UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

INVESTIGATION REPORT NOS. 50-324/80-44 and 50-325/80-46

SUBJECT: Carolina Power and Light Company
Brunswick Steam Electric Plant
Southport, North Carolina

Possible Failure to Report Unmonitored and Uncontrolled Radioactivity Releases

DATES OF INVESTIGATION: November 16, 1980 - May 8, 1981

INVESTIGATORS: Carl E. Alderson for R. J. Marsh, Regional Investigator, Enforcement and Investigation Staff — 8/28/81 Date

John M. Puckett — 9/8/81 Date
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Facilities Radiation Protection Section

REVIEWED BY: Carl E. Alderson — 9/9/81 Date
Carl E. Alderson, Director
Enforcement and Investigation Staff

SECTION I

SUMMARY OF INVESTIGATION

CAROLINA POWER AND LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT

NOVEMBER 16, 1980 - MAY 8, 1981

A. INTRODUCTION

On March 26, 1980, Carolina Power and Light Company (CP&L) representatives notified Region II that an atmospheric release of radioactive material had occurred at the Brunswick Steam Electric Plant (BSEP) on February 22, 1980. The source of the release was identified as leaking tubes in Auxiliary Boiler No. 1. A special inspection was conducted March 29 - April 3, 1980, and the licensee was cited for five violations of NRC requirements as documented in IE Report No. 50-325/80-12 and 50-324/80-11. As a result of the violations cited a $24,000 civil penalty was assessed to CP&L on June 13, 1980.

Questions subsequently arose as to: (1) whether or not BSEP operations personnel had deliberately continued the release on February 22, 1980, as an operational expedient; and (2) the extent of the Plant Manager's knowledge on that date of the release. An NRC investigation, conducted June 2-6, 1980, and documented in IE Report No. 50-325/80-26 and 50-324/80-23, failed to disclose any violations of NRC requirements beyond those referenced above.

In October 1980, Region II inspectors performing a routine inspection of the BSEP quality assurance program identified licensee documents which indicated that additional releases had occurred from the auxiliary boilers. Subsequent conversations between those inspectors and the NRC personnel who had participated in the earlier inspection and investigation of the February 22 release disclosed that the NRC had not previously known about the additional releases.

A special inspection was initiated on November 16, 1980, to obtain additional information regarding the potential releases identified in licensee documents. Based on preliminary information obtained during November 16-18, 1980, it was determined that an investigation should be conducted under the authority provided by Section 161.c of the Atomic Energy Act of 1954, as amended.

B. SCOPE OF INVESTIGATION

On November 18, 1980, the special inspection then in progress was expanded into an investigation to determine the facts and circumstances surrounding the "potential" releases identified in the licensee's internal documentation, the licensee's internal handling of the matter, and the failure to inform the NRC of the additional releases.

Information obtained during the investigation identified additional areas of concern to the NRC and the scope of the investigation was expanded to include: the licensee's handling of radioactive contamination of the Storm Drain Collector Basin and Stabilization Pond, flooding of pipe tunnels, and operability of effluent radiation monitoring equipment.

During the course of the investigation the investigators conducted interviews and held discussions with numerous Carolina Power and Light Company (CP&L) employees including both corporate office and Brunswick site personnel. A total of 20 individuals were interviewed under oath and in the presence of a court reporter on the basis that they were identified by other interviewees as having first-hand knowledge of the matters under investigation. In addition, the investigation included a review of appropriate regulatory requirements, NRC records, and licensee programs, procedures and records including:

- Title 10 Code of Federal Regulations
- Brunswick Technical Specifications
- Various correspondence between CP&L and the NRC including inspection and investigation reports
- Various licensee procedures
- Various records required to be retained by the licensee including QA audit reports, station logbooks, recorder charts, and radiation survey data.

The investigation also included direct observation by the investigators of plant equipment and areas.

C. FINDINGS AND CONCLUSIONS

During the course of the investigation the investigators identified five violations of NRC requirements as follows:

- Failure to perform evaluations required by 10 CFR 20.201(b) to ensure compliance with 10 CFR 20.206(a) as discussed in Paragraph II.B.3 of this report.

- Failure to monitor gaseous releases of radioactivity to the environment as required by Brunswick Technical Specification (BTS) 3.5.2.b as discussed in Paragraph II.C.2 of this report.

- Failure to continuously monitor and record radioactive liquid waste releases as required by BTS 3.5.1.d as discussed in Paragraph II.C.1 of this report.

- Failure to notify NRC Operations Center of uncontrolled release as required by 10 CFR 50.72 as discussed in Paragraph II.B.3 of this report.

- Failure to include information required by BTS 5.4.1.1 in SemiAnnual Environmental Report as discussed in Paragraphs II.B.4 and II.C.1 of this report.

In addition to these violations, one Unresolved Item was identified which will require further NRC inspection and/or evaluation.

- Isokinetic Grab Samples: The licensee's ability or inability to obtain the required isokinetic samples will be reviewed during future inspections as discussed in Paragraph II.C.2 of this report.

The investigation did not disclose information which would support a conclusion that information was deliberately withheld from the NRC by Carolina Power and Light representatives; however, it is concluded that the licensee's management controls for radiological and environmental protection were inadequate. Specifically, it is concluded that: (1) the licensee's mechanisms for identifying, evaluating and resolving differing professional opinions were inadequate; (2) communications between the Plant General Manager and the Plant Nuclear Safety Committee were inadequate; and (3) the licensee has not adequately evaluated operational conditions related to radiological and environmental protection in a timely manner.

D. MEETINGS WITH THE LICENSEE

The investigators met with the Plant General Manager on November 17. 1980, and informed him that an inspection was being conducted to obtain more information regarding the potential radioactive releases identified in the Operations Quality Assurance Surveillance Report, OQAS-80-6(B). Subsequently, the Plant General Manager was informed on November 18, 1980, that based on the preliminary information obtained, the inspection was being expanded into an investigation into the licensee's handling of that surveillance report and other issues.

An enforcement conference was conducted in the Region II office on March 30, 1981. Senior licensee management in attendance included the Vice President, Power Systems; the Vice President, Nuclear Operations and the Brunswick Plant General Manager. A complete listing of attendees is documented in IE Report No. 50-325/81-07 and 50-324/81-07. NRC representatives summarized the issues and concerns raised by the investigation of off-site releases from the auxiliary boilers and the environmental effluents monitoring and control program at Brunswick. The preliminary findings were also presented. The licensee representatives acknowledged their understanding of the general concerns, but felt additional information bearing on the issues discussed was available and requested a followup meeting to allow them to respond to specific issues.

The requested followup meeting was held in the Region II office on May 8, 1981. That meeting was documented in a letter from Region II to CP&L dated May 21, 1981. Licensee representatives provided additional information regarding specific issues raised by the NRC in the March 30, 1981, enforcement conference. Where appropriate, the additional information has been considered in the preparation of this report. Senior licensee representatives also described organizational changes and staffing level increases that had been effected to improve management control of their radiation and environmental protection program.

SECTION II

DETAILS OF INVESTIGATION

CAROLINA POWER AND LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT

NOVEMBER 16, 1980 - MAY 8, 1981

A. PERSONNEL CONTACTED

Carolina Power and Light Company - Corporate Offices

W. J. Dorman, Project Quality Assurance Specialist-Operations
D. H. Edwards, Senior Generation Specialist
T. Elleman, Vice President, Nuclear Safety and Research
B. J. Furr, Vice President, Nuclear Operations
M. Johnson, Manager, Operations Quality Assurance
B. Mayton, Director, Corporate Health Physics
A. M. McCauley, Project Engineer, Nuclear Safety Section
R. Sherin, Senior Environmental Specialist
G. Warriner, Project Specialist-Environmental
B. H. Webster, Manager, Environmental and Radiation Control
G. Oliver, Manager, Environmental and Radiation Control
John H. O'Neill, Jr., Shaw, Pittman, Potts, and Trowbridge (Counsel for CP&L)
C. H. Moseley, Jr., Manager, Shearon Harris Visitors Center (Tech Advisor for Counsel)

Carolina Power and Light Company - Brunswick Steam Electric Plant

J. Cook, Foreman, Radiation Control Test Group
C. Hooft, Maintenance Mechanic
B. Hudson, Maintenance Engineer
J. A. Kaham, Radiation Control
J. L. Kiser, Radiation Control Engineer
J. A. Padgett, Director, Nuclear Safety and Quality Assurance
R. Pasteur, Foreman, Chemistry
R. M. Poulk, Regulatory Specialist
A. C. Tollison, Jr., General Manager
L. Tripp, Supervisor, Radiation Control
W. M. Tucker, Manager, Technical and Administrative

U.S. Nuclear Regulatory Commission

J. E. Outzs, Resident Inspector
D. Johnson, Resident Inspector
A. Belisle, Inspector
W. Ruhlman, Inspector

B. AUXILIARY BOILER SYSTEM RELEASES

1. Background

On March 26, 1980, Region II was notified by Carolina Power and Light Company (CP&L) representatives that an atmospheric release of radioactive material had occurred at the Brunswick Steam Electric Plant (BSEP) on February 22, 1980, due to tube leaks in Auxiliary Boiler No. 1. An unannounced inspection was conducted during the period March 29 - April 3, 1980. The results of that inspection were documented in IE Report No. 50-325/80-12 and 50-324/80-11. The inspection disclosed the following noncompliances with NRC requirements:

- Operation of the Auxiliary Boiler system in a contaminated status without having performed a safety evaluation as required by 10 CFR 50.59.

- Failure of the Plant Nuclear Safety Committee to evaluate an item of potential safety significance (operation of Auxiliary Boiler System in a contaminated status) as required by Technical Specification 6.5.1.6.G.

- Failure to follow procedures as required by Technical Specification 6.8.1 in that surveys were not initiated to determine the magnitude of the release which subsequent calculations indicated would have required declaring a "site emergency" with notification to both the NRC and the State of North Carolina.

- Exceeding the instantaneous release rate limit established by Technical Specification 2.5.2 for Iodine-131 and certain other radioactive materials in particulate form.

- Failure to submit a written report within 14 days of the environmental event as required by Appendix B Technical Specification 5.4.2.b.

As a result of these findings a meeting was conducted in the Region II office on April 15, 1980. During this meeting Region II personnel outlined the inspection findings for CP&L management representatives and expressed concerns regarding the adequacy of the health physics program at BSEP, and that the exchange of information with regard to the release had not been as free and complete as desirable.

The results of the inspection formed the basis for escalated enforcement action by the NRC which culminated in a $24,000 civil penalty being assessed to CP&L on June 13, 1980.

As a result of the findings documented in the report referenced above, and due to comments of plant workers made to the NRC inspectors during the conduct of that inspection, questions arose as to whether or not operations personnel had deliberately continued the release on February 22, 1980, as an operational expedient, and the extent of the Plant General Manager's knowledge of the event on the evening of February 22, 1980, when, during a telephone call to Region II on unrelated matters, he advised that the plant had experienced a leak of radioactively contaminated water from an auxiliary boiler earlier that day, but did not mention an atmospheric release. An investigation to resolve these issues was conducted by Region II on June 2-6, 1980. The results of that investigation were documented in IE Report 50-325/80-26 and 50-324/80-23. The investigation failed to disclose any violations of NRC requirements beyond those cited as a result of the inspection discussed above.

In late-October 1980, Region II inspectors performed a routine inspection of the quality assurance program at BSEP. The inspection involved both the BSEP site and CP&L corporate offices. The results were documented in IE Report 50-325/80-42 and 50-324/80-39. Paragraph 22.b of the Details of that report identified the following violation:

"Failure to Include Releases in Semiannual Report

"Surveillance OQAS-80-6(B) was conducted April 21-24, 1980. This report, forwarded to management on April 25, 1980, identified eleven releases or possible releases from the auxiliary boilers. An additional release from the auxiliary boiler on February 22, 1980 had resulted in a civil penalty (50-325/80-12, 50-324/80-11). The licensee's Semiannual Environmental and Effluent Report for the period January 1, 1980, through July 30, 1980, was then reviewed. The report, forwarded to the NRC with the licensee's letter (BSEP/80-1345) dated August 13, 1980, specifically stated that only one release had been made and evaluated. The Environmental Technical Specifications (ETS) (5.4.1.1.a) require that the report cover the preceeding six months of operations and include a summary of the quantities of radioactive effluent released from the plant.

"Contrary to the requirements, the summary of releases did not include releases from the auxiliary boilers as a result of tube leaks on or about January 23, February 28, March 2,

March 6, and March 13, 1980. This failure to comply with the requirements of E.T.S. 5.4.1.1.a consitutes a violation (325/80-42-01, 324/80-39-01)."

Discussions between the NRC personnel who had participated in the earlier inspection and investigation (investigator and inspector) discussed above, and the inspectors who performed the QA inspection, disclosed that the additional potential releases from the auxiliary boilers identified in the CP&L internal OQAS report had not been previously known to the NRC. A question therefore arose regarding CP&L dealings with the NRC concerning the February 22, 1980 release and the failure to make any report regarding the additional potential releases. The term "potential" is used as a qualifier since the referenced CP&L OQAS report contains entries representing these events (eleven identified) as unevaluated against the criteria specified in 10 CFR 20.201(b).

An inspection was initiated on November 16, 1980, at the Brunswick site for the purpose of obtaining additional information regarding the "potential" releases and the licensee's past communications on this matter with the NRC. Based on preliminary information obtained during the period November 16-18, 1980, it was determined that the inspection should be expanded into an investigation into these and other issues. Consequently, on November 18, 1980, lead responsibility was transferred from the inspector to the investigator. In view of this additional inspection and investigative effort the licensee was informed, by letter from Region II dated April 10, 1981, that the citation dealing with the semiannual reports was still under active consideration by the NRC and was being withdrawn pending further investigation.

2. Review of Operational Quality Assurance Surveillance Report 80-6(B)

The CP&L internal report, OQAS-80-6(B) dated April 25, 1980, which had been identified during the NRC's inspection of the BSEP quality assurance program was reviewed by the investigators. The report identified "potential" releases and requested Plant Nuclear Safety Committee review of the events to evaluate compliance with seven regulatory requirements which were enumerated in the report. The investigators also reviewed various BSEP work requests, unit logs, auxiliary operator logs, radwaste shift foreman's logs, and equipment clearances to determine the validity of the OQAS report. This review disclosed that the OQAS report was valid regarding the identification of events that indicated the potential for eleven additional atmospheric releases from the auxiliary

boilers or various relief valves during the period January 24, 1979, through March 13, 1980. However, the investigators review of the various logs disclosed at least one additional instance where the Unit 2 log and the radwaste shift foreman's log indicated a potential release from Auxiliary Boiler No. 2 on 2/22/80 that was not reflected in the OQAS report. The Unit 2 Log contained the following entry for 2/22/80: "...began startup on #2 boiler at 2330. Steam is coming out of the stack." (It should be noted that the 2/22/80 release that was the subject of the previous inspection and civil penalty was from Auxiliary Boiler No. 1.) The investigation failed to disclose any documentation that corrective maintenance was performed on Auxiliary Boiler No. 2 following this log entry on 2/22/80, until a log entry indicated that boiler was again shutdown on 3/2/80 due to tube leaks. In the absence of identifiable corrective action during the period 2/22/80 to 3/2/80, it must be assumed that each instance of operation of Auxiliary Boiler No. 2 during that period represents additional potential releases not identified in the OQAS report.

3. Licensee Evaluation of Potential Releases

During the course of the investigation, it was determined that the licensee had not performed formal evaluations of the potential releases identified in OQAS-80-6(B) at the time of the NRC inspection of the BSEP QA program in October 1980, even though they had been identified in the OQAS report which was dated 4/25/80. The licensee's reasoning for not performing the formal evaluations sooner is discussed in Paragraph II.B.4 below. The licensee was informed that the failure to perform the evaluations (of each potential release) to ensure compliance with 10 CFR 20.106(a) was a violation of 20.201(b).

Licensee representatives informed the investigators that a thorough evaluation was in progress and the investigators requested that they be provided with a copy of the results of the evaluation. These results were provided to the NRC during the course of the investigation as an enclosure to a letter from CP&L to Region II dated January 22, 1981.

The licensee's evaluation provided the following information regarding quantification of additional auxiliary boiler leaks potentially occurring after the atmospheric release from Auxiliary Boiler No. 1 on 2/22/80.

Leak Ending Date (1980)	Auxiliary Boiler Number	Duration of Leak (Hrs)	Total Quantity Released (mCi)	Maximum 1-Hour Release Rate (μCi/sec)
2/28	1	39.5	168	3.45
3/2	2	43	996	18.31
3/6	1	77	0.46	.002 (Approx.)
3/10	1	41.5	134	2.59
3/13	1	28	69.6	2.0

The investigators' review of the licensee's evaluation disclosed that the licensee had not addressed the potential release from Auxiliary Boiler No. 2 on 2/22/80, nor did it consider the possible extended duration of that release into the potential release ending on 3/2/80 (which the licensee assumed started on 2/29/80), even though these other potential releases had been identified to licensee personnel by the investigators.

The review of the licensee's evaluation also indicated that the licensee had reviewed only the Work Request file to determine when the boilers had been shutdown to repair leaks which would indicate a potential release prior to the shutdown. As described in the licensee's evaluation, other documentation available in logbooks was used to establish the maximum duration of the potential releases thus identified. The logbooks were apparently not thoroughly reviewed as a source of information indicative of further potential releases where maintenance or repair work had not been documented. When questioned regarding this matter, licensee personnel acknowledged that this was a correct interpretation of the way the evaluation was performed.

It should be noted that entries contained in the various logbooks reviewed by the investigators clearly indicated, in some cases, actual or potential radioactive releases at the time they were written; however, interviews of licensee personnel during this and the previous investigation (June 1980) indicated that licensee personnel failed to associate contaminated water and tube leaks, and realize that the resultant steam, whether visible or not, could be contaminated.

It should be further noted that had such realization existed at the time of the log entries, appropriate surveys, if performed, may have disclosed no significant releases. On the other hand, the surveys might have indicated the need to declare an emergency situation in accordance with the licensee's Emergency Plan. The quantities released and release rates shown above indicate violations of release rate limits such that reports would have been required under 10 CFR 50.72, Technical Specification 5.4.2 and the licensee's Emergency Plan. While the

investigators recognize that these figures are based, for the most part, on assumptions and recollections of personnel involved, rather than known conditions, one clear case exists where the licensee appears to have had sufficient information indicating that a "red telephone" report under 10 CFR 50.72 should have been made. Specifically, an entry in the Rad Waste Shift Foremans' log on 3/13/80 states: "#1 boiler has steam coming out of stack again, much too heavy for rain." and the Work Request form (RW-M-187) written at 1:50 a.m. on 3/13/80 indicates the nature of the trouble as "Excessive steam coming out of the stack. Appears to have a tube leak". Information provided during the interviews indicated that BSEP staff members recognized, possibly as early as February 22, 1980, but no later than February 27, 1980, that steam releases from the auxiliary boilers represented a pathway for release of radioactive material to the environment. Failure to notify the NRC Operations Center of the unplanned and uncontrolled release within one hour is a violation of 10 CFR 50.72(a).

Even though the licensee's evaluation of potential atmospheric releases subsequent to 2/22/80 is found to be inadequate in that it did not evaluate and quantify all potential releases, the impact on the environment and public health and safety of all of the releases occurring between 2/22/80 and final shutdown of the boilers would have been reflected in the environmental monitoring program accomplished in response to the February 22 release from Auxiliary Boiler No. 1 which lead to a civil penalty. Subsequent review of the results of that environmental monitoring program by NRC inspectors indicated that no hazard to the environment or the public health and safety existed.

4. Licensee Handling of OQAS-80-6(B)

The transmittal letter for surveillance report OQAS-80-6(B) was dated April 25, 1980, just 10 days after the enforcement conference which had been conducted with CP&L management in the Region II office on April 15, 1980, regarding the February 22, 1980 release from Auxiliary Boiler No. 1. In that no apparent action had been taken to resolve the issues raised by the report at the time of the NRC inspection in October 1980, interviews were conducted to determine the facts associated with the handling of the report and the reasons no action had been taken.

Surveillance Initiation

The interviews disclosed that around mid-April 1980, a Project Quality Assurance Specialist in the CP&L Operations Quality Assurance (OQA) Group discussed with his supervisor, the Manager, Operations Quality Assurance (OQA), the possibility that additional releases had occurred from the Auxiliary Boiler system at BSEP. These concerns had resulted from informal checks that he had conducted with the BSEP staff regarding the operation of the auxiliary boilers. The QA Specialist stated to the investigators that he had "...all indications that additional releases had taken place, and that it appeared that we (OQA) should do an inspection in that area to ascertain the validity of it or not."

Following his supervisor's approval of an inspection plan, an Operations Quality Assurance Surveillance (OQAS) was performed at the BSEP facility during the period April 21-23, 1980. The QA Specialist's audit included reviews of maintenance requests (trouble tickets) associated with the Auxiliary Boiler system and various plant operations logbooks.

At the conclusion of the audit the QA Specialist had what he considered to be evidence that the possibility definitely existed that additional releases had occurred during the period January 1, 1979 - March 13, 1980, particularly in those cases where valves were leaking or where tube leaks were identified in maintenance requests coincident with log entries indicating steam coming from the stack.

Audit Exit Meeting

Prior to his exit meeting the QA Specialist met with selected BSEP staff members and discussed his findings in depth. He also discussed his findings with his supervisor prior to the exit meeting. He indicated that he had written his findings on the plant surveillance report form (which would have made them "action items"), but that because of statements made during the actual exit briefing with the BSEP Plant General Manager and the plant staff, he felt the necessary evaluations of the potential leaks would be accomplished and he, therefore, identified his findings as "General Comments" in his report rather than "New Action Items". His belief that appropriate action would be taken was based on the Plant General Manager's response to a statement made by the BSEP Director of Nuclear Safety and Quality Assurance (Director, NSQA-BSEP) during the exit meeting. As he recalled it, the Director, NSQA-BSEP made a comment to the effect: "Our action for the 22nd release would still be the same. No environmental effects have shown

up. Since the extensive sampling program encompassed the other releases, and indications are not there to show that the releases went off-site, what purpose would be served by evaluating and reporting the other releases?" The Plant General Manager allegedly responded saying that they should allocate the manpower to do the necessary evaluations.

The Director, NSQA-BSEP was interviewed and recalled both the surveillance (audit) and the meetings with the QA Specialist during the audit. He stated he attended the meeting conducted at the conclusion of the audit and recalls making statements to the QA Specialist something like "I really don't understand what your goal is, what your objective is. We had a blow out. We had problems in the environment. I just do not see the purpose of what you are trying to accomplish." He indicated that he agreed with some of the expressed concerns and disagreed with others. In reference to those findings expressly addressing reporting requirements he stated: "No. There were absolutely none of those that I was in agreement with."

The Plant General Manager was interviewed and he did not specifically recall the exit meeting where the findings of OQAS-80-6(B) were presented to him and his staff; however, he did recall several discussions with the Vice President, Nuclear Operations during the summer of 1980, regarding the substance of that report.

The Manager, OQA was interviewed regarding the exit meeting and he indicated that the concensus of the group at the exit meeting was that the NRC had been informed and that the only action that remained to be done was for the Plant Nuclear Safety Committee (PNSC) to review the matter and make sure the minutes of the meeting included all of the releases, not just that of February 22nd.

It should be noted that the subsequent NRC inspection of CP&L's Quality Assurance program conducted in October 1980 (IE Report 50-325/80-42) identified violations regarding "Failure to Perform Corrective Action on Items Identified During Surveillances" and "Failure to Correctly Identify Audit Findings". Since the referenced citations address this aspect of the handling of OQAS-80-6(B), no further enforcement action regarding this particular matter is deemed appropriate as a result of this investigation. However, it should be further noted that this failure to enter surveillance findings into a formal tracking system to insure their adequate resolution is considered to be a significant contributing condition to other

violations that are addressed elsewhere in this report. Had the findings of this and other surveillance efforts been properly identified, tracked, and resolved, some of the violations identified herein may have been avoided.

Surveillance Report

The QA Specialist subsequently prepared his formal report of the surveillance, OQAS-80-6(B) listing his findings as "General Comments". The report was approved by the Manager, OQA on April 28, 1980 and was transmitted to the Plant General Manager and the Director, NSQA-BSEP by memorandum dated April 25, 1980 (sic) with a copy to the CP&L Vice President, Nuclear Operations.

Briefing of Vice President, Nuclear Operations

According to the QA Specialist, he and his supervisor reviewed the surveillance findings with the Vice President, Nuclear Operations including what they viewed as the appropriate corrective actions that should be taken. As stated by the QA Specialist, "We told him something to the effect that we recommended in the report that the Plant Nuclear Safety Committee evaluate the information contained in the report. That is essentially the assurance we had, that they would be doing it." The QA Specialist indicated that "reportability" was discussed during this briefing.

The Vice President, Nuclear Operations acknowledged that he was briefed on the surveillance findings by the Manager, OQA and the QA Specialist shortly ("sometime during the next fourteen days") after the issuance of OQAS-80-6(B). In describing his actions following this briefing, the Vice President recalled that "... the major problem was the fact that other leaks, other than the 22nd, may be reportable, individually reportable." He indicated that he discussed the matter with the Plant General Manager including whether they should be reported and whether the NRC was aware of the additional leaks. Regarding the conclusions reached in that discussion he stated:

> "The final conclusion of that discussion was -- we apparently drew an erroneous conclusion at that time -- that the Commission had conducted an investigation (June 1980) and inspection (March 1980). I think that in retrospect it was a bad conclusion on our part. We concluded at that time that the leaks, both before and after the 22nd, were in a separate category than the one on the 22nd. The one on the 22nd, we did recognize as a major leak. The others we looked at as being in the insignificant category.

> Also, we looked at it on the basis that the Commission had done their investigation, and we honestly felt, or at least I did, that the Commission was aware of the leaks. In fact, I was quite surprised four or five weeks ago when the NRC QA inspection turned out that the Commission was not aware of leaks after the 22nd."

The Director, NSQA-BSEP, who is a member of the BSEP PNSC was interviewed to determine what actions were taken at the site when OQAS-80-6(B) was received. He pointed out that the report contained no "findings", but only general comments. He explained that by "findings" he meant items which he considered "noncompliances and that go into a system to be tracked." He indicated that he had not discussed with anyone the question of whether or not the comments should be entered into any type of tracking system. He stated that he was not aware of any action taken by the PNSC with regard to the recommendation that the PNSC review the reporting requirements referenced in OQAS-80-6(B) at the time it was received.

It was noted by the investigators that several other BSEP staff members, who were involved in the auxiliary boiler releases, or were contacted during the OQAS audit and/or present at the OQAS exit meeting, also participated in the function of the PNSC (as principle or alternate members), yet no record was identified which would indicate that the PNSC afforded any consideration to the concerns raised in OQAS-80-6(B) prior to the NRC inspection in October 1980.

Previous NRC Investigation

During the period June 2-6, 1980, the investigation referenced in paragraph II.B.1 above, was conducted to determine whether or not BSEP operations personnel had been aware of and deliberately continued the release from Auxiliary Boiler No. 1 on February 22, 1980, as an operational expedient. That investigation was, as noted previously, limited in scope to the events of February 22 as they related to Auxiliary Boiler No. 1. Plant personnel did not, in either open or confidential interviews, make any reference to the possibility that additional releases beyond that of February 22 had taken place.

QA Specialist's First Memorandum

At about the same time as the previous investigation or shortly thereafter, the QA Specialist (who was not interviewed during the previous investigation) wrote an undated memorandum to his

supervisor, the Manager, OQA in which he expressed concern that the additional releases should be reported to the NRC as soon as possible. The investigators reviewed the memorandum and found that it identified several regulatory requirements which should be considered and cited operational data which the QA Specialist felt indicated the need for a full evaluation. Although he could not establish the specific date that he wrote the letter, the QA Specialist indicated that he thought he had written it on or about June 11, 1980. The QA Specialist indicated to the investigators that he took this action because no action had apparently been taken by the BSEP staff with regard to OQAS-80-6(B). The QA Specialist indicated that he had conversations with his supervisor regarding the concerns identified in the memorandum prior to writing the memorandum, but said they did not discuss the memorandum itself. The QA Specialist assumed that his supervisor had seen the memorandum because he had placed it in the supervisor's "in basket".

When interviewed, the supervisor (Manager, OQA) acknowledged that he had seen the memorandum and when asked what actions resulted from the memorandum, he responded: "I asked the QA Specialist when he presents me with something like this, if certain people at the plant are aware of this. If he says yes, then I say that is their responsibility to do it, and we will followup. That is about the end of it."

This view of the OQAS function regarding responsibility to assure resolution of audit findings was discussed during the NRC's QA inspection of October 1980 and, as mentioned previously, the licensee was cited for failure to take corrective action on such findings.

Radiation Control Engineer's Memorandum Dated July 8, 1980

On July 8, 1980, a BSEP Radiation Control Engineer wrote a memorandum to the BSEP Radiation Control Supervisor. While that memorandum dealt primarily with concerns related to radioactive contamination of the Storm Drain Collection Basin and Stabilization Pond (see Section II.C.1 of this report), it also addressed concerns regarding openness with the NRC and specifically recommended that auxiliary boiler follow-up environmental sample results be provided to the NRC as they became available and were confirmed. It is noted that the memorandum indicates that "a phone conversation would appear to be most appropriate" and does not mention written reporting requirements regarding auxiliary boiler releases.

When interviewed regarding his memorandum, the engineer indicated that at the time he wrote his memorandum he did not feel that CP&L owed the NRC a formal report on the additional releases, but thought it would be in CP&L's best interest to pass the information along to the NRC as an item of interest. He stated that he discussed his memorandum with the Plant General Manager on the same day that he had given it to the Radiation Control Supervisor, but that the conversation had been about the stabilization pond problem and did not include any discussion of the auxiliary boilers.

The Radiation Control Engineer's memorandum received wide dissemination to both BSEP key staff including the Manager, Technical and Administrative; the Director, NSQA; and the Plant General Manager; and to several members of CP&L's corporate management including the Vice President, Nuclear Safety and Research. The Radiation Control Engineer stated his principle purpose in writing this letter (at his supervisor's request) was to formalize the numerous concerns he had expressed to his supervisor during a series of meetings in the May/June time period. He indicated these concerns principally focused on the storm drain, but also included the handling of the auxiliary boiler information.

Meetings Related to OQAS-80-6(B) and Radiation Control Engineer's Memorandum

In late-August 1980, as a result of conversations between the QA Specialist and the Director, Corporate Health Physics, regarding the QA Specialist's continuing concerns over what he perceived to be required reports and the concerns expressed by the Radiation Control Engineer (BSEP) in his memorandum of July 8, 1980, a meeting was held with CP&L's Vice President, Nuclear Safety and Research. The meeting, held on approximately August 24, 1980, resulted in a discussion by the QA Specialist of his concerns with the Vice President, Nuclear Safety and Research. The Vice President was made aware at this meeting of OQAS-80-6(B) regarding the auxiliary boilers, and the BSEP Radiation Control Engineer's memorandum. The QA Specialist indicated he had copies of both documents with him which were shown to the Vice President during the discussion.

A second meeting attended by the QA Specialist, the Director, Corporate Health Physics, and the Vice President, Nuclear Safety and Research was held on approximately September 5, 1980. CP&L's corporate Manager, Environmental and Radiation Control was also present. The concerns were once again discussed and the Manager, Environmental and Radiation Control was charged by the Vice President, Nuclear Safety and Research with following-up on the surveillance report findings.

The Manager, Environmental and Radiation Control stated to the investigators that he recalled only one meeting with the Vice President, apparently that of September 5, 1980. He stated he received a copy of the surveillance report (OQAS Report 80-6(B)) in the days following the meeting and that he discussed this report with the Plant General Manager and the Vice President, Nuclear Operations. He stated: "...I guess at that time we did not feel that concerned about the other releases, or the potential other releases, because we thought they had already been identified, and the 22nd one was the one that we felt should be zeroed in on."

The Vice President, Nuclear Operations informed the investigators that the Vice President, Nuclear Safety and Research had called him shortly after the September 5, 1980, meeting and had asked if he was concerned. The Vice President, Nuclear Operations indicated that he responded affirmatively and said he would discuss the matter further with the Plant General Manager. The Vice President, Nuclear Operations subsequently discussed the matter with the Plant General Manager and the Director, OQA. He then contacted the Vice President, Nuclear Safety and Research and informed him that "we had reviewed everything again, and that we were okay." The Vice President, Nuclear Operations stated: "After that, I did not hear anything more from (the Vice President Nuclear Safety and Research). At that time, I felt for sure that everything was okay from the standpoint of our interpretation of the facts...". He further stated: "At that time the reportability was not the major concern. I think the major concern at that time was probably the timeliness, and the assurance that all the corrective action had been completed. If I had to put it into categories, I would say that it was the timeliness first, and the reportability was the second concern, but both were concerns."

The QA Specialist indicated that during mid-October 1980 he was called by the Corporate Manager, Environmental and Radiation Control who asked if the QA Specialist would be satisfied if the PNSC were to evaluate the other releases and if this review were included in the PNSC minutes. The QA Specialist stated to the investigators: "I responded yes. I was assuming that the PNSC minutes would also generate the necessary reports".

Subsequently, the failure of CP&L to follow through on the evaluation and reportability of the other "potential releases" was identified by the NRC's QA inspection of late October. As of the initiation of this investigation on November 16, 1980, the required evaluations had not yet been completed. The

investigators were informed by BSEP staff that an investigation of all potential releases from the auxiliary boilers was under way. The results of BSEP's efforts in this area were documented in the CP&L letter of January 22, 1981, which was discussed in Paragraph II.B.3 above.

5. Analysis of Air Sampler Data

During the course of the investigation, information was obtained which caused the investigators to question the handling of certain air sampler data related to the known release from Auxiliary Boiler No. 1 on February 22, 1980. Specifically, it was learned that what had previously been thought (by the NRC) to be the results from a single air sample filter removed from the Station 23-PMAC on February 25, 1980, was actually the result of a combination of the results from two sample filters which had been removed from that station on February 22 and 25, 1980.

The investigators pursued this matter during the interviews and determined that the results from both sample filters were provided to BSEP site personnel on February 27, 1980, and calculations were performed in accordance with Appendix B Technical Specification 5.4.2.6 ("T-Test") to determine reportability. According to the individuals who performed the calculations, the T-Test was first applied individually to the sample data from the two samples and the results indicated that the data from the February 22 sample was reportable, while the data from the February 25 sample was not. However, according to those involved, a question arose as to how the data should be handled because the T-Test involved a comparison of data from the Station 23-PMAC sample filters with a seven-day "control" sample filter which was not removed until its routine replacement on February 25, 1980, and neither of the Station 23-PMAC samples covered the seven-day period; rather, the two taken together covered the same seven-day period as the "control" sample filter. Thus, licensee personnel concluded that the T-Test should be applied to a weighted average of the data from the two samples. As a result, the T-Test indicated that the data was not reportable. The investigators were unable to determine who specifically made the decision to use the weighted average approach, but subsequent evaluation by the investigators disclosed that the use of combined, weighted average sample results for the T-Test calculations is not prohibited by the BSEP Technical Specifications.

Two concerns were, however, identified regarding this matter. First, as a result of the investigators' request for the data from the two samples in question, licensee personnel at the New Hill Energy Center and at BSEP reviewed the previous calculations associated with the T-Test. They subsequently advised the investigators that an error had been made in the earlier analysis and that new calculations performed on December 23, 1980, disclosed that when the T-Test was applied to the weighted average of the corrected sample data, the data was reportable as an environmental event. The licensee was previously cited for failure to report this event; therefore, further citation regarding this error is not appropriate.

A second concern associated with the PMAC samples of February 22 and 25, 1980, involved BSEP's interpretation of the significance associated with the finding of elevated radioisotopic levels on the second PMAC air filter (e.g., that removed on February 25th). If the term period of the contaminating event is considered to be the water/steam release from Auxiliary Boiler No. 1 during the early morning of February 22, 1980, then it follows that the release of contaminated particulate material into the air ended with the shutdown of Auxiliary Boiler No. 1 at approximately 8:00 a.m. that morning. It then follows that the February 22 PMAC sample (filter) contained indications of contaminated particulate matter which would be attributed to the event of earlier that day.

When the PMAC air filter was removed in the afternoon of February 22, it was replaced with a new (clean) filter. Upon the removal of this second filter on February 25 and subsequent analysis it would be expected that the filter, since the contaminating event had concluded prior to its installation, would contain little, if any, radioactive contamination.

This phenomena (e.g., the presence on the February 25 PMAC sample of elevated Cesium 134 and 137 levels) was discussed by the investigators with the BSEP and CP&L staff to determine if its significance was recognized. That is, that the presence of contaminates would indicate that either the original event had not concluded as of the time the new filter was installed, that an additional contaminating event(s) had occurred, or that the deposition of airborne material from the initial release was still underway subsequent to the installation of the second filter. The results of the discussions indicated that the significance of the contaminants found on the second filter, as indicative of an additional release, was not recognized at the time.

6. Licensee Meeting on April 14, 1980

As a result of information obtained during the investigative interviews a question arose as to the extent of licensee management's knowledge of the potential additional releases at the time of the enforcement conference conducted in Region II on April 15, 1980, to discuss the February 22, 1980 release from Auxiliary Boiler No. 1 and the NRC's concerns regarding CP&L's handling of the matter. Specifically, licensee personnel present at a meeting at the BSEP site on April 14, 1980, stated to the investigators that the subject of potential additional releases was raised during that meeting, but this possibility was not brought to the attention of the NRC during the enforcement conference held the following day.

The interviews disclosed that among others, attendees at the April 14 meeting included the Vice President, Nuclear Operations; the Manager, Environmental and Radiation Control; and the BSEP Plant General Manager.

As described by the participants, the meeting was of a somewhat informal nature, lasting through the afternoon and evening hours, and covered the various topics that were expected to be discussed with the NRC the following day. Most of those present at that meeting recalled that the Senior Nuclear Generation Specialist discussed the environmental survey data that had been accumulated in following up on the February 22 release from Auxiliry Boiler No. 1 and, in particular, that there were anomolies present in the data which might be explained as possibly fallout or inherent with the sample medium selected (pine needles).

Various attendees at the meeting recalled that following the Senior Nuclear Generation Specialist's statement as to possible explanations for the anomolous data, the Radiation Control Engineer made a comment that there was evidence suggesting another boiler release or unaccounted for releases from other sources. The Radiation Control Engineer and others were asked what sort of response he got to his comment. They indicated that there was no specific response and the discussion moved on to other issues. From the interviewees' responses, it appears that neither the site nor corporate personnel present gave any indication that they either understood or acknowledged the significance of these purported releases and the attendant requirements for their evaluation/reporting. In particular, neither the Vice President, Nuclear Operations nor the Plant General Manager recalled the Radiation Control Engineer making such a statement.

On April 15, 1980, an enforcement conference was conducted in the NRC's Region II office regarding the February 22 release from Auxiliary Boiler No. 1 and the associated violations of NRC requirements. The violations and a summary of the enforcement conference are documented in IE Inspection Report 50-325/80-18. During the enforcement conference emphasis was placed on the reporting of unusual occurrences, but none of the licensee personnel present, which included the Radiation Control Engineer, made any reference to the anomolous data or to the possibility of additional releases. However, as indicated above, the investigation did not disclose any information to clearly indicate that the senior licensee representatives present had heard or understood the Radiation Control Engineer's comment during the licensee's meeting the previous day.

7. Semiannual Environmental and Effluent Release Report

As noted in Paragraph II.B.1 above, the licensee was cited, in IE Inspection Report 50-325/80-42, for failure to include the "potential" releases identified in OQAS-80-6(B) in their Semiannual Environmental and Effluent Release Report dated August 13, 1980. That citation was subsequently withdrawn pending further investigation; however, the licensee addressed the citation in his response to the other citations in the Notice of Violation. The licensee's actions in response to that citation included the submittal of an amended semiannual report to include five additional releases to the atmosphere. However, the licensee, in the written response to that citation, and throughout this investigation, has maintained that, while conditions existed that could have resulted in additional releases, sufficient information does not exist to establish that the boiler leaks resulted in actual atmospheric releases of radioactive material to the unrestricted area. The additional releases reported in the amended semiannual report represent maximum calculated releases based on documented repairs of leaks in the auxiliary boilers and licensee personnel recollections of the size of the leaks at the time of repair.

With regard to the licensee's contention that the releases are only potential releases because of the lack of information to establish actual releases of radioactive material to the unrestricted area, the investigators concur that the calculated values represent "potential" quantities released, but disagree that the "potential" can be applied to whether or not a release occurred. The laws of physics and inituitive logic make it clear that releases occurred even though the actual quantities of the individual releases are not known.

While the investigation disclosed additional potential releases beyond those added in the amended semiannual report, quantification of those additional potential releases would only be a record correcting exercise in that the previously evaluated actual measured environmental impact in the unrestricted area will not change.

C. OTHER AREAS ADDRESSED

As stated in the Summary Section of this report, information obtained during the portion of this investigation dealing with releases from the auxiliary boilers, raised additional areas of NRC concern and the scope of the investigation was expanded to address those areas. The additional investigative effort is documented below.

1. Storm Drain Collector Basin and Stabilization Pond

As discussed in Paragraph II.B.4 above, the BSEP Radiation Control Engineer wrote a memorandum to the BSEP Radiation Control Supervisor which addressed his concerns related to radioactive contamination of the Storm Drain Collector Basin and Spoil Pond. In that the memorandum also addressed the auxiliary boiler releases, the investigators interviewed various licensee personnel relative to the memorandum as previously discussed in Paragraph II.B.4. Apart from its relationship to the auxiliary boiler releases, the investigators efforts disclosed the following information regarding the memorandum, and the Storm Drain Collector Basin and Stabilization Pond.

a. System Description

Storm drainage from the BSEP site is directed into a concrete structure referred to as the storm drain collector basin (SDCB). The SDCB has a capacity of approximately 100,000 gallons and in addition to collecting surface water from the site it also receives the cooling tower blowdown and makeup water treatment system discharges. The basin has a removable gate at one end which, if opened, would allow gravity flow from the basin, through a culvert to the discharge canal. Overfilling the basin causes water to flow over the removable gate and on to the discharge canal. The basin is also equipped with two 1200-gpm pumps to pump the basin contents to the stabilization pond. A drawing of the SDCB is shown in Exhibit 1.

The stabilization pond is a 64-acre impoundment which was constructed from a spoil pond used during the dredging of the intake canal. Due to the elevations involved, water collects in only about 39 acres of the pond and when full, the mean depth is approximately 3.5 feet, providing a total storage capacity of about 45,000,000 gallons.

The pond has been used since 1977 to meet Environmental Protection Agency (EPA) effluent release standards for pH, suspended solids, oil and/or grease content. Stabilization in the pond occurs through the natural processes available within the impoundment. Large volume dilution and an extended retention time allow for pH adjustments and settling of suspended solids. The marsh growth within the pond provides surfaces that collect and disperse oil and grease slicks. Outflow from the pond is through a standpipe to the intake canal. A drawing of the pond is shown in Exhibit 2.

b. History of Stabilization Pond Contamination

As mentioned above, the pond has been used since 1977 to meet the effluent release requirements of EPA. While the storm drain basin (collector system) is not known to have been contaminated at the time of the system modification to pump water to the pond from the collector basin, a series of events subsequently occurred which resulted in radioactively contaminated liquids finding their way into the storm drains and from there into the stabilization pond. As described by the licensee in the enclosure to the January 22, 1981, letter to Region II, the contaminating events included the following:

- Spills from the Chem-Nuclear Mobile Solidification Unit
- Radwaste spill on April 26, 1978
- Series of small leaks from the Condensate Storage Tanks
- Overflow of the Auxiliary Surge Tank in January 1979
- Series of leaks from the Auxiliary Boilers in 1978-1980
- Spill on Radwaste Loading Dock on March 4, 1980
- Pumping of liquid from the -17ft elevation of the Reactor Building to the storm drains

In each of these cases, contaminated materials entered the plant storm drain system which was intended for handling rainfall runoff, and was subsequently pumped into the stabilization pond.

In addition to these past contaminating events, the investigation identified at least two areas where the potential for further contamination of the pond exists. These are the RHR SW pump floor drains at the -50ft elevation in the Reactor Building and salt water drains

in the East-West Turbine Building Pipe Tunnel. Although the latter source is currently blocked off, the drains have been a past source of contamination and are a potential future source if not properly controlled.

The investigation disclosed that on February 22, 1980, the licensee became aware of contaminated sludged in the collection basin and at that time the transfer pumps were "locked out" of automatic operation and sampling was subsequently required prior to manual operation of the pumps. Prior to that date the pumps operated automatically and any sampling for radionuclides was sporadic and no formal records were maintained. Further, it was determined that the licensee had been sampling the stabilization pond for radionuclides on a weekly basis since at least January 1979.

c. Licensee Activities Related to System

The investigators determined that during the May-June 1980 time frame the interest of the CP&L Corporate and BSEP staff were drawn to the Storm Drain Collector Basin and Stabilization Pond for a number of reasons. The reasons included an apparent gradual recognition that this system had the potential for becoming a significant problem, the issuance of IE Bulletin 80-10, the performance of an Operations Quality Assurance Surveillance (audit) by the licensee, and the discovery that water leakage into electrical cable tunnels nearby was radioactive and was coming from cracks in the collector basin.

Operational Quality Assurance Audit 80-10(B)

The investigation disclosed that in May 1980 the Project QA Specialist provided an inspection plan for a proposed audit of the Stabilization Pond at BSEP to his supervisor, the Manager, Operations Quality Assurance. According to the QA Specialist, he proposed the audit due to concerns he had as a result of conversations with BSEP personnel regarding the operation of the stabilization pond. The audit was performed on May 27-28, 1980.

As a part of the audit, the QA Specialist had samples of the pond floor collected and submitted for analysis. The sediment samples consisted of from 1 to 2-inches of sediment acquired from a point in the stabilization pond approximately 5-feet from the influent pipe from the collector basin. The analysis revealed a concentration

of selected nuclides of 2.84E-4 μCi/gram. The QA Specialist stated that he recommended to the BSEP Radiation Control Supervisor that additional samples be obtained and analyzed to better define the activity in the pond.

In addition to meetings with the BSEP Radiation Control Supervisor and CP&L's Manager, Environmental and Radiation Control (E&RC) during the course of the audit, the QA Specialist conducted an exit interview with BSEP staff members on May 28, 1980 and discussed his findings.

When the QA Specialist prepared his report, OQAS-80-10(B), he listed his findings as "General Comments" rather than "Action Items" (as he had with OQAS-80-6(B) as discussed in Paragraph II.B.4 above). The distinction between General Comments and Action Items was also discussed in Paragraph II.B.4.

Subsequent to the audit the QA Specialist discussed the findings with his supervisor (Manager, OQA) who in turn discussed them with the Vice President, Nuclear Operations. The Vice President indicated to the investigators that he recalled numerous discussions with the Manager, E&RC during the late spring and early summer about the stabilization pond and the associated problems.

IE Bulletin 80-10

As a result of NRC findings in the evaluation of the February 22, 1980, release from Auxiliary Boiler No. 1 at BSEP, IE Bulletin 80-10 was issued to all power plant licensees on May 6, 1980. The bulletin addressed the operation of systems normally considered to be non-radioactive (or described as such in the Safety Analysis Report) in a contaminated condition and required licensees, among other actions to:

- Review facility design and operation to identify such systems already contaminated or having the potential to become so;

- Establish a routine sampling/analysis or monitoring program for these systems in order to promptly identify any contaminating events which could lead to unmonitored, uncontrolled liquid or gaseous releases to the environment, including releases to on-site leaching fields or retention ponds.

The bulletin required that these actions be completed within 45 days and verified by letter to the NRC within an additional 15 days.

The licensee's response to IEB 80-10 dated July 1, 1980, indicated that a review had been completed and that a routine sampling/analysis or monitoring program had been established. A review of licensee files regarding IEB 80-10 disclosed documentation that several plant systems had been identified and evaluated; but the Storm Drain Collector Basin and Stabilization Pond were not among them. However, the investigation disclosed that the Storm Drain Collector Basin and Stabilization Pond were evaluated separately by the BSEP Radiation Control Engineer and a draft document was typed on June 24, 1980.

The Radiation Control Engineer indicated that the safety analysis was initiated as a result of other concerns, rather than in response to IEB 80-10 and was accomplished in mid-June with a draft being typed on June 24, 1980. One of the recommendations contained in the analysis was to institute a sampling, analysis and effluent accountability procedure for liquid being pumped from the storm drain collection basin into the pond. The investigation disclosed that Radiation Control and Test Procedure No. 3290, which was approved on June 20, 1980, provided for control and monitoring of radioactivity transferred from the Storm Drain Collector Basin to the pond and for monitoring the pond effluent. The investigators review of the approved procedure and interviews of licensee personnel disclosed the following inadequacies:

(1) Appendix C of the procedure which is a single line drawing of the collector basin and pond system depicts a direct pathway from the collector basin to the discharge canal; however, the minutes of the PNSC meeting on June 20, 1980 (at which the procedure was reviewed) do not reflect that this pathway was recognized as creating a potential for unmonitored and uncontrolled release;

(2) The procedure did not incorporate, nor did the PNSC meeting minutes reflect consideration of, recommendations contained in OQAS Report 80-10(B) such as that sampling for Sr-90 be instituted; and

(3) The procedure required periodic effluent monitoring to provide for estimated discharge from the stabilization pond, but established no requirement to quantitatively establish a current inventory of radionuclides in the pond.

With regard to Item (1) above, it should be noted that the licensee took steps during the course of the investigation to block the potential release pathway. With regard to Item (3), the licensee performed calculations to establish a current inventory and included the information in the enclosure to their January 22, 1981, letter to Region II. While the licensee concluded that the current inventory was approximately 65 mCi, this value is questionable due to the size of the samples taken, the efficiency of the counting equipment and the infrequent sample data available on which to base calculations. The licensee's data and calculational methods will be further addressed during future inspections.

The Radiation Control Engineer informed the investigators that he sent his draft safety analysis to the QA Specialist on June 27, 1980, because he wanted his input and he considered him to be an independent reviewer with an excellent knowledge of regulatory requirements. The QA Specialist's review was completed and his comments were sent to the Radiation Control Engineer in early July. His comments included specific recommendations that additional areas be address as part of the safety analysis.

The QA Specialist's comments regarding the adequacy of the analysis were made known to the BSEP Radiation Control Supervisor and the Manager, E&RC. They disagreed with the comments and the Vice President, Nuclear Operations, after discussions with them, accepted their position that the safety analysis did not need to go as far as the QA Specialist had proposed.

QA Specialist Memorandum of July 2, 1980

The QA Specialist informed the investigators that he became increasingly concerned over the apparent lack of site response to OQAS-80-6(B) (as discussed previously in Section II.B.4) and an apparent non-responsive posture on what he felt were serious concerns regarding the stabilization pond and storm drain collector basin. Therefore, on July 2, 1980, he wrote a memorandum to his supervisor (Manager, OQA) summarizing the reporting requirements he felt should be considered. The memorandum also discussed the implications associated with the disposal of radioactive waste in the pond.

The Manager, OQA acknowleged to the investigators that he had received the QA Specialist's memorandum, but indicated that he took no action at that time because people in responsible positions at the site were aware of the problem and it was their responsibility to correct it.

Radiation Control Engineer's Memorandum

As previously discussed in Paragraph II.B.4 of this report, the Radiation Control Engineer wrote a memorandum dated July 8, 1980 to the Radiation Control Supervisor expressing concern about the way the auxiliary boiler, storm drain collector basin/stabilization pond, and other problems were being handled. That memorandum and subsequent related meetings regarding the concerns were discussed in Paragraph II.B.4 and are not repeated here.

QA Specialist's "Citations"

As an apparent result of IEB 80-10 and the safety analysis on the collector basin/stabilization pond, the Manager, E&RC prepared an action list of various tasks to be accomplished. He indicated to the investigators that he did this in "probably July".

In following up on certain tasks assigned to the Operations Quality Assurance group, the QA Specialist travelled to BSEP on approximately August 4, 1980. During the trip he met with the Manager, E&RC and during the meeting he gave the Manager, E&RC a document he had prepared that reflected his interpretation of the violations of NRC reporting requirements that existed. According to the QA Specialist he told the Manager, E&RC that: "if I were the inspector, this is what I would get you for".

The investigation disclosed that no action was taken in response to this document. The Manager, E&RC indicated to the investigators that he disagreed with interpretations by the QA Specialist, particularly with regard to definitions of unrestricted area and point of release to the unrestricted area. The Manager, E&RC was apparently relying in part on a statement in the FSAR which defined the restricted area as that bounded by a hypothetical circle of certain dimensions and centered on the main exhaust stack. It should be noted that the licensee, after being informed that this was not consistent with the 10 CFR 20 definition of unrestricted area, erected a fence around the stabilization pond to control access.

Leaks in Storm Drain Collector Basin

Information obtained during the investigation disclosed that during the time period July-August 1980 leakage of water into nearby electrical cable tunnels was determined to originate from cracks in the concrete collector basin. In late August licensee personnel also observed water running from the basin weir wall and into the pipe leading to the discharge canal. Weekly sample data provided by the licensee in the enclosure to the January 22, 1981, letter to Region II indicates a continuing average concentration of radioactivity in water in the collector basin in the range 1.0E-6 to 1.0E-7 μCi/ml between June 25, 1980 and November 23, 1980 and reaching values as high as 1.0E-4 μCi/ml on two occasions.

Repair work was initiated once the cracks were found; however, as late as November 12, 1980, the collector basin was still leaking and effort to locate and repair cracks was continuing. The enclosure to the licensee's January 22 letter indicates that all cracks have been repaired and further, that the pipe to the discharge canal has been plugged to eliminate that pathway.

d. Related NRC Findings

In reviewing the licensee's handling of the Storm Drain Collector Basin and Stabilization Pond the investigators identified the following violation of NRC requirements:

- The licensee was in violation of Appendix B Technical Specification 3.5.1.d requiring continuous monitoring and recording of radioactivity in liquid releases when radioactive wastes were pumped from the storm drain collector basin to the stabilization pond (an unrestricted area) between April 1978 and November 1980 when the pond was fenced to control access.

- The licensee was in violation of that same Technical Specification when radioactively contaminated liquids were released through cracks in the storm drain collector basin to the discharge canal. The cracks were discovered in May 1980 and the release pathway was not blocked off until November 1980.

- A review of the BSEP Semiannual Environmental Reports submitted for the periods ending June 30 and December 31, 1979, and June 30, 1980, disclosed that the licensee was in violation of Appendix B Technical Specification

5.4.1.1 in that they did not include liquid effluents discharged from the stabilization pond during the periods covered by the reports.

2. Roof Vent Monitors

During an IE inspection conducted at BSEP on October 20-24, 1980, independent measurements were made by the Region II Mobile Laboratory to confirm the licensee's capability for analyzing radioactive effluents. These measurements indicated that up to forty-percent of the total particulate activity in samples from the reactor building roof vents were not being identified by the licensee's radiation monitoring equipment. This problem was discussed with licensee representatives during the exit interview on October 24, 1980. The Plant General Manager indicated that he understood the problem and would discuss corrective action with his staff.

Subsequently, the BSEP Plant General Manager was informed by telephone on November 10, 1980, that failure to identify and measure particulate radioactivity on the charcoal cartridge would be cited as a violation in IE Report 50-325/80-41 and 50-324/80-38. Specific corrective actions were discussed with the Plant General Manager to include: determination of how particulates were getting past the particulate filter to the charcoal cartridge; the affect on determining and reporting the quantities of radioactive particulate releases; the time period over which this had been occurring; and action to prevent recurrence.

On November 16, 1980, the NRC inspector (Radiation Specialist) who had responsibility for followup on this issue (and coincidently assigned to the instant investigation) entered the BSEP at 8:30 p.m. to verify corrective measures had been initiated. In the company of a licensee representative, the inspector examined the Unit 2 Reactor Building roof vent monitor and found that the monitor, due to poor maintenance practices, was incapable of accurately measuring the quantity of radioactive material being released to the environment. Specific problems identified included:

- improper spring tension on the particulate filter holddown ring, permitting particulate radioactive material to bypass the filter and be deposited on the charcoal cartridge;

- poor alignment of the "O-ring" seal between the particulate detector chamber and the iodine chamber (caused by use of non-standard replacement screws) permitting additional bypass flow around the particulate filter; and

- a missing "O-ring" seal on the particulate filter holder assembly which permitted dilution of the sample flow to all three detectors in the monitor.

Based on these observations, the inspector concluded that the quantity of radioactive material and its rate of release from the Unit 2 Reactor Building vent was not being monitored (and was therefore, uncontrolled) to meet the requirements of the BSEP Environmental Technical Specifications (ETS) and NRC Regulatory Guide 1.21. Based on the findings of the above referenced inspection, it appeared that this condition may have existed since as far back as July 21, 1980.

The inspector discussed his conclusion with the NRC-licensed, Unit 2 operator on duty. The discussion included the requirements of ETS 3.5.2.b regarding alternate sampling, and 10 CFR 50.72(a) regarding immediate notification to the NRC Operations Center of uncontrolled releases of radioactive material. The licensed operator informed the inspector that he (the operator) would have to confer with the Senior Reactor Operator on duty before taking any action. Having informed the licensed operator of the problem with the monitor and the applicable requirements, the inspector left the control room and proceeded to a meeting with the BSEP Chemistry Foreman who had been called to the site as a result of the identified problems with the monitor.

The inspector discussed the problem with the Chemistry Foreman and there was disagreement over the interpretation of ETS 3.5.2. The Chemistry Foreman maintained that he had 24-hours after discovery of the inoperability of the monitor to obtain the required grab samples, while the inspector felt that it was clear that the monitor had been inoperable for longer than 24-hours when discovered and that an immediate sample was required to satisfy the ETS.

The inspector suggested to the Chemistry Foreman that it would be prudent to determine operability of similar monitors on the Unit 1 Reactor Building Vent and both Turbine Buildings Vents. After observing plant operating conditions, other available operational effluent monitors, and local area radiation and airborne contamination monitors, the inspector determined that there was no immediate threat to public health and safety due to the inoperability of the Unit 2 Reactor Building Roof Vent monitor and no immediate action by the NRC was necessary and he left the site.

On the following morning, the investigators met with the Plant General Manager to inform him of the initiation of the instant investigation. During that meeting, the Plant General Manager indicated that he was aware of the events of the previous

evening and informed the investigators that the "red phone" notification to the NRC Operations Center had not been made, attributing the lack of notification to confusion among he and his staff as to the proper interpretation of 10 CFR 50.72(a). After hearing the inspector's position regarding the matter, the Plant General Manager stated that he would confer further with his staff. Subsequently, at 2:00 p.m. on that same day (November 17, 1980) the Plant General Manager informed the inspector that he was proceeding to report the uncontrolled release as required by 10 CFR 50.72(a).

The investigators determined that the licensee's examination of the Roof Vent Monitors for the Unit 1 Reactor Building and both Unit 1 and 2 Turbine Buildings on November 17, 1980, revealed that they too were in varying states of disrepair. All were repaired and returned to service on November 18, 1980; however, even though the monitors were not functioning properly for a period in excess of 24-hours, no isokinetic grab samples were taken as required by ETS 3.5.2b. This is a violation.

During the course of the investigation, two additional instances of failure to comply with ETS 3.5.2b occurred. In one instance the Unit 1 Reactor Building Roof Vent monitor was operated from 8:36 a.m. on December 11, 1980 until 11:19 a.m. December 15, 1980 without a filter for collecting particulate radioactivity and daily grab samples were not taken. In the other instance, the main off-gas vent (stack) monitor was inoperable from 5:36 p.m. on December 15, 1980 to 2:05 p.m. on December 22, 1980, due to a pump malfunction and again, no grab samples were taken. In both of these cases it was felt that the licensee had sufficient information available to have detected the failures shortly (no more than 24-hours) after they occurred.

With regard to the required grab samples, it should be noted that Note 5 of ETS Table 3.5.2 states that to be representative of the average quantities and concentrations of radioactive materials in particulate form released in gaseous effluents, samples should be collected in proportion to the rate flow of the effluent stream (i.e., isokenetic). Further, the bases of ETS 3.5.2 states that the sampling and monitoring requirements of ETS 3.5.2 provide assurance that radioactive materials released in gaseous wastes are properly controlled and monitored in conformance with General Design Criteria 60 and 64 of Appendix A to 10 CFR 50. Collectively, these two criteria require among other things that the nuclear power plant design shall provide means of monitoring effluent discharge paths for radioactivity and suitably controlling the release of radioactive materials in gaseous and liquid effluents. In that the Chemistry

Foreman stated to the inspector (during their conversation of November 16, 1980, referenced above) that no provision existed for obtaining an isokenetic sample from the Reactor Building Roof Vents, this matter is designated an Unresolved Item pending further inspection and review by the NRC.

One additional problem associated with the operation of the Reactor Building Roof Vent Monitors came to the investigators' attention during the inspection. Various licensee personnel indicated that difficulties had been encountered in maintaining the alarm setpoint of these monitors at the proper setting, pointing out that several times the control was found at the maximum setting (off-scale high). The alarm setpoint control is located in the control room and some of the individuals contacted by the investigators attributed the problem to control room personnel changing the setpoint to remove and/or prevent "nuisance" alarms when operating near the normal setpoint value. The investigators learned that a Chemistry Supervisor, becoming frustrated with repeated failures in attempts to stop this unauthorized changing of the setpoints, actually initiated paperwork under the license's procedures for complying with 10 CFR 21, in an attempt to force resolution of the issue. While the repeated findings of the setpoint control in the wrong position were obviously not the result of a malfunction of the control itself (which might be defined as a defect under Part 21), licensee personnel eventually completed the required evaluation and the investigators did not take issue with the final disposition; however, two areas of concern to the investigators were identified. These were: (1) the length of time required to perform the evaluation; and (2) the Plant General Manager's lack of knowledge regarding the issue.

Regarding the former, the investigators learned that the form identifying the problem was initiated in January 1980 and final resolution did not occur until November 16, 1980. It was noted that a first evaluation was completed around June 1980, but the analytical methods and assumptions were questioned and a second evaluation was performed, being completed around September 1980. While Part 21 does not establish time limits for conducting the required evaluations, the nine months required to complete the evaluation in this case does not appear to be in keeping with the purpose and intent of 10 CFR 21 and is therefore, unacceptable.

Regarding the Plant General Manager's knowledge regarding this particular issue, it was noted that he is supposed to function as the Chairman of the Plant Nuclear Safety Committee (PNSC) and the PNSC serves in an advisory capacity to him, and even though this particular issue had been discussed by the PNSC on at least two different occasions, the Plant General Manager

stated that he did not become aware of the matter until it was mentioned to him by the investigators on November 21, 1980. This raises concerns both with regard to the day-to-day functioning of the PNSC and with the adequacy of communications between the Plant General Manager and members of his staff, particularly those who also function as members of the PNSC.

While the investigation did not establish noncompliance with NRC requirements, both of these concerns were discussed with licensee management during meetings in the Region II office on March 30 and May 8, 1981. The license was also informed that functioning of the PNSC would be reviewed in depth during a future inspection.

3. Pipe Tunnel Flooding

In reviewing various plant logs in connection with investigative activities associated with the Auxiliary Boilers, the investigators noted various Rad Waste Log entries referencing apparent problems of water accumulating in tunnels. This problem was discussed in interviews of BSEP staff members including the Plant General Manager, the Director, BSEP-NSQA, and the Manager, Technical and Administration (T&A). All indicated awareness that a problem of radwaste tank overflows and floor drain back-ups had existed for several years and attributed the problem to design of the Radwaste system and occasional equipment breakdown. The Manager, T&A indicated that, although the water level in the radwaste tunnels fluctuated (to a high of several feet in past years and a current occasional high of 10-14 inches), the condition was viewed as a continuous problem. He concurred with the investigators' characterization of the situation, stating that "storage" was probably a fair assessment of it. Other BSEP staff members viewed the situation as only an occasional irritant and not of a continuous nature. However, several staff members described alterations made to equipment located in the tunnels (e.g., relocation of electrical wiring and solenoid operated values, etc.) that were required due to the presence of the accumulated liquids.

This problem of recurring accumulation and retention of radioactive liquids in piping tunnels was addressed during the Health Physics Appraisal inspection conducted at BSEP on December 8-19, 1980, was documented in IE Report No. 50-325/80-45, and will be tracked through resolution as Followup Item No. 80-45-29.

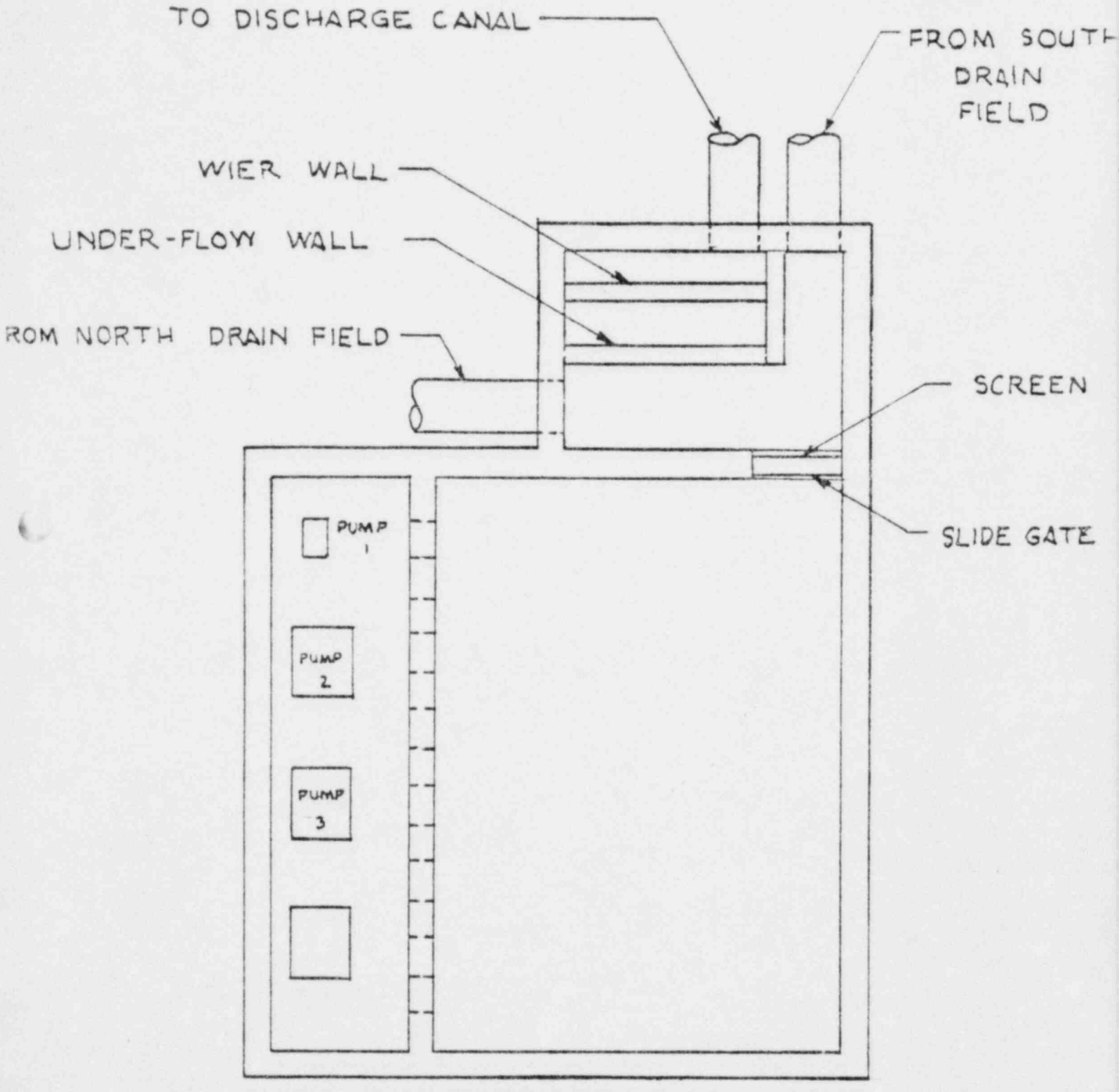

FIGURE 2 PUMP BASIN - PLAN

EXHIBIT 1

SCALE : $\frac{1}{8}$" = 1'-0"

RDS

FIGURE 1: STORM DRAIN / STABILIZATION POND SYSTEM

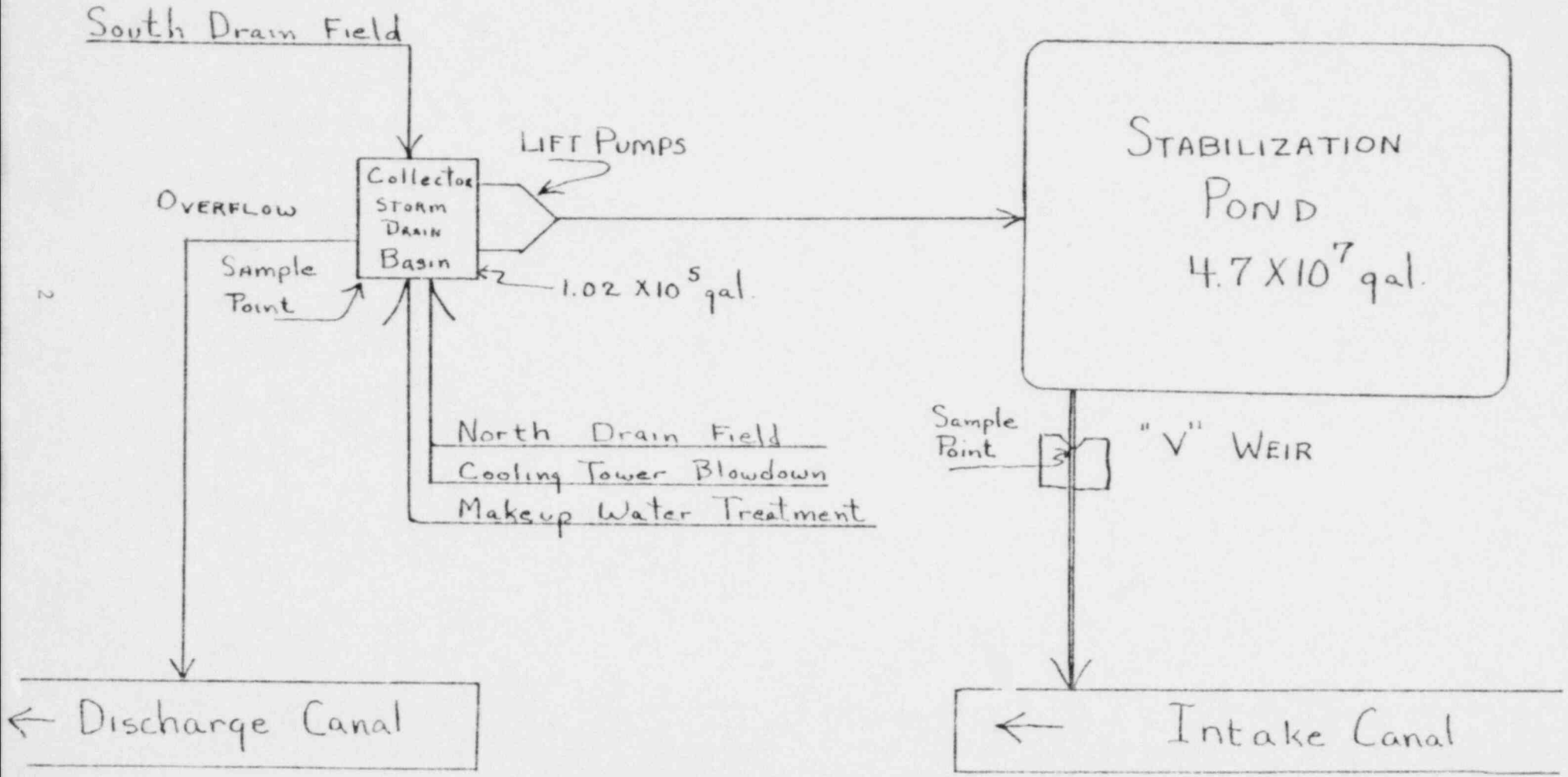

EXHIBIT 2