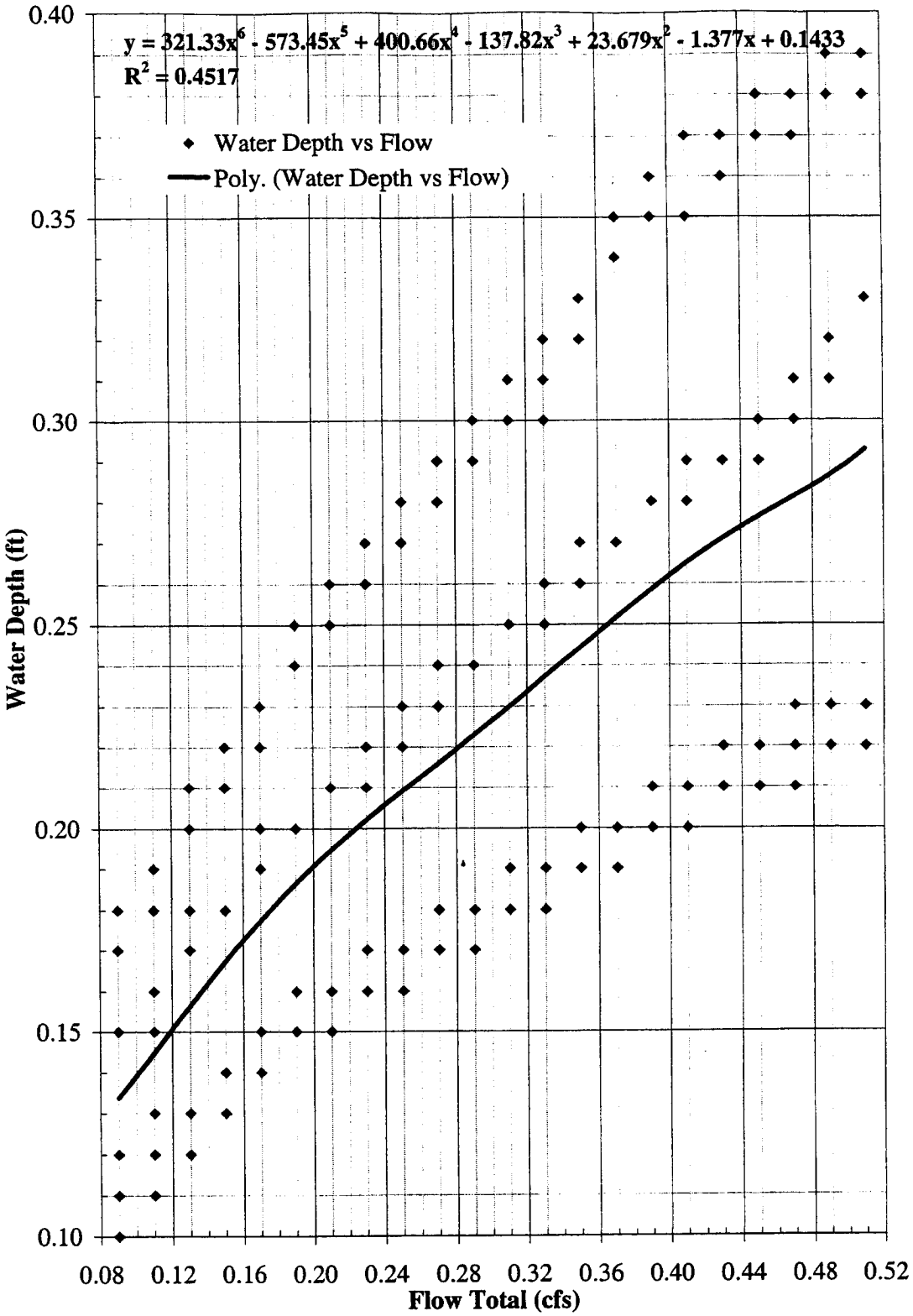


Figure 2-4: Flow Rate Versus Depth Curve for Des Moines Creek



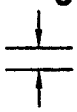
Miller Creek

Change in Channel Low Flow Depth = 0.00 ft (0 mm)

Change in Channel Low Flow Width = +0.02 ft (+6 mm)

Walker Creek

Change in Channel Low Flow Depth = -0.01 ft (-3 mm)



Change in Channel Low Flow Width = -0.10 ft (-30 mm)

Des Moines Creek

Change in Channel Low Flow Depth = -0.03 ft (-9 mm)

Change in Channel Low Flow Width = -0.33 ft (-101 mm)

FILE: K:\CAD\2912\55291201\Task 28\Low flow impacts fig.dwg
DATE: 12/10/01

0 0.5" 1"
DRAWING TO SCALE

Figure 2-5
Changes in Average Water Depths and Widths Between the 1994 and 2006 2-Year, 7-Day Low Flows (Not Accounting for Low-Flow Mitigation)

3. MITIGATION PROPOSAL

3.1 INTRODUCTION OF APPROACH

Hydrologic modeling of the airport drainage areas to determine the potential impacts of Master Plan Update projects, combined with the embankment modeling described in Section 1.3, demonstrate the magnitude of potential low-streamflow impacts due to the construction of Master Plan Update projects. To mitigate these impacts, the Port will collect excess runoff from impervious surfaces during winter storms and reserve that stormwater for discharge during the defined summer low-flow period. This mitigation plan includes the following components:

- Low-flow mitigation performance standards.
- Determination of the season and duration for low-flow mitigation.
- Sizing and location of storage vaults.
- Water quality design aspects.

The proposed mitigation plan is described in the following selections. In addition, a pilot program to test the efficacy of this mitigation approach is described in Section 3.6.

3.2 PERFORMANCE STANDARDS

The overall goal of the Flow Impact Offset Facility is to provide water to Walker and Des Moines Creeks at rates and times equal to the impacts to streamflows calculated by the low-flow analysis. The following measurable performance standards have been developed in order to facilitate meeting this goal:

- To fill the vaults during the rainy season according to the analysis provided in Section 3.3.
- To provide flow at the rates specified in Section 2.5.1 for the entire annual low-flow period each year for each stream (July 24 through October 24 in Des Moines Creek; August 1 through October 31 in Walker Creek).
- To provide flow for additional periods (throughout the month of November) using water remaining in the vaults at the end of the low-flow period.
- To operate the facility in a manner to prevent instream water quality violations caused by operation of the facility.
- To design, operate, and maintain the facility so an adaptive management strategy can be applied.

3.3 WATER QUANTITY – VAULT SIZING ANALYSIS

The vault sizing and vault fill time analyses are summarized below. Additional information and data are provided in Appendices I and J.

3.3.1 Vault Sizing

Vault size was determined by calculating the vault volume necessary to fulfill the required mitigation during the 92-day mitigation period for each stream for each year in the period of record from 1949 to 1995, and selecting the year requiring the largest vault volume as the 'worst case' scenario. The vault size equation returns a daily update of constant mitigation flow accumulation modified by any rainfall recharge. This calculation was repeated for each day in the mitigation period using the previous day's total as a starting point.

The HSPF hydrologic model was used to calculate the rainfall recharge volume generated by runoff from the impervious surface area tributary to the flow mitigation vaults. The intent of the simulation was to account for the reduction in runoff volume due to surface retention and evaporation effects. Flow routing also impacts the timing of the flow to the vaults. The hydrologic parameters, precipitation data, and evaporation data developed for the Des Moines Creek calibration model were used in the impervious surface runoff file. No pervious surfaces were simulated in the model. The HSPF vault sizing input file is included in Appendix J.

The mean, median, minimum, and maximum of the largest vault size necessary within a year were calculated from all years in the period of record from 1949 to 1995. The maximum value was used to determine the size of the storage facility necessary to fulfill the mitigation needs for each stream basin (Table 3-1).

Table 3-1. Summer low flow impact offset maximum vault sizes.

Basin	Vault Size (acre-ft)
Walker Creek	19.0[a]
Des Moines Creek	13.5

[a] Analysis determined 18.5 acre-ft; concept design used 19.0 acre-ft.

3.3.2 Vault Fill Time

The vault fill time calculation records the number of days required to fill a vault to the storage capacity needed on the first day of the mitigation period, for all years in the full record (1949 to 1995) using historical precipitation records and impervious surface areas. Fill time for storage vaults was calculated as the number of days required to fill an empty vault from its close date to the fill limit determined in the vault size calculations. Beginning on the close date and using the previous day's volume as a starting point (zero on the first day), runoff (as calculated by the HSPF recharge model, see Appendix J) was added to the vault. When runoff from storm events filled a vault to the maximum fill volume, the number of days necessary to reach that volume was recorded. The vaults in Des Moines and Walker Creeks were assumed to begin filling on January 2nd.

The mean, median, minimum, and maximum number of days were calculated from the number of days necessary to fill the vault in the period of record from 1949 to 1995 (Table 3-2).

Table 3-2. Low flow vault fill time estimates.

	Estimated Vault Fill Time (days)			
Basin	Mean	Median	Minimum	Maximum
Walker Creek	71	60	22	213
Des Moines Creek	11	8	1	38

3.4 WATER QUALITY DESIGN

3.4.1 Introduction

Ecology has defined standards for water quality related to stormwater release, including periods of low flow. Ecology has jurisdiction to monitor and enforce these standards through their National Pollution Discharge Elimination System (NPDES) Permit. These standards include turbidity, dissolved oxygen (DO), temperature, and dissolved metals. The Port's current stormwater design plans for the third runway construction include a stormwater system and operational procedures to provide the storage and managed release of stormwater during low-flow periods. These stormwater storage facilities employ biofiltration strips, catchbasins, detention pond, and vaults to meet current King County water quality requirements. In addition, the facilities are designed to be retrofitted according to the Ecology Stormwater Management Manual (Ecology 2001) if specific water quality concerns are identified during post-construction monitoring. The Port's monitoring and reporting program (see Section 5) is proposed to assess the performance of the facilities, allowing adaptive management to be used in the implementation of additional water quality measures to ensure that standards will continue to be met.

Des Moines, Miller, and Walker Creeks are all assumed to be Class AA (extraordinary) waters (WAC 173-201A-030). As such, the water quality standards discussed in this report are those listed for Class AA water bodies, which are the most stringent standards. Water quality standards for metals are based on toxicity, are independent of the receiving water classification, and are listed in WAC 173-201A-040 (Toxic Substances). Ecology has started the process to potentially revise state water quality standards. The Port will continue to evaluate the proposed changes as part of the final design process and make any needed changes to the facility.

The state water quality standards applicable to the managed release of stormwater to offset flow impacts are discussed below. Specific design features, assumptions, and other information considered in the design of the facility are included. Operational and monitoring proposals are presented in Sections 4 and 5 of this report. References to stormwater vaults refer only to those vaults proposed to detain stormwater to offset impacts to streamflows. Likewise, references to stormwater and stormwater discharges refer only to the managed release of stormwater to offset flow impacts.

All of the stormwater that will be released to offset the impacts during summer low-flow periods will be collected from new and existing airfield areas. The airfield is a highly managed controlled-access area, and generates stormwater that is generally cleaner than typical urban stormwater (Port of Seattle 2000a).

3.4.2 Turbidity

The state water quality standard for turbidity in class AA waters is a two-tiered standard. For receiving water with turbidity less than or equal to 50 NTU (background flow), discharged water may not increase the receiving waters more than 5 NTU over background. For receiving water with turbidity greater than 50 NTU, discharged water may not increase turbidity of the receiving waters more than 10 percent. Turbidity levels in the streams vary between less than 5 NTU to over 1,000 NTU. The lowest turbidity levels in the streams generally occur during low streamflow (base flow) conditions, which correspond to the majority of periods when the stormwater would be released to the streams to offset flow impacts. It is assumed that the releases of stormwater to offset flow impacts would have to meet the 5 NTU standard most, if not all, of the time. To minimize the need to provide constant background level monitoring of the stream above and below the release locations, releases will be limited to 5 NTU or less to ensure compliance at all times.

There are several operational considerations and water quality BMPs in place at the airport to reduce the sediment and turbidity levels in runoff water going into stormwater storage. The Port uses catchbasins, the Industrial Wastewater System (IWS), and biofiltration strips as BMPs on the existing airfield, and the SMP proposes to retrofit the existing airfield with additional sediment trap BMPs in the bottom of each new detention vault facility. The new airfield surface will incorporate similar BMPs to minimize the amount of sediment and suspended solids that could potentially get into the stormwater vaults. The primary BMP consists of the construction of biofiltration strips in the new and existing airfield areas that treat stormwater as it drains directly from impervious areas of runways and taxiways. The Port will also maintain catchbasins to ensure they continue to trap sediments. Filter strips are already in place in the existing Taxiway "C" airfield area that drains to the stormwater vault (SDS3A) located in the Des Moines Creek watershed (see Section 7 in the SMP). In addition, the airfield is a controlled area subject to very low levels of travel by ground vehicles and frequent cleaning and inspection for debris that could be harmful to aircraft. Consequently, the airfield is generally much cleaner than most urban areas that generate stormwater runoff.

There are also operational procedures outlined in the airport's Stormwater Pollution Prevention Plan (SWPPP) that will minimize opportunities for sediment and suspended solids to enter the stormwater vaults. These include:

- Sweeping ramp areas several times per week.
- Annual inspection of catchbasins and cleaning if the depth of sediment equals or exceeds one-third the depth from the bottom of the basin to the invert of the lowest pipe.
- Proper storage and disposal of sediment removed from catchbasins.
- Hydroblasting of runway skid-mark rubber. Water and removed rubber is vacuumed by the same machine, drained, and deposited at the decant station until disposed as solid waste.

All of these BMPs will limit the amount of sediments and suspended solids that enter the stormwater vaults, and therefore will reduce the turbidity of the water stored in the vaults and discharged to the streams.

All of the proposed stormwater vaults, including those associated with the Flow Impact Offset Facility, employ features designed to provide treatment (settling and removal) of suspended solids and turbidity. These features include:

- Dividing the dead storage area (similar to the areas in the vaults where the stormwater detained to offset flow impacts will be held) into several compartments by constructing short walls within the dead storage area of each vault. The compartments provide areas for suspended solids to settle out and be contained. Each compartment's outlet will be configured so that the suspended solids are captured in the compartments during low-flow release periods. Design considerations of this type are typically included in stormwater vaults. Details will be provided at final design of the stormwater vaults.

- The vaults will include an extra 6-inch depth for the first third of the bottom (minimum) to facilitate trapping sediment that reaches the vault.

- The inlets and outlets in the vaults will be configured to minimize disturbance of sediments and floatables within the vaults. This will be done by locating the inlets and outlets within the middle third of the reserved storage depth. Outlets will incorporate a floating design to accomplish this, as well as to maintain a consistent discharge rate.

- Maintenance of the vaults will remove and properly dispose of collected sediments outside of the anticipated low-flow release periods.

- The vaults will be designed to allow installation of additional water quality measures, if needed. Additional water quality features may include filtration of the discharges, oil/water separators, or aeration.

The design of the stormwater vaults, in combination with the operational and monitoring considerations discussed below, will ensure that release of stormwater will not cause violations in the turbidity standards. The Port is currently investigating filtration of stormwater associated with discharges from a landside drainage basin. This research includes determining the effectiveness of several filtration media in treating the stormwater. The results of this study will be completed before final design of the flow offset facilities, and the data will be used to select the filtration method most appropriate to treat the stormwater discharge, if needed.

3.4.3 Temperature

The state water quality standard for temperature in class AA waters is not to raise the temperature of the receiving water to over 16 degrees Celsius (°C). If the baseline temperature of the receiving water is greater than or equal to 16°C, then discharges cannot raise the temperature more than 0.3°C. To date, Ecology has not applied these requirements to stormwater discharges, although they have required temperature monitoring of certain stormwater discharges. Ecology could apply the temperature standard to future stormwater discharges.

The highest annual temperatures in the streams are usually reached during the summer months, which is the period when the Flow Impact Offset Facility is expected to be in operation. Solar radiation is the primary mechanism by which stormwater temperatures increase in detention ponds. Since the stormwater vaults are typically underground structures, there will generally be no direct

solar warming. Underground storage provides a constant temperature that will be lower than open storage facilities, more closely matching a native groundwater seep temperature. Water released from the Flow Impact Offset Facility is not expected to increase instream water temperatures. Since the proposed underground stormwater vaults will result in relatively cool water being discharged, no special design considerations are proposed to manage water temperatures in the vaults associated with the Flow Impact Offset Facility.

The Port has begun to collect water temperature data from existing stormwater vaults and in the streams in order to characterize the expected temperatures of the reserved stormwater discharges. Commencing in the summer of 2001, average daily water temperature data is being collected from the NEPL vault and the SDS3A vault located near the south end of the airfield. Data will be collected from June though October of each year from the dead storage area of each vault. These existing vaults were selected because they are similar in size to the proposed stormwater volumes associated with the Flow Impact Offset Facility. The NEPL vault is partially exposed to sunlight (on its west side and top), while the SDS3A vault is completely underground. By collecting temperature data from both vaults, a range of expected temperatures will be established. Temperature data will be collected from the dead storage zone in each vault in order to approximate the vaults associated with the Flow Impact Offset Facility. This data will be compared to stream temperature data also being collected by the Port to characterize any cooling effects of stormwater releases on water temperatures in the streams.

3.4.4 Dissolved Oxygen

The state water quality standard for DO in Class AA waters is 9.5 milligrams per liter (mg/l). Low DO levels in streams during summer low-flow periods is a potential water quality concern. The Flow Impact Offset Facility will be designed and operated in a manner that will not decrease the DO levels in the streams, and under typical conditions, may act to increase DO levels in the streams.

It is anticipated that DO levels in the stormwater vaults should not be significantly reduced while the water is stored. There should be little, if any, biological activity in the vaults that could consume oxygen as a result of the lack of sunlight and the low biological oxygen demand (BOD) typically seen in stormwater runoff from the airfield (Port of Seattle 2000a). The infrequent and short-lived episodes of elevated BOD due to runway de-icing activities are not expected to impact the DO concentrations of the stormwater detained in the Flow Impact Offset Facility because the stormwater associated with these events moves through the stormwater management system in a matter of hours, is replaced with runoff with the low BOD concentrations more typical of airport runoff (Port of Seattle 2000b), and typically happens during the winter months when reserved stormwater releases from the Flow Impact Offset Facility would not take place. In addition, the Port operates BMPs to move snow containing de-icing chemicals (a potential source of BOD) from the airfield to snowmelt areas that drain to the IWS, further reducing the BOD in water that drains to stormwater vaults.

Vents will be included in the stormwater vaults associated with the Flow Impact Offset Facility to allow for the circulation of fresh air. This will help maintain the dissolved oxygen concentration of the stormwater.

An additional design consideration is the positioning of the inlet(s) to the stormwater vaults associated with the Flow Impact Offset Facility. The inlet(s) will be placed as low as possible in the

vault (consistent with the inlet placement parameters in the turbidity section above) in order to facilitate flushing of the vault each time there is sufficient rainfall to generate stormwater runoff. Typically, stormwater inlets in vaults are placed at higher elevations within the vault. As a result, water in the lower or dead storage areas may not be circulated and may stagnate. By placing the inlet at a lower elevation, water already in the lower portions of the vault will be displaced by the incoming water and will not have the opportunity to stagnate. Continually replacing the water in the stormwater vaults should benefit the DO levels in the stormwater. Each stormwater vault associated with the Flow Impact Offset Facility will have its inlet position carefully considered during the final design phase, and placed to enhance this circulating effect as much as possible consistent with other requirements.

Passive aeration of stormwater can be achieved through natural turbulence or agitation of the discharges. Steeply sloped pipes with periodic drop structures will be required to move the water from the vault outlets to the stream elevation. An energy-dissipating structure will be required near the release point at stream level to slow the velocity adequately for entering the stream safely, without causing scour or erosion. Both the steeply sloped discharge pipes and the energy-dissipating structures will provide the turbulence or agitation needed to provide passive aeration. Where insufficient fall is available for this natural aeration process, the installation and operation of aeration devices may be necessary. Other vaults are located near the level of the stream discharge elevation such that active aeration measures may be required through the installation of some type of aeration device. Active aeration systems that could be utilized include microbubble diffusers, gas injection, air injection, mechanical aerators, or aeration hoses. Microbubble diffusers consist of a porous ceramic plate (similar to aquarium aeration stones) and a pump to inject air through the plate. Gas and air injection systems inject a controlled amount of gas or air under pressure into the discharge water pipe. Mechanical aerators physically agitate water and allow air to become mixed with the water. Aeration hoses are flexible porous rubber hoses that have air pumped through them similar to the microbubble diffusers. Information on each of these devices is included in Appendix F. Although the selection of the device(s) to be installed will be made during the final design of the Flow Impact Offset Facility, it is likely that the microbubble diffuser will be selected and installed because of its simplicity, effectiveness, cost, and ability to be installed in the discharge pipes. Other attractive features of the microbubble diffuser include low maintenance requirements, the use of a small compressor or pump to provide air instead of the use of compressed gas tanks, and the ability to be automated to function anytime the reserved stormwater discharge valve is open.

3.4.5 Nutrients

There are no water quality standards for nutrients in the current water quality standards. However, nutrients typically found in urban stormwater could be of potential concern. If nutrient-rich stormwater is stored for long periods, exposure to solar radiation can potentially cause algae blooms. However, it is expected that there will be no adverse water quality impacts associated with nutrients in the release of reserved stormwater for the following reasons:

- There is no significant source of nutrients associated with the airfield areas identified as sources of water for the Flow Impact Offset Facility. Primary sources for nutrients in urban stormwater are fertilizers applied to lawns and landscaped areas. However, the grass infield areas of the airfield are not fertilized or irrigated because lush growth could become a wildlife attractant concern. Any landscaped areas to which fertilizers are applied are located near the terminal and drain to stormwater basins that do not contribute flow to the Flow

Impact Offset Facility. The Port's use of fertilizers includes applying the BMPs listed in the airport's SWPPP, which further reduces the amount of fertilizers and nutrients that enter stormwater. With careful management of fertilizer use at the airport, there is no major source of nutrients for the drainage areas that contribute stormwater to the Flow Impact Offset Facility.

- The operation of BMPs on the airfield (biofiltration swales) would reduce the opportunity and concentrations of any nutrients that exist prior to the stormwater entering the vaults.

- Since the vaults are underground facilities, there is no sunlight that would stimulate the growth of algae often associated with elevated nutrient levels.

- Instream residence time for the stormwater discharged from the Flow Impact Offset Facility is only a matter of hours (the time it takes water to flow from the discharge points in the airport vicinity to the streams' discharge points in Puget Sound). Therefore, there will be minimal opportunity for biological activity (algae blooms) in the streams. Such water quality impacts from nutrients are typically associated with lakes and ponds, where long residence time would provide the opportunity for excess algae growth to occur. Since no lakes or ponds occur in the streams between the airport and Puget Sound, this is not an issue.

Given the above, the Port does not propose any monitoring for nutrients in the discharges from the Flow Impact Offset Facility. Through continued implementation of the SWPPP, the BMPs currently in place that manage the use of fertilizers will continue to minimize the opportunities for nutrients to enter stormwater runoff.

3.4.6 Metals

Metals of concern include copper, lead, and zinc. Washington State water quality standards for these metals are based on the dissolved fraction, are dependent on the hardness of the water, and, as with all water quality standards, are applicable to the receiving waters. Chemistry data from existing airfield stormwater discharges (which are typical of the stormwater that would be reserved for release during low-flow periods) have been reported in the annual stormwater monitoring reports. Metal concentrations in these discharges are reported as total recoverable metals, which are not directly comparable to the dissolved fraction listed in the water quality standards. However, this data does serve as an indication of metal concentrations to be expected in the discharges of stormwater from the Flow Impact Offset Facility. Median metals concentrations from airfield stormwater typically range from 0.012 to 0.031 mg/l copper, 0.001 to 0.003 mg/l lead, and 0.020 to 0.051 mg/l zinc (Port of Seattle 2001b). These values were obtained for stormwater sampled at points prior to entering the receiving waters. Additional treatment that occurs in surface waterways prior to entering the receiving waters will result in lower metals concentrations actually entering the streams. In general, these metal concentrations are also less than typical urban runoff, as discussed in the Port's annual stormwater monitoring reports (Port of Seattle 2000a, 2001b). In addition, the Port has conducted whole effluent toxicity testing of stormwater discharges, as required by its NPDES permit (see discussions in the annual monitoring reports). Stormwater associated with airfield subbasins met the performance standards for whole effluent toxicity according to Ecology guidelines. All this information indicates that the Flow Impact Offset Facility can be managed to meet the water quality standards for metals in the receiving waters.

The following items should be considered in the management of the Flow Impact Offset Facility for compliance with state water quality standards:

- A large portion of metals in urban stormwater is attributed to motor vehicle activity. This is illustrated in the annual stormwater monitoring reports, which show higher metal concentrations are associated with the landside basins where motor vehicle activity is concentrated. Since access to the airfield is strictly controlled, motor vehicle activity is kept to a minimum. Therefore, metal concentrations in stormwater runoff are minimized. The airfield basins are the areas that will be providing stormwater to the Flow Impact Offset Facility, and these areas typically have the lowest lead and zinc concentrations of all airport stormwater discharges (copper concentrations are more consistent in all airport stormwater discharges, but are still relatively low in airfield stormwater).

- Data collected by the Port show that a large fraction of the metal concentrations are associated with particulates (i.e., the metal ions are bound to particulate matter). Therefore, the design and management practices proposed to minimize or reduce particulates and turbidity will also reduce total metal concentrations in the stormwater discharges. Biofiltration swales, settling in vaults, and (additional) filtration are all effective in reducing particulates, and therefore total metal concentrations will be reduced as well. Although these BMPs may not be effective in removing dissolved metals, the majority of the metals are bound to particulates and will be removed. The design features proposed for the reserved stormwater vaults (compartmentalized storage, sloping the vault floor away from the stormwater outlets, careful placement of the stormwater inlets and outlets, and the provision for installation of filters) will ensure that the discharge of sediments and metals bound to particles will be minimized.

- The Port is currently investigating filtration of stormwater associated with discharges from a landside basin. This research includes determining the effectiveness of several filtration media in treating the stormwater. The results of this study will be completed before final design of the flow offset facilities, and the data will be used to select the filtration method most appropriate to treat the discharge from the Flow Impact Offset Facility, if needed.

3.5 ADDITIONAL INFORMATION

There are several other considerations relating to the design and operation of the Flow Impact Offset Facility, including the following items:

- The discharge points for the Flow Impact Offset Facility will be the same as the typical ("live") discharge point for each vault or pond they are associated with. This eliminates the need to permit and construct additional discharge points to the streams. The proposed location of each stormwater discharge point for the Flow Impact Offset Facility is illustrated in the drawings in Appendix F.

- All stormwater management facilities, including those associated with the Flow Impact Offset Facility, will be located within the airport's perimeter fencing, thereby controlling access to the facilities and reducing the potential for damage to the facilities from vandalism.

- The Port will operate, inspect, monitor, and maintain the Flow Impact Offset Facility as long as there is an airport at the site. In addition, the Port will provide annual monitoring reports to ensure that the Flow Impact Offset Facility is meeting its performance goals. An adaptive management method will be used to allow for needed adjustments in the operation of the facilities, and to allow for the installation of new management/monitoring technology, if needed.

- As stated in Ecology's *Stormwater Management Manual for Western Washington* (Ecology 2001), the objective of stormwater management is to "control the quantity and quality of stormwater produced by new development and redevelopment such that they comply with water quality standards and contribute to the protection of beneficial uses of the receiving waters." Ecology has determined that stormwater management activities in Washington State do not require a water right. Since the Port's proposal to offset flow impacts to the receiving waters consists of stormwater management activities, a water right is not required for the Flow Impact Offset Facility.

- The Port is incorporating BMPs into the embankment design to ensure infiltration into the embankment rather than the embankment conveyance system. These BMPs include the use of flatter than normal slopes in biofiltration swales, the use of materials (soils) with good infiltration capacities, the incorporation of soil amendments to increase infiltration, managing vegetation to enhance infiltration, and scarifying surfaces to eliminate barriers to infiltration.

- The Port has investigated the potential for conveyance losses to seepage between the discharge points of the reserved vaults and the streams. The portion of conveyance that occurs in unlined ditches or swales occurs in close proximity to the streams, so that any seepage to shallow groundwater is expected to discharge to the streams in a very short time, thereby not impacting the amount of water delivered to the streams. The proposed water quantity monitoring program will provide data to assess this performance characteristic. If losses are detected that are impacting the quantity of water delivered to the streams, actions will be taken to correct the situation, such as conveying the water in pipes to a point where losses will not occur.

- The Port is currently assessing the ability to route the discharges from the Flow Impact Offset Facility into wetlands that are hydraulically connected to the streams. This will be implemented wherever possible in the final design of each reserved stormwater vault. Note that if this is implemented, it may require the construction of additional discharge points (i.e., the reserved stormwater discharge point may have to be separate from the normal ("live") stormwater discharge point to achieve this goal). Analyses indicate that the groundwater hydrology of wetlands hydraulically connected to the streams will be maintained (Parametrix 2001b). To determine if hydrologic conditions in the wetlands are sufficient to maintain the existing vegetation types, the groundwater hydrology of the riparian wetlands adjacent to the Master Plan Update improvements will be monitored for up to 15 years as described in the *Natural Resource Mitigation Plan* (Parametrix 2000b).

3.6 PILOT PROGRAM PROPOSAL

Section I. a) ix) of the Department of Ecology's Water Quality Certification #1996-4-02325 states:

> "The Port shall develop a pilot program to test one reserve stormwater vault for performance. The Port shall include a proposal for a pilot in the revised plan. The pilot shall be completed within three years after receipt of the Section 404 permit from the U. S. Army Corps of Engineers."

The Port proposes to modify the existing "taxiway" vault (SDS3A) in the Des Moines Creek drainage basin as the pilot program for the Flow Impact Offset Facility. The SDS3A vault was selected because most of the vaults proposed as part of the Flow Impact Offset Facility may not be constructed within the time period required in the Water Quality Certification. The SDS3A vault already exists, and can be easily reconfigured to include a reserved stormwater release function. Modification of the discharge structure and the addition of a separate reserved stormwater discharge line would be required.

Because the SDS3A vault already exists, it does not include several of the water quality design features of the proposed vaults, such as ventilation and optimal placement of stormwater inlets. However, this presents the opportunity to utilize the SDS3A vault as a baseline study, i.e., the water quality of the reserved discharge can be tested without the benefit of any of the proposed special design features. If data collected during operation of the pilot program indicates potential water quality problems, then the vault would be reconfigured to include the appropriate features, and additional data would be collected to measure the effectiveness of the features. Examples include:

- The SDS3A vault does not have any special ventilation features to enhance dissolved oxygen (DO) levels of the stored stormwater. Baseline information on DO within the vault and reserved discharges as they enter the stream would be collected. If DO levels are low, additional aeration features (both passive and active) can be added and their effectiveness measured through additional monitoring. The knowledge gained could then be applied to the proposed vaults.

- The SDS3A vault collects stormwater from the airfield (controlled vehicle access area), and employs typical sediment control BMPs (biofiltration swales, settling within the vault). Baseline information on the turbidity of reserved stormwater discharges would be collected, and modification to the vault would be made if turbidity problems are detected. Modifications could include reconfiguring the reserved storage area within the vault to increase its sediment trapping capability, reconfiguring inlets/outlets, or filtration. The effectiveness of these additional features would be measured, and knowledge gained could then be applied to the proposed vaults.

The SDS3A vault will be reconfigured to test the reserved stormwater release concept so that one full year of operational testing and monitoring will be completed within the time period set forth in Section I. a) ix) of the Department of Ecology's Water Quality Certification. After one full year of operation and monitoring, the Port will develop a report describing the operation and its performance. The report will be submitted to Ecology for review. If the SDS3A vault pilot program does not meet any of the performance standards listed in Section 3.2, the report will include an analysis and recommendations to increase performance to the required levels. These recommendations will be implemented in all of the reserved storage vaults, as appropriate.

4. OPERATION AND MAINTENANCE PLAN

4.1 PURPOSE AND SCOPE

4.1.1 Purpose of Plan

The low-flow impact offset vaults were designed to provide long-term detention of runoff for slow release during the summer low-flow period. The purpose of this Operation and Maintenance Plan is to set forth the procedures and schedules that Port maintenance staff will use for operating, inspecting, and maintaining the low-flow vaults. These procedures will be necessary to ensure that stored runoff water is available in adequate quantity and quality for release to the streams during summer low-flow conditions. A well-implemented operations and maintenance plan will also help the Port minimize long-term life cycle costs for the facilities.

4.1.2 Scope of Plan

The Operation and Maintenance Plan addresses the Low Flow Impact Offset Facilities listed below for Walker Creek (SDW2) and Des Moines Creek (SDS3). Detailed design information for each of these vaults is provided in Section 4.2. Facility operation information is contained in Section 4.3. Section 4.4 describes procedures for Port staff to periodically inspect the vaults and examine certain components and potential conditions, such as the accumulation of sediment and debris, clogging of pipes, or structural damage. Section 4.5 provides safety procedures that will be used by Port staff during vault operation, inspection, and maintenance activities.

4.2 FACILITY DESCRIPTIONS

The operation, site layout, and design features of the low-flow vaults are provided below. This information is intended to provide background information to Port staff regarding the operation and maintenance of these facilities.

4.2.1 Facility Design and Operation Concept

Underground vaults will be used to detain stormwater for reserve discharge during the summer low-flow period. Low-flow mitigation storage will be created in vaults adjacent to the SMP detention vaults. Water for low-flow mitigation storage will be captured and stored during the January through July period and released slowly during August through November (see Section 4.3, Facility Operation). In addition to flow control, the vaults will also include water quality treatment components (e.g., trash racks, oil-water separators, filters, etc.), as appropriate for the activities within the areas contributing stormwater to each vault.

4.2.2 Facilities Overview

A total of two low-flow vaults will be used. Locations of the vaults on the airport site are shown in Figure 4-1. Table 4-1 provides a list of the vaults and summarizes their major characteristics,

including facility layout and access, hydraulic features, and water quality control and treatment features. Concept drawings of each facility are provided in Appendix F.

4.3 FACILITY OPERATION

4.3.1 System Schedules

The overall operating schedules for the Walker and Des Moines Creek low-flow vaults are shown in Table 4-2 and in Figures 4-2 and 4-3. The fill rate (water storage) is shown in the figures as linear, but in practice the fill rate is expected to be highly variable depending on the specific vault design, capacity, and rainfall patterns.

If any water remains in the vaults at the end of the summer low-flow period (end of October), the Port shall continue to release the water at the existing rate until the vaults are empty, or until rainfalls occur that cause a significant increase in the base flows of the streams.

Table 4-1. Summary of Low Flow Impact Offset Facilities.

	SDW2	SDS3
General description		
Location	West central side of new runway	North of South 188th Street
System	Walker Creek	Des Moines Creek
Drawing number	C 131	C 141
Type	Underground, rectangular, concrete, single-compartment vault with high-level bypass pipe adjacent to pond F	Underground, rectangular, concrete, with two compartments: low-flow storage and short-term detention
Plan dimensions	Approximately 442 ft x 250 ft	Low-flow storage compartment, approximately 126 ft x 700 ft
Access	Approximately 40 10x10-ft access grates; 1 down ramp	Approximately 6 main access lids
Low-flow offset storage		
Type	Vault dedicated to low-flow offset storage	Low-flow storage compartment as part of overall structure
Volume	19.0 acre-ft[a]	13.5 acre-ft
Maximum water depth	8.0 ft	7.2 ft
Hydraulic features		
Inlet structure	Pipe from MH SDW2-9	Pipe from MH SDS3-592
Outlet structure	Low-level outlet pipe	Low-level outlet pipe
Outlet control	Valve	Valve
Outlet conveyance	Approximate 700-ft pipe	Pipe to MH SDS3-197
Discharge to stream	Adjacent to pond F outfall	SDS3 outfall
Water quality features		
Sediment trap	Sloped vault floor with internal dividing walls	Sloped vault floor with internal dividing walls
Aeration	Passive air flow through grates	Passive air flow through grates
Trash racks	(detail for construction)	(detail for construction)
Filters	Optional sand or filter media filter	Optional sand or filter media filter
Oil-water separators	(detail for construction)	(detail for construction)
Mechanical and Electrical		
Monitoring and alarms	(detail for construction)	(detail for construction)
Lighting	(detail for construction)	(detail for construction)
Washdown	(detail for construction)	(detail for construction)

[a] Analysis determined 18.5 acre-ft; concept design used 19.0 acre-ft.

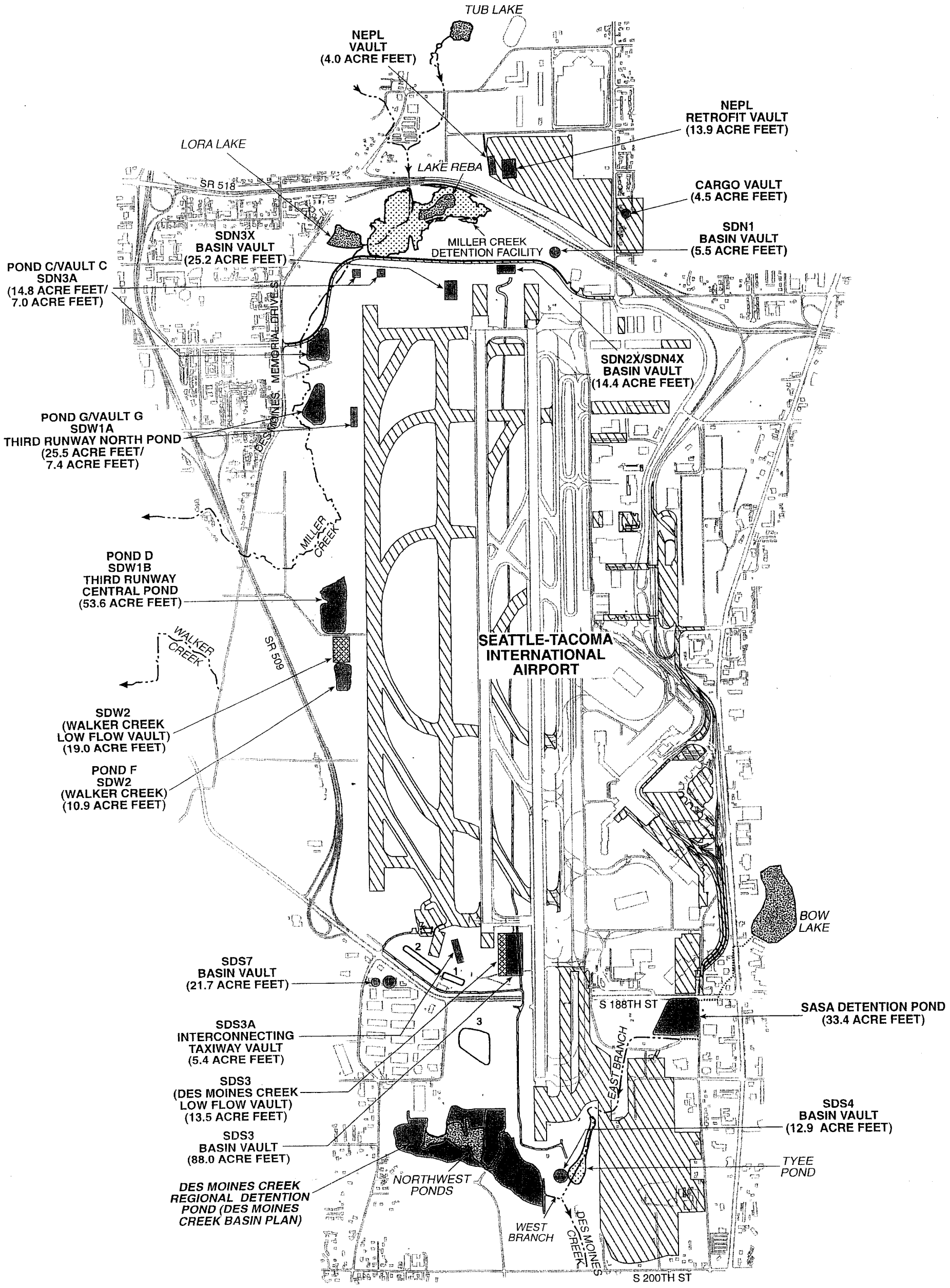


Figure 4-1
Low Flow Offset Facilities Locations

Figure 4-2
Walker Creek Facilities – Annual Schedule

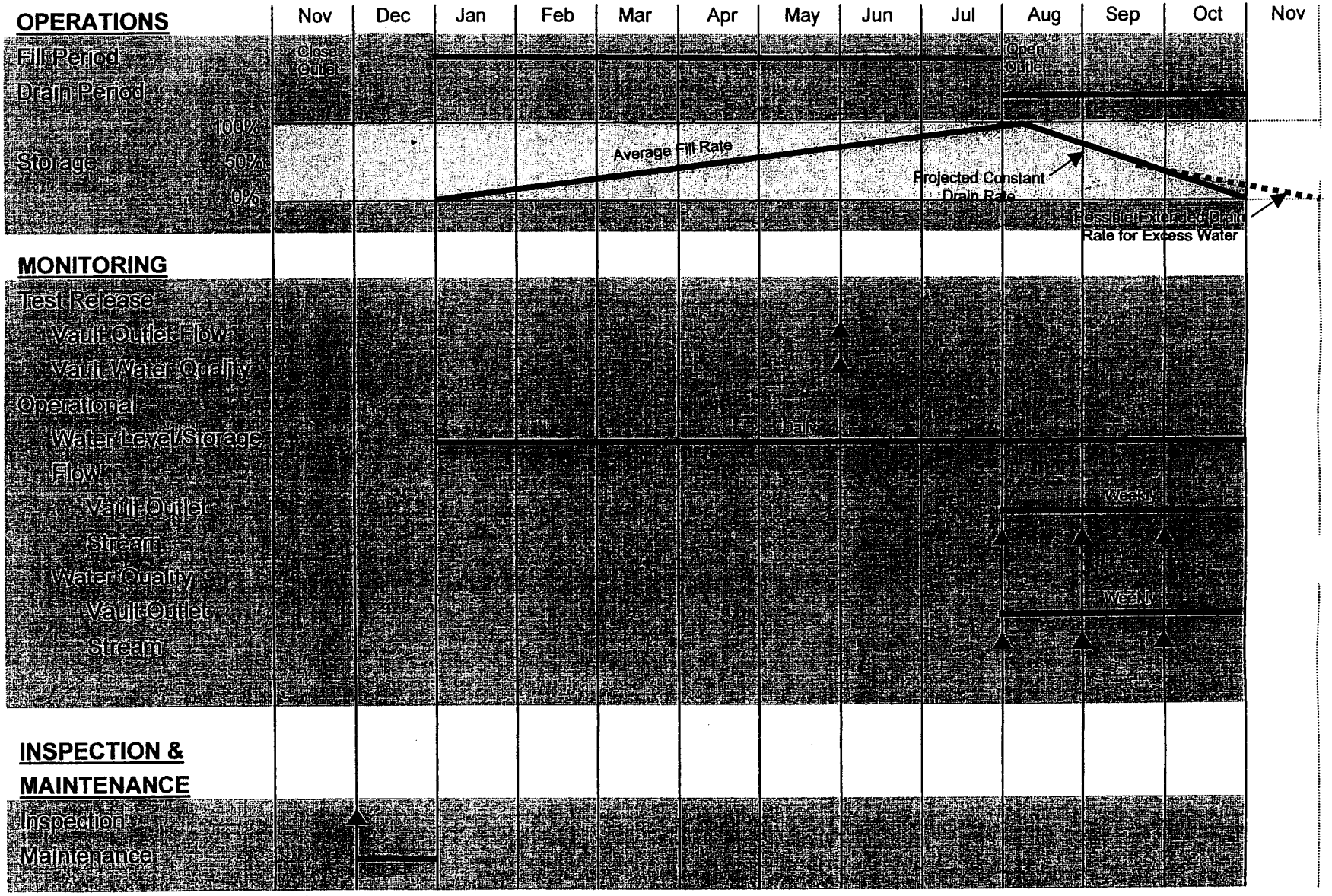


Figure 4-3
Des Moines Creek Facilities – Annual Schedule

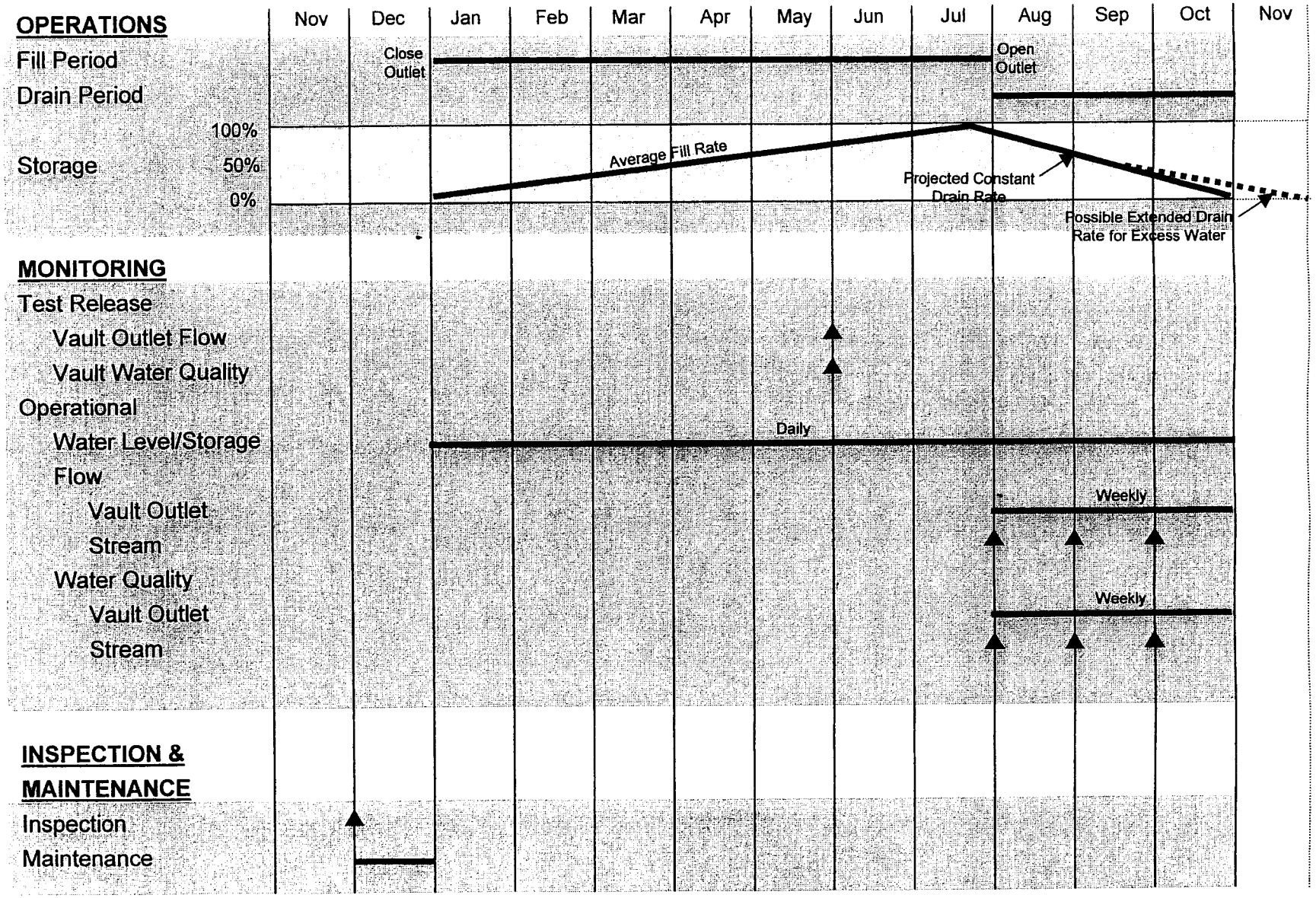


Table 4-2. Summary of Low-Flow Vaults Operating Schedules

	Walker Creek	Des Moines Creek
Start Vault Filling	January 2	January 2
Open Outlet/Start Vault Draining	August 1	July 24
Summer Low-Flow Period Ends	October 31	October 24
Summer Low-Flow Period Release Rate	0.11 cfs	0.08 cfs

4.3.2 Facility-Specific Schedules

As operating experience is gained by the Port, the fill and release schedules for the vaults may be adjusted to allow for more effective system operation. Facility-specific schedules will be added to this Operation and Maintenance Plan as they are developed in the future.

4.4 INSPECTION AND MAINTENANCE

The objective of the inspection and maintenance program is to ensure the reliability and consistent performance of the Low Flow Impact Offset Facilities in providing water in sufficient quantity and quality to the streams. In addition, the program will help to extend the life of the facilities and reduce the overall life-cycle costs to the Port.

4.4.1 Procedures

Figure 4-4 conceptually illustrates the inspection and maintenance program. The sample form shown in Figure 4-5 lists typical vault components that will be inspected. An inspection and maintenance record form that is specific to each facility will be developed as final designs are completed.

Inspectors will evaluate their observations with standards to determine if maintenance is required. In many situations, it is expected that maintenance will be performed at the time of inspection. In other situations, when additional staff or equipment is necessary, a work order request will be prepared and the maintenance will be performed at a later date.

4.4.2 Sediment Removal

Sediment is expected to accumulate in the bottom of the facilities below the low-flow outlet. Oil, grease, and other types of debris may also accumulate with the sediment. Regular and proper removal of sediment and debris is critical to ensure that water stored in the vaults will be of satisfactory quality when it is discharged to the streams.

Depending on the facility's design and the quantity of sediment that has accumulated, sediment will be removed with vactor trucks, small front loaders, or manual tools. Washdown water may also be required. Regardless of the methods used, the low-flow outlet will be closed during the sediment removal process to prevent contaminated water from being discharged to the streams. The Port's existing decant facility shall be used for the disposal of all sediment and associated water that is removed from the vault during the sediment removal process.

Figure 4-4
Inspection and Maintenance Process Overview

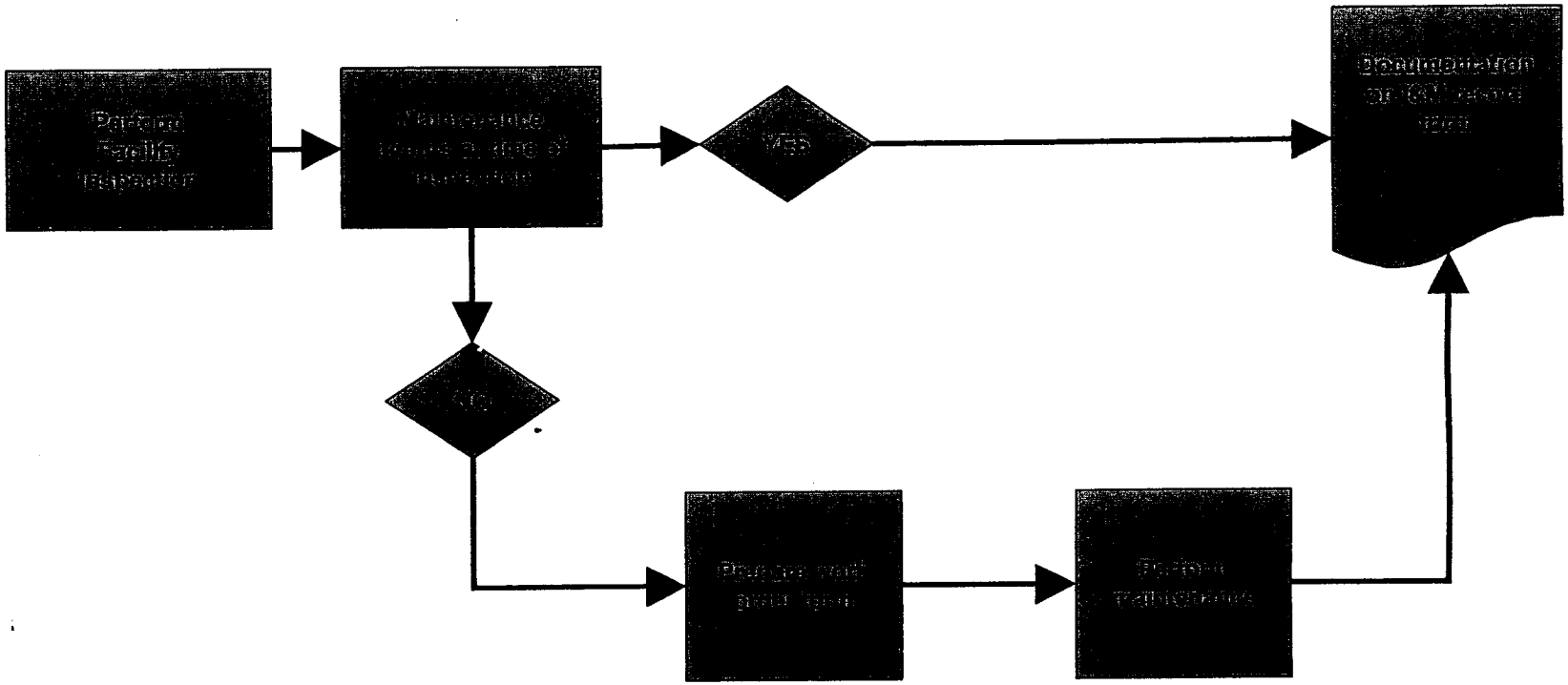


Figure 4-5
Inspection and Maintenance Record

Facility: _____

Inspection Date: _____

Inspector: _____

	Inspection		Maintenance	
Facility Component	**Observed Conditon**	**Required Maintenance**	**Performed By**	**Date**
Access				
Hatches				
Ladders				
Ramps				
Vents				
Hydraulics and Controls				
Outlet pipe				
Outlet valve				
Weir				
Water Quality Treatment				
Trash racks				
Filters				
Oil-water separators				
Sediment Level				
Electrical / Mechanical				
Lights				
Water level instrumentation				
Internal piping				

4.4.3 Schedule

Vault facilities are projected to contain water in varying amounts during the period from January through October for low-flow mitigation purposes. Therefore, in order to conduct inspection and maintenance activities in-the-dry, this work will need to occur during November and December of each year. Specifically, as shown by the schedules in Figures 4-2 and 4-3, inspections will be performed in early November, followed by maintenance activities as necessary through December.

4.4.4 Documentation

An inspection and maintenance record form shall be completed for each inspection at each vault facility.

4.4.5 Reporting

Inspection and maintenance activities shall be summarized in the Port's annual report to Ecology.

4.5 SAFETY

Accumulated sediment, stagnant water conditions, and limited ventilation are typical conditions in vaults and may cause noxious gases to form and accumulate in the vaults. Additional ventilation will be provided in the low-flow vaults. Vault inspection and maintenance procedures must be in compliance with OSHA confined-space entry requirements, which includes clearly marking entrances to confined-space areas.

5. MONITORING PLAN

5.1 WATER QUALITY AND FLOW MONITORING

The Port is proposing a comprehensive monitoring plan for the Flow Impact Offset Facility to ensure that the performance standards are met and that no violations of state water quality standards occur in the receiving waters, and to support an adaptive management strategy. Monitoring consists of three elements: characterization of existing/expected water quality, monitoring of annual test releases from the Flow Impact Offset Facility, and monitoring of the discharges and receiving waters during operation of the facility. Each element is discussed below.

5.1.1 Characterization of Existing/Expected Water Quality

A great deal of water quality data already exists on the Port's stormwater discharges and on the streams. This data has been collected for a variety of purposes, including satisfying the Port's NPDES permit requirements, basin planning activities, and other studies done in the area by the Port and others. The data set includes water quality measurements within the stream systems during the summer periods when the Flow Impact Offset Facility will be scheduled to discharge to the streams. In addition, the Port has started to collect data to characterize the discharges from the Flow Impact Offset Facility. Temperature data is being collected starting in 2001 from the existing NEPL vault and the SDS3A vault in order to characterize the expected temperatures of the Flow Impact Offset Facility. The NEPL vault is partially exposed to sunlight (on its west side and top), while the SDS3A vault is completely underground. By collecting temperature data from both vaults, a range of expected temperatures can be established for each type of vault (buried and partially exposed). Temperature data will be collected from the dead storage zone in each vault in order to approximate the Flow Impact Offset Facility. The Port has collected some instream temperature data beginning in September 2000. Other data that is being collected as part of other Port water quality studies will be used prior to the operation of the Flow Impact Offset Facility to characterize expected water quality within the streams during the summer months (when the facility will be discharging). All of this data will be analyzed and presented in the final design of the facilities associated with the Flow Impact Offset Facility.

5.1.2 Monitoring of Annual Test Releases from the Flow Impact Offset Facility

Each year, prior to the operation of the Flow Impact Offset Facility, the Port proposes to conduct small test discharges from each outlet. The test discharges are intended to confirm the operation of each discharge and to detect and respond to potential problems prior to the annual operation of the Flow Impact Offset Facility. For example, because of the small orifices needed to control discharges to the required rate, a small amount of debris in an orifice could potentially impact the discharge rates. The discharge structures are being designed as floatable structures to maintain a constant discharge rate and minimize the potential to clog with debris or sediment (see Appendix F). Floating debris would be removed at this time to prevent impacts to the annual operation of the facility. Any other problems that may occur within the facility would be detected and corrected at this time.

Water quality sampling of small-volume test discharges is proposed. By conducting this sampling, potential water quality problems can be detected and corrective measures taken prior to scheduled annual releases to the stream systems. Water quality data obtained from the test discharges will be compared to the stream characterization data to determine the potential for water quality violations. If any are indicated, the Port will take corrective action prior to the annual operation of the facility, such as installing portable aerators or additional filtration in the discharges prior to their entry into the streams.

Wherever possible, the Port will install automated dataloggers and/or autosamplers to collect flow data and water quality samples. This will allow the monitoring plan to be flexible if it is determined that samples or data need to be collected more or less frequently than proposed at this time. In addition, it may become possible to automate the operation of the Flow Impact Offset Facility. Valves can be automated to close or open based on signals from dataloggers, and other logic can be programmed into an electronic management system (for example, the valve can be programmed to open only during the low-streamflow period). These systems will be evaluated during final design of the facility.

Water quality sampling of the test discharges will include the following:

- Flow
- Turbidity
- Dissolved Oxygen (DO)
- Temperature
- Metals

5.1.3 Operational Monitoring

The Port is proposing to monitor the operation of the Flow Impact Offset Facility to provide assurance that the facility is achieving its performance goals and not causing any water quality violations in the receiving waters. This will be accomplished by periodic monitoring of both the discharge and receiving waters during the annual operation of the facility, both while the vaults are being filled during the rainy season and while the vaults are discharging through the reserved stormwater outlets. The monitoring proposal for the Flow Impact Offset Facility includes the following monitoring components: water levels within the stormwater vaults, flow, turbidity, DO, temperature, and metals. Additional information on these components is provided below.

5.1.3.1 Water Levels

Water levels within the stormwater vaults will be monitored through installation and operation of a pressure transducer and datalogger in each vault. Average daily water levels will be calculated based on more frequent measurements by the pressure transducer/logger. This data will then be applied to the vault geometry to calculate the volume of water in the stormwater vaults. In addition, vault filling and emptying (average daily water levels) will be monitored throughout the year.

5.1.3.2 Flow

Discharge from each vault will be measured upon opening of the Flow Impact Offset Facility outlets and measured a minimum of weekly throughout annual operation of the facility. In addition, stream gage data will be collected from the King County gages currently active in the Miller, Walker, and Des Moines Creek watersheds in the airport facility and downstream to the mouth of each stream. The Port will coordinate with King County to ensure that data from these gages will continue to be collected in the future.

5.1.3.3 Turbidity

Turbidity data will be taken at discharge points, upstream in receiving waters, and downstream in receiving waters (approximately 100 ft from where the discharges enter the streams). The turbidity measurements will be taken upon opening of Flow Impact Offset Facility outlets and taken a minimum of weekly throughout operation of the facility.

5.1.3.4 Dissolved Oxygen

Dissolved oxygen data will be taken at discharge points and approximately 100 ft downstream from where the discharges enter the streams. The DO measurements will be taken upon opening of Flow Impact Offset Facility outlets and taken a minimum of weekly throughout operation of the facility.

5.1.3.5 Temperature

Water temperature will be measured within the vaults, at discharge points, and in the receiving waters (streams). Temperature measurements within the vaults will be obtained using dataloggers that will provide average daily temperature throughout the year. Instream temperature measurements will be taken at the discharge points, upstream in receiving waters, and approximately 100 ft downstream from where discharges enter the streams. The field temperature measurements will be taken a minimum of weekly upon opening of Flow Impact Offset Facility outlets.

5.1.3.6 Metals

Samples will be analyzed for copper, lead, and zinc. The samples will be obtained from discharge points and receiving waters (approximately 100 ft downstream from where discharges enter the streams). The metals sampling and analysis will occur upon opening of Flow Impact Offset Facility outlets and a minimum of monthly throughout operation of the facility.

5.1.3.7 Schedule

Weekly monitoring of the discharges for the quality parameters (except metals) is proposed as a starting point for monitoring the Flow Impact Offset Facility. Once an adequate volume of data exists, an analysis will be completed on the variability of the water quality parameters, and sampling frequencies can be increased or decreased, as appropriate. Data collected during the pilot program will be included in this analysis. Because the facility will be discharging from a stored volume of water, the water quality of the discharges is not expected to change significantly, until runoff

replenishes the vaults. In the event of a significant rainfall event during the operation of the facility (greater than 0.5 inches in a 24-hour period), the Port will conduct additional sampling to ensure that the rainfall did not substantially change the character of the water within the Flow Impact Offset Facility, which could potentially cause a violation of instream water quality standards. Monthly sampling for metals is sufficient because existing data shows that the metals concentrations in stormwater runoff from the airfield is relatively consistent and low compared to stormwater discharges from other urban areas.

5.1.3.8 Locations

Specific monitoring locations, both of the discharges and instream, will be consistent with the requirements of the Section 401 Water Quality Certification and will be precisely located and included in the final design of facilities associated with the Flow Impact Offset Facility. All water quality data will be recorded and reported in an annual monitoring report that will be submitted to Ecology by December 31 of each year. If the monitoring data show that the discharges from the Flow Impact Offset Facility consistently meet water quality standards within the receiving waters, the Port may propose a modified monitoring plan for subsequent operation of the facility. If any water quality problems were encountered during operation of the facilities, the annual report will include a discussion of the immediate actions taken to address the problem and actions taken or proposed to prevent a recurrence of the problem in the future. All sampling and analytical methods used to monitor the Flow Impact Offset Facility will conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 or to the latest revision of *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association [APHA] et al. 1998). This will ensure that the monitoring methods for the Flow Impact Offset Facility are consistent with other water quality monitoring done under the NPDES permit for the airport.

5.2 BIOLOGICAL MONITORING

Instream biological monitoring will be performed in Miller, Walker, and Des Moines Creeks to assess the impacts of the Port's Flow Impact Offset Facility. The biological monitoring will consist of Benthic Index of Biotic Integrity (B-IBI) monitoring and physical habitat monitoring. Biological monitoring will occur four times per year and will continue through the fifth year after construction, then annually until completion of a 15-year monitoring period. During the years when monitoring is occurring four times per year, monitoring events will occur in January/February, April/May, June/July, and September/October. If monitoring indicates potential adverse effects, the Port will evaluate potential adaptive management strategies (see Section 5.4, Adaptive Management). The biological monitoring protocols are discussed in the following subsections.

5.2.1 B-IBI Sampling Protocol

5.2.1.1 Approach

A measure of biotic integrity will be used to evaluate the existing and future low-flow conditions of Des Moines, Miller, and Walker Creeks. The B-IBI for Puget Sound Lowlands (Kleindl 1995; Karr and Chu 1997) quantifies the overall biotic condition of a stream based on measured attributes of benthic macroinvertebrates compared to regional distributions. B-IBI scores have been shown to

correlate well with levels of urbanization (Fore et al. 1996; Horner et al. 1996). This analysis was designed to analyze invertebrates collected in the fall (Kleindl 1995; Karr and Chu 1997) and will be used to assess the September/October samples. Invertebrates collected during the other monitoring periods will be assessed using several of the same metrics in the B-IBI, coupled with professional judgement, and will be compared to the fall B-IBI score. The protocol described below is from *Biological Monitoring and Assessment: Using Multimetric Indexes Effectively* (Karr and Chu 1997) and will be applied to samples collected throughout the year.

5.2.1.2 Field Equipment

The following field equipment will be used for the B-IBI monitoring:

- 500-micron mesh Surber type sampler
- 500-micron (or smaller) mesh sieve
- Flagged weight to identify sample location
- Ethyl alcohol (95%)
- Two 1-liter squirt bottles for alcohol
- Garden trowel or large spike to disturb substrate
- White bucket or white wash bin to empty sample from Surber
- Large cup with handle to rinse invertebrates off Surber
- Stop watch
- Forceps (tweezers)
- Plastic spatula
- Waterproof ("Rite-in-the-rain") paper
- Pencil, permanent marker (Sharpie), and grease pencil
- 250-ml screw-top jars (three per sample site)
- Ziploc bags

5.2.1.3 Site Selection

Sample sites will be selected that are representative of the larger study areas. This determination will be based on physiographic characteristics, including vegetation, soils, geology, land use, gradient, riparian characteristics, and substrate. For each representative stream reach, a riffle long enough to accommodate three replicate samples will be identified. Ideal sampling locations will consist of rocks 5 to 10 cm in diameter sitting on top of pebbles. Substrates dominated by rocks larger than 50 cm in diameter will be avoided.

To the extent possible, sample sites will not be located directly downstream from anomalies such as culverts, bridges, roads, landslides, or waterfalls (unless these are the conditions that the monitoring program is evaluating). In situations where an anomaly cannot be avoided, sampling will occur at least 50 meters upstream of a bridge and 200 meters downstream of a bridge. The location of each sample site will be recorded.

5.2.1.4 Data Management

During the B-IBI monitoring, site location data and site selection rationale will be recorded onto electronic datasheets. This information can be collected in a field notebook and recorded onto the B-IBI summary sheet later, or entered directly with the field computer.

5.2.1.5 Invertebrate Collection

Three total replicates will be taken from each sample location using the following methodology:

1. Sample within the main flow of the stream. To the extent possible, sample at water depths of 10 to 40 cm. Depending on low-flow conditions, the sampling may need to occur from shallower water depths. Depth, flow, and substrate type should be similar for the three replicate samples collected in the riffle. Begin sampling downstream and proceed upstream for the three replicates.

2. Place the Surber sampler on the selected spot with the opening of the nylon net facing upstream. Brace the frame and hold it firmly on the stream bottom.

3. Lift the larger rocks resting within the frame and brush off crawling or loosely attached organisms so that they drift into the net. After "cleaning" the rocks, inspect for invertebrates and discard from the sampling area.

4. Once the larger rocks are removed, disturb the substrate vigorously with a trowel or large spike for 60 seconds. This disturbance should extend to a depth of about 10 cm to loosen organisms in the interstitial spaces, washing them into the net.

5. Lift the Surber out of the water and tilt the net up and out of the water while keeping the open end upstream. This will help to wash the organisms into the receptacle. Drop a piece of weighted flagging tape to mark the location of the first replicate sample. Do not step on remaining sample areas while walking to the streambank.

6. On the streambank, empty contents of the Surber into large bucket or wash bin. Remove all animals and debris from the Surber sampler.

7. Separate benthic macroinvertebrates from the substrate by stirring the contents of the plastic wash pan. Pour floating organic matter into a 500-μm soil sieve, then transfer into a sampling jar and preserve with ethanol (95 percent). Residual water in the sample will dilute the ethanol to about 70 percent.

8. Repeat rinsing and pouring into the 500-μm soil sieve until all apparent animals are removed from gravel. Add a small amount of water to remaining gravel and set aside for a few moments. Remaining invertebrates will begin to move among the substrate. Use a magnifying glass and tweezers to remove the last animals and place directly into the sample jar.

9. One important note: the density of invertebrates within a riffle can be variable, and there may be times when a sample has low numbers of invertebrates. It is important that a sample have at least 500 individuals (Fore 1999 personal communication). This number will be

estimated in the field by looking at the density of invertebrates in the concentrated sample. If the density appears small, additional combined samples will be necessary.

Archive Sample

Insert a sample label that contains the name of the team, date, location, sample number, and replicate number into the jar. Fill the sample jar to the top with alcohol and seal. Write the location and date on top of the sample lid. Place the jar in a Ziploc bag labeled with the same information.

Collect Replicate Samples

Return to the location of the first sample, walk upstream, and collect another sample of invertebrates. Leave another flagged marker and process the sample as above. Repeat this process once more for a total of three replicate samples from each site location. Each replicate should be labeled (e.g., #1, #2, #3) and archived separately.

Taxonomy

Invertebrates will be identified to the highest possible taxonomic level by a professional invertebrate taxonomist.

5.2.1.6 Reporting

Information obtained from the B-IBI monitoring will be synthesized to evaluate potential impacts associated with operation of the Flow Impact Offset Facility. All B-IBI data will be recorded and reported in the annual monitoring report to be submitted to Ecology by December 31 of each year. If any negative impacts were encountered during operation of the facilities, the annual report will include a discussion of the immediate actions taken to address the problem, and actions taken or proposed to prevent a reoccurrence of the problem in the future.

5.2.2 Physical Habitat Monitoring Protocol

Physical habitat monitoring will be used to evaluate the existing and future low-flow conditions of Miller, Walker, and Des Moines Creeks. Protocols for the physical habitat monitoring are provided in Appendix G.

5.3 FILL MONITORING, INFILTRATION BMPS, AND INFILTRATION CONTINGENCY MEASURES

The hydrogeologic modeling by Hydrus and Slice described in Section 2.3 modeled the movement of precipitation that has infiltrated into the fill embankment. The properties of the fill (e.g., grain size distribution) largely control the amount of water that will infiltrate and water movement through the embankment. Additional factors include the methods of fill placement, final grading, and revegetation. The following section describes the monitoring plan for confirming infiltration properties of the in-place fill.

5.3.1 Existing Fill Quality Control Testing

The embankment construction specification (Specification P-152) establishes that proposed fill sources be tested for acceptance by the Port at least 30 days prior to the proposed use of the fill. Submittal requirements include the following tests, which must all be performed in accordance with American Society for Testing and Materials (ASTM) D 3740 (Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction):

- Sieve analysis and natural moisture content (ASTM C 136)
- Specific gravity (ASTM D 854 or C 127)
- Moisture/density relationship (ASTM D 1557)
- Plasticity index for Group 4 soils (ASTM D 4318)
- Environmental certification report
- Direct shear test for Group 5 soil (ASTM D 3080)

The data must be certified by a licensed geotechnical engineer ensuring that they accurately represent material from the source site. Use of the fill is subject to approval by a Port engineer (Specification P-152-2.1).

The density of in-place fill is tested in "lots" for approval of the lot by a Port engineer (a "lot" is 2000 tons of material in place) in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922 (Specification P-152-2.3). In addition, every other lot of Group 1A must be tested by the contractor for fines content in accordance with ASTM C 136.

5.3.2 New Infiltration Capacity Testing Protocol for Fill

In addition to established quality control testing procedures for the fill, tests will be performed to evaluate infiltration capacity. The infiltration capacity measured in the field can be related to infiltration capacity assumptions used in embankment modeling. For modeling, infiltration capacity and hydraulic conductivity were assumed equal and the fill was characterized as a uniform mixture of two media: an inactive gravel fraction, and an active matrix through which unsaturated flow occurred (Pacific Groundwater Group 2001). If macro-pore flow is absent and entrapped air in the soil is minimal during field testing, the following equations define the relationship between bulk infiltration capacity measured in the field and modeled hydraulic conductivity of the fill matrix:

$$Ib = Im(1-\%G)$$

and

$$Im = Km$$

where
- Ib = bulk infiltration capacity measured in the field
- Im = matrix infiltration capacity
- %G = fraction of the fill that is gravel
- Km = saturated hydraulic conductivity of the soil matrix, appropriate as input for modeling variably saturated flow

An important variable in the general water balance of the embankment is the infiltration capacity of the surficial soils. The general water balance is less sensitive to the character of soils buried within

the embankment. Therefore, infiltration testing will only be performed when the embankment is nearing completion. It is assumed for purposes of these calculations that no "topsoil" or other distinct surficial layer will be placed on the embankment. If such a layer is decided upon in the future, the timing, locations, and depth of infiltration tests may require alteration from the protocol established below.

Infiltration testing will be performed upon substantial completion of the embankment, including establishment of the various zones (fill types) that will comprise the surface of the embankment. Up to eight locations on top of the new embankment fill will be selected by the Port based on the following criteria:

- Provide geographic coverage of pavement subgrade, pavement support, and common embankment zones of the new fill as shown in Figure 7 of the *Geotechnical Engineering Report, 404 Permit Support, Third Runway Embankment, Sea-Tac International Airport* (Hart Crowser 1999). Testing of the "MSE reinforcing" fill zone will not be performed.

- Remain safely away from air traffic operations.

- Remain safely away from utilities.

- Consider access for water trucks.

At each location, a modified Pilot Infiltration Test (PIT) described in the *Stormwater Management Manual for Western Washington* (Ecology 2001) will be performed. An area of at least 100 ft^2 will be accurately leveled and bermed to allow ponding of imported water (shallow excavations may be used). Turbidity-free water at ambient temperature will be metered into the basin and discharged onto a permeable geotextile to prevent disturbance of the soil surface. Initial ponding may be maintained at substantial depth but not to exceed 1 ft. After at least 17 hours of continuous ponding, the pond depth will be decreased by reduction of discharge to the minimum pond depth necessary to completely cover the basin bottom. The water discharge rate required to maintain a constant minimal ponding depth will be measured. When that water flow rate has not changed substantially over a duration of 1 hour, the test will be terminated. The following equation will be used to calculate bulk infiltration capacity using the test data (in consistent units):

Ib = steady water flow rate / area of basin bottom

For instance, if the steady water flow rate is 25 cf per hour into a basin of 100 ft^2, the infiltration capacity is 0.25 ft per hour (3 inches per hour or 2×10^{-3} cm/sec).

To support interpretation of the infiltration tests, orthogonal photographs of the basin bottoms will be taken with a visible scale. A large volume bulk soil sample will also be collected by digging into the basin bottom. The sample will be retained as a contingency should questions about the test arise. Data collection and reporting guidelines supplied in Ecology's PIT procedures will also be followed.

5.3.3 Fill Infiltration Performance Criterion

The infiltration capacity of the built embankment will be considered substantially lower than that used in modeling if the Km used in modeling (1.35×10^{-4} cm/sec) falls above the upper 95 percent confidence interval of the infiltration test population (the Km values, or a fitted population distribution, calculated from the infiltration test data). This approach will identify field conditions wherein the built embankment has an infiltration capacity substantially less than assumed in modeling.

No similar criterion will be applied to identify conditions wherein the built embankment has a substantially higher infiltration capacity than assumed for modeling. Reasons for this are: (1) the greater concern is building an embankment that infiltrates too little water, and (2) the proposed approach does not require correcting for macro-pore flow that will likely influence the field data.

5.3.4 Fill Infiltration BMPs

BMPs designed to promote infiltration into the embankment are described in the October 26, 2000 HNTB memorandum (Appendix C). The BMPs are limited to use of flatter slopes on the airfield, longer water courses over pervious surfaces, and use of a variety of naturally occurring fill materials. Other measures were deemed inappropriate because of increased risk of instability, construction complexity, and costs, and possible adverse impacts. The three acceptable BMPs are used in the current design of the embankment.

In addition to the three BMPs discussed in the attached memo, a polyacrylamide (PAM) tackifier has been, and will continue to be, used to reduce erosion of the embankment surfaces. A procedure for application of the PAM is attached. PAM has been shown to increase infiltration of irrigation water into soil as a result of stabilization of soil structure. Also, in a partial deviation from Specification P-152, truck traffic will be routed across a minimal area of the embankment upon placement of the final 2 ft of fill. This deviation will not affect the density specification required for engineering acceptance of the constructed fill.

If the measured infiltration capacity of the constructed embankment is substantially lower than used in modeling and anticipated by use of the above BMPs, implementation of contingency measures may be warranted, based on long-term monitoring data as described above.

5.3.5 Fill Infiltration Contingency Measures

Embankment modeling and infiltration testing are only proposed for the third runway fill. Therefore, the contingency measures outlined below are only applicable to the third runway fill.

If the infiltration capacity of the third runway fill is substantially lower than assumed for embankment modeling, the infiltration tests will be rerun after the establishment of vegetation. The post-vegetation tests will be conducted and interpreted in the same fashion as the pre-vegetation tests, except that flat areas will be bermed with soil for use as basins, and excavations will not be used. Vegetation will be maintained within the bermed areas while preparing the basins for testing.

If the post-vegetation infiltration capacity of the third runway fill appears substantially lower than assumed for embankment modeling, long-term monitoring data will be interpreted to allow the Port

to adapt water management practices to the as-built condition. This approach is appropriate given the fact that infiltration capacity is only one of many variables involved in determining the as-built water budget, and responding solely to a changed condition in the infiltration capacity could be unnecessary or even misguided given other potential differences between predicted and as-built conditions. Collecting and responding to long-term monitoring data is preferable because it considers the aggregated effects of all factors. Long-term hydrologic and environmental monitoring is discussed in response to Condition I(e). Based on that monitoring, plans will be developed as necessary to respond to adverse conditions not mitigated by existing designs.

5.4 ADAPTIVE MANAGEMENT

The Flow Impact Offset Facility and its Operation and Maintenance Plan are being developed to facilitate an adaptive management strategy. Comprehensive programs are proposed to monitor the facility's performance, and changes to the facility or its operation will be made to meet the performance standards. Monitoring programs will address water quality, water quantity, fill parameters and infiltration performance, impacts to stream biology, and impacts to wetlands. Monitoring programs are discussed in Sections 5.1 and 5.2. Some potential adaptive management strategies are discussed below.

Water quality will be extensively monitored. The discharges from the reserved vaults will be monitored, as well as instream water quality in each stream. In addition, test discharges will be monitored prior to activation of the facility each year. If any instream water quality violations are detected, or if it is determined that the potential to cause an instream water quality violation exists, appropriate action will immediately be taken to correct the situation. Potential contingency actions include unscheduled maintenance of BMPs or the addition of other BMPs (filtration, mechanical aeration, etc.).

Water quantity will be monitored, including vault filling rates, discharge rates, and instream flow at gaging stations. Adaptive management strategies would include the development of modified schedules for vault filling, adjustment of the impervious areas that contribute to filling the reserved vaults, and adjustment of the discharge structures to maintain the target flow.

Tests will be conducted to evaluate infiltration capacity of the embankment fill. The measured infiltration will be compared to the infiltration assumptions used in the low-flow analysis (see Section 5.3). If the assumptions are not being met, potential adaptive management strategies include aeration (perforation) of infiltration surfaces, soil amendments, and regrading surfaces.

Wetlands and stream biology will be monitored during operation of the facility. If impacts are observed, potential adaptive management strategies include revising the operating schedule of the facility to optimize the timing and amount of discharge to the streams.

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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September 21, 2001

REGISTERED MAIL

Port of Seattle
Attn: Ms. Elizabeth Leavitt
17900 International Blvd., Suite 402
Seattle-Tacoma International Airport
SeaTac, WA 98188-4236

Dear Ms. Leavitt:

Re: Water Quality Certification for U.S. Army Corps of Engineers Public Notice 1996-4-02325 (Amended-1); Construction of a Third Runway and related projects at the Seattle-Tacoma International Airport (STIA) in the Miller, Walker, and Des Moines Creek watersheds and in wetlands at the Seattle-Tacoma International Airport, located within the vicinity of the city of SeaTac, King County, Washington; and in wetlands at the mitigation site in Auburn, King County, Washington.

The public notice from the U.S. Army Corps of Engineers (Corps) for proposed work has been reviewed. On behalf of the state of Washington, we certify that the work proposed in the Port of Seattle's (the Port's) revised Joint Aquatic Resource Permit Application (JARPA) dated October 25, 2000, the Corps' public notice and the Department of Ecology's (Ecology's) public notice complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of the Clean Water Act, as amended, and other appropriate requirements of state law. This letter also serves as the state response to the Corps. This letter also serves as notification that Ecology has rescinded Order Number 1996-4-02325 issued on August 10, 2001 and replaced it with Order Number 1996-4-02325 (Amended-1) issued on September 21, 2001.

Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended, Ecology concurs with the Port's certification that this work is consistent with the approved Washington State Coastal Zone Management Program. This concurrence is based upon the Port's compliance with all applicable enforceable policies of the Coastal Zone Management Program, including Section 401 of the Federal Water Pollution Control Act.

Work authorized by this certification is limited to the work described in the October 25, 2000, JARPA, the Corp's Public Notice, and the plans submitted by the Port to Ecology for review and written approval.

This certification shall be withdrawn if the Corps does not issue a Section 404 permit. It shall also be withdrawn if the project is revised in such a manner or purpose that the Corps or Ecology determines the revised project must obtain new authorization and public notice. The Port will

then be required to reapply for state certification under Section 401 of the Federal Clean Water Act.
This certification is subject to the conditions contained in the enclosed Order and to the water quality and aquatic resource related conditions of the following permits and approvals:

- The Hydraulic Project Approval (HPA) be issued by the Washington State Department of Fish & Wildlife (WDFW).
- NPDES permit #WA-002465-1, issued by the Department of Ecology on February 20, 1998 and modified on May 29, 2001.
- NPDES General Stormwater Permit for Construction Activity #SO3-00491 issued by the Department of Ecology on April 4, 2001.

If you have any questions, please contact Ann Kenny at (425) 649-4310. Written comments can be sent to her at the Department of Ecology, Northwest Regional Office, 3190 160th Avenue SE, Bellevue, Washington, 98008-5452. The enclosed Order may be appealed by following the procedures described in the Order.

Sincerely,

Gordon White

Gordon White
Program Manager
Shorelands and Environmental Assistance Program

GW:AK
Enclosure
cc: Michelle Walker, Corps of Engineers
Gail Terzi, Corps of Engineers
Tony Opperman, WDFW
Tom Sibley, NMFS
Nancy Brennan-Dubbs, USFWS
Joan Cabreza, EPA
Kimberly Lockard, Airport Communities Coalition

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, and THE PORT OF SEATTLE, Respondents.	PCHB No. 01-160 DECLARATION OF DONALD E. WEITKAMP, PH.D IN SUPPORT OF PORT'S OPPOSITION TO ACC'S MOTION FOR PARTIAL SUMMARY JUDGMENT

DONALD E. WEITKAMP declares as follows:

1. Identity of Declarant. I am over the age of 18 years, am competent to testify as a witness herein, and have personal knowledge of the facts stated in this declaration.

2. Resume and Experience. I am a fish biologist with experience in freshwater and marine aspects of the biology of salmonids, resident fishes, and invertebrates of the Pacific Northwest. My experience has been with the freshwater spawning, rearing and migrations of salmonids together with the estuarine rearing and migration of juvenile salmonids. I have over 30 years professional experience working as a fisheries and resource biologist throughout the United States, Central America, and China. A true and correct copy of my professional resume is attached as Exhibit A to this declaration.

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3. Involvement With Project. With respect to the Port of Seattle's planned Master Plan Update (MPU) projects at Seattle-Tacoma International Airport ("STIA"), I have assisted in the preparation of the Biological Assessment for the federal Fish and Wildlife Service and the National Marine Fisheries Service for the various projects at STIA. I am thoroughly familiar with existing stream conditions and flow conditions in the area of STIA. I have reviewed the existing and proposed stormwater management plans for STIA and the proposed low flow analysis and mitigation plan for the Port's projects.

4. Materials Reviewed. I have reviewed the Biological Assessment, Master Plan Update Improvements, Seattle-Tacoma International Airport (Parametrix 1999) that was prepared for the federal agencies, the Biological Opinion issued by the United States Fish and Wildlife Service, the Essential Fish Habitat assessment prepared for the services, the Low Streamflow Analysis and the Summer Low Flow Impact Offset Facility Proposal prepared for the STIA projects, the Natural Resources Mitigation Plan prepared for the Corps of Engineers, the Stormwater Management Plan for the STIA projects, the §401 Certification issued by the Department of Ecology, and the declarations submitted by ACC declarants.

5. Potential Adverse Impacts to Aquatic Biota of Area Streams. The MPU projects and conditions provided in the §401 Certification will adequately protect water resources around the STIA, preventing harm to sensitive streams and aquatic life. In my opinion, the water quality controls and conditions of the project design, and those placed on the project in the §401 Certification, including stormwater best management practices, are adequate to protect area streams and other aquatic resources. Water quality criteria are commonly promulgated in a conservative manner that prevents detectable impacts to aquatic resources. Meeting these criteria will adequately protect the aquatic resources of the STIA area streams.

6. The streams adjacent to STIA have been highly altered by existing urban development independent of STIA. This urban development has substantially altered the stream's hydraulic and chemical characteristics. Runoff from developed urban areas is highly altered from pre-development stream conditions by changes in the rate of runoff, and the presence of roadway pollutants, fertilizers

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and pesticides. Treatment of STIA runoff prior to discharge to these streams mitigates some of the existing impacts produced by untreated runoff from the airport communities.

7. Fish and Salmon Use of STIA Area Creeks. Those portions of Miller, Walker and Des Moines Creek near STIA are not inhabited by chum and chinook salmon based on any evidence I have seen. Portions of the streams near STIA are the headwaters of these small creeks and are smaller than most natural waters inhabited by these species. The streams in STIA area have several warm water fish species that are exotic or introduced species, including yellow perch, black crappie and pumpkinseed sunfish. These species commonly inhabit streams having characteristics adverse to salmonids and are not commonly found in the same habitats as salmonids. Most likely the effects of urbanization have sufficiently altered the streams to make them more suitable for these warm water species than for cold water salmonids. The presence of these warm water species together with the small size of the headwater reaches of Miller, Walker, Des Moines and Gilliam Creeks (which constitute the portions of those creeks near STIA) indicates that salmonids are not likely to inhabit the portions of these streams in the STIA vicinity.

8. Juvenile salmon migrating along the shorelines of Puget Sound from other streams are not likely to enter Miller, Walker, or Des Moines Creeks. Some of these migrants are likely to be briefly present in Puget Sound waters where those creeks enter the Sound. The studies prepared for the federal agencies' consultation under the Endangered Species Act state that there is no data or observations to support the presumed use of these creek estuaries by chinook. It is likely that a few chinook will hold near the mouth of those streams during migration along Puget Sound's shoreline, but it is unlikely any would venture upstream past the vicinity of the stream mouth. Young salmonids, including chum and chinook, commonly frequent the discharge of small tributaries into mainstem streams, lakes and estuarine areas. This association is likely due to the food sources the streams carry in their discharges. Stream discharges carry aquatic insects into estuarine habitats providing concentrated sources of prey the young salmon commonly have been consuming during their freshwater rearing phase. Chum and coho salmon have been found in the lower portions of the streams, some distance from STIA. In the vicinity of STIA, however, these streams are not of

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adequate size to provide habitat for most salmon. Only small numbers of cutthroat and possibly coho are likely to be found in this vicinity.

9. Biological Assessment Prepared for Federal Agencies. Following the requirements of the Endangered Species Act, the Port prepared a Biological Assessment, for the actions being taken pursuant to the Port's Master Plan Update at STIA, for the National Marine Fisheries Service and the U.S. Fish & Wildlife Service (collectively, the "Services"). The Services are the agencies with responsibility for protection of species listed under the Endangered Species Act. The Biological Assessment concluded that the Master Plan Update projects at STIA are not likely to adversely affect the listed species under the Endangered Species Act. A copy of the Biological Assessment is attached as Exhibit B to my first declaration, submitted in opposition to ACC's motion for stay.

10. Letter of Concurrence from NMFS Concludes Not Likely to Adversely Affect. The National Marine Fisheries Service has issued a letter of concurrence with the finding that the project is not likely to adversely affect chinook salmon. A copy of the letter of concurrence is attached as Exhibit C to my first declaration.

11. Biological Opinion from USF&WS Concludes Not Likely to Adversely Affect. The U.S. Fish & Wildlife Service has issued a Biological Opinion indicating concurrence with the finding that the Master Plan Update project is not likely to adversely affect their listed species. A copy of that Biological Opinion is attached as Exhibit D to my first declaration.

12. Essential Fish Habitat Study Concludes No Long-Term Adverse Affects will Occur. An analysis of Essential Fish Habitat has also been conducted by the Federal Aviation Agency ("FAA") and U.S. Army Corps of Engineers to comply with the provisions of Section 305(b) of the Magnuson-Stevens Act (MSA). The FAA assumed the role of lead federal agency for purposes of this consultation and designated the Port of Seattle as its non-federal representative for the purposes of preparing this Essential Fish Habitat assessment. See 50 C.F.R. § 600.920(b)-(c). In addition to species listed under the ESA, the Essential Fish Habitat analysis included other, non-listed fish species such as coho salmon. That analysis concluded that the Port's Master Plan Update projects, including the projects for which the §401 Certification was issued, would have no adverse effects to

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chinook or pink salmon, and no long-term effects will occur to coho salmon. The Essential Fish Habitat assessment concluded that those restoration projects planned for Miller Creek as part of the Master Plan Update would provide a long-term benefit to coho. Construction associated with the habitat restoration projects planned for Miller Creek may produce some short-term effects on coho salmon. A copy of the Essential Fish Habitat analysis is attached as Exhibit E to my first declaration.

13. Is Stormwater Detention Appropriate to Mitigate Impacts of Increased Impervious Surface Area? Stormwater detention in urban areas of increased impervious surface area is an appropriate means of mitigation. Man-made detention of water volumes that would have otherwise naturally infiltrated into and been detained in the soil column is appropriate to maintain natural stream discharge rates. Previous development in the affected basins has already altered natural stream flows. The Master Plan Update project would add additional impervious surface area that would further alter stream discharge rates in the absence of mitigation measures. Thus, stormwater detention is proposed to replicate the natural detention that would have occurred in the absence of the project. Stormwater detention is to be provided in amounts and during low flow periods so as to maintain pre-development low flows. Stormwater is not being detained longer than would have naturally occurred in pre-development conditions.

14. Will Flows In Area Streams Below 1.0 CFS Have an Adverse Impact on Fish? Des Moines, Miller and Walker Creeks all flow at less than 1.0 cubic feet/second (cfs) during low flow periods. Stream flows have decreased to less than 1.0 cfs (7 day avg.) for every year of record except one year for one creek. Parametrix and others examined this record covering the past fifty years in preparation of the Low Flow Analysis for the §401 Certification and the Biological Assessment for the federal agencies. These pre-project low flow conditions establish the carrying capacity of the streams and demonstrate that the streams do not provide (either currently or at any time during the period of record) desirable salmonid habitat in the vicinity of STIA. Even without low flow mitigation, the project will not materially change these limiting flow conditions for any of the four streams. Small changes in flow are not likely to produce measurable effects on temperature and dissolved oxygen. Local weather and water source conditions have a much greater effect on these

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stream characteristics. Small decreases in stream flow are unlikely to cause stranding or mortality of any fish. Regardless, the project's stormwater management plan is designed to mitigate low stream flow preventing adverse impacts.

15. Is the Timing of Low Flow Mitigation Appropriate? The timing of low flow impacts and appropriate mitigation is determined by the historical occurrence of low flows. It is during this late summer period that mitigation of stream flows is most important and of most value to the aquatic biota. Parametrix reviewed data collected over nearly 50 years for area streams. In all but a few of those years, the low flow events in the creeks occurred in August and September. This is consistent with stream gauge data from most Puget Sound lowland streams, which commonly show lowest flows from late July through early September. In all but a few years of the nearly 50 years reviewed, the mean flow in Des Moines, Walker, and Miller Creeks decreased slowly from June through late October, with the lowest mean flows in August through early October. Stream flows then tend to increase rapidly after mid- to late-October with the autumn rains in the Puget Sound region. The required low flow mitigation plan provides a level of flow during low flow periods that is equivalent to current flow levels, and will provide protection for the aquatic resources of the streams. On site stormwater detention of this nature is a common requirement to protect aquatic resources in developed portions of Washington State where impervious surface area exceeds natural conditions.

16. Adequacy of Biological Information Necessary to Estimate Impacts. A substantial amount of information is available on the species of fish present in the four streams of the STIA area. The fish species present have been identified, and appropriate information exists in the literature and water quality criteria to determine the actions appropriate to protect these species. The Port has conducted numerous habitat surveys and incorporated other (non-Port) survey data into its analysis of conditions in Miller, Walker and Des Moines creeks. These surveys consist of data on fish, other aquatic species, water quality, water quantity, habitat features, and stream stability. Surveys include:

- Ames 1970
- Aquatic Resources Consultants, Inc. 1996
- Batcho 1999 personal communication

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- Des Moines Creek Basin Committee 1997
- Herrera Environmental Consultants, Inc. 1995, 1996 and 1997
- Hillman et al. 1999
- King County Surface Water Management 1997
- Luchessa 1995
- Pacific Groundwater Group 2000
- Parametrix, Inc. 1997, 1999a
- Port of Seattle 1994
- Resources Planning Associates et al 1994
- Trout Unlimited 1993

These surveys were used to determine the existing conditions prior to the Port's Master Plan Update Improvements (which include the projects for which a §401 Certification was required). Specifically, "baseline conditions" were established in the Biological Assessment (Parametrix 2000a) and Essential Fish Habitat Consultation (Parametrix 2000b) for salmonids and salmonid habitat. The United States Fish and Wildlife Service issued a Biological Opinion that accepted the baseline conditions established by the Port in those documents.

17. In conclusion, based on my review of the project and scientific evidence, the stormwater mitigation measures required by the §401 Certification provide reasonable assurance that the Master Plan Update projects will not cause significant adverse impact to fish and aquatic biota.

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

Executed at Kirkland, Washington, this 14th day of January 2002.

Donald E. Weitkamp, Ph.D.

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EX. A

Don Weitkamp, Ph.D.

Ph.D., Fisheries Biology, 1976
Master of Science, Invertebrate Pathology, 1971
Bachelor of Science, Zoology, 1966

Dr. Weitkamp has been investigating fisheries and associated water quality issues in the Pacific Northwest River system since 1971. His initial research in this area dealt with the water quality issue of supersaturation through out the Columbia and Snake Rivers. He subsequently worked with various habitat, rearing and passage issues in rivers and estuaries of the Pacific Northwest. This work investigated the effects of various habitat and water quality alterations on fisheries resource. He has designed, managed and directed research investigating aquatic populations and habitat.

Don Weitkamp, Ph.D., is a Parametrix Principal responsible for projects dealing with salmon habitat issues in both estuarine and freshwater. He has conducted numerous salmon habitat projects in the streams and estuaries of the Northwest to analyze the habitat they use in port areas. These investigations have determined how young salmon behave in the habitats provided by altered shorelines such as piers, as well as along more natural shorelines. During the last two years Dr. Weitkamp has been conducting an intensive review of the literature dealing with the estuarine rearing requirements of young chinook and other salmon resulting in an extensive annotated bibliography and draft literature review.

ANALYSIS OF POTENTIAL RESTORATION MEASURES

In the 1970' s Dr. Weitkamp began assessing habitat restoration potential for chinook spawning and rearing in both freshwater and estuarine environments. He developed the design and guided monitoring of intertidal rearing habitat in Commencement Bay in 1988 after assessing potential restoration measures for a contaminated sediment site (Tacoma Kraft Mill). Recently he analyzed the habitat restoration potential for the Asarco shoreline site in Commencement Bay. For the past two years he has been analyzing the habitat restoration potential for the disposal site for sediments to be dredged from Thea Foss Waterway. In the Port of Seattle it was his responsibility to analyze and develop potential restoration measures for the southwest Harbor Project at the former Lockheed Shipyard site.

In the early 1980' s he helped to develop a chinook spawning area in the Columbia River and the use of pheromones to attract spawners to newly constructed habitat where they had not previously spawned. Recently he assisted the City of Seattle in evaluation of habitat conditions in the Lake Washington, the Green River, and Puget Sound. He is currently leading a project to assess the restoration of a natural flood plain on the Tolt River to provide improved habitat for salmon spawning and rearing.

BIOLOGICAL ASSESSMENTS

Recently Dr. Weitkamp prepared the Biological Assessments for the shoreline protection and habitat construction at the Asarco site, and the development of saltmarsh at the Tahoma site in Commencement Bay. He has prepared a draft BA for the St. Paul Waterway sediment disposal site that involved extensive habitat mitigation as part of the action to fill St. Paul Waterway. He has been serving as a representative for Simpson and Asarco to the EPA team preparing the Commencement Bay BA to support sediment cleanup actions. Recently he prepared draft BAs for a pier restoration project at Point Roberts and for the

Chinese Reconciliation Park development in Tacoma. He is currently working on the fisheries aspects of the BA for the Columbia River channel deepening project proposed by the U.S. Army Corps of Engineers. He has participated in a number of BA' s prepared for actions in fresh water habitats. He prepared an assessment of the status of summer chinook in the mid-Columbia region that assisted in preventing this species from becoming listed as threatened.

PARTICIPATION SALMON RECOVERY EFFORTS

Dr. Weitkamp served on the project selection panel for Washington State' s Salmon Recovery Funding Board. He was a member of the team working with the City of Seattle to identify limiting factors and potential restoration measures for the City. He is a member of the team selected to assist Snohomish County with ESA issues. Previously he served for two years on the panel of agency representatives and experts established to identify potential habitat restoration sites in Commencement Bay.

GREEN-DUWAMISH R. / ELLIOTT BAY EXPERIENCE

Dr. Weitkamp began conducting research for the Port of Seattle on salmon habitat issues in the early 1980' s with the project to construct Terminal 37. He has conducted analysis of spawning and flow requirements, as well as sampling and observational studies to determine the behavior of young salmon in shoreline habitats and the influence of factors such as prey availability and potential predation.

SALMON HABITAT RESTORATION

In recent years, his involvement in projects affecting aquatic resources has lead to the need to develop habitat restoration as an effective means to mitigate the impacts of shoreline development actions and stimulate public support for the actions. His role has been to work with agency representatives and public interest groups to identify and incorporate their interests into these restoration actions. By this means he has helped clients to efficiently get their projects permitted with public and agency support. This has proved to be an effective means to both accomplish development projects and restore previously lost resources.

Dr. Weitkamp has coordinated involvement of regulatory and special interest groups to develop consensus on solutions to allow development projects to proceed. Dr. Weitkamp has developed innovative habitat restoration actions as integral parts of sediment remediation and shoreline development to achieve pragmatic solutions.

HYDROELECTRIC PROJECTS & FISH RESOURCES

He has conducted numerous projects related to the dams in the Pacific Northwest. These include evaluation of the biological impact of implementation of Tacoma's second water right from the Green River, and a subsequent survey of chinook spawning during a low water year. He conducted a 15 year study of fall chinook spawning in the Hanford Reach for an area strongly influenced by dam operation. He has directed studies of survival studies at Wells, Rocky Reach, and Rock Island Dam for passage through spillways and turbines. He has directed studies of genetics and migration survival of hatchery population of salmonids in the mid-Columbia. His experience with dams includes involvement in the development of turbine intake screens, fish bypass and outfall systems, surface collection systems, and transportation of salmon smolts.

REPRESENTATIVE PROJECT EXPERIENCE

Green River Diversion
Evaluated the potential impacts on fisheries habitat in the Green River which would result from the increased withdrawal of water to serve City of Tacoma domestic requirements. This project included evaluating the adequacy of the Washington State Department of Ecology requirements for minimum flows and special conditions for instream flows within the Green River watershed. Dr. Weitkamp provided expert testimony before the State Shorelines Hearing Board on behalf of the City of Tacoma and the Washington State Department of Ecology concerning these water rights issues, the IFIM analysis, and the impact of instream flows on fisheries resources.

Elliott Bay Fish Studies
Conducted a number of studies in the harbor area of the Green-Duwamish River and the Port of Seattle to monitor juvenile salmon and resident fish populations and to evaluate the effects of dredging/filling and other shoreline modifications on marine invertebrates and fish populations. These studies of the benthos and fish have involved sampling to establish population densities and habitat types, measuring effects of habitat alterations and enhancement, and determining fish behavior to evaluate the impacts of dredging, filling and pier construction.

Cedar Falls Resource Evaluation Studies
Coordinated an investigation of fish abundance and distribution in Chester Morse Lake. The study investigated fish distribution both vertically and spatially throughout the lake to evaluate the potential fish entrainment impacts from a proposed power intake. In this project, Parametrix conducted or assisted in all facets of the project. We supplied the Oneida traps, gill nets, and boats used for the sampling and hydroacoustic surveys.

Cedar River Watershed Programmatic EIS
Assigned Principal and technical participant in a programmatic EIS and development of a secondary use plan for alternative uses of Seattle's municipal watershed. This EIS and plan evaluated recreation, education, wildlife, and timber harvest opportunities along with the need to protect water quality. Our role was to help clarify the vision of alternative opportunities and to assess both the benefits and impacts.

Water Supply Options Evaluation
Participated in an evaluation of potential water supply options for the City of Portland Oregon, by assessing potential impacts to aquatic resources. Options from construction of a new dam and reservoir on the Bull Run Watershed to aquifer storage options were evaluated, including withdrawal from the Columbia, Willamette and Clackamus rivers. Effects of water withdrawal, habitat alteration and intake screening options were evaluated.

METRO Water Supply EIS, Portland
Assigned Principal and participant in analysis of environmental impacts associated with various alternatives for increasing the water supply to the Portland metropolitan area. Evaluated fishery impacts to the Clackamas, Willamette, Columbia, and Bull Run Rivers. This project required maintenance of natural resource and recreational values as part of water development.

Yakima River IFIM Studies and Recommendations
Led the effort for a detailed review of instream flow studies to determine the adequacy of available information. Simultaneously, negotiations were conducted between resource agency experts and user group representatives to define biological criteria for the basin. These criteria defined the species and life stages utilizing specific segments of the river system. This information was then used to develop acceptable flow recommendations for the Yakima River Basin and its storage reservoirs.

Salmon Spawning Assessment Vernita Bar
He helped design and conducted extensive studies of fall chinook spawning for over 15 years at the largest natural spawning site in the U.S. (Hanford Reach). This FERC license study evaluated all factors potentially affecting spawning success with special emphasis on spawning habitat and flow fluctuations. It included development of an artificial spawning area to mitigate possible impacts due to flow regulation. These efforts resulted in operating criteria for Priest Rapids Dam, during the spawning period, that minimize the upper elevations at which the chinook spawn, resulting in lower required flows during crucial spring periods.

Habitat Restoration/Forbes Creek
Provided fish habitat analysis and design services to restore natural habitat characteristics to Forbes Creek, a Lake Washington tributary, previously channelized by a large gravel pit development. Habitat and flow control features were incorporated to provide natural stream habitat within a large residential development. This provided recreational opportunities by placing fish spawning habitat within a residential development.

Saltmarsh Habitat Restoration
Provided project management, technical design and agency coordination for habitat restoration on Middle Waterway in Commencement Bay. This joint project by natural resource trustees (state and federal agencies) and Simpson Tacoma Kraft Company is restoring saltmarsh habitat from a previously filled area adjacent to a tideflat. The project is mitigation for past damages to natural resources and sediments. Services included site investigation, design, coordination and monitoring.

Tahoma Salt Marsh Development
Don is currently leading a project to develop the Tahoma Saltmarsh habitat project for the City of Tacoma. This involves site investigations, coordination with Natural Resource Trustees, and design of habitat that will support saltmarsh vegetation along with protected habitat for juvenile salmon migrating along Commencement Bay' s shoreline. He is currently assisting with habitat development and preparation of a Biological Assessment for the Chinese Reconciliation Park proposed for the adjacent shoreline.

Sediment Remediation and Habitat Restoration
Managed confined capping of contaminated nearshore sediments associated with a large pulp and paper mill. Prepared sampling plans for characterizing extent of contamination, prepared monitoring plans for construction, and performed post-construction surveys to meet EPA consent decree criteria. Participated in disposal configuration design, which is intended to provide nearshore habitat for juvenile salmonids. Prepared technical documents in support of permit applications and conducted monitoring to verify the project's success since construction in 1988. Helped developed the public participation process that was key to the success of this project.

Southwest Harbor Redevelopment EIS
Assigned principal and leader of marine resource tasks on programmatic redevelopment of the 80-acre area in the southwest harbor (former Lockheed Shipyard). His primary responsibility was to analyze existing intertidal and subtidal habitat value and designed new intertidal habitat areas on a potential nearshore confined disposal site for contaminated sediments to benefit young salmon and other species. He led agency coordination/negotiation on habitat issues to develop acceptable mitigation alternatives. This project involved redevelopment of several sites that included both upland and in-water contamination (sediment contamination). The project became a combined EIS and Remedial Investigation to provide an opportunity for redevelopment in a relatively short time. He helped the Port develop public participation in planning and development of both alternative actions and mitigation.

Under-Pier Habitat, Commencement Bay
Designed and conducted studies of young salmon migrating and rearing under piers in the Port of Tacoma to determine their presence, food sources, and potential predation. Young salmon were found to commonly use areas under pier aprons with food production to be about 50% of that occurring in similar adjacent areas without aprons. Fish predators were not found in the shallow water depths under aprons where the young salmon were found.

Juvenile Salmon Use of St. Paul Waterway, Commencement Bay
Designed and guided sampling of young salmon and marine fishes using the shoreline habitats of St. Paul waterway and adjacent areas of Commencement Bay that will be altered by the proposed sediment containment facility. Young salmon were collected, identified and enumerated at various locations to identify their relative use of different shoreline habitats. He also conducted an extensive literature review to identify the habitat characteristics important to young salmon.

Remediation/ASARCO Smelter Sediments
Assigned Principal for remedial investigation and feasibility study of the upland and marine superfund site contaminated by a copper smelter. Designed marine sampling plan helped owner negotiate with the U.S. EPA, and resolve the area to be remediated. Prepared an underwater video to demonstrate to public and agencies the existing limit of biological effects. Helped develop alternative remediation plans for contaminated areas.

Habitat Restoration/NRDA
Assisted the City of Tacoma with development of a plan to construct new estuarine habitat to satisfy Natural Resource Damage Claims. His role is to develop alternative concepts, coordinate with Natural Resource Trustees and develop a specific habitat restoration plan for an area on Middle Waterway adjacent to a previous project he helped to develop.

Lavaca Bay Habitat Restoration
He helped develop a plan for a habitat restoration project to develop natural resources in both terrestrial and estuarine environments of a large bay on the Gulf of Mexico. This area has previously been contaminated with mercury and other metals as the result of industrial activities. He has prepared a conceptual plan and a video presentation to effectively communicate this concept to the involved panties. This concept will restore natural resource functions as a part of contaminant remediation and provide recreational opportunities for both residents and tourists.

Fuel Pier Relocation RI/EIS
As assigned principal, Dr. Weitkamp helped the U.S. Navy develop shoreline alternatives and negotiate a sampling program with regulatory agencies. This program identified biological resources and contaminant distributions within an area to be dredged at the existing fuel pier before construction of a new fuel pier. This information and the EIS identified disposal options and mitigation for habitat alterations. He helped the Navy develop agency participation in identifying action alternatives and mitigation.

Hatchery Production Environmental Assessment
Oversaw a NEPA environmental assessment of a large salmon and steelhead hatchery program for a major Columbia River tributary, the Yakima River. Analysis of multiple proposed sites included potential effects on existing fisheries populations, water quality and quantity, land use and recreation, and wildlife. This hatchery system incorporates adaptive management strategies for program development and is being used as a prototype for the entire Columbia Basin.

Hatchery Effectiveness Survey
Assigned Principal for a comprehensive survey to identify non-published research projects conducted in the last 10 to 15 years on all aspects of salmon, trout, and sturgeon culture. The project developed a computerized database that summarizes this information and makes it readily available.

Sultan River Hydroelectric Impacts
Dr. Weitkamp participated in both phases of the evaluation of the Henry M. Jackson hydroelectric project. This included strategy on development of the IFIM analysis during the first phase prior to operation. During the second phase, he helped develop the study plan and analysis for evaluation of salmon passage and spawning to evaluate operational impacts.

Surface Collector Rocky Reach Dam
As a member of an engineering team, leading efforts to incorporate biological criteria in the design of a unique collector for juvenile salmon. This system will incorporate hydraulic characteristics with fish behavior tendencies to provide a practical bypass solution that avoids expensive installation of intake diversion screens. His role is to help develop and evaluate alternative designs by incorporating fish behavior characteristics with hydraulic evaluations.

Intake Screens Wanapum/Priest Rapids Dams
Provided biological expertise to help develop a unique turbine intake screen and bypass system for these hydroelectric projects. Directed prototype testing which has shown favorable results of high diversion rates, very high survival, and very low stress in diverted fish.

Fish Diversion Screen Analysis Rock Island/Rocky Reach Dams
Worked with hydraulic engineers and hydraulic laboratories to develop screen design and fish bypass criteria for these hydroelectric projects. Using biological information together with physical modeling, we developed the appropriate criteria to provide direction for engineers to design successful screens and bypass systems.

Orifice Collection Bypass Gallery
Responsible for biological evaluation of engineering alternatives for moving diverted fish efficiently from dam gatewells to downstream outfalls for Wanapum and Priest Rapids Dams. These evaluations involved

1:4 scale model evaluations of various orifice models together with modeling conduits and control gates. Models were assessed using both hydraulic parameters and small fish.

Fish Bypass Outfall Design
Biologist member of an interdisciplinary team to develop an outfall design and location to be constructed at Wanapum Dam. This effort involved field evaluations, construction of a 1:100 scale model of the dam and three miles of the river, and videotaping both the real site and the model to identify a location that will minimize predation. A 1:10 scale model of the outfall was constructed to evaluate the best means for discharging young salmon.

Rock Island Dam Fish Outfall
Providing biological analysis for the design and location of a fish bypass outfall to be built for the first powerhouse at Rock Island Dam. This assessment is being done through field studies and biological evaluation of the hydraulic conditions. Responsible for agency coordination to involve agency representatives in the development of this project.

Bulb Turbine Survival Study
Under agency direction, the new bulb turbines installed at Rock Island Dam were tested to identify survival rates of salmon and steelhead smolts passing through them. Responsible for designing the holding facilities and marking all smolts to be released. He was also responsible for downstream recovery of smolts by traps and seines.

Priest Rapids Smolt Transportation
Conducted a five-year transportation study of chinook and sockeye smolts that were carried by truck from Priest Rapids to below Bonneville Dam; helped design the studies and supervised the design of the handling/transport facilities, stress studies, and release strategies.

Mid-Columbia System Survival Studies
Controversy over the effects of hydroelectric projects in the mid-Columbia led to the conduct of system mortality studies (5 dams). Responsibilities included coordinating efforts to design the study, mark juvenile salmon, and evaluate the transport and release, stress and short-term survival.

Wells Dam Passage Survival
Designed, directed, and analyzed results for evaluating passage survival of juvenile salmonids passing through turbines and the spillway at Wells Dam. This involved catching and releasing approximately 300,000 juveniles and coordinating recovery of data from multiple downstream dams. The results demonstrated moderately high rates of survival during passage through the dam.

Smolt Bypass Development
Dr. Weitkamp has served as a member of a number of engineering teams developing various systems for bypass of juvenile salmon at hydroelectric projects on Pacific Northwest rivers. He has lead efforts to incorporate biological criteria in the design of a variety of collection and bypass systems, including the unique Rocky Reach collector. These systems incorporate hydraulic characteristics with fish behavior tendencies to provide practical bypass solutions. These projects have included the development of intake diversion screens, associated bypass conveyances, transportation systems, and surface collection systems. He has also helped to develop bypass outfall evaluation criteria and techniques that identify the best locations to release bypassed smolts. His role in these various projects has been to help develop and

evaluate alternative designs by incorporating fish behavior characteristics with hydraulic evaluations. These efforts have included hydraulic model interpretation, prototype design, and field evaluation of prototype systems.

Turbine-Spillway Survival Evaluations

Dr. Weitkamp has directed and participated in a variety of turbine and other hydroelectric survival evaluations. These have included the Rock Island Bulb Turbine, Wells Turbine-Spillway, Rocky Reach Spillway, Mid Columbia System Survival, and Wanapum Turbine-Spillway Survival tests. In these tests we have evaluated turbines and spillways to identify survival rates of juvenile salmon and steelhead passing through them. He has been responsible for designing the holding facilities, marking fish to be released, designing release facilities, downstream recovery of smolts by traps and seines, physiological monitoring of smolts, and interpretation of recovery data. He has provided expert testimony on these studies at a number of FERC hearings.

Priest Rapids Smolt Transportation

He helped design and conducted a five-year transportation study of chinook and sockeye smolts that were carried by truck from Priest Rapids to below Bonneville Dam. This included design of the studies and supervising the design of the handling/transport facilities, stress studies, and release strategies.
Sockeye and chinook smolts were collected from both Priest Rapids and Wanapum Dams, marked, and transported by truck to downstream of Bonneville Dam to several release points. Sockeye were also transported to McNary Dam and loaded onto Corps of Engineers barges for transport downstream. These studies included thorough evaluation of stress incurred by the smolts by evaluating blood chemistry parameters.

Dissolved Gas Supersaturation

Dr Weitkamp has designed long-term and short-term, site-specific monitoring programs for private and public hydroelectric operators in the Columbia River System (U.S. Bureau of Reclamation; Grant, Douglas, and Chelan County PUDs; and Idaho Power Company.) These monitoring studies identified levels of dissolved gas supersaturation, incidence of gas bubble disease, and causes of supersaturation. He conducted in situ bioassay experiments to determine maximum tolerable supersaturation levels under river conditions, and assisted computational modelers in developing a computer model of supersaturation dynamics for a hydroelectric spillway.

Clark Fork River Supersaturation Evaluation

Designed site-specific monitoring programs for the Water Quality Work Group of the interagency FERC relicensing team. Directed studies to monitor dissolved gas supersaturation and its biological effects during exceptionally high flow years. These monitoring studies identified levels of dissolved gas supersaturation, incidence of gas bubble disease, and operational methods to reduce supersaturation.

Columbia River System Supersaturation Monitoring

Designed long-term and short-term, site-specific monitoring programs for private and public hydroelectric operators in the Columbia River System (U.S. Bureau of Reclamation; PUDs for Grant, Douglas, and Chelan Counties; and Idaho Power Company.) These monitoring studies identified levels of dissolved gas supersaturation, incidence of gas bubble disease, and causes of supersaturation.

Supersaturation Bioassays
Designed and conducted two *in situ* bioassay studies in the Columbia River using juvenile salmon to evaluate the effects of supersaturation under natural conditions. These data provided the basis to revise dissolved gas criteria for hydroelectric projects. They demonstrated the differences between laboratory observations and field conditions encountered in the rivers.

Snake-Salmon Rivers Supersaturation Monitoring
Supervised monitoring efforts over a three-year period to identify dissolved gas levels caused by natural conditions and hydroelectric discharges in Hell's Canyon and the free flowing Salmon River. These efforts demonstrated that natural river conditions cause supersaturation at levels sufficient to produce gas bubble disease under laboratory conditions.

Reservoir Drawdown
Parametrix was retained by various port and irrigation interests to evaluate the biological effectiveness and impacts or proposed reservoir drawdowns to aid salmon survival. This effort assessed impacts to juvenile salmon, adult salmon, resident fish, reservoir habitat, wetlands, and water quality. Dr. Weitkamp also developed an innovative proposal for a mobile net pen system as a more effective and less destructive alternative to reservoir drawdowns.

John Wayne Marina EIS
Identified clam, eelgrass, and fish resources to be impacted by this Sequim Bay marina. Provided technical expertise and prepared EIS sections addressing biology and water quality and dredging issues. Helped the Port of Port Angeles negotiate reasonable mitigation actions which allowed the marina to be constructed.

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U.S. Supreme Court

HECKLER v. CHANEY, 470 U.S. 821 (1985)

470 U.S. 821

**HECKLER, SECRETARY OF HEALTH AND HUMAN SERVICES v. CHANEY ET AL.
CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT
No. 83-1878.**

**Argued December 3, 1984
Decided March 20, 1985**

Respondent prison inmates were convicted of capital offenses and sentenced to death by lethal injection of drugs. They petitioned the Food and Drug Administration (FDA), alleging that use of the drugs for such a purpose violated the Federal Food, Drug, and Cosmetic Act (FDCA), and requesting that the FDA take various enforcement actions to prevent those violations. The FDA refused the request. Respondents then brought an action in Federal District Court against petitioner Secretary of Health and Human Services, making the same claim and seeking the same enforcement actions. The District Court granted summary judgment for petitioner, holding that nothing in the FDCA indicated an intent to circumscribe the FDA's enforcement discretion or to make it reviewable. The Court of Appeals reversed. Noting that the Administrative Procedure Act (APA) only precludes judicial review of federal agency action when it is precluded by statute, 5 U.S.C. 701(a) (1), or "committed to agency discretion by law," 701(a)(2), the court held that 701(a)(2)'s exception applies only where the substantive statute leaves the courts with "no law to apply," that here there was "law to apply," that therefore the FDA's refusal to take enforcement action was reviewable, and that moreover such refusal was an abuse of discretion.

Held:

The FDA's decision not to take the enforcement actions requested by respondents was not subject to review under the APA. Pp. 827-838.

(a) Under 701(a)(2), judicial review of an administrative agency's decision is not to be had if the statute in question

is drawn so that a court would have no meaningful standard against which to judge the agency's exercise of discretion. In such a case, the statute ("law") can be taken to have "committed" the decisionmaking to the agency's judgment absolutely. An agency's decision not to take enforcement action is presumed immune from judicial review under 701(a)(2). Such a decision has traditionally been "committed to agency discretion," and it does not appear that Congress in enacting the APA intended to alter that tradition. Accordingly, such a decision is unreviewable unless Congress has indicated an intent to circumscribe agency enforcement [470 U.S. 821, 822] discretion, and has provided meaningful standards for defining the limits of that discretion. Pp. 827-835.

(b) The presumption that agency decisions not to institute enforcement proceedings are unreviewable under 701(a)(2) is not overcome by the enforcement provisions of the FDCA. Those provisions commit complete discretion to the Secretary to decide how and when they should be exercised. The FDCA's prohibition of "misbranding" of drugs and introduction of "new drugs," absent agency approval, does not supply this Court with "law to apply." Nor can the FDA's "policy statement" indicating that the agency considered itself "obligated" to take certain investigative actions, be plausibly read to override the agency's rule expressly stating that the FDA Commissioner shall object to judicial review of a decision to recommend or not to recommend civil or criminal enforcement action. And the section of the FDCA providing that the Secretary need not report for prosecution minor violations of the Act does not give rise to the negative implication that the Secretary is required to investigate purported "major" violations of the Act. Pp. 835-837.

231 U.S. App. D.C. 136, 718 F.2d 1174, reversed.

REHNQUIST, J., delivered the opinion of the Court, in which BURGER, C. J., and BRENNAN, WHITE, BLACKMUN, POWELL, STEVENS, and O'CONNOR, JJ., joined. BRENNAN, J., filed a concurring opinion, post, p. 838. MARSHALL, J., filed an opinion concurring in the judgment, post, p. 840.

Deputy Solicitor General Geller argued the cause for petitioner. With him on the briefs were Solicitor General Lee, Acting Assistant Attorney General Willard, Samuel A. Alito, Jr., Leonard Schaitman, John M. Rogers, Thomas Scarlett, and Michael P. Peskoe.

Steven M. Kristovich argued the cause for respondents. With him on the brief were David E. Kendall, Julius LeVonne Chambers, James M. Nabrit III, John Charles Boger, James S. Liebman, and Anthony G. Amsterdam. *

[Footnote *] A brief of amicus curiae urging reversal was filed for the Washington Legal Foundation by Daniel J. Popeo, Paul D. Kamenar, George C. Smith, and Stephen Weitzman.

Briefs of amici curiae urging affirmance were filed for the American Society of Law and Medicine et al. by James M. Doyle; and for the Public Citizen by Alan B. Morrison and William B. Schultz. [470 U.S. 821, 823]

JUSTICE REHNQUIST delivered the opinion of the Court.

This case presents the question of the extent to which a decision of an administrative agency to exercise its "discretion" not to undertake certain enforcement actions is subject to judicial review under the Administrative Procedure Act, 5 U.S.C. 501 et seq. (APA). Respondents are several prison inmates convicted of capital offenses and sentenced to death by lethal injection of drugs. They petitioned the Food and Drug Administration (FDA), alleging that under the circumstances the use of these drugs for capital punishment violated the Federal Food, Drug, and Cosmetic Act, 52 Stat. 1040, as amended, 21 U.S.C. 301 et seq. (FDCA), and requesting that the FDA take various enforcement actions to prevent these violations. The FDA refused their request. We review here a decision of the Court of Appeals for the District of Columbia Circuit, which held the FDA's refusal to take enforcement actions both reviewable and an abuse of discretion, and remanded the case with directions that the agency be required "to fulfill its statutory function." 231 U.S. App. D.C. 136, 153, 718 F.2d 1174, 1191 (1983).

I

Respondents have been sentenced to death by lethal injection of drugs under the laws of the States of Oklahoma and Texas. Those States, and several others, have recently adopted this method for carrying out the capital sentence. Respondents first petitioned the FDA, claiming that the drugs used by the States for this purpose, although approved by the FDA for the medical purposes stated on their labels, were not approved for use in human executions. They alleged that the drugs had not been tested for the purpose for which they were to be used, and that, given that the drugs would likely be administered by untrained personnel, it was also likely that the drugs would not induce the quick and painless death intended. They urged that use of these drugs for human execution was the "unapproved use of an approved drug" and [470 U.S. 821, 824] constituted a violation of the Act's prohibitions against "misbranding." 1 They also suggested that the FDCA's requirements for approval of "new drugs" applied, since these drugs were now being used for a new purpose. Accordingly, respondents claimed that the FDA was required to approve the drugs as "safe and effective" for human execution before they could be distributed in interstate commerce. See 21 U.S.C. 355. They therefore requested the FDA to take various investigatory and enforcement actions to prevent these perceived violations; they requested the FDA to affix warnings to the labels of all the drugs stating that they were unapproved and unsafe for human execution, to send statements to the drug manufacturers and prison administrators stating that the drugs should not be so used, and to adopt procedures for seizing the drugs from state prisons and to recommend the prosecution of all those in the chain of distribution who knowingly distribute or purchase the drugs with intent to use them for human execution.

The FDA Commissioner responded, refusing to take the requested actions. The Commissioner first detailed his disagreement with respondents' understanding of the scope of FDA jurisdiction over the unapproved use of approved drugs for human execution, concluding that FDA jurisdiction in the area was generally unclear but in any event should not be exercised to interfere with this particular aspect of state criminal justice systems. He went on to state:

> "Were FDA clearly to have jurisdiction in the area, moreover, we believe we would be authorized to decline to exercise it under our inherent discretion to decline to pursue certain enforcement matters. The unapproved use of approved drugs is an area in which the case law is far from uniform. Generally, enforcement proceedings in this area are initiated only when there is a serious [470 U.S. 821, 825] danger to the public health or a blatant scheme to defraud. We cannot conclude that those dangers are present under State lethal injection laws, which are duly authorized statutory enactments in furtherance of proper State functions. . . ."

Respondents then filed the instant suit in the United States District Court for the District of Columbia, claiming the same violations of the FDCA and asking that the FDA be required to take the same enforcement actions requested in the prior petition. 2 Jurisdiction was grounded in the general federal-question jurisdiction statute, 28 U.S.C. 1331, and review of the agency action was sought under the judicial review provisions of the APA, 5 U.S.C. 701-706. The District Court granted summary judgment for petitioner. It began with the proposition that "decisions of executive departments and agencies to refrain from instituting investigative and enforcement proceedings are essentially unreviewable by the courts." Chaney v. Schweiker, Civ. No. 81-2265 (DC, Aug. 30, 1982), App. to Pet. for Cert. 74a (emphasis in original). The court then cited case law stating that nothing in the FDCA indicated an intent to circumscribe the FDA's enforcement discretion or to make it reviewable.

A divided panel of the Court of Appeals for the District of Columbia Circuit reversed. The majority began by discussing the FDA's jurisdiction over the unapproved use of approved drugs for human execution, and concluded that the FDA did have jurisdiction over such a use. The court then addressed the Government's assertion of unreviewable discretion [470 U.S. 821, 826] to refuse enforcement action. It first discussed this Court's opinions which have held that there is a general presumption that all agency decisions are reviewable under the APA, at least to assess whether the actions were "arbitrary, capricious, or an abuse of discretion." See Abbott Laboratories v. Gardner, 387 U.S. 136, 139 -141 (1967); 5 U.S.C. 706(2) (A). It noted that the APA, 5 U.S.C. 701, only precludes judicial review of final agency action - including refusals to act, see 5 U.S.C. 551(13) - when review is precluded by statute, or "committed to agency discretion by law." Citing this Court's opinions in Dunlop v. Bachowski, 421 U.S. 560 (1975), and Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402 (1971), for the view that these exceptions should be narrowly construed, the court held that the "committed to agency discretion by law" exception of 701(a)(2) should be invoked only where the substantive statute left the courts with "no law to apply." 231 U.S. App. D.C., at 146, 718 F.2d, at 1184 (citing Citizens to Preserve

Overton Park, supra, at 410). The court cited Dunlop as holding that this presumption "applies with no less force to review of . . . agency decisions to refrain from enforcement action." 231 U.S. App. D.C., at 146, 718 F.2d, at 1184.

The court found "law to apply" in the form of a FDA policy statement which indicated that the agency was "obligated" to investigate the unapproved use of an approved drug when such use became "widespread" or "endanger[ed] the public health." Id., at 148, 718 F.2d, at 1186 (citing 37 Fed. Reg. 16504 (1972)). The court held that this policy statement constituted a "rule" and was considered binding by the FDA. Given the policy statement indicating that the FDA should take enforcement action in this area, and the strong presumption that all agency action is subject to judicial review, the court concluded that review of the agency's refusal was not foreclosed. It then proceeded to assess whether the agency's decision not to act was "arbitrary, capricious, or an abuse of discretion." Citing evidence that the FDA assumed [470 U.S. 821, 827] jurisdiction over drugs used to put animals to sleep 3 and the unapproved uses of drugs on prisoners in clinical experiments, the court found that the FDA's refusal, for the reasons given, was irrational, and that respondents' evidence that use of the drugs could lead to a cruel and protracted death was entitled to more searching consideration. The court therefore remanded the case to the District Court, to order the FDA "to fulfill its statutory function."

The dissenting judge expressed the view that an agency's decision not to institute enforcement action generally is unreviewable, and that such exercises of "prosecutorial discretion" presumptively fall within the APA's exception for agency actions "committed to agency discretion by law." He noted that traditionally courts have been wary of second-guessing agency decisions not to enforce, given the agency's expertise and better understanding of its enforcement policies and available resources. He likewise concluded that nothing in the FDCA or FDA regulations would provide a basis for a court's review of this agency decision. A divided Court of Appeals denied the petition for rehearing. 233 U.S. App. D.C. 146, 724 F.2d 1030 (1984). We granted certiorari to review the implausible result that the FDA is required to exercise its enforcement power to ensure that States only use drugs that are "safe and effective" for human execution. 467 U.S. 1251 (1984). We reverse.

II

The Court of Appeals' decision addressed three questions: (1) Whether the FDA had jurisdiction to undertake the enforcement actions requested, (2) whether if it did have jurisdiction [470 U.S. 821, 828] its refusal to take those actions was subject to judicial review, and (3) whether if reviewable its refusal was arbitrary, capricious, or an abuse of discretion. In reaching our conclusion that the Court of Appeals was wrong, however, we need not and do not address the thorny question of the FDA's jurisdiction. For us, this case turns on the important question of the extent to which determinations by the FDA not to exercise its enforcement authority over the use of drugs in interstate commerce may be judicially reviewed. That decision in turn involves the construction of two separate but necessarily interrelated statutes, the APA and the FDCA.

The APA's comprehensive provisions for judicial review of "agency actions" are contained in 5 U.S.C. 701-706. Any person "adversely affected or aggrieved" by agency action, see 702, including a "failure to act," is entitled to "judicial review thereof," as long as the action is a "final agency action for which there is no other adequate remedy in a court," see 704. The standards to be applied on review are governed by the provisions of 706. But before any review at all may be had, a party must first clear the hurdle of 701(a). That section provides that the chapter on judicial review "applies, according to the provisions thereof, except to the extent that - (1) statutes preclude judicial review; or (2) agency action is committed to agency discretion by law." Petitioner urges that the decision of the FDA to refuse enforcement is an action "committed to agency discretion by law" under 701(a)(2).

This Court has not had occasion to interpret this second exception in 701(a) in any great detail. On its face, the section does not obviously lend itself to any particular construction; indeed, one might wonder what difference exists between (a)(1) and (a)(2). The former section seems easy in application; it requires construction of the substantive statute involved to determine whether Congress intended to preclude judicial review of certain decisions. That is the approach taken with respect to (a)(1) in cases such as Southern [470 U.S. 821, 829] R. Co. v. Seaboard Allied Milling Corp, 442 U.S. 444 (1979), and Dunlop v. Bachowski, 421 U.S., at 567 . But one could read the language "committed to agency discretion by law" in (a)(2) to require a similar inquiry. In addition, commentators have pointed out that construction of (a)(2) is

further complicated by the tension between a literal reading of (a)(2), which exempts from judicial review those decisions committed to agency "discretion," and the primary scope of review prescribed by 706(2)(A) - whether the agency's action was "arbitrary, capricious, or an abuse of discretion." How is it, they ask, that an action committed to agency discretion can be unreviewable and yet courts still can review agency actions for abuse of that discretion? See 5 K. Davis, Administrative Law 28:6 (1984) (hereafter Davis); Berger, Administrative Arbitrariness and Judicial Review, 65 Colum. L. Rev. 55, 58 (1965). The APA's legislative history provides little help on this score. Mindful, however, of the common-sense principle of statutory construction that sections of a statute generally should be read "to give effect, if possible, to every clause . . .," see United States v. Menasche, 348 U.S. 528, 538 -539 (1955), we think there is a proper construction of (a)(2) which satisfies each of these concerns.

This Court first discussed (a)(2) in Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402 (1971). That case dealt with the Secretary of Transportation's approval of the building of an interstate highway through a park in Memphis, Tennessee. The relevant federal statute provided that the Secretary "shall not approve" any program or project using public parkland unless the Secretary first determined that no feasible alternatives were available. Id., at 411. Interested citizens challenged the Secretary's approval under the APA, arguing that he had not satisfied the substantive statute's requirements. This Court first addressed the "threshold question" of whether the agency's action was at all reviewable. After setting out the language of 701(a), the Court stated: [470 U.S. 821, 830]

> "In this case, there is no indication that Congress sought to prohibit judicial review and there is most certainly no `showing of "clear and convincing evidence" of a . . . legislative intent' to restrict access to judicial review. Abbott Laboratories v. Gardner, 387 U.S. 136, 141 (1967). . . .
>
> "Similarly, the Secretary's decision here does not fall within the exception for action `committed to agency discretion.' This is a very narrow exception. . . . The legislative history of the Administrative Procedure Act indicates that it is applicable in those rare instances where `statutes are drawn in such broad terms that in a given case there is no law to apply.' S. Rep. No. 752, 79th Cong., 1st Sess., 26(1945)." Overton Park, supra, at 410 (footnote omitted).

The above quote answers several of the questions raised by the language of 701(a), although it raises others. First, it clearly separates the exception provided by (a)(1) from the (a)(2) exception. The former applies when Congress has expressed an intent to preclude judicial review. The latter applies in different circumstances; even where Congress has not affirmatively precluded review, review is not to be had if the statute is drawn so that a court would have no meaningful standard against which to judge the agency's exercise of discretion. In such a case, the statute ("law") can be taken to have "committed" the decisionmaking to the agency's judgment absolutely. This construction avoids conflict with the "abuse of discretion" standard of review in 706 - if no judicially manageable standards are available for judging how and when an agency should exercise its discretion, then it is impossible to evaluate agency action for "abuse of discretion." In addition, this construction satisfies the principle of statutory construction mentioned earlier, by identifying a separate class of cases to which 701(a)(2) applies.

To this point our analysis does not differ significantly from that of the Court of Appeals. That court purported to apply [470 U.S. 821, 831] the "no law to apply" standard of Overton Park. We disagree, however, with that court's insistence that the "narrow construction" of (a)(2) required application of a presumption of reviewability even to an agency's decision not to undertake certain enforcement actions. Here we think the Court of Appeals broke with tradition, case law, and sound reasoning.

Overton Park did not involve an agency's refusal to take requested enforcement action. It involved an affirmative act of approval under a statute that set clear guidelines for determining when such approval should be given. Refusals to take enforcement steps generally involve precisely the opposite situation, and in that situation we think the presumption is that judicial review is not available. This Court has recognized on several occasions over many years that an agency's decision not to prosecute or enforce, whether through civil or criminal process, is a decision generally committed to an agency's absolute discretion. See United States v. Batchelder, 442 U.S. 114, 123 -124 (1979); United States v. Nixon, 418 U.S. 683, 693 (1974); Vaca v. Sipes, 386 U.S. 171, 182 (1967); Confiscation Cases, 7 Wall. 454 (1869). This recognition of

the existence of discretion is attributable in no small part to the general unsuitability for judicial review of agency decisions to refuse enforcement.

The reasons for this general unsuitability are many. First, an agency decision not to enforce often involves a complicated balancing of a number of factors which are peculiarly within its expertise. Thus, the agency must not only assess whether a violation has occurred, but whether agency resources are best spent on this violation or another, whether the agency is likely to succeed if it acts, whether the particular enforcement action requested best fits the agency's overall policies, and, indeed, whether the agency has enough resources to undertake the action at all. An agency generally cannot act against each technical violation of the statute it is charged with enforcing. The agency is far better equipped than the courts to deal with the many variables involved [470 U.S. 821, 832] in the proper ordering of its priorities. Similar concerns animate the principles of administrative law that courts generally will defer to an agency's construction of the statute it is charged with implementing, and to the procedures it adopts for implementing that statute. See Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., 435 U.S. 519, 543 (1978); Train v. Natural Resources Defense Council, Inc., 421 U.S. 60, 87 (1975).

In addition to these administrative concerns, we note that when an agency refuses to act it generally does not exercise its coercive power over an individual's liberty or property rights, and thus does not infringe upon areas that courts often are called upon to protect. Similarly, when an agency does act to enforce, that action itself provides a focus for judicial review, inasmuch as the agency must have exercised its power in some manner. The action at least can be reviewed to determine whether the agency exceeded its statutory powers. See, e. g., FTC v. Klesner, 280 U.S. 19 (1929). Finally, we recognize that an agency's refusal to institute proceedings shares to some extent the characteristics of the decision of a prosecutor in the Executive Branch not to indict - a decision which has long been regarded as the special province of the Executive Branch, inasmuch as it is the Executive who is charged by the Constitution to "take Care that the Laws be faithfully executed." U.S. Const., Art. II, 3.

We of course only list the above concerns to facilitate understanding of our conclusion that an agency's decision not to take enforcement action should be presumed immune from judicial review under 701(a)(2). For good reasons, such a decision has traditionally been "committed to agency discretion," and we believe that the Congress enacting the APA did not intend to alter that tradition. Cf. 5 Davis 28:5 (APA did not significantly alter the "common law" of judicial review of agency action). In so stating, we emphasize that the decision is only presumptively unreviewable; the presumption [470 U.S. 821, 833] may be rebutted where the substantive statute has provided guidelines for the agency to follow in exercising its enforcement powers. 4 Thus, in establishing this presumption in the APA, Congress did not set agencies free to disregard legislative direction in the statutory scheme that the agency administers. Congress may limit an agency's exercise of enforcement power if it wishes, either by setting substantive priorities, or by otherwise circumscribing an agency's power to discriminate among issues or cases it will pursue. How to determine when Congress has done so is the question left open by Overton Park.

Dunlop v. Bachowski, 421 U.S. 560 (1975), relied upon heavily by respondents and the majority in the Court of Appeals, presents an example of statutory language which supplied sufficient standards to rebut the presumption of unreviewability. Dunlop involved a suit by a union employee, under the Labor-Management Reporting and Disclosure Act, 29 U.S.C. 481 et seq. (LMRDA), asking the Secretary of Labor to investigate and file suit to set aside a union election. Section 482 provided that, upon filing of a complaint by a union member, "[t]he Secretary shall investigate such complaint and, if he finds probable cause to believe that a violation . . . has occurred . . . he shall . . . bring a civil action . . . ." After investigating the plaintiff's claims the Secretary of Labor declined to file suit, and the plaintiff sought judicial review under the APA. This Court held that [470 U.S. 821, 834] review was available. It rejected the Secretary's argument that the statute precluded judicial review, and in a footnote it stated its agreement with the conclusion of the Court of Appeals that the decision was not "an unreviewable exercise of prosecutorial discretion." 421 U.S., at 567 , n. 7. Our textual references to the "strong presumption" of reviewability in Dunlop were addressed only to the (a)(1) exception; we were content to rely on the Court of Appeals' opinion to hold that the (a)(2) exception did not apply. The Court of Appeals, in turn, had found the "principle of absolute prosecutorial discretion" inapplicable, because the language of the LMRDA indicated that the Secretary was required to file suit if certain "clearly defined" factors were present. The decision therefore was not "`beyond the judicial capacity to supervise.'" Bachowski v. Brennan, 502 F.2d 79, 87-88 (CA3 1974) (quoting Davis 28.16, p. 984 (1970 Supp.)).

Dunlop is thus consistent with a general presumption of unreviewability of decisions not to enforce. The statute being administered quite clearly withdrew discretion from the agency and provided guidelines for exercise of its enforcement power. Our decision that review was available was not based on "pragmatic considerations," such as those cited by the Court of Appeals, see 231 U.S. App. D.C., at 147, 718 F.2d, at 1185, that amount to an assessment of whether the interests at stake are important enough to justify intervention in the agencies' decisionmaking. The danger that agencies may not carry out their delegated powers with sufficient vigor does not necessarily lead to the conclusion that courts are the most appropriate body to police this aspect of their performance. That decision is in the first instance for Congress, and we therefore turn to the FDCA to determine whether in this case Congress has provided us with "law to apply." If it has indicated an intent to circumscribe agency enforcement discretion, and has provided meaningful standards for defining the limits of that discretion, there is "law to apply" under 701(a)(2), and courts [470 U.S. 821, 835] may require that the agency follow that law; if it has not, then an agency refusal to institute proceedings is a decision "committed to agency discretion by law" within the meaning of that section.

III

To enforce the various substantive prohibitions contained in the FDCA, the Act provides for injunctions, 21 U.S.C. 332, criminal sanctions, 333 and 335, and seizure of any offending food, drug, or cosmetic article, 334. The Act's general provision for enforcement, 372, provides only that "[t]he Secretary is authorized to conduct examinations and investigations . . ." (emphasis added). Unlike the statute at issue in Dunlop, 332 gives no indication of when an injunction should be sought, and 334, providing for seizures, is framed in the permissive - the offending food, drug, or cosmetic "shall be liable to be proceeded against." The section on criminal sanctions states baldly that any person who violates the Act's substantive prohibitions "shall be imprisoned . . . or fined." Respondents argue that this statement mandates criminal prosecution of every violator of the Act but they adduce no indication in case law or legislative history that such was Congress' intention in using this language, which is commonly found in the criminal provisions of Title 18 of the United States Code. See, e. g., 18 U.S.C. 471 (counterfeiting); 18 U.S.C. 1001 (false statements to Government officials); 18 U.S.C. 1341 (mail fraud). We are unwilling to attribute such a sweeping meaning to this language, particularly since the Act charges the Secretary only with recommending prosecution; any criminal prosecutions must be instituted by the Attorney General. The Act's enforcement provisions thus commit complete discretion to the Secretary to decide how and when they should be exercised.

Respondents nevertheless present three separate authorities that they claim provide the courts with sufficient indicia of an intent to circumscribe enforcement discretion. Two of these may be dealt with summarily. First, we reject [470 U.S. 821, 836] respondents' argument that the Act's substantive prohibitions of "misbranding" and the introduction of "new drugs" absent agency approval, see 21 U.S.C. 352(f)(1), 355, supply us with "law to apply." These provisions are simply irrelevant to the agency's discretion to refuse to initiate proceedings.

We also find singularly unhelpful the agency "policy statement" on which the Court of Appeals placed great reliance. We would have difficulty with this statement's vague language even if it were a properly adopted agency rule. Although the statement indicates that the agency considered itself "obligated" to take certain investigative actions, that language did not arise in the course of discussing the agency's discretion to exercise its enforcement power, but rather in the context of describing agency policy with respect to unapproved uses of approved drugs by physicians. In addition, if read to circumscribe agency enforcement discretion, the statement conflicts with the agency rule on judicial review, 21 CFR 10.45(d)(2) (1984), which states that "[t]he Commissioner shall object to judicial review . . . if (i) [t]he matter is committed by law to the discretion of the Commissioner, e. g., a decision to recommend or not to recommend civil or criminal enforcement action . . . ." But in any event the policy statement was attached to a rule that was never adopted. Whatever force such a statement might have, and leaving to one side the problem of whether an agency's rules might under certain circumstances provide courts with adequate guidelines for informed judicial review of decisions not to enforce, we do not think the language of the agency's "policy statement" can plausibly be read to override the agency's express assertion of unreviewable discretion contained in the above rule. 5 [470 U.S. 821, 837]

Respondents' third argument, based upon 306 of the FDCA, merits only slightly more consideration. That section provides:

> "Nothing in this chapter shall be construed as requiring the Secretary to report for prosecution, or for the institution of libel or injunction proceedings, minor violations of this chapter whenever he believes that the public interest will be adequately served by a suitable written notice or ruling." 21 U.S.C. 336.

Respondents seek to draw from this section the negative implication that the Secretary is required to report for prosecution all "major" violations of the Act, however those might be defined, and that it therefore supplies the needed indication of an intent to limit agency enforcement discretion. We think that this section simply does not give rise to the negative implication which respondents seek to draw from it. The section is not addressed to agency proceedings designed to discover the existence of violations, but applies only to a situation where a violation has already been established to the satisfaction of the agency. We do not believe the section speaks to the criteria which shall be used by the agency for investigating possible violations of the Act.

IV

We therefore conclude that the presumption that agency decisions not to institute proceedings are unreviewable under 5 U.S.C. 701(a)(2) is not overcome by the enforcement provisions of the FDCA. The FDA's decision not to take the [470 U.S. 821, 838] enforcement actions requested by respondents is therefore not subject to judicial review under the APA. The general exception to reviewability provided by 701(a)(2) for action "committed to agency discretion" remains a narrow one, see Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402 (1971), but within that exception are included agency refusals to institute investigative or enforcement proceedings, unless Congress has indicated otherwise. In so holding, we essentially leave to Congress, and not to the courts, the decision as to whether an agency's refusal to institute proceedings should be judicially reviewable. No colorable claim is made in this case that the agency's refusal to institute proceedings violated any constitutional rights of respondents, and we do not address the issue that would be raised in such a case. Cf. Johnson v. Robinson, 415 U.S. 361, 366 (1974); Yick Wo v. Hopkins, 118 U.S. 356, 372 -374 (1886). The fact that the drugs involved in this case are ultimately to be used in imposing the death penalty must not lead this Court or other courts to import profound differences of opinion over the meaning of the Eighth Amendment to the United States Constitution into the domain of administrative law.

The judgment of the Court of Appeals is

> Reversed.

Footnotes

[Footnote 1] See 21 U.S.C. 352(f): "A drug or device shall be deemed to be misbranded . . . [u]nless its labeling bears (1) adequate directions for use . . . ."

[Footnote 2] Although respondents also requested an evidentiary hearing, the District Court regarded this hearing as having "no purpose apart from serving as a prelude to the pursuit of the very enforcement steps that plaintiffs demanded in their administrative petition." Chaney v. Schweiker, Civ. No. 81-2265 (DC, Aug. 30, 1982), App. to Pet. for Cert. 77a, n. 15. Respondents have not challenged the statement that all they sought were certain enforcement actions, and this case therefore does not involve the question of agency discretion not to invoke rulemaking proceedings.

[Footnote 3] In response to respondents' petition, the Commissioner had explained that the FDA had assumed jurisdiction in these cases because, unlike the drugs used for human execution, these drugs were "new drugs" intended by the manufacturer to be used for this purpose, and thus fell squarely within the FDA's approval jurisdiction. The Court of Appeals did not explain why this distinction was not "rational."

[Footnote 4] We do not have in this case a refusal by the agency to institute proceedings based solely on the belief that it lacks jurisdiction. Nor do we have a situation where it could justifiably be found that the agency has "consciously and expressly adopted a general policy" that is so extreme as to amount to an abdication of its statutory responsibilities. See, e. g., Adams v. Richardson, 156 U.S. App. D.C. 267, 480 F.2d 1159 (1973) (en banc). Although we express no opinion

on whether such decisions would be unreviewable under 701(a)(2), we note that in those situations the statute conferring authority on the agency might indicate that such decisions were not "committed to agency discretion."

[Footnote 5] Respondents also urge, as did the Court of Appeals, that a statement by the FDA's lawyers in a footnote to to their "memorandum in support of dismissal" in the District Court indicates that the agency considers the "policy statement" "binding." The footnote said that the "Federal [470 U.S. 821, 837] Register notice . . . sets forth the agency's current position o[n] the legal status of approved labeling for prescription drugs." The statement from the memorandum cites no authority, is taken out of context, and on its face does not indicate that the agency considered this position "binding" in any sense of the word. Moreover, we find it difficult to believe that statements of agency counsel in litigation against private individuals can be taken to establish "rules" that bind an entire agency prospectively. Such would turn orderly process on its head.

JUSTICE BRENNAN, concurring.

Today the Court holds that individual decisions of the Food and Drug Administration not to take enforcement action in response to citizen requests are presumptively not reviewable under the Administrative Procedure Act, 5 U.S.C. 701-706. I concur in this decision. This general presumption is based on the view that, in the normal course of events, Congress intends to allow broad discretion for its administrative agencies to make particular enforcement decisions, and there often may not exist readily discernible "law to apply" for courts to conduct judicial review of nonenforcement decisions. See Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402, 410 (1971). [470 U.S. 821, 839]

I also agree that, despite this general presumption, "Congress did not set agencies free to disregard legislative direction in the statutory scheme that the agency administers." Ante, at 833. Thus the Court properly does not decide today that nonenforcement decisions are unreviewable in cases where (1) an agency flatly claims that it has no statutory jurisdiction to reach certain conduct, ante, at 833, n. 4; (2) an agency engages in a pattern of nonenforcement of clear statutory language, as in Adams v. Richardson, 156 U.S. App. D.C. 267, 480 F.2d 1159 (1973) (en banc), ante, at 833, n. 4; (3) an agency has refused to enforce a regulation lawfully promulgated and still in effect, ante, at 836; 1 or (4) a nonenforcement decision violates constitutional rights, ante, at 838. It is possible to imagine other nonenforcement decisions made for entirely illegitimate reasons, for example, nonenforcement in return for a bribe, judicial review of which would not be foreclosed by the nonreviewability presumption. It may be presumed that Congress does not intend administrative agencies, agents of Congress' own creation, to ignore clear jurisdictional, regulatory, statutory, or constitutional commands, and in some circumstances including those listed above the statutes or regulations at issue may well provide "law to apply" under 5 U.S.C. 701(a)(2). Individual, isolated nonenforcement decisions, however, must be made by hundreds of agencies each day. It is entirely permissible to presume that Congress has not intended courts to review such mundane matters, absent either some indication of congressional intent to the contrary or proof of circumstances such as those set out above.

On this understanding of the scope of today's decision, I join the Court's opinion. 2

[Footnote 1] Cf. Motor Vehicle Manufacturers Assn. v. State Farm Mutual Ins. Co., 463 U.S. 29, 40 -44 (1983) (failure to revoke lawfully a previously promulgated rule is reviewable under the APA).

[Footnote 2] I adhere to my view that the death penalty is in all circumstances cruel and unusual punishment forbidden by the Eighth and Fourteenth [470 U.S. 821, 840] Amendments, see Gregg v. Georgia, 428 U.S. 153, 227 (1976) (BRENNAN, J., dissenting). My concurrence here should not be misread as an expression of approval for the use of lethal injections to effect capital punishment as an independent matter. The Court is correct, however, that "profound differences of opinion over the meaning of the Eighth Amendment" should not influence our consideration of a question purely of statutory administrative law. Ante, at 838. [470 U.S. 821, 840]

JUSTICE MARSHALL, concurring in the judgment.

Easy cases at times produce bad law, for in the rush to reach a clearly ordained result, courts may offer up principles,

doctrines, and statements that calmer reflection, and a fuller understanding of their implications in concrete settings, would eschew. In my view, the "presumption of unreviewability" announced today is a product of that lack of discipline that easy cases make all too easy. The majority, eager to reverse what it goes out of its way to label as an "implausible result," ante, at 827, not only does reverse, as I agree it should, but along the way creates out of whole cloth the notion that agency decisions not to take "enforcement action" are unreviewable unless Congress has rather specifically indicated otherwise. Because this "presumption of unreviewability" is fundamentally at odds with rule-of-law principles firmly embedded in our jurisprudence, because it seeks to truncate an emerging line of judicial authority subjecting enforcement discretion to rational and principled constraint, and because, in the end, the presumption may well be indecipherable, one can only hope that it will come to be understood as a relic of a particular factual setting in which the full implications of such a presumption were neither confronted nor understood.

I write separately to argue for a different basis of decision: that refusals to enforce, like other agency actions, are reviewable in the absence of a "clear and convincing" congressional intent to the contrary, but that such refusals warrant deference when, as in this case, there is nothing to suggest [470 U.S. 821, 841] that an agency with enforcement discretion has abused that discretion.

I

In response to respondents' petition, the FDA Commissioner stated that the FDA would not pursue the complaint

> "under our inherent discretion to decline to pursue certain enforcement matters. The unapproved use of approved drugs is an area in which the case law is far from uniform. Generally, enforcement proceedings in this area are initiated only when there is a serious danger to the public health or a blatant scheme to defraud. We cannot conclude that those dangers are present under State lethal injection laws . . . . [W]e decline, as a matter of enforcement discretion, to pursue supplies of drugs under State control that will be used for execution by lethal injection."

The FDA may well have been legally required to provide this statement of basis and purpose for its decision not to take the action requested. Under the Administrative Procedure Act, such a statement is required when an agency denies a "written application, petition, or other request of an interested person made in connection with any agency proceedings." 1 5 U.S.C. 555(e). Whether this written explanation was legally required or not, however, it does provide a sufficient [470 U.S. 821, 842] basis for holding, on the merits, that the FDA's refusal to grant the relief requested was within its discretion.

First, respondents on summary judgment neither offered nor attempted to offer any evidence that the reasons for the FDA's refusal to act were other than the reasons stated by the agency. Second, as the Court correctly concludes, the FDCA is not a mandatory statute that requires the FDA to prosecute all violations of the Act. Thus, the FDA clearly has significant discretion to choose which alleged violations of the Act to prosecute. Third, the basis on which the agency chose to exercise this discretion - that other problems were viewed as more pressing - generally will be enough to pass muster. Certainly it is enough to do so here, where the number of people currently affected by the alleged misbranding is around 200, and where the drugs are integral elements in a regulatory scheme over which the States exercise pervasive and direct control.

When a statute does not mandate full enforcement, I agree with the Court that an agency is generally "far better equipped than the courts to deal with the many variables involved in the proper ordering of its priorities." Ante, at 831-832. As long as the agency is choosing how to allocate finite enforcement resources, the agency's choice will be entitled to substantial deference, for the choice among valid alternative enforcement policies is precisely the sort of choice over which agencies generally have been left substantial discretion by their enabling statutes. On the merits, then, a decision not to enforce that is based on valid resource-allocation decisions will generally not be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," 5 U.S.C. 706(2)(A). The decision in this case is no exception to this principle.

The Court, however, is not content to rest on this ground. Instead, the Court transforms the arguments for deferential review on the merits into the wholly different notion that "enforcement" decisions are presumptively unreviewable [470 U.S.

821, 843] altogether - unreviewable whether the resource-allocation rationale is a sham, unreviewable whether enforcement is declined out of vindictive or personal motives, and unreviewable whether the agency has simply ignored the request for enforcement. But cf. Logan v. Zimmerman Brush Co., 455 U.S. 422 (1982) (due process and equal protection may prevent agency from ignoring complaint). But surely it is a far cry from asserting that agencies must be given substantial leeway in allocating enforcement resources among valid alternatives to suggesting that agency enforcement decisions are presumptively unreviewable no matter what factor caused the agency to stay its hand.

This "presumption of unreviewability" is also a far cry from prior understandings of the Administrative Procedure Act. As the Court acknowledges, the APA presumptively entitles any person "adversely affected or aggrieved by agency action," 5 U.S.C. 702 - which is defined to include the "failure to act," 5 U.S.C. 551 (13) - to judicial review of that action. That presumption can be defeated if the substantive statute precludes review, 701(a)(1), or if the action is committed to agency discretion by law, 701(a)(2), but as Justice Harlan's opinion in Abbott Laboratories v. Gardner, 387 U.S. 136 (1967), made clear in interpreting the APA's judicial review provisions:

> "The legislative material elucidating [the APA] manifests a congressional intention that it cover a broad spectrum of administrative actions, and this Court has echoed that theme by noting that the Administrative Procedure Act's `generous review provisions' must be given a `hospitable' interpretation. . . . [O]nly upon a showing of `clear and convincing evidence' of a contrary legislative intent should the courts restrict access to judicial review." Id., at 140-141 (citations omitted; footnote omitted).

See generally H. R. Rep. No. 1980, 79th Cong., 2d Sess., 41 (1946) (to preclude APA review, a statute "must upon its face [470 U.S. 821, 844] give clear and convincing evidence of an intent to withhold it"); cf. Moog Industries, Inc. v. FTC, 355 U.S. 411, 414 (1958) (Federal Trade Commission decisions to prosecute are reviewable and can be overturned when "patent abuse of discretion" demonstrated). 2 Rather than confront Abbott Laboratories, perhaps the seminal case on judicial review under the APA, the Court chooses simply to ignore it. 3 Instead, to support its new-found "presumption of unreviewability," the Court resorts to completely undefined and unsubstantiated references to "tradition," see ante, at 831, and to citation of four cases. See United States v. Batchelder, 442 U.S. 114 (1979); United States v. Nixon, 418 U.S. 683 (1974); Vaca v. Spies, 386 U.S. 171 (1967); Confiscation Cases, 7 Wall. 454 (1869). 4 Because the Court's "tradition" rationale, which flies in the face of Abbott Laboratories, stands as a flat, unsupported ipse dixit, these four cases form the only doctrinal foundation for the majority's presumption of unreviewability. [470 U.S. 821, 845]

Yet these cases hardly support such a broad presumption with respect to agency refusal to take enforcement action. The only one of these cases to involve administrative action, Vaca v. Sipes, suggests, in dictum, that the General Counsel of the National Labor Relations Board has unreviewable discretion to refuse to initiate an unfair labor practice complaint. To the extent this dictum is sound, later cases indicate that unreviewability results from the particular structure of the National Labor Relations Act and the explicit statutory intent to withdraw review found in 29 U.S.C. 153(d), rather than from some general "presumption of unreviewability" of enforcement decisions. See NLRB v. Sears, Roebuck & Co., 421 U.S. 132, 138 (1975). 5 Neither Vaca nor Sears, Roebuck discusses the APA. The other three cases - Batchelder, Nixon, and the Confiscation Cases - all involve prosecutorial discretion to enforce the criminal law. Batchelder does not maintain that such discretion is unreviewable, but only that the mere existence of prosecutorial discretion does not violate the Constitution. The Confiscation Cases, involving suits to confiscate property used in aid of rebellion, hold that, where the United States brings a criminal action that is "wholly for the benefit of the United States," 7 Wall., at 455, a person who provides information leading to the action has no "vested" or absolute right to demand, "so far as the interests of the United States are concerned," id., at 458, that the action be maintained. The half-sentence cited from Nixon, which states that the Executive has "absolute discretion to decide whether to prosecute a case," 418 U.S., at 693 , is the only apparent support the Court actually offers for even the limited notion that prosecutorial discretion in the criminal area is unreviewable. But that half-sentence is of course misleading, for Nixon held it an abuse of that discretion [470 U.S. 821, 846] to attempt to exercise it contrary to validly promulgated regulations. Thus, Nixon actually stands for a very different proposition than the one for which the Court cites it: faced with a specific claim of abuse of prosecutorial discretion, Nixon makes clear that courts are not powerless to intervene. And none of the other prosecutorial discretion cases upon which the Court rests involved a claim that discretion had been abused in some specific way.

Moreover, for at least two reasons it is inappropriate to rely on notions of prosecutorial discretion to hold agency inaction

unreviewable. First, since the dictum in Nixon, the Court has made clear that prosecutorial discretion is not as unfettered or unreviewable as the half-sentence in Nixon suggests. As one of the leading commentators in this area has noted, "the case law since 1974 is strongly on the side of reviewability." 2 K. Davis, Administrative Law 9:6, p. 240 (1979). In Blackledge v. Perry, 417 U.S. 21, 28 (1974), instead of invoking notions of "absolute" prosecutorial discretion, we held that certain potentially vindictive exercises of prosecutorial discretion were both reviewable and impermissible. The "retaliatory use" of prosecutorial power is no longer tolerated. Thigpen v. Roberts, 468 U.S. 27, 30 (1984). Nor do prosecutors have the discretion to induce guilty pleas through promises that are not kept. Blackledge v. Allison, 431 U.S. 63 (1977); Santobello v. New York, 404 U.S. 257, 262 (1971). And in rejecting on the merits a claim of improper prosecutorial conduct in Bordenkircher v. Hayes, 434 U.S. 357 (1978), we clearly laid to rest any notion that prosecutorial discretion is unreviewable no matter what the basis is upon which it is exercised:

> "There is no doubt that the breadth of discretion that our country's legal system vests in prosecuting attorneys carries with it the potential for both individual and institutional abuse. And broad though that discretion may [470 U.S. 821, 847] be, there are undoubtedly constitutional limits upon its exercise." Id., at 365.

See also Wayte v. United States, ante, at 608. Thus, even in the area of criminal prosecutions, prosecutorial discretion is not subject to a "presumption of unreviewability." See generally Vorenberg, Decent Restraint of Prosecutorial Power, 94 Harv. L. Rev. 1521, 1537-1543 (1981). If a plaintiff makes a sufficient threshold showing that a prosecutor's discretion has been exercised for impermissible reasons, judicial review is available.

Second, arguments about prosecutorial discretion do not necessarily translate into the context of agency refusals to act. "In appropriate circumstances the Court has made clear that traditions of prosecutorial discretion do not immunize from judicial scrutiny cases in which the enforcement decisions of an administrator were motivated by improper factors or were otherwise contrary to law." Marshall v. Jerrico, Inc., 446 U.S. 238, 249 (1980) (citations omitted). Criminal prosecutorial decisions vindicate only intangible interests, common to society as a whole, in the enforcement of the criminal law. The conduct at issue has already occurred; all that remains is society's general interest in assuring that the guilty are punished. See Linda R. S. v. Richard D., 410 U.S. 614, 619 (1973) ("[A] private citizen lacks a judicially cognizable interest in the prosecution or nonprosecution of another"). In contrast, requests for administrative enforcement typically seek to prevent concrete and future injuries that Congress has made cognizable - injuries that result, for example, from misbranded drugs, such as alleged in this case, or unsafe nuclear powerplants, see, e. g., Florida Power & Light Co. v. Lorion, ante, p. 729 - or to obtain palpable benefits that Congress has intended to bestow - such as labor union elections free of corruption, see Dunlop v. Bachowski, 421 U.S. 560 (1975). Entitlements to receive these benefits or to be free of these injuries often run to specific classes of individuals [470 U.S. 821, 848] whom Congress has singled out as statutory beneficiaries. The interests at stake in review of administrative enforcement decisions are thus more focused and in many circumstances more pressing than those at stake in criminal prosecutorial decisions. A request that a nuclear plant be operated safely or that protection be provided against unsafe drugs is quite different from a request that an individual be put in jail or his property confiscated as punishment for past violations of the criminal law. Unlike traditional exercises of prosecutorial discretion, "the decision to enforce - or not to enforce - may itself result in significant burdens on a . . . statutory beneficiary." Marshall v. Jerrico, Inc., supra, at 249.

Perhaps most important, the sine qua non of the APA was to alter inherited judicial reluctance to constrain the exercise of discretionary administrative power - to rationalize and make fairer the exercise of such discretion. Since passage of the APA, the sustained effort of administrative law has been to "continuously narro[w] the category of actions considered to be so discretionary as to be exempted from review." Shapiro, Administrative Discretion: The Next Stage, 92 Yale L. J. 1487, 1489, n. 11 (1983). Discretion may well be necessary to carry out a variety of important administrative functions, but discretion can be a veil for laziness, corruption, incompetency, lack of will, or other motives, and for that reason "the presence of discretion should not bar a court from considering a claim of illegal or arbitrary use of discretion." L. Jaffe, Judicial Control of Administrative Action 375 (1965). Judicial review is available under the APA in the absence of a clear and convincing demonstration that Congress intended to preclude it precisely so that agencies, whether in rulemaking, adjudicating, acting or failing to act, do not become stagnant backwaters of caprice and lawlessness. "Law has reached its finest moments when it has freed man from the unlimited discretion of some ruler, some civil or military official, some bureaucrat." United States v. Wunderlich, 342 U.S. 98, 101 (1951). [470 U.S. 821, 849]

For these and other reasons, 6 reliance on prosecutorial discretion, itself a fading talisman, to justify the unreviewability of agency inaction is inappropriate. See generally Stewart & Sunstein, Public Programs and Private Rights, 95 Harv. L. Rev. 1195, 1285-1286, n. 386 (1982) (discussing differences between agency inaction and prosecutorial discretion); Note, Judicial Review of Administrative Inaction, 83 Colum. L. Rev. 627, 658-661 (1983) (same). To the extent arguments about traditional notions of prosecutorial discretion have any force at all in this context, they ought to apply only [470 U.S. 821, 850] to an agency's decision to decline to seek penalties against an individual for past conduct, not to a decision to refuse to investigate or take action on a public health, safety, or welfare problem.

II

The "tradition" of unreviewability upon which the majority relies is refuted most powerfully by a firmly entrenched body of lower court case law that holds reviewable various agency refusals to act. 7 This case law recognizes that attempting to [470 U.S. 821, 851] draw a line for purposes of judicial review between affirmative exercises of coercive agency power and negative agency refusals to act, see ante, at 832, is simply untenable; one of the very purposes fueling the birth of administrative agencies was the reality that governmental refusal to act could have just as devastating an effect upon life, liberty, and the pursuit of happiness as coercive governmental action. As Justice Frankfurter, a careful and experienced student of administrative law, wrote for this Court, "any distinction, as such, between `negative' and `affirmative' orders, as a touchstone of jurisdiction to review [agency action] serves no useful purpose." Rochester Telephone Corp. v. United States, 307 U.S. 125, 143 (1939). 8 The lower courts, facing [470 U.S. 821, 852] the problem of agency inaction and its concrete effects more regularly than do we, have responded with a variety of solutions to assure administrative fidelity to congressional objectives: a demand that an agency explain its refusal to act, a demand that explanations given be further elaborated, and injunctions that action "unlawfully withheld or unreasonably delayed," 5 U.S.C. 706, be taken. See generally Stewart & Sunstein, 95 Harv. L. Rev., at 1279. Whatever the merits of any particular solution, one would have hoped the Court would have acted with greater respect for these efforts by responding with a scalpel rather than a blunderbuss.

To be sure, the Court no doubt takes solace in the view that it has created only a "presumption" of unreviewability, and that this "presumption may be rebutted where the substantive statute has provided guidelines for the agency to follow in exercising its enforcement powers." Ante, at 832-833. But this statement implies far too narrow a reliance on positive law, either statutory or constitutional, see ibid., as the sole source of limitations on agency discretion not to enforce. In my view, enforcement discretion is also channelled by traditional background understandings against which the APA was enacted and which Congress hardly could be thought to have intended to displace in the APA. 9 For example, a refusal to enforce that stems from a conflict of interest, that is the result of a bribe, vindictiveness or retaliation, or that traces to personal or other corrupt motives ought to be judicially remediable. 10 Even in the absence [470 U.S. 821, 853] of statutory "guidelines" precluding such factors as bases of decision, Congress should not be presumed to have departed from principles of rationality and fair process in enacting the APA. 11 Moreover, the agency may well narrow its own enforcement discretion through historical practice, from which it should arguably not depart in the absence of explanation, or through regulations and informal action. Traditional principles of rationality and fair process do offer "meaningful standards" and "law to apply" to an agency's decision not to act, and no presumption of unreviewability should be allowed to trump these principles.

Perhaps the Court's reference to guidance from the "substantive statute" is meant to encompass such concerns and to allow the "common law" of judicial review of agency action to provide standards by which inaction can be reviewed. But in that case I cannot fathom what content the Court's "presumption of unreviewability" might have. If inaction can be reviewed to assure that it does not result from improper abnegation of jurisdiction, from complete abdication of statutory responsibilities, from violation of constitutional rights, or from factors that offend principles of rational and fair administrative process, it would seem that a court must always inquire into the reasons for the agency's action before deciding whether the presumption applies. 12 As Judge Friendly said many years ago, review of even a decision over which substantial administrative discretion exists would then be available to determine whether that discretion had been [470 U.S. 821, 854] abused because the decision was "made without a rational explanation, inexplicably departed from established policies, or rested . . . on other considerations that Congress could not have intended to make relevant." Wong Wing Hang v. INS, 360 F.2d 715, 719 (CA2 1966). In that event, we would not be finding enforcement decisions unreviewable, but rather would be reviewing them on the merits, albeit with due deference, to assure that such decisions did not result from an abuse of discretion.

That is the basis upon which I would decide this case. Under 706(A)(2) and Abbott Laboratories v. Gardner, 387 U.S. 136 (1967), agency action, including the failure to act, is reviewable to assure that it is not "arbitrary, capricious, or an abuse of discretion," unless Congress has manifested a clear and convincing intent to preclude review. Review of enforcement decisions must be suitably deferential in light of the necessary flexibility the agencies must have in this area, but at least when "enforcement" inaction allegedly deprives citizens of statutory benefits or exposes them to harms against which Congress has sought to provide protection, review must be on the merits to ensure that the agency is exercising its discretion within permissible bounds. See Berger, Administrative Arbitrariness: A Synthesis, 78 Yale L. J. 965 (1969); L. Jaffe, Judicial Control of Administrative Action 375 (1965).

III

The problem of agency refusal to act is one of the pressing problems of the modern administrative state, given the enormous powers, for both good and ill, that agency inaction, like agency action, holds over citizens. As Dunlop v. Bachowski, 421 U.S. 560 (1975), recognized, the problems and dangers of agency inaction are too important, too prevalent, and too multifaceted to admit of a single facile solution under which "enforcement" decisions are "presumptively unreviewable." Over time, I believe the approach announced today will come to be understood, not as mandating that courts [470 U.S. 821, 855] cover their eyes and their reasoning power when asked to review an agency's failure to act, but as recognizing that courts must approach the substantive task of reviewing such failures with appropriate deference to an agency's legitimate need to set policy through the allocation of scarce budgetary and enforcement resources. Because the Court's approach, if taken literally, would take the courts out of the role of reviewing agency inaction in far too many cases, I join only the judgment today.

[Footnote 1] All Members of the Court in Dunlop v. Bachowski, 421 U.S. 560 (1975), agreed that a statement of basis and purpose was required for the denial of the enforcement request at issue there. See id., at 571-575; id., at 594 (REHNQUIST, J., concurring in result in part and dissenting in part). Given the revisionist view the Court takes today of Dunlop, perhaps these statements too are to be limited to the specific facts out of which they emerged. Yet the Court's suggestion that review is proper when the agency asserts a lack of jurisdiction to act, see ante, at 833, n. 4, or some other basis inconsistent with congressional intent, would seem to presuppose the existence of a statement of basis and purpose explaining the basis for denial of enforcement action.

[Footnote 2] The Senate Committee Report accompanying the APA stated: "The mere filing of a petition does not require an agency to grant it, or to hold a hearing, or engage in any other public rule making proceedings. The refusal of an agency to grant the petition or to hold rule making proceedings, therefore, would not per se be subject to judicial reversal." S. Doc. No. 248, 79th Cong., 2d Sess., 201 (1946). As Judge McGowan has observed, "this language implies that judicial review would sometimes be available in the circumstances mentioned" in the Report. Natural Resources Defense Council, Inc. v. SEC, 196 U.S. App. D.C. 124, 136, n. 14, 606 F.2d 1031, 1043, n. 14 (1979).

[Footnote 3] The Court did not ignore Abbott Laboratories in Southern R. Co. v. Seaboard Allied Milling Corp., 442 U.S. 444, 454 , 462-463 (1979), a denial of enforcement case that required "clear and convincing evidence" of congressional intent to preclude review of the failure to investigate a complaint.

[Footnote 4] It is ironic that Vaca v. Sipes and the Confiscation Cases were cited by the Government in its brief in Dunlop when it unsuccessfully pressed the very proposition accepted today: that agency enforcement decisions are presumptively unreviewable. See Brief for Petitioner in Dunlop v. Bachowski, O. T. 1974, No. 74-466, pp. 25-31.

[Footnote 5] Cf. Southern R. Co. v. Seaboard Allied Milling Corp., supra (concluding, after extensive examination of history and structure of Act, that agency decisions not to investigate under 15(8)(a) of the Interstate Commerce Act are unreviewable).

[Footnote 6] Legal historians have suggested that the notion of prosecutorial discretion developed in England and America largely because private prosecutions were simultaneously available at the time. See Langbein, Controlling

Prosecutorial Discretion in Germany, 41 U. Chi. L. Rev. 439, 443-446 (1974). Private enforcement of regulatory statutes, such as the FDCA, is of course largely unavailable.

In addition, scholars have noted that the tradition of unreviewability of prosecutor's decisions developed at a time when virtually all executive action was considered unreviewable. In asking what accounts for this "tradition," one scholar offered the following rhetorical questions:

> "Is it because the tradition became settled during the nineteenth century when courts were generally assuming that judicial intrusion into any administration would be unfortunate? Is it because the tradition became settled while the Supreme Court was actuated by its 1840 remark that `The interference of the Courts with the performance of the ordinary duties of the executive departments of the government, would be productive of nothing but mischief.' [citing Decatur v. Paulding, 14 Pet. 497, 516 (1840)]. Is it because the tradition became settled before the courts made the twentieth-century discovery that the courts can interfere with executive action to protect against abuses but at the same time can avoid taking over the executive function? Is it because the tradition became settled before the successes of the modern system of limited judicial review became fully recognized?
>
> "On the basis of what the courts know today about leaving administration to administrators but at the same time providing an effective check to protect against abuses, should the courts not take a fresh look at the tradition that prevents them from reviewing the prosecuting function?" K. Davis, Discretionary Justice 211 (1969) (footnote omitted).

[Footnote 7] See, e. g., Bargmann v. Helms, 230 U.S. App. D.C. 164, 715 F.2d 638 (1983); Natural Resources Defense Council, Inc. v. EPA, 683 F.2d 752, 753, 767-768 (CA3 1982); WWHT, Inc. v. FCC, 211 U.S. App. D.C. 218, 656 F.2d 807 (1981); Carpet, Linoleum & Resilient Tile Layers, Local Union No. 419 v. Brown, 656 F.2d 564 (CA10 1981); Natural Resources Defense Council, Inc. v. SEC, 196 U.S. App. D.C. 124, 606 F.2d 1031 (1979); British Airways Board v. Port Authority of New York, 564 F.2d 1002, 1012-1013 (CA2 1977); Pennsylvania v. National Assn. of Flood Insurers, 520 F.2d 11 (CA3 1975); REA Express, Inc. v. CAB, 507 F.2d 42 (CA2 1974); Davis v. Romney, 490 F.2d 1360 (CA3 1974); Adams v. Richardson, 156 U.S. App. D.C. 267, 480 F.2d 1159 (1973) (en banc); International Harvester Co. v. Ruckelshaus, 155 U.S. App. D.C. 411, 478 F.2d 615 (1973); Rockbridge v. Lincoln, 449 F.2d 567 (CA9 1971); Environmental Defense Fund, Inc. v. Ruckelshaus, 142 U.S. App. D.C. 74, 439 F.2d 584 (1971); Environmental Defense Fund, Inc. v. Hardin, 138 U.S. App. D.C. 391, 428 F.2d 1093 (1970); Medical Committee for Human Rights v. SEC, 139 U.S. App. D.C. 226, 432 F.2d 659 (1970), vacated as moot, 404 U.S. 403 (1972); Trailways of New England, Inc. v. CAB, 412 F.2d 926 (CA1 1969); International Union, United Auto., Aero. & Agric. Implement Workers v. NLRB, 427 F.2d 1330 (CA6 1970); Public Citizen Health Research Group v. Auchter, 554 F. Supp. 242 (DC 1983), rev'd in part, 226 U.S. App. D.C. 413, 702 F.2d 1150 (1983); Sierra Club v. Gorsuch, 551 F. Supp. 785 (ND Cal. 1982); Hoffmann-LaRoche, Inc. v. Weinberger, 425 F. Supp. 890 (DC 1975); NAACP v. Levi, 418 F. Supp. 1109 (DC 1976); Guerrero v. Garza, 418 F. Supp. 182 (WD Wis. 1976); Souder v. Brennan, 367 F. Supp. 808, 811 (DC 1973); City-Wide Coalition Against Childhood Lead Paint Poisoning v. Philadelphia Housing Auth., 356 F. Supp. 123 (ED Pa. 1973); American Public Health Assn. v. Veneman, 349 F. Supp. 1311 (DC 1972).

To be sure, some of these cases involved the refusal to initiate rulemaking proceedings, and the majority expressly disavows any claim that [470 U.S. 821, 851] its presumption of unreviewability applies to such refusals. See ante, at 825, n. 2. But the majority offers no explanation of how an enforcement request that seeks protection of the public or statutory beneficiaries from present and future concrete harms, or from loss of deserved benefits, implicates considerations substantially different from those at stake in judicial review of the refusal to initiate rulemaking proceedings.

[Footnote 8] Justice Frankfurter went to some length in Rochester Telephone to expose the fallacy of any purported distinction between agency action and inaction:

> "`[N]egative order' and `affirmative order' are not appropriate terms of art. . . . `Negative' has really been an obfuscating adjective in that it implied a search for a distinction - non-action as against action - which does not involve the real considerations on which rest, as we have seen, the reviewability of Commission orders within the

framework of its discretionary authority and within the general criteria of justiciability. `Negative' and `affirmative,' in the context of these problems, is as unilluminating and mischief-making a distinction as the outmoded line between `nonfeasance' and `misfeasance.'

". . . An order of the Commission dismissing a complaint on the merits and maintaining the status quo is an exercise of administrative function, no more and no less, than an order directing some change in status. . . . In the application of relevant canons of judicial review an order of the Commission directing the adoption of a practice might raise considerations absent from a situation where the Commission merely allowed such a practice to continue. But this bears on the disposition of a case and should not control jurisdiction." 307 U.S., at 140 -142 (emphasis added; footnotes omitted).

[Footnote 9] The Court cites 5 K. Davis, Administrative Law 28:5 (1984), for the proposition that the APA did not alter the "common law" of judicial review of agency action; Davis' correct statement ought to make clear that traditional principles of fair and rational decisionmaking were incorporated into, rather than obliterated by, the APA, and that judicial review is available to assure that agency action, including inaction, is consistent with these principles. See also Merrill Lynch, Pierce, Fenner & Smith, Inc. v. Curran, 456 U.S. 353, 378 (1982) ("[W]e must examine Congress' perception of the law that it was shaping or reshaping").

[Footnote 10] "A scheme injecting a personal interest, financial or otherwise, into the enforcement process may bring irrelevant or impermissible factors into [470 U.S. 821, 853] the prosecutorial decision and in some contexts raise serious constitutional questions." Marshall v. Jerrico, Inc., 446 U.S. 238, 249 -250 (1980).

[Footnote 11] Indeed, "[t]he more general and powerful the background understanding, the less likely it is to have been stated explicitly by the legislature, even if the legislature in fact shares that understanding." Stewart & Sunstein, Public Programs and Private Rights, 95 Harv. L. Rev. 1195, 1231 (1982).

[Footnote 12] When an agency asserts that a refusal to enforce is based on enforcement priorities, it may be that, to survive summary judgment, a plaintiff must be able to offer some basis for calling this assertion into question or for justifying his inability to do so. [470 U.S. 821, 856]

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, and THE PORT OF SEATTLE, Respondents.	PCHB No. 01-160 DECLARATION OF STEVEN J. SWENSON

Steven J. Swenson declares as follows:

1. I am over the age of 18, make this declaration based on personal knowledge, and am competent to testify to the facts stated herein.

2. I received a Bachelor of Science degree from the University of Washington in 1977. My degree is in Civil engineering and I specialized in Environmental Engineering. I have taken specialized training courses in hydrology, hydraulics, water supply, and wastewater treatment.

3. I am a professional civil engineer licensed in the State of Washington. I have worked for R. W. Beck for over 25 years and lead the firm's storm water planning and design group in Seattle. A copy of my curriculum vitae is attached as Exhibit A.

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4. I have a broad base of experience working on storm water management projects in Washington, helping local permit-applicants to work with federal, state and local agencies to gain approval for storm water management facilities and systems. These systems commonly include detention facilities like vaults, lagoons and ponds, infiltration facilities designed to route runoff to groundwater, conveyance systems like pipelines, ditches and constructed stream channels, and treatment systems. Recent clients have include the cities of Bellevue, Lynnwood, Kent, Mount Vernon, Burlington, Des Moines, Bellingham, Kirkland, and Seattle, as well as King and Snohomish Counties.

5. I also commonly work with local governments engaged in planning efforts focused on storm water problems. I am currently working with the City of Seattle and Snohomish County on large storm water management planning efforts designed to analyze hydrologic conditions and current hydraulic (storm water infrastructure) systems to identify potential problem areas resulting from increased urbanization. The primary problems being scrutinized through these planning efforts are flooding, water quality degradation, and fish habitat problems. These types of planning efforts recommend solutions that commonly involve implementing regulations for new development that require construction of facilities such as detention vaults, detention ponds, lagoons, constructed wetlands, treatment facilities, infiltration basins designed to address high flow and in some cases, low flow problems. Other communities where I have assisted with such planning efforts include: the cities of Bellingham, Burlington, Edmonds, Kent, Kirkland, Lynnwood, Renton, City of Snohomish, Mill Creek, Des Moines, Mount Vernon, North Bend, and Steilacoom.

6. Increasing urbanization and associated increases in impervious surfaces typically cause changes in storm water hydrology that can adversely impact surface waters as follows: when

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precipitation occurs in an undeveloped area, most of the water infiltrates into the soil and migrates to groundwater. This groundwater moves slowly through the soil column and some or all of it will discharge to streams, rivers and other surface waters in the area. This hydrologic cycle is interrupted when impervious surfaces are constructed. Rainfall, which previously infiltrated into the soil, will instead run off the impervious surface and be routed directly to area surface waters. This process has a number of negative impacts. First, water running over impervious surfaces commonly picks up pollutants. Second, the volume and rate of water entering surface waters during precipitation events is increased, sometimes dramatically, causing high flows that can damage the stream channel, eliminate fish habitat and cause severe erosion. Finally, because recharge of groundwater is reduced, the volume of groundwater discharging to surface waters is decreased, with sometimes damaging decreases in low summer flows that can harm fish habitat.

7. I also have experience working with local governments and the public to develop local storm water control programs and ordinances. These ordinances impose storm water management requirements on developers and landowners and are often put in place to comply with state and federal requirements related to storm water. These ordinances establish requirements for storm water controls and set standards for constructing, maintaining, and operating storm water management facilities and systems. Some local jurisdictions require or encourage infiltration of collected storm water where the soils are pervious enough to make infiltration feasible. Infiltration is a preferred "best management practice" because it addresses both high flow problems and low flow problems and it tends to reduce pollutant concentrations.

8. I have worked on storm water management issues for 25 years. In the early days of storm water regulation the primary focus was to control damage to property from high flows. When

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the Clean Water Act was amended in 1987 to expressly require discharge (NPDES) permits for certain storm water discharges, the focus shifted to controlling pollutant concentrations. A growing concern even in the late 1980s, however, was the impact of urbanization on stream flows. It was recognized then that increased wintertime high flows, and the corresponding problem of reduced summer flows was a significant problem. As storm water management regulatory requirements have matured, it has become commonplace for storm water ordinances and permits to require the capture, detention and treatment of storm water prior to discharge. The purpose of these systems is to reduce pollutant concentrations in the storm water, and to reduce the adverse impacts of changes in flow rates and volumes. Today, there are literally thousands of operating stormwater management systems that involve the collection, detention, and slow release of stormwater. Historically, the focus has been on high flow impacts, but in some jurisdictions, storm water management practices that address low flow impacts, e.g., infiltration, are being required where feasible.

9. I am familiar with earlier versions and the current version of the Stormwater Management Manual for Western Washington (August 2001) published by the Department of Ecology (Ecology Manual). The current version of the Ecology Manual explicitly recognizes the impacts of urbanization on storm water, and the attendant high flow and low flow impacts. The manual recommends using infiltration where feasible to better maintain the natural hydrologic cycle and states "Reduction of [high storm water] flows through infiltration decreases stream channel erosion and helps to maintain base flows throughout the summer months". Ecology Manual, pg. 2-32. The new Ecology Manual lists infiltration as the first option to consider for flow control BMPs. Ecology Manual, pg. 4-3.

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10. The listing of several salmon species in the Puget Sound basin as threatened or endangered has caused storm water regulators and managers to become increasingly aware of the importance of controlling both the higher wet season and lower dry season flows that result from urban development because of the harm this change in hydrology has on fish habitat.

11. Thus, to mitigate the impacts of development and to comply with state and federal regulations, jurisdictional entities have adopted requirements for new development to control the discharge rates of runoff to surface water bodies. This is typically done by construction of a detention or infiltration system.

12. There are numerous examples of infiltration systems being used for storm water management. These include the Meadowdale infiltration pond in Lynwood, Edwards Street Improvement project and storm water infiltration system in the City of Yelm, roof infiltration for single family residential homes for new development in King County, Chambers Creek storm drain facility in Pierce County, Panther Lake infiltration facilities in Federal Way, and numerous infiltration ponds in Thurston County. These systems were installed with the intent of managing storm water in a manner that reduces impacts from development by replicating predevelopment runoff and stream flows. The goal of urban storm water management has been to develop and require systems and methods to control the quality and rates of runoff to mimic predevelopment conditions to the extent it is technically and economically feasible. Numerous jurisdictions are providing incentives to developers to construct "low impact" projects that use technologies to manage both wet season high flows and dry season low flow. The jurisdictions that have adopted regulations promoting "low impact" development include: King County, Island County, and Kitsap County and the cities of Lacey, Seattle, and Olympia.

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13. Where infiltration is not feasible or desirable, detention vaults or ponds are normally used to detain captured storm water. Traditionally, these facilities are sized and designed to control only wet season high flows. However, they could be oversized to store a portion of the winter runoff for summertime releases in a manner that would mimic year-round discharges to streams, i.e., the predevelopment hydrologic cycle. Such a storm water detainment system would be similar in effect to infiltration. Both protect against reductions in summertime low flows by collecting surface water from the developed area, detaining or storing it, and then releasing it to the stream in a manner that would reflect natural conditions. Instead of using the storage capacity of a vault or pond, infiltration uses the storage capacity of the soil pore space to temporarily store collected storm water. Instead of discharging from a designed outlet in a vault, infiltrated storm water discharges through the soil column to surface waters. Whatever the storage mechanism, the effect is the same: storm water is captured, detained for a period of weeks or months and then returned to the stream during the dry season.

14. I have reviewed several key documents describing how storm water will be managed at STIA, including the Comprehensive Stormwater Management Plan Master Plan Update Improvements Seattle-Tacoma International Airport Port of Seattle (SMP) (Parametrix, December 2000) and the Low Streamflow Analysis and Summer Low Flow Impact Offset Facility Proposal – Port of Seattle (Low Flow Analysis) (Parametrix, 2001). These documents describe the storm water management facilities and systems that are proposed for the airport redevelopment project.

15. The SMP describes the storm water collection, conveyance, detention, and treatment facilities that currently exist, are under construction or are planned at STIA, all of which are required under the Port's NPDES permit and the Water Quality Certification issued for the proposed Master

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Plan Update developments. The Low Flow Analysis presents the methodology used to calculate the impacts to summertime stream flows in Miller, Walker, and Des Moines creeks. After reviewing these documents, I have a general understanding of the storm water management system designed by the Port to comply with its NPDES permit and the water quality certification.

16. The required collection, conveyance, detainment, treatment and discharge system, while larger and more sophisticated than most storm water management systems, employs the same technologies used by other projects in Western Washington. The Port is being required to infiltrate as much of its storm water as possible given site soil and space constraints. As mentioned above, this is a common and preferred best management practice. Likewise, the vaults and ponds being used to detain collected storm water, while large, are a common means for managing storm water discharges.

17. I understand that the Airport Communities Coalition (ACC) contends that the storm water management system required at STIA requires a water right permit because it "is not a typical storm water detention project." Specifically, ACC argues that the required system "differs from traditional storm water projects" in three ways, each of which I will address below.

18. First, ACC contends that the Port's system will detain water for a greater amount of time than a typical system. For storm water treatment purposes, it is common for many systems to use "wet" or "extended detention" ponds or vaults that may result in storm water runoff volumes being detained for weeks or months. My understanding is that the Port's system will store collected storm water for up to several months at a time, but it is common for many storm water treatment systems to store storm water for similar periods of time.

19. Second, ACC argues that the Port's storm water system is atypical because of the type of treatment being utilized. The treatment methods required by Ecology at STIA consist of

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conventional treatment methods. The Port intends to use filter strips (vegetated migration pathways through which captured storm water will pass), bioswales (vegetated swales designed to settle and filter collected stormwater) and settlement in ponds and vaults (this is probably the single most common method of treating storm water). In my experience, these treatment methods are typical of storm water management facilities.

20. Finally, ACC argues that the Port's storm water system is unusual because of the "precise, prolonged and exacting release rates." No two-storm water management systems for large development projects are ever exactly the same. Each has its own specific hydrologic, water quality, and habitat mitigation requirements. The storm water management system for STIA is unique given the size of many components, but the overall STIA project is also unique given its size. This project is somewhat unique in its sophistication , but its basic design and objectives are similar to other storm water projects I am familiar with. With regard to ACC's specific allegations, it is not at all uncommon to design stormwater detention facilities to meet precise and exacting discharge rates.

21. To my knowledge, no storm water management system in this state has been required to obtain a water right permit to operate.

DATED this 14th day of January 2002 at Seattle, Washington.

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EX. A

University of Washington
B.S. in Civil Engineering

Since joining R. W. Beck in 1976, Mr. Swenson has specialized primarily in stormwater management planning and design; he has experience in wastewater and water system planning and design. His background includes strong project coordination and management skills and experience working with public interest groups and private citizens in developing surface water management projects. He is skilled in technical analysis of water resource hydrology, hydraulics, water quality, and aquatic habitat. He has applied these skills to a number of comprehensive planning efforts.

Much of Mr. Swenson's comprehensive planning experience originates with a strong background in design. Mr. Swenson has and continues to manage stormwater pumping, conveyance, storage, water quality improvement, and fish passage projects.

In addition to his stormwater technical and comprehensive planning skills, Mr. Swenson has been intimately involved in helping cities develop their overall stormwater programs. His stormwater program development experience includes CIP development, program financing, agency coordination and permitting, and public involvement.

Relevant Project Experience

Drainage Needs Reports

Snohomish County, Washington

Mr. Swenson is the project manager overseeing the preparation of drainage needs reports that include analysis, planning, and design of solutions for existing and probable future drainage and surface water quality problems in rapidly urbanizing areas of Snohomish County. Close cooperation with county planners is required to ensure coordination between Drainage Needs Report preparation and the Urban Growth Area subarea planning process, as well as consistency with other county-wide planning efforts. Compliance with a tight schedule and working within a limited budget are critical aspects of this project.

Sea-Van Residential Development

City of Mount Vernon, Washington

Project Manager. Mr. Swenson is currently managing the technical review of a 670-acre, 800-unit residential development. The residential community is being developed in four separate phases over a period of several years. Mr. Swenson is responsible for reviewing each phase of the development. Aspects of the review include ensuring that the development is consistent with the City's development standards and that environmental resources are preserved to the greatest extent possible.

Ridgewood Design Memorandum and PS&E

Snohomish County, Washington

Project Manager. Mr. Swenson was responsible for creating a design memo to address solutions to a recurring flooding problem in Snohomish

County. The problem resulted from additional surface water runoff being routed from a new subdivision into an existing subdivision's drainage system. Tasks involved in this project included a preliminary environmental assessment, development and presentation of two public meetings, and performance of a hydraulic and hydrologic analysis using the Waterworks computer program.

Comprehensive Flood Drainage Plan

City of Lynnwood, Washington

Project Manager. Mr. Swenson was responsible for the preparation of a comprehensive drainage plan for the City of Lynnwood. He determined specific capital improvements and regulatory requirements for minimizing stormwater-related flooding and water quality problems, and directed an extensive computer modeling effort using the U.S. EPA's HSPF and SWMM programs. R. W. Beck performed an inventory of the City's existing storm sewer network and associated facilities, including pipe sizes and material types, as well as elevations for selected pipe and channel systems. Data produced by the inventory were input to the model. Mr. Swenson also developed a capital improvement program and cost estimates that were used in a rate analysis. Based on this information, the City included the formation of a utility in its financial plan.

Squalicum Creek Floodplain Management Plan

City of Bellingham, Washington

Project Manager. Mr. Swenson was responsible for preparing a comprehensive floodplain management plan for a reach of the Squalicum Creek drainage basin located within the city limits of Bellingham. The new plan was developed to help city officials balance environmental issues with community development needs while meeting regulatory requirements. The project also involved updating a 1982 Federal Emergency Management Agency hydrology and hydraulic study. The plan included provisions to preserve fisheries, wildlife, and wetlands resources within the stream corridor.

Juanita Creek Regional Flow Control Facilities and Stream Restoration Project

King County, Washington

Project Engineer. Mr. Swenson was responsible for designing two regional detention facilities to reduce flooding, erosion, and sedimentation, and to enhance water quality in Juanita Creek. He also directed the design of a stream-channel restoration project along Juanita Creek to improve fisheries habitat and to repair bank failure areas using both traditionally engineered and "bio-engineered" techniques. Other key issues included flow control, safety (significant portions of the creek run through residential areas), maintenance and operation, and aesthetic appeal.

Scriber Creek Watershed Management Plan
Snohomish County, Washington

Project Engineer. Mr. Swenson was responsible for developing an action plan that recommended specific guidelines for preventing property damage and water quality degradation within the watershed. He used results derived from HSPF computer modeling to analyze existing conditions and problem areas. Using this information and other data, he helped develop structural and nonstructural solutions to flooding, drainage, and water quality problems as well as a capital improvement program for future construction.

Panther Creek Wetlands Improvement Project
City of Renton, Washington

Technical Reviewer. Mr. Swenson provided technical support in preparing data for use in a TR-20 hydrologic modeling effort. The TR-20 program was used to model a basin tributary to the Panther Creek wetland. He was also involved in analyzing the effects of backwater from the downstream East Side Green River system and making the decision that the predicted performance of any proposed improvements at the Panther Creek wetland could not be guaranteed unless the proposed improvements were incorporated into a model of the entire East Side Green River system. Mr. Swenson was also involved in the review and preparation of an interim predesign report that summarized findings and recommendations.

Massey Creek Drainage Basin Study
City of Des Moines, Washington

Project Engineer. Mr. Swenson was responsible for inventorying all of the basin's existing stormwater control facilities and developing design alternatives using the SCS TR-20 computer model. He was also responsible for analyzing tidal effects and backwater conditions using the U.S. Army Corps of Engineers' HEC-2 computer model. These models were used to determine both structural and nonstructural solutions to stormwater-related flooding and water quality problems. They were also used to prepare a capital improvement program. Mr. Swenson assisted the City in obtaining funding through the Washington Department of Ecology's Flood Control Assistance Account Program (FCAAP).

Smith Creek Drainage Study
City of Des Moines, Washington

Project Engineer. Mr. Swenson was responsible for preparing the Smith Creek drainage study, which identified long-range drainage improvements (regional detention, wetlands preservation, habitat enhancement, and regulations) for the Smith Creek basin. Mr. Swenson conducted hydrologic and hydraulic modeling to predict the two-, 25-, and 100-year storm events. A key aspect to the project was assessing the stormwater runoff impacts from the Midway Landfill, which abuts Smith Creek.

Whatcom Creek Flood Management Improvements
City of Bellingham, Washington

Project Engineer. Mr. Swenson was responsible for computer modeling of hydraulics using the U.S. Army Corps of Engineers' HEC-2 program to calculate water surface profiles during a design storm event. Based on this information, he developed design criteria, plans, and specifications for flood improvements to Whatcom Creek. During final design, he adhered to stringent environmental requirements for maintenance of fish habitat, mitigation of lost fisheries habitat, and development of erosion and sedimentation control schemes to minimize impacts to fisheries during construction.

Regional Stormwater Detention Facilities
City of Bellevue, Washington

Project Engineer. Mr. Swenson performed a hydraulic analysis and hydrologic review of the Kelsey Creek stormwater drainage system and conducted a computer-aided hydraulic analysis of the drainage system. The data generated from this analysis were used as design criteria and operation parameters for the construction of eight regional detention facilities. Mr. Swenson coordinated with the Washington State Department of Ecology's Dam Safety Section while performing preliminary and final design of the facilities.

Maple Avenue Stormwater System Improvements
Town of La Conner, Washington

Project Engineer. Mr. Swenson designed and sized a stormwater collection system for the Maple Avenue trunk storm sewer in La Conner, Washington. He performed hydrologic and hydraulic analyses using the HYDRA modeling program.

Surface Water Runoff Analysis
TRA Bellevue, Washington

Project Engineer. Mr. Swenson was retained to perform a surface water runoff analysis for an EIS being prepared for a large development in Bellevue. A computer model using SCS methods was developed to predict runoff from the development area. The effects of runoff on the downstream stormwater drainage system were analyzed for the post-development condition, and detention systems were sized to keep post-development runoff from exceeding predevelopment conditions.

Infiltration/Inflow Study
Seattle Engineering Department/Washington

Project Manager. Mr. Swenson evaluated the causes of sewer backups and basement flooding, and suggested solutions for a 240-acre area in the Greenwood District of Seattle. Mr. Swenson monitored flows to determine the sources of excessive infiltration/inflow and supervised field investigations. The project team's recommendations included separating storm and sanitary flows by rerouting stormwater flows, reducing groundwater sources, or constructing new sewers.

Medvedjie Creek Fish Hatchery

Northern Southeast Regional Agriculture Association/Sitka, Alaska

Project Engineer. Mr. Swenson was responsible for performing a hydraulic analysis and determining flows and pipe sizes for the Medvedjie Creek Fish Hatchery. He also performed all mechanical design work for the hatchery, including pipelines, pump stations, ultraviolet disinfection equipment, and reservoir.

Neets Creek Fish Hatchery

Southern Southeast Agriculture Association/Ketchikan, Alaska

Project Engineer. Mr. Swenson was responsible for establishing the entire hydraulic water surface profile for the hatchery building and the exterior raceways as well as the hydraulic design of the hatchery pipelines to accommodate the hydraulic profile. His design responsibilities also included a 10,000-foot-long water supply pipeline.

Downtown Utility/Street Upgrade

City of Fairbanks, Alaska

Project Engineer. Mr. Swenson served as design engineer for water system improvements for the downtown utility/street upgrade project for Fairbanks, including responsibility for the hydraulic analysis for the water distribution network using a computer model. The modeling for this system posed a unique and difficult challenge because it was necessary to accommodate an existing water-circulating system with intermittent in-line pumps designed to prevent freezing. Mr. Swenson provided a design to improve water distribution and fire-flow capacity yet not adversely affect minimum-circulating velocity criteria. Water system improvements included the design of 2,200 feet of 14-inch-diameter water line with numerous 1- and 2-inch domestic connections and 6-inch fire services.

Wastewater Treatment Plant Improvements

City of Richland, Washington

Modeler. Mr. Swenson modeled wastewater loadings for the Richland Wastewater Treatment Plant and participated in pilot plant and water quality studies related to the treatment facility.

Comprehensive Sewer System Engineering Report

Tulalip Tribes of Washington

Project Engineer. Mr. Swenson was responsible for preparing a comprehensive sewer system engineering report that recommended improvements to the Tribes' sewer system. Using computer modeling techniques, field surveys, and desktop analyses, Mr. Swenson recommended treatment plant improvements, pumping requirements, and collection and conveyance system modifications.

Comprehensive Water System Plan
City of Anacortes, Washington

Project Engineer. Mr. Swenson developed a mathematical model of the City of Anacortes' supply and distribution systems, which was used as an analytical tool in developing its comprehensive water plan. His analysis of the system resulted in major improvements to the system, including increased capability to meet peak demands and provide fire protection.

Water System Improvements
Skagit County Public Utility District No. 1/Washington

Project Engineer. Mr. Swenson was responsible for water system analysis and design of improvements. The modeling effort for this system was very complex due to the vast amount of small-diameter pipeline, multiple pressure zones, and several booster pumps. Mr. Swenson's design responsibilities included design of chlorination improvements to the system.

Water System Modeling
Okanogan County, Washington

Project Engineer. Mr. Swenson conducted computer modeling, performed a hydraulic analysis, and prepared an abbreviated water system plan for the Lake Osoyoos North End water users in Okanogan County.

Inman Landfill Expansion Project
Skagit County, Washington

Design Engineer. Mr. Swenson was responsible for designing key landfill portions for the Inman Landfill, including the geomembrane liner, leachate collection system, leachate pumping units, and leachate pretreatment and storage lagoon. He assisted in designing the third phase expansion, which included converting an existing portion of the landfill to accept fly ash. This assignment involved designing a double-composite liner and expanding the leachate collection and pumping system. Mr. Swenson determined site preparation and excavation requirements and prepared construction cost estimates for design components.

Landfill Feasibility Study
Jefferson County, Washington

Engineer. Mr. Swenson participated in the study and evaluation of landfill development and closure alternatives as well as leachate management alternatives. The final report included a discussion of regulatory requirements and an evaluation of the economic effects of waste reduction from increased recycling. The study developed waste and site capacity projections for each alternative. The comparison of alternatives also included life-cycle cost analysis and annual operation and maintenance costs.

Solid Waste Landfill and Alternative Studies
City of Port Angeles, Washington

Engineer. Mr. Swenson assisted in the development of a landfill operation and closure plan and in the design of a new landfill under the state's Minimum Functional Standards for Solid Waste Handling. The design included an evaluation of recycling facilities to be located at the landfill. Mr. Swenson played an instrumental role in developing the excavation plan, determining contours, and accounting for projected waste quantities.

Solid Waste Disposal Alternatives Project
Thurston County, Washington

Computer Analyst. Mr. Swenson prepared a computer program to assist in identifying and evaluating options for solid waste disposal within Thurston County. The program was designed to analyze the feasibility of alternatives and to help select a long-range solid waste management system. Mr. Swenson developed an economic model that incorporated all costs for construction and operation of the system with a resulting tipping fee required for full recovery. In addition, he explored the environmental, public policy, economic, and operation-related issues of alternatives including recycling/landfill, recycling/incineration/ landfill, and composting/landfill.

County Resource Recovery Facility
Skagit County, Washington

Project Engineer. Mr. Swenson developed an ash-residue sampling/ testing and data-evaluation protocol. This protocol was the first to be developed in the state for bottom ash and fly ash from resource recovery facilities.

Enumclaw Landfill Closure
King County, Washington

Stormwater Design Engineer. Mr. Swenson supported the analyses, engineering, and design for the stormwater management and control system at the Enumclaw Landfill. Based on site-specific hydrologic and hydrogeologic conditions, the stormwater design for the second phase of the closure consisted of collection and disposal of runoff from the landfill cap to meet flow requirements. Design plans and construction specifications provided for temporary erosion and sediment control for protection of the soil cover until vegetation can be established.

Enumclaw Transfer/Recycling Station
King County, Washington

Stormwater Design Engineer. Mr. Swenson provided technical direction for the evaluations, engineering, and design for the drainage and stormwater control system at the new Enumclaw Transfer/Recycling Station. The design addressed the runoff from substantial amounts of roadway and paved areas, and included a stormwater collection system, a treatment bioswale, and an infiltration pond for disposal. To mitigate for

roadway fill in a wetland area, a wetland was created at a site. Some of the stormwater was diverted into a new wetland following treatment in a bioswale.

Bryant Landfill Closure
Snohomish County, Washington

Stormwater Design Engineer. Mr. Swenson reviewed design plans and specifications for the surface and stormwater controls necessary for this landfill closure. The site challenges included hydrologic analyses and hydraulic design of the conveyance system to transport runoff to an on-site infiltration recharge basin.

Development Review
City of Black Diamond, Washington

Project Manager. Mr. Swenson performed a development review of the Northwest Housing-Ridge Development in accordance with City standards. The review included evaluating proposed streets, water distribution, storm drainage, and sewer collection system improvements. He reviewed the proposed development for consistency with King County's road standards, the King County Surface Water Design Manual, the City's pending Stormwater Design Manual, and the Washington State Department of Ecology's Criteria for Sewer Works Design.

Mill and Springbrook Creeks Stormwater Management Analysis
City of Kent, Washington

Project Manager. Mr. Swenson is preparing a stormwater management analysis for Mill and Springbrook Creeks. The analysis includes hydraulic and hydrologic modeling of the creeks, both of which flow through Kent. Mr. Swenson is providing information to define and evaluate base-flood design criteria. The criteria will be used for the design of a 270-acre-foot regional detention and treatment facility in an area that was previously used as lagoons for sewage treatment. He is also evaluating several flooding problems and is developing conceptual designs of solutions to the problems.

Surface Water Management Plan
City of Mount Vernon, Washington

Project Manager. Mr. Swenson was responsible for preparing a surface water management plan for the Mount Vernon urban service area. He worked with the City to create a comprehensive surface water management program that provides guidance on stormwater control facilities, pollution source-control measures, resource-protection measures, operations and maintenance, financing, and compliance with existing and anticipated regulatory requirements. Mr. Swenson has also worked with the City to implement a surface water utility service charge. The service charge is based on a flat rate for single-family residences, and based on impervious surface area for commercial and multifamily

properties. Funding for this project was obtained through the Washington Department of Ecology's Centennial Clean Water Fund.

Wetland Environmental Permitting
City of Lynnwood, Washington

Project Manager. Mr. Swenson is responsible for preparing the necessary technical information and permit application to obtain a Section 404 permit from the U.S. Army Corps of Engineers for siting stormwater control facilities in wetlands. Mr. Swenson is facilitating close coordination with the City and jurisdictional agencies to involve all interested parties in the process. He is presenting the agencies with specific information regarding facility design and associated impacts, including a detailed assessment of current and proposed wetland hydrologic regimes, stormwater quality and its impact on the wetlands, and an overall assessment of the impact on the wetlands from the proposed detention facility.

Covington Master Drainage Plan
King County, Washington

Project Manager. Mr. Swenson was responsible for preparing a master drainage plan for the Covington community area within the Soos Creek watershed. The 1,237-acre area is designated as a regional urban activity center by the King County Comprehensive Land Use Plan. He developed a plan for surface water management control facilities, source control of possible pollutants, resource-protection measures, public education, operations and management, and monitoring of the drainage system. Mr. Swenson developed alternative conceptual designs, a final Master Drainage Plan, and a financial plan to fund the Drainage Plan's Implementation.

Surface Water Management Plan
City of Poulsbo, Washington

Project Manager. Mr. Swenson prepared a surface water management plan for the City of Poulsbo. The plan includes identifying existing surface water problems and alternative solutions, working with the City to comply with existing and anticipated regulatory requirements, and creating a comprehensive surface water management program. The program provides guidance on stormwater control facilities, pollution source-control measures, resource-protection measures, and operations and maintenance. The project received funding from the Washington State Department of Ecology's Flood Control Account Assistance Program.

Kulshan Creek Stormwater Pump Station
City of Mount Vernon, Washington

Project Manager. Mr. Swenson was responsible for the design of the Mount Vernon Kulshan Creek stormwater pump station, which handles high-flow periods in Kulshan Creek. The pump station construction was divided into two phases. During Phase I, a pump station, fish ladder,

automatically controlled gate, and new inlet 72-inch pipeline were constructed with a capacity of 150 cfs. Phase II added additional pumping equipment to provide an additional 50-cfs capacity to the pump station. For this $5 million project, Mr. Swenson also managed all the permitting and financing arrangements. Funding was obtained through the Hazard Mitigation Grant Program.

Squalicum Creek Capital Improvement Projects

City of Bellingham, Washington

Project Manager. Mr. Swenson directed the design of three capital improvement projects on Squalicum and Baker Creeks in Bellingham, Washington. The projects included the development of a Predesign report looking at the feasible alternatives for several large culvert undercrossings of major arterial roadways. Of primary concern was passing significant storm event flows while at the same time making provisions for fish passage. Mr. Swenson was also responsible for plans and specifications, and estimated construction costs. In order to prepare SEPA documents, he worked with numerous state and federal agencies, including the Washington State Department of Fish and Wildlife, City of Bellingham, Washington State Department of Transportation, Department of Ecology and the U.S. Army Corps of Engineers.

Whitman Lake Fish Hatchery

Southern Southeast Regional Aquaculture Association/Ketchikan, Alaska

Project Engineer. Mr. Swenson was responsible for performing a hydraulic analysis and determining flows and pipe sizes for the Whitman Lake Fish Hatchery. He also performed mechanical design work for the hatchery, including pipelines, pump stations, rearing ponds, and new reservoir intake.

Surface Water Management Plan

City of Snohomish, Washington

Project Manager. Mr. Swenson was responsible for coordination with the City of Snohomish, agencies, and public interest groups to develop a long-term management plan to reduce flooding, improve surface and groundwater quality, and protect environmental resources. Solutions to flooding problems are being combined with water quality and fish habitat improvements in an attempt to enhance salmon habitat in the area streams. Funding for this project was obtained through the Washington Department of Ecology's Centennial Clean Water Fund.

Comprehensive Flood and Drainage Plan Update

City of Lynnwood, Washington

Project Manager. Mr. Swenson directed the preparation of an update to the City of Lynnwood's Comprehensive Flood and Drainage Plan. Mr. Swenson was also instrumental in developing the original plan. The purpose of the update was to analyze the effect of roadway improvements and wetlands regulations, and to evaluate and recommend

solutions to specific stormwater-related water quality problems. Work for the update included additional hydraulic computer modeling of Scriber Creek, a review of the existing stormwater utility operation and maintenance plan, a review and update of the proposed capital improvement program, and an update to recommended solutions to flooding, water quality, fish habitat, and wetlands preservation problems.

Redmond Town Center Sanitary Sewer Lift Station

The Winmar Company/Redmond, Washington

Project Engineer. For a proposed 110 acre commercial/retail development located in Redmond, Mr. Swenson is responsible for the design of a new sanitary sewer lift station with a maximum capacity of 1,000 gpm. The new pump station structure will be constructed using sunken caisson methods because of high groundwater level due to adjacent river. The caisson structure is divided into wet and dry wells by a separating wall. Mr. Swenson is directing civil mechanical, structural, electrical, and CADD design services for the project. He is also responsible for obtaining project approval from the City of Redmond, as well as coordination with the pump station building and landscape architects, and the Winmar Company staff.

Redmond Town Center Construction Site Runoff Stormwater Treatment System

The Winmar Company/Redmond, Washington

Project Manager. Mr. Swenson is responsible for developing a stormwater treatment process for construction site runoff from a proposed 110-acre commercial/retail development located in Redmond. The work involves design of a chemical feed system to promote settling and reduce turbidity as the stormwater passes through treatment areas. Mr. Swenson is also responsible for coordination with state and local agencies.

Comprehensive Surface Water Management Plan Update and Facility Predesign

City of Burlington, Washington

Project Manager. Mr. Swenson is preparing an update to the City of Burlington's existing Comprehensive Surface Water Management Plan. The focus of this update is to perform a predesign of a new stormwater pump station, forcemain, and gravity storm drain system on the west side of the City.

Predesign of the west-side system includes reviewing the existing hydrologic analysis to determine the system design flows, performing a hydraulic analysis of the proposed pump station/forcemain/gravity system, optimizing stormwater detention to minimize required system capacity, developing preliminary plan and profile drawings, and preparing construction cost estimates.

This project also included an evaluation of the required design flows for the Gages Slough Stormwater Pump Station.

Stormwater Management Funding Program
City of Burlington, Washington

Project Manager. Mr. Swenson managed the development of a funding mechanism to implement a stormwater program which includes capital projects, operation and maintenance, engineering, administration, and public education costs. The funding mechanism must generate the necessary revenues and be politically acceptable. Mr. Swenson was instrumental in establishing a public involvement process to involve key stakeholders in decision making. As a result, the City adopted a utility service charge to fund its program.

Riverbend Road Stormwater Pump Station
City of Mount Vernon, Washington

Project Manager. A large area proposed for commercial development within the City of Mount Vernon is faced with development restrictions because of inadequate drainage facilities. Previous planning work performed by Mr. Swenson for Mount Vernon recommended a stormdrain/pump station project that could provide adequate service to this area. Mr. Swenson is responsible for the design of this new pump station and stormdrain pipeline for the City of Mount Vernon. Mr. Swenson is directing the hydraulic analysis, civil, mechanical, structural, electrical, and CADD design services for the project. He is also managing all the necessary permitting, as well as assisting the City with a $2.1 million revenue bond sale to finance the project.

On-Call Surface Water Management Services
Snohomish County, Washington

Project Manager. Mr. Swenson is responsible for providing on-call surface water management engineering services to Snohomish County. Tasks completed to date include several designs to solve localized flooding problems associated with inadequate pipe systems, culverts, and infiltration systems. Hydrologic and hydraulic analysis was also provided to establish design criteria for County engineers to perform the actual design.

Other projects include hydraulic studies to prevent lake flooding, and analysis of lake aeration systems. Mr. Swenson is currently providing drainage-related engineering and preliminary design for several large road improvement projects. This includes siting and sizing detention and stormwater quality treatment systems, conveyance systems and roadway stream crossings. This work must be in compliance with the new Title 24 county ordinance, and must be coordinated with other permitting processes such as obtaining Hydraulic Project Approvals from the Washington State Department of Fish and Wildlife.

Mill Creek Phase 2 Flood Control Plan
King County, Washington

Project Manager. Mr. Swenson is managing the preparation of a flood control plan for the Mill Creek Basin. He directed subconsultant

activities during Phase 2 of the work, which involved a feasibility analysis of flood control alternatives using HSPF and FEQ models, a public involvement program, and an alternatives evaluation process that included the public, in order to select a preferred flood control alternative. Mr. Swenson is currently managing Phase 3 of the project, which includes engineering design and environmental review of the preferred flood control alternative. Mr. Swenson's responsibilities also include development of a funding approach for the selected flood control plan, and coordination with King County and the Cities of Auburn and Kent.

SeaTac Business Park Master Drainage Plan
King County, Washington

Technical Reviewer. Mr. Swenson closely reviewed the development of a master drainage plan for a 200-acre area in King County. The plan recommended structural and nonstructural methods to control runoff, and the County specified that the plan would be used as a model for all future business park developments within King County. Work on the project included hydrologic and hydraulic computer modeling of the area's drainage basin, a system inventory, and the formulation of recommendations to serve a proposed new business park.

Springwood Apartments Regional Wetland Design
King County, Washington

Project Engineer. Mr. Swenson helped prepare the preliminary and final design of a regional stormwater detention facility and culvert improvements near the Springwood Apartments in King County. His work included hydrologic computer modeling and a siting study for a detention facility that could meet downstream peak flow control requirements with minimum impacts to area wetlands. Mr. Swenson was also involved in the design of an adjustable release flow control structure, embankment structure, armored overflow spillway, sediment retention facility, access roads for operations and maintenance, and downstream culvert replacements. In addition, his responsibilities included a detailed wetland analysis, preparation of a construction mitigation plan, and SEPA environmental review.

Stormwater Pump Station Nos. 1 and 4 Design
Consolidated Diking Improvement District #2 of Cowlitz County/ Washington

Project Manager. Mr. Swenson is responsible for the preliminary and final design for pump stations Nos. 1 and 4. During predesign, the pump stations' capacities and the operational capabilities of existing pump station No. 1 were established. The configuration of pump station No. 1 was evaluated and the best location for new pump station No. 4 was determined. Forebay volume requirements were calculated to ensure that overflows from pump station No. 2 can be intercepted by pump station No. 4. Mr. Swenson determined pumping equipment required and evaluated emergency power supply options in the event of power

outages. In addition, he determined what environmental permits are required for the project. The project is currently in the final design phase.

10th Avenue South Culvert Replacement and Intersection Improvement
City of Des Moines, Washington

Project Manager. Mr. Swenson was responsible for designing two three-sided box culverts and 140 feet of new channel to replace the existing under-sized culvert beneath 10th Avenue South. The project included updating the hydraulic model to size the culverts; providing for fish passage in the culverts and fish habitat in the new channel; preparing the civil design; coordinating the civil, structural, roadway and utility design; and preparing the construction cost estimate and contract documents for bid.

Community Workbook, Curriculum, and Workshop Development; EPA NPDES Phase II Stormwater Regulations
American Public Works Association

Author/Presenter. To educate smaller communities on compliance with new Phase II NPDES stormwater requirements being implemented by EPA, Mr. Swenson participated in development of a workbook and curriculum, and is helping conduct workshops across the country for the APWA. The program discusses the proposed new regulations and how communities can implement stormwater programs to comply with these regulations, get public support, and fund their programs.

Surface Water Management Action Program
City of Mill Creek, Washington

Project Manager. Mr. Swenson led the R. W. Beck team that developed a surface water program and program costs for the City of Mill Creek. The team then assisted the City in implementing a surface water utility to fund the program. The program includes capital projects, operation and maintenance, and public education costs. During the project, Mr. Swenson met with a committee of citizens and stakeholder groups to review the overall program costs and different options for creating a utility service charge for stormwater. He also worked with the City to implement a utility service charge recommended by the committee. The utility was subsequently approved by the City Council.

Drainage Manual Revision
Snohomish County, Washington

Project Manager. Mr. Swenson is responsible for preparing the Snohomish County Drainage Manual pursuant to the new Snohomish County Drainage Code (SCC Title 24) adopted in 1998. The manual contains guidance for complying with the code, including review and submittal requirements, detention facility performance standards, water quality treatment BMP requirements, required source control measures, and a protocol for obtaining approval for alternative BMPs. His contributions to the manual also include technical information on

engineering design for drainage facilities and other drainage control measures. Mr. Swenson participates in discussions with an advisory committee consisting of professional consultants, developers, and county planning and public works staff.

Surface Water Design Manual Update

King County, Washington

Project Engineer. R. W. Beck provided engineering services to update the existing King County surface water design manual and to develop an ongoing training program. Mr. Swenson was involved with preparing immediate corrections and clarifications; addressing substantive technical and policy amendments that required further development, research, and public review; and incorporating water quality controls into the manual. As part of the final phase, he participated in a regulatory analysis for the County's legal authority to implement and enforce water quality requirements. The design manual is a nationally recognized publication and is acknowledged by municipalities throughout the Northwest and across the United States as a model document. The manual is also the basis for large portions of the Washington State Department of Ecology's Stormwater Management Manual for the Puget Sound Basin.

Managed Competition for Stormwater System Maintenance

City of Kirkland, Washington

Project Engineer. Mr. Swenson performed work to conduct a managed competition for the operation and maintenance of portions of the City of Kirkland's stormwater system. He reviewed the City's current maintenance practices and developed performance standards that were used to prepare the RFP for outsourcing.

Comprehensive Stormwater Management Plan

Town of Eatonville, Washington

Project Manager. Mr. Swenson is currently managing preparation of a comprehensive stormwater plan that includes a capital improvement program, operation and maintenance program, inventory and mapping, water quality and fish habitat assessment, public involvement, and program administration. Mr. Swenson will present alternative program levels of service and the results of a financial analysis for each alternative. The financial analysis will be reconciled with a new utility service charge that will fund the program.

Stormwater Management Program

City of North Bend, Washington

Project Manager. Mr. Swenson is currently managing preparation of a comprehensive stormwater plan that includes a capital improvement program, operation and maintenance program, inventory and mapping, water quality and fish habitat assessment, public involvement, and program administration. The comprehensive plan is being integrated with a floodplain management plan, since much of the city lies in a

FEMA-designated floodplain. Mr. Swenson will review program costs identified in the comprehensive plan with a citizens committee and other key stakeholder groups as part of a process to develop a recommended program. He will also present alternative program levels of service and results of a financial analysis for each alternative. The financial analysis assumes that the City would fund the program through a new utility service charge. Once a recommended level of service and associated funding are approved, he will assist the City in adopting the new utility.

Padden Creek Daylighting Project

City of Bellingham, Washington

Project Manager. Mr. Swenson is managing a preliminary draft for a project that would create a new open channel for Padden Creek. A section of the Creek has flowed in an underground tunnel since the 1890s. The purpose of the project is to provide fish passage, since the existing tunnel blocks fish, as well as provide added conveyance capacity to eliminate a flooding problem. The work involves sizing and locating alternative alignments for the channel that will provide adequate flow conveyance, fish passage, and fish habitat. Alternative alignments involve several road crossings, and space is limited along existing rights-of-way. In addition to technical challenges, selection of the preferred alternative will be affected by permitting scenarios and acceptance by the community. The aggressive predesign schedule is driven by grant application funding cycles, as the construction phase of the project will depend on obtaining grant funding.

Martha Lake Drainage Improvements

Snohomish County/Washington

Project Manager. Mr. Swenson directed a study to analyze and propose solutions to flooding problems at Martha Lake. The lake flooding was attributed to conveyance problems with the lake outlet. An HEC-RAS backwater hydraulic model was created to analyze the Lake outlet capacity. Downstream improvements from the lake were sized using this model. Many of the recommendations to prevent lake flooding included improved maintenance of the outlet channel to prevent clogging with debris and trash.

196TH Street-Filbert Road (SR 524) Drainage Analysis and Preliminary Design

Snohomish County, Washington

Project Manager. Mr. Swenson directed the R. W. Beck team that prepared the preliminary design for stormwater, detention, water quality, and conveyance facilities for the widening of 196th Street/Filbert Road (SR 524) in Bothell. It was necessary to design these improvements to comply with new County standards for stormwater detention and treatment. The work involved the location of new facilities along the roadway corridor amongst existing development. Preliminary designs for five stream crossings were included in the project, requiring

hydrologic and hydraulic analysis such as bridge scour evaluation. The facilities were sized to meet fish passage standards.

112th Street SW Detention Systems and Culvert Crossings

Snohomish County, Washington

Project Manager. Mr. Swenson directed the R. W. Beck team that prepared the preliminary design for stormwater, detention, water quality, and conveyance facilities for the widening of 112th Street SW. It was necessary to design these improvements to comply with new County standards for stormwater detention and treatment. The work involved locating new facilities along the roadway corridor amongst existing development. Preliminary designs for five stream crossings were included in the project, requiring hydrologic and hydraulic analysis such as bridge scour evaluation. The facilities were sized to meet fish passage standards.

Mount Vernon Flood Control Wall

City of Mount Vernon, Washington

Project Manager. Mr. Swenson managed a team of engineers and architects to design a portable wall that would prevent high water levels during flood conditions in the Skagit River from entering the downtown area. To protect the City from severe flooding during these events, sandbag walls have been constructed along the top of the Skagit River dike. To provide a more reliable flood barrier, the City wanted to construct a portable wall system that is easier and faster to erect in an emergency than the sandbag walls.

The criteria for the design required minimal loss of parking and no loss of views of the Skagit River from the downtown business district. Mr. Swenson helped facilitate the development of the design solution in meetings with the businesses and environmental interests affected by the project.

Gages Slough Pump Station

City of Burlington, Washington

Project Manager. Mr. Swenson managed the design for a new stormwater pump station for the City of Burlington. The pump station will provide an outlet into the Skagit River for Gages Slough when the river is at high water levels. A hydraulic model was used to confirm that the new pump station could control the depth and duration of flooding to properties as well as maintain existing wetland resources along the Gages Slough riparian corridor. The R. W. Beck team was also responsible for all of the necessary permitting for the project.

Design tasks included sizing the upstream culvert and channel system; choosing pumping equipment; designing the pump station to prevent vortices and pre-rotation of the pumps; and designing a new force main penetration for the Skagit River dike.

Squalicum Creek Floodplain Flood Control Berm
City of Bellingham, Washington

Project Manager. Mr. Swenson is directing the design of a flood control berm that is set back from Squalicum Creek in the City of Bellingham. The berm was recommended as part of a separate planning effort also managed by Mr. Swenson. The purpose of the berm is to prevent creek flows from entering commercial buildings that are threatened by flooding. The design of the berm is being coordinated with permitting agencies to comply with shoreline and wetland setback and buffer requirements

NE 120th Place Culvert Replacement
City of Kirkland, Washington

Project Manager. Mr. Swenson supervised the design of a large corrugated metal pipe arch to replace an undersized culvert, in order to prevent roadway flooding and to allow for fish passage at NE 120th Place and Juanita Creek in Kirkland. Work included surveying, hydraulic analysis, permitting, plans and specifications, cost estimates, construction management assistance, and public involvement. Permits were obtained, including Hydraulic Project Approval from the Washington Department of Fish and Wildlife, and a Section 401 Water Quality Certification from the Washington State Department of Ecology.

Comprehensive Stormwater Management Plan
City of Des Moines, Washington

Project Manager. Mr. Swenson is preparing an update to the City of Des Moines' Comprehensive Stormwater Management Plan. The focus of this update is to gather information developed on individual basin studies and integrate the information into an overall program, with a new capital improvement program, changes to policies and regulations, changes to the current maintenance program, and public education elements. The study includes financial rate analysis and recommendations for new stormwater utility rates that were implemented to fund the recommended program. Also included is the development of a strategy to meet the Puget Sound Basin Plan requirements.

Lake Meridian/Soosette Creek Watershed Study
City of Kent, Washington

Project Manager. Mr. Swenson managed this project for the City of Kent to determine required stormwater capital expenditures in a recently annexed area in the Soosette Creek, Lake Meridian, Clark Lake, and Meridian Valley Creek watersheds. The City was interested in capital costs for a stormwater system for this newly annexed area, in order to determine the capital component of the stormwater utility service charge. The City's stormwater utility service charge varies between the different drainage basins depending upon the capital needs in those areas. To support flood reduction and fish habitat improvements to the area, a watershed study was conducted that included development of a capital

improvement program for these basins that enabled the City to establish a basin-specific utility service charge.

35th Avenue SE Roadway Improvement Project
Snohomish County, Washington

Project Manager. Mr. Swenson managed an analysis to locate and prepare conceptual site layouts for stormwater control facilities in connection with the design and construction of 4.2 miles of street improvements for 35th Avenue SE, from 116th Street SE to Seattle Hill Road. He incorporated individual drainage quality and quantity control facilities, designed by the County and by the roadway design consultant, into an overall drainage control concept plan for approval by permitting agencies. For a major portion of the project, Mr. Swenson successfully implemented an innovative approach to provide the required stormwater storage at an off-site wetland enhancement area, rather than using a conventional stormwater pond. This was necessary because the existing road was very low and flat in relation to an existing stream crossing, and lacked the grade needed to construct a conventional pond.

South Mount Vernon Stream Gaging
Skagit County and City Of Mount Vernon, Washington

Principal-in-Charge. Under two parallel projects, R. W. Beck is providing stream gaging services on Bulson Creek and Carpenter Creek for Skagit County, and on Maddox Creek for the City of Mount Vernon. The data obtained from the two projects will be used to quantify streamflow and the effects of pump stations and tide gates, and will also be used to characterize the basin and calibrate future hydrologic and hydraulic models in the area. R. W. Beck will conduct field reconnaissance and select appropriate stream gaging instrumentation (area/velocity meters and stage-only meters), install the equipment, make streamflow measurements for instrumentation calibration, and provide a technical memorandum to describe the methodologies used and present data from the analysis.

Sturtevant Creek Watershed Analysis
City of Bellevue

Project Manager. Mr. Swenson worked with the City of Bellevue to evaluate several alternatives for managing stormwater within the Central Business District (CBD) portion of the Sturtevant Creek basin. These alternatives presented different methods for providing flow control for areas within the Sturtevant Creek portion of the CBD that will be re-developed in the future. These alternatives included on-site detention, regional detention, and a high flow storm drain that would transport undetained peak flows directly to Lake Washington. An abbreviated hydrologic/hydraulic analysis was performed to size facilities and determine capital costs for each alternative. The results of this analysis and a recommended stormwater management strategy were provided to the City.

Stormwater Management Planning

Seattle Public Utilities/Washington

Project Manager. Steve Swenson is leading a team that was recently selected to assist SPU with development of a strategy to address renewal of the City's NPDES Phase I stormwater permit. In order to identify basin-specific water quality problems and their sources, the plan will characterize existing water quality problems in receiving water bodies using existing data supplemented with a simplified pollutant loading analysis based on land use. GIS will be used extensively as a data management tool so that existing water quality data and pollutant loading information can be referenced geographically as well as numerically. The plan will also evaluate different stormwater treatment BMPs and store this information in the GIS database in the form of relationship tables that describe BMP removal efficiencies for different pollutant parameters as well as other factors such as cost, maintenance considerations, and land area requirements. Once all this information is input into the GIS database, the GIS model can be queried to evaluate the most appropriate BMPs to use in specific drainage basins throughout the City with the end product being the development of basin-specific water quality control strategies. This information will be used as the basis for a stormwater quality management plan that will be incorporated into the City's NPDES permit renewal.

BEFORE THE POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and PORT OF SEATTLE, Respondents.	PCHB No. 01-133 DECLARATION OF EDWARD O'BRIEN

Edward O'Brien declares as follows:

1. I am over the age of 18, am competent to testify, and have personal knowledge of the facts stated herein.

2. I have been employed by the Department of Ecology (Ecology) since 1979, and for most of that time I have worked in the Water Quality Program. For the last 10 years I have been working on stormwater issues for the Water Quality Program. I have worked on the three primary categories of stormwater management – industrial, municipal and construction.

3. I am familiar with the Stormwater Management Manual for Puget Sound issued by Ecology in February of 1992 (1992 Manual). A revised draft of the manual specific was issued in August of 1999 and then again in August of 2000 (1999 Draft Manual). After

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thorough review and comment, the final version of the western Washington stormwater manual was issued by Ecology on September 27, 2001.

4. I worked extensively with the 1992 Manual, the 1999 Draft Manual and am very familiar with the final version of the manual that was recently issued. I work with the stormwater manuals on a daily basis.

5. I am also familiar with the 1998 King County Surface Water Design Manual (King County Design Manual). This manual is similar to the Ecology stormwater manuals, except that it was prepared and issued by King County.

6. These manuals are used by Ecology, other state and federal agencies, Indian Tribes, local governments, stormwater permittees and members of the public to gain an understanding of stormwater issues and management. More specifically, the manuals are used by local governments and Tribes to develop stormwater control regulations and ordinances. They are used by Ecology staff, permittees and technical consultants to develop stormwater discharge permits.

7. All of the manuals describe how development, particularly the addition of impervious surfaces, alters the natural hydrologic cycle. Very simply, removing natural vegetation and replacing it with buildings or other impervious surfaces will result in two major impacts. The first is elevated concentrations of pollutants in stormwater runoff. Typically, stormwater runoff from developed areas, as compared with runoff from undisturbed areas, contains elevated levels of turbidity, oils and grease and other conventional and nonconventional pollutants.

8. The second major impact is the alteration of the natural hydrologic cycle. Again, very simply, development tends to result in far less precipitation infiltrating into soils and from there to groundwater. Instead, because of the addition of impervious surfaces much of the precipitation runs off into area surface waters, be they wetlands, lakes or streams. When large areas are developed and made impervious, peak flows in surface waters are magnified

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significantly from predevelopment conditions. These high flows can cause erosion, stream channel alteration and habitat damage.

9. A corresponding impact of development and the addition of impervious surfaces is a reduction in low summer flows. Precipitation that infiltrates to groundwater tends to move slowly through the soil column and some portion of it seeps into and recharges surface water bodies. The portion of groundwater seeps that reach surface water bodies during low flow periods recharge these surface waters at critical times for aquatic organisms. When large percentages of precipitation runs off of developed areas, it does not infiltrate to groundwater, and thus does not recharge surface waters during low flow periods. This can cause low summer flows to be further reduced.

10. The King County Surface Water Design Manual describes these impacts as follows:

> **3.1.1 HYDROLOGIC IMPACTS AND MITIGATIONS**
>
> Human alteration of the landscape, including clearing, grading, paving, building construction, and landscaping, changes the physical and biological features that affect hydrologic processes. Soil compaction and paving reduce the infiltration and storage capacity of soils. This leads to a runoff process called *Horton overland flow* whereby the rainfall rate exceeds the infiltration rate, and the excess precipitation flows downhill over the soil surface. This type of flow rapidly transmits rainfall to the stream or conveyance system, causing much higher peak flow rates than would occur in the unaltered landscape.
>
> Horton overland flow is almost nonexistent in densely vegetated areas, such as forest or shrub land, where the vast majority of rainfall infiltrates into the soil. Some of this infiltrated water is used by plants, and, depending on soil conditions, some of it percolates until it reaches the groundwater table. Sometimes the percolating soil water will encounter a low-permeability soil or rock layer. In this case, it flows laterally as interflow over the low-permeability layer until it reaches a stream channel. Generally, forested lands deliver water to streams by subsurface pathways, which are much slower than the runoff pathways from cleared and landscaped lands. Therefore, urbanization of forest and pasture lands leads to increased stormwater flow volumes and higher peak flow rates.
>
> For these reasons, development without mitigation increases peak stormwater rates, stormwater volumes, and annual basin yields. Furthermore, the reduction of groundwater recharge decreases summer base flows.

AR 005270

King County Design Manual, Section 3.1.1, 1998.

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11. Similarly, in the 1992 Manual the effects of development are described as follows:

> Runoff that was previously slowly released to streams through interflow now runs quickly off the surface directly into the streams. This increases both the velocity and total quantity of flow causing streambank erosion and general habitat destruction. Sediment from increasingly eroded and unstable stream banks and cleared areas is deposited downstream filling ponds, streambeds and stormwater facilities. An additional consequence is that summer base flows are greatly reduced because of a lack of interflow. . . .

1992 Manual, Volume I-1.1.

12. All of the manuals include discussions of "best management practices" (BMPs). BMPs are recommended stormwater management practices addressing the various adverse impacts of uncontrolled stormwater, including pollutant loadings and changes to the hydrologic cycle.

13. When Ecology began requiring the active management of stormwater in the late 1980s and the early 1990s, the focus was to remove pollutants from the water column. However, from the beginning, the hydrologic impacts described above were recognized as a significant problem. Over time, it became commonplace to require the collection, detention and treatment of stormwater to remove pollutants from the water column and to reduce the impact of high flood flows.

14. Early in the development of the stormwater management program, Ecology also recognized the importance of mitigating low flow impacts. For example, infiltration of collected stormwater has been an important part of stormwater management since at least the issuance of the 1992 manual. Infiltration is listed in both the 1992 and the current manual as a preferred BMP because of its beneficial impact on both pollutant loadings and its beneficial impact on low summer flows. The 1992 manual states that infiltration is "Ecology's highest priority" BMP, because of multiple benefits, including "groundwater recharge." 1992 Manual, Volume I, Section I-4.2, Classification of BMPs. In addition, Volume III of the 1992 manual addressing runoff controls states: "Benefits of infiltration include preservation of baseflow in

streams, recharge of groundwater, [and] reduction of peak runoff flows . . . ." Volume III, Section III-3.1.

15. Avoiding or mitigating for low flow impacts caused by new development is becoming an increasingly important focus of Ecology's Water Quality Program. While it is not possible to completely avoid impacts to natural hydrologic cycles, we are looking for techniques and strategies to minimize these impacts as much as possible.

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

DATED this 1st day of October, 2001 at Olympia, Washington.

EDWARD O'BRIEN

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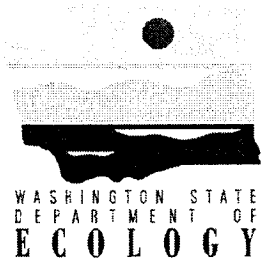

Stormwater Management Manual for Western Washington

Volume I - Minimum Technical Requirements and Site Planning
Volume II - Construction Stormwater Pollution Prevention
Volume III - Hydrologic Analysis and Flow Control Design/BMPs
Volume IV - Source Control BMPs
Volume V - Runoff Treatment BMPs

Prepared by:

Washington State Department of Ecology
Water Quality Program

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c) If the 100-year peak discharge is greater than 0.5 cfs for either existing or developed conditions, or if a significant adverse impact to downgradient properties or drainage systems is likely, then a conveyance system must be provided to convey the concentrated runoff across the downstream properties to an acceptable discharge point (i.e., an enclosed drainage system or open drainage feature where concentrated runoff can be discharged without significant adverse impact).

Stormwater control or treatment structures should not be located within the expected 25-year water level elevations for salmonid-bearing waters. Such areas may provide off-channel habitat for juvenile salmonids and salmonid fry. Designs for outfall systems to protect against adverse impacts from concentrated runoff are included in Volume V, Chapter 4.

2.5.5 Minimum Requirement #5: On-site Stormwater Management

Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding or erosion impacts. Roof Downspout Control BMPs, functionally equivalent to those described in Chapter 3 of Volume III, and Dispersion and Soil Quality BMPs, functionally equivalent to those in Chapter 5 of Volume V, shall be required to reduce the hydrologic disruption of developed sites.

Objective

To use inexpensive practices on individual properties to reduce the amount of disruption of the natural hydrologic characteristics of the site.

Supplemental Guidelines

"Flooding and erosion impacts" include impacts such as flooding of septic systems, crawl spaces, living areas, outbuildings, etc.; increased ice or algal growth on sidewalks/roadways; earth movement/settlement, increased landslide potential; erosion and other potential damage.

Recent research indicates that current techniques in residential, commercial, and industrial land development cause gross disruption of the natural hydrologic cycle with severe impacts to water and water-related natural resources. Based upon gross level applications of continuous runoff modeling and assumptions concerning minimum flows needed to maintain beneficial uses, watersheds must retain the majority of their natural vegetation cover and soils, and developments must meet the Flow Control Minimum Requirement of this chapter, in order to avoid significant natural resource degradation in lowland streams.

Law of Water Rights and Resources

by A. Dan Tarlock

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mine if a source is a watercourse.[3] Seasonable flows in small streams are open to appropriation,[4] but Idaho has held that excess water cannot be decreed as a water right.[5] Wyoming places specific limits on the use of unappropriated waters. The Surplus Water Law limits the use of water in excess of amounts needed to satisfy all pre-1945 appropriations to one cubic foot or water per second for each seventy acres owned by the applicant or to the proportionate amount of surplus water available and put to beneficial use.[6]

§ 5:15 —When unappropriated water is available for appropriation

The essence of a priority system is that prior rights are superior to subsequent ones. Thus, to acquire a new appropriative right, a claimant or permit applicant must show that there is unappropriated water available. Availability is generally measured by a "normal water year."[1] Under this standard water is available for appropriation even if the right cannot be satisfied every year, but water is obviously unavailable for appropriation if only one-half of the decree holders can usually be served during periods of peak demand.[2] But, water use on most streams is like the federal budget. No one really knows how much water is actually being put to beneficial use by how many people. Paper claims and decrees may fully appropriate the

---

Water Code § 11.021., and this includes a "lake" formed by the overflow of a river. Indianola Co. v. Texas Water Co., 730 S.W.2d 64 (Tex. Ct. App. 1987), w.e. ref. and motion for rehearing denied, 749 S.W.2d 771 (Tex. 1988). The Supreme Court refused to approve the court of appeals' conclusion that surface or storm waters of a depression may be public waters when they are not part of a watercourse.

[3]"The Disparity Between State Water Rights Records and Actual Water Use Patterns—I Wonder Where the Water Went?" 5 Land & Water L. Rev. 23 (1970), and Battle, "Paper Clouds Over Waters: Shelf Filings and Hyperextended Permits in Wyoming," 22 Land & Water L. Rev. 673 (1987).

[4]E.g., Jaquez Ditch Co. v. Garcia, 17 N.M. 160, 124 P. 891 (1912)

[5]A & B Irrigation Dist. v. Idaho Conservation League, 131 Idaho 411, 958 P.2d 568, 573 (1997).

[6]Wyo. Stat. §§ 41-4-318–324. A constitutional challenge was dismissed because a post-1945 appropriator lacked standing to challenge the Act. Budd v. Bishop, 543 P.2d 368 (Wyo. 1975).

[Section 5:15]

[1]Dovel v. Dobson, 122 Idaho 59, 831 P.2d 527 (1992).

[2]St. Johns Irrigation & Ditch Co. v. Arizona State Water Comm., 127 Ariz. 350, 621 P.2d 37 (1980) (writ of prohibition may issue to prevent state agency from exercising jurisdiction over new applications).

WATERS AND WATER RIGHTS

1991 EDITION

Robert E. Beck
Editor-in-Chief

VOLUME TWO

PART II–RIPARIANISM
(Continued)

PART III–PRIOR APPROPRIATION

2000 REPLACEMENT VOLUME

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The Nebraska Supreme Court put it this way in 1990: "Since the permit system provides a surer method of providing lasting notice of the existence and quantity of valid appropriative rights, requiring a diversion as a prerequisite serves no useful purpose."[94] The Court then concluded that it seemed to them that the framers of the Nebraska Constitution who had included "divert" in the Constitution "chose to use 'divert' in order to stress that the appropriative right was independent of riparian ownership."[95] Finally in 1994, in *In re Water Right Claim No. 1927-2,*[96] the South Dakota Supreme Court made it clear that a diversion is not required to use water from springs, in this case for wetland maintenance on a National Wildlife Refuge.

§ 12.02(c)(2). Beneficial/Reasonable Use.

Statutes in appropriation states today typically require beneficial use for appropriation. For example, the Utah statute provides that: "Beneficial use shall be the basis, the measure and the limit of all rights to the use of water in this state."[97] In identifying beneficial use as "the basis, the measure and the limit," the language provides two clear focal points. First, the water must be put to a beneficial as contrasted with a nonbeneficial use and, second, only that amount of water that is put to beneficial use is appropriated.

Some statutes contain general definitions of beneficial use. Because of the generality of their terms, these statutes may not be very helpful in delineating content but they may show different focal points. For example, the South Dakota statute provides that beneficial use is: "any use of water... that is reasonable and useful and beneficial to the appropriator, and at the same time is consistent with the interests of

[94] In re Application A-16642, 236 Neb. 671, 463 N.W.2d 591, 601 (1990).

[95] 463 N.W.2d at 602. But Neb. Rev. Stat. § 46-2,108 puts some limit on who can appropriate water for instream purposes: "An instream appropriation may be obtained only by the Game and Parks Commission or a natural resources district and only for that amount necessary for recreation and fish and wildlife."

[96] 524 N.W.2d 855, 857 (S.D. 1994).

[97] Utah Code Ann. § 73-1-3. For similar statutes, see Ariz. Rev. Stat. Ann. § 45-141(B); Nev. Rev. Stat. § 533.035; N.M. Stat. § 72-1-2; S.D. Codified Laws § 46-1-8. *Cf.* Neubert v. Yakima-Tieton Irrig. Dist., 117 Wash. 2d 232, 814 P.2d 199 (1991), in which the Washington Supreme Court purports to re-emphasize its approach that the appropriation right is measured only by time and volume, so that once the right has been acquired in the first instance for a specific beneficial use, it can be used for any other beneficial use and, thus, water appropriated for irrigation, a beneficial use, can be used for frost prevention, a beneficial use. However, in *Neubert* the court also pointed out that the actual language concerning the original use of the water was that it was "made available for agricultural purposes" and, certainly, preventing frost damage to crops is an agricultural purpose. Nonetheless, there must be a beneficial use of water in Washington. *See infra* Grant D. Parker & Tom McDonald, *Washington,* Treatise Part XI, Subpart B (State Surveys).

the public of this state in the best utilization of water supplies."[98] Compare this with the North Dakota statute which provides: " 'Beneficial use' means a use of water for a purpose consistent with the best interests of the people of the state."[99]

Some statutes contain specific listings of beneficial uses. For example, in Montana:

> "Beneficial use," unless otherwise provided, means: (a) a use of water for the benefit of the appropriator, other persons, or the public, including but not limited to agricultural (including stock water), domestic, fish and wildlife, industrial, irrigation, mining, municipal, power, and recreational uses; (b) a use of water appropriated by the department for the state water leasing program... and of water leased under a valid lease issued by the department...; or (c) a use of water by the department of fish, wildlife, and parks pursuant to a lease...; or (d) a use of water to maintain and enhance streamflows to benefit the fishery resource in the Upper Clark Fork River basin . . . .[100]

Some statutes specify a particular beneficial use, apparently simply to make it clear that it is a beneficial use. For example, the Nevada statute provides: "The use of water... for any recreational purpose, is hereby declared to be a beneficial use"[101] and that water can be appropriated "to avoid the pollution or contamination of a water source."[102]

Idaho has made it clear that recharge of groundwater basins is a beneficial use of surface water.[103] A Texas court has ruled that storage of surface water in an aquifer is a valid approach to municipal use.[104] The incidental recharge of the aquifer in the process is not disabling even though theoretically the stored water is subject to being withdrawn by another overlying landowner under the groundwater absolute ownership doctrine applied in Texas. Utah requires any individual to obtain a permit from the state engineer before engaging in aquifer recharge or the recovery of water injected or stored within an

---

98 S.D. Codified Laws § 46-1-6(3). *See* In re Water Right Claim No. 1927-2, 524 N.W.2d 855, 858-859 (S.D. 1994) (maintenance of waterfowl habitat is beneficial use).

99 N.D. Cent. Code § 61-04-01.1(1).

100 Mont. Code Ann. § 85-2-102(2).

101 Nev. Rev. Stat. § 533.030(2).

102 *Id.* § 533.437 (environmental permit). *See also id.* § 244.386, authorizing counties with populations over 400,000 to purchase, exchange, or lease water rights to preserve habitat for endangered species.

103 Idaho Code § 42-4201A(2).

104 Texas Rivers Protection Ass'n v. Texas Nat. Resource Conserv. Comm'n, 910 S.W.2d 147 (Tex. App. 1995), *writ den.*

aquifer.[105] A permit to recharge is dependent upon a preexisting water right. The state engineer has the duty, prior to recovery of recharge water, to determine the amount of the recharge water that has reached the aquifer and the amount of that recharge water that has stayed with the "hydrologic area of influence,"[106] a substantial central state administrative control over this activity. Because of chronic water shortages in California, the state has had since 1978 a groundwater recharge program using used and reclaimed water.[107]

On the other hand, some statutes specify certain nonbeneficial uses. For example, the Oklahoma statute provides: "No Oklahoma water from any source shall be used in connection with the transportation, maintenance or operation of a coal slurry pipeline within or through the State of Oklahoma."[108] "[I]f suitable recycled water is available,"[109] California prohibits the use of potable water for the following uses: cemeteries, golf courses, parks, highway landscaped areas, industrial use, irrigation, toilet and urinal flushing in nonresidential structures, residential landscaping, floor trap priming, cooling towers, and air-conditioning devices.[110] A statute may provide for restricting certain uses deemed less beneficial or necessary to protect a primary use such as for drinking water. For example, Nevada provides that in certain counties, the commissioners may prohibit or restrict "the use of water... for recreational purposes in any man-made lake or stream."[111]

In summary, the end use for the water must be a generally recognized and socially accepted use (abstract benefit) and the water must be put to that use and not "let run to waste." However the beneficial end use does include a carriage right from the point of diversion to the point of use.[112] During such carriage there may be leakage, evaporation, and other loss of water.[113] Thus the quantity of water appropriated is going to reflect these losses as well as the actual amount applied to the end use.[114]

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[105] *See* Utah Code Ann. §§ 73-3b-101-402. (Groundwater Recharge and Recovery Act of 1991).

[106] Utah Code Ann. § 73b-3b-197.

[107] *See infra* Treatise § 13.04.

[108] Okla. Stat. tit. 27, § 7.6. *See* Missouri-Kansas-Texas R.R. v. Oklahoma, 712 P.2d 40 (Okla. 1985). At one time Montana had a similar statute. Former Mont. Rev. Code § 85-2-104 (repealed in 1985).

[109] Cal. Water Code § 13551.

[110] *Id.* §§ 13551, 13552.2, 13552.6, 13553.

[111] Nev. Rev. Stat. § 533.030(3)(a).

[112] *See generally infra* Treatise § 13.03. *But see infra* text accompanying notes 169-170, 214-220.

[113] *See generally infra* Treatise § 13.03.

[114] *See also infra* text accompanying notes 191-205, Treatise § 14.04(b) text accompanying notes 165-168 (duty of water).

Early on, the terminology relating to what is now the beneficial use concept was not settled. In 1859, the California Supreme Court referred to it as a "valuable use."[115] The Arizona Supreme Court, in 1888, referred to "a reasonable and necessary use."[116] The 1872 California Code referred to "some useful or beneficial purpose."[117] However, the concerns in implementing the limitation on use were with the possibility of vesting "an absolute monopoly in a single individual"[118] and with speculation which could prevent others in the community, who were ready, willing, and able to go ahead with a water use, from doing so.[119] This would be wasting the resource. Initially, the system relented on this proposition only with reference to the building of reservoirs to catch otherwise unusable seasonal flows and floodwaters. The greater waste was letting unused water run "to the sea."[120] Thus, the idea of use itself was perhaps even more important than the addition of a term like valuable, reasonable, necessary, or beneficial was. However, by the time North Dakota enacted its irrigation code in 1905, the language had become settled: "Beneficial use shall be the basis, the measure, and the limit of the right to use of water...."[121]

The anti-speculation, anti-monopoly concern with the situation where the claimant did not have a specific use in mind continues today,[122] but municipalities are allowed to acquire supplies for

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[115] McDonald & Blackburn v. Bear River & Auburn Water & Mining Co., 13 Cal. 220, 233 (1859).

[116] Clough v. Wing, 2 Ariz. 371, 17 P. 453, 455 (1888).

[117] Cal. Civ. Code § 1411 (1872).

[118] Clough v. Wing, 2 Ariz. 371, 17 P. 453, 455 (1888).

[119] For an excellent exposition of the basis for, and the weaknesses in, the beneficial use element, *see* Janet C. Neuman, *Beneficial Use, Waste, and Forfeiture: The Inefficient Search for Efficiency in Western Water Use,* 28 Envtl. L. 919 (1998). Professor Neuman identifies three purposes within the beneficial use doctrine: preventing speculation and monopoly; maximizing the use of a scarce resource; and flexibility for water users. *Id.* at 962-967. She then evaluates how successful the doctrine has been in relation to these purposes, *id.* at 968-978, and discusses its prospects for the 21st Century, *id.* at 978-995.

[120] *See* In re Metropolitan Utilities Dist. of Omaha, 179 Neb. 783, 140 N.W.2d 626, 637 (1966): "It is axiomatic that waters which flow beyond the points of use to the sea are lost and constitute a form of waste, which is against public policy." *See also* Peabody v. City of Vallejo, 2 Cal. 2d 351, 364, 40 P.2d 486, 490 (1935).

[121] 1905 N.D. Laws ch. 34, § 2. *Compare* with the Utah language quoted at the beginning of the section, *supra* text accompanying note 97.

[122] Colorado River Water Conserv. Dists. v. Vidler Tunnel Water Co., 197 Colo. 413, 594 P.2d 566, 569 (1979) (must have evidence that person is "committed to actual beneficial use of the water"); Rocky Mt. Power Co. v. Colorado River Water Conserv. Dist., 646 P.2d 383 (Colo. 1982) (must show "more than a speculative or conjectural future beneficial use"). *But see* Stephen F. Williams, *The Requirement of Beneficial Use as a Cause of Waste in Water Resource Development,* 23 Nat. Resources J. 7 (1983). In In the Matter of the Application for Water Rights, 891 P.2d

projected future use and, indeed, in many instances are required to, for long-term growth.[123]

Courts have found particular uses that have been questioned to be beneficial[124] and some to be nonbeneficial.[125] They have also

952 (Colo. 1995), the majority notes that while the Colorado "can and will" statute is a codification of the anti-speculation doctrine, "the statute goes beyond the anti-speculation doctrine of *Vidler* [594 P.2d 566] by adding the requirement that an applicant for a conditional water right decree must demonstrate that the water can and will be beneficially used." *Id.* at 961. In the context of this case, the majority asks how the applicant can do this if there is insufficient water for the project and answers that the applicant cannot do it. *See* Mark E. Hamilton, *The "Can and Will" Doctrine of Colorado Revised Statute Section 37-92-305(9)(b): Changing the Nature of Conditional Water Rights in Colorado,* 65 U. Colo. L. Rev. 947 (1994). *See also infra* Treatise § 14.04(d)(3) text accompanying notes 401-402. In In re Applications A-14137 & A-14138, 240 Neb. 117, 480 N.W.2d 709 (1992), the court held that original applications could be dismissed after 14 years when there still was no defined project.

123 More states are allowing municipalities and utilities to appropriate water for "reasonably anticipated future municipal, industrial or domestic needs... as determined in accordance with a master plan." Nev. Rev. Stat. § 533.030(3). *See also infra* Treatise § 14.04(b) text accompanying notes 176-177. In City of Thornton v. Bijou Irrigation Co., 926 P.2d 1 (Colo. 1996), the water court was satisfied as to the first step in the city's effort to establish the appropriation date, determining as adequate the city's overt acts to give notice and the elements of intent and anti-speculation, including meeting the Colorado "can and will" statute. This decision was affirmed by the Colorado Supreme Court; however, the Court also affirmed the water court's requirement of reality checks in the future to ascertain that indeed the volumetric determination made now is actually being used. Under the city's three-phase development plan (*id.* at 20-21), construction would begin on phase I in 2000 with delivery beginning in 2002 and increasing to a total of 33,200 a.f.y. by 2028. Phase II construction would begin in 2026 and delivery in 2029, increasing to a combined 56,900 a.f.y. Phase III construction would begin in 2034 with delivery in 2036, the project to ultimately deliver 67,000 a.f.y. According to the Colorado Supreme Court, having a reality check at a later point as to a volumetric determination is consistent with the special exception given to municipalities from the anti-speculation doctrine. Furthermore, in the reality checks the court can consider how the city has used its current water portfolio. *See infra* Treatise § 48.03(c)(3) for discussion of constitutionality in the interstate context.

124 *See, e.g.,* Cache La Poudre Reservoir Co. v. Windsor Reservoir & Canal Co., 25 Colo. 53, 52 P. 1104 (1898) (right to maintain reservoir upheld); Water-Supply & Storage Co. v. Larimer & Weld Irrig. Co., 24 Colo. 322, 51 P. 496 (1897) (storage for irrigation constituted valid appropriation); Fitzpatrick v. Montgomery, 20 Mont. 181, 50 P. 416 (1897) (prior mining use upheld against agriculture); Gallagher v. Basey, 1 Mont. 457 (1872), *aff'd,* 87 U.S. (20 Wall.) 670, 22 L. Ed. 452 (1875) (irrigation approved as beneficial use); Union Mill & Mining Co. v. Dangberg, 81 F. 73, 98 (D. Nev. 1897) (mining use upheld); Lobdell v. Hall, 3 Nev. 507 (1867) (turning water onto meadow to strand fish was valid appropriation); Neubert v. Yakima-Tieton Irrig. Dist., 117 Wash. 2d 232, 814 P.2d 199 (1991) (frost prevention to crops is beneficial use); In re Water Right Claim No. 1927-2, 524 N.W.2d 855, 858 (S.D. 1994) (maintenance of waterfowl habitat is beneficial use).

125 Tulare Irrig. Dist. v. Lindsay-Strathmore Irrig. Dist., 3 Cal. 2d 489, 45 P.2d

emphasized that beneficial use is an evolving concept.[126] In *Department of Parks v. Idaho Department of Water Administration*,[127] the Idaho Supreme Court held that the list in the Idaho Constitution[128] that included only domestic, agriculture, mining, manufacturing, and power uses was not exhaustive and that the legislature could declare that aesthetic and recreational values were beneficial uses of water as the legislature had done with Malad Canyon.[129]

An issue exists as to whether a use that is beneficial at the time of appropriation, but which would not be allowed as beneficial at a later time, if then applied for, can be terminated or otherwise limited because of this change of character in the use. The 1872 California Code provided that: "The appropriation must be for some useful or beneficial purpose, and when the appropriator or his successor in interest ceases to use it for such a purpose, the right ceases."[130] The Utah statute quoted above[131] and the many others like it are not that explicit. An argument could be made that because beneficial use is the measure and the limit of the right, once a use ceases to be a beneficial use, the right ceases, but courts generally have not found termination. Rather it appears that because prior appropriation water rights were early on viewed as property and as perpetual in nature, courts have been reluctant to accept reasoning that could terminate a current use simply on the basis that it is no longer a beneficial use. What courts seem to have required instead is that the user cease the original use before the right is treated as terminated. In effect this would mean that in reality the only two methods by which a water

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972 (1935) (flooding to exterminate rodents); Blaine Cty. Inv. Co. v. Mays, 49 Idaho 766, 291 P. 1055 (1930) (flooding to form ice for preservation of soil moisture); In re Water Rights of Deschutes River & Tributaries, 134 Or. 623, 286 P. 563, 294 P. 1049 (1930) (increased flow to carry off debris during irrigation season). In 1936, Montana was not clear about the benefits from a swimming pool or fish pond. Osnes Livestock Co. v. Warren, 103 Mont. 284, 62 P.2d 206 (1936). But Colorado earlier upheld the propagation of fish as a beneficial purpose. Faden v. Hubbell, 93 Colo. 358, 28 P.2d 247 (1933). *See also* Lake Shore Duck Club v. Lake View Duck Club, 50 Utah 76, 166 P. 309 (1917) (disapproval of water use to maintain game refuge on public lands); Robinson v. Schoenfield, 62 Utah 233, 218 P. 1041 (1923) (use of spring to water cattle where others used spring). These Utah cases, however, emphasize the idea of exclusiveness and the control element in a water right and not the beneficial use element. *See also supra* notes 65, 66.

126 *See* In re Water Right Claim No. 1927-2, 524 N.W.2d 855, 858 (S.D. 1994). In this case the South Dakota Supreme Court refused to follow Lake Shore Duck Club v. Lake View Duck Club, 50 Utah 76, 166 P. 309 (1917), noting that beneficial use is an evolving concept and then demonstrating that wildlife habitat maintenance is viewed today as a beneficial use of water.

127 96 Idaho 440, 530 P.2d 924 (1974).

128 Idaho Const. art. 15, § 3.

129 Idaho Code § 67-4307.

130 Cal. Civ. Code § 1411 (1872).

131 *See supra* text accompanying note 93.

WEST'S NEVADA REVISED STATUTES ANNOTATED
TITLE 48. WATER
CHAPTER 533. ADJUDICATION OF VESTED WATER RIGHTS; APPROPRIATION OF PUBLIC WATERS
APPROPRIATION OF PUBLIC WATERS
ENVIRONMENTAL PERMITS

533.437. "Environmental permit" defined

As used in NRS 533.437 to 533.4377, inclusive, unless the context otherwise requires, "environmental permit" means a temporary permit to appropriate water to avoid the pollution or contamination of a water source.

Added by Laws 1991, p. 757.

<General Materials (GM) - References, Annotations, or Tables>

N. R. S. 533.437

NV ST 533.437

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C

Supreme Court of Colorado,
En Banc.

PUEBLO WEST METROPOLITAN DISTRICT, City of Florence, and St. Charles Mesa Water Association, Appellants,
v.
SOUTHEASTERN COLORADO WATER CONSERVANCY DISTRICT, Appellee.

No. 82SA225.

Oct. 22, 1984.

Protestants appealed orders of summary judgment entered against them by the District Court, Water Division No. 2, John C. Statler, J., on their protest to the entry of partially absolute decrees for storage of water in a reservoir and a lake. The Supreme Court, Quinn, J., held that: (1) statute of limitations for water right determinations barred protestants' counterclaim which raised a substantive challenge to a 1976 partial absolute decree entered in favor of water conservancy district which made absolute the conditional storage decrees for a reservoir and a lake to the extent of beneficial use; (2) resume, which made reference to earlier conditional decrees, was sufficient to put interested persons on notice of the absolute water storage rights sought by water conservancy district as to a reservoir and lake; (3) conditional storage decrees adequately described their source as the western slope project water, the storage of which served as the basis upon which 1982 summary judgment for absolute storage decrees was founded; and (4) flood control is a "beneficial use" of waters so as to justify granting water conservancy district an absolute storage decree in a reservoir to the extent of river flood waters captured and stored there.

Affirmed.

West Headnotes

[1] Waters and Water Courses 152(11)
405k152(11) Most Cited Cases

Under statute of limitations for water right determinations, any substantive challenge to a judgment of a water right decree is barred unless filed within three years of entry of such judgment and decree and unless supported by a satisfactory showing of mistake, inadvertence, or excusable neglect. C.R.S. 37-92-304(10).

[2] Waters and Water Courses 152(11)
405k152(11) Most Cited Cases

Statute of limitations for water right determinations barred protestants' substantive challenge in 1981 to a 1976 partial absolute decree entered in favor of water conservancy district which made absolute the conditional storage decrees for a reservoir and lake to the extent of beneficial use. C.R.S. 37-92-304(10).

[3] Judgment 181(2)
228k181(2) Most Cited Cases

[3] Judgment 181(3)
228k181(3) Most Cited Cases

Because summary judgment is a drastic remedy, it may properly be entered only when there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. Rules Civ.Proc., Rule 56.

[4] Judgment 185(2)
228k185(2) Most Cited Cases

[4] Judgment 185(6)
228k185(6) Most Cited Cases

Burden of establishing the lack of any genuine factual issues is on party moving for summary judgment, but once this burden is met, the opposing party must then demonstrate that a controverted factual question exists; if the party opposing summary judgment fails to meet this burden, then the court may properly enter summary judgment on behalf of the moving party as long as the operative legal principles entitle it to such judgment. Rules Civ.Proc., Rule 56(e).

[5] Judgment 178
228k178 Most Cited Cases

Purpose of summary judgment remedy is to permit the parties to pierce the formal allegations of the pleadings and save the time and expense connected with the trial when, as a matter of law, based on undisputed facts, one party could not prevail. Rules Civ.Proc., Rule 56.

[6] Waters and Water Courses 133
405k133 Most Cited Cases

"Notice" of the water right sought consists of the resume, compiled from the filed applications with the

water clerk, from any persons seeking a determination of a water right. C.R.S. 37-92-302(1)(a), (2), (3)(a, c).

[7] **Waters and Water Courses** 133
405k133 Most Cited Cases

Resume, which made reference to earlier conditional decrees, was sufficient to put interested persons on notice of the absolute water storage rights sought by water conservancy district as to a lake and a reservoir. C.R.S. 37-92- 302(1)(a), (2), (3)(a, c).

[8] **Waters and Water Courses** 152(12)
405k152(12) Most Cited Cases

In action brought by protestants challenging partial absolute decrees for conditional water storage rights entered in favor of water conservancy district, protestants failed to show any injury from the allegedly defective notice that would accord them standing to raise on appeal any due process argument. U.S.C.A. Const.Amends. 5, 14; C.R.S.1963, 148-9-7; C.R.S. 37-92-304(9).

[9] **Waters and Water Courses** 152(11)
405k152(11) Most Cited Cases

As respects challenge to partial absolute decrees for conditional water storage rights entered in favor of water conservancy district, conditional storage decrees adequately and correctly described their source as the western slope project water, the storage of which served as the basis upon which summary judgment for absolute storage decrees was founded.

[10] **Waters and Water Courses** 144
405k144 Most Cited Cases

Flood control is a "beneficial use" of waters so as to justify granting water conservancy district an absolute storage decree in a reservoir to the extent of river flood waters captured and stored there. Const. Art. 16, ß 6; C.R.S. 37-92-101 to 37-92-602.

*596 Robert F.T. Krassa, P.C., Robert F.T. Krassa, Pueblo, for appellants.

Fairfield & Woods, Charles J. Beise, Howard Holme, Kevin B. Pratt, Denver, for appellee.

QUINN, Justice.

The protestants, Pueblo West Metropolitan District, City of Florence, and St. Charles Mesa Water Association ("protestants"), appeal [FN1] orders of summary judgment entered against them by the Division No. 2 water court on their protest to the entry of partially absolute decrees for storage of water in Pueblo Reservoir and Turquoise Lake. We affirm the judgment.

FN1. This court has direct appellate jurisdiction of water court adjudications. *See* Colo. Const. art. VI, ß 2(2), ß 13-4-102(1)(d), 6 C.R.S. (1973) and C.A.R. 1(a)(2).

I.

For many years the Arkansas River and its tributaries constituted the principal source of water for the Arkansas River Valley in southeastern Colorado. In order to supplement this flow of water the United States Congress in 1962 authorized the Fryingpan-Arkansas Project (Project), a major transmountain water diversion project. The Project functions by diverting water from the Colorado River Basin on Colorado's western slope, across the Continental Divide and into the Arkansas River Valley on Colorado's eastern slope. Water is diverted through the Boustead Tunnel, which crosses the Divide, into Lake Fork Creek, an Arkansas River tributary, and thence into Turquoise Lake, where it is stored until released downstream through a series of pipes and conduits into the Arkansas River and ultimately into Pueblo Reservoir. Southeastern, which administers the Project and is responsible for payment to the United States of the Project's reimbursable costs, holds several decrees for Project water. A brief summary of these decrees will help clarify the facts and issues before us.

Southeastern obtained its first decree for Project water in 1959 in Garfield County (hereafter, the "western slope decree"). [FN2] This decree was for diversion of western slope water through the Boustead Tunnel to Sugar Loaf Reservoir (now Turquoise Lake) and ultimately to Pueblo Reservoir, and provided, in relevant part, as follows:

FN2. This decree was entered by the Garfield County District Court on August 3, 1959, in Civil Action No. 4613.

The Fryingpan-Arkansas Divide Tunnel conveys waters from the West side of the Continental

> Divide to the East side of the Continental Divide, and has a capacity of 900 cubic feet of water per second of time where the waters are discharged into the watershed of the Arkansas River. The headgates of the collection system[s] and the collection systems themselves represent claims aggregating 4,010 cubic feet of water per second of time, but the limitation on the diversion is the capacity of the Fryingpan-Arkansas Divide Tunnel of 900 cubic feet of water per second of time.
> Waters diverted by said tunnel will be conveyed to and stored in Sugar Loaf Reservoir [now Turquoise Lake] and thence to Twin Lakes Reservoir, both thereof being in Lake County, and said reservoirs are existing reservoirs which will be enlarged. Thereafter, said waters will be conveyed by power canals and conduits to power generating facilities at various points along the Arkansas ***597** River terminating in the Pueblo Reservoir in Pueblo County.

In 1962 and 1969, Southeastern obtained conditional storage decrees for Pueblo Reservoir and Turquoise Lake respectively (hereafter, the "conditional storage decrees"). These decrees were issued by the district courts of Pueblo and Chaffee counties, both of which are on the eastern slope of the Continental Divide. [FN3] The two decrees each contain provisions regarding their respective sources of water. The 1962 decree for Pueblo Reservoir provides that its source of water is "the Arkansas River and drainage tributary thereto above the dam which creates the [Pueblo] Reservoir." Similarly, the 1969 decree for Turquoise Lake provides that its source of water is "Lake Fork of the Arkansas River and drainage tributary thereto above the dam which creates the [Turquoise Lake] Reservoir." Both conditional storage decrees also contain "exchange provisions" which, again, are very similar. The exchange provision in the 1962 conditional storage decree for Pueblo Reservoir states:

> FN3. The 1962 decree was entered by the Pueblo County District Court on June 25, 1962, in Case No. 8757, and the 1969 decree by the Chaffee County District Court on July 19, 1969, in Civil Action No. 5141.

> In addition to the priority hereinabove described, there is hereby decreed to the Pueblo Reservoir the right under priority of February 10, 1939, to take and store the waters of the Arkansas River so located as to be physically controllable by said Pueblo Reservoir in substitution for waters from the Colorado River tributaries decreed for storage in said Pueblo Reservoir and introduced into said Arkansas River.

Similarly, the 1969 decree for conditional storage rights for Turquoise Lake states:

> In addition to the priority hereinabove described, there is hereby decreed to [Turquoise Lake] the right under priority of February 10, 1939, to take and store the waters from the Arkansas River so located as to be physically controllable by said [Turquoise Lake] in substitution for waters from the Colorado River tributaries and decreed for storage in said [Turquoise Lake] and introduced into said Arkansas River.

In 1976, Southeastern filed an application to make absolute, to the extent of beneficial use, the conditional storage decrees of 1962 and 1969. Southeastern's application incorporated an attached "summary of activities," which stated in part:

> Initial storage in ... Turquoise Lake started April 15, 1968.... The maximum storage in the enlarged Turquoise Lake to date has been 104,927 acre-feet, which occurred on July 26, 1973....
>
> * * *
>
> Boustead Tunnel ... was completed in October 1971 .... Total diversions have been 32,070 acre-feet in 1972, 36,580 acre-feet in 1973, 33,830 acre-feet in 1974 and 37,060 acre-feet in 1975.
>
> * * *
>
> ... Initial storage in [Pueblo] reservoir started January 9, 1974, and as of February 1, 1976, the total storage in the reservoir was 62,529 acre-feet .... Of the total storage of 62,529 acre-feet about 40,522 acre-feet was Project water and about 22,007 acre-feet was winter water ....

Southeastern alleged beneficial use to the extent of 62,529 acre feet in Pueblo Reservoir and 104,927 acre feet in Turquoise Lake. Pursuant to statutory procedure, [FN4] the water court included Southeastern's application in a resume, which was published in various newspapers of general circulation. The resume identified the conditional decrees by their names and case numbers and stated:

> FN4. § 37-92-302, 15 C.R.S. (1973 & 1983 Supp.).

> Applicant requests the entry of a final decree for the features hereinafter described ... to the extent the same have been used.
> Pueblo Reservoir--62,529 acre-feet.

***598** Turquoise Reservoir (Sugar Loaf)--104,927 acre-feet.

In support of the application, there was attached a summary of activities of the United States Bureau of Reclamation, together with a statement showing the amount of money expended pursuant to said conditional decrees. (Said documents consist of five pages and may be examined at the office of the Clerk for Water Division No. 2[.])

Southeastern's application was subsequently granted on August 19, 1976. [FN5]

FN5. The 1976 partial absolute decree was entered by the District Court for Water Division No. 2, Pueblo, Colorado, on October 1, 1976, in Case No. W-28 (76).

In January 1980, Southeastern made application in the water court for Water Division No. 2 for a change of water right by adding three new beneficial uses--flood control, recreation, and wildlife conservation--to the uses originally set forth in the 1962 and 1969 conditional storage decrees for Pueblo Reservoir and Turquoise Lake. Southeastern's application was granted on October 23, 1980. [FN6]

FN6. The decree was entered by the District Court for Water Division No. 2, Pueblo, Colorado, on October 23, 1980 in Case No. 80CW6.

Finally, on August 27, 1980, Southeastern applied for additional partial absolute decrees for the conditional storage rights originally granted in 1962 and 1969, as modified by the 1980 change in water right decree. Southeastern's application referred to the 1962 and 1969 conditional storage decrees by name and case number. The application also named as sources of water for the requested absolute rights: "[w]ater diverted under the District's west-slope decrees"; "Sugar Loaf Reservoir [Turquoise Lake]--Lake Fork of Arkansas River"; and "Pueblo Reservoir--Arkansas River." Southeastern's request for additional partial absolute decrees, combined with the 1976 partial absolute decrees, totaled 104,025 acre feet for Pueblo Reservoir and 127,167 acre feet for Turquoise Lake. The protestants entered an appearance in this action but did not file a statement of opposition. In its ruling of June 26, 1981, the referee found that:

[n]o storage has occurred in Pueblo Reservoir under the Southeastern Colorado Water Conservancy District east slope conditional storage decrees, except for 5,645 acre-feet of flood storage, and that of the water stored, 68,617 acre- feet was water diverted under the Southeastern Colorado Water Conservancy District west slope decrees.

With respect to Turquoise Lake, the referee found that:

no storage has occurred in Turquoise Lake under the District's east slope conditional storage decrees, and that of the waters stored, 82,718 acre-feet was water diverted under the Southeastern Colorado Water Conservancy District's west slope decrees.

The water referee made absolute the Pueblo Reservoir decree to the extent of 41,496 acre feet beyond the 62,529 acre feet already absolutely decreed in 1976, for a total of 104,025 acre feet, which was the amount requested by Southeastern. The water referee's absolute decree for Pueblo Reservoir included 5,645 acre feet of flood storage. With regard to Turquoise Lake, the referee made absolute the conditional storage decree to the extent of 22,240 acre feet beyond the 104,927 acre feet absolutely decreed in 1976, for a total of 127,167 acre feet, again the amount requested by Southeastern.

Protestants on July 15, 1981, filed identical protests to the referee's rulings, arguing that the water court should deny Southeastern's application for partially absolute decrees. Protestants asserted that, with the exception of 5,645 acre feet of flood storage in Pueblo Reservoir, the only water stored by Southeastern in the two reservoirs was water diverted from the Colorado River under its 1959 western slope decree rather than water originating in the Arkansas River and its tributaries--the source named in Southeastern's applications for conditional storage decrees for Turquoise ***599** Lake and Pueblo Reservoir. The protestants also argued that the 5,645 acre feet of flood storage could not be used as a basis for an absolute decree, since those flood waters were not put to "beneficial use" by Southeastern. The protestants also filed a counterclaim seeking to invalidate the absolute decree entered in 1976. They again argued that the water stored in Pueblo Reservoir and Turquoise Lake was water from the Colorado River diverted under Southeastern's 1959 western slope decree, and that Southeastern had thereby obtained an absolute right on the basis of water that came from a source other than that described in the notice accompanying the original conditional decrees of 1962 and 1969. According to protestants, this infirmity deprived the water court of

jurisdiction to enter the partial absolute decree in favor of Southeastern in 1976.

Southeastern filed a motion for summary judgment of dismissal with regard to protestants' counterclaim, arguing that the 1976 decree which made absolute the conditional storage decrees for Pueblo Reservoir and Turquoise Lake to the extent of beneficial use was *res judicata,* and that the protestants were barred by the three-year statute of limitations, section 37-92-304(10), 15 C.R.S. (1973). The water court on February 1, 1982, granted Southeastern's motion and dismissed protestants' counterclaim. Southeastern also filed a motion for summary judgment as to the remainder of the protest, contending, *inter alia,* that the language of the 1962 Pueblo Reservoir and 1969 Turquoise Lake conditional storage decrees was broad enough to include storage of western slope water in the two eastern slope reservoirs, and that flood control was a beneficial use sufficient to warrant the entry of an absolute decree to the extent of that use. The water court found that there was no genuine issue as to any material fact and entered summary judgment on April 16, 1982, in favor of Southeastern.

On appeal, the protestants initially claim that Southeastern's summary judgment motions were improvidently granted because a genuine issue of material fact exists, namely, whether the resumes prepared from Southeastern's applications for absolute decrees in the 1976 and 1980 proceedings gave adequate notice to interested persons of the nature of the water right sought. [FN7] Secondly, the protestants argue that entry of summary judgment in favor of Southeastern was improper since the discrepancy between the ultimate source of the water in the two reservoirs (the Colorado River) and the sources listed in the 1962 and 1969 conditional storage decrees (the Arkansas River and its tributaries) precludes the entry of a decree for an absolute water right as a matter of law. Finally, the protestants argue that flood control is not a "beneficial use" of water sufficient to warrant the entry of an absolute decree to the extent of that use. Before addressing these issues we first consider a threshold matter raised by Southeastern relating to ***600** the protestants' counterclaim in which they sought to void the 1976 partial absolute decree.

FN7. Protestants also assert that a genuine issue of material fact exists regarding the source of the water in Pueblo Reservoir and Turquoise Lake. As we discuss in Part IV, this assertion is based on their interpretation of the term "source" as used in the statute setting forth the requirements for an application to determine water rights. Simply put, protestants argue that Southeastern's absolute rights must be based on the same sources as its conditional rights; that the 1962 and 1969 conditional decrees name the Arkansas River and its tributaries as the sources of water in Pueblo Reservoir and Turquoise Lake, and Southeastern, therefore, must assert in its application for a partial absolute decree that the Arkansas and its tributaries are the sources of water for the two reservoirs; and that since the referee found that the Colorado River is the source of the water stored in the two reservoirs, a genuine issue of material fact exists precluding the entry of summary judgment in favor of Southeastern.
This argument is utterly devoid of merit. Southeastern has never contested the referee's finding that the water stored in Pueblo Reservoir and Turquoise Lake came from the Colorado River; indeed, contrary to protestant's assertion, Southeastern's 1980 application for a partial absolute storage decree specifically lists water diverted under its west slope decree as a source of water. The real core of protestants' argument is that the water court erred *as a matter of law* in entering summary judgment in favor of Southeastern. We address this argument in Part IV of the opinion.

II.

Southeastern argues that the protestants' challenge by way of counterclaim to the 1976 partial absolute decree is barred by *res judicata* and the statute of limitations and, also, that a counterclaim is not procedurally permitted under the applicable provisions of the Water Right Determination and Administration Act of 1969, ß ß 37-92-301 to -602, 15 C.R.S. (1973 & 1983 Supp.). Because we agree that the applicable statute of limitations bars the protestants' counterclaim, we need not consider whether a counterclaim is a permissible form of pleading in water court proceedings.

Section 37-92-304(10), 15 C.R.S. (1973), contains the statute of limitations for water right determinations. It provides:

> Clerical mistakes in said judgment and decree may be corrected by the water judge on his own initiative or on the petition of any person, and

> substantive errors therein may be corrected by the water judge on the petition of any person whose rights have been adversely affected thereby and a showing satisfactory to the water judge that such person, due to mistake, inadvertence, or excusable neglect, failed to file a protest with the water clerk within the time specified in this section. Any petition referred to in the preceding sentence shall be filed with the water clerk within three years after the date of the entry of said judgment and decree. The water judge may order such notice of any such correction proceedings as he determines to be appropriate. Any order of the water judge making such corrections shall be subject to appellate review as in other civil actions.

[1][2] Under this statute any substantive challenge to a judgment of a water right decree is barred unless filed within three years of entry of such judgment and decree and unless supported by a satisfactory showing of mistake, inadvertence, or excusable neglect. *Bubb v. Christensen*, 200 Colo. 21, 610 P.2d 1343 (1980). The protestants' counterclaim, which was filed on July 15, 1981, raises a substantive challenge to the 1976 partial absolute decree entered in favor of Southeastern and is clearly beyond the three-year statutory period of limitations. Thus, even if the protestants had made the requisite showing of mistake, inadvertence, or excusable neglect, which they did not, the counterclaim would still be untimely. To rule otherwise would frustrate thepolicies behind the statute of limitations. These policies include according certainty to adjudicated water rights and conserving scarce societal and judicial resources by requiring all parties adversely affected by a claim of a water right to assert opposition to the claim in a single proceeding.

III.

We turn to the protestants' first challenge to the April 16, 1982, summary judgment order for partial absolute decrees for conditional storage rights entered in favor of Southeastern. In support of their claim that there exists a genuine issue of material fact which precludes the entry of summary judgment, protestants assert that a factual question exists as to whether Southeastern gave adequate notice to interested persons of those water rights which it sought to make absolute in its 1980 application for partial absolute storage decrees.

[3][4][5] In resolving this issue we must be cognizant of the long- standing principles relating to summary judgments. Because summary judgment is a drastic remedy, it may properly be entered only when there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. C.R.C.P. 56; *Bailey v. Clausen*, 192 Colo. 297, 557 P.2d 1207 (1976); *O.C. Kinney, Inc. v. Paul Hardeman, Inc.*, 151 Colo. 571, 379 P.2d 628 (1963). The burden of establishing the lack of any genuine factual issue is on the moving party, but once this burden is met, the opposing party must then demonstrate that a controverted factual question exists. ***601** C.R.C.P. 56(e); *Ginter, Jr. v. Palmer & Co.*, 196 Colo. 203, 585 P.2d 583 (1978); *Meyer v. Schwartz*, 638 P.2d 821 (Colo.App.1981). If the party opposing summary judgment fails to meet this burden, then the court may properly enter summary judgment on behalf of the moving party as long as the operative legal principles entitle it to such judgment. *O.C. Kinney, Inc.*, 151 Colo. 571, 379 P.2d 628; *Bailey*, 192 Colo. 297, 557 P.2d 1207. The purpose of the summary judgment remedy, after all, is "to permit the parties to pierce the formal allegations of the pleadings and save the time and expense connected with a trial when, as a matter of law, based on undisputed facts, one party could not prevail." *Ginter, Jr.*, 196 Colo. 203, 585 P.2d 583; *see also Abrahamsen v. Mountain States Tele. & Tele. Co.*, 177 Colo. 422, 494 P.2d 1287 (1972); *Kinney*, 151 Colo. 571, 379 P.2d 628. It is in light of these guidelines that we must evaluate the protestants' claim.

[6] Any person seeking a determination of a water right must file an application with the water clerk setting forth, *inter alia,* facts supporting the ruling sought, as well as a "legal description of the diversion or proposed diversion, a description of the source of the water, the date of the initiation of the appropriation or proposed appropriation, the amount of water claimed, and the use or proposed use of the water." § 37-92-302(1)(a) and (2), 15 C.R.S. (1973). The water clerk thereafterprepares a monthly resume of applications, noting the "name and address of the applicant, a description of the water right or conditional water right involved, and a description of the ruling sought." § 37-92-302(3)(a), 15 C.R.S. (1973). This resume must be published in local newspapers of general circulation and mailed to any person "the referee has reason to believe would be affected or who has requested the same by submitting his name and address to the water clerk." § 37-92-302(3)(c), 15 C.R.S. (1973). It is this resume, compiled from the filed applications, which constitutes "notice" of the water right sought. *Stonewall Estates v. C.F. & I. Steel Corp.*, 197 Colo. 255, 592 P.2d 1318 (1979).

[7] Contrary to the protestants' assertion, there is no

"notice" problem with Southeastern's 1980 application, since both the application and resume indicated that it was the 1962 conditional storage decree for Pueblo Reservoir and the 1969 conditional storage decree for Turquoise Lake which Southeastern was seeking to make partially absolute. [FN8] As we later discuss in Part IV, *infra,* because the language of those conditional decrees was broad enough to encompass storage of western slope water in exchange for eastern slope water, the resume, which made reference to those decrees, was sufficient to put interested persons on notice of the absolute storage rights sought by Southeastern as to Turquoise Lake and Pueblo Reservoir. Accordingly, we hold that the protestants have not met their burden of establishing that a genuine issue of material fact exists on the notice issue.

FN8. Although the record does not contain copies of the published resumes from the 1980 case, the referee found that the "Water Clerk caused publication of the application as provided by statute," and the protestants have not contended that the published resumes did not make adequate reference to the two conditional decrees.

[8] We are not persuaded otherwise by *Stonewall Estates,* 197 Colo. 255, 592 P.2d 1318, relied upon by the protestants. *Stonewall Estates* involved an application for underground water rights. Although the caption of the application noted that the waters involved were nontributary, the application did not so indicate. The water clerk, in preparing and publishing the resume of the application, also did not indicate the nontributary character of the water. In holding that the partially absolute decree entered pursuant to the application and resume was void, the court said:

> The published resume constitutes notice of a claim. Thus, our situation in Colorado is such that a holder of a decreed priority in an affected area can assume (absent actual notice or a statement ***602** otherwise in the resume) that a claim to water is for tributary water. The resume here, not advising that nontributary water was involved, suffered from such a defect that it was a nullity.

197 Colo. at 258-59, 592 P.2d at 1320. *Stonewall Estates* involved a serious omission of material information from the application and resume, whereas in the instant case neither the application nor the resume prepared from it was in any way misleading as to the nature of the conditional water storage rights sought to be made absolute. The protestants' reliance on *Stonewall Estates* is obviously misplaced. [FN9]

FN9. Protestants also argue that the publication method of providing notice, which was enacted in 1969, violates due process. Prior to the 1969 Act, ß 148-9-7, 7 C.R.S. 1963, required notification by registered mail. Protestants assert that there "may" be owners of water rights who received notice by mail of the 1962 and 1969 conditional storage decrees who did not receive notice of the 1976 or 1980 applications for partial absolute decrees. We decline to address the protestants' argument for two reasons. First, they do not claim, nor is there any indication, that they did not receive actual notice of the 1976 proceeding, and it is clear that they did receive actual notice of the 1980 proceeding. Thus, the protestants have failed to show any injury from the allegedly defective notice that would accord them standing to raise on appeal the due process argument. *Miller v. Reeder,* 157 Colo. 134, 401 P.2d 604 (1965). Second, protestants failed to challenge the validity of the statutory publication notice in the water court, and they may not now attempt to raise it here. *See* ß 37-92-304(9), 15 C.R.S. (1973).

IV.

We next consider protestants' argument that, even if there were no genuine issues of material fact, the water court erred in entering summary judgment in favor of Southeastern as a matter of law. In support of this argument they rely on section 37-92-302(2), 15 C.R.S. (1983 Supp.), which provides, *inter alia,* that "in the case of applications for a determination of a water right ... the forms shall require, among other things, ... *a description of the source of the water* ..." (emphasis added). Protestants interpret the word "source" as used in the statute or in a decree of a water right to refer to the water's point of origin or original source, as opposed to its point of procurement or immediate source.

The 1962 conditional storage decree for Pueblo Reservoir states that its source of water is "the Arkansas River and drainage tributary thereto above the dam which creates the [Pueblo] Reservoir." The 1969 conditional storage decree for Turquoise Lake

states that its source is "Lake Fork of the Arkansas River and drainage tributary thereto above the dam which creates the [Turquoise Lake] Reservoir." Based on these descriptions and their interpretation of "source," the protestants conclude that Southeastern's absolute right to store water in the two reservoirs was improperly granted because the referee found that the stored water's point of origin was the Colorado River, rather than the Arkansas River and its tributaries, as named in the conditional decrees.

[9] We need not decide whether the word "source" means "point of origin" or "point of procurement" in this context, since even assuming the protestants' interpretation is correct, their claim must fail. Although both the 1962 Pueblo Reservoir conditional storage decree and the 1969 Turquoise Lake conditional storage decree mention as their "source" of water the Arkansas River and its various tributaries, the protestants' focus on these descriptions is too narrow. The decrees must be read in their entirety. Both decrees contain "exchange" provisions that are broad enough to encompass the western slope water stored in the two reservoirs. The 1962 Pueblo Reservoir conditional storage decree grants to Southeastern the right to "*take and store the waters of the Arkansas River* so located as to be physically controllable by said Pueblo Reservoir *in substitution for waters from the Colorado River* tributary decreed for storage in said Pueblo Reservoir and introduced into said Arkansas River" (emphasis added). It is clear that this substitution language encompasses the Project water at issue here, which, pursuant to Southeastern's 1959 western slope direct flow decree, passed ***603** through the Boustead Tunnel into an Arkansas tributary and ultimately into Pueblo Reservoir. Similarly, west slope Project water, which passed through the Boustead Tunnel and into Turquoise Lake, was encompassed by a virtually identical exchange provision in the Turquoise Lake decree. We conclude that the conditional storage decrees adequately and correctly describe as their sources the western slope Project water, the storage of which served as the basis upon which the 1982 summary judgment for absolute storage decrees was founded.

V.

[10] The final issue is whether flood control is a "beneficial use" of water so as to justify the referee in granting Southeastern an absolute storage decree in Pueblo Reservoir to the extent of the 5,645 acre feet of Arkansas River flood waters captured and stored in that reservoir. We conclude that flood control does constitute a beneficial use.

Article XVI, section 6 of the Colorado Constitution provides that "[t]he right to divert the unappropriated waters of any natural stream to *beneficial uses* shall never be denied" (emphasis added). The Water Right Determination and Administration Act of 1969 (Act), ß ß 37-92-101 to -602, 15 C.R.S. (1973 & 1983 Supp.), provides the statutory framework for implementing the constitutional right to divert the unappropriated waters of natural streams to beneficial uses. Under the Act, "beneficial use" is defined as "the use of that amount of water that is reasonable and appropriate under reasonably efficient practices *to accomplish without waste the purpose for which the appropriation is lawfully made* ..." ß 37-92-103(4), 15 C.R.S. (1973) (emphasis added).

This court has recognized that the capture and storage of flood waters may be a "beneficial use" underlying an appropriation of water. *See R.J.A., Inc. v. Water Users Association of District No. 6,* --- Colo. ---, --- P.2d ---- No. 83SA25, slip op. n. 7 (Colo. Sept. 10, 1984); *Southeastern Colorado Water Conservancy District v. Shelton Farms,* 187 Colo. 181, 529 P.2d 1321 (1974). Furthermore, we note that the Conservancy Law of Colorado specifically provides that conservancy districts may be established for the purpose of preventing floods, and, in order to effectuate that purpose, provides that conservancy districts may acquire, own, lease, use, sell, and hold water rights. ß ß 37- 2-101, 37-3-103(1)(h), 15 C.R.S. (1973). The legislature, we believe, would not have granted conservancy districts the right to acquire a water right for the purpose of preventing floods unless it considered flood prevention a beneficial use of water. We therefore conclude that the referee properly entered an absolute storage decree for Pueblo Reservoir to the extent of the 5,645 acre feet of flood waters stored there.

The judgment of the water court is affirmed.

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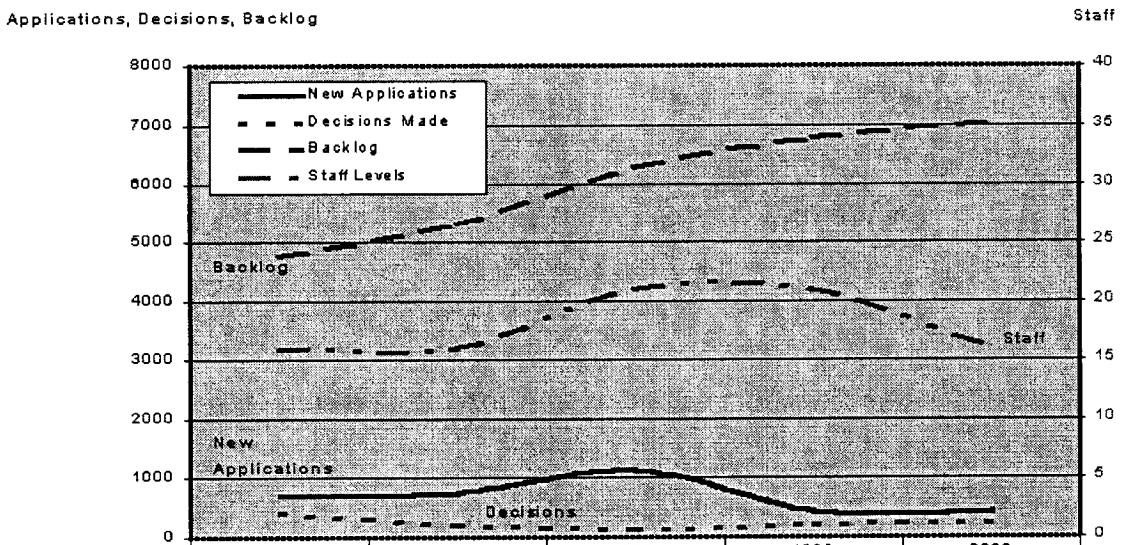
Water Right Permitting Trends
2001 Series



	1996	1997	1998	1999	2000
New Applications	690	750	1150	450	440
Decisions Made	410	200	140	200	240
Backlog	4760	5320	6300	6790	7040
Staff Levels	16	16	21	21	16

Notes:

- NEW APPLICATIONS include applications for new water rights and changes to existing water rights, on a calendar year basis.
- DECISIONS MADE include permits issued for new water rights and changes, on a calendar year basis. Rejected and withdrawn applications and changes for which no report of examination was issued are not counted.
- BACKLOG includes all pending applications for new water rights and changes at the end of the calendar year.
- STAFF LEVELS indicates the full time equivalents working on processing applications and changes. Staff Level data is on a fiscal year (July to June) basis.

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ORIGINAL

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, and THE PORT OF SEATTLE, Respondents.	PCHB No. 01-160 CERTIFICATE OF SERVICE

I hereby certify that I have on this 14th day of January, 2002, served a copy of:

1. **Port of Seattle's Memorandum in Opposition to ACC's Motion for Summary Judgment Regarding the Absence of a Water Right for Third Runway § 401 Certification; and**
2. **Certificate of Service**

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I declare under penalty of perjury under the laws of the State of Washington that the above is true and correct. Executed at Olympia, Washington, this 14th day of January 2002.

Julie A. Bunting

AR 005301

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