KAERI/TR-2796/2004

월성 3호기 이상유동 채널 핵연료의 건전성 평가를 위한 후보 평가대상 채널 선정

KAERI

2004. 7.

한국원자력연구소

KAERI/TR-2796/2004
[기 술 보 고 서]

제 출 문

한국원자력연구소장 귀하

본 보고서를 2004 년도 “이상유동 핵연료관 건전성 평가 기술 개발” 과제 중 수행된 결과를 다음과 같은 기술보고서로 제출합니다.

제목 : 월성 3호기 이상유동 채널 핵연료의 건전성 평가를 위한 후보 평가대상 채널 선정

2004. 7. 27.

주저자 : 전지수(미래형원자로연료개발부 : 선임연구원)
공저자 : 조문성(미래형원자로연료개발부 : 책임연구원)

KAERI/TR-2796/2004
[기 술 보 고 서]

월성 3호기 이상유동 채널 핵연료의 건전성 평가를 위한 후보 평가대상 채널 선정

전 지 수, 조 문 성

2004. 7.

이상유동 핵연료관 건전성 평가 기술 개발 과제

한국원자력연구소

요 약 문

본 보고서는 중수로 원자로에서 이상유동 채널의 핵연료 건전성을 평가하기 위해 월성 3호기 후보 평가대상 채널군을 선정하였다. 먼저, 월성 3호기 CIGAR 작업 일정을 고려하여 KNFC 신연료의 입고전 검사, 신연료 장전, 방출 연료의 저장, 육안 검사 및 제원 측정 계획 등과 같은 세부 업무 일정표를 작성하였다. 이 일정표에 의하면 검사 신연료를 장전하기 앞서 이상유동을 갖는 후보 평가대상 채널군을 제안할 필요가 있다. 후보 평가대상 채널 선정을 위해 2001년 5월부터 2002년 12월까지 매월 1회 측정된 월성 3호기 운전 자료를 NUCIRC 전산코드에 적용하여 채널 유량 및 채널 출구 건도 분포를 계산하였다. 매월 계산된 자료에서 채널출구 건도가 0.2% 이상이고 채널출력과 유량이 각각 6300 kW 및 25.5 kg/s 보다 큰 고출력 후보 채널과 채널출력이 4800 kW 보다 크고 5300 kW 보다 작은 저출력 후보 채널을 분류하였다. 이들 후보 채널군 자료를 바탕으로 발생 빈도가 많은 채널 순서대로 분류하여 고출력 채널에서는 O16 채널 외 30개 채널과 저출력 채널에서는 D17 채널 외 10개 채널을 후보 평가대상 채널군으로 제안하였다.

SUMMARY

This report intends to select the test channel groups in the Wolsong-3 reactor for the evaluation of PHWR fuel integrity in the two phase flow condition. First, a detailed work schedule for fuel inspection, fuel loading, storage of the discharged fuel, and in-bay visual and dimensional examination was established on the CIGAR work plan of the Wolsong-3 reactor. According to the schedule, it is necessary to suggest the appropriate test channel groups with two phase flow before the new fuel loading. For the selection of the test channel groups, the distributions of the channel flow rate and the channel exit quality are calculated by the NUCIRC code with the monthly measured operation data of the Wolsong-3 reactor during May 2001 to December 2002. The monthly calculated data could sort out the channels with the channel exit quality greater than 0.2%, in the high power channels with the power higher than 6300 kW and the flow rate greater than 25.5 kg/s, and in the low power channels with the power higher than 4800 kW and less than 5300 kW. Based on the frequency rank of these sorted channels, O16 channel with thirty other channels in the high power region and D17 channel with ten other channels in the low power region are suggested as the test channel groups.

목 차

Pages

요약문----------(i)
summary----------(ii)
목차----------(iii)
표목차----------(v)
그림목차----------(vi)
1. 서론----------(1)
2. 월성 3호기 CIGAR 작업 일정과 연계된 이상유동 핵연료의 건전성
평가 업무 세부 일정표----------(2)
2.1 개요----------(2)
2.2 KNFC 신연료의 입고전 검사 및 월성 입고----------(2)
2.3 CIGAR 작업 대상외 채널에서 신연료 장전, 방출 연료의 저장,
육안 검사 및 제원 측정 계획----------(3)
가. 신연료 장전 및 방출된 기존 연료의 저장----------(3)
나. 정상 핵연료 교체 및 방출된 신연료의 저장----------(4)
2.4 CIGAR 작업 대상 2개 채널에서 신연료 장전, 방출 연료의 저장,
육안 검사 및 제원 측정 계획----------(6)
가. CIGAR 작업 대상 2개 채널의 장전 일정 선정----------(6)
나. 신연료 장전 및 방출된 연료의 저장----------(6)
2.5 세부 일정표----------(7)
가. In-Bay Inspection 장비를 이용한 육안 검사 및 제원 측정
일정표----------(7)
나. 총괄 업무 세부 일정표----------(8)
3. 후보 평가대상 채널 선정을 위한 월성 3호기 운전 자료 분석----------(9)
3.1 개요----------(9)
3.2 원자로 모관 열수력 경계 조건----------(9)
3.3 채널 유량 및 채널 출구 건도 분포 계산 결과----------(14)
3.4 이상유동 채널 후보군 선정 결과----------(66)
가. 매월 이상유동 채널 후보군 자료----------(66)
나. 평가대상 후보 이상유동 채널 선정----------(79)
4. 결론----------(84)
참고문헌----------(85)

표 목 차

Pages

표 1. Monthly Operation Data of Wolsung-3 Reactor during May 2001 to December 2002----------(10)

표 2-1. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 May----------(67)

표 2-2. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 July----------(67)

표 2-3. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 August----------(68)

표 2-4. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 September----------(68)

표 2-5. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 October----------(69)

표 2-6. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 November----------(69)

표 2-7. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 December----------(70)

표 2-8. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 January----------(70)

표 2-9. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 February----------(71)

표 2-10. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 March----------(71)

표 2-11. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 April----------(72)

표 2-12. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 May----------(73)
표 2-13. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 July----------(74)
표 2-14. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 August----------(75)
표 2-15. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 September----------(76)
표 2-16. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 November----------(77)
표 2-17. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 December----------(78)
표 3. The Choice Groups for Two Phase Flow Channel in the Wolsong-3 Reactor----------(84)

그 림 목 차

Pages

그림 1. RIH and ROH Temperature Data of Wolsung-3 Reactor during May 2001 to December 2002----------(11)
그림 2. RIH and ROH Pressure Data of Wolsung-3 Reactor during May 2001 to December 2002----------(12)
그림 3. Header-to-Header Pressure Drop Data of Wolsung-3 Reactor during May 2001 to December 2002----------(13)

그림 4-1.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 May (CASE-0105)----------(15)
그림 5-1.Channel Power in the Wolsong-3 Reactor on 2001 May----------(16)
그림 6-1.Channel Flow Rate in the Wolsong-3 Reactor on 2001 May------(16)
그림 7-1.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 May----------(17)
그림 8-1.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 May----------(17)

그림 4-2.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 July (CASE-0107)----------(18)
그림 5-2.Channel Power in the Wolsong-3 Reactor on 2001 July---------(19)
그림 6-2.Channel Flow Rate in the Wolsong-3 Reactor on 2001 July-----(19)
그림 7-2.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 July----------(20)
그림 8-2.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 July----------(20)

그림 4-3.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 August (CASE-0108)----------(21)
그림 5-3.Channel Power in the Wolsong-3 Reactor on 2001 August-------(22)
그림 6-3.Channel Flow Rate in the Wolsong-3 Reactor on 2001 August---(22)
그림 7-3.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 August----------(23)
그림 8-3.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 August----------(23)

그림 4-4.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 September (CASE-0109)----------(24)
그림 5-4.Channel Power in the Wolsong-3 Reactor on 2001 September----(25)
그림 6-4.Channel Flow Rate in the Wolsong-3 Reactor on 2001 September ----------(25)
그림 7-4.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 September----------(26)
그림 8-4.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 September----------(26)

그림 4-5. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 October (CASE-0110)----------(27)
그림 5-5.Channel Power in the Wolsong-3 Reactor on 2001 October------(28)
그림 6-5.Channel Flow Rate in the Wolsong-3 Reactor on 2001 October ----------(28)
그림 7-5.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 October----------(29)
그림 8-5.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 October----------(29)

그림 4-6.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 November (CASE-0111)----------(30)
그림 5-6.Channel Power in the Wolsong-3 Reactor on 2001 November-----(31)
그림 6-6.Channel Flow Rate in the Wolsong-3 Reactor on 2001 November ----------(31)
그림 7-6.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 November----------(32)
그림 8-6.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 November----------(32)

그림 4-7.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 December (CASE-0112)----------(33)
그림 5-7.Channel Power in the Wolsong-3 Reactor on 2001 December-----(34)
그림 6-7.Channel Flow Rate in the Wolsong-3 Reactor on 2001 December ----------(34)

그림 7-7.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 December----------(35)
그림 8-7.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 December----------(35)

그림 4-8.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 January (CASE-0201)----------(36)
그림 5-8.Channel Power in the Wolsong-3 Reactor on 2002 January------(37)
그림 6-8.Channel Flow Rate in the Wolsong-3 Reactor on 2002 January ----------(37)
그림 7-8.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 January----------(38)
그림 8-8.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 January----------(38)

그림 4-9.Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 February (CASE-0202)----------(39)
그림 5-9.Channel Power in the Wolsong-3 Reactor on 2002 February-----(40)
그림 6-9.Channel Flow Rate in the Wolsong-3 Reactor on 2002 February ----------(40)
그림 7-9.Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 February----------(41)
그림 8-9.Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 February----------(41)

그림 4-10. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 March (CASE-0203)----------(42)
그림 5-10. Channel Power in the Wolsong-3 Reactor on 2002 March--------(43)
그림 6-10. Channel Flow Rate in the Wolsong-3 Reactor on 2002 March----(43)
그림 7-10. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 March----------(44)
그림 8-10. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 March----------(44)

그림 4-11. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 April (CASE-0204)----------(45)

그림 5-11. Channel Power in the Wolsong-3 Reactor on 2002 April--------(46)
그림 6-11. Channel Flow Rate in the Wolsong-3 Reactor on 2002 April----(46)
그림 7-11. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 April----------(47)
그림 8-11. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 April----------(47)

그림 4-12. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 May (CASE-0205)----------(48)
그림 5-12. Channel Power in the Wolsong-3 Reactor on 2002 May----------(49)
그림 6-12. Channel Flow Rate in the Wolsong-3 Reactor on 2002 May------(49)
그림 7-12. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 May----------(50)
그림 8-12. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 May----------(50)

그림 4-13. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 July (CASE-0207)----------(51)
그림 5-13. Channel Power in the Wolsong-3 Reactor on 2002 July---------(52)
그림 6-13. Channel Flow Rate in the Wolsong-3 Reactor on 2002 July-----(52)
그림 7-13. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 July----------(53)
그림 8-13. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 July----------(53)

그림 4-14. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 August (CASE-0208)----------(54)
그림 5-14. Channel Power in the Wolsong-3 Reactor on 2002 August-------(55)
그림 6-14. Channel Flow Rate in the Wolsong-3 Reactor on 2002 August---(55)
그림 7-14. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 August----------(56)
그림 8-14. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 August----------(56)

그림 4-15. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 September (CASE-0209)----------(57)

그림 5-15. Channel Power in the Wolsong-3 Reactor on 2002 September----(58)
그림 6-15. Channel Flow Rate in the Wolsong-3 Reactor on 2002 September ----------(58)
그림 7-15. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 September----------(59)
그림 8-15. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 September----------(59)

그림 4-16. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 November (CASE-0211)----------(60)
그림 5-16. Channel Power in the Wolsong-3 Reactor on 2002 November-----(61)
그림 6-16. Channel Flow Rate in the Wolsong-3 Reactor on 2002 November ----------(61)
그림 7-16. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 November----------(62)
그림 8-16. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 November----------(62)

그림 4-17. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 December (CASE-0212)----------(63)
그림 5-17. Channel Power in the Wolsong-3 Reactor on 2002 December-----(64)
그림 6-17. Channel Flow Rate in the Wolsong-3 Reactor on 2002 December ----------(64)
그림 7-17. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 December----------(65)
그림 8-17. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 December----------(65)

그림 9. The Probability for Two Phase Flow in the High Power Channels (Continued)----------(80)
그림 9. The Probability for Two Phase Flow in the High Power Channels (Continued)----------(81)
그림 9. The Probability for Two Phase Flow in the High Power Channels ----------(82)
그림 10. The Probability for Two Phase Flow in the Low Power Channels ----------(83)

1. 서론

CANDU 원자로는 정상운전 중에서도 많은 핵연료채널의 출구 하류 영역에서 냉각수에 액체(liquid)와 기포(vapor)가 공존하는 이상류(two phase flow)가 발생하는 특성이 있다. 이상류 유동은 일반적으로 핵연료다발의 건전성에 유해한 진동, 피로(fatigue) 및 마모 손상(fretting wear)을 보다 많이 유발시키는 것으로 예상된다. 핵연료다발의 과도한 진동은 핵연료 피복관의 피로, 압력관의 내표면 마모, 연료다발의 지지체(bearing pad) 및 간격체(spacer)의 마모 손상 등을 유발하여 핵연료다발 및 압력관의 건전성을 저해하고 궁극적으로 원전 안전성을 위협하게 된다.

현재까지 국내외적으로 24 kg/s 이상의 고유량 이상유동 핵연료채널의 핵연료다발 및 압력관 내표면 마모량에 대한 정량적인 자료가 없는 상태이다. 중수원전 핵연료관의 고유량 이상유동을 모사할 수 있는 노외 시험 시설이 현재 국내외적으로 존재하지 않고, 또한 그 시설 설계·제작의 난점을 고려하면 가동중 중수원전 이상유동 핵연료채널에서 핵연료 장전 전후 핵연료다발 및 압력관 마모량을 측정하는 것이 보다 경제적이고 실제 원전 평가 자료를 제시함으로써 평가 결과의 신뢰도를 제고할 것으로 사료된다. 이에 따라, 2001년도부터 한국원자력연구소는 과학기술부 정부중장기개발 원전성능개선 분야 과제인 “이상유동 핵연료관 건전성 평가 기술 개발”을 수행하고 있으며, 본 과제에서 핵연료다발의 마모량은 “월성 3호기 이상유동 채널에 장전된 후 방출된 핵연료의 육안검사 및 제원 측정”을 수행하여 정량화할 것이며 압력관의 마모량은 월성 3호기 제 5차 계획예방정비 기간에 수행되는 “채널 압력관 CIGAR 측정” 자료를 활용할 계획이다.

본 보고서는 월성 3호기 CIGAR 작업 일정을 고려하여 이상유동 채널에 장전된 후 방출된 핵연료의 육안검사 및 제원 측정 업무의 세부 일정 계획을 작성하였다. 일정표에 의하면 KNFC 신연료 36개 다발을 장전 전에 정밀 제원 측정하고, 이들 다발을 3개 고출력 및 1개 저출력 채널에 장전 조사후 방출된 사용후 연료를 수중에서 정밀 제원 측정을 수행할 예정이다. 검사 핵연료가 장전될 후보 채널군을 선정하기 위해 2001년 5월부터 2002년 12월까지 월성 3호기 운전 자료를 바탕으로 NUCIRC 코드[1]를 이용하여 채널 유량 및 출구 건도 분포를 계산하고 채널의 이상유동 빈도를 조사하였으며, 저출력 채널에서 D17 외 10개 채널과 고출력 채널에서 O16 외 30개 채널을 후보 채널로 제시하였다.

2. 월성 3호기 CIGAR 작업 일정과 연계된 이상유동 핵연료의 건전성 평가 업무 세부 일정표

2.1 개요

2001년도부터 한국원자력연구소는 과학기술부 정부중장기개발 원전성능개선 분야 과제인 “이상유동 핵연료관 건전성 평가 기술 개발”을 수행하고 있으며, 본 과제의 주요 연구개발 목표 및 내용에 “월성 3호기 이상유동 채널에 장전된 후 방출된 핵연료의 육안검사 및 제원 측정”과 한수원(주)에 위탁한 “채널 압력관 CIGAR 측정”이 포함되어있다. 최근, 월성 3호기의 CIGAR 작업 예상 일정이 확정되어 제 5차 계획예방정비 기간 중인 2004.12.20～2005.1.09 에 월성 3호기 4개 채널(O-08,O-14,Q-11,U-11)의 압력관 CIGAR 측정이 계획되어 있다. 이 CIGAR 작업 일정을 고려하여 “월성 3호기 이상유동 채널에 장전된 후 방출된 핵연료의 육안검사 및 제원 측정”을 효율적으로 수행하기 위한 세부 일정표를 작성하였다. 세부 일정표는 KNFC 신연료 입고전 검사, CIGAR 작업 대상외 채널의 신연료 장전, 기존 연료 및 신연료의 방출 및 저장, 육안 검사 및 제원 측정에 상세한 계획뿐만 아니라 CIGAR 작업 대상 2 개 채널의 선정, 신연료 장전, 신연료 방출 및 저장, 육안 검사 및 제원 측정에 상세한 계획을 기술하고자 한다.

2.2 KNFC 신연료의 입고전 검사 및 월성 입고

- In-bay Inspection 장비 제작 완료 :
  - 2003년 12월 30일까지 제작하여 KAERI에서 검수 완료

- KNFC 신연료의 제원 측정 :
  - 한국원자력연구소 인력이 수행
  - 1 box에 들어 있는 fresh 36개 다발의 제원을 In-bay Inspection 장비를 사용하여 측정할 것이며 이중 32개 다발은 CIGAR 작업 대상외 채널 4개 채널에 장전될 것이며 나머지 4개 다발은 CIGAR 작업 대상 2 개 채널에 각각 2다발씩 장전할 예정임
  - 2004년 1월 3일～2004년 2월 5일에 걸쳐 제원 측정 작업 완료

- KNFC 신연료의 월성 입고 :
  - 2004년 KNFC의 정기적 1분기 신연료 월성 입고 (2004년 2월~3월 예정)
  - 따라서, 2004년 2월 23일~2004년 2월 28일 사이에 월성 입고 예정

2.3 CIGAR 작업 대상외 채널에서 신연료 장전, 방출 연료의 저장, 육안 검사 및 제원 측정 계획

가. 신연료 장전 및 방출된 기존 연료의 저장

1) 신연료 장전이전 상태 :

→ flow

1-old	2-old	3-old	4-old	5-old	6-old	7-old	8-old	9-old	10-old	11-old	12-old

2) 8 개 신연료 장전 :

- 2004년 3월까지 CIGAR 대상외 후보 채널 군 제안
- 2004년 4월에 3개 고출력 채널(CH-1, CH-2, CH-3)과 1개 저출력 채널(CH-4)에 각각 신연료 8개씩 총 32 개 다발 장전

→ flow

1-new	2-new	3-new	4-new	5-new	6-new	7-new	8-new	1-old	2-old	3-old	4-old

- 2004년 4월에 4개 채널(CH-1, CH-2, CH-3, CH-4)에서 방출된 기존 연료 각각 2개씩 총 8 개 다발을 S/F Reception Bay에 저장 보관함

11-old	12-old

: 2004년 10월에 In-Bay Inspection 후에 Reception Bay에서 수중 storage로 방출

나. 정상 핵연료 교체 및 방출된 신연료의 저장

1) 고출력(CH-1, CH-2, CH-3) 채널의 핵연료교체 :

- 핵연료교체전 상태

→ flow

1-new	2-new	3-new	4-new	5-new	6-new	7-new	8-new	1-old	2-old	3-old	4-old

- 1-st 핵연료교체 : 2004년 10월에 예정

→ flow

37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	1-new	2-new	3-new	4-new

- 2004년 10월에 3개 채널(CH-1, CH-2, CH-3)에서 방출된 신연료 2개씩(high bundle power) 총 6 개 다발을 S/F Reception Bay에 저장 보관함

6-new	7-new

: 2005년 6월에 In-Bay Inspection 후에 Reception Bay에서 수중 storage로 방출

- 2-nd 핵연료교체 : 2005년 5월에 예정

→ flow

37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele

- 2005년 5월에 방출된 신연료 2개씩(two-phase region) 총 6 개 다발을 S/F Reception Bay에 저장 보관함

3-new	4-new

: 2006년 2월에 In-Bay Inspection 후에 Reception Bay에서 수중 storage로 방출

2) 저출력(CH-4) 채널의 핵연료교체 :

- 핵연료교체전 상태

→ flow

1-new	2-new	3-new	4-new	5-new	6-new	7-new	8-new	1-old	2-old	3-old	4-old

- 1-st 핵연료교체 : 2004년 12월에 예정

→ flow

37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	1-new	2-new	3-new	4-new

- 2004년 12월에 CH-4 채널에서 방출된 신연료 (high bundle power) 총 2개 다발을 S/F Reception Bay에 저장 보관함

6-new	7-new

: 2005년 6월에 In-Bay Inspection 후에 Reception Bay에서 수중 storage로 방출

- 2-nd 핵연료교체 : 2005년 8월에 예정

→ flow

37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele

- 2005년 8월에 방출된 신연료 총 2개 다발(two-phase region)을 S/F Reception Bay에 저장 보관함

3-new	4-new

: 2006년 2월에 In-Bay Inspection 후에 Reception Bay에서 수중 storage로 방출

2.4 CIGAR 작업 대상 2개 채널에서 신연료 장전, 방출 연료의 저장, 육안 검사 및 제원 측정 계획

가. CIGAR 작업 대상 2개 채널의 장전 일정 선정

나머지 4개 신연료 다발이 장전될 CIGAR 작업 대상 2 개 채널(Q-11, O-08)은 제 5차 계획예방정비 기간 2004.12.20~2005.1.09 중에 압력관 내경 측정을 완료하고 원자로 re-start한 후 처음 핵연료교체 시점인 2005년 7월에 신연료를 장전할 예정임

나. 신연료 장전 및 방출된 연료의 저장

1) 신연료 장전이전 상태 :

→ flow

1-old	2-old	3-old	4-old	5-old	6-old	7-old	8-old	9-old	10-old	11-old	12-old

2) 2005년 7월에 2개 신연료를 2개 채널(Q-11, O-08)에 각각 장전 :

→ flow

37-ele	37-ele	3-new	4-new	37-ele	37-ele	37-ele	37-ele	1-old	2-old	3-old	4-old

3) 1-st 핵연료교체 : 2006년 1월에 예정

→ flow

37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	3-new	4-new

4) 2-nd 핵연료교체 : 2006년 7월에 예정

→ flow

37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele	37-ele

- 2006년 7월에 2개 채널(Q-11, O-08)에서 방출된 신연료 총 4 개 다발을 S/F Reception Bay에 저장 보관함

3-new	4-new

: 2007년 1월에 In-Bay Inspection 후에 Reception Bay에서 수중 storage로 방출

2.5 세부 일정표

가. In-Bay Inspection 장비를 이용한 육안 검사 및 제원 측정 일정표

검사 날짜	총 검사 다발 개수	다발 방출 이력
2004년 10월	8개	8개 : 2004년 4월에 채널(CH-1, CH-2, CH-3, CH-4)에서 방출된 기존연료(11-old, 12-old) (6개월 저장)
2005년 6월	8개	6개 : 2004년 10월에 채널(CH-1, CH-2,CH-3) 에서 방출된 신연료(6-new, 7-new) (8개월 저장) 2개 : 2004년 12월 CH-4 채널에서 방출된 신연료(6-new, 7-new) (6개월 저장)
2006년 2월	8개	6개 : 2005년 5월에 채널(CH-1, CH-2,CH-3) 에서 방출된 신연료(3-new, 4-new) (9개월 저장) 2개 : 2005년 8월 CH-4 채널에서 방출된 신연료(3-new, 4-new) (6개월 저장)
2007년 1월	4개	4개 : 2006년 7월 (O-08,Q-11) 채널에서 방출된 신연료(3-new, 4-new) (6개월 저장)

나. 총괄 업무 세부 일정표

날짜	작업 업무 내용	주관
2003년 12월 30일	• In-Bay Inspection 장비 제작 KAERI 검수 완료	KAERI
2004년 1월 3일 ~ 2004년 2월 5일	• In-Bay Inspection 장비를 이용한 KNFC 신연료 36개 다발의 정밀 제원 측정	KAERI
2004년 2월 23일 ~ 2004년 2월 28일	• KNFC 신연료 36개 다발(1 box)을 월성 입고 예정 • KNFC에서 신연료 36개 다발의 정밀 제원 측정이 수행되지 않은 경우 월성 3호기 신연료저장고(S118)에서 정밀 제원 측정 수행(날짜는 조정)	KNFC/KHNP KAERI/KHNP
2004년 3월 1일 ~ 2004년 3월 31일	• CIGAR 대상외 신연료 장전 채널(CH-1, CH-2, CH-3, CH-4)선정을 위한 후보 채널 군 제안	KAERI
2004년 4월 1일 ~ 2004년 4월 30일	• W-3 정상 핵연료교체 계획과 후보 채널 군이 서로 일치하는 채널중에서 3 개 고출력 채널(CH-1, CH-2, CH-3)과 1개 저출력 채널(CH-4) 에 각각 8개씩 총 32개 신연료 다발 장전 - 방출된 기존연료(11-old, 12-old) 8다발을 reception bay에서 보관(6개월)	KHNP
2004년 9월 1일 ~ 2004년 9월 31일	• In-Bay Inspection 장비를 월성 3호기 이전 설치 및 장비 점검 완료	KHNP/KAERI
2004년 10월 1일 ~ 2004년 10월 30일	• 2004년 4월에 방출되어 reception bay에서 보관된 기존연료(11-old, 12-old) 8다발(6개월 저장)에 대한 In-Bay Inspection 검사 수행 - 검사 수행후 다발을 수중 storage로 방출	KHNP/KAERI
2004년 10월 1일 ~ 2004년 10월 30일	• 고출력 채널(CH-1, CH-2, CH-3)에 1-st 핵연료교체 예정 - 방출된 신연료(6-new, 7-new) 6다발을 reception bay에서 보관(8개월)	KHNP
2004년 12월 1일 ~ 2004년 12월 20일	• 저출력 채널(CH-4)에 1-st 핵연료교체 예정 - 방출된 신연료(6-new, 7-new) 2다발을 reception bay에서 보관(6개월)	KHNP
2004년 12월 20일 ~ 2005년 1월 9일	• 제 5차 계획예방정비 • CIGAR 대상 채널(O-08, O-14, Q-11, U-11)에서 모든 핵연료방출 • CIGAR 대상 채널 압력관 검사 수행	KHNP
2005년 5월 1일 ~ 2005년 5월 31일	• 고출력 채널(CH-1, CH-2, CH-3)에 2-nd 핵연료교체 예정 - 방출된 신연료(3-new, 4-new) 6다발을 reception bay에서 보관(9개월)	KHNP
2005년 6월 1일 ~ 2005년 6월 30일	• 2004년 10월과 12월에 고출력 채널(CH-1, CH-2, CH-3)과 저출력 채널(CH-4)에서 방출된 신연료(6-new, 7-new) 8개 다발에 대한 In-Bay Inspection 검사 수행 - 검사 수행후 다발을 수중 storage로 방출	KHNP/KAERI
2005년 7월 1일 ~ 2005년 7월 31일	• W-3 re-start 후 CIGAR 대상 채널(O-08, Q-11)에 처음 핵연료교체 예정이며 이때 신연료(3-new, 4-new) 각각 2다발씩 총 4개 다발 장전	KHNP
2005년 8월 1일 ~ 2005년 8월 31일	• 저출력 채널(CH-4)에 2-nd 핵연료교체 예정 - 방출된 신연료(3-new, 4-new) 2다발을 reception bay에서 보관(6개월)	KHNP
2006년 1월 1일 ~ 2006년 1월 31일	• CIGAR 대상 채널(O-08, Q-11)에 1-st 핵연료교체 예정	KHNP
2006년 2월 1일 ~ 2006년 2월 28일	• 2005년 5월과 8월에 고출력 채널(CH-1, CH-2, CH-3)과 저출력 채널(CH-4)에서 방출된 신연료(3-new, 4-new) 8개 다발에 대한 In-Bay Inspection 검사 수행 - 검사 수행후 다발을 수중 storage로 방출	KHNP/KAERI
2006년 7월 1일 ~ 2006년 7월 31일	• CIGAR 대상 채널(O-08, Q-11)에 2-nd 핵연료교체 예정 - 방출된 신연료(3-new, 4-new) 4다발을 reception bay에서 보관(6개월)	KHNP
2007년 1월 1일 ~ 2007년 1월 31일	• 2006년 7월 CIGAR 대상 채널(O-08, Q-11)에서 방출된 신연료(3-new, 4-new) 4개 다발에 대한 In-Bay Inspection 검사 수행 - 검사 수행후 다발을 수중 storage로 방출	KHNP/KAERI

3. 후보 평가대상 채널 선정을 위한 월성 3호기 운전 자료 분석

3.1 개요

앞서 기술된 “총괄 업무 세부 일정표”에 의하면 KNFC 신연료 36개 다발(1 box)을 월성 3호기에 장전 전에 정밀제원 측정을 수행한 후 2004년 4월 중에 3개 고출력 채널과 1개 저출력 채널에 장전할 계획이다. 검사 신연료는 월성 3호기 정상 핵연료교체 주기에 따라 장전 조사되며, 조사후 방출된 일부 사용후핵연료다발은 reception bay에서 약 6개월 정도 냉각 보관한 후 수중 육안검사 및 정밀제원 측정을 수행할 예정이다.

검사 핵연료는 월성 3호기 380 개 채널 중에서 이상유동이 발생하는 채널에 장전할 것이다. 이를 위해 2001년 5월부터 2002년 12월까지 월성 3호기 운전 자료를 바탕으로 NUCIRC 코드[1]를 이용하여 채널 유량 및 출구 건도 분포를 계산하고 채널 출구에서 이상유동 발생 빈도가 높은 채널을 조사하여 검사 핵연료가 장전될 후보 채널군으로 제시하였다.

3.2 원자로 모관 열수력 경계 조건

표 1 은 2001년 5월부터 2002년 12월까지 월성 3호기 매월 운전 자료로서 양단 모관에서 온도 및 압력 자료를 보여주고 있다. 그림 1에서 보는바와 같이 입구 모관의 온도는 평균 505°F～506°F 범위에서 일정하게 운전되었으며 출구 모관의 온도는 평균 586°F～591°F 범위에서 운전되었다. 그림 2와 그림 3은 입출구 모관에서 압력과 원자로 냉각수 path의 양단 모관사이 압력강하를 각각 보여주고 있다. 양단 모관 사이 압력강하는 입출구 자관, end fitting 및 핵연료채널의 수력적 저항 등에 의해 결정되는데 2001년 5월부터 2002년 12월까지 점차적 감소되는 경향을 보여주고 있고, path 23(RIH2_ROH3) 및 path 67(RIH6_ROH7)의 초기 몇 개월 압력강하 자료는 다른 path 에 비교해서 크게 나타났다. 이에 대한 정확한 이유는 추정할 수 없지만 본 계산에서는 매월 측정된 자료를 실제 운전 조건으로 가정하고 NUCIRC 코드에서 각 path 별로 경계 조건을 설정하여 채널 유량 및 건도 분포를 계산하였다.

표 1. Monthly Operation Data of Wolsung-3 Reactor during May 2001 to December 2002

			Header Temperature (F)					
Date / Item	T_RIH_2	T_RIH_4	T_RIH_6	T_RIH_8	T_ROH_1	T_ROH_3	T_ROH_5	T_ROH_7
May-01	504.38	505.17	504.51	504.65	589.33	590.12	590.79	586.65
Jul-01	504.38	505.24	504.70	504.79	588.44	587.26	589.81	589.83
Aug-01	504.47	505.29	504.79	504.84	587.24	586.67	590.26	590.37
Sep-01	504.36	505.24	504.76	504.75	588.26	584.23	591.76	590.09
Oct-01	504.41	505.29	504.90	504.84	588.81	585.88	591.93	588.70
Nov-01	504.43	505.33	505.01	504.93	588.26	583.86	591.82	587.85
Dec-01	504.43	505.30	505.00	504.91	587.55	584.82	590.58	588.50
Jan-02	504.45	505.35	505.16	505.00	588.38	584.25	589.50	589.19
Feb-02	504.55	505.47	505.18	505.02	588.36	583.44	590.75	589.26
Mar-02	504.55	505.46	505.18	505.07	587.33	585.06	591.62	588.82
Apr-02	504.55	505.51	505.19	505.16	587.33	581.81	591.42	586.84
May-02	504.53	505.46	505.23	505.22	586.67	582.34	591.20	588.11
Jul-02	505.18	506.27	506.03	506.12	587.99	589.48	591.44	590.07
Aug-02	505.34	506.40	506.20	506.18	587.62	587.51	590.51	589.47
Sep-02	505.39	506.42	506.39	506.23	587.45	590.15	591.36	590.09
Oct-02	505.38	506.44	506.34	506.28	587.93	589.24	591.31	590.10
Nov-02	505.45	506.50	506.32	506.28	588.03	588.46	591.16	589.18
Dec-02	505.47	506.58	506.40	506.38	587.90	588.74	590.65	589.75
Avg. Value	504.76	505.71	505.40	505.37	587.94	586.30	590.99	589.05
				505.31				588.57
				Header Pressure (psi)				
Date / Item	P_RIH_2	P_RIH_4	P_RIH_6	P_RIH_8	P_ROH_1	P_ROH_3	P_ROH_5	P_ROH_7
May-01	1643.85	1639.62	1647.02	1639.60	1446.56	1446.92	1445.57	1448.71
Jul-01	1644.28	1639.27	1647.76	1639.71	1446.34	1446.36	1445.93	1448.45
Aug-01	1643.92	1638.68	1647.81	1639.71	1446.33	1446.00	1445.74	1448.51
Sep-01	1642.90	1637.58	1646.89	1638.85	1445.47	1445.51	1445.36	1448.12
Oct-01	1636.96	1637.10	1638.71	1637.97	1445.11	1445.27	1444.81	1447.45
Nov-01	1636.23	1636.22	1638.10	1637.56	1444.23	1444.24	1444.46	1446.88
Dec-01	1635.36	1635.77	1637.40	1636.64	1444.02	1444.00	1444.09	1446.32
Jan-02	1633.91	1634.82	1636.46	1635.98	1443.25	1443.12	1443.30	1445.87
Feb-02	1634.13	1634.83	1636.04	1636.14	1443.74	1443.59	1443.78	1446.02
Mar-02	1633.77	1634.16	1635.20	1635.15	1443.36	1443.12	1442.79	1445.11
Apr-02	1632.46	1632.84	1634.50	1634.38	1441.97	1441.99	1442.27	1444.67
May-02	1631.74	1632.17	1633.75	1633.67	1441.42	1441.42	1441.73	1444.17
Jul-02	1633.77	1634.38	1633.27	1635.79	1445.97	1445.65	1446.95	1447.93
Aug-02	1633.62	1634.02	1632.52	1635.34	1445.47	1445.53	1445.89	1447.41
Sep-02	1632.97	1633.98	1632.91	1635.97	1444.58	1445.16	1445.98	1447.66
Oct-02	1632.24	1631.94	1631.71	1634.29	1442.32	1443.67	1444.34	1446.54
Nov-02	1632.46	1632.96	1632.20	1635.00	1443.74	1445.24	1445.43	1447.44
Dec-02	1631.30	1631.47	1630.37	1632.95	1442.20	1443.94	1444.00	1445.88
Avg. Value	1635.88	1635.10	1637.37	1636.37	1444.23	1444.48	1444.58	1446.84
				1636.18				1445.03
		Header-to-Header Pressure Drop (psi)						
Date / Item	DP_HH_23	DP_HH_41	DP_HH_67	DP_HH_85				
May-01	196.93	193.06	198.31	194.03				
Jul-01	197.92	192.93	199.30	193.78				
Aug-01	197.92	192.35	199.31	193.97				
Sep-01	197.39	192.12	198.77	193.49				
Oct-01	191.69	191.99	191.26	193.15				
Nov-01	191.99	191.99	191.21	193.10				
Dec-01	191.37	191.75	191.08	192.55				
Jan-02	190.79	191.57	190.59	192.68				
Feb-02	190.54	191.09	190.02	192.36				
Mar-02	190.64	190.80	190.09	192.36				
Apr-02	190.48	190.86	189.83	192.10				
May-02	190.31	190.75	189.58	191.95				
Jul-02	188.12	188.41	185.34	188.85				
Aug-02	188.10	188.55	185.10	189.45				
Sep-02	187.80	189.39	185.25	189.99				
Oct-02	188.57	189.62	185.17	189.95				
Nov-02	187.22	189.22	184.76	189.56				
Dec-02	187.36	189.27	184.48	188.95				
Avg. Value	191.40	190.87	190.53	191.79				
				191.15				

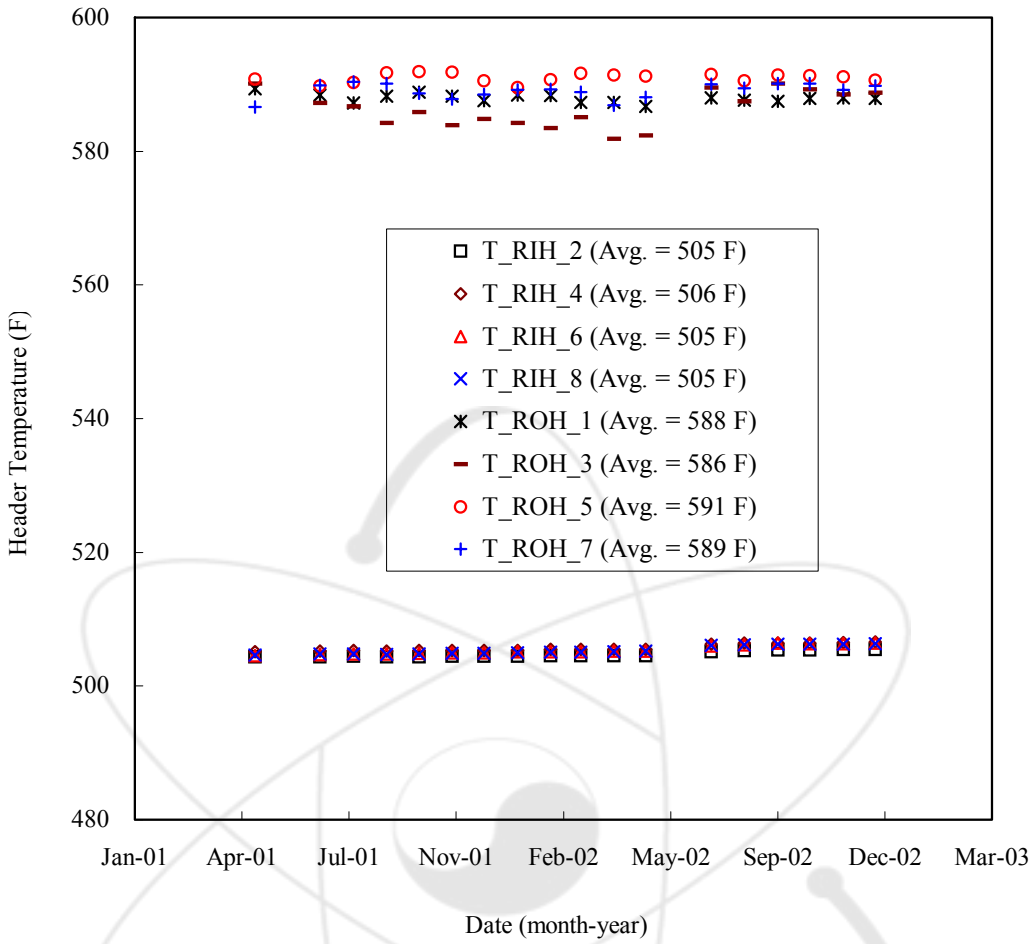


그림 1. RIH and ROH Temperature Data of Wolsung-3 Reactor during May 2001 to December 2002

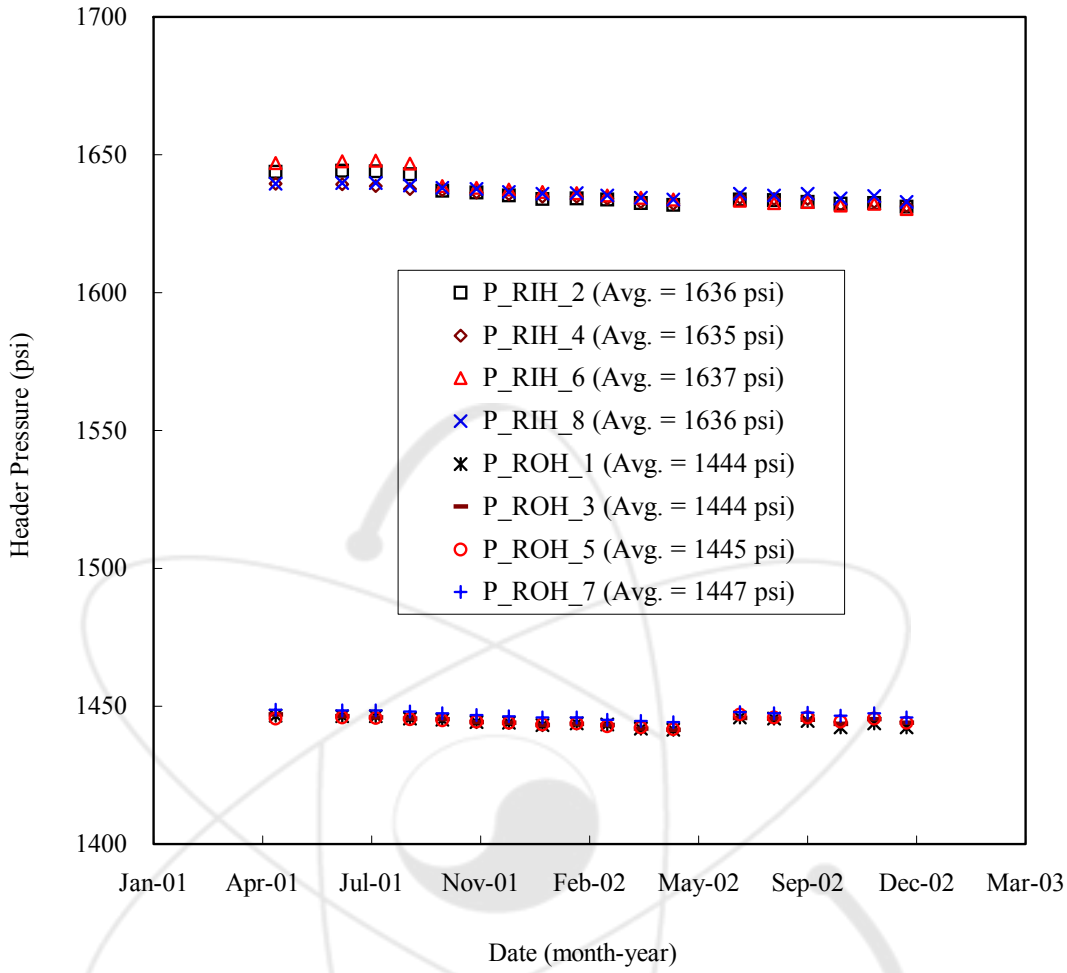


그림 2. RIH and ROH Pressure Data of Wolsung-3 Reactor during May 2001 to December 2002

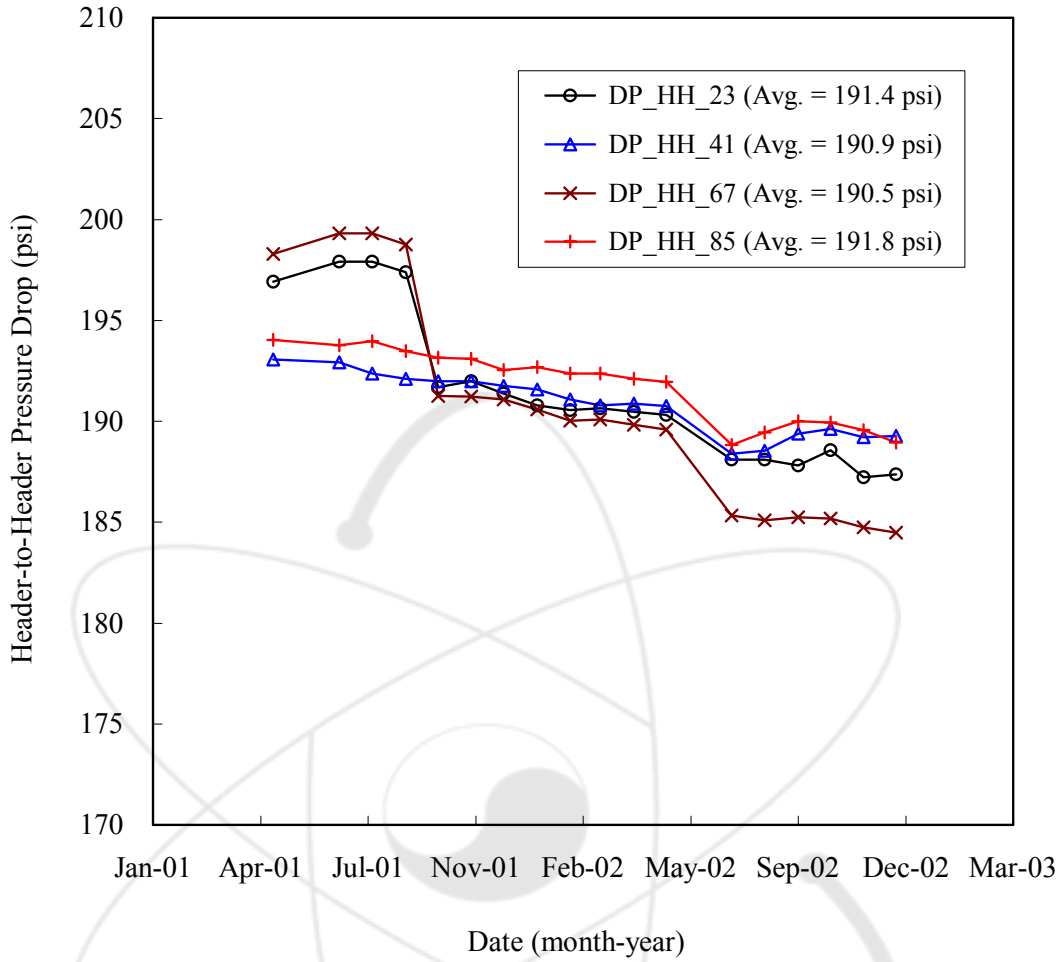
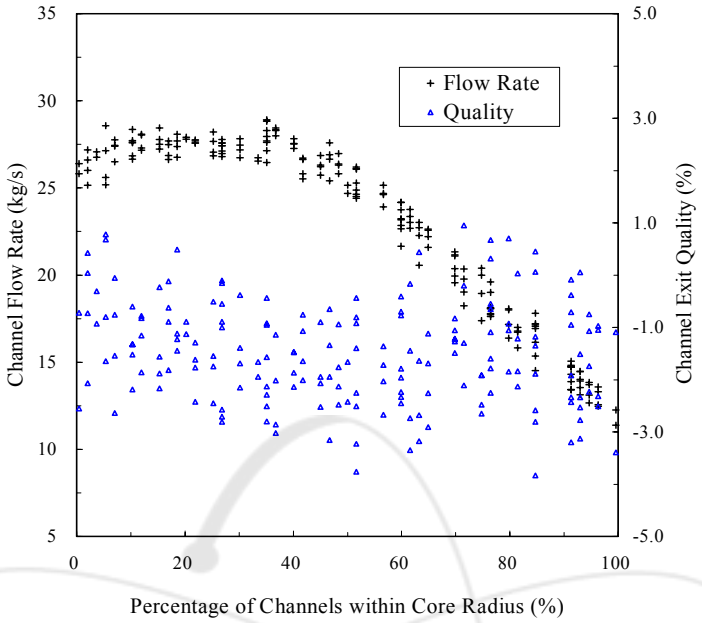


그림 3. Header-to-Header Pressure Drop Data of Wolsung-3 Reactor during May 2001 to December 2002

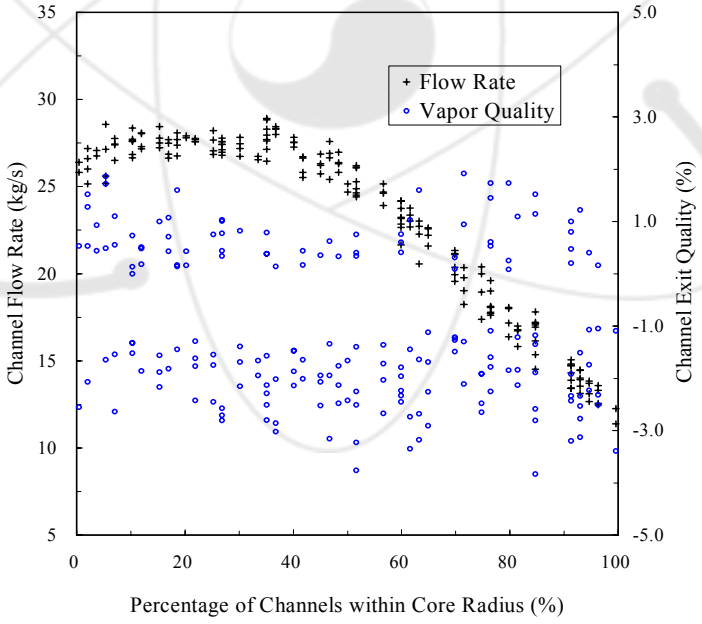
3.3 채널 유량 및 채널 출구 건도 분포 계산 결과

그림 4-1는 표 1에서 2001년 5월 월성 3호기 운전 자료와 그림 5-1의 채널 출력 분포자료를 NUCIRC 코드에 적용하여 계산된 채널 유량과 출구 건도 분포를 원자로 중심에서 각 채널 위치까지 거리에 따라서 도식적으로 나타내고 있으며, 이 그림의 (a) 및 (b)는 각각 열역학적 평형 건도와 기포의 질량 건도를 기준으로 표시하였다. 그림 6-1, 그림 7-1 및 그림 8-1 는 채널 유량, 채널 출구의 열역학적 평형 건도 및 기포의 질량 건도 값들을 채널 지도(channel map) 위에 명시하였다. CANDU-6 원자로는 매일 가동중 핵연료 교체(On power refueling)를 하므로 채널출력 분포 및 원자로 운전조건 등이 시시각각 약간씩 변동한다. 따라서 계산은 앞서 그림 1,그림 2 및 그림 3에서 보는바와 같이 매월 1회 측정된 운전 자료와 이때의 출력 자료를 NUCIRC 코드에 적용하여 계산하였으며 각각의 결과 그림은 그림 4- 번호에 매월 순서대로 1에서 17까지 번호를 부여하였다.

그림 4-1에서 보는바와 같이 채널유량은 원자로 중심에서 50% 반경내에 있는 채널에서는 25 kg/s 이상 고유량을 유지하고 50% 반경밖 저출력 채널에서는 원자로 중심에서 멀어질수록 채널유량이 선형적으로 감소하는 분포를 갖는다. 그림 4-1의 (a)과 (b)에서 각각 열역학적 평형 건도와 기포의 질량 건도를 기준으로 계산된 채널 출구 분포를 나타내고 있다. 열평형 출구 건도 자료와 질량 건도 자료를 비교하면 원자로 중심 고유량 고출력 영역의 많은 채널에서 질량 건도 출력이 열평형 출력보다 크게 나타는 것을 볼 수 있다. 이는 CANDU-6 원자로의 수평 압력관에 장전되는 핵연료다발은 압력관의 중심과 다발의 중심이 서로 일치하지 않아 유동 불균형 현상이 크게 나타나기 때문이며 열평형 건도가 비록 과냉각 조건이더라도 다발 하부에서 기포가 발생하여 실제 질량 건도가 나타나게 된다. 즉, 압력관 상부 내벽과 핵연료다발 상부 연료봉 사이 유로로 우회하는 유량(bypassing flow)이 많아져 핵연료봉에서 발생된 열을 효율적으로 전달하지 못하고 상대적으로 핵연료다발 하부 연료봉 주위의 유량을 감소시키는 결과가 된다. 이러한 유동 불균형 현상은 압력관 크립이 증가할수록 급격히 발생하는 것을 알 수 있었다[2,3].



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-1. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 May (CASE-0105)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.938	2.981	3.289	3.376	3.315	2.992									**A**
B						2.875	3.520	3.970	4.088	4.269	4.129	4.227	4.164	4.119	3.694	3.464	2.928						**B**
C					3.047	3.855	4.281	4.907	4.805	4.935	5.155	5.320	5.245	5.360	5.044	4.397	3.737	3.258					**C**
D				3.393	3.831	4.762	5.117	5.704	5.559	5.934	5.718	5.760	6.081	6.169	5.970	5.353	4.983	4.383	3.680				**D**
E			3.134	3.846	4.624	5.482	5.989	5.976	6.295	6.203	6.071	6.301	6.546	6.488	6.517	6.096	5.613	4.922	4.386	3.270			**E**
F			3.972	4.634	5.293	5.696	6.397	6.636	6.486	6.021	6.032	6.452	6.514	6.190	6.449	6.598	6.252	5.771	4.890	3.915			**F**
G		3.689	4.604	5.032	5.876	6.203	6.192	6.739	6.414	6.539	6.378	6.543	6.263	6.396	6.735	6.601	6.074	6.104	5.565	4.610	3.728		**G**
H		4.027	5.066	5.570	6.019	6.519	6.758	6.727	6.535	6.251	6.335	6.563	6.098	6.539	6.638	6.442	6.521	6.283	5.785	4.884	3.969		**H**
J	3.156	4.451	5.063	5.841	6.371	6.325	6.537	6.468	6.468	6.681	6.656	6.195	6.451	6.014	6.202	6.172	6.308	6.296	5.825	5.558	4.485	3.204	**J**
K	3.215	4.668	5.588	6.301	6.501	6.639	6.698	6.688	6.157	6.624	6.584	6.489	6.216	6.351	6.507	6.395	5.858	5.862	6.322	5.820	4.881	3.709	**K**
L	3.248	4.545	5.534	6.496	6.454	6.558	6.348	6.426	6.545	6.213	6.281	6.006	6.471	6.536	6.086	6.141	6.491	6.122	6.228	5.679	5.071	3.866	**L**
M	3.560	4.562	5.882	6.541	6.772	6.772	6.891	6.729	6.673	6.458	5.871	5.935	6.095	6.535	6.638	6.400	6.499	6.470	6.430	5.969	5.039	3.722	**M**
N	3.202	4.687	5.715	6.016	6.769	6.936	6.919	6.803	6.396	6.549	6.474	6.368	5.951	6.344	6.654	6.797	6.821	6.715	6.118	5.423	4.672	3.648	**N**
O	3.007	4.316	5.370	6.208	6.477	6.609	6.409	6.784	6.567	6.679	6.630	6.362	6.075	6.330	6.679	6.506	6.729	6.600	5.911	5.533	4.599	3.213	**O**
P		3.742	4.997	5.440	5.973	6.562	6.470	6.696	6.330	6.667	6.295	6.694	6.595	6.335	6.578	6.204	6.302	6.163	6.010	5.227	4.085		**P**
Q		3.083	4.377	4.839	5.374	6.154	6.109	6.086	6.250	6.534	6.603	6.715	6.640	6.182	6.478	6.630	6.353	5.748	5.426	4.611	3.738		**Q**
R			3.687	4.553	5.265	5.637	5.888	6.336	6.311	6.078	6.274	6.523	6.603	6.323	6.586	6.464	6.089	5.586	4.742	3.847			**R**
S			3.111	3.939	4.723	5.314	5.516	6.206	6.380	6.045	6.340	6.241	6.494	6.548	6.407	5.716	5.573	4.927	3.945	3.178			**S**
T				3.246	3.970	4.760	5.289	5.661	5.764	6.002	5.814	5.611	5.540	5.896	5.811	5.269	4.861	4.008	3.211				**T**
U					3.069	3.741	4.116	4.795	5.023	4.963	5.114	4.893	4.767	4.805	4.857	4.423	3.846	3.156					**U**
V						2.405	3.047	3.332	3.899	3.986	3.975	4.027	4.043	3.863	3.408	3.120	2.464						**V**
W									2.777	2.858	2.977	2.907	2.580	2.748									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-1. Channel Power in the Wolsong-3 Reactor on 2001 May

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.47	14.01	13.87	13.97	13.77	12.57									**A**
B						12.26	14.30	17.81	18.00	17.72	18.95	18.67	17.91	17.76	18.14	14.20	12.36						**B**
C					13.70	15.35	18.09	21.10	22.22	23.37	23.24	23.41	23.01	22.32	20.70	18.33	15.20	13.81					**C**
D				13.54	17.01	18.23	22.28	25.15	26.08	26.37	26.65	26.26	26.57	25.51	25.53	21.95	18.13	16.17	13.30				**D**
E			13.85	16.79	19.95	22.67	24.88	26.87	27.82	28.29	27.94	28.14	27.83	28.04	25.99	25.14	21.89	20.00	15.87	13.95			**E**
F			16.94	19.79	23.17	24.68	26.71	27.62	27.46	27.58	27.06	26.38	27.77	27.12	28.03	25.67	24.36	22.19	19.84	16.71			**F**
G		15.05	18.13	22.73	24.51	26.63	26.73	27.77	27.56	27.70	26.63	26.74	27.34	27.82	27.14	26.78	26.27	24.53	21.95	18.38	14.71		**G**
H		17.14	21.33	24.62	26.22	26.45	26.79	27.80	27.79	27.17	26.83	25.85	27.42	27.28	28.19	26.76	26.83	25.59	24.80	21.04	17.28		**H**
J	13.31	17.17	22.64	26.20	27.28	27.82	27.70	28.43	27.72	27.45	25.60	26.62	27.12	28.00	28.07	28.03	27.43	27.51	25.83	22.66	16.77	13.40	**J**
K	14.45	18.06	23.76	26.31	28.33	27.12	28.08	28.08	27.77	26.76	26.01	25.50	27.33	27.34	28.39	27.76	27.65	28.01	26.59	22.98	17.96	13.82	**K**
L	14.72	20.39	24.16	27.59	28.82	28.20	27.71	28.37	27.14	27.19	25.83	26.19	26.57	27.40	28.00	27.97	27.80	29.10	27.21	24.35	19.62	14.53	**L**
M	14.76	19.99	24.18	26.91	28.91	27.68	27.48	27.59	28.57	26.62	26.40	26.01	27.00	28.16	28.01	27.48	28.15	28.52	27.30	23.47	19.86	14.35	**M**
N	14.48	19.60	23.03	26.96	28.45	27.57	26.75	28.04	27.39	27.08	25.16	25.78	26.86	27.63	27.65	27.54	26.99	28.72	26.57	23.48	19.26	14.47	**N**
O	13.58	18.06	22.58	25.28	27.52	26.75	27.58	27.24	27.64	26.51	25.18	25.12	27.23	27.27	27.73	27.09	26.92	26.89	25.74	21.95	17.97	13.36	**O**
P		17.21	21.16	24.69	26.30	27.13	26.97	27.91	27.52	27.30	26.64	26.53	26.85	27.82	27.50	27.35	26.89	26.51	23.95	21.22	16.92		**P**
Q		14.82	19.00	23.01	26.12	25.52	26.55	27.43	27.75	27.37	26.85	25.89	27.59	27.35	27.66	25.34	25.63	25.75	23.36	18.71	14.90		**Q**
R			17.06	20.34	23.75	25.16	25.81	27.70	27.18	27.42	26.85	26.98	26.73	27.42	27.10	25.74	24.50	24.09	20.18	17.40			**R**
S			13.11	16.72	19.56	21.64	24.40	25.74	27.55	28.00	28.30	27.89	28.20	27.05	25.81	23.99	21.48	18.91	16.85	12.88			**S**
T				13.92	15.82	19.04	20.56	23.91	24.63	25.82	25.42	25.65	25.50	24.82	23.30	20.90	18.43	15.95	13.73				**T**
U					12.66	14.52	17.78	20.38	21.60	22.68	22.86	22.55	22.88	21.31	20.54	17.23	14.55	12.37					**U**
V						11.38	13.41	16.14	16.38	17.62	17.37	17.51	17.37	16.51	15.91	13.51	11.22						**V**
W									12.56	13.14	13.44	13.26	13.25	12.38									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

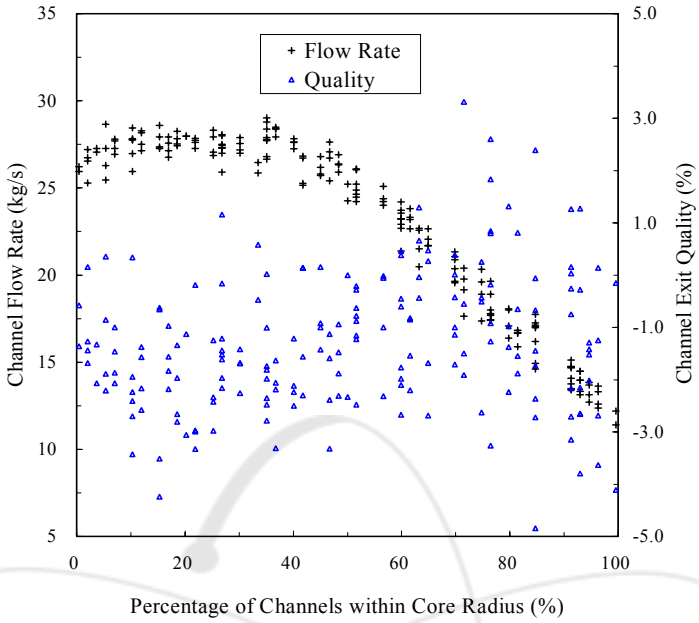
그림 6-1. Channel Flow Rate in the Wolsong-3 Reactor on 2001 May

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-0.97	-3.13	-0.95	-0.66	-0.54	-0.85									**A**
B						-1.09	-0.09	-1.89	-1.85	-0.55	-2.65	-1.72	-1.37	-1.22	-3.52	-0.01	-0.98						**B**
C					-2.23	0.06	-0.65	-1.27	-2.91	-3.35	-2.33	-1.97	-1.71	-0.98	-0.10	-0.41	-0.07	-1.17					**C**
D				0.05	-2.13	0.95	-1.64	-1.72	-3.23	-2.13	-3.16	-2.53	-1.91	-0.57	-1.15	-0.16	1.96	1.75	2.02				**D**
E			-1.74	-1.84	-1.49	-0.77	-0.81	-2.52	-2.14	-2.86	-2.80	-2.34	-1.27	-1.79	0.04	-0.74	0.56	-0.37	2.15	-1.16			**E**
F			-1.35	-1.30	-1.96	-1.66	-1.07	-0.95	-1.39	-2.81	-2.45	-0.40	-1.52	-1.84	-1.91	0.53	0.34	0.82	-0.36	-1.15			**F**
G		-0.38	0.32	-2.68	-0.92	-1.65	-1.66	-0.89	-1.62	-1.45	-0.89	-0.56	-1.82	-1.96	-0.22	-0.49	-1.57	-0.25	0.17	-0.01	0.42		**G**
H		-1.18	-1.23	-2.03	-1.95	-0.44	-0.10	-0.89	-1.56	-1.86	-1.32	0.30	-2.61	-0.95	-1.53	-0.82	-0.81	-0.37	-1.53	-1.46	-1.72		**H**
J	-1.05	0.70	-2.26	-2.51	-1.48	-2.15	-1.29	-2.17	-1.52	-0.76	0.68	-1.62	-1.01	-3.20	-2.49	-2.73	-1.69	-1.99	-2.07	-0.52	1.58	-0.99	**J**
K	-2.53	0.67	-1.45	-0.94	-2.02	-0.55	-1.23	-1.16	-2.64	-0.31	0.04	0.35	-2.12	-1.52	-2.02	-1.69	-3.46	-3.51	-1.19	0.21	1.65	1.38	**K**
L	-2.34	-2.48	-1.79	-1.34	-2.29	-1.75	-1.82	-2.19	-0.80	-2.07	-0.72	-2.01	-0.56	-1.13	-2.74	-2.73	-1.44	-3.55	-1.68	-1.54	0.63	1.26	**L**
M	-0.71	-1.92	-0.70	-0.65	-1.57	-0.51	-0.12	-0.60	-1.65	-0.73	-2.55	-1.84	-2.28	-1.56	-1.30	-1.41	-1.79	-1.98	-1.41	0.35	0.05	0.91	**M**
N	-2.34	-1.09	-0.17	-2.48	-1.14	-0.15	0.49	-0.82	-1.54	-0.93	0.42	-0.45	-2.44	-1.97	-0.77	-0.50	0.11	-1.60	-1.65	-1.72	-0.58	0.10	**N**
O	-2.32	-0.93	-1.12	-0.44	-1.47	-0.38	-1.77	-0.23	-1.32	-0.05	0.78	0.19	-2.53	-1.56	-1.01	-0.87	-0.24	-0.39	-1.89	0.23	0.31	-0.48	**O**
P		-2.81	-1.06	-2.67	-2.07	-0.92	-1.00	-1.13	-1.88	-0.78	-1.33	-0.07	-0.43	-2.17	-0.96	-2.21	-1.32	-1.71	0.08	-0.28	-0.55		**P**
Q		-3.20	-1.60	-3.18	-3.76	-0.76	-1.95	-2.57	-2.42	-1.12	-0.62	0.64	-1.04	-2.13	-1.61	0.84	-0.28	-2.04	-1.33	-0.04	0.29		**Q**
R			-2.59	-2.11	-2.24	-2.42	-2.01	-2.13	-1.69	-2.71	-1.55	-0.95	-0.32	-1.93	-0.68	-0.15	-0.11	-1.40	-0.88	-2.17			**R**
S			-1.07	-1.21	-0.83	-0.41	-2.25	-0.90	-1.87	-3.02	-2.51	-2.31	-1.90	-0.74	-0.39	-0.98	0.56	0.88	-1.43	-0.06			**S**
T				-1.51	0.03	-0.20	0.44	-1.36	-1.40	-1.76	-1.95	-2.90	-2.83	-1.21	-0.07	-0.05	1.04	-0.05	-1.24				**T**
U					-0.75	0.45	-1.78	-1.21	-1.69	-2.74	-2.45	-2.81	-3.74	-2.08	-1.21	0.46	0.90	0.41					**U**
V						-3.39	-1.92	-3.83	-1.06	-2.25	-1.91	-1.91	-1.47	-1.51	-2.95	-1.71	-2.48						**V**
W									-2.51	-2.77	-2.43	-2.40	-4.82	-2.24									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

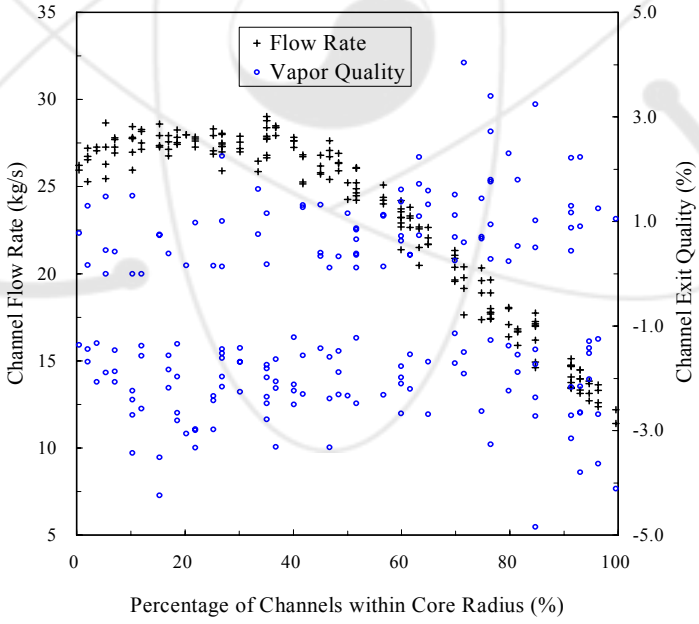
그림 7-1. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 May

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.16	-3.13	0.20	0.48	0.72	0.36									**A**
B						-1.09	1.00	-1.89	-1.85	0.61	-2.65	-1.72	-1.37	-1.22	-3.52	1.03	0.29						**B**
C					-2.23	1.14	0.53	-1.27	-2.91	-3.35	-2.33	-1.97	-1.71	0.29	1.04	0.67	1.01	-1.17					**C**
D				1.22	-2.13	1.92	-1.64	-1.72	-3.23	-2.13	-3.16	-2.53	-1.91	0.69	-1.15	1.01	2.82	2.63	2.93				**D**
E			-1.74	-1.84	-1.49	0.41	0.40	-2.52	-2.14	-2.86	-2.80	-2.34	-1.27	-1.79	1.25	0.43	1.64	0.73	3.05	-1.16			**E**
F			-1.35	-1.30	-1.96	-1.66	0.17	0.38	-1.39	-2.81	-2.45	0.84	-1.52	-1.84	-1.91	1.58	1.41	1.82	0.73	-1.15			**F**
G		0.80	1.45	-2.68	0.34	-1.65	-1.66	0.44	-1.62	-1.45	0.43	0.79	-1.82	-1.96	0.98	0.75	-1.57	0.86	1.24	1.08	1.48		**G**
H		-1.18	-1.23	-2.03	-1.95	0.79	1.03	0.43	-1.56	-1.86	0.13	1.44	-2.61	0.44	-1.53	0.44	0.45	0.79	-1.53	-1.46	-1.72		**H**
J	-1.05	1.73	-2.26	-2.51	-1.48	-2.15	-1.29	-2.17	-1.52	0.55	1.72	-1.62	0.39	-3.20	-2.49	-2.73	-1.69	-1.99	-2.07	0.67	2.49	0.15	**J**
K	-2.53	1.73	-1.45	0.33	-2.02	0.77	0.14	0.18	-2.64	0.93	1.28	1.49	-2.12	-1.52	-2.02	-1.69	-3.46	-3.51	0.11	1.31	2.59	2.35	**K**
L	-2.34	-2.48	-1.79	-1.34	-2.29	-1.75	-1.82	-2.19	0.49	-2.07	0.53	-2.01	0.77	0.37	-2.74	-2.73	-1.44	-3.55	-1.68	-1.54	1.72	2.26	**L**
M	0.47	-1.92	0.60	0.62	-1.57	0.75	1.07	0.73	-1.65	0.53	-2.55	-1.84	-2.28	-1.56	0.14	-1.41	-1.79	-1.98	-1.41	1.39	1.21	1.94	**M**
N	-2.34	-1.09	1.03	-2.48	0.14	1.01	1.60	0.48	-1.54	0.44	1.52	0.86	-2.44	-1.97	0.48	0.82	1.33	-1.60	-1.65	-1.72	0.58	1.30	**N**
O	-2.32	0.25	-1.12	0.75	-1.47	0.82	-1.77	1.00	-1.32	1.10	1.86	1.33	-2.53	-1.56	0.38	0.42	0.91	0.79	-1.89	1.28	1.49	0.70	**O**
P		-2.81	0.09	-2.67	-2.07	0.38	0.34	0.16	-1.88	0.51	-1.33	1.08	0.82	-2.17	0.37	-2.21	-1.32	-1.71	1.23	0.97	0.56		**P**
Q		-3.20	-1.60	-3.18	-3.76	0.44	-1.95	-2.57	-2.42	0.17	0.71	1.71	0.36	-2.13	-1.61	1.97	0.83	-2.04	-1.33	1.04	1.40		**Q**
R			-2.59	-2.11	-2.24	-2.42	-2.01	-2.13	-1.69	-2.71	-1.55	0.37	0.87	-1.93	0.69	0.93	1.10	-1.40	0.29	-2.17			**R**
S			-1.07	-1.21	0.31	0.76	-2.25	0.35	-1.87	-3.02	-2.51	-2.31	-1.90	0.45	0.77	0.31	1.58	1.86	-1.43	1.13			**S**
T				-1.51	1.09	0.94	1.60	-1.36	-1.40	-1.76	-1.95	-2.90	-2.83	-1.21	1.13	1.06	2.01	1.01	-1.24				**T**
U					0.40	1.52	-1.78	-1.21	-1.69	-2.74	-2.45	-2.81	-3.74	-2.08	-1.21	1.59	1.85	1.47					**U**
V						-3.39	-1.92	-3.83	0.08	-2.25	-1.91	-1.91	-1.47	-1.51	-2.95	-1.71	-2.48						**V**
W									-2.51	-2.77	-2.43	-2.40	-4.82	-2.24									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-1. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 May



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-2. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 July (CASE-0107)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.093	3.435	3.436	3.430	3.349	2.945									**A**
B						2.995	3.713	4.205	4.265	4.500	4.601	4.267	4.436	4.053	4.023	3.464	2.899						**B**
C					3.170	4.178	4.828	5.184	5.531	5.596	5.239	5.399	5.028	5.135	4.888	4.629	4.051	3.157					**C**
D				3.539	4.352	5.119	5.719	5.895	6.175	5.998	5.669	6.046	5.807	5.846	5.697	5.546	4.982	4.227	3.493				**D**
E			3.084	3.838	4.989	5.517	5.961	6.425	6.164	6.056	6.323	6.119	6.548	6.608	6.369	5.726	5.269	4.975	4.051	2.947			**E**
F			3.899	4.579	5.256	6.090	6.257	6.395	6.393	6.440	6.400	6.329	6.607	6.715	6.708	6.372	6.084	5.406	4.412	3.503			**F**
G		3.629	4.680	5.582	5.901	6.009	6.495	6.365	5.863	6.157	5.997	6.484	6.634	6.245	6.666	6.359	6.428	5.822	5.090	4.195	3.383		**G**
H		3.964	5.114	6.058	6.310	6.377	6.266	6.050	5.918	6.327	5.918	6.367	6.681	6.683	6.548	6.785	6.476	5.983	5.425	4.994	3.655		**H**
J	3.118	4.549	5.670	6.368	6.441	6.475	5.989	5.794	5.849	6.302	6.310	6.580	6.411	6.704	6.800	6.805	6.260	6.214	6.220	5.342	4.165	2.947	**J**
K	3.194	4.843	5.564	6.145	6.448	6.463	6.200	6.229	6.404	6.364	6.221	6.439	5.961	6.186	6.548	6.509	6.679	6.592	6.472	5.862	4.613	3.477	**K**
L	3.271	4.987	6.041	6.557	6.597	6.162	6.582	6.507	6.224	6.455	6.108	6.455	6.368	6.543	6.790	6.874	6.686	6.780	6.663	6.066	5.035	3.668	**L**
M	3.631	4.995	5.945	6.277	6.371	6.227	6.515	6.247	6.491	6.187	6.425	6.429	5.946	6.334	6.621	6.824	6.363	6.285	6.281	5.815	5.022	3.528	**M**
N	3.143	4.648	5.568	6.476	6.467	6.554	6.488	6.401	6.528	6.221	6.411	6.387	6.503	6.108	6.379	6.724	6.774	6.585	6.518	5.222	4.789	3.546	**N**
O	2.948	4.216	5.224	6.234	6.238	6.333	6.830	6.675	6.223	6.311	6.550	6.136	6.555	6.123	6.513	6.783	6.535	6.406	6.353	5.294	4.439	3.027	**O**
P		3.760	5.124	6.125	6.530	6.786	6.912	6.698	6.653	6.511	6.668	6.478	6.428	6.616	6.428	6.817	6.782	6.465	5.940	5.086	3.805		**P**
Q		3.646	4.660	5.607	6.132	6.348	6.737	6.749	6.078	6.264	6.273	6.601	6.605	6.670	6.226	6.480	5.997	5.867	5.059	4.246	3.499		**Q**
R			3.725	4.599	5.383	5.665	6.419	6.267	6.124	6.452	5.992	6.190	6.397	6.590	6.527	6.060	5.571	5.170	4.272	3.463			**R**
S			3.079	3.863	4.662	5.466	6.039	6.053	6.304	6.479	6.350	6.057	6.509	6.420	6.130	5.910	5.250	4.484	3.508	2.835			**S**
T				3.143	3.840	4.698	5.319	5.399	5.446	5.841	5.673	6.018	6.166	5.784	5.648	4.899	4.498	3.591	2.855				**T**
U					2.959	3.666	4.288	4.667	4.773	5.096	5.055	5.243	5.391	5.183	4.786	4.286	3.611	2.867					**U**
V						2.309	2.920	3.143	3.668	3.779	3.825	3.985	4.089	3.846	3.290	2.945	2.283						**V**
W									2.612	2.696	2.861	2.888	2.945	2.791									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-2. Channel Power in the Wolsong-3 Reactor on 2001 July

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.38	13.97	13.76	13.98	13.75	12.61									**A**
B						12.21	14.08	17.75	18.01	17.43	18.90	18.66	17.82	17.75	18.17	14.19	12.40						**B**
C					13.69	14.93	17.40	20.90	21.71	23.32	23.21	23.46	23.02	22.44	20.86	18.09	14.76	13.85					**C**
D				13.32	16.66	17.65	21.50	25.09	26.06	26.34	26.72	26.21	26.68	25.68	25.63	21.49	18.19	16.42	13.61				**D**
E			13.84	16.83	19.57	22.68	24.87	26.81	27.82	28.38	27.89	28.24	27.81	28.11	26.31	25.32	22.40	19.98	16.43	14.00			**E**
F			16.99	19.78	23.23	24.26	26.82	27.72	27.54	27.51	27.05	26.52	27.80	26.37	28.04	26.20	24.81	22.79	20.02	16.72			**F**
G		15.12	17.99	22.58	24.48	26.72	26.46	27.99	27.61	27.82	26.75	26.91	26.99	27.91	27.26	27.10	25.89	24.84	22.39	18.61	14.90		**G**
H		17.13	21.34	24.22	26.18	26.64	27.32	27.98	27.94	27.14	26.97	26.28	27.21	27.02	28.27	25.78	26.97	25.84	24.90	20.99	17.34		**H**
J	13.30	17.08	22.07	26.05	27.24	27.88	27.75	28.60	27.77	27.69	26.28	26.35	27.16	27.89	27.69	27.83	27.42	27.59	25.61	22.85	17.14	13.45	**J**
K	14.49	17.77	23.82	26.38	28.41	27.30	28.25	28.16	27.81	27.05	26.55	25.60	27.43	27.36	28.45	27.73	27.51	27.87	26.51	22.82	18.44	14.17	**K**
L	14.71	20.32	23.55	27.63	28.78	28.32	27.57	28.44	27.26	27.20	25.94	25.93	26.67	27.51	27.61	27.66	27.63	29.09	26.72	24.03	19.67	14.79	**L**
M	14.77	19.61	24.20	27.07	29.03	27.94	27.94	27.83	28.66	26.74	26.23	25.46	27.09	28.18	28.11	26.76	28.24	28.54	27.39	23.78	19.96	14.53	**M**
N	14.47	19.65	23.19	26.91	28.50	28.05	27.54	28.27	27.27	27.28	25.28	25.84	26.56	27.73	27.79	27.75	27.16	28.81	26.11	23.55	19.08	14.59	**N**
O	13.62	18.07	22.65	25.21	27.62	26.99	27.28	27.36	27.75	26.94	25.46	25.53	27.15	27.29	27.91	26.44	27.27	27.10	25.54	22.23	18.23	13.39	**O**
P		17.25	21.06	24.38	25.72	26.80	25.90	27.97	27.27	27.50	25.96	26.91	27.05	27.83	27.59	26.89	25.91	26.40	24.11	21.39	16.97		**P**
Q		14.66	18.89	22.68	26.10	25.15	25.85	26.99	27.84	27.41	27.13	26.16	27.72	27.01	27.77	25.76	25.94	25.73	23.44	18.90	15.10		**Q**
R			17.04	20.39	23.72	25.22	25.27	27.77	27.18	27.45	26.86	27.17	26.97	27.39	27.18	26.13	24.82	24.19	20.23	17.46			**R**
S			13.14	16.71	19.64	21.37	24.22	25.80	27.63	27.93	28.37	27.90	28.27	27.16	26.10	23.74	21.98	19.32	16.92	12.94			**S**
T				13.96	15.89	19.15	20.49	24.00	24.65	25.90	25.41	25.67	25.28	24.90	23.51	21.19	18.89	16.12	13.74				**T**
U					12.71	14.62	17.79	20.37	21.67	22.65	22.92	22.51	22.89	21.17	20.60	17.42	14.86	12.50					**U**
V						11.41	13.41	16.19	16.38	17.67	17.37	17.55	17.36	16.56	15.91	13.55	11.22						**V**
W									12.59	13.14	13.48	13.25	13.27	12.38									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

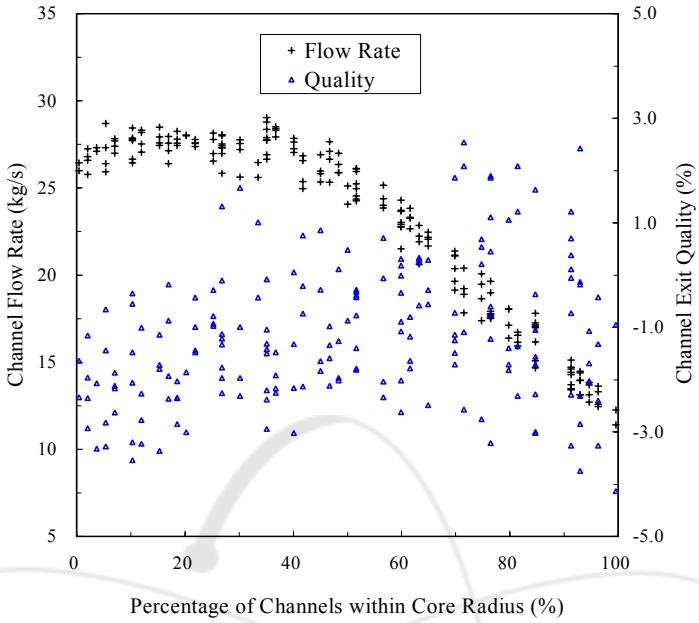
그림 6-2. Channel Flow Rate in the Wolsong-3 Reactor on 2001 July

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.14	-0.28	0.03	-0.34	-0.28	-1.23									**A**
B						-0.15	1.26	-0.67	-0.98	0.80	-0.43	-1.51	-0.04	-1.51	-2.01	-0.06	-1.24						**B**
C					-1.42	2.39	2.60	0.01	0.27	-0.85	-1.98	-1.72	-2.50	-1.93	-0.84	0.82	2.15	-1.84					**C**
D				1.27	0.81	3.31	1.29	-1.00	-1.16	-1.88	-3.32	-1.55	-2.85	-1.76	-2.12	0.91	1.89	0.69	0.45				**D**
E			-2.02	-1.88	0.39	-0.60	-0.88	-1.00	-2.50	-3.31	-1.98	-2.95	-1.24	-1.47	-0.59	-2.13	-1.09	-0.12	-0.13	-3.17			**E**
F			-1.73	-1.50	-2.10	0.00	-1.56	-1.74	-1.69	-1.44	-1.25	-0.87	-1.25	0.32	-1.12	-0.51	-0.51	-0.96	-2.57	-3.25			**F**
G		-0.75	0.84	-0.44	-0.78	-2.30	-0.47	-2.16	-3.33	-2.66	-2.18	-0.86	-0.38	-2.47	-0.49	-1.48	-0.12	-1.46	-1.93	-2.08	-1.67		**G**
H		-1.45	-1.00	-0.05	-0.92	-1.01	-1.97	-3.06	-3.51	-1.57	-2.70	-0.55	-0.63	-0.29	-1.86	0.95	-1.06	-1.53	-2.83	-0.95	-3.31		**H**
J	-1.25	1.31	0.47	-0.63	-1.21	-1.68	-2.99	-4.24	-3.43	-2.07	-0.86	-0.16	-1.15	-1.01	-0.38	-0.64	-1.82	-2.29	-0.57	-1.49	-0.32	-2.68	**J**
K	-2.66	1.83	-1.54	-1.48	-2.19	-1.21	-2.81	-2.58	-1.87	-1.33	-1.44	0.13	-2.97	-2.02	-1.93	-1.30	-0.81	-1.17	-0.63	0.51	-0.01	-0.34	**K**
L	-2.17	-0.51	0.46	-1.13	-1.81	-2.98	-0.97	-1.95	-1.89	-1.27	-1.36	-0.34	-0.95	-1.18	-0.29	-0.26	-0.69	-1.60	0.02	0.03	0.45	-0.11	**L**
M	-0.26	0.25	-0.45	-1.59	-2.79	-2.34	-1.56	-2.24	-2.21	-1.68	-0.58	0.17	-2.80	-2.16	-1.41	0.40	-2.25	-2.52	-1.92	-0.35	-0.05	-0.34	**M**
N	-2.65	-1.27	-0.82	-0.94	-2.06	-1.61	-1.34	-2.17	-1.00	-2.07	0.15	-0.43	-0.44	-2.76	-1.70	-0.87	-0.09	-2.04	-0.04	-2.50	0.06	-0.55	**N**
O	-2.69	-1.38	-1.68	-0.28	-2.24	-1.42	-0.19	-0.62	-2.41	-1.46	0.35	-0.78	-0.96	-2.20	-1.64	0.43	-1.10	-1.14	-0.26	-0.84	-0.62	-1.69	**O**
P		-2.72	-0.42	-0.02	0.15	0.02	1.16	-1.13	-0.66	-1.38	0.34	-1.03	-1.09	-1.30	-1.47	0.01	0.89	-0.63	-0.22	-1.00	-1.99		**P**
Q		0.15	-0.18	-0.04	-1.23	0.14	0.58	-0.16	-2.97	-1.97	-1.83	0.09	-1.24	-0.32	-2.45	0.06	-1.69	-1.61	-2.72	-1.78	-1.19		**Q**
R			-2.37	-1.91	-1.77	-2.33	0.14	-2.35	-2.26	-1.52	-2.42	-2.13	-1.13	-1.06	-0.91	-1.77	-2.14	-2.93	-2.88	-4.08			**R**
S			-1.29	-1.55	-1.14	0.38	-0.21	-1.43	-2.12	-1.63	-2.48	-2.85	-1.89	-1.21	-1.52	-0.07	-1.07	-1.39	-3.70	-2.39			**S**
T				-2.15	-0.65	-0.55	0.66	-2.32	-2.48	-2.31	-2.39	-1.56	-0.53	-1.64	-0.81	-1.75	-0.97	-2.37	-3.43				**T**
U					-1.52	-0.06	-0.92	-1.71	-2.69	-2.20	-2.67	-1.43	-1.41	-0.40	-1.54	-0.31	-0.74	-1.62					**U**
V						-4.11	-2.71	-4.84	-2.24	-3.26	-2.63	-2.16	-1.21	-1.64	-3.56	-2.86	-3.83						**V**
W									-3.63	-3.80	-3.15	-2.49	-2.50	-1.91									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

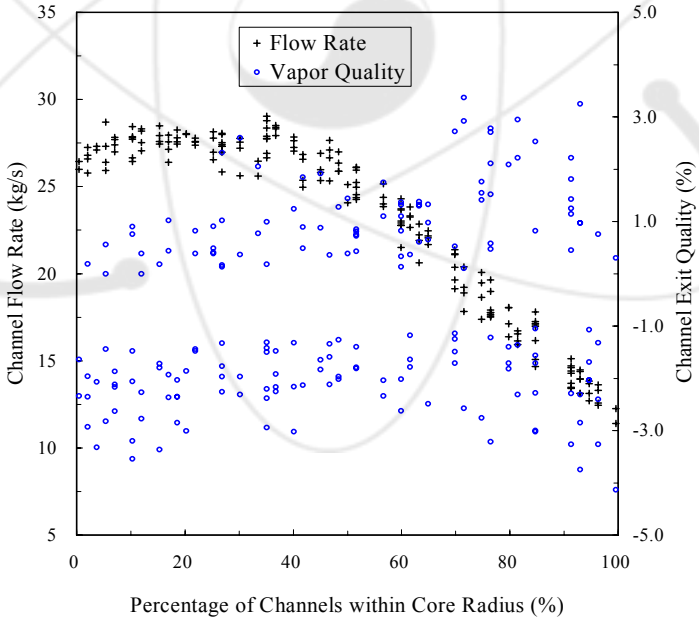
그림 7-2. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 July

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.25	0.91	1.17	0.84	0.86	-1.23									**A**
B						1.05	2.22	0.50	0.24	1.76	0.71	-1.51	1.10	-1.51	-2.01	0.99	-1.24						**B**
C					-1.42	3.24	3.40	1.12	1.33	0.37	-1.98	-1.72	-2.50	-1.93	0.32	1.82	2.94	-1.84					**C**
D				2.23	1.80	4.04	2.23	0.14	0.12	-1.88	-3.32	-1.55	-2.85	-1.76	-2.12	1.92	2.76	1.69	1.50				**D**
E			-2.02	-1.88	1.51	0.63	0.36	0.34	-2.50	-3.31	-1.98	-2.95	-1.24	-1.47	0.67	-2.13	0.13	1.05	0.99	-3.17			**E**
F			-1.73	-1.50	-2.10	1.16	-1.56	-1.74	-1.69	-1.44	0.15	0.43	0.14	1.47	0.18	0.74	0.71	0.30	-2.57	-3.25			**F**
G		0.44	1.80	0.74	0.39	-2.30	0.76	-2.16	-3.33	-2.66	-2.18	0.46	0.90	-2.47	0.79	-1.48	0.98	-1.46	-1.93	-2.08	-1.67		**G**
H		-1.45	0.25	1.11	0.40	0.18	-1.97	-3.06	-3.51	-1.57	-2.70	0.75	0.74	0.95	-1.86	2.05	0.18	-1.53	-2.83	0.31	-3.31		**H**
J	-1.25	2.30	1.59	0.66	-1.21	-1.68	-2.99	-4.24	-3.43	-2.07	0.45	1.04	0.18	0.40	0.92	0.72	-1.82	-2.29	0.69	-1.49	0.89	-2.68	**J**
K	-2.66	2.72	-1.54	-1.48	-2.19	0.14	-2.81	-2.58	-1.87	-1.33	-1.44	1.29	-2.97	-2.02	-1.93	-1.30	0.46	0.16	0.63	1.65	1.07	0.85	**K**
L	-2.17	0.67	1.61	0.12	-1.81	-2.98	0.39	-1.95	-1.89	0.17	-1.36	0.94	0.42	0.18	0.95	0.96	0.54	-1.60	1.24	1.19	1.58	0.97	**L**
M	0.88	1.44	0.72	-1.59	-2.79	-2.34	-1.56	-2.24	-2.21	-1.68	0.78	1.33	-2.80	-2.16	-1.41	1.58	-2.25	-2.52	-1.92	0.80	1.09	0.85	**M**
N	-2.65	-1.27	0.36	0.33	-2.06	-1.61	-1.34	-2.17	0.42	-2.07	1.30	0.84	0.85	-2.76	-1.70	0.43	1.05	-2.04	1.19	-2.50	1.20	0.71	**N**
O	-2.69	-1.38	-1.68	0.84	-2.24	-1.42	0.98	0.74	-2.41	-1.46	1.48	0.49	0.43	-2.20	-1.64	1.60	0.16	0.14	0.86	0.35	0.56	-1.69	**O**
P		-2.72	0.70	1.13	1.32	1.16	2.25	0.16	0.75	-1.38	1.49	0.37	0.19	0.14	-1.47	1.22	1.96	0.66	0.88	0.25	-1.99		**P**
Q		1.30	0.94	1.10	-1.23	1.27	1.62	1.01	-2.97	-1.97	-1.83	1.28	0.14	0.91	-2.45	1.23	-1.69	-1.61	-2.72	-1.78	-1.19		**Q**
R			-2.37	-1.91	-1.77	-2.33	1.31	-2.35	-2.26	-1.52	-2.42	-2.13	0.15	0.36	0.39	-1.77	-2.14	-2.93	-2.88	-4.08			**R**
S			-1.29	-1.55	-1.14	1.38	0.87	-1.43	-2.12	-1.63	-2.48	-2.85	-1.89	-1.21	-1.52	1.10	0.13	-1.39	-3.70	-2.39			**S**
T				-2.15	0.53	0.60	1.72	-2.32	-2.48	-2.31	-2.39	-1.56	0.68	-1.64	0.37	-1.75	0.26	-2.37	-3.43				**T**
U					-1.52	1.02	0.28	-1.71	-2.69	-2.20	-2.67	-1.43	-1.41	0.74	-1.54	0.89	0.48	-1.62					**U**
V						-4.11	-2.71	-4.84	-2.24	-3.26	-2.63	-2.16	-1.21	-1.64	-3.56	-2.86	-3.83						**V**
W									-3.63	-3.80	-3.15	-2.49	-2.50	-1.91									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-2. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 July



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-3. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 August (CASE-0108)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.007	3.453	3.480	3.550	3.517	3.362									**A**
B						2.887	3.556	4.030	4.112	4.443	4.776	4.759	4.678	4.105	4.060	3.426	2.863						**B**
C					3.125	4.073	4.710	4.933	5.370	5.605	5.640	5.550	5.549	5.109	4.784	4.655	4.041	3.114					**C**
D				3.677	4.404	4.999	5.532	5.599	5.985	5.954	6.192	6.119	5.675	5.655	5.521	5.559	4.972	4.197	3.491				**D**
E			3.236	4.479	5.227	5.405	5.709	6.182	5.998	6.501	6.475	5.946	6.329	6.552	6.210	6.183	5.699	5.051	4.073	2.993			**E**
F			4.030	5.222	5.788	6.181	6.077	6.190	6.299	6.471	6.477	6.153	6.393	6.554	6.583	6.145	5.914	5.305	4.835	3.905			**F**
G		3.629	4.718	5.723	5.985	6.450	6.502	6.325	6.446	6.247	6.537	6.420	6.626	6.629	6.413	6.011	6.136	5.575	4.999	4.132	3.311		**G**
H		3.911	5.057	6.194	6.455	6.368	6.259	6.064	5.961	6.478	6.578	6.261	6.518	6.446	6.214	6.602	6.168	5.735	5.709	4.898	3.491		**H**
J	3.107	4.503	5.642	6.445	6.405	6.667	6.598	6.580	6.466	6.265	6.155	6.448	6.227	6.530	6.670	6.647	6.465	5.946	6.001	5.046	3.912	2.769	**J**
K	3.249	4.853	5.495	6.530	6.447	6.486	6.179	6.167	6.317	6.133	5.939	6.291	6.571	6.596	6.331	6.199	6.425	6.311	6.143	5.545	4.308	3.253	**K**
L	3.803	5.116	6.020	6.490	6.725	6.779	6.609	6.463	5.928	6.243	5.814	6.362	6.273	6.400	6.594	6.705	6.475	6.644	6.613	5.885	4.756	3.436	**L**
M	3.778	5.068	5.837	6.112	6.314	6.691	6.393	5.937	6.133	5.799	6.141	6.398	6.461	6.203	6.402	6.822	6.904	6.871	6.636	5.598	4.785	3.320	**M**
N	3.545	4.655	5.482	6.388	6.402	6.497	6.269	6.052	6.277	5.825	6.108	6.221	6.457	5.988	6.195	6.552	6.681	6.516	6.486	5.012	4.653	3.377	**N**
O	2.991	4.211	5.542	6.224	6.852	6.992	6.767	6.377	5.861	5.946	6.326	6.582	6.637	6.690	6.504	6.864	6.450	6.724	6.295	5.095	4.260	2.891	**O**
P		3.701	5.057	6.110	6.655	6.758	6.938	6.467	6.538	6.228	6.476	6.280	6.290	6.813	6.937	6.880	6.844	6.581	5.863	4.992	3.684		**P**
Q		3.603	4.545	5.494	6.077	6.269	6.808	6.760	6.558	6.142	6.098	6.427	6.437	6.687	6.837	6.546	6.465	6.056	5.088	4.257	3.490		**Q**
R			3.592	4.441	5.312	6.063	6.531	6.591	6.106	6.536	6.582	6.119	6.207	6.541	6.390	5.912	5.509	5.250	4.786	3.915			**R**
S			2.960	3.716	4.527	5.393	5.986	5.985	6.284	6.523	6.434	6.551	6.387	6.164	5.855	5.718	5.127	4.510	3.976	2.992			**S**
T				3.025	3.715	4.589	5.257	5.388	5.913	5.934	6.067	6.154	6.045	5.539	5.406	4.680	4.356	3.545	2.920				**T**
U					2.881	3.608	4.343	4.717	4.819	5.240	5.064	5.310	5.331	5.125	4.657	4.174	3.520	2.821					**U**
V						2.303	2.983	3.619	3.746	3.786	3.796	3.925	4.013	3.808	3.610	2.927	2.241						**V**
W									2.663	2.702	2.842	2.852	2.939	2.780									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-3. Channel Power in the Wolsong-3 Reactor on 2001 August

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.44	13.95	13.70	13.82	13.50	12.29									**A**
B						12.25	14.28	17.80	18.04	17.51	18.65	18.14	17.47	17.72	18.17	14.20	12.40						**B**
C					13.70	15.07	17.57	21.15	22.05	23.31	23.03	23.43	22.79	22.44	20.87	18.05	14.73	13.85					**C**
D				13.14	16.56	17.83	21.91	25.16	26.09	26.35	26.66	26.16	26.69	25.66	25.64	21.41	18.20	16.43	13.60				**D**
E			13.84	16.14	19.13	22.77	24.98	26.91	27.85	28.32	27.89	28.26	27.80	28.11	26.46	25.07	21.64	19.84	16.37	13.99			**E**
F			16.98	18.90	22.80	24.06	26.85	27.76	27.55	27.52	26.98	26.59	27.85	26.77	28.09	26.38	24.96	22.81	19.93	16.67			**F**
G		15.12	17.92	22.22	24.38	26.56	26.46	28.00	27.56	27.80	26.40	26.97	26.94	27.84	27.49	27.14	26.21	24.87	22.37	18.62	14.88		**G**
H		17.14	21.38	23.86	25.97	26.66	27.32	27.99	27.93	27.05	26.65	26.34	27.41	27.31	28.32	26.29	27.04	25.82	24.88	21.00	17.35		**H**
J	13.30	17.13	22.18	25.94	27.26	27.77	27.59	28.49	27.71	27.69	26.40	26.55	27.18	28.00	27.84	28.02	27.27	27.62	25.76	22.88	17.20	13.46	**J**
K	14.48	17.76	23.83	25.87	28.41	27.30	28.25	28.18	27.82	27.09	26.58	25.84	27.26	27.02	28.48	27.73	27.65	27.90	26.70	23.34	18.60	14.22	**K**
L	14.42	20.07	23.66	27.66	28.78	28.15	27.57	28.44	27.31	27.26	25.99	26.09	26.70	27.56	27.78	27.87	27.75	29.11	26.82	24.29	20.03	14.87	**L**
M	14.61	19.48	24.30	27.11	29.04	27.78	27.96	27.88	28.71	26.80	26.44	25.51	26.94	28.15	28.14	26.69	27.90	28.18	27.18	23.92	20.18	14.56	**M**
N	14.40	19.65	23.26	26.99	28.52	28.06	27.58	28.31	27.40	27.32	25.77	26.03	26.56	27.74	27.77	27.86	27.27	28.82	26.11	23.57	19.23	14.63	**N**
O	13.62	18.08	22.46	25.24	27.04	25.62	27.37	27.60	27.80	26.99	25.93	24.47	27.04	26.72	27.91	26.10	27.31	26.41	25.60	22.26	18.29	13.38	**O**
P		17.25	21.10	24.40	25.34	26.91	25.84	28.04	27.45	27.54	26.43	27.01	27.06	27.60	26.53	26.70	25.66	26.21	24.14	21.42	16.94		**P**
Q		14.71	18.99	22.85	26.11	25.36	25.62	26.98	27.79	27.44	27.15	26.50	27.77	26.91	27.39	25.52	25.44	25.60	23.44	18.87	15.10		**Q**
R			17.06	20.40	23.73	25.12	24.96	27.74	27.20	27.41	26.55	27.17	26.98	27.44	27.24	26.14	24.78	24.18	20.10	17.44			**R**
S			13.14	16.72	19.65	21.51	24.26	25.82	27.63	27.94	28.36	27.80	28.28	27.14	26.13	23.93	22.00	19.29	16.89	12.91			**S**
T				13.97	15.94	19.22	20.63	24.00	24.54	25.89	25.32	25.63	25.34	24.92	23.55	21.20	18.89	16.12	13.72				**T**
U					12.71	14.67	17.76	20.38	21.67	22.65	22.91	22.46	22.89	21.16	20.60	17.47	14.88	12.48					**U**
V						11.41	13.41	16.16	16.39	17.67	17.38	17.56	17.34	16.56	15.87	13.55	11.21						**V**
W									12.59	13.14	13.48	13.24	13.27	12.36									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

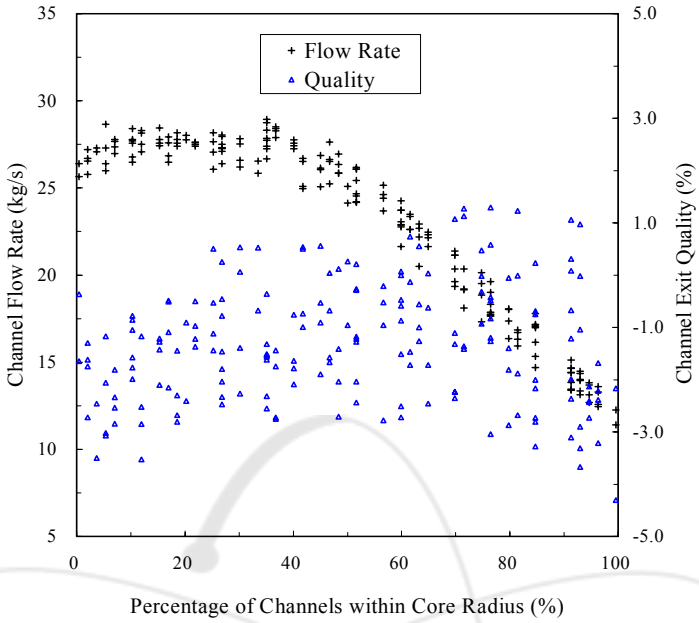
그림 6-3. Channel Flow Rate in the Wolsong-3 Reactor on 2001 August

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-0.42	-0.13	0.38	0.51	1.00	1.97									**A**
B						-0.95	0.11	-1.56	-1.71	0.45	0.54	1.21	1.49	-1.21	-1.81	-0.19	-1.45						**B**
C					-1.69	1.63	1.86	-1.14	-0.56	-0.80	-0.34	-1.12	-0.36	-2.00	-1.26	1.01	2.16	-2.07					**C**
D				2.42	1.21	2.54	0.24	-2.04	-1.79	-2.02	-1.59	-1.26	-3.25	-2.36	-2.68	1.04	1.87	0.55	0.47				**D**
E			-1.07	2.08	1.86	-1.08	-1.81	-1.83	-3.02	-1.92	-1.50	-3.46	-1.88	-1.62	-1.20	-0.36	1.15	0.29	-0.01	-2.86			**E**
F			-1.05	2.08	0.18	0.48	-2.13	-2.38	-1.97	-1.33	-0.93	-1.48	-1.92	-0.39	-1.51	-1.36	-1.19	-1.34	-0.64	-1.13			**F**
G		-0.73	1.11	0.33	-0.39	-0.74	-0.43	-2.26	-1.48	-2.35	-0.18	-1.08	-0.36	-1.21	-1.43	-2.57	-1.29	-2.30	-2.24	-2.34	-2.04		**G**
H		-1.71	-1.25	0.71	-0.28	-1.04	-1.97	-3.01	-3.36	-1.01	-0.35	-0.93	-1.26	-1.22	-2.86	0.02	-2.06	-2.33	-1.81	-1.33	-4.10		**H**
J	-1.32	1.06	0.29	-0.28	-1.32	-0.99	-0.99	-1.80	-1.48	-2.17	-1.44	-0.70	-1.72	-1.60	-0.86	-1.24	-1.06	-3.10	-1.40	-2.58	-1.62	-3.78	**J**
K	-2.31	1.90	-1.78	0.11	-2.17	-1.13	-2.85	-2.77	-2.12	-2.07	-2.35	-0.46	-0.92	-0.47	-2.57	-2.24	-1.67	-2.03	-1.80	-0.99	-1.55	-1.74	**K**
L	1.21	0.21	0.31	-1.34	-1.42	-0.97	-0.87	-2.06	-2.82	-1.96	-2.34	-0.73	-1.26	-1.64	-1.01	-0.90	-1.42	-1.98	-0.15	-0.72	-0.98	-1.51	**L**
M	0.70	0.69	-0.89	-2.12	-2.94	-0.79	-1.93	-3.20	-3.28	-2.93	-1.64	0.04	-1.04	-2.51	-2.07	0.46	-0.34	-0.49	-0.63	-1.24	-1.23	-1.59	**M**
N	-0.18	-1.22	-1.18	-1.26	-2.25	-1.77	-2.03	-3.23	-1.87	-3.32	-1.16	-1.10	-0.57	-3.11	-2.24	-1.46	-0.43	-2.22	-0.08	-3.24	-0.59	-1.57	**N**
O	-2.40	-1.40	-0.29	-0.32	0.05	1.67	-0.43	-1.72	-3.54	-2.63	-0.66	1.48	-0.58	-0.04	-1.64	0.96	-1.37	0.32	-0.47	-1.61	-1.49	-2.52	**O**
P		-3.00	-0.72	-0.06	0.86	-0.08	1.31	-1.86	-1.14	-2.27	-0.55	-1.70	-1.52	-0.49	0.84	0.36	1.30	-0.10	-0.49	-1.37	-2.56		**P**
Q		-0.05	-0.77	-0.58	-1.40	-0.21	1.01	-0.10	-1.44	-2.35	-2.37	-0.64	-1.77	-0.19	-0.26	0.47	0.22	-0.87	-2.58	-1.69	-1.21		**Q**
R			-3.02	-2.57	-2.02	-0.87	0.76	-1.31	-2.31	-1.21	-0.29	-2.33	-1.72	-1.22	-1.37	-2.23	-2.31	-2.61	-0.58	-1.83			**R**
S			-2.04	-2.31	-1.71	-0.01	-0.42	-1.65	-2.16	-1.48	-2.20	-1.26	-2.24	-1.99	-2.42	-0.89	-1.54	-1.23	-1.28	-1.30			**S**
T				-2.85	-1.36	-1.09	0.29	-2.34	-0.77	-1.97	-0.98	-1.04	-0.97	-2.46	-1.72	-2.61	-1.59	-2.58	-2.98				**T**
U					-2.03	-0.37	-0.60	-1.49	-2.49	-1.64	-2.62	-1.11	-1.61	-0.62	-2.05	-0.90	-1.27	-1.90					**U**
V						-4.13	-2.29	-2.28	-1.82	-3.21	-2.76	-2.43	-1.55	-1.81	-1.79	-2.94	-4.11						**V**
W									-3.26	-3.75	-3.26	-2.69	-2.50	-1.95									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

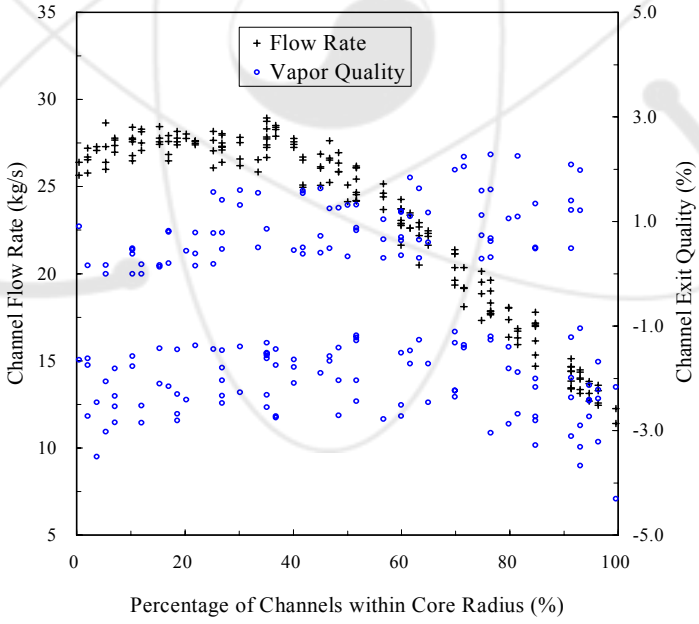
그림 7-3. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 August

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.76	0.97	1.43	1.50	2.02	2.86									**A**
B						0.30	1.25	-1.56	-1.71	1.52	1.55	2.21	2.41	-1.21	-1.81	0.91	-1.45						**B**
C					-1.69	2.53	2.71	-1.14	0.65	0.37	0.82	0.11	0.78	-2.00	-1.26	1.94	3.03	-2.07					**C**
D				3.25	2.22	3.37	1.30	-2.04	-1.79	-2.02	-1.59	-1.26	-3.25	-2.36	-2.68	2.01	2.74	1.58	1.52				**D**
E			-1.07	2.95	2.72	0.13	-1.81	-1.83	-3.02	-1.92	-1.50	-3.46	-1.88	-1.62	-1.20	0.82	2.11	1.32	1.06	-2.86			**E**
F			-1.05	2.92	1.31	1.44	-2.13	-2.38	-1.97	-1.33	0.41	-1.48	-1.92	0.83	-1.51	-1.36	0.11	-1.34	0.59	-1.13			**F**
G		0.45	2.11	1.38	0.72	0.49	0.77	-2.26	-1.48	-2.35	1.02	0.20	0.88	0.16	-1.43	-2.57	-1.29	-2.30	-2.24	-2.34	-2.04		**G**
H		-1.71	-1.25	1.75	0.88	0.18	-1.97	-3.01	-3.36	0.39	0.90	0.41	0.14	0.15	-2.86	1.23	-2.06	-2.33	-1.81	-1.33	-4.10		**H**
J	-1.32	2.09	1.33	0.85	-1.32	0.37	0.39	-1.80	-1.48	-2.17	-1.44	0.56	-1.72	-1.60	0.46	0.13	0.36	-3.10	-1.40	-2.58	-1.62	-3.78	**J**
K	-2.31	2.78	-1.78	1.28	-2.17	0.17	-2.85	-2.77	-2.12	-2.07	-2.35	0.78	0.45	0.87	-2.57	-2.24	-1.67	-2.03	-1.80	0.28	-1.55	-1.74	**K**
L	2.22	1.41	1.37	-1.34	-1.42	0.39	0.44	-2.06	-2.82	-1.96	-2.34	0.55	0.14	-1.64	0.38	0.43	-1.42	-1.98	0.95	0.57	0.25	-1.51	**L**
M	1.81	1.76	0.33	-2.12	-2.94	0.49	-1.93	-3.20	-3.28	-2.93	-1.64	1.14	0.39	-2.51	-2.07	1.58	0.90	0.80	0.69	-1.24	-1.23	-1.59	**M**
N	0.97	-1.22	-1.18	-1.26	-2.25	-1.77	-2.03	-3.23	-1.87	-3.32	0.19	0.21	0.76	-3.11	-2.24	-1.46	0.82	-2.22	1.14	-3.24	0.62	-1.57	**N**
O	-2.40	-1.40	0.98	0.81	1.24	2.60	0.82	-1.72	-3.54	-2.63	0.56	2.44	0.75	1.28	-1.64	2.07	-1.37	1.47	0.73	-1.61	-1.49	-2.52	**O**
P		-3.00	0.52	1.10	1.92	0.99	2.32	-1.86	0.18	-2.27	0.76	-1.70	-1.52	0.83	2.01	1.46	2.27	0.97	0.71	-1.37	-2.56		**P**
Q		1.14	0.47	0.61	-1.40	0.89	2.05	1.02	-1.44	-2.35	-2.37	0.56	-1.77	0.99	0.94	1.53	1.32	0.36	-2.58	-1.69	-1.21		**Q**
R			-3.02	-2.57	-2.02	0.39	1.85	-1.31	-2.31	0.13	0.91	-2.33	-1.72	0.13	-1.37	-2.23	-2.31	-2.61	0.60	-1.83			**R**
S			-2.04	-2.31	-1.71	1.10	0.75	-1.65	-2.16	-1.48	-2.20	-1.26	-2.24	-1.99	-2.42	0.35	-1.54	-1.23	-1.28	-1.30			**S**
T				-2.85	-1.36	0.10	1.32	-2.34	0.43	-1.97	0.36	0.16	0.32	-2.46	-1.72	-2.61	-1.59	-2.58	-2.98				**T**
U					-2.03	0.82	0.58	-1.49	-2.49	-1.64	-2.62	0.13	-1.61	0.61	-2.05	0.28	-1.27	-1.90					**U**
V						-4.13	-2.29	-2.28	-1.82	-3.21	-2.76	-2.43	-1.55	-1.81	-1.79	-2.94	-4.11						**V**
W									-3.26	-3.75	-3.26	-2.69	-2.50	-1.95									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-3. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 August



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-4. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 September (CASE-0109)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.828	3.313	3.323	3.425	3.431	3.355									**A**
B						2.713	3.339	3.782	3.862	4.205	4.612	4.699	4.626	4.043	4.020	3.362	2.802						**B**
C					2.958	3.870	4.498	4.656	5.096	5.362	5.579	5.455	5.629	5.131	4.779	4.653	3.986	3.055					**C**
D				3.499	4.221	4.798	5.359	5.378	5.779	5.740	6.157	6.192	6.349	6.251	5.991	5.586	4.897	4.130	3.485				**D**
E			3.063	4.351	5.099	5.289	6.093	6.150	6.434	6.545	6.449	6.428	6.366	6.626	6.174	6.199	5.730	5.021	4.089	3.409			**E**
F			3.802	5.070	5.735	6.133	6.396	6.132	6.195	6.321	6.330	5.993	6.241	6.444	6.538	6.093	5.858	5.259	4.920	4.076			**F**
G		3.407	4.447	5.449	5.771	6.440	6.444	6.291	6.512	6.091	6.458	6.184	6.463	6.622	6.435	6.675	6.228	5.619	5.016	4.185	3.428		**G**
H		3.689	4.778	5.945	6.296	6.220	6.228	6.699	6.622	6.434	6.446	6.027	6.357	6.379	6.824	6.793	6.286	6.263	5.890	5.005	4.005		**H**
J	2.966	4.310	5.452	6.212	6.161	6.550	6.715	6.689	6.576	6.135	5.964	6.316	6.533	6.447	6.669	6.682	6.670	6.435	6.023	5.027	3.989	2.819	**J**
K	3.144	4.753	5.872	6.528	6.259	6.387	6.620	6.135	6.237	6.009	5.815	6.123	6.490	6.561	6.201	6.607	6.353	6.195	5.987	5.465	4.598	3.279	**K**
L	3.780	5.076	5.968	6.402	6.655	6.735	6.551	6.475	5.865	6.295	6.337	6.274	6.048	6.148	6.348	6.497	6.222	6.405	6.434	5.758	4.697	3.401	**L**
M	3.718	5.028	5.834	6.680	6.777	6.747	6.311	6.451	6.192	6.290	6.128	6.274	6.399	5.992	6.135	6.576	6.743	6.699	6.567	5.444	4.710	3.280	**M**
N	3.576	4.637	5.876	6.332	6.234	6.264	6.060	5.942	6.291	5.760	5.974	6.046	6.349	6.499	6.027	6.316	6.487	6.334	6.377	4.982	4.711	3.392	**N**
O	2.989	4.208	5.612	6.017	6.660	6.780	6.517	6.252	6.412	5.880	6.186	6.529	6.542	6.687	6.320	6.810	7.022	6.898	6.336	5.614	4.425	2.977	**O**
P		4.137	4.973	5.899	6.376	6.440	6.740	6.281	6.493	6.136	6.419	6.213	6.672	6.780	6.925	6.746	6.817	6.648	5.994	5.276	4.274		**P**
Q		3.632	4.455	5.334	5.875	6.423	6.710	6.671	6.673	6.155	6.614	6.445	6.343	6.539	6.766	6.462	6.612	6.208	5.745	4.871	3.781		**Q**
R			3.539	4.718	5.173	6.031	6.484	6.816	6.734	6.637	6.742	6.666	6.127	6.418	6.278	6.327	6.034	5.377	5.064	4.225			**R**
S			2.899	3.640	4.402	5.288	6.008	6.500	6.393	6.531	6.388	6.609	6.250	6.000	5.690	5.642	5.106	4.530	4.118	3.101			**S**
T				2.946	3.616	4.511	5.294	5.910	6.127	5.904	6.142	6.098	5.957	5.855	5.290	4.544	4.261	3.500	2.932				**T**
U					2.817	3.555	4.369	4.755	4.821	5.280	5.029	5.293	5.238	5.049	4.521	4.050	3.425	2.766					**U**
V						2.277	2.969	3.667	3.745	3.814	4.156	3.909	3.928	3.703	3.534	2.833	2.176						**V**
W									2.667	2.713	2.861	2.833	2.905	2.717									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-4. Channel Power in the Wolsong-3 Reactor on 2001 September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.46	14.01	13.84	13.96	13.61	12.28									**A**
B						12.25	14.41	17.80	18.03	17.72	18.86	18.23	17.51	17.71	18.15	14.24	12.39						**B**
C					13.69	15.32	17.82	21.14	22.16	23.36	23.06	23.42	22.61	22.41	20.86	18.03	14.80	13.83					**C**
D				13.36	16.85	18.12	22.18	25.15	26.08	26.35	26.62	26.07	26.51	25.22	25.55	21.33	18.28	16.54	13.59				**D**
E			13.83	16.32	19.35	22.76	24.68	26.88	27.76	28.27	27.85	28.17	27.77	28.07	26.44	25.00	21.55	19.86	16.33	13.91			**E**
F			16.97	19.17	22.86	24.13	26.69	27.73	27.53	27.50	27.05	26.60	27.83	26.92	28.06	26.37	24.95	22.80	19.80	16.54			**F**
G		15.13	18.32	22.67	24.54	26.52	26.54	27.96	27.48	27.78	26.48	27.00	27.15	27.80	27.47	26.68	26.10	24.83	22.35	18.59	14.86		**G**
H		17.13	21.37	24.41	26.14	26.68	27.28	27.77	27.78	27.07	26.78	26.43	27.42	27.33	28.08	25.64	26.99	25.51	24.81	20.94	17.30		**H**
J	13.29	17.36	22.47	26.18	27.25	27.83	27.40	28.44	27.57	27.67	26.39	26.61	26.91	27.98	27.82	27.96	26.99	27.53	25.74	22.85	17.18	13.44	**J**
K	14.47	17.88	23.48	25.84	28.39	27.31	28.16	28.15	27.79	27.07	26.55	26.00	27.29	27.04	28.46	27.55	27.62	27.89	26.68	23.38	18.42	14.21	**K**
L	14.42	20.14	23.73	27.63	28.75	28.17	27.60	28.39	27.28	27.21	25.64	26.11	26.74	27.55	27.89	27.96	27.76	29.10	27.03	24.38	20.04	14.85	**L**
M	14.65	19.53	24.26	26.53	28.94	27.65	27.93	27.78	28.66	26.68	26.40	25.70	26.97	28.16	28.13	27.26	28.07	28.38	27.24	23.92	20.17	14.56	**M**
N	14.35	19.62	22.61	26.96	28.50	28.05	27.57	28.29	27.37	27.29	25.78	26.05	26.65	27.65	27.77	27.86	27.48	28.81	26.31	23.54	19.13	14.61	**N**
O	13.60	18.06	22.33	25.43	27.43	26.20	27.60	27.58	27.69	26.97	26.00	24.56	27.11	26.70	27.89	26.27	26.07	25.85	25.51	21.68	18.21	13.37	**O**
P		17.17	21.14	24.62	26.05	27.26	26.39	28.02	27.43	27.51	26.48	26.98	26.49	27.60	26.53	27.05	25.70	25.93	23.88	21.21	16.65		**P**
Q		14.66	19.02	22.94	26.10	24.96	25.85	27.09	27.64	27.41	26.85	26.41	27.74	27.13	27.46	25.70	25.05	25.38	23.04	18.21	14.87		**Q**
R			17.04	20.36	23.72	25.09	25.09	27.40	26.59	27.28	26.07	26.83	26.97	27.45	27.23	25.97	24.52	24.14	19.66	17.31			**R**
S			13.13	16.71	19.63	21.63	24.20	25.08	27.57	27.90	28.32	27.69	28.26	27.15	26.12	23.98	21.98	19.27	16.81	12.88			**S**
T				13.95	15.92	19.21	20.51	23.69	24.17	25.85	25.25	25.63	25.39	24.86	23.55	21.18	18.89	16.10	13.71				**T**
U					12.69	14.68	17.71	20.35	21.64	22.62	22.89	22.45	22.87	21.20	20.58	17.49	14.87	12.48					**U**
V						11.40	13.40	16.14	16.37	17.65	17.32	17.53	17.33	16.54	15.86	13.54	11.20						**V**
W									12.57	13.12	13.46	13.23	13.25	12.35									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

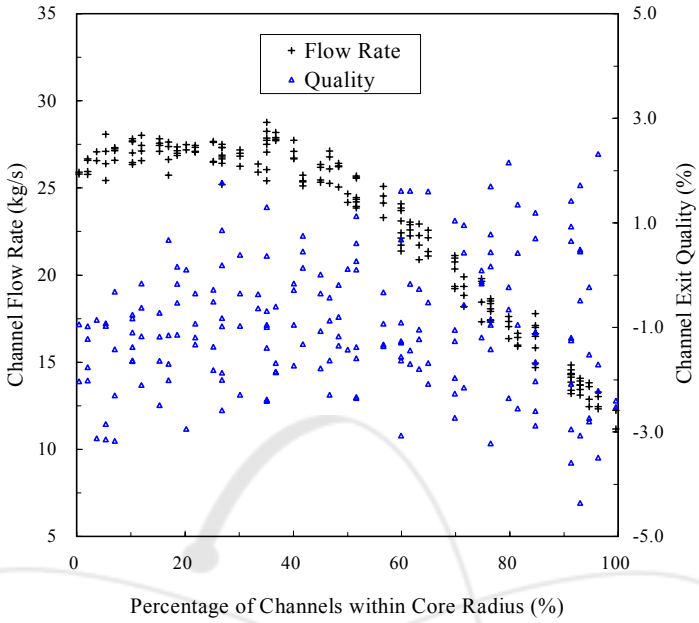
그림 6-4. Channel Flow Rate in the Wolsong-3 Reactor on 2001 September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.68	-1.04	-0.67	-0.32	0.33	1.93									**A**
B						-2.17	-1.21	-2.73	-2.87	-0.83	-0.32	0.86	1.20	-1.49	-1.98	-0.60	-1.86						**B**
C					-2.73	0.23	0.58	-2.24	-1.72	-1.72	-0.59	-1.47	0.05	-1.90	-1.26	1.01	1.76	-2.43					**C**
D				0.97	-0.01	1.27	-0.56	-2.78	-2.44	-2.71	-1.67	-0.94	-0.97	-0.03	-1.06	1.23	1.43	0.10	0.44				**D**
E			-2.13	1.23	1.07	-1.51	-0.27	-1.90	-1.64	-1.75	-1.56	-1.95	-1.74	-1.37	-1.30	-0.27	1.36	0.13	0.13	-0.23			**E**
F			-2.17	1.13	0.00	0.26	-0.99	-2.55	-2.27	-1.80	-1.44	-1.98	-2.38	-0.84	-1.63	-1.51	-1.38	-1.50	-0.17	-0.10			**F**
G		-1.99	-0.49	-1.00	-1.28	-0.74	-0.68	-2.33	-1.22	-2.81	-0.49	-1.86	-1.01	-1.22	-1.34	-0.16	-0.90	-2.14	-2.15	-2.08	-1.35		**G**
H		-2.81	-2.35	-0.52	-0.91	-1.53	-2.04	-0.91	-1.21	-1.17	-0.86	-1.75	-1.78	-1.44	-0.86	1.11	-1.65	-0.33	-1.15	-0.83	-1.53		**H**
J	-2.22	-0.05	-0.62	-1.22	-2.09	-1.39	-0.50	-1.43	-1.05	-2.54	-2.06	-1.19	-0.55	-1.84	-0.84	-1.10	-0.20	-1.54	-1.30	-2.64	-1.22	-3.45	**J**
K	-2.90	1.29	-0.13	0.12	-2.72	-1.46	-1.45	-2.85	-2.34	-2.46	-2.72	-1.12	-1.21	-0.59	-2.95	-0.84	-1.89	-2.37	-2.30	-1.30	-0.04	-1.56	**K**
L	1.06	-0.02	0.07	-1.58	-1.62	-1.12	-1.09	-1.99	-3.02	-1.75	-0.37	-1.05	-2.00	-2.42	-1.83	-1.61	-2.20	-2.69	-0.85	-1.25	-1.24	-1.69	**L**
M	0.31	0.47	-0.87	0.04	-1.51	-0.53	-2.15	-1.58	-3.07	-1.30	-1.65	-0.44	-1.26	-3.15	-2.88	-0.65	-0.96	-1.15	-0.90	-1.77	-1.54	-1.80	**M**
N	-0.02	-1.26	0.74	-1.41	-2.75	-2.47	-2.68	-3.53	-1.81	-3.50	-1.62	-1.70	-0.98	-1.48	-2.74	-2.19	-1.18	-2.76	-0.56	-3.34	-0.23	-1.46	**N**
O	-2.39	-1.40	0.03	-1.18	-0.76	0.53	-1.37	-2.10	-1.77	-2.84	-1.17	1.24	-0.95	-0.02	-2.21	0.67	1.28	1.31	-0.27	0.83	-0.65	-1.95	**O**
P		-0.75	-1.11	-0.96	-0.53	-1.32	0.25	-2.41	-1.28	-2.52	-0.78	-1.91	0.06	-0.60	0.81	-0.26	1.19	0.26	0.12	-0.05	0.67		**P**
Q		0.08	-1.20	-1.26	-2.04	0.54	0.52	-0.46	-0.97	-2.30	-0.51	-0.50	-2.05	-0.80	-0.53	0.07	0.98	-0.20	0.05	1.67	0.59		**Q**
R			-3.28	-1.36	-2.51	-0.96	0.50	-0.36	0.06	-0.78	0.50	-0.36	-1.96	-1.62	-1.71	-0.74	-0.28	-2.15	0.92	-0.19			**R**
S			-2.41	-2.68	-2.23	-0.47	-0.29	0.56	-1.78	-1.44	-2.32	-0.99	-2.64	-2.49	-2.95	-1.19	-1.61	-1.12	-0.49	-0.52			**S**
T				-3.31	-1.88	-1.41	0.55	-0.21	0.21	-2.04	-0.68	-1.24	-1.30	-1.34	-2.12	-3.16	-2.01	-2.80	-2.88				**T**
U					-2.43	-0.69	-0.42	-1.32	-2.46	-1.47	-2.72	-1.16	-1.95	-0.95	-2.61	-1.51	-1.80	-2.25					**U**
V						-4.30	-2.37	-2.00	-1.81	-3.04	-0.93	-2.49	-1.95	-2.34	-2.18	-3.52	-4.58						**V**
W									-3.21	-3.67	-3.11	-2.78	-2.71	-2.36									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

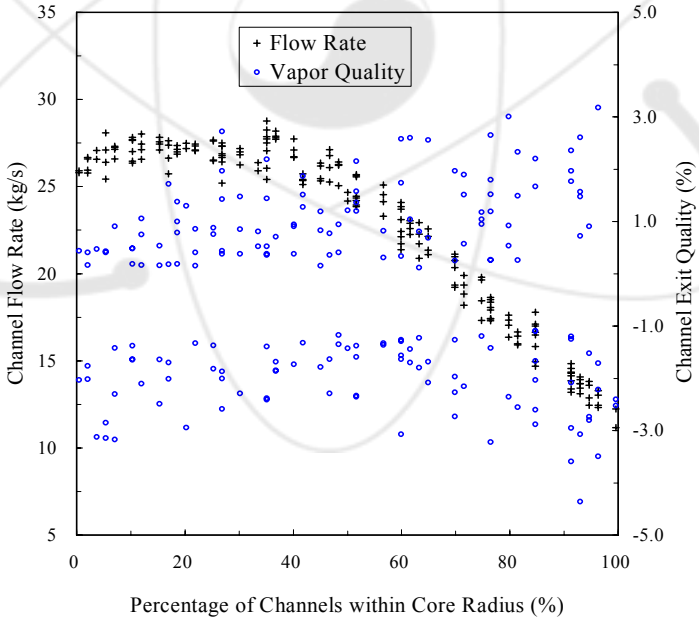
그림 7-4. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.68	-1.04	0.49	0.82	1.40	2.83									**A**
B						-2.17	-1.21	-2.73	-2.87	0.32	0.74	1.81	2.18	-1.49	-1.98	0.51	-1.86						**B**
C					-2.73	1.34	1.61	-2.24	-1.72	-1.72	0.64	-1.47	1.16	-1.90	-1.26	1.94	2.61	-2.43					**C**
D				1.98	1.09	2.24	0.65	-2.78	-2.44	-2.71	-1.67	0.35	0.34	1.16	0.14	2.14	2.38	1.14	1.50				**D**
E			-2.13	2.25	1.99	-1.51	0.88	-1.90	-1.64	-1.75	-1.56	-1.95	-1.74	-1.37	-1.30	0.87	2.26	1.21	1.15	0.91			**E**
F			-2.17	2.05	1.18	1.31	0.38	-2.55	-2.27	-1.80	-1.44	-1.98	-2.38	0.43	-1.63	-1.51	-1.38	-1.50	1.01	1.00			**F**
G		-1.99	0.62	0.30	-1.28	0.50	0.50	-2.33	0.15	-2.81	0.80	-1.86	0.38	0.15	-1.34	1.00	0.37	-2.14	-2.15	-2.08	-1.35		**G**
H		-2.81	-2.35	0.66	0.40	-1.53	-2.04	0.44	0.17	0.18	0.46	-1.75	-1.78	-1.44	0.47	2.13	-1.65	0.85	0.11	0.33	-1.53		**H**
J	-2.22	1.06	0.60	-1.22	-2.09	-1.39	0.79	-1.43	0.38	-2.54	-2.06	0.17	0.83	-1.84	0.46	0.18	0.95	-1.54	-1.30	-2.64	-1.22	-3.45	**J**
K	-2.90	2.28	1.10	1.26	-2.72	-1.46	-1.45	-2.85	-2.34	-2.46	-2.72	0.20	0.16	0.78	-2.95	0.49	-1.89	-2.37	-2.30	-1.30	1.12	-1.56	**K**
L	2.09	1.12	1.20	-1.58	-1.62	0.19	0.20	-1.99	-3.02	-1.75	0.91	0.37	-2.00	-2.42	-1.83	-1.61	-2.20	-2.69	0.38	-1.25	-1.24	-1.69	**L**
M	1.40	1.59	0.35	1.25	-1.51	0.78	-2.15	-1.58	-3.07	0.16	-1.65	0.83	0.14	-3.15	-2.88	0.56	0.38	0.15	0.37	-1.77	-1.54	-1.80	**M**
N	1.21	-1.26	1.84	-1.41	-2.75	-2.47	-2.68	-3.53	-1.81	-3.50	-1.62	-1.70	0.40	-1.48	-2.74	-2.19	0.15	-2.76	0.69	-3.34	0.97	-1.46	**N**
O	-2.39	-1.40	1.17	-1.18	0.45	1.60	-1.37	-2.10	-1.77	-2.84	0.17	2.23	0.41	1.26	-2.21	1.72	2.28	2.29	0.84	1.89	0.53	-1.95	**O**
P		0.48	-1.11	0.30	0.72	-1.32	1.41	-2.41	0.13	-2.52	0.49	-1.91	1.35	0.75	1.95	0.90	2.17	1.34	1.24	1.05	1.73		**P**
Q		1.22	-1.20	-1.26	-2.04	1.59	1.55	0.79	0.39	-2.30	0.82	0.76	-2.05	0.47	0.76	1.23	1.95	0.88	1.16	2.60	1.57		**Q**
R			-3.28	-1.36	-2.51	0.33	1.54	0.86	1.31	0.47	1.56	0.89	-1.96	-1.62	-1.71	0.48	0.86	-2.15	1.87	0.92			**R**
S			-2.41	-2.68	-2.23	0.70	0.83	1.63	-1.78	-1.44	-2.32	0.34	-2.64	-2.49	-2.95	-1.19	-1.61	0.09	0.63	0.69			**S**
T				-3.31	-1.88	-1.41	1.63	1.04	1.32	-2.04	0.49	-1.24	-1.30	-1.34	-2.12	-3.16	-2.01	-2.80	-2.88				**T**
U					-2.43	0.50	0.68	-1.32	-2.46	-1.47	-2.72	0.10	-1.95	0.28	-2.61	-1.51	-1.80	-2.25					**U**
V						-4.30	-2.37	-2.00	-1.81	-3.04	0.29	-2.49	-1.95	-2.34	-2.18	-3.52	-4.58						**V**
W									-3.21	-3.67	-3.11	-2.78	-2.71	-2.36									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-4. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 September



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-5. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 October (CASE-0110)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.815	3.319	3.233	3.328	3.387	3.447									**A**
B						2.673	3.261	3.741	4.218	4.482	4.535	4.657	4.629	4.523	4.128	3.325	2.713						**B**
C					3.336	3.850	4.420	4.546	4.990	5.242	5.491	5.267	5.607	5.652	5.321	4.646	3.851	2.917					**C**
D				3.426	4.188	4.739	5.302	5.786	5.681	6.135	6.025	5.983	6.325	6.351	6.126	5.448	4.694	3.947	3.357				**D**
E			2.944	4.272	5.081	5.783	6.186	6.044	6.388	6.354	6.171	6.413	6.588	6.516	6.538	6.123	5.623	4.913	3.997	3.442			**E**
F			3.633	4.942	5.734	6.090	6.614	6.669	6.042	6.054	6.066	6.288	5.961	6.129	6.381	6.510	5.810	5.684	5.039	4.157			**F**
G		3.315	4.251	5.272	6.166	6.540	6.494	6.799	6.507	6.456	6.279	5.847	6.069	6.322	6.645	6.650	6.167	6.207	5.673	4.239	3.463		**G**
H		4.020	4.572	5.726	6.280	6.817	6.920	6.900	6.594	6.141	6.163	6.289	5.962	5.937	6.613	6.581	6.712	6.475	5.982	5.086	4.203		**H**
J	2.957	4.182	5.184	5.962	6.480	6.507	6.734	6.602	6.397	5.795	5.620	5.945	6.307	6.033	6.339	6.388	6.562	6.467	5.993	5.570	4.545	2.892	**J**
K	3.595	4.606	5.731	6.306	6.441	6.202	6.699	6.649	6.103	5.786	6.119	5.833	6.222	6.417	6.616	6.629	6.146	6.019	6.319	5.432	4.754	3.288	**K**
L	3.821	4.933	5.650	6.036	6.375	6.509	6.349	6.433	6.463	6.147	6.190	6.028	6.359	6.065	6.294	6.431	6.693	6.228	6.240	5.631	4.607	3.391	**L**
M	3.721	4.957	5.599	6.563	6.762	6.734	6.206	6.575	6.116	6.355	5.874	6.009	6.370	6.699	6.803	6.680	6.760	6.575	6.421	5.804	4.648	3.624	**M**
N	3.805	5.047	6.014	6.258	6.864	6.951	6.817	6.674	6.396	6.404	5.841	5.778	6.155	6.716	6.994	7.081	7.030	6.845	6.154	4.818	4.628	3.411	**N**
O	3.600	4.802	5.764	6.480	6.643	6.736	6.378	6.111	6.525	6.573	6.104	6.379	6.322	6.684	6.986	6.833	7.001	6.742	6.043	5.508	4.297	3.346	**O**
P		4.366	4.924	5.772	6.232	6.683	6.483	5.966	6.370	6.640	6.407	6.681	6.690	6.595	6.853	6.518	6.496	6.339	6.073	5.053	4.248		**P**
Q		3.704	4.427	5.177	5.652	6.325	6.313	6.268	6.529	6.728	6.712	6.253	6.124	6.314	6.653	6.741	6.431	5.909	5.640	4.797	3.652		**Q**
R			3.964	4.782	5.006	5.773	6.057	6.517	6.629	6.431	6.565	6.630	6.581	6.391	6.585	6.379	5.900	5.107	4.894	4.173			**R**
S			2.967	3.963	4.560	5.008	5.614	6.379	6.639	6.382	6.531	6.389	6.059	6.435	6.242	5.506	4.861	4.306	4.054	3.324			**S**
T				2.917	3.482	4.248	4.969	5.757	6.090	6.245	6.077	5.815	5.657	5.821	5.442	4.385	4.038	3.356	3.151				**T**
U					2.709	3.386	4.175	4.588	5.160	5.272	5.213	5.091	4.935	4.796	4.301	3.839	3.237	2.636					**U**
V						2.458	2.869	3.577	3.633	3.690	4.098	3.692	3.669	3.461	3.384	2.664	2.049						**V**
W									2.566	2.598	2.721	2.667	2.733	2.542									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-5. Channel Power in the Wolsong-3 Reactor on 2001 October

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.45	13.70	13.85	13.78	13.65	11.96									**A**
B						12.24	14.14	17.78	17.61	17.41	18.46	18.27	17.16	17.28	17.88	14.24	12.21						**B**
C					13.60	14.94	17.91	20.75	22.14	22.90	23.10	23.08	22.63	21.25	20.07	17.68	14.97	13.63					**C**
D				13.44	16.41	18.19	21.71	25.09	25.57	26.28	26.10	26.15	26.03	24.94	24.82	21.63	18.21	16.70	13.49				**D**
E			13.82	15.98	19.34	21.38	24.35	26.34	27.74	27.72	27.86	27.73	27.64	27.64	25.75	24.54	21.75	19.62	16.43	13.63			**E**
F			16.64	19.36	22.12	24.17	25.35	27.50	26.98	27.51	26.53	26.46	27.44	27.05	27.64	25.73	24.57	22.28	19.13	16.39			**F**
G		14.84	18.37	22.27	23.85	25.41	26.38	26.67	27.45	27.14	26.64	26.62	27.28	27.43	27.17	25.99	26.15	23.64	21.49	18.30	14.86		**G**
H		17.10	20.96	24.54	25.46	25.42	25.20	27.18	27.10	27.12	26.36	26.29	27.05	27.38	27.76	26.33	25.70	24.93	24.25	20.84	16.91		**H**
J	13.28	17.05	22.57	25.68	27.10	27.18	27.33	27.83	27.66	27.15	26.40	26.27	27.15	27.60	27.97	27.61	27.18	27.02	25.73	22.18	16.62	13.24	**J**
K	13.93	18.07	23.05	26.23	27.80	27.31	27.35	28.02	27.24	27.07	25.95	26.06	26.94	27.22	27.94	27.51	27.22	27.90	26.14	23.37	17.79	14.21	**K**
L	14.36	19.80	24.09	27.11	28.76	27.67	27.64	27.82	27.09	26.67	25.80	25.81	26.59	27.14	27.89	27.54	27.46	28.67	27.13	24.02	20.04	14.63	**L**
M	14.28	19.65	23.85	26.78	28.26	27.62	27.38	27.70	28.08	26.59	25.89	25.93	26.49	27.94	27.28	27.04	27.49	28.43	26.88	23.70	19.87	14.40	**M**
N	14.07	18.51	22.25	26.42	28.19	26.41	26.87	27.44	27.32	26.57	25.77	25.68	26.75	26.86	26.61	26.03	26.16	28.17	26.49	23.20	19.22	14.39	**N**
O	13.02	17.34	21.35	24.45	26.67	26.25	27.05	27.57	27.01	26.59	25.43	24.92	26.81	26.68	26.36	26.13	25.45	26.30	25.34	21.88	17.97	13.24	**O**
P		16.50	21.12	24.14	26.18	26.06	26.88	27.49	27.44	26.56	26.46	25.84	26.42	27.29	26.76	26.82	26.57	26.01	23.64	21.01	16.67		**P**
Q		14.56	18.64	22.94	25.62	25.11	25.91	27.33	27.10	26.98	25.74	26.59	27.34	27.26	27.05	24.93	24.87	25.66	22.76	18.31	14.75		**Q**
R			17.01	19.90	23.71	24.67	25.73	27.06	26.83	26.77	26.49	26.30	26.62	27.03	26.98	25.29	24.65	23.81	19.94	17.06			**R**
S			12.87	16.66	19.21	21.72	23.93	25.32	26.72	27.89	27.74	27.79	27.84	27.01	25.52	23.99	21.66	19.29	16.57	12.70			**S**
T				13.68	15.91	18.85	20.89	23.29	24.19	25.06	25.26	25.27	25.41	24.47	23.53	20.87	18.89	15.87	13.70				**T**
U					12.45	14.70	17.43	20.34	21.10	22.60	22.42	22.47	22.55	21.25	20.29	17.50	14.66	12.48					**U**
V						11.17	13.39	15.83	16.36	17.31	17.32	17.29	17.34	16.31	15.86	13.35	11.20						**V**
W									12.33	13.12	13.20	13.23	13.06	12.35									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

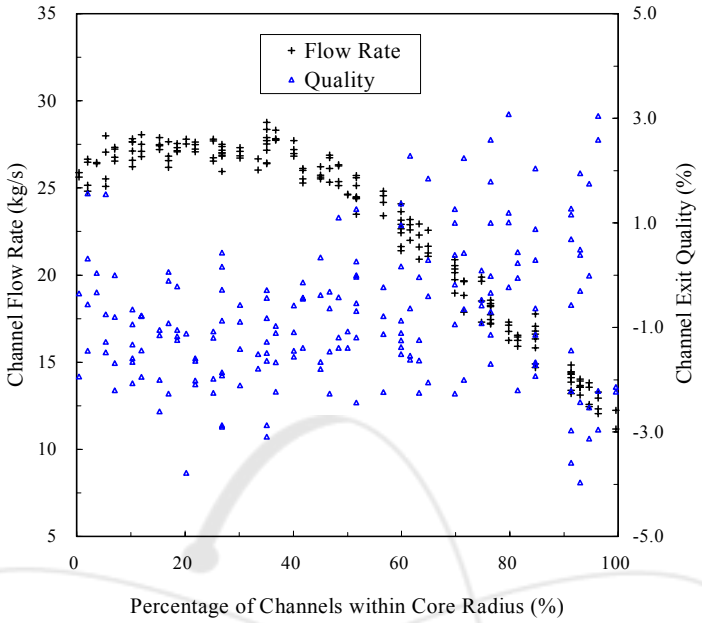
그림 6-5. Channel Flow Rate in the Wolsong-3 Reactor on 2001 October

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.71	-0.49	-1.20	-0.61	0.04	3.18									**A**
B						-2.40	-1.25	-2.88	-0.66	0.78	-0.16	0.64	1.68	1.22	-1.17	-0.80	-2.16						**B**
C					-0.23	0.70	0.17	-2.27	-2.08	-1.70	-0.91	-1.83	-0.03	1.09	1.60	1.41	0.81	-2.97					**C**
D				0.45	0.42	0.96	-0.27	-1.33	-2.33	-1.35	-1.63	-1.67	-0.63	0.47	-0.02	0.46	0.65	-0.90	-0.04				**D**
E			-2.80	1.35	1.04	1.61	0.27	-1.78	-1.73	-1.86	-2.38	-1.65	-0.94	-1.35	0.35	-0.11	0.80	-0.02	-0.36	0.31			**E**
F			-2.60	0.43	0.68	0.12	0.75	-0.69	-2.29	-2.59	-1.82	-0.91	-2.93	-1.91	-1.77	0.27	-1.21	0.49	0.98	0.42			**F**
G		-2.08	-1.42	-1.23	0.61	0.45	-0.37	0.19	-1.19	-1.14	-1.15	-2.62	-2.32	-1.84	-0.44	0.27	-1.12	0.84	1.05	-1.51	-1.12		**G**
H		-1.10	-2.73	-1.36	-0.35	1.30	1.77	0.10	-0.72	-2.10	-1.38	-0.77	-2.71	-2.83	-1.23	-0.05	0.65	0.76	-0.33	-0.39	-0.07		**H**
J	-2.22	-0.23	-1.68	-1.59	-0.95	-0.97	-0.35	-1.18	-1.63	-3.17	-3.14	-2.10	-1.42	-2.81	-1.94	-1.71	-0.65	-1.02	-1.37	-0.04	2.13	-2.68	**J**
K	0.49	0.44	-0.17	-0.80	-1.68	-2.00	-0.53	-1.17	-2.30	-3.12	-1.22	-2.10	-1.75	-1.15	-1.30	-0.72	-2.21	-2.90	-0.79	-1.40	1.34	-1.48	**K**
L	1.42	-0.12	-1.26	-2.29	-2.41	-1.37	-1.70	-1.65	-0.97	-1.76	-0.94	-1.58	-0.87	-2.35	-1.97	-1.48	-0.50	-2.90	-1.52	-1.36	-1.60	-1.43	**L**
M	0.93	0.09	-1.29	-0.43	-0.99	-0.51	-2.01	-1.10	-2.85	-0.98	-2.03	-1.46	-0.96	-0.82	-0.19	-0.15	-0.44	-1.53	-1.06	-0.28	-1.47	0.35	**M**
N	1.72	1.70	1.61	-1.17	-0.60	0.86	0.16	-0.62	-1.42	-0.86	-2.02	-2.27	-1.65	-0.17	1.04	1.53	1.44	-0.75	-1.41	-3.64	-0.66	-1.02	**N**
O	2.32	2.15	1.60	1.13	-0.16	0.39	-1.33	-2.49	-0.83	-0.32	-0.92	0.47	-1.38	0.00	0.97	0.88	1.78	0.49	-1.07	0.27	-0.95	0.51	**O**
P		1.19	-1.26	-0.93	-1.07	0.37	-0.82	-2.94	-1.64	-0.16	-0.76	0.43	0.19	-0.90	0.44	-0.75	-0.40	-0.68	0.61	-0.71	0.54		**P**
Q		0.65	-0.85	-1.80	-2.35	0.14	-0.64	-1.87	-0.93	-0.17	0.67	-1.24	-2.40	-1.58	-0.54	1.61	0.59	-1.38	-0.04	1.25	0.09		**Q**
R			-1.09	-0.57	-3.07	-1.43	-1.32	-0.95	-0.35	-0.98	-0.28	-0.03	-0.24	-1.36	-0.53	-0.05	-0.82	-2.82	-0.02	-0.12			**R**
S			-1.52	-0.95	-1.05	-1.63	-1.38	0.01	-0.29	-1.85	-1.39	-1.72	-2.91	-1.00	-0.63	-1.66	-2.25	-2.10	-0.47	1.12			**S**
T				-3.07	-2.55	-2.15	-1.04	-0.33	0.10	-0.19	-0.87	-1.87	-2.31	-1.11	-1.54	-3.50	-3.00	-3.27	-1.49				**T**
U					-2.74	-1.67	-0.95	-1.97	-0.52	-1.44	-1.56	-1.92	-2.78	-1.99	-3.23	-2.52	-2.58	-3.12					**U**
V						-2.52	-2.95	-2.03	-2.35	-3.22	-1.19	-3.25	-3.21	-3.29	-2.96	-4.32	-5.53						**V**
W									-3.49	-4.36	-3.59	-3.83	-3.52	-3.54									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

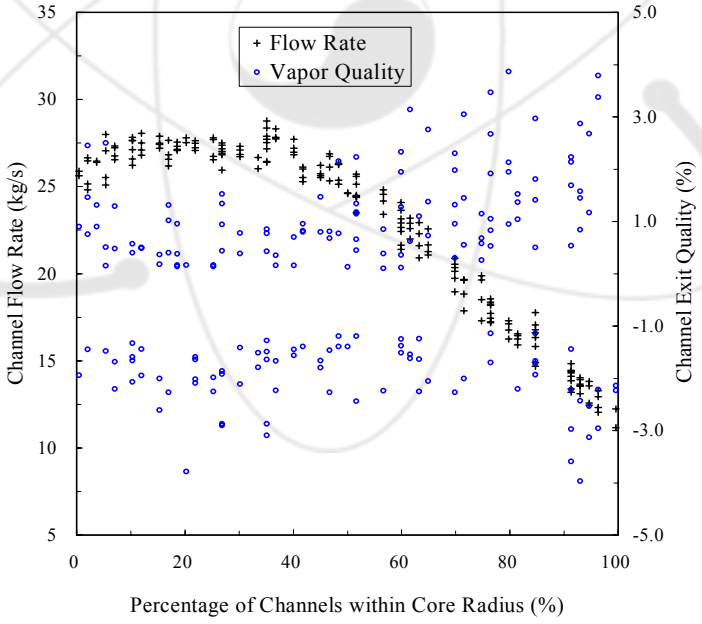
그림 7-5. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 October

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.71	0.72	-1.20	0.50	1.21	3.88									**A**
B						-2.40	-1.25	-2.88	0.54	1.80	0.95	1.65	2.56	2.24	-1.17	0.43	-2.16						**B**
C					0.91	1.67	1.19	-2.27	-2.08	-1.70	0.34	-1.83	1.12	2.08	2.55	2.32	1.77	-2.97					**C**
D				1.48	1.49	1.90	0.81	-1.33	-2.33	-1.35	-1.63	-1.67	0.62	1.52	1.12	1.46	1.65	0.28	1.01				**D**
E			-2.80	2.33	1.97	2.58	1.36	-1.78	-1.73	-1.86	-2.38	-1.65	0.41	-1.35	1.48	1.08	1.82	1.09	0.84	1.40			**E**
F			-2.60	1.51	1.74	1.21	1.87	0.52	-2.29	-2.59	-1.82	0.44	-2.93	-1.91	-1.77	1.41	-1.21	1.50	1.94	1.49			**F**
G		-2.08	-1.42	-1.23	1.58	1.51	0.81	1.43	0.15	0.19	0.18	-2.62	-2.32	-1.84	0.86	1.39	0.15	1.89	2.01	-1.51	-1.12		**G**
H		-1.10	-2.73	-1.36	0.83	2.19	2.72	1.30	0.54	-2.10	-1.38	0.52	-2.71	-2.83	0.14	1.05	1.67	1.67	0.81	0.71	1.04		**H**
J	-2.22	0.92	-1.68	-1.59	0.38	0.38	0.86	0.16	-1.63	-3.17	-3.14	-2.10	-1.42	-2.81	-1.94	-1.71	0.53	0.35	-1.37	1.15	2.94	-2.68	**J**
K	1.57	1.52	1.04	0.41	-1.68	-2.00	0.79	0.17	-2.30	-3.12	0.17	-2.10	-1.75	0.19	0.14	0.53	-2.21	-2.90	0.45	-1.40	2.34	-1.48	**K**
L	2.36	1.04	-1.26	-2.29	-2.41	-1.37	-1.70	-1.65	0.41	-1.76	0.44	-1.58	0.50	-2.35	-1.97	-1.48	0.80	-2.90	-1.52	-1.36	-1.60	-1.43	**L**
M	1.97	1.18	-1.29	0.77	0.36	0.76	-2.01	0.19	-2.85	0.41	-2.03	-1.46	0.40	0.50	1.06	1.02	0.82	-1.53	0.16	0.85	-1.47	1.46	**M**
N	2.61	2.65	2.60	-1.17	0.71	1.97	1.38	0.75	-1.42	0.47	-2.02	-2.27	-1.65	1.02	2.14	2.54	2.45	0.49	-1.41	-3.64	0.57	-1.02	**N**
O	3.18	3.01	2.56	2.15	0.94	1.48	-1.33	-2.49	0.48	0.91	0.43	1.54	-1.38	1.25	2.09	1.97	2.66	1.56	0.14	1.34	0.24	1.56	**O**
P		2.20	-1.26	0.31	0.15	1.44	0.44	-2.94	-1.64	1.06	0.49	1.57	1.39	0.43	1.56	0.47	0.82	0.47	1.76	0.51	1.62		**P**
Q		1.77	0.27	-1.80	-2.35	1.28	0.52	-1.87	0.41	1.00	1.72	0.13	-2.40	-1.58	0.74	2.56	1.56	-1.38	1.07	2.27	1.21		**Q**
R			-1.09	0.57	-3.07	-1.43	-1.32	0.38	0.85	0.38	0.88	1.07	0.95	-1.36	0.80	1.15	0.42	-2.82	1.09	0.95			**R**
S			-1.52	0.26	0.25	-1.63	-1.38	1.19	0.91	-1.85	-1.39	-1.72	-2.91	0.35	0.65	-1.66	-2.25	-2.10	0.62	2.13			**S**
T				-3.07	-2.55	-2.15	0.12	0.82	1.20	0.94	0.36	-1.87	-2.31	0.12	-1.54	-3.50	-3.00	-3.27	-1.49				**T**
U					-2.74	-1.67	0.26	-1.97	0.69	-1.44	-1.56	-1.92	-2.78	-1.99	-3.23	-2.52	-2.58	-3.12					**U**
V						-2.52	-2.95	-2.03	-2.35	-3.22	-1.19	-3.25	-3.21	-3.29	-2.96	-4.32	-5.53						**V**
W									-3.49	-4.36	-3.59	-3.83	-3.52	-3.54									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-5. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 October



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-6. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 November (CASE-0111)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.369	3.443	3.188	3.189	3.186	3.226									**A**
B						2.705	3.361	3.933	4.502	4.634	4.448	4.500	4.353	4.287	3.791	3.037	2.485						**B**
C					3.359	3.868	4.551	5.223	5.506	5.273	5.404	5.491	5.299	5.312	4.931	4.252	3.538	2.707					**C**
D				3.313	4.102	4.935	5.332	6.042	6.257	6.172	5.823	5.696	5.952	5.910	5.685	5.012	4.353	3.703	3.193				**D**
E			2.887	4.107	4.858	5.664	6.112	6.542	6.465	6.225	5.936	6.185	6.429	6.118	6.230	5.751	5.375	4.719	3.865	3.421			**E**
F			3.907	4.736	5.418	5.730	6.372	6.627	6.509	5.956	5.924	6.329	6.374	5.927	6.081	6.402	6.263	5.793	4.997	4.226			**F**
G		3.284	4.184	5.001	5.891	6.111	6.108	6.694	6.359	6.461	6.324	6.495	6.131	6.255	6.656	6.557	6.625	6.338	5.757	4.848	3.589		**G**
H		4.095	4.987	5.471	5.895	6.474	6.675	6.623	6.472	6.176	6.338	6.601	6.120	6.609	6.595	6.436	6.715	6.471	5.966	5.179	4.398		**H**
J	2.952	4.413	5.080	5.696	6.298	6.159	6.396	6.339	6.398	6.669	6.772	6.759	6.641	6.628	6.313	6.269	6.527	6.502	5.989	5.787	4.793	3.509	**J**
K	3.589	4.527	5.625	6.139	6.431	6.517	6.531	6.559	6.121	6.655	6.699	6.642	6.370	6.418	6.627	6.659	6.722	6.707	6.585	5.983	4.976	3.437	**K**
L	3.780	4.861	5.608	6.494	6.212	6.305	6.157	6.285	6.515	6.226	6.315	6.082	6.449	5.909	6.146	6.736	6.830	6.739	6.211	5.641	4.926	3.451	**L**
M	3.682	4.949	6.131	6.577	6.609	6.584	6.742	6.600	6.596	6.448	5.887	5.967	6.216	6.525	6.689	6.422	6.523	6.364	6.204	5.710	4.557	3.638	**M**
N	3.829	5.173	6.123	6.718	6.762	6.811	6.731	6.632	6.305	6.514	6.411	6.295	5.973	6.405	6.681	6.855	6.871	6.589	5.873	4.612	4.449	3.298	**N**
O	3.687	4.933	5.798	6.496	6.411	6.442	6.152	6.533	6.383	6.451	5.947	6.209	6.038	6.319	6.695	6.498	6.689	6.444	6.167	5.295	4.084	3.254	**O**
P		4.484	5.422	5.714	6.051	6.534	6.177	5.690	6.053	6.482	6.152	6.585	6.514	6.274	6.577	6.854	6.726	6.075	5.964	4.797	4.083		**P**
Q		3.785	4.512	5.214	5.983	6.255	6.071	5.936	6.179	6.453	6.544	6.701	6.629	6.112	6.382	6.655	6.200	5.654	5.447	4.639	3.491		**Q**
R			4.203	4.963	5.530	5.853	6.258	6.310	6.350	6.148	6.326	6.511	6.553	6.202	6.547	6.307	5.890	5.477	4.847	4.091			**R**
S			3.408	4.197	4.835	5.399	5.974	6.283	6.557	6.603	6.551	6.278	6.494	6.419	6.245	5.910	5.405	4.792	4.136	3.382			**S**
T				3.012	3.541	4.271	4.915	5.646	5.934	6.181	5.911	5.616	5.473	5.688	5.494	4.455	4.459	3.513	3.289				**T**
U					2.732	3.371	4.132	4.511	5.175	5.219	5.214	4.921	4.736	4.629	4.206	3.857	3.350	2.742					**U**
V						2.490	2.861	3.635	4.009	4.176	4.142	3.588	3.528	3.339	3.344	2.697	2.385						**V**
W									2.636	2.654	2.716	2.607	2.655	2.469									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-6. Channel Power in the Wolsong-3 Reactor on 2001 November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.06	13.56	13.85	13.81	13.77	12.19									**A**
B						12.24	14.11	17.77	17.29	17.19	18.52	18.49	17.55	17.59	17.92	14.27	12.23						**B**
C					13.57	14.91	17.72	20.15	21.66	22.89	23.15	23.03	22.93	22.02	20.76	18.15	15.24	13.66					**C**
D				13.57	16.55	17.87	21.61	24.82	25.14	26.26	26.12	26.19	26.23	25.61	25.25	22.13	18.57	16.73	13.58				**D**
E			13.82	16.24	19.74	21.63	24.50	25.63	27.72	27.73	27.88	27.78	27.76	27.72	26.36	24.91	22.24	19.82	16.51	13.66			**E**
F			16.63	19.67	22.66	24.61	26.01	27.53	26.72	27.52	26.54	26.44	27.41	27.07	27.70	26.04	23.73	22.00	19.22	16.26			**F**
G		14.84	18.37	22.30	24.42	26.12	26.67	27.01	27.49	27.08	26.57	26.31	27.27	27.47	27.13	26.32	25.10	23.30	21.22	17.62	14.80		**G**
H		17.05	20.89	24.56	25.73	26.39	25.94	27.81	27.21	27.11	26.22	25.56	27.05	27.02	27.78	26.65	25.71	24.87	24.29	20.65	16.59		**H**
J	13.28	16.77	22.57	25.71	27.21	27.31	27.64	27.90	27.65	26.56	25.10	25.11	26.68	27.43	27.97	27.64	27.20	27.03	25.73	21.71	16.30	12.84	**J**
K	13.93	18.20	23.19	26.33	27.79	27.17	27.55	28.06	27.23	26.46	24.81	24.91	26.91	27.21	27.95	27.42	26.77	27.59	25.58	22.43	17.47	14.15	**K**
L	14.39	19.89	24.09	26.89	28.77	27.69	27.65	27.83	27.06	26.66	25.62	25.82	26.47	27.18	27.90	27.24	27.08	28.63	27.14	24.03	19.80	14.64	**L**
M	14.32	19.65	22.92	26.74	28.37	27.80	26.82	27.63	27.99	26.47	25.89	25.93	26.62	28.08	27.46	27.36	27.77	28.45	26.96	23.78	19.89	14.38	**M**
N	14.03	18.27	22.00	25.36	28.31	26.83	27.14	27.51	27.33	26.39	25.15	25.40	26.77	27.25	27.45	26.73	26.64	28.35	26.52	23.24	19.29	14.41	**N**
O	12.95	17.13	21.27	24.38	26.97	26.84	27.08	27.43	27.13	26.76	25.52	25.31	26.87	27.19	27.22	26.99	26.34	26.95	25.22	22.14	18.02	13.30	**O**
P		16.33	20.55	24.17	26.22	26.44	27.01	27.52	27.48	26.80	26.59	26.17	26.81	27.46	27.39	25.98	25.89	26.17	23.90	21.11	16.84		**P**
Q		14.46	18.55	22.93	25.59	25.28	26.04	27.37	27.22	27.31	26.19	25.74	27.12	27.28	27.31	25.13	25.36	25.69	23.03	18.56	14.87		**Q**
R			16.79	19.62	23.65	24.64	25.52	27.16	27.11	26.88	26.75	26.51	26.66	27.07	27.07	25.48	24.65	23.81	20.01	17.14			**R**
S			12.59	16.44	18.96	21.40	23.48	25.53	26.82	27.83	27.73	27.80	27.82	27.06	25.53	23.61	21.37	19.03	16.50	12.65			**S**
T				13.67	15.91	18.84	20.91	23.40	24.43	25.13	25.34	25.31	25.43	24.51	23.52	20.89	18.84	15.87	13.66				**T**
U					12.45	14.70	17.44	20.35	21.08	22.60	22.41	22.48	22.58	21.26	20.31	17.49	14.66	12.47					**U**
V						11.17	13.38	15.82	16.25	17.24	17.30	17.31	17.35	16.33	15.87	13.35	11.19						**V**
W									12.33	13.11	13.20	13.23	13.08	12.36									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

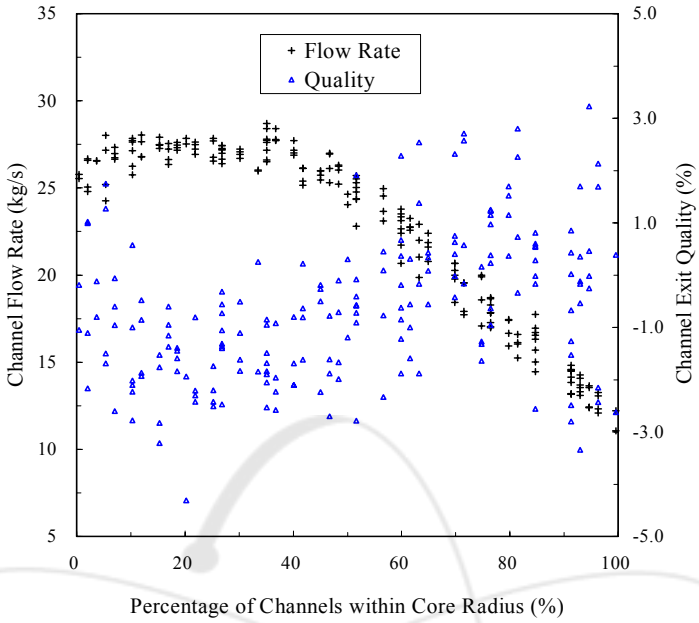
그림 6-6. Channel Flow Rate in the Wolsong-3 Reactor on 2001 November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.59	0.39	-1.44	-1.49	-1.23	1.30									**A**
B						-2.14	-0.57	-1.93	1.01	1.79	-0.58	-0.19	-0.04	-0.13	-2.76	-2.52	-3.74						**B**
C					-0.01	0.88	1.00	1.00	0.29	-1.54	-1.25	-0.94	-1.35	-0.79	-0.50	-0.80	-1.14	-4.28					**C**
D				-0.30	-0.05	2.24	-0.04	-0.23	-0.03	-1.19	-2.27	-2.59	-1.98	-1.41	-1.79	-1.52	-1.18	-2.15	-1.17				**D**
E			-3.13	0.23	-0.18	0.96	0.00	0.34	-1.45	-2.23	-3.09	-2.36	-1.48	-2.60	-1.00	-1.65	-0.46	-0.95	-1.09	0.17			**E**
F			-1.14	-0.65	-0.87	-1.39	-0.43	-0.82	-0.57	-2.87	-2.25	-0.73	-1.61	-2.53	-2.71	-0.21	1.01	1.17	0.74	0.94			**F**
G		-2.22	-1.70	-2.25	-0.69	-1.39	-1.79	-0.28	-1.64	-1.05	-0.92	-0.29	-2.08	-2.05	-0.35	-0.19	1.14	1.63	1.66	2.02	-0.29		**G**
H		-0.64	-0.94	-2.24	-1.80	-0.44	0.43	-1.12	-1.15	-1.95	-0.66	0.74	-2.19	-0.44	-1.27	-0.65	0.68	0.83	-0.39	0.12	1.20		**H**
J	-2.22	1.19	-2.05	-2.44	-1.56	-2.11	-1.59	-2.00	-1.59	0.00	1.55	1.41	0.00	-0.81	-1.99	-2.08	-0.74	-0.89	-1.36	1.21	3.84	1.77	**J**
K	0.49	-0.02	-0.64	-1.39	-1.67	-0.87	-1.17	-1.44	-2.20	0.04	1.56	1.40	-1.23	-1.12	-1.25	-0.53	-0.04	-0.53	0.47	1.37	2.79	-0.47	**K**
L	1.16	-0.47	-1.38	-0.64	-2.87	-1.98	-2.27	-2.07	-0.75	-1.45	-0.35	-1.39	-0.45	-2.84	-2.40	-0.28	0.16	-1.32	-1.58	-1.31	-0.04	-1.07	**L**
M	0.69	0.09	1.37	-0.32	-1.49	-1.08	0.06	-0.94	-1.28	-0.56	-1.94	-1.58	-1.52	-1.43	-0.64	-1.16	-1.35	-2.15	-1.78	-0.65	-1.85	0.48	**M**
N	1.95	2.59	2.28	1.10	-0.97	0.16	-0.22	-0.77	-1.68	-0.33	0.32	-0.30	-2.22	-1.41	-0.44	0.31	0.61	-1.63	-2.30	-4.39	-1.49	-1.68	**N**
O	3.04	3.08	1.85	1.26	-1.09	-0.89	-2.02	-1.05	-1.33	-0.80	-1.48	-0.30	-2.30	-1.44	-0.48	-0.72	0.12	-0.83	-0.53	-0.68	-1.97	-0.03	**O**
P		2.04	1.26	-1.13	-1.66	-0.29	-1.86	-3.78	-2.61	-0.79	-1.66	-0.04	-0.56	-2.00	-0.78	0.91	0.80	-1.64	0.06	-1.81	-0.37		**P**
Q		1.27	-0.34	-1.63	-1.19	-0.14	-1.51	-2.90	-2.09	-1.24	-0.11	0.80	-0.62	-2.20	-1.55	1.19	-0.47	-2.21	-0.88	0.33	-0.86		**Q**
R			0.29	0.42	-1.11	-1.08	-0.45	-1.64	-1.41	-1.92	-1.20	-0.53	-0.32	-1.96	-0.68	-0.35	-0.83	-1.46	-0.18	-0.58			**R**
S			1.75	0.44	0.39	0.17	0.26	-0.38	-0.58	-1.11	-1.28	-2.03	-1.53	-1.06	-0.60	0.07	0.13	0.26	-0.03	1.61			**S**
T				-2.43	-2.20	-2.00	-1.24	-0.79	-0.54	-0.42	-1.46	-2.54	-2.91	-1.58	-1.31	-3.19	-1.02	-2.42	-0.55				**T**
U					-2.53	-1.72	-1.14	-2.27	-0.40	-1.62	-1.51	-2.54	-3.53	-2.63	-3.62	-2.40	-1.89	-2.36					**U**
V						-2.23	-2.97	-1.67	-0.23	-0.70	-0.92	-3.76	-3.88	-3.92	-3.15	-4.08	-2.92						**V**
W									-2.96	-3.97	-3.59	-4.19	-4.02	-4.02									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

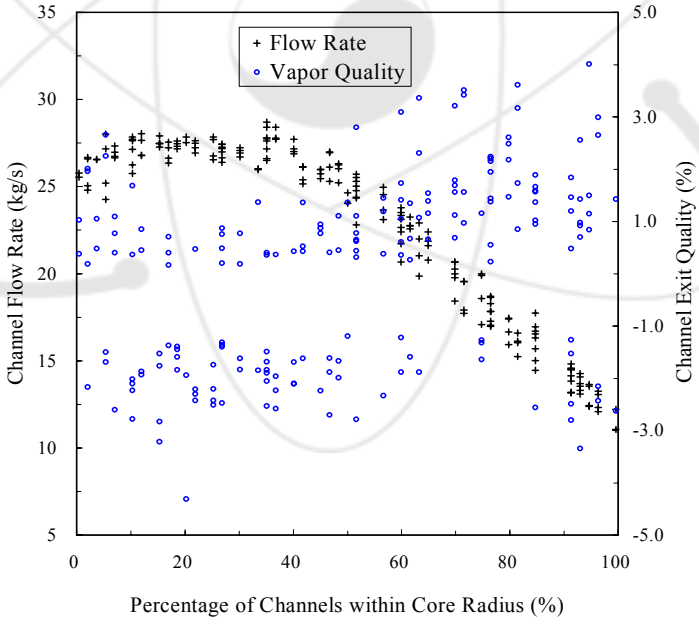
그림 7-6. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.38	1.45	-1.44	-1.49	-1.23	2.22									**A**
B						-2.14	0.54	-1.93	1.95	2.67	0.58	0.95	1.04	1.00	-2.76	-2.52	-3.74						**B**
C					1.17	1.81	1.92	1.98	1.38	-1.54	-1.25	0.33	-1.35	0.38	0.66	0.31	-1.14	-4.28					**C**
D				0.84	1.04	3.05	1.10	0.85	1.18	-1.19	-2.27	-2.59	-1.98	-1.41	-1.79	-1.52	-1.18	-2.15	-1.17				**D**
E			-3.13	1.37	0.96	1.95	1.15	1.47	-1.45	-2.23	-3.09	-2.36	-1.48	-2.60	0.33	-1.65	0.71	0.28	0.08	1.29			**E**
F			-1.14	0.55	0.36	-1.39	0.80	0.43	0.78	-2.87	-2.25	0.51	-1.61	-2.53	-2.71	0.92	2.01	2.11	1.75	1.99			**F**
G		-2.22	-1.70	-2.25	0.45	-1.39	-1.79	0.94	-1.64	0.38	0.40	0.95	-2.08	-2.05	0.88	0.94	2.13	2.58	2.61	2.89	0.85		**G**
H		0.50	0.30	-2.24	-1.80	0.77	1.53	0.17	0.18	-1.95	0.57	1.75	-2.19	0.87	0.13	0.54	1.67	1.82	0.77	1.19	2.21		**H**
J	-2.22	2.13	-2.05	-2.44	-1.56	-2.11	-1.59	-2.00	-1.59	1.29	2.50	2.41	1.13	0.53	-1.99	-2.08	0.48	0.41	-1.36	2.16	4.55	2.67	**J**
K	1.58	1.05	0.62	-1.39	-1.67	0.44	0.17	-1.44	-2.20	1.31	2.45	2.40	0.16	0.20	0.16	0.76	1.12	0.75	1.51	2.31	3.60	0.76	**K**
L	2.14	0.68	-1.38	0.68	-2.87	-1.98	-2.27	-2.07	0.51	-1.45	0.90	-1.39	0.85	-2.84	-2.40	1.01	1.32	-1.32	-1.58	-1.31	1.13	-1.07	**L**
M	1.69	1.15	2.33	0.81	-1.49	0.17	1.31	0.40	0.15	0.76	-1.94	-1.58	-1.52	-1.43	0.76	0.17	-1.35	-2.15	-1.78	0.61	-1.85	1.54	**M**
N	2.87	3.47	3.14	2.15	0.35	1.34	0.96	0.50	-1.68	0.90	1.46	0.95	-2.22	-1.41	0.83	1.48	1.67	-1.63	-2.30	-4.39	-1.49	-1.68	**N**
O	3.79	3.87	2.76	2.23	0.16	0.39	-2.02	0.37	-1.33	0.48	-1.48	0.90	-2.30	-1.44	0.82	0.51	1.28	0.42	0.73	0.57	-1.97	1.15	**O**
P		2.97	2.30	0.10	-1.66	0.85	-1.86	-3.78	-2.61	0.49	-1.66	1.09	0.76	-2.00	0.48	2.00	1.90	-1.64	1.20	-1.81	0.83		**P**
Q		2.23	0.83	-1.63	-1.19	0.96	-1.51	-2.90	-2.09	0.14	1.02	1.83	0.74	-2.20	-1.55	2.19	0.73	-2.21	0.31	1.43	0.21		**Q**
R			1.41	1.45	0.12	0.13	0.82	-1.64	-1.41	-1.92	0.14	0.74	0.88	-1.96	0.52	0.81	0.41	-1.46	0.95	0.52			**R**
S			2.68	1.53	1.32	1.28	1.34	0.80	0.70	0.16	-1.28	-2.03	-1.53	0.17	0.66	1.24	1.19	1.28	1.02	2.50			**S**
T				-2.43	-2.20	-2.00	-1.24	0.39	0.66	0.77	-1.46	-2.54	-2.91	-1.58	-1.31	-3.19	0.28	-2.42	0.70				**T**
U					-2.53	-1.72	-1.14	-2.27	0.73	-1.62	-1.51	-2.54	-3.53	-2.63	-3.62	-2.40	-1.89	-2.36					**U**
V						-2.23	-2.97	-1.67	0.95	0.53	0.26	-3.76	-3.88	-3.92	-3.15	-4.08	-2.92						**V**
W									-2.96	-3.97	-3.59	-4.19	-4.02	-4.02									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-6. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 November



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-7. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2001 December (CASE-0112)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.310	3.302	3.013	2.981	2.959	3.005									**A**
B						2.632	3.250	3.795	4.394	4.537	4.228	4.234	4.052	4.031	3.540	2.864	2.368						**B**
C					3.352	3.780	4.439	5.152	5.506	5.503	5.227	5.319	4.979	5.004	4.664	4.067	3.420	2.620					**C**
D				3.326	4.050	4.996	5.583	5.912	6.180	6.019	5.685	5.943	5.714	5.615	5.466	5.172	4.559	3.615	3.118				**D**
E			3.447	4.175	4.808	5.608	5.960	6.435	6.247	6.108	6.256	6.098	6.302	5.938	6.087	5.541	5.164	4.547	4.120	3.331			**E**
F			4.191	4.819	5.417	6.106	6.280	6.429	6.518	6.435	5.865	6.277	6.538	6.555	6.553	6.239	6.045	5.545	4.756	4.023			**F**
G		3.400	4.713	5.471	5.898	6.037	6.600	6.591	6.145	6.367	6.199	6.608	6.650	6.297	6.622	6.304	6.445	6.008	5.443	4.678	3.395		**G**
H		4.169	5.161	5.435	5.762	6.341	6.521	6.360	6.285	6.559	6.237	6.608	6.808	6.759	6.511	6.236	6.440	6.154	5.677	4.906	4.204		**H**
J	2.914	4.487	5.433	5.587	6.248	6.457	6.191	6.068	6.186	6.651	6.706	6.807	6.590	6.796	6.801	6.761	6.364	6.305	6.368	5.634	4.635	3.452	**J**
K	3.499	4.395	5.541	5.948	6.331	6.461	6.324	6.391	6.561	6.612	6.584	6.617	6.202	6.305	6.639	6.592	6.734	6.635	6.528	5.949	4.863	3.348	**K**
L	3.614	4.682	5.871	6.461	6.523	6.130	6.490	6.050	6.297	6.003	6.140	5.894	6.363	5.839	6.732	6.909	6.719	6.741	6.576	5.569	5.020	3.422	**L**
M	3.470	4.670	5.948	6.225	6.265	6.227	6.496	6.271	6.468	6.305	6.335	5.913	6.130	6.447	6.726	6.826	6.407	6.215	6.167	5.738	4.968	3.730	**M**
N	3.607	4.922	5.769	6.480	6.365	6.444	6.408	6.310	6.006	6.400	6.537	6.526	6.568	6.351	6.553	6.784	6.796	6.533	6.409	4.690	4.571	3.365	**N**
O	3.508	4.691	5.479	6.226	6.099	6.161	6.495	6.393	6.140	6.397	6.626	6.323	6.574	6.234	6.584	6.817	6.591	6.391	6.399	5.440	4.587	3.405	**O**
P		4.294	5.323	6.056	6.344	6.396	5.977	5.518	5.855	6.458	6.666	6.604	6.435	6.105	6.345	6.804	6.812	6.581	6.128	5.293	4.256		**P**
Q		3.662	4.392	5.141	6.045	6.131	5.963	6.393	6.067	6.340	6.422	6.658	6.582	6.490	6.145	6.423	6.023	5.990	5.456	4.696	3.526		**Q**
R			4.240	4.985	5.634	5.823	6.393	6.243	6.276	6.512	6.156	6.265	6.324	5.945	6.294	6.007	5.653	5.417	4.744	4.046			**R**
S			3.585	4.456	5.137	5.756	6.262	6.297	6.503	6.636	6.419	6.039	6.382	6.216	6.006	5.790	5.297	4.717	4.021	3.353			**S**
T				3.609	4.334	5.072	5.601	5.830	5.917	6.112	5.782	5.547	5.934	5.657	5.465	4.335	4.413	3.400	3.226				**T**
U					3.051	3.721	4.510	5.078	5.328	5.218	5.286	5.001	4.867	4.762	4.575	3.854	3.283	2.671					**U**
V						2.823	3.424	3.913	4.220	4.334	4.328	4.246	4.145	3.904	3.530	2.736	2.406						**V**
W									2.751	2.744	2.834	2.782	2.876	2.654									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-7. Channel Power in the Wolsong-3 Reactor on 2001 December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.09	13.70	13.84	13.80	13.77	12.37									**A**
B						12.22	14.14	17.75	17.41	17.28	18.58	18.61	17.66	17.70	17.90	14.27	12.21						**B**
C					13.55	15.01	17.83	20.26	21.61	22.76	23.13	23.06	22.95	22.06	20.85	18.15	15.24	13.64					**C**
D				13.53	16.60	17.73	21.04	24.97	25.32	26.24	26.12	26.14	26.21	25.62	25.23	22.06	18.39	16.73	13.57				**D**
E			13.64	16.12	19.77	21.73	24.77	25.98	27.71	27.74	27.81	27.74	27.76	27.69	26.43	24.89	22.36	19.83	16.22	13.71			**E**
F			16.31	19.54	22.65	24.05	26.14	27.62	26.69	27.42	26.54	26.45	27.25	26.66	27.56	26.24	24.22	22.52	19.58	16.57			**F**
G		14.83	17.83	21.99	24.34	26.12	25.97	27.21	27.48	27.17	26.64	25.95	26.78	27.41	27.17	26.60	25.61	24.14	22.09	17.85	14.85		**G**
H		16.96	20.67	24.53	25.73	26.51	26.39	27.84	27.27	26.77	26.25	25.51	26.00	26.52	27.77	26.79	26.35	25.63	24.44	20.96	16.88		**H**
J	13.26	16.66	22.40	25.71	27.17	27.23	27.62	27.92	27.64	26.64	25.20	24.91	26.78	26.97	27.52	27.20	27.32	27.09	25.10	21.96	16.48	12.89	**J**
K	14.07	18.29	23.26	26.31	27.79	27.19	27.60	28.04	26.97	26.57	25.05	24.96	26.92	27.25	27.89	27.51	26.67	27.70	25.65	22.49	17.60	14.20	**K**
L	14.55	19.99	23.79	26.95	28.69	27.70	27.54	27.85	27.16	26.67	25.78	25.80	26.57	27.14	27.54	26.69	27.39	28.58	26.79	24.00	19.58	14.62	**L**
M	14.49	19.90	23.34	26.99	28.40	27.84	27.23	27.73	28.03	26.60	25.55	25.92	26.58	28.07	27.36	26.56	27.74	28.45	26.92	23.74	19.54	14.26	**M**
N	14.26	18.72	22.75	26.03	28.41	27.44	27.45	27.65	27.33	26.55	24.79	24.77	26.21	27.21	27.58	26.86	26.82	28.31	26.21	23.19	19.24	14.38	**N**
O	13.07	17.46	21.87	25.02	27.02	26.92	26.92	27.49	27.15	26.74	24.27	25.01	26.48	27.19	27.31	26.10	26.55	27.00	24.60	21.96	17.61	13.17	**O**
P		16.56	20.67	23.65	25.97	26.61	26.99	27.53	27.46	26.80	25.75	25.99	26.90	27.43	27.51	26.08	25.64	25.37	23.50	20.71	16.64		**P**
Q		14.58	18.64	22.90	25.51	25.40	26.04	27.28	27.23	27.31	26.35	25.82	27.15	27.12	27.29	25.73	25.46	25.58	22.99	18.46	14.83		**Q**
R			16.71	19.57	23.51	24.65	25.15	27.16	27.07	26.64	26.75	26.68	26.89	27.05	27.21	25.67	24.73	23.77	20.09	17.13			**R**
S			12.42	16.05	18.43	20.67	22.80	25.46	26.90	27.72	27.73	27.81	27.78	27.09	25.66	23.80	21.49	19.12	16.56	12.66			**S**
T				13.32	15.26	17.92	19.87	23.10	24.39	25.21	25.31	25.27	25.37	24.48	23.51	20.86	18.86	15.85	13.68				**T**
U					12.40	14.45	16.98	19.98	20.78	22.57	22.40	22.46	22.53	21.24	20.26	17.48	14.64	12.47					**U**
V						11.06	13.15	15.71	15.94	17.04	17.09	17.15	17.26	16.25	15.85	13.33	11.19						**V**
W									12.32	13.09	13.19	13.22	13.05	12.34									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

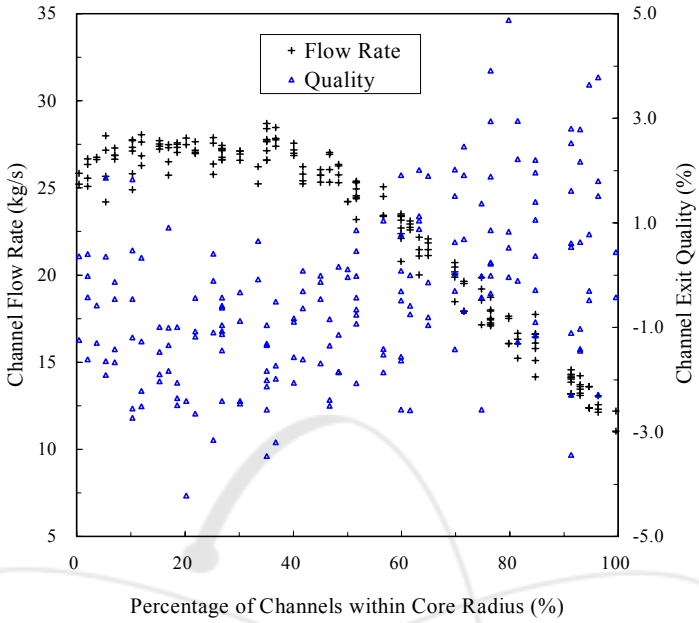
그림 6-7. Channel Flow Rate in the Wolsong-3 Reactor on 2001 December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.13	-0.54	-2.49	-2.75	-2.64	-0.35									**A**
B						-2.62	-1.26	-2.56	0.37	1.23	-1.64	-1.52	-1.53	-1.48	-3.93	-3.54	-4.53						**B**
C					-0.02	0.28	0.38	0.63	0.34	-0.56	-1.88	-1.59	-2.54	-2.01	-1.67	-1.65	-1.79	-4.79					**C**
D				-0.17	-0.34	2.71	1.38	-0.77	-0.41	-1.67	-2.70	-1.76	-2.73	-2.41	-2.50	-0.84	-0.03	-2.59	-1.60				**D**
E			0.46	0.73	-0.42	0.67	-0.72	-0.19	-2.10	-2.58	-2.05	-2.59	-1.88	-3.13	-1.52	-2.34	-1.38	-1.69	0.45	-0.34			**E**
F			0.60	-0.16	-0.85	0.30	-0.81	-1.49	-0.51	-1.31	-2.42	-0.91	-0.96	-0.26	-1.15	-0.89	-0.07	-0.14	-0.56	-0.34			**F**
G		-1.53	1.25	-0.17	-0.59	-1.62	0.25	-0.73	-2.30	-1.39	-1.37	0.30	-0.11	-1.87	-0.48	-1.19	0.17	-0.16	-0.25	0.97	-1.46		**G**
H		-0.17	-0.02	-2.33	-2.24	-0.95	-0.32	-1.94	-1.76	-0.48	-1.00	0.80	0.71	0.32	-1.52	-1.40	-0.60	-0.73	-1.51	-1.21	0.00		**H**
J	-2.43	1.70	-0.56	-2.79	-1.69	-1.11	-2.21	-2.83	-2.23	-0.06	1.27	1.74	-0.23	-0.01	-0.18	-0.23	-1.34	-1.55	0.31	0.42	2.78	1.35	**J**
K	-0.12	-0.64	-1.00	-1.99	-1.96	-1.06	-1.84	-1.93	-0.60	-0.12	0.99	1.28	-1.76	-1.50	-1.17	-0.81	0.03	-0.83	0.24	1.19	2.11	-1.07	**K**
L	0.02	-1.32	-0.19	-0.78	-1.90	-2.51	-1.16	-2.78	-1.50	-2.17	-1.05	-1.98	-0.81	-3.03	-0.35	0.60	-0.34	-1.27	-0.18	-1.53	0.55	-1.20	**L**
M	-0.67	-1.27	0.37	-1.61	-2.53	-2.20	-0.95	-2.02	-1.69	-1.11	-0.19	-1.74	-1.76	-1.66	-0.44	0.63	-1.68	-2.60	-1.85	-0.52	0.19	1.16	**M**
N	0.35	0.97	0.31	-0.10	-2.23	-1.36	-1.45	-1.87	-2.60	-0.80	1.02	0.91	0.05	-1.54	-0.93	0.02	0.25	-1.75	-0.34	-4.07	-0.90	-1.25	**N**
O	1.69	1.52	0.08	-0.08	-2.10	-1.83	-0.81	-1.53	-2.10	-0.96	1.75	0.25	-0.29	-1.70	-0.89	0.87	-0.28	-1.04	0.69	-0.03	0.77	1.01	**O**
P		0.81	0.75	0.45	-0.50	-0.85	-2.47	-4.31	-3.21	-0.86	0.57	0.12	-0.88	-2.50	-1.60	0.67	1.27	0.57	0.95	0.51	0.64		**P**
Q		0.43	-0.96	-1.88	-0.91	-0.64	-1.85	-1.40	-2.42	-1.59	-0.60	0.60	-0.79	-0.89	-2.27	-0.02	-1.14	-1.01	-0.80	0.68	-0.60		**Q**
R			0.56	0.57	-0.62	-1.19	0.22	-1.84	-1.62	-0.56	-1.74	-1.44	-1.23	-2.75	-1.58	-1.50	-1.71	-1.64	-0.68	-0.78			**R**
S			3.23	2.26	2.32	2.28	1.91	-0.27	-0.80	-0.92	-1.68	-2.77	-1.84	-1.73	-1.50	-0.46	-0.33	-0.08	-0.60	1.40			**S**
T				1.70	2.80	2.57	2.54	0.09	-0.57	-0.71	-1.88	-2.73	-1.31	-1.65	-1.41	-3.66	-1.25	-2.98	-0.97				**T**
U					-0.25	0.54	1.15	0.40	0.43	-1.59	-1.22	-2.23	-2.98	-2.08	-2.01	-2.41	-2.25	-2.84					**U**
V						0.39	0.85	-0.02	1.15	0.23	0.16	-0.32	-0.75	-0.86	-2.13	-3.80	-2.76						**V**
W									-2.15	-3.34	-2.80	-3.04	-2.54	-2.73									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

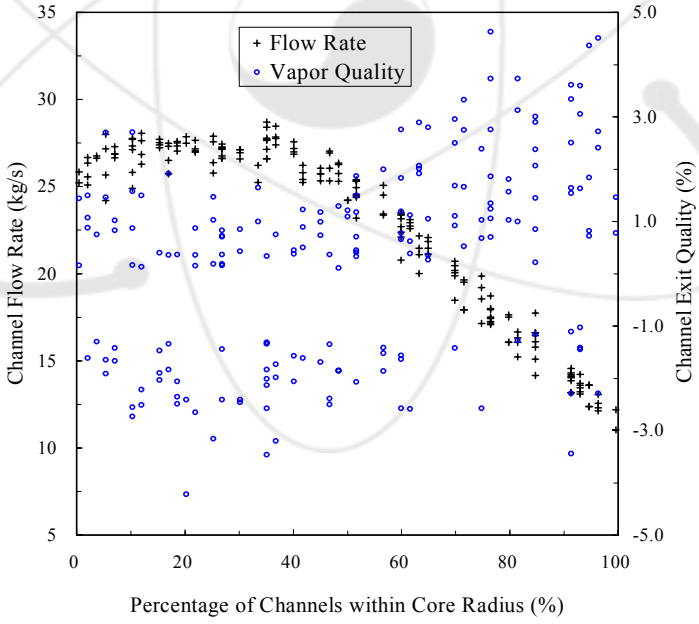
그림 7-7. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.99	0.70	-2.49	-2.75	-2.64	0.80									**A**
B						-2.62	-1.26	-2.56	1.47	2.20	-1.64	-1.52	-1.53	-1.48	-3.93	-3.54	-4.53						**B**
C					1.15	1.37	1.44	1.69	1.39	0.67	-1.88	-1.59	-2.54	-2.01	-1.67	-1.65	-1.79	-4.79					**C**
D				0.92	0.85	3.51	2.31	0.38	0.78	-1.67	-2.70	-1.76	-2.73	-2.41	-2.50	0.37	1.09	-2.59	-1.60				**D**
E			1.50	1.73	0.69	1.73	0.44	0.94	-2.10	-2.58	-2.05	-2.59	-1.88	-3.13	-1.52	-2.34	-1.38	-1.69	1.55	0.80			**E**
F			1.66	0.97	0.36	1.36	0.43	-1.49	0.77	-1.31	-2.42	0.43	0.39	0.96	0.16	0.39	1.11	1.04	0.61	0.84			**F**
G		-1.53	2.24	1.07	0.62	-1.62	1.37	0.49	-2.30	-1.39	-1.37	1.42	1.10	-1.87	0.80	0.14	1.29	0.92	0.84	1.92	-1.46		**G**
H		0.95	1.12	-2.33	-2.24	0.36	0.87	-1.94	-1.76	0.85	0.37	1.80	1.79	1.50	-1.52	-1.40	0.70	0.46	-1.51	-1.21	1.06		**H**
J	-2.43	2.61	0.66	-2.79	-1.69	0.19	-2.21	-2.83	-2.23	1.09	2.25	2.65	0.98	1.27	1.06	0.99	-1.34	-1.55	1.40	1.55	3.58	2.32	**J**
K	0.98	0.55	0.27	-1.99	-1.96	0.20	-1.84	-1.93	0.77	1.05	2.01	2.26	-1.76	-1.50	0.17	0.48	1.13	0.45	1.33	2.16	2.94	-1.07	**K**
L	1.20	-1.32	1.05	0.41	-1.90	-2.51	0.17	-2.78	-1.50	-2.17	0.38	-1.98	0.50	-3.03	0.94	1.69	0.89	-1.27	0.97	-1.53	1.66	-1.20	**L**
M	0.48	-1.27	1.41	-1.61	-2.53	-2.20	0.40	-2.02	-1.69	0.19	1.03	-1.74	-1.76	-1.66	0.84	1.75	-1.68	-2.60	-1.85	0.69	1.27	2.15	**M**
N	1.43	1.95	1.35	1.11	-2.23	-1.36	-1.45	-1.87	-2.60	0.48	1.96	1.88	1.31	-1.54	0.43	1.25	1.41	-1.75	0.85	-4.07	0.28	-1.25	**N**
O	2.65	2.49	1.16	1.11	-2.10	-1.83	0.47	-1.53	-2.10	0.40	2.66	1.37	0.98	-1.70	0.43	2.02	0.87	0.19	1.79	1.10	1.80	2.01	**O**
P		1.89	1.79	1.45	0.77	0.40	-2.47	-4.31	-3.21	0.45	1.68	1.31	0.45	-2.50	-1.60	1.69	2.23	1.58	1.95	1.62	1.65		**P**
Q		1.46	0.23	-1.88	0.32	0.52	-1.85	-1.40	-2.42	-1.59	0.71	1.65	0.48	0.45	-2.27	1.18	0.14	0.31	0.35	1.68	0.50		**Q**
R			1.59	1.56	0.61	-1.19	1.36	-1.84	-1.62	0.76	-1.74	-1.44	0.13	-2.75	-1.58	-1.50	-1.71	-1.64	0.52	0.42			**R**
S			4.01	3.17	3.21	3.09	2.80	0.87	0.43	0.37	-1.68	-2.77	-1.84	-1.73	-1.50	0.74	0.77	1.01	0.54	2.31			**S**
T				2.56	3.61	3.42	3.36	1.19	0.65	0.45	-1.88	-2.73	-1.31	-1.65	-1.41	-3.66	-1.25	-2.98	0.17				**T**
U					0.84	1.57	2.15	1.56	1.54	-1.59	-1.22	-2.23	-2.98	-2.08	-2.01	-2.41	-2.25	-2.84					**U**
V						1.43	1.84	1.02	2.18	1.38	1.16	0.88	0.49	0.44	-2.13	-3.80	-2.76						**V**
W									-2.15	-3.34	-2.80	-3.04	-2.54	-2.73									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-7. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2001 December



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-8. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 January (CASE-0201)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.266	3.158	2.855	2.828	2.841	2.968									**A**
B						2.935	3.262	4.079	4.301	4.375	4.011	4.031	3.907	4.010	3.870	3.363	2.562						**B**
C					3.283	3.673	4.295	5.032	5.404	5.475	5.034	5.176	5.145	4.907	4.635	4.144	3.619	3.272					**C**
D				3.197	3.871	4.867	5.521	5.702	6.078	5.950	6.068	5.915	5.496	5.430	5.350	5.334	4.846	4.178	3.286				**D**
E			3.484	4.029	4.590	5.406	6.101	6.350	6.611	6.680	6.469	5.915	6.114	6.320	6.009	5.949	5.189	4.939	4.278	3.380			**E**
F			4.290	4.710	5.225	6.031	6.038	6.218	6.536	6.641	6.574	6.182	6.381	6.467	6.450	6.000	5.830	5.385	4.641	4.011			**F**
G		4.016	4.963	5.632	5.880	6.345	6.526	6.465	6.652	6.447	6.707	6.556	6.662	6.676	6.438	6.001	6.134	5.686	5.285	4.760	3.889		**G**
H		4.484	5.398	5.558	6.287	6.241	6.326	6.200	6.217	6.716	6.796	6.409	6.585	6.538	6.738	6.629	6.106	5.808	5.933	5.339	4.323		**H**
J	3.724	4.938	5.869	6.395	6.275	6.489	6.038	6.603	6.672	6.614	6.526	6.546	6.152	6.416	6.614	6.615	6.457	5.979	6.255	5.568	4.668	3.631	**J**
K	3.847	5.119	5.726	6.488	6.301	6.344	6.135	6.287	6.573	6.494	6.365	6.389	5.774	5.796	6.124	6.117	6.420	6.327	6.298	5.934	4.923	3.875	**K**
L	3.830	4.850	6.051	6.420	6.476	6.540	6.515	6.524	6.242	6.455	6.082	6.369	6.094	5.405	6.332	6.515	6.380	6.570	6.694	6.148	5.210	3.993	**L**
M	3.913	5.135	5.873	5.939	5.941	5.908	6.220	6.035	6.372	6.151	6.428	6.360	5.895	6.033	6.281	6.680	6.789	6.793	6.614	5.736	5.050	3.817	**M**
N	3.641	4.887	5.538	6.219	6.039	6.090	6.070	6.080	6.365	6.250	6.409	6.481	6.519	6.069	6.189	6.427	6.553	6.366	6.414	4.579	4.442	3.302	**N**
O	3.473	4.578	5.266	6.027	6.426	5.955	6.376	6.226	5.974	6.191	6.623	6.740	6.750	6.719	6.468	6.760	6.340	6.690	6.261	5.201	4.489	3.319	**O**
P		4.214	5.292	6.140	6.446	6.340	6.496	5.522	6.390	6.328	6.639	6.449	6.384	6.810	6.858	6.739	6.667	6.473	5.849	5.165	4.105		**P**
Q		3.673	4.865	5.771	6.138	6.121	6.542	6.499	6.442	6.182	6.215	6.511	6.504	6.668	6.739	6.379	6.322	5.990	5.158	4.469	3.654		**Q**
R			4.309	4.989	5.656	6.096	6.356	5.992	6.019	6.481	6.571	6.169	6.244	6.477	6.223	5.782	5.403	5.166	4.437	3.805			**R**
S			3.622	4.444	5.072	5.686	6.056	5.923	6.114	6.389	6.347	6.460	6.341	6.059	5.769	5.593	5.047	4.465	3.747	3.165			**S**
T				3.654	4.349	5.039	5.504	5.466	5.516	5.781	5.623	5.940	6.006	5.496	5.290	4.157	4.241	3.198	3.038				**T**
U					3.034	3.931	4.355	4.929	5.032	4.948	5.159	4.989	5.211	4.711	4.588	3.985	3.170	2.536					**U**
V						2.818	3.389	3.756	4.122	4.286	4.283	4.356	4.278	3.961	3.494	2.688	2.364						**V**
W									2.719	3.028	2.902	3.123	2.951	2.667									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-8. Channel Power in the Wolsong-3 Reactor on 2002 January

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.13	13.71	13.85	13.79	13.77	12.36									**A**
B						12.19	14.12	17.75	17.50	17.51	18.56	18.61	17.64	17.69	17.86	14.21	12.19						**B**
C					13.61	15.11	18.01	20.45	21.84	22.74	23.16	23.04	22.92	22.03	20.84	18.12	15.19	13.56					**C**
D				13.60	16.66	17.93	21.11	25.07	25.39	26.26	26.05	26.13	26.20	25.63	25.20	21.81	17.89	16.39	13.50				**D**
E			13.60	16.32	19.88	22.11	24.47	26.05	27.57	27.39	27.79	27.72	27.77	27.60	26.42	24.74	22.34	19.48	15.93	13.64			**E**
F			16.10	19.65	22.69	24.22	26.22	27.66	26.60	27.14	25.78	26.50	27.32	26.78	27.56	26.34	24.45	22.70	19.62	16.56			**F**
G		14.20	17.42	21.47	24.39	25.79	26.22	27.28	27.16	27.03	25.73	26.00	26.64	27.03	27.40	26.62	26.12	24.38	22.25	17.66	14.38		**G**
H		16.44	20.06	24.53	25.33	26.61	26.62	27.87	27.23	26.29	24.91	26.04	26.61	27.13	27.45	26.03	26.53	25.76	24.22	20.24	16.62		**H**
J	12.57	16.06	21.47	24.94	27.17	27.12	27.65	27.71	27.33	26.65	25.67	25.51	27.13	27.48	27.80	27.40	27.20	27.09	25.40	22.07	16.42	12.62	**J**
K	13.46	17.25	22.94	25.76	27.75	27.26	27.59	28.06	26.89	26.76	25.57	25.49	26.92	27.30	27.95	27.68	27.09	27.83	26.08	22.48	17.46	13.45	**K**
L	14.31	19.85	23.36	26.92	28.70	27.57	27.49	27.72	27.17	26.35	25.84	25.32	26.70	27.15	27.85	27.37	27.70	28.56	26.41	23.05	19.19	14.08	**L**
M	14.03	19.20	23.43	27.03	28.40	27.88	27.32	27.76	27.99	26.66	25.21	25.44	26.57	28.11	27.61	26.96	27.32	28.23	26.40	23.72	19.30	14.15	**M**
N	14.22	18.72	23.12	26.35	28.46	27.45	27.50	27.64	27.29	26.62	25.09	24.80	26.35	27.20	27.71	27.35	27.36	28.29	26.18	23.17	19.26	14.36	**N**
O	13.08	17.63	22.07	25.31	26.86	26.95	26.97	27.52	27.13	26.87	24.19	23.95	25.89	26.47	27.35	26.27	26.77	26.34	24.90	22.18	17.70	13.23	**O**
P		16.63	20.71	23.36	25.73	26.58	26.76	27.49	27.40	26.85	25.82	26.28	26.91	26.69	26.63	26.17	26.02	25.57	24.07	20.85	16.80		**P**
Q		14.57	17.95	22.17	25.35	25.41	25.24	27.18	27.06	27.34	26.50	26.21	27.14	26.81	26.69	25.83	24.97	25.57	23.03	18.76	14.69		**Q**
R			16.61	19.51	23.50	24.21	25.24	27.15	27.11	26.62	26.38	26.65	26.91	26.86	27.20	25.66	24.74	23.76	20.15	17.14			**R**
S			12.36	16.06	18.48	20.79	23.19	25.73	27.00	27.85	27.70	27.74	27.74	27.10	25.64	23.95	21.60	19.25	16.59	12.82			**S**
T				13.23	15.24	17.92	20.02	23.43	24.56	25.30	25.34	25.19	25.28	24.45	23.51	20.84	18.86	15.83	13.68				**T**
U					12.38	14.15	17.18	20.18	21.12	22.59	22.38	22.45	22.47	21.23	20.22	17.47	14.62	12.46					**U**
V						11.04	13.18	15.78	16.08	17.09	17.15	16.95	17.13	16.20	15.84	13.31	11.18						**V**
W									12.30	13.08	13.17	13.18	13.03	12.34									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

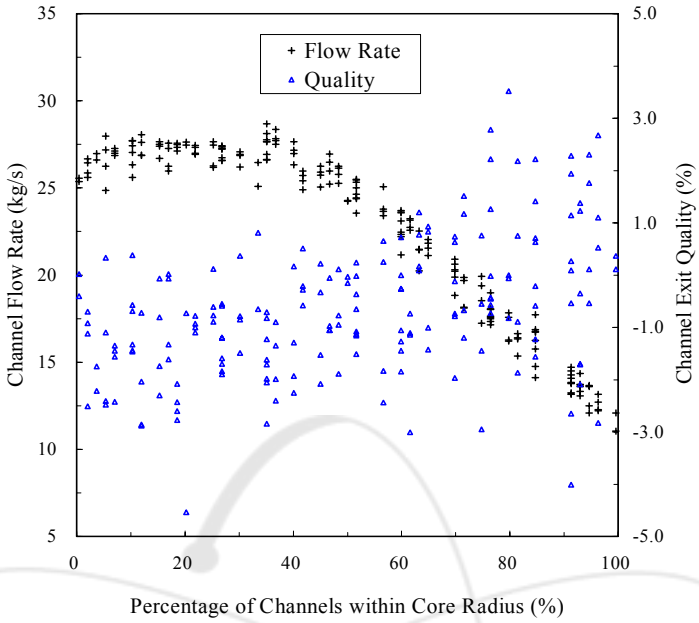
그림 6-8. Channel Flow Rate in the Wolsong-3 Reactor on 2002 January

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.80	-1.41	-3.44	-3.64	-3.33	-0.56									**A**
B						-0.42	-1.11	-1.16	-0.04	0.24	-2.57	-2.42	-2.18	-1.54	-2.29	-0.47	-3.11						**B**
C					-0.48	-0.29	-0.35	0.03	-0.14	-0.59	-2.57	-2.06	-1.88	-2.33	-1.75	-1.24	-0.59	-0.58					**C**
D				-1.03	-1.28	1.91	1.13	-1.52	-0.76	-1.86	-1.35	-1.81	-3.40	-2.99	-2.84	-0.05	1.76	0.59	-0.42				**D**
E			0.78	-0.11	-1.42	-0.31	-0.02	-0.46	-0.83	-0.51	-1.34	-3.11	-2.42	-1.87	-1.73	-0.79	-1.24	0.29	1.63	-0.01			**E**
F			1.40	-0.69	-1.56	-0.04	-1.61	-2.13	-0.33	-0.43	0.41	-1.23	-1.47	-0.58	-1.44	-1.71	-0.97	-0.86	-1.07	-0.36			**F**
G		2.80	2.94	0.88	-0.66	-0.31	-0.08	-1.13	-0.44	-0.99	0.91	0.13	0.01	-0.37	-1.19	-2.15	-1.14	-1.45	-0.96	1.59	1.89		**G**
H		1.96	1.51	-1.86	-0.13	-1.31	-1.07	-2.41	-1.90	0.33	1.83	-0.14	-0.36	-0.71	-0.55	0.38	-1.78	-1.94	-0.40	1.17	0.83		**H**
J	3.78	4.88	1.90	0.46	-1.57	-0.88	-2.65	-0.99	-0.46	-0.13	0.35	0.43	-1.83	-1.48	-0.91	-0.78	-0.93	-2.54	-0.19	0.11	3.06	2.97	**J**
K	2.79	3.91	0.00	0.16	-1.98	-1.44	-2.35	-2.22	-0.46	-0.58	-0.02	0.16	-3.09	-3.09	-2.75	-2.36	-1.19	-1.85	-0.74	1.17	2.60	3.07	**K**
L	1.61	-0.42	0.77	-0.84	-2.01	-1.10	-1.01	-1.19	-1.65	-0.42	-1.24	-0.02	-1.74	-4.37	-1.77	-1.03	-1.58	-1.74	0.44	1.27	1.80	2.81	**L**
M	2.52	1.37	0.08	-2.50	-3.46	-3.16	-1.83	-2.73	-1.91	-1.61	0.36	0.06	-2.47	-2.91	-1.98	-0.03	-0.17	-0.67	-0.02	-0.49	0.80	1.87	**M**
N	0.63	0.86	-0.75	-1.14	-3.20	-2.41	-2.49	-2.51	-1.42	-1.30	0.40	0.76	-0.13	-2.39	-2.12	-1.38	-0.80	-2.22	-0.28	-4.43	-1.47	-1.56	**N**
O	1.51	0.83	-0.81	-0.93	-0.89	-2.46	-1.18	-2.03	-2.55	-1.67	1.86	2.57	0.67	0.32	-1.25	0.60	-1.22	0.36	0.02	-1.06	0.24	0.41	**O**
P		0.37	0.63	1.04	-0.01	-0.96	-0.62	-4.22	-1.47	-1.27	0.47	-0.51	-1.02	0.21	0.60	0.44	0.54	0.10	-0.39	-0.04	-0.19		**P**
Q		0.54	1.88	1.04	-0.43	-0.64	0.65	-0.96	-1.08	-2.06	-1.34	-0.07	-1.00	-0.08	0.01	-0.16	0.22	-0.97	-1.91	-0.52	0.24		**Q**
R			1.06	0.69	-0.49	0.11	0.08	-2.57	-2.41	-0.59	-0.11	-1.70	-1.47	-0.89	-1.77	-2.21	-2.54	-2.50	-2.01	-1.96			**R**
S			3.64	2.22	2.02	1.91	0.86	-1.69	-2.06	-1.73	-1.83	-1.41	-1.91	-2.20	-2.25	-1.25	-1.39	-1.30	-2.01	-0.02			**S**
T				2.17	2.95	2.46	2.01	-1.41	-2.07	-1.85	-2.39	-1.32	-0.97	-2.16	-2.01	-4.34	-1.99	-4.02	-2.12				**T**
U					-0.30	2.20	0.22	-0.30	-0.96	-2.59	-1.63	-2.23	-1.60	-2.25	-1.90	-1.72	-2.85	-3.73					**U**
V						0.44	0.61	-0.90	0.52	-0.01	-0.02	0.39	0.01	-0.48	-2.29	-4.05	-3.03						**V**
W									-2.29	-1.45	-2.29	-0.78	-1.98	-2.60									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

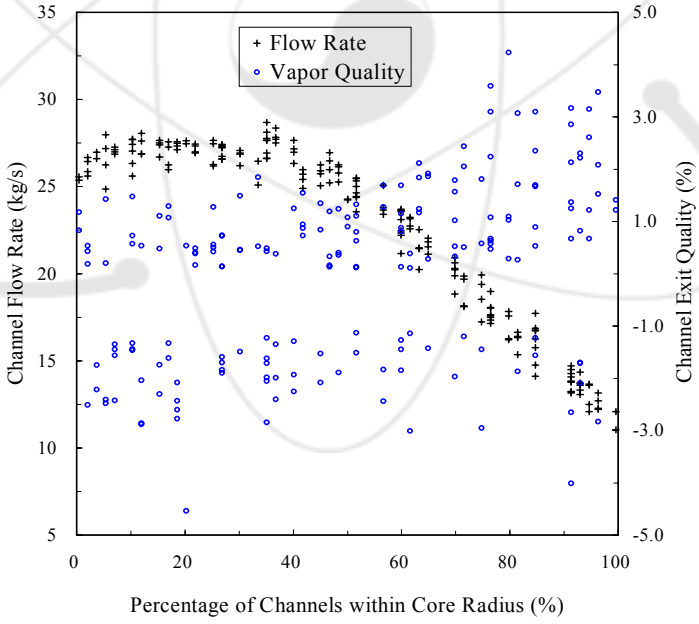
그림 7-8. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 January

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.72	-1.41	-3.44	-3.64	-3.33	0.67									**A**
B						0.78	-1.11	-1.16	1.03	1.24	-2.57	-2.42	-2.18	-1.54	-2.29	0.75	-3.11						**B**
C					0.72	0.85	0.70	1.11	1.05	0.62	-2.57	-2.06	-1.88	-2.33	-1.75	-1.24	0.54	0.68					**C**
D				-1.03	-1.28	2.75	2.07	-1.52	0.41	-1.86	-1.35	-1.81	-3.40	-2.99	-2.84	1.09	2.64	1.63	0.76				**D**
E			1.84	1.00	-1.42	0.78	1.18	0.74	0.45	0.75	-1.34	-3.11	-2.42	-1.87	-1.73	0.42	-1.24	1.33	2.54	1.15			**E**
F			2.38	0.52	-1.56	1.09	-1.61	-2.13	0.85	0.83	1.47	0.15	-1.47	0.72	-1.44	-1.71	0.33	0.34	0.10	0.81			**F**
G		3.61	3.73	1.92	0.45	0.89	1.00	0.16	0.87	0.37	1.92	1.28	1.26	0.90	0.14	-2.15	0.14	-1.45	0.29	2.52	2.83		**G**
H		2.90	2.50	-1.86	0.99	-1.31	0.19	-2.41	-1.90	1.50	2.71	1.01	0.89	0.53	0.81	1.49	-1.78	-1.94	0.77	2.13	1.91		**H**
J	4.51	5.50	2.80	1.50	-1.57	0.43	-2.65	0.40	0.87	1.02	1.46	1.52	-1.83	-1.48	0.43	0.48	0.42	-2.54	0.89	1.20	3.81	3.75	**J**
K	3.60	4.63	1.12	1.29	-1.98	-1.44	-2.35	-2.22	0.83	0.75	1.07	1.33	-3.09	-3.09	-2.75	-2.36	0.15	-1.85	0.44	2.12	3.43	3.83	**K**
L	2.51	0.68	1.83	0.37	-2.01	0.19	0.36	0.17	-1.65	0.88	0.16	1.11	-1.74	-4.37	-1.77	0.37	-1.58	-1.74	1.48	2.23	2.71	3.60	**L**
M	3.34	2.39	1.19	-2.50	-3.46	-3.16	-1.83	-2.73	-1.91	-1.61	1.44	1.20	-2.47	-2.91	-1.98	1.10	1.01	0.52	1.21	0.68	1.84	2.78	**M**
N	1.63	1.86	0.39	0.11	-3.20	-2.41	-2.49	-2.51	-1.42	-1.30	1.50	1.73	1.06	-2.39	-2.12	-1.38	0.46	-2.22	0.85	-4.43	-1.47	-1.56	**N**
O	2.41	1.81	0.35	0.33	0.38	-2.46	0.15	-2.03	-2.55	-1.67	2.70	3.38	1.73	1.53	0.13	1.68	0.12	1.46	1.18	0.11	1.41	1.43	**O**
P		1.45	1.68	2.00	1.18	0.34	0.71	-4.22	-1.47	0.13	1.58	0.77	0.38	1.42	1.73	1.51	1.57	1.24	0.75	1.09	0.92		**P**
Q		1.54	2.76	2.01	0.71	0.50	1.65	0.37	0.36	-2.06	-1.34	1.05	0.37	1.07	1.25	0.96	1.32	0.31	-1.91	0.59	1.36		**Q**
R			2.07	1.66	0.66	1.21	1.23	-2.57	-2.41	0.72	1.03	-1.70	-1.47	0.42	-1.77	-2.21	-2.54	-2.50	-2.01	-1.96			**R**
S			4.37	3.13	2.96	2.76	1.87	-1.69	-2.06	-1.73	-1.83	-1.41	-1.91	-2.20	-2.25	-1.25	-1.39	-1.30	-2.01	1.13			**S**
T				3.06	3.73	3.33	2.89	-1.41	-2.07	-1.85	-2.39	-1.32	0.31	-2.16	-2.01	-4.34	-1.99	-4.02	-2.12				**T**
U					0.82	3.01	1.35	0.92	0.27	-2.59	-1.63	-2.23	-1.60	-2.25	-1.90	-1.72	-2.85	-3.73					**U**
V						1.46	1.64	0.22	1.57	1.06	1.03	1.47	1.08	0.65	-2.29	-4.05	-3.03						**V**
W									-2.29	-1.45	-2.29	0.41	-1.98	-2.60									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-8. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 January



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-9. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 February (CASE-0202)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.182	3.044	2.762	2.746	2.772	2.918									**A**
B						3.044	3.582	4.062	4.155	4.247	3.923	3.954	3.850	3.984	3.908	3.412	2.556						**B**
C					3.273	3.915	4.218	4.854	5.225	5.436	5.379	5.193	5.322	4.966	4.679	4.156	3.622	3.326					**C**
D				3.088	3.751	4.748	5.349	5.432	5.867	6.205	6.141	6.006	6.134	6.063	5.845	5.514	4.974	4.272	3.246				**D**
E			3.392	3.894	4.462	5.235	6.024	6.064	6.489	6.579	6.376	6.378	6.106	6.390	6.048	6.199	5.768	5.108	4.239	3.275			**E**
F			4.175	4.607	5.513	6.003	6.295	5.987	6.232	6.335	6.350	5.938	6.174	6.335	6.485	6.504	5.943	5.347	4.503	3.845			**F**
G		3.941	4.850	5.604	5.774	6.356	6.402	6.286	6.515	6.119	6.505	6.220	6.429	6.563	6.427	6.755	6.274	5.658	5.131	4.570	3.749		**G**
H		4.304	5.269	6.130	6.344	6.116	6.278	6.693	6.676	6.498	6.517	6.084	6.383	6.391	6.871	6.892	6.670	6.346	5.994	5.221	4.076		**H**
J	3.594	4.736	5.705	6.341	6.160	6.502	6.597	6.645	6.621	6.304	6.192	6.372	6.569	6.450	6.647	6.689	6.722	6.478	6.094	5.252	4.358	3.412	**J**
K	3.656	4.948	5.483	6.475	6.154	6.216	5.995	6.073	6.311	6.177	6.095	6.312	6.534	6.497	6.188	6.597	6.364	6.132	5.961	5.554	4.578	3.684	**K**
L	3.642	4.626	5.897	6.354	6.482	6.580	6.430	6.442	5.979	6.383	6.379	6.398	6.127	5.427	6.286	6.383	6.151	6.277	6.371	5.836	4.907	3.814	**L**
M	3.829	5.037	5.790	6.609	6.755	6.638	6.276	6.433	6.199	5.875	6.253	6.418	6.484	6.060	6.202	6.565	6.719	6.667	6.518	5.461	4.863	3.651	**M**
N	3.489	4.728	5.451	6.303	6.635	6.240	6.033	5.960	6.318	5.960	6.109	6.264	6.496	6.643	6.654	6.348	6.489	6.722	6.319	4.521	4.678	3.226	**N**
O	3.337	4.446	5.586	5.968	6.657	6.694	6.387	6.137	6.341	5.955	6.331	6.562	6.570	6.697	6.345	6.765	6.968	6.800	6.209	5.492	4.505	3.276	**O**
P		4.041	5.137	5.988	6.373	6.264	6.511	5.414	6.302	6.089	6.414	6.135	6.080	6.635	6.842	6.612	6.620	6.460	5.825	5.201	4.078		**P**
Q		3.498	4.759	5.595	5.962	6.367	6.554	6.437	6.475	6.062	6.530	6.347	6.238	6.442	6.677	6.325	6.520	6.122	5.590	4.521	3.743		**Q**
R			4.096	4.724	5.420	6.060	6.274	6.528	6.474	6.471	6.614	6.559	6.088	6.375	6.190	6.353	6.025	5.380	4.910	3.894			**R**
S			3.456	4.228	4.844	5.477	5.873	5.806	6.045	6.305	6.268	6.527	6.203	5.970	6.096	5.739	5.190	4.601	3.862	3.250			**S**
T				3.551	4.237	4.888	5.367	5.345	5.884	5.759	6.016	6.067	5.962	5.461	5.337	4.234	4.372	3.304	3.148				**T**
U					3.286	3.929	4.209	4.838	4.917	4.836	5.094	4.931	5.356	5.126	4.764	4.193	3.322	2.898					**U**
V						2.777	3.320	3.633	4.023	4.196	4.192	4.339	4.335	4.095	3.643	3.147	2.556						**V**
W									2.637	2.988	2.842	3.137	2.953	2.708									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-9. Channel Power in the Wolsong-3 Reactor on 2002 February

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.21	13.70	13.84	13.78	13.75	12.36									**A**
B						12.09	13.78	17.73	17.57	17.63	18.54	18.59	17.63	17.67	17.84	14.15	12.18						**B**
C					13.60	14.76	18.02	20.63	22.04	22.74	23.11	23.02	22.87	22.01	20.81	18.11	15.17	13.52					**C**
D				13.60	16.64	18.10	21.45	25.07	25.45	26.14	25.96	26.08	26.11	25.40	25.12	21.35	17.67	16.19	13.51				**D**
E			13.68	16.40	19.87	22.22	24.64	26.25	27.66	27.50	27.77	27.64	27.73	27.56	26.38	24.18	21.31	19.10	15.96	13.69			**E**
F			16.26	19.69	22.46	24.28	25.97	27.66	26.86	27.41	26.27	26.52	27.32	26.91	27.54	25.58	24.33	22.68	19.62	16.62			**F**
G		14.26	17.57	21.48	24.44	25.71	26.45	27.29	27.33	27.12	26.25	26.47	27.07	27.21	27.36	25.44	25.91	24.37	22.27	17.95	14.54		**G**
H		16.72	20.30	23.78	25.05	26.60	26.60	27.63	26.69	26.88	25.61	26.35	26.87	27.22	27.02	25.11	25.62	25.10	24.05	20.43	16.95		**H**
J	12.71	16.27	21.82	25.01	27.16	27.07	27.45	27.65	27.43	26.99	26.24	25.91	26.71	27.45	27.73	27.23	26.61	26.91	25.58	22.41	16.77	12.89	**J**
K	13.73	17.49	23.24	25.77	27.73	27.25	27.56	28.07	27.11	26.97	25.85	25.65	26.57	26.99	27.92	27.44	27.10	27.82	26.19	23.24	17.96	13.72	**K**
L	14.50	19.93	23.71	26.94	28.68	27.46	27.57	27.72	27.18	26.43	25.38	25.16	26.65	27.12	27.82	27.45	27.69	28.57	26.97	23.75	19.75	14.26	**L**
M	14.08	19.38	23.57	26.49	28.14	27.66	27.27	27.70	27.97	26.67	25.55	25.20	26.22	28.07	27.60	27.10	27.40	28.30	26.62	23.85	19.63	14.31	**M**
N	14.36	18.98	23.15	26.24	28.37	27.38	27.48	27.61	27.27	26.62	25.60	25.30	26.34	26.82	27.37	27.34	27.35	28.13	26.24	23.15	19.08	14.35	**N**
O	13.16	17.82	21.54	25.34	26.34	26.20	26.92	27.50	27.04	26.87	24.86	24.32	26.39	26.47	27.37	26.19	25.29	25.91	25.02	21.79	17.66	13.24	**O**
P		16.78	20.91	23.67	25.91	26.62	26.73	27.46	27.39	26.86	26.32	26.49	26.99	27.10	26.61	26.53	26.08	25.57	24.05	20.78	16.79		**P**
Q		14.71	18.07	22.54	25.51	24.90	25.10	27.23	27.00	27.33	25.98	26.43	27.24	27.08	26.87	25.86	24.48	25.38	22.72	18.67	14.57		**Q**
R			16.87	19.85	23.63	24.24	25.42	26.93	26.94	26.58	26.19	26.28	26.89	26.92	27.16	25.18	24.36	23.72	19.83	17.13			**R**
S			12.49	16.35	18.83	21.17	23.55	25.72	26.96	27.84	27.67	27.66	27.74	27.07	25.53	23.78	21.52	19.16	16.57	12.72			**S**
T				13.32	15.35	18.14	20.25	23.41	24.39	25.26	25.21	25.08	25.29	24.44	23.47	20.82	18.83	15.82	13.66				**T**
U					12.09	14.13	17.33	20.23	21.13	22.58	22.35	22.42	22.40	21.07	20.19	17.38	14.61	12.43					**U**
V						11.05	13.25	15.77	16.20	17.16	17.23	16.96	16.99	16.02	15.81	13.29	11.16						**V**
W									12.29	13.07	13.15	13.16	13.02	12.32									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

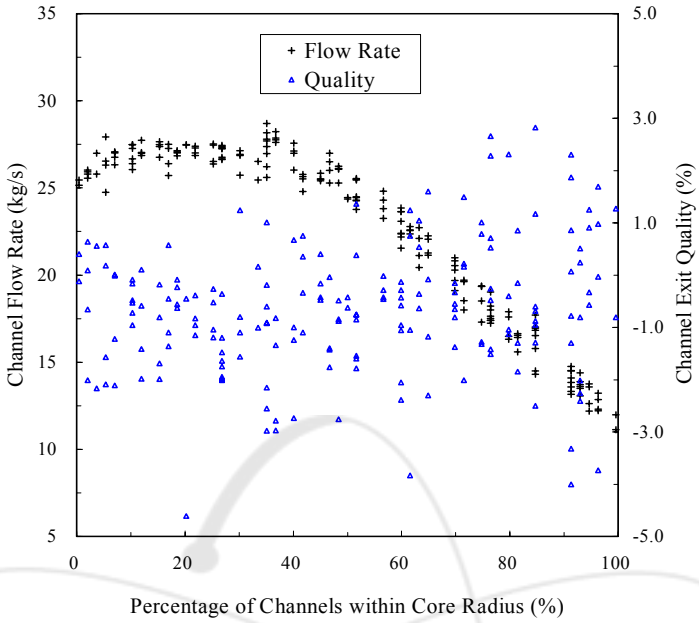
그림 6-9. Channel Flow Rate in the Wolsong-3 Reactor on 2002 February

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.10	-2.09	-4.01	-4.12	-3.72	-0.90									**A**
B						0.37	1.14	-1.23	-0.82	-0.43	-2.95	-2.73	-2.43	-1.62	-2.09	-0.09	-3.13						**B**
C					-0.54	1.41	-0.73	-0.79	-1.01	-0.74	-1.27	-1.97	-1.16	-2.07	-1.52	-1.16	-0.52	-0.18					**C**
D				-1.70	-1.87	1.17	0.17	-2.44	-1.51	-0.95	-1.05	-1.46	-1.25	-0.69	-1.11	1.03	2.63	1.33	-0.68				**D**
E			0.11	-0.89	-1.97	-1.06	-0.37	-1.53	-1.29	-0.90	-1.62	-1.62	-2.41	-1.61	-1.56	0.46	1.84	1.40	1.42	-0.63			**E**
F			0.63	-1.20	-0.27	-0.15	-0.58	-2.84	-1.49	-1.59	-0.61	-2.01	-2.11	-1.08	-1.30	0.44	-0.46	-0.96	-1.66	-1.27			**F**
G		2.28	2.22	0.77	-1.08	-0.21	-0.65	-1.70	-1.00	-2.08	-0.07	-1.24	-0.95	-0.84	-1.18	1.11	-0.50	-1.52	-1.55	0.41	0.91		**G**
H		0.71	0.74	0.65	0.22	-1.71	-1.20	-0.73	-0.07	-0.72	0.38	-1.40	-1.17	-1.22	0.12	1.97	0.65	0.29	-0.05	0.53	-0.66		**H**
J	2.67	3.52	0.93	0.24	-1.93	-0.79	-0.78	-0.81	-0.69	-1.35	-1.10	-0.35	-0.20	-1.34	-0.74	-0.42	0.28	-0.83	-0.84	-1.31	1.09	1.13	**J**
K	1.23	2.78	-1.14	0.11	-2.40	-1.84	-2.77	-2.88	-1.45	-1.75	-1.12	-0.14	-0.40	-0.65	-2.52	-0.69	-1.36	-2.41	-1.91	-0.76	0.42	1.52	**K**
L	0.27	-1.45	0.00	-1.06	-1.98	-0.89	-1.33	-1.44	-2.48	-0.70	0.02	0.16	-1.58	-4.27	-1.87	-1.49	-2.26	-2.61	-0.91	-0.34	-0.03	1.51	**L**
M	1.94	0.76	-0.26	-0.05	-0.82	-0.77	-1.61	-1.46	-2.41	-2.51	-0.40	0.45	-0.30	-2.78	-2.20	-0.46	-0.42	-1.09	-0.47	-1.55	-0.24	0.69	**M**
N	-0.35	-0.02	-1.11	-0.77	-1.35	-1.90	-2.60	-2.86	-1.56	-2.22	-0.92	-0.27	-0.17	-0.29	-0.41	-1.61	-0.98	-1.02	-0.61	-4.62	-0.22	-1.99	**N**
O	0.52	0.00	0.83	-1.16	0.17	0.37	-1.10	-2.30	-1.33	-2.42	0.33	1.65	-0.19	0.27	-1.65	0.69	1.89	1.05	-0.18	0.36	0.37	0.14	**O**
P		-0.59	-0.12	0.25	-0.33	-1.23	-0.55	-4.54	-1.74	-2.04	-0.57	-1.68	-2.02	-0.55	0.59	-0.16	0.37	0.07	-0.44	0.12	-0.29		**P**
Q		-0.54	1.26	0.09	-1.13	0.51	0.81	-1.19	-0.93	-2.43	0.02	-0.73	-1.90	-0.97	-0.25	-0.34	1.28	-0.38	-0.06	-0.18	0.90		**Q**
R			-0.21	-0.67	-1.45	-0.03	-0.28	-0.71	-0.85	-0.59	0.12	-0.15	-1.93	-1.25	-1.83	0.03	-0.08	-1.70	0.23	-1.49			**R**
S			2.30	0.75	0.63	0.72	-0.02	-2.08	-2.25	-1.99	-2.05	-1.13	-2.32	-2.44	-1.05	-0.58	-0.74	-0.59	-1.38	0.68			**S**
T				1.38	2.18	1.51	1.20	-1.83	-0.65	-1.89	-0.97	-0.78	-1.11	-2.26	-1.79	-4.00	-1.35	-3.42	-1.38				**T**
U					1.76	2.22	-0.57	-0.74	-1.43	-3.01	-1.85	-2.42	-0.98	-0.41	-1.12	-0.59	-1.94	-1.19					**U**
V						0.11	0.09	-1.56	-0.06	-0.45	-0.55	0.31	0.45	0.36	-1.43	-1.07	-1.52						**V**
W									-2.83	-1.71	-2.65	-0.64	-1.95	-2.27									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

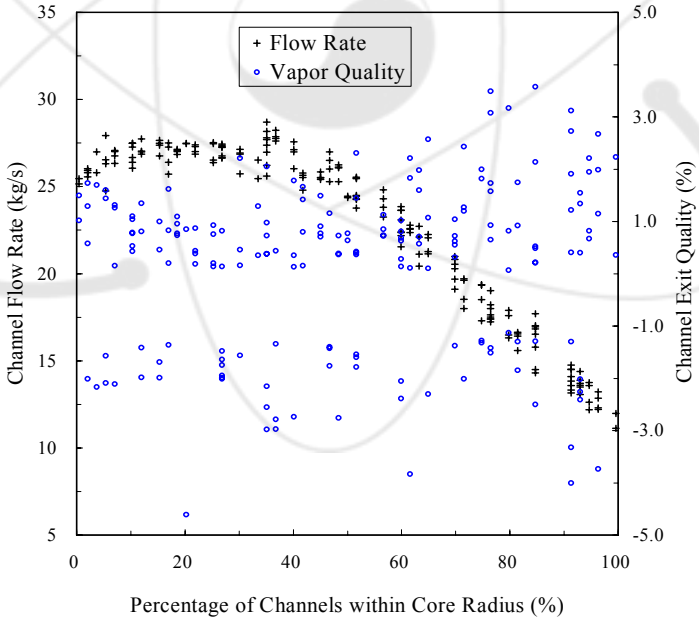
그림 7-9. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 February

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.08	-2.09	-4.01	-4.12	-3.72	0.34									**A**
B						1.41	2.13	-1.23	0.29	0.67	-2.95	-2.73	-2.43	-1.62	-2.09	0.98	-3.13						**B**
C					0.67	2.35	0.47	0.33	0.28	0.39	-1.27	-1.97	0.10	-2.07	-1.52	-1.16	0.59	0.91					**C**
D				-1.70	-1.87	2.05	1.24	-2.44	-1.51	0.36	0.16	-1.46	-1.25	0.62	0.12	1.99	3.45	2.29	0.47				**D**
E			1.22	0.27	-1.97	0.13	0.80	-1.53	-1.29	0.38	-1.62	-1.62	-2.41	-1.61	-1.56	1.48	2.75	2.36	2.36	0.47			**E**
F			1.67	-1.20	0.88	0.90	0.73	-2.84	-1.49	-1.59	0.56	-2.01	-2.11	0.18	-1.30	1.53	0.73	0.30	-1.66	-1.27			**F**
G		3.17	3.10	1.84	0.13	0.94	0.52	-1.70	0.39	-2.08	1.07	0.14	0.41	0.47	0.15	2.14	0.71	-1.52	-1.55	1.48	1.96		**G**
H		1.70	1.79	1.69	1.35	-1.71	0.14	0.54	1.11	0.54	1.48	-1.40	0.17	0.15	1.34	2.88	1.67	1.35	1.11	1.62	0.49		**H**
J	3.48	4.23	1.92	1.33	-1.93	0.46	0.49	0.48	0.57	-1.35	0.20	0.88	1.04	-1.34	0.52	0.82	1.36	0.44	0.37	-1.31	2.09	2.13	**J**
K	2.22	3.59	-1.14	1.24	-2.40	-1.84	-2.77	-2.88	-1.45	-1.75	0.19	1.01	0.87	0.75	-2.52	0.57	-1.36	-2.41	-1.91	0.39	1.50	2.45	**K**
L	1.37	-1.45	1.15	0.13	-1.98	0.42	-1.33	-1.44	-2.48	0.54	1.18	1.31	-1.58	-4.27	-1.87	-1.49	-2.26	-2.61	0.35	0.79	1.09	2.43	**L**
M	2.86	1.81	0.81	1.19	0.43	0.50	-1.61	-1.46	-2.41	-2.51	0.83	1.52	0.95	-2.78	-2.20	0.81	0.83	0.16	0.75	-1.55	0.96	1.67	**M**
N	0.82	1.08	0.11	0.40	-1.35	-1.90	-2.60	-2.86	-1.56	-2.22	0.43	0.92	1.00	0.98	0.90	-1.61	0.36	0.36	0.64	-4.62	0.98	-1.99	**N**
O	1.53	1.09	1.86	0.12	1.25	1.49	0.17	-2.30	-1.33	-2.42	1.43	2.55	0.99	1.45	-1.65	1.72	2.84	2.06	0.90	1.41	1.48	1.26	**O**
P		0.53	1.02	1.28	0.84	-1.23	0.74	-4.54	-1.74	-2.04	0.73	-1.68	-2.02	0.77	1.66	0.97	1.44	1.21	0.72	1.18	0.86		**P**
Q		0.67	2.24	1.17	-1.13	1.55	1.85	0.14	0.41	-2.43	1.29	0.49	-1.90	0.38	0.93	0.83	2.18	0.76	1.09	0.95	1.93		**Q**
R			0.89	0.51	-1.45	1.08	0.87	0.49	0.45	0.72	1.28	1.02	-1.93	0.13	-1.83	1.22	1.10	-1.70	1.26	-1.49			**R**
S			3.15	1.71	1.57	1.69	1.11	-2.08	-2.25	-1.99	-2.05	0.14	-2.32	-2.44	0.33	0.64	0.42	0.60	-1.38	1.64			**S**
T				2.30	3.07	2.44	2.12	-1.83	0.63	-1.89	0.33	0.42	0.12	-2.26	-1.79	-4.00	-1.35	-3.42	-1.38				**T**
U					2.61	3.10	0.57	0.52	-1.43	-3.01	-1.85	-2.42	0.28	0.72	-1.12	0.59	-1.94	-1.19					**U**
V						1.22	1.25	-1.56	1.03	0.63	0.58	1.40	1.51	1.47	-1.43	-1.07	-1.52						**V**
W									-2.83	-1.71	-2.65	0.48	-1.95	-2.27									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-9. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 February



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-10. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 March (CASE-0203)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.162	3.015	2.756	2.723	2.738	2.905									**A**
B						3.146	3.726	4.109	4.111	4.230	4.280	3.943	3.810	3.987	3.987	3.588	3.012						**B**
C					3.298	4.100	4.734	4.944	5.179	5.360	5.421	5.123	5.360	5.261	4.752	4.602	3.685	3.359					**C**
D				3.031	3.750	4.790	5.493	5.996	5.852	6.211	6.027	5.886	6.172	6.142	5.953	5.469	4.889	4.226	3.157				**D**
E			3.275	3.816	4.837	5.249	6.163	6.508	6.550	6.457	6.199	6.375	6.462	6.322	6.379	6.056	5.638	4.984	4.149	3.170			**E**
F			3.972	4.414	5.531	5.933	6.489	6.634	6.204	6.199	6.234	6.274	5.988	6.023	6.152	6.315	5.635	5.167	4.837	3.736			**F**
G		3.749	4.581	5.351	5.575	6.323	6.293	6.200	6.471	6.531	6.406	5.999	6.098	6.141	5.960	6.398	5.939	5.848	4.994	4.407	3.625		**G**
H		4.062	4.981	5.913	6.199	6.494	6.192	6.741	6.649	6.307	6.330	6.389	6.049	5.934	6.434	6.483	6.497	6.260	5.861	5.109	3.906		**H**
J	3.473	4.552	5.506	6.127	6.358	6.418	6.677	6.638	6.536	6.065	5.891	6.049	6.342	6.052	6.280	6.333	6.496	6.388	5.961	5.491	4.212	3.282	**J**
K	3.566	4.923	5.853	6.331	5.967	6.151	6.709	6.737	6.369	6.036	5.836	5.994	6.297	6.363	6.457	6.575	6.210	6.040	6.347	5.447	4.408	3.573	**K**
L	3.607	5.083	5.835	6.141	6.283	6.494	6.481	6.673	6.686	6.551	6.437	6.235	5.900	5.302	6.170	6.317	6.733	6.639	6.316	5.740	4.755	3.719	**L**
M	3.819	5.035	5.712	6.602	6.725	6.747	6.348	6.769	6.463	6.667	6.313	6.368	6.486	6.505	6.187	6.573	6.772	6.634	6.470	5.806	4.783	3.596	**M**
N	3.412	4.680	5.914	6.278	6.766	6.280	6.719	6.780	6.696	6.651	6.168	6.151	6.395	6.771	6.925	6.999	6.975	6.793	6.140	4.454	4.683	3.504	**N**
O	3.246	4.355	5.715	6.481	6.738	6.844	6.447	6.223	6.621	6.599	6.371	6.521	6.532	6.770	6.994	6.809	6.939	6.609	5.988	5.426	4.376	3.222	**O**
P		3.910	5.019	5.918	6.401	6.738	6.545	5.384	6.307	6.099	6.372	6.094	6.657	6.689	6.906	6.504	6.369	6.189	5.981	5.022	3.911		**P**
Q		3.370	4.669	5.490	5.821	6.407	6.430	6.292	6.459	6.568	6.634	6.262	6.238	6.446	6.748	6.704	6.346	5.805	5.490	4.313	3.625		**Q**
R			3.974	4.898	5.247	5.917	6.070	6.465	6.479	6.318	6.461	6.635	6.613	6.564	6.683	6.437	5.918	5.123	4.819	3.726			**R**
S			3.324	4.071	4.620	5.244	5.715	6.239	5.886	6.037	5.965	6.389	6.242	6.555	6.385	5.704	5.059	4.471	3.985	3.164			**S**
T				3.403	4.043	4.675	5.243	5.675	5.831	5.501	5.897	6.021	6.006	6.074	5.429	4.243	4.342	3.253	3.105				**T**
U					3.184	3.789	4.028	4.693	4.701	4.612	4.951	5.300	5.458	5.302	4.826	4.307	3.622	2.975					**U**
V						2.653	3.182	3.456	3.837	4.011	4.041	4.286	4.325	4.115	3.646	3.224	2.613						**V**
W									2.504	2.875	2.735	3.092	2.903	2.680									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-10. Channel Power in the Wolsong-3 Reactor on 2002 March

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.22	13.70	13.84	13.79	13.75	12.38									**A**
B						11.98	13.59	17.71	17.60	17.63	18.52	18.58	17.64	17.65	17.84	13.89	12.09						**B**
C					13.58	14.50	17.41	20.55	22.07	22.80	23.09	23.03	22.81	21.94	20.79	17.65	15.11	13.47					**C**
D				13.60	16.64	18.01	21.11	24.80	25.46	26.13	26.01	26.08	26.08	25.29	25.02	21.42	17.81	16.24	13.54				**D**
E			13.75	16.42	19.69	22.20	24.25	25.53	27.57	27.61	27.80	27.65	27.63	27.58	26.03	24.57	21.57	19.35	16.10	13.72			**E**
F			16.53	19.71	22.40	24.37	25.51	27.37	26.87	27.43	26.38	26.36	27.35	26.97	27.59	26.03	24.52	22.72	19.41	16.61			**F**
G		14.51	18.01	22.10	24.49	25.78	26.52	27.31	27.39	26.85	26.39	26.53	27.19	27.38	27.43	26.45	26.11	24.28	22.27	18.19	14.69		**G**
H		17.02	20.82	24.31	25.42	26.23	26.63	27.49	26.76	27.04	26.06	25.98	26.96	27.29	27.73	26.38	26.16	25.33	24.30	20.66	17.00		**H**
J	12.86	16.49	22.24	25.49	27.12	27.14	27.29	27.65	27.48	27.02	26.31	26.18	27.01	27.51	27.88	27.53	27.11	27.00	25.65	22.18	16.94	13.07	**J**
K	13.88	17.51	22.55	26.07	27.75	27.26	27.14	27.75	27.08	26.98	25.92	25.95	26.85	27.13	27.90	27.43	27.13	27.81	25.96	23.29	18.19	13.88	**K**
L	14.53	19.35	23.85	27.00	28.70	27.54	27.51	27.48	26.54	26.03	25.16	25.53	26.66	27.15	27.81	27.47	27.22	28.54	27.01	23.87	19.91	14.36	**L**
M	14.10	19.37	23.65	26.49	28.16	27.47	27.26	27.27	27.94	25.80	25.45	25.29	26.22	27.99	27.61	27.06	27.33	28.29	26.73	23.51	19.74	14.35	**M**
N	14.39	19.04	22.36	26.25	28.23	27.38	27.02	26.99	26.75	25.80	25.56	25.47	26.45	26.45	26.63	26.06	26.10	28.10	26.40	23.16	19.05	14.29	**N**
O	13.23	17.91	21.28	24.29	26.03	25.73	26.86	27.49	26.68	26.32	24.75	24.38	26.46	26.23	26.14	25.98	25.42	26.46	25.28	21.88	17.84	13.27	**O**
P		16.82	21.00	23.80	25.84	25.61	26.67	27.47	27.39	26.86	26.39	26.50	26.29	27.02	26.35	26.72	26.60	26.03	23.72	20.95	16.86		**P**
Q		14.75	18.22	22.73	25.53	24.80	25.45	27.27	27.01	27.08	25.71	26.45	27.24	27.05	26.63	24.84	24.90	25.59	22.88	18.80	14.71		**Q**
R			16.96	19.64	23.64	24.45	25.64	26.97	26.93	26.75	26.51	26.03	26.28	26.72	26.53	24.97	24.50	23.75	19.94	17.14			**R**
S			12.61	16.54	19.11	21.55	23.77	25.49	26.98	27.87	27.70	27.69	27.74	26.73	25.07	23.81	21.58	19.21	16.54	12.78			**S**
T				13.50	15.59	18.53	20.45	23.25	24.45	25.29	25.29	25.11	25.22	24.00	23.45	20.82	18.81	15.82	13.65				**T**
U					12.20	14.32	17.40	20.29	21.15	22.60	22.36	22.33	22.33	20.72	20.16	17.24	14.51	12.41					**U**
V						11.12	13.33	15.78	16.31	17.23	17.29	17.06	16.98	16.00	15.80	13.26	11.15						**V**
W									12.29	13.08	13.16	13.17	13.02	12.31									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

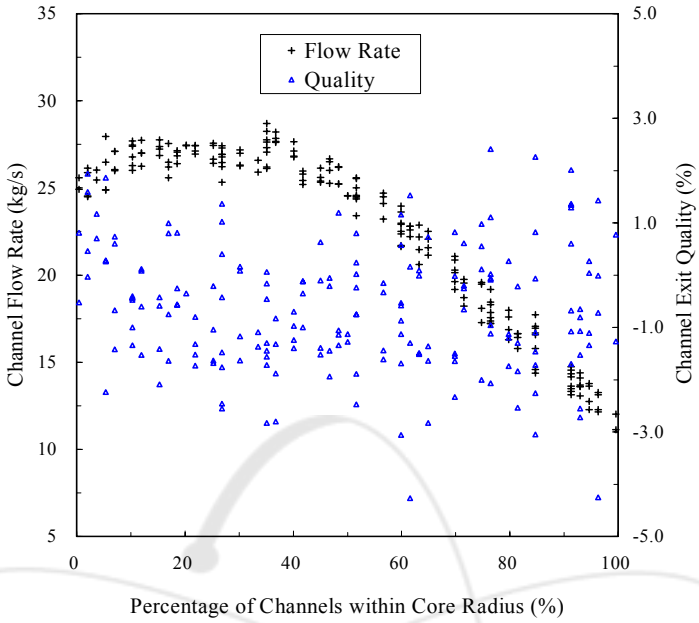
그림 6-10. Channel Flow Rate in the Wolsong-3 Reactor on 2002 March

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.98	-2.26	-4.00	-4.26	-3.91	-0.99									**A**
B						1.27	2.30	-0.95	-1.04	-0.48	-1.28	-2.76	-2.62	-1.59	-1.70	1.17	0.09						**B**
C					-0.33	2.82	2.28	-0.33	-1.18	-1.05	-1.06	-2.23	-0.96	-0.86	-1.20	1.32	-0.10	0.00					**C**
D				-2.02	-1.85	1.49	1.04	-0.29	-1.54	-0.88	-1.43	-1.84	-1.10	-0.34	-0.64	0.82	2.08	1.04	-1.27				**D**
E			-0.57	-1.30	-0.15	-0.96	0.38	0.40	-1.00	-1.34	-2.15	-1.62	-1.24	-1.82	-0.22	-0.27	1.10	0.62	0.80	-1.31			**E**
F			-0.60	-2.01	-0.13	-0.42	0.35	-0.60	-1.56	-1.99	-1.04	-0.79	-2.70	-2.11	-2.36	-0.43	-1.68	-1.67	-0.06	-1.81			**F**
G		0.86	0.52	-0.64	-1.78	-0.34	-1.01	-1.95	-1.15	-0.56	-0.45	-1.98	-2.07	-2.28	-2.67	-0.72	-1.75	-0.77	-2.06	-0.51	0.03		**G**
H		-0.69	-0.81	-0.42	-0.47	-0.19	-1.48	-0.45	-0.18	-1.41	-0.48	-0.13	-2.29	-2.69	-1.67	-0.26	-0.23	-0.10	-0.70	-0.05	-1.56		**H**
J	1.69	2.31	-0.08	-0.76	-1.24	-1.10	-0.39	-0.81	-0.96	-2.11	-2.09	-1.61	-1.12	-2.60	-1.97	-1.74	-0.72	-1.17	-1.33	-0.19	0.20	0.06	**J**
K	0.51	2.66	0.75	-0.49	-2.97	-2.01	-0.23	-0.59	-1.22	-2.17	-2.01	-1.40	-1.36	-1.17	-1.68	-0.74	-1.85	-2.68	-0.47	-1.19	-0.52	0.64	**K**
L	0.07	1.01	-0.29	-1.76	-2.55	-1.19	-1.10	-0.53	0.18	0.09	0.40	-0.59	-2.30	-4.67	-2.21	-1.69	-0.12	-1.49	-1.10	-0.76	-0.74	0.83	**L**
M	1.87	0.79	-0.58	-0.04	-0.91	-0.27	-1.36	-0.09	-1.57	0.64	-0.12	0.23	-0.29	-1.37	-2.25	-0.40	-0.20	-1.17	-0.69	-0.04	-0.67	0.33	**M**
N	-0.81	-0.26	1.24	-0.84	-0.82	-1.75	-0.09	0.10	-0.01	0.56	-0.66	-0.76	-0.57	0.33	0.89	1.33	1.40	-0.76	-1.30	-4.86	-0.17	-0.25	**N**
O	-0.03	-0.40	1.60	1.36	0.67	1.24	-0.83	-1.99	-0.16	0.01	0.57	1.47	-0.35	0.68	1.25	1.00	1.69	0.05	-1.12	0.05	-0.34	-0.14	**O**
P		-1.29	-0.65	-0.02	-0.16	1.01	-0.36	-4.61	-1.69	-1.98	-0.72	-1.80	0.27	-0.32	0.99	-0.64	-0.74	-1.10	0.32	-0.69	-1.22		**P**
Q		-1.30	0.71	-0.36	-1.60	0.75	0.16	-1.64	-0.96	-0.63	0.57	-1.02	-1.89	-0.93	0.10	1.65	0.37	-1.58	-0.54	-1.24	0.07		**Q**
R			-0.88	0.22	-2.05	-0.62	-1.10	-0.92	-0.80	-1.20	-0.52	0.24	0.14	-0.48	0.14	0.47	-0.55	-2.62	-0.18	-2.33			**R**
S			1.25	-0.15	-0.55	-0.43	-0.75	-0.42	-2.74	-2.79	-2.98	-1.57	-2.19	-0.33	0.22	-0.72	-1.31	-1.21	-0.70	0.04			**S**
T				0.24	0.85	0.16	0.54	-0.46	-0.85	-2.76	-1.40	-0.95	-0.90	0.19	-1.43	-3.95	-1.46	-3.69	-1.63				**T**
U					0.91	1.17	-1.51	-1.38	-2.30	-3.83	-2.39	-0.92	-0.51	0.55	-0.82	0.05	-0.05	-0.61					**U**
V						-0.81	-0.78	-2.50	-1.13	-1.42	-1.32	-0.05	0.42	0.49	-1.39	-0.52	-1.06						**V**
W									-3.73	-2.41	-3.32	-0.92	-2.27	-2.44									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

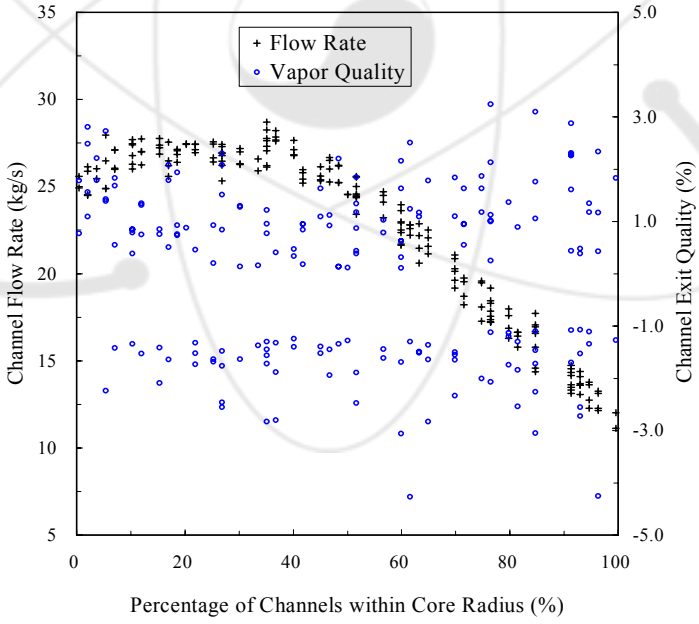
그림 7-10. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 March

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.99	-2.26	-4.00	-4.26	-3.91	-0.99									**A**
B						2.23	3.12	0.22	0.07	0.65	-1.28	-2.76	-2.62	-1.59	-1.70	2.13	1.24						**B**
C					0.82	3.58	3.08	0.72	0.10	0.11	0.14	-2.23	0.30	0.36	-1.20	2.27	0.98	1.16					**C**
D				-2.02	-1.85	2.43	1.98	0.85	-1.54	0.39	-1.43	-1.84	0.13	0.82	0.60	1.82	2.89	2.05	-1.27				**D**
E			0.67	-1.30	1.04	0.28	1.45	1.49	0.35	-1.34	-2.15	-1.62	0.13	-1.82	0.93	0.83	2.04	1.64	1.75	-1.31			**E**
F			0.52	-2.01	1.02	0.77	1.42	0.73	-1.56	-1.99	0.20	0.51	-2.70	-2.11	-2.36	0.79	-1.68	-1.67	1.07	-1.81			**F**
G		1.91	1.58	0.57	-1.78	0.80	0.35	-1.95	0.19	0.77	0.83	-1.98	-2.07	-2.28	-2.67	0.48	-1.75	0.44	-2.06	0.61	1.19		**G**
H		0.49	0.32	0.74	0.71	0.98	-1.48	0.85	1.00	-1.41	0.79	1.05	-2.29	-2.69	-1.67	0.89	0.92	0.95	0.44	1.06	-1.56		**H**
J	2.67	3.17	1.07	0.40	0.13	0.16	0.87	0.46	0.43	-2.11	-2.09	-1.61	0.21	-2.60	-1.97	-1.74	0.49	0.14	-1.33	1.03	1.31	1.22	**J**
K	1.55	3.49	1.83	0.73	-2.97	-2.01	0.96	0.81	0.15	-2.17	-2.01	-1.40	-1.36	0.18	-1.68	0.51	-1.85	-2.68	0.77	-1.19	0.63	1.65	**K**
L	1.22	2.00	0.81	-1.76	-2.55	0.14	0.20	0.77	1.44	1.29	1.50	0.74	-2.30	-4.67	-2.21	-1.69	1.03	-1.49	0.13	0.40	0.51	1.90	**L**
M	2.73	1.82	0.63	1.16	0.38	0.93	-1.36	1.10	-1.57	1.73	1.02	1.34	0.94	-1.37	-2.25	0.84	0.96	0.13	0.47	1.14	0.56	1.40	**M**
N	0.40	0.93	2.21	0.37	0.44	-1.75	1.09	1.35	1.26	1.70	0.58	0.51	0.76	1.50	1.92	2.37	2.41	0.47	-1.30	-4.86	1.00	0.91	**N**
O	1.15	0.82	2.57	2.31	1.78	2.21	0.44	-1.99	1.04	1.31	1.60	2.39	0.88	1.75	2.29	2.06	2.57	1.22	0.12	1.17	0.86	0.92	**O**
P		-1.29	0.55	1.13	0.91	2.05	0.82	-4.61	-1.69	-1.98	0.53	-1.80	1.47	0.90	2.07	0.53	0.48	0.14	1.39	0.53	-1.22		**P**
Q		-1.30	1.73	0.71	-1.60	1.66	1.29	-1.64	0.39	0.74	1.62	0.37	-1.89	0.42	1.27	2.58	1.37	-1.58	0.63	-1.24	1.21		**Q**
R			0.21	1.27	-2.05	0.64	0.15	0.38	0.46	0.14	0.76	1.36	1.37	0.75	1.35	1.50	0.68	-2.62	0.95	-2.33			**R**
S			2.21	0.92	0.62	0.69	0.42	0.77	-2.74	-2.79	-2.98	-1.57	-2.19	0.88	1.33	0.44	-1.31	-1.21	0.52	1.17			**S**
T				1.34	1.75	1.20	1.60	0.72	0.37	-2.76	-1.40	0.31	0.35	1.29	-1.43	-3.95	-1.46	-3.69	-1.63				**T**
U					1.95	2.14	-1.51	-1.38	-2.30	-3.83	-2.39	0.32	0.64	1.64	0.32	1.12	1.04	0.50					**U**
V						0.36	0.41	-2.50	-1.13	-1.42	-1.32	1.00	1.49	1.54	-1.39	0.71	-1.06						**V**
W									-3.73	-2.41	-3.32	0.19	-2.27	-2.44									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-10. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 March



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-11. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 April (CASE-0204)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.209	3.200	3.557	3.563	3.098	3.137									**A**
B						3.079	3.685	4.071	4.074	4.293	4.689	4.748	4.650	4.239	4.187	3.755	3.203						**B**
C					3.177	4.020	4.741	5.151	5.123	5.290	5.516	5.603	5.562	5.564	5.321	4.859	4.166	3.449					**C**
D				2.914	3.613	4.639	5.325	6.005	6.227	6.133	5.867	5.736	6.084	6.087	5.957	5.416	4.857	4.204	3.086				**D**
E			3.150	3.708	4.860	5.550	6.029	6.543	6.427	6.279	6.322	6.202	6.389	6.109	6.374	5.947	5.601	4.916	4.047	3.065			**E**
F			3.811	4.772	5.445	5.716	6.389	6.653	6.596	6.034	6.043	6.266	5.770	5.877	6.485	6.406	6.138	5.156	4.864	3.617			**F**
G		3.513	4.302	5.149	5.831	6.162	6.186	6.772	6.409	6.525	6.322	6.455	5.992	6.074	6.548	6.444	6.403	6.068	5.481	4.291	3.499		**G**
H		3.751	4.619	5.602	5.961	6.486	6.784	6.748	6.587	6.254	6.340	6.515	5.980	6.319	6.312	6.272	6.412	6.158	5.713	4.929	3.731		**H**
J	3.260	4.232	5.145	5.806	6.347	6.253	6.565	6.467	6.510	6.759	6.781	6.616	6.386	5.848	5.982	6.010	6.255	6.209	5.706	5.431	4.065	3.158	**J**
K	3.400	4.671	5.745	6.182	6.482	6.573	6.697	6.721	6.308	6.733	6.715	6.104	6.242	6.170	6.324	6.344	6.437	6.431	6.289	5.681	4.710	3.486	**K**
L	3.770	5.001	5.690	6.547	6.175	6.355	6.305	6.459	6.687	6.518	6.499	6.223	6.329	5.175	5.884	5.959	6.505	6.529	5.984	5.483	4.551	3.567	**L**
M	3.744	4.915	6.043	6.577	6.614	6.746	6.866	6.674	6.241	6.619	6.210	6.287	6.355	6.471	6.533	6.245	6.384	6.260	6.164	5.624	4.538	3.418	**M**
N	3.286	4.514	5.946	6.680	6.748	6.911	6.874	6.769	6.535	6.754	6.604	6.517	6.200	6.507	6.665	6.795	6.849	6.592	6.321	4.354	4.551	3.451	**N**
O	3.142	4.213	5.555	6.360	6.456	6.628	6.251	6.595	6.548	6.701	6.307	6.458	6.306	6.445	6.751	6.544	6.773	6.512	6.398	5.456	4.307	3.155	**O**
P		4.130	4.803	5.583	6.043	6.555	6.243	5.216	6.165	6.628	6.412	6.812	6.740	6.430	6.700	6.994	7.001	6.658	6.193	5.073	4.210		**P**
Q		3.666	4.520	5.205	5.554	6.212	6.136	5.993	6.235	6.568	6.672	6.812	6.772	6.273	6.506	6.770	6.383	5.899	5.634	4.766	3.750		**Q**
R			3.802	4.805	5.332	5.790	6.233	6.313	6.369	6.143	6.322	6.607	6.723	6.371	6.613	6.294	5.939	5.524	4.935	3.775			**R**
S			3.168	3.861	4.417	5.080	5.920	6.288	6.406	6.017	6.406	6.343	6.661	6.589	6.282	5.551	5.227	4.474	4.081	3.174			**S**
T				3.239	3.862	4.511	5.137	5.698	5.842	5.904	5.868	5.857	5.796	6.008	5.589	4.152	4.242	3.198	3.072				**T**
U					3.105	3.736	4.309	4.618	4.564	4.485	4.770	5.193	5.227	5.122	4.635	4.183	3.575	2.941					**U**
V						2.592	3.131	3.350	3.712	3.878	3.895	4.102	4.114	3.911	3.461	3.122	2.529						**V**
W									2.428	2.846	2.981	3.034	2.765	2.539									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-11. Channel Power in the Wolsong-3 Reactor on 2002 April

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.16	13.68	13.47	13.42	13.73	12.20									**A**
B						12.03	13.63	17.72	17.59	17.56	18.09	18.01	17.02	17.55	17.79	13.67	11.88						**B**
C					13.62	14.59	17.36	20.14	22.06	22.80	22.98	22.80	22.55	21.28	19.93	17.29	14.45	13.33					**C**
D				13.60	16.64	18.22	21.47	24.71	25.01	26.17	26.01	26.10	26.11	25.35	25.00	21.52	17.84	16.28	13.53				**D**
E			13.77	16.42	19.63	21.69	24.58	25.40	27.65	27.61	27.76	27.66	27.67	27.60	26.03	24.71	21.62	19.48	16.25	13.72			**E**
F			16.57	19.54	22.52	24.55	25.80	27.30	26.27	27.43	26.42	26.37	27.37	26.99	27.53	25.78	23.86	22.73	19.34	16.62			**F**
G		14.75	18.29	22.19	24.37	25.97	26.58	26.46	27.41	26.84	26.47	26.20	27.20	27.37	27.14	26.32	25.53	23.82	21.82	18.24	14.79		**G**
H		17.06	20.87	24.48	25.61	26.20	25.32	27.43	26.86	27.02	26.01	25.58	26.95	27.24	27.73	26.68	26.27	25.49	24.38	20.87	17.00		**H**
J	13.13	16.88	22.50	25.59	27.13	27.18	27.44	27.77	27.47	26.06	24.90	25.26	26.95	27.53	27.93	27.56	27.26	27.04	25.68	22.27	17.08	13.17	**J**
K	14.09	17.85	22.81	26.22	27.67	26.94	27.14	27.74	27.10	26.04	24.54	25.86	26.84	27.20	27.91	27.59	27.00	27.76	26.05	22.97	17.74	14.01	**K**
L	14.34	19.48	23.96	26.67	28.69	27.57	27.56	27.70	26.49	26.14	24.93	25.56	26.50	27.15	27.85	27.50	27.58	28.54	27.07	23.95	19.99	14.51	**L**
M	14.16	19.59	22.92	26.50	28.25	27.43	26.21	27.40	27.95	25.88	25.57	25.50	26.38	28.00	27.46	27.33	27.67	28.37	26.85	23.76	19.81	14.48	**M**
N	14.40	19.17	22.22	25.23	28.21	26.23	26.40	26.99	27.09	25.46	24.49	24.64	26.66	27.01	27.32	26.65	26.48	28.23	26.21	23.16	19.19	14.31	**N**
O	13.26	17.99	21.56	24.52	26.78	26.30	26.96	27.23	26.77	25.99	24.87	24.50	26.69	26.98	26.84	26.75	25.82	26.72	24.45	21.81	17.89	13.29	**O**
P		16.68	21.07	24.11	26.14	26.12	26.92	27.47	27.38	26.25	26.28	25.22	26.05	27.32	27.00	25.33	24.91	24.95	23.17	20.91	16.62		**P**
Q		14.54	18.45	22.87	25.54	25.21	25.90	27.28	27.11	27.05	25.58	25.21	26.56	27.17	27.08	24.60	24.78	25.59	22.61	18.25	14.56		**Q**
R			16.97	19.75	23.62	24.55	25.43	27.05	27.00	26.78	26.66	26.09	25.91	26.91	26.77	25.32	24.48	23.70	19.73	17.13			**R**
S			12.74	16.63	19.17	21.64	23.40	25.32	26.83	27.85	27.63	27.70	27.57	26.59	25.33	23.90	21.47	19.21	16.46	12.77			**S**
T				13.60	15.78	18.70	20.62	23.21	24.42	25.23	25.27	25.17	25.31	24.11	23.34	20.82	18.82	15.82	13.66				**T**
U					12.28	14.38	17.21	20.28	21.14	22.59	22.36	22.39	22.45	21.05	20.20	17.37	14.54	12.41					**U**
V						11.12	13.34	15.78	16.31	17.23	17.28	17.20	17.22	16.20	15.81	13.29	11.15						**V**
W									12.29	13.07	13.14	13.18	13.02	12.32									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

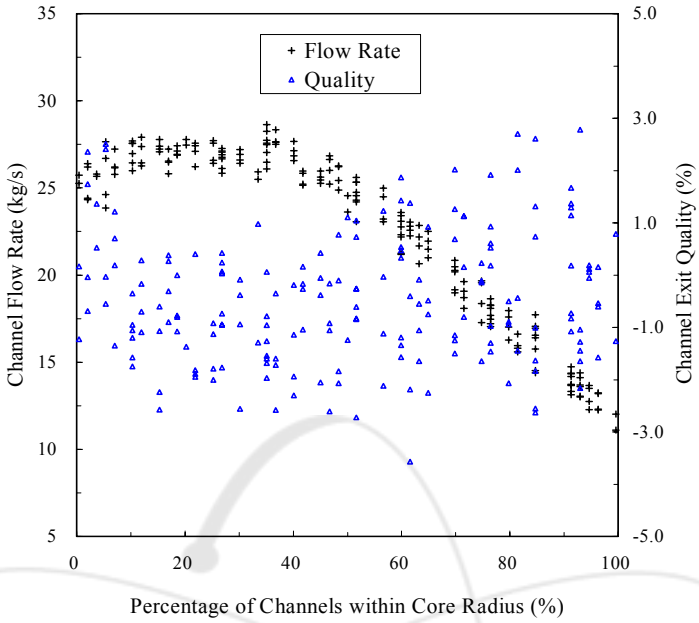
그림 6-11. Channel Flow Rate in the Wolsong-3 Reactor on 2002 April

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.43	-1.07	1.34	1.34	-1.62	0.77									**A**
B						0.77	2.01	-1.10	-1.20	-0.06	0.98	1.47	2.06	-0.22	-0.67	2.53	1.77						**B**
C					-1.11	2.26	2.41	0.82	-1.36	-1.30	-0.58	-0.23	0.00	0.84	1.87	2.98	3.42	0.77					**C**
D				-2.72	-2.54	0.61	0.09	-0.15	0.02	-1.14	-1.94	-2.30	-1.37	-0.52	-0.59	0.57	1.92	0.92	-1.68				**D**
E			-1.34	-1.84	-0.02	0.57	-0.24	0.63	-1.40	-1.88	-1.72	-2.13	-1.45	-2.46	-0.20	-0.72	0.95	0.24	0.15	-1.92			**E**
F			-1.46	-0.25	-0.53	-1.28	-0.12	-0.46	0.08	-2.46	-1.68	-0.78	-3.36	-2.53	-1.26	0.03	0.56	-1.67	0.14	-2.38			**F**
G		-0.68	-0.96	-1.49	-0.75	-1.00	-1.37	0.40	-1.32	-0.56	-0.75	-0.24	-2.37	-2.45	-0.59	-0.45	0.19	0.33	0.17	-1.08	-0.69		**G**
H		-2.26	-2.33	-1.61	-1.39	-0.16	1.36	-0.35	-0.42	-1.53	-0.40	0.55	-2.47	-1.41	-2.02	-1.10	-0.55	-0.50	-1.26	-0.93	-2.41		**H**
J	-0.01	0.27	-1.64	-1.89	-1.24	-1.63	-0.80	-1.41	-1.00	0.74	1.86	0.91	-0.89	-3.22	-2.86	-2.72	-1.54	-1.74	-2.16	-0.46	-0.56	-0.74	**J**
K	-0.65	1.11	0.16	-1.06	-1.32	-0.42	-0.25	-0.60	-1.42	0.70	1.94	-0.93	-1.50	-1.78	-2.06	-1.53	-1.02	-1.41	-0.69	-0.03	1.31	0.01	**K**
L	1.29	0.55	-0.87	-0.21	-2.83	-1.63	-1.64	-1.34	0.26	-0.03	0.81	-0.62	-0.76	-5.03	-3.07	-2.79	-1.04	-1.79	-2.15	-1.72	-1.65	-0.13	**L**
M	1.36	0.11	1.16	-0.05	-1.30	-0.21	0.99	-0.43	-2.24	0.46	-0.52	-0.09	-0.80	-1.43	-1.04	-1.58	-1.62	-2.31	-1.73	-0.85	-1.77	-0.74	**M**
N	-1.53	-1.12	1.53	1.19	-0.83	1.02	0.81	0.08	-0.67	1.17	1.59	1.07	-1.31	-0.82	-0.29	0.28	0.75	-1.44	-0.52	-5.19	-0.84	-0.55	**N**
O	-0.72	-1.13	0.73	0.80	-0.70	0.16	-1.52	-0.59	-0.44	0.60	0.28	1.20	-1.22	-0.78	0.00	-0.30	0.86	-0.34	0.88	0.26	-0.69	-0.54	**O**
P		-0.07	-1.55	-1.44	-1.52	0.06	-1.48	-5.11	-2.09	0.12	-0.47	1.46	0.75	-1.33	-0.03	1.97	2.61	1.23	1.57	-0.43	0.54		**P**
Q		0.60	-0.09	-1.51	-2.47	-0.12	-1.09	-2.55	-1.73	-0.57	0.80	1.69	0.26	-1.51	-0.91	2.12	0.61	-1.22	0.17	1.31	0.99		**Q**
R			-1.72	-0.20	-1.69	-1.13	-0.35	-1.45	-1.17	-1.76	-1.04	0.13	0.81	-1.21	-0.16	-0.19	-0.42	-1.12	0.47	-2.05			**R**
S			0.04	-1.30	-1.50	-1.13	0.24	-0.10	-0.97	-2.80	-1.56	-1.66	-0.74	-0.08	-0.24	-1.30	-0.51	-1.16	-0.09	0.17			**S**
T				-0.81	-0.22	-0.66	-0.01	-0.33	-0.75	-1.34	-1.45	-1.54	-1.64	-0.04	-0.71	-4.29	-1.87	-3.96	-1.79				**T**
U					0.27	0.82	0.02	-1.65	-2.83	-4.27	-3.06	-1.33	-1.47	-0.36	-1.63	-0.57	-0.34	-0.81					**U**
V						-1.27	-1.08	-3.05	-1.74	-2.07	-2.00	-1.01	-0.76	-0.69	-2.36	-1.19	-1.67						**V**
W									-4.25	-2.55	-1.70	-1.27	-3.14	-3.37									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

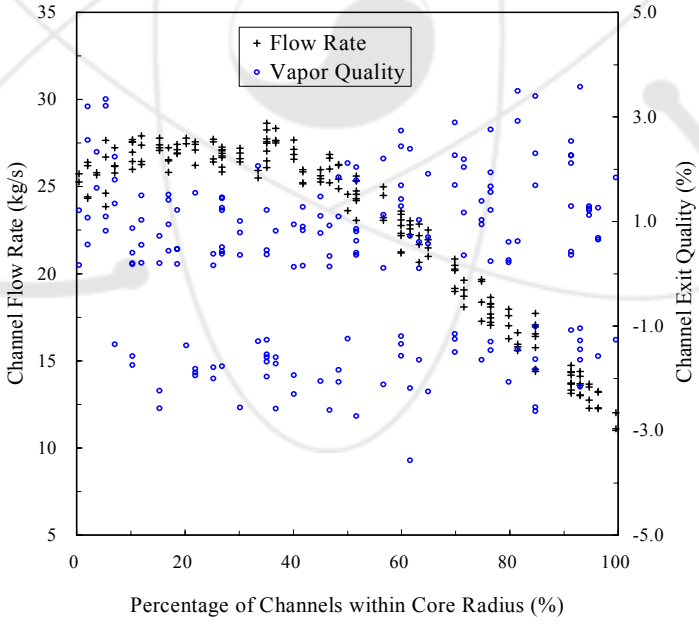
그림 7-11. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 April

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.34	-1.07	2.28	2.25	-1.62	1.79									**A**
B						1.83	2.88	-1.10	-1.20	1.02	1.87	2.40	2.87	0.92	0.48	3.33	2.70						**B**
C					-1.11	3.10	3.24	1.84	-1.36	-1.30	0.63	0.84	1.11	1.86	2.75	3.72	4.12	1.82					**C**
D				-2.72	-2.54	1.63	1.17	1.03	1.18	0.13	-1.94	-2.30	-1.37	0.69	0.61	1.63	2.75	1.85	-1.68				**D**
E			-1.34	-1.84	1.10	1.63	0.87	1.63	-1.40	-1.88	-1.72	-2.13	-1.45	-2.46	0.92	0.43	1.93	1.25	1.29	-1.92			**E**
F			-1.46	0.96	0.62	-1.28	0.95	0.77	1.30	-2.46	-1.68	0.48	-3.36	-2.53	-1.26	1.21	1.55	-1.67	1.18	-2.38			**F**
G		0.44	0.25	-1.49	0.44	0.18	-1.37	1.51	-1.32	0.76	0.51	0.96	-2.37	-2.45	0.73	0.76	1.33	1.35	1.25	-1.08	0.46		**G**
H		-2.26	-2.33	-1.61	-1.39	0.96	2.30	0.88	0.85	-1.53	0.85	1.60	-2.47	-1.41	-2.02	0.17	0.69	0.71	-1.26	0.28	-2.41		**H**
J	1.17	1.37	-1.64	-1.89	-1.24	-1.63	0.46	-1.41	0.39	1.83	2.73	1.95	0.44	-3.22	-2.86	-2.72	-1.54	-1.74	-2.16	0.69	0.57	0.40	**J**
K	0.48	2.13	1.24	0.14	-1.32	0.84	0.93	0.75	-1.42	1.79	2.81	0.41	-1.50	-1.78	-2.06	-1.53	0.39	-1.41	0.46	1.14	2.30	1.20	**K**
L	2.26	1.63	0.32	0.92	-2.83	-1.63	-1.64	-1.34	1.43	1.09	1.78	0.60	0.53	-5.03	-3.07	-2.79	0.20	-1.79	-2.15	-1.72	-1.65	0.95	**L**
M	2.31	1.18	2.16	1.12	-1.30	0.93	2.08	0.84	-2.24	1.56	0.77	1.02	0.50	-1.43	0.39	-1.58	-1.62	-2.31	-1.73	0.36	-1.77	0.44	**M**
N	-1.53	-1.12	2.51	2.20	0.41	2.08	1.94	1.31	0.55	2.21	2.49	2.04	-1.31	0.49	0.92	1.45	1.76	-1.44	0.74	-5.19	0.31	0.70	**N**
O	0.43	-1.13	1.78	1.85	0.47	1.28	-1.52	0.76	0.84	1.68	1.39	2.16	0.16	0.49	1.26	0.88	1.92	0.82	1.94	1.30	0.51	0.67	**O**
P		1.06	-1.55	-1.44	-1.52	1.22	-1.48	-5.11	-2.09	1.35	0.79	2.42	1.77	-1.33	1.06	2.92	3.42	2.21	2.55	0.68	1.61		**P**
Q		1.61	1.00	-1.51	-2.47	0.95	0.16	-2.55	-1.73	0.74	1.79	2.62	1.45	-1.51	0.40	3.01	1.57	-1.22	1.22	2.29	1.99		**Q**
R			-1.72	0.94	-1.69	0.12	0.84	-1.45	0.14	-1.76	0.20	1.26	1.91	0.13	0.96	0.93	0.74	0.12	1.51	-2.05			**R**
S			1.18	-1.30	-1.50	0.11	1.34	1.09	0.34	-2.80	-1.56	-1.66	0.46	1.13	0.89	-1.30	0.71	-1.16	1.01	1.25			**S**
T				0.39	0.89	0.55	1.09	0.79	0.39	-1.34	-1.45	-1.54	-1.64	1.11	0.58	-4.29	-1.87	-3.96	-1.79				**T**
U					1.35	1.76	1.13	-1.65	-2.83	-4.27	-3.06	-1.33	-1.47	0.73	-1.63	0.57	0.85	0.38					**U**
V						-1.27	-1.08	-3.05	-1.74	-2.07	-2.00	0.09	0.45	0.49	-2.36	-1.19	-1.67						**V**
W									-4.25	-2.55	-1.70	-1.27	-3.14	-3.37									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-11. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 April



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-12. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 May (CASE-0205)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.049	3.020	3.406	3.420	2.906	2.917									**A**
B						3.076	3.599	3.914	3.888	4.055	4.483	4.577	4.446	3.943	3.876	3.472	2.997						**B**
C					3.348	4.059	4.659	5.119	5.249	5.048	5.266	5.500	5.285	5.283	5.009	4.521	3.921	3.205					**C**
D				3.672	4.358	4.717	5.183	5.776	6.021	5.848	5.656	6.020	5.936	5.858	5.631	5.033	4.502	3.924	2.886				**D**
E			3.374	4.404	5.180	5.761	5.885	6.333	6.135	6.046	6.321	6.141	6.476	6.515	6.231	5.615	5.278	4.664	3.823	2.890			**E**
F			3.890	4.998	5.611	6.203	6.346	6.450	6.555	6.476	5.997	6.413	6.664	6.644	6.612	6.169	6.032	5.484	4.706	3.435			**F**
G		3.499	4.291	5.098	5.927	6.140	6.680	6.691	6.202	6.463	6.269	6.686	6.704	6.242	6.573	6.201	6.306	5.880	5.319	4.084	3.342		**G**
H		3.686	4.895	5.449	5.758	6.288	6.609	6.489	6.426	6.665	6.341	6.681	6.806	6.660	6.226	6.029	6.142	5.916	5.523	4.746	3.586		**H**
J	3.164	4.087	4.977	5.552	6.120	5.951	6.261	6.194	6.340	6.830	6.869	6.866	6.589	6.569	5.966	5.839	6.038	6.069	6.117	5.395	3.972	3.082	**J**
K	3.296	4.517	5.623	5.943	6.343	6.492	6.488	6.596	6.776	6.842	6.778	6.692	6.305	6.216	6.403	6.324	6.518	6.462	6.352	5.841	4.773	3.453	**K**
L	3.764	4.939	5.971	6.548	6.564	6.227	6.648	6.318	6.617	6.363	6.373	6.125	6.362	5.218	6.482	6.701	6.590	6.651	6.604	5.960	4.886	3.568	**L**
M	3.708	4.858	6.076	6.370	6.387	6.506	6.743	6.532	6.711	6.506	6.026	6.115	6.177	6.387	6.654	6.760	6.427	6.708	6.169	5.634	4.492	3.355	**M**
N	3.294	4.871	5.911	6.590	6.514	6.727	6.714	6.583	6.343	6.625	6.621	6.519	6.019	6.310	6.512	6.731	6.758	6.446	6.338	4.282	4.438	3.390	**N**
O	3.163	4.250	5.581	6.337	6.327	6.503	6.695	6.584	6.349	6.610	6.705	6.387	6.596	6.279	6.609	6.881	6.576	6.253	6.284	5.312	4.157	3.049	**O**
P		4.334	5.374	6.141	6.489	6.544	6.142	5.156	6.001	6.559	6.260	6.722	6.631	6.276	6.526	6.922	6.830	6.586	6.013	5.217	4.188		**P**
Q		3.809	4.623	5.310	6.059	6.190	6.074	6.461	6.174	6.515	6.556	6.844	6.831	6.775	6.817	6.644	6.165	6.065	5.466	4.680	3.637		**Q**
R			3.812	4.871	5.458	5.754	6.332	6.276	6.413	6.628	6.337	6.525	6.659	6.235	6.506	6.120	5.751	5.449	4.777	3.630			**R**
S			3.150	3.825	4.409	5.405	6.057	6.294	6.584	6.727	6.610	6.301	6.656	6.472	6.168	5.862	5.298	4.663	4.027	3.064			**S**
T				3.200	3.820	4.479	5.103	5.743	5.944	6.182	5.964	5.876	6.146	5.929	5.553	4.075	4.137	3.132	2.983				**T**
U					3.090	3.720	4.391	4.703	5.103	4.659	5.204	5.260	5.160	4.998	4.473	4.052	3.488	2.871					**U**
V						2.589	3.161	3.422	3.853	3.992	3.958	4.086	4.035	3.794	3.332	3.023	2.444						**V**
W									2.805	2.977	3.070	3.041	2.714	2.467									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-12. Channel Power in the Wolsong-3 Reactor on 2002 May

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.31	13.68	13.66	13.61	13.74	12.35									**A**
B						12.02	13.73	17.72	17.59	17.67	18.37	18.27	17.29	17.65	17.84	14.04	12.08						**B**
C					13.50	14.52	17.47	20.17	21.96	22.81	23.09	22.91	22.86	21.88	20.53	17.75	14.77	13.57					**C**
D				13.01	15.95	18.09	21.69	25.00	25.33	26.22	26.01	26.06	26.11	25.52	25.15	22.06	18.37	16.63	13.54				**D**
E			13.66	15.60	18.98	21.19	24.75	25.96	27.68	27.62	27.75	27.65	27.62	27.50	26.25	24.81	22.23	19.75	16.46	13.72			**E**
F			16.55	19.06	22.18	23.62	25.85	27.57	26.42	27.27	26.41	26.13	26.91	26.16	27.38	26.19	24.09	22.52	19.54	16.63			**F**
G		14.74	18.29	22.18	24.20	25.96	25.50	26.67	27.43	26.92	26.49	25.54	26.33	27.34	27.10	26.56	25.81	24.19	22.14	18.25	14.81		**G**
H		17.06	20.84	24.49	25.62	26.48	25.84	27.78	27.09	26.27	25.98	25.10	25.74	26.62	27.73	26.74	26.49	25.69	24.38	20.92	17.00		**H**
J	13.20	17.01	22.51	25.60	27.14	27.20	27.57	27.78	27.57	25.78	24.63	24.56	26.59	27.31	27.92	27.56	27.28	27.04	25.48	22.29	17.11	13.18	**J**
K	14.11	18.09	23.04	26.27	27.66	27.06	27.42	27.92	26.16	25.67	24.33	24.62	26.79	27.18	27.88	27.58	26.95	27.75	25.92	22.57	17.64	14.06	**K**
L	14.33	19.57	23.40	26.64	28.63	27.56	27.23	27.70	26.69	26.40	25.27	25.62	26.47	27.13	27.73	27.08	27.47	28.50	26.49	23.43	19.74	14.50	**L**
M	14.18	19.67	22.77	26.84	28.26	27.72	26.54	27.55	27.65	26.20	25.72	25.73	26.50	28.00	27.32	26.53	27.65	28.19	26.84	23.75	19.80	14.50	**M**
N	14.39	18.65	22.26	25.42	28.34	26.77	26.88	27.37	27.23	25.80	24.42	24.61	26.67	27.14	27.50	26.87	26.73	28.23	26.18	23.16	19.22	14.33	**N**
O	13.24	17.95	21.49	24.55	26.85	26.60	26.21	27.22	26.97	26.20	23.86	24.68	26.26	27.10	27.13	25.74	26.42	26.98	24.75	22.03	17.93	13.31	**O**
P		16.40	20.49	23.22	25.46	26.11	26.92	27.46	27.39	26.45	26.44	25.44	26.33	27.33	27.30	25.53	25.40	25.12	23.58	20.73	16.64		**P**
Q		14.37	18.25	22.84	25.34	25.22	25.92	27.13	27.10	27.13	25.83	25.12	26.38	26.27	26.36	24.94	25.23	25.40	22.87	18.39	14.68		**Q**
R			16.96	19.64	23.60	24.55	25.15	27.04	26.92	26.13	26.60	26.30	26.13	26.94	26.92	25.51	24.63	23.71	19.99	17.13			**R**
S			12.74	16.63	19.16	21.24	23.05	25.26	26.57	27.51	27.48	27.70	27.55	26.82	25.47	23.54	21.39	19.10	16.50	12.83			**S**
T				13.61	15.80	18.71	20.65	23.07	24.29	24.88	25.22	25.16	25.05	24.23	23.38	20.82	18.82	15.82	13.66				**T**
U					12.28	14.39	17.05	20.27	21.00	22.57	22.31	22.36	22.44	21.13	20.20	17.42	14.58	12.43					**U**
V						11.12	13.32	15.76	16.28	17.21	17.27	17.19	17.26	16.23	15.81	13.28	11.15						**V**
W									12.27	13.06	13.13	13.17	13.02	12.31									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

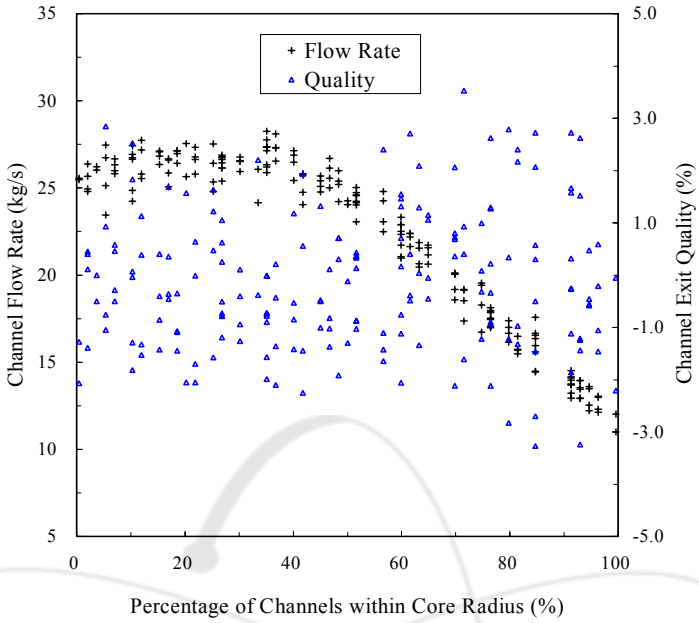
그림 6-12. Channel Flow Rate in the Wolsong-3 Reactor on 2002 May

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.15	-2.16	0.18	0.21	-2.81	-0.84									**A**
B						0.79	1.37	-1.83	-2.07	-1.30	-0.14	0.42	0.78	-1.75	-2.18	0.36	0.03						**B**
C					0.06	2.61	1.92	0.69	-0.75	-2.19	-1.57	-0.69	-1.23	-0.68	0.06	0.89	1.58	-0.97					**C**
D				2.78	2.01	1.13	-0.55	-1.12	-0.84	-2.07	-2.61	-1.34	-1.85	-1.42	-1.80	-1.27	-0.18	-0.80	-2.92				**D**
E			0.12	2.70	2.02	1.87	-0.83	-0.38	-2.30	-2.58	-1.68	-2.31	-1.14	-1.13	-0.81	-1.93	-0.72	-1.03	-1.15	-2.99			**E**
F			-1.01	1.13	0.33	1.11	-0.27	-1.26	-0.09	-0.94	-1.79	-0.13	-0.23	0.44	-0.74	-0.98	0.02	-0.26	-0.65	-3.31			**F**
G		-0.73	-0.97	-1.65	-0.26	-1.04	0.98	0.03	-1.95	-0.80	-0.90	0.95	0.43	-1.89	-0.48	-1.40	-0.27	-0.55	-0.65	-2.03	-1.62		**G**
H		-2.55	-1.15	-2.12	-2.05	-0.96	0.42	-1.37	-1.07	0.28	-0.35	1.46	0.99	0.06	-2.27	-1.92	-1.58	-1.46	-1.92	-1.71	-3.12		**H**
J	-0.60	-0.50	-2.25	-2.72	-1.94	-2.56	-1.82	-2.24	-1.58	1.21	2.41	2.33	-0.05	-0.81	-2.90	-3.25	-2.23	-2.17	-0.63	-0.61	-1.07	-1.24	**J**
K	-1.28	0.18	-0.40	-1.84	-1.72	-0.74	-1.08	-1.09	0.70	1.36	2.36	1.92	-1.25	-1.63	-1.79	-1.59	-0.70	-1.30	-0.38	0.83	1.73	-0.17	**K**
L	1.29	0.23	0.54	-0.16	-1.60	-2.00	-0.31	-1.75	-0.03	-0.69	0.17	-0.98	-0.63	-4.87	-1.15	-0.17	-0.69	-1.40	0.18	0.35	-0.05	-0.11	**L**
M	1.14	-0.11	1.43	-0.92	-1.97	-1.13	0.38	-0.95	-0.55	-0.04	-1.23	-0.82	-1.46	-1.69	-0.54	0.54	-1.46	-0.83	-1.70	-0.80	-1.95	-1.13	**M**
N	-1.45	0.93	1.38	0.77	-1.60	0.07	0.00	-0.70	-1.35	0.52	1.74	1.10	-1.89	-1.53	-0.90	-0.02	0.30	-1.88	-0.44	-5.44	-1.37	-0.94	**N**
O	-0.54	-0.89	0.92	0.73	-1.14	-0.38	0.40	-0.60	-1.20	0.19	2.51	0.82	-0.02	-1.40	-0.58	1.46	-0.15	-1.35	0.27	-0.42	-1.44	-1.26	**O**
P		1.31	1.26	1.23	0.42	0.06	-1.77	-5.27	-2.57	-0.17	-1.06	1.00	0.21	-1.80	-0.77	1.58	1.62	0.87	0.59	0.27	0.40		**P**
Q		1.67	0.52	-1.06	-0.61	-0.17	-1.29	-0.95	-1.89	-0.77	0.27	1.87	0.59	0.66	0.55	1.41	-0.38	-0.52	-0.58	0.78	0.22		**Q**
R			-1.63	0.15	-1.19	-1.24	0.16	-1.54	-0.94	0.24	-0.92	-0.22	0.44	-1.66	-0.60	-0.90	-1.19	-1.39	-0.35	-2.75			**R**
S			-0.05	-1.45	-1.50	0.47	1.04	-0.05	-0.19	-0.35	-0.79	-1.79	-0.74	-0.61	-0.72	0.06	-0.15	-0.19	-0.40	-0.54			**S**
T				-1.04	-0.44	-0.80	-0.09	-0.03	-0.26	-0.10	-1.06	-1.45	-0.24	-0.40	-0.87	-4.60	-2.35	-4.30	-2.35				**T**
U					0.19	0.74	0.61	-1.25	-0.49	-3.57	-1.34	-1.05	-1.71	-0.93	-2.30	-1.27	-0.88	-1.31					**U**
V						-1.26	-0.83	-2.63	-0.94	-1.46	-1.65	-1.07	-1.19	-1.33	-3.05	-1.81	-2.31						**V**
W									-1.58	-1.65	-1.08	-1.21	-3.45	-3.86									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

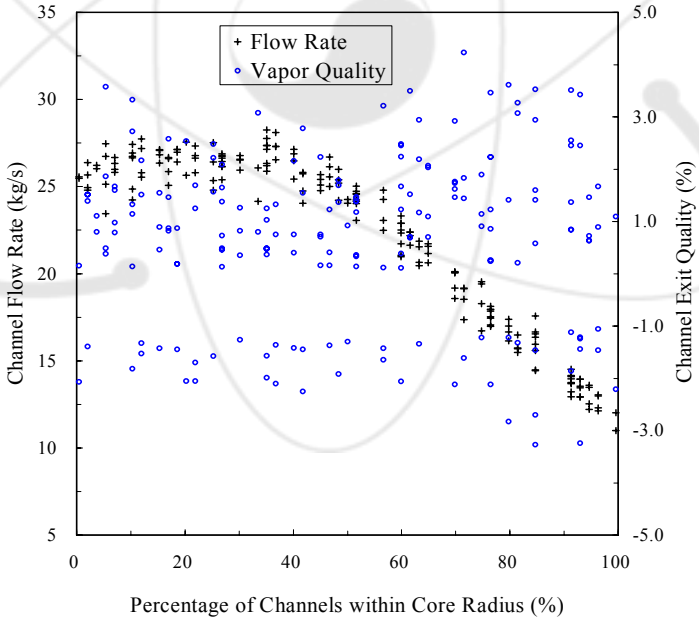
그림 7-12. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 May

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.26	-2.16	1.29	1.28	-2.81	0.35									**A**
B						1.84	2.27	-1.83	-2.07	-1.30	0.94	1.48	1.73	-1.75	-2.18	1.40	1.16						**B**
C					1.21	3.40	2.76	1.70	0.57	-2.19	-1.57	0.41	-1.23	0.56	1.14	1.81	2.47	-0.97					**C**
D				3.58	2.92	2.04	0.61	0.11	0.36	-2.07	-2.61	-1.34	-1.85	-1.42	-1.80	-1.27	0.94	0.44	-2.92				**D**
E			1.25	3.50	2.89	2.74	0.40	0.78	-2.30	-2.58	-1.68	-2.31	0.15	0.14	0.41	-1.93	0.41	0.11	-1.15	-2.99			**E**
F			-1.01	2.19	1.29	2.12	0.83	-1.26	1.01	0.43	-1.79	1.00	0.94	1.56	0.48	0.34	1.15	0.84	0.54	-3.31			**F**
G		0.42	0.24	-1.65	0.86	0.15	2.06	1.21	-1.95	0.47	0.44	1.97	1.59	-1.89	0.78	-1.40	0.87	0.65	0.59	-2.03	-1.62		**G**
H		-2.55	-1.15	-2.12	-2.05	0.37	1.46	-1.37	0.20	1.50	0.87	2.38	2.09	1.30	-2.27	-1.92	-1.58	-1.46	-1.92	-1.71	-3.12		**H**
J	0.65	0.61	-2.25	-2.72	-1.94	-2.56	-1.82	-2.24	-1.58	2.24	3.21	3.18	1.08	0.50	-2.90	-3.25	-2.23	-2.17	0.65	0.60	0.08	-1.24	**J**
K	-1.28	1.22	0.72	-1.84	-1.72	0.51	0.19	0.21	1.80	2.33	3.20	2.73	0.15	-1.63	-1.79	-1.59	0.52	-1.30	0.77	1.88	2.62	0.95	**K**
L	2.26	1.39	1.69	0.92	-1.60	-2.00	0.94	-1.75	1.09	0.56	1.21	0.41	0.59	-4.87	0.19	1.01	0.53	-1.40	1.32	1.41	1.12	0.96	**L**
M	2.12	1.03	2.44	0.34	-1.97	0.16	1.51	0.40	0.82	1.07	0.17	0.45	-1.46	-1.69	0.79	1.68	-1.46	0.47	-1.70	0.39	-1.95	-1.13	**M**
N	-1.45	1.94	2.39	1.85	-1.60	1.26	1.22	0.55	-1.35	1.64	2.56	2.07	-1.89	-1.53	0.44	1.09	1.44	-1.88	0.78	-5.44	-1.37	0.18	**N**
O	0.69	0.26	1.91	1.79	0.13	0.79	1.55	0.72	0.18	1.34	3.34	1.76	1.19	-1.40	0.75	2.46	0.96	-1.35	1.35	0.72	-1.44	-1.26	**O**
P		2.30	2.27	2.20	1.48	1.22	-1.77	-5.27	-2.57	1.03	0.20	2.07	1.35	-1.80	0.48	2.51	2.51	1.90	1.68	1.32	1.49		**P**
Q		2.54	1.56	0.10	0.63	0.90	-1.29	0.38	-1.89	0.47	1.41	2.73	1.68	1.73	1.67	2.34	0.77	0.71	0.60	1.76	1.30		**Q**
R			-1.63	1.17	-1.19	-1.24	1.28	-1.54	0.36	1.44	0.38	0.94	1.51	-1.66	0.69	0.38	0.11	-1.39	0.71	-2.75			**R**
S			1.12	-1.45	-1.50	1.43	2.04	1.11	0.94	0.82	0.45	-1.79	0.47	0.66	0.46	1.19	0.90	0.85	0.67	0.67			**S**
T				-1.04	0.62	0.35	1.03	1.13	0.81	1.09	0.14	-1.45	0.88	0.75	0.35	-4.60	-2.35	-4.30	-2.35				**T**
U					1.29	1.69	1.67	-1.25	0.70	-3.57	-1.34	0.12	-1.71	0.28	-2.30	-1.27	0.26	-1.31					**U**
V						-1.26	0.36	-2.63	0.22	-1.46	-1.65	0.08	-1.19	-1.33	-3.05	-1.81	-2.31						**V**
W									-1.58	-1.65	-1.08	-1.21	-3.45	-3.86									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-12. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 May



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-13. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 July (CASE-0207)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.840	2.798	3.167	3.158	2.641	2.648									**A**
B						2.926	3.406	3.685	3.668	3.836	4.206	4.251	4.093	3.595	3.571	3.259	2.892						**B**
C					3.207	3.924	4.499	4.979	5.247	5.376	5.068	5.205	4.883	4.927	4.724	4.350	3.874	3.178					**C**
D				3.607	4.310	5.023	5.561	5.617	5.912	5.814	6.063	6.000	5.635	5.868	5.443	5.422	4.785	3.963	3.369				**D**
E			3.222	4.293	4.925	5.613	6.059	6.198	6.551	6.678	6.510	6.444	6.258	6.454	6.023	5.973	5.178	4.566	3.843	3.003			**E**
F			3.740	4.821	5.217	5.898	5.947	6.136	6.480	6.654	6.655	6.362	6.570	6.596	6.443	5.930	5.835	5.439	4.709	4.028			**F**
G		3.512	4.251	5.379	5.715	5.689	6.336	6.406	6.607	6.452	6.726	6.599	6.766	6.761	6.537	6.018	6.128	5.676	5.345	4.616	3.583		**G**
H		4.164	5.160	5.506	6.071	6.041	6.264	6.189	6.218	6.729	6.767	6.439	6.659	6.668	6.810	6.643	6.001	5.741	5.915	4.893	4.216		**H**
J	3.178	4.166	5.626	6.250	6.195	6.456	6.107	6.599	6.661	6.607	6.518	6.510	6.216	6.536	6.678	6.565	5.895	5.826	6.160	5.438	4.647	3.238	**J**
K	3.247	4.466	5.678	6.464	6.348	6.457	6.273	6.380	6.618	6.512	6.310	6.345	5.892	5.984	6.283	6.148	6.354	6.227	6.155	5.865	4.915	3.543	**K**
L	3.767	4.838	6.037	6.495	6.680	6.736	6.707	6.652	6.364	6.425	5.950	6.161	5.755	6.166	6.523	6.593	6.351	6.469	6.646	6.153	5.174	3.659	**L**
M	3.707	4.758	5.983	6.166	6.625	6.284	6.449	6.198	6.472	6.095	5.686	5.641	5.734	6.056	6.368	6.724	6.825	6.863	6.811	5.954	5.069	3.490	**M**
N	3.693	5.045	6.074	6.402	6.268	6.422	6.377	6.307	6.521	6.300	6.299	6.206	5.638	5.956	6.128	6.380	6.589	6.835	6.683	5.971	4.740	3.543	**N**
O	3.278	4.790	5.533	6.191	6.704	6.282	6.631	6.437	6.212	6.376	6.653	6.634	6.629	6.606	6.373	6.696	6.282	6.727	6.333	5.464	4.234	3.095	**O**
P		4.472	5.453	6.243	6.571	6.428	6.230	6.894	6.701	6.560	6.762	6.564	6.456	6.815	6.849	6.664	6.462	6.334	5.808	5.275	4.224		**P**
Q		3.903	4.668	5.714	6.129	6.520	6.672	6.721	6.127	6.347	6.312	6.646	6.633	6.763	6.804	6.361	6.276	5.986	5.231	4.615	3.591		**Q**
R			4.159	4.924	5.489	5.640	6.330	6.543	6.251	6.665	6.698	6.339	6.470	6.610	6.289	5.829	5.476	5.236	4.606	3.992			**R**
S			3.165	3.801	4.757	5.378	5.838	5.998	6.317	6.619	6.510	6.629	6.502	6.251	5.966	5.845	5.268	4.617	3.927	3.022			**S**
T				3.120	3.681	4.237	4.777	5.419	5.690	6.246	5.896	6.117	6.175	5.773	5.634	5.119	4.492	3.139	2.915				**T**
U					2.945	3.492	4.159	4.442	5.113	5.386	5.445	5.228	5.047	5.093	4.439	4.105	3.558	2.882					**U**
V						2.424	2.965	3.247	3.753	4.023	4.364	4.068	3.958	3.745	3.291	3.029	2.448						**V**
W									2.775	2.971	3.137	3.036	2.706	2.703									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-13. Channel Power in the Wolsong-3 Reactor on 2002 July

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.30	13.53	13.69	13.67	13.66	12.30									**A**
B						12.03	13.76	17.58	17.39	17.53	18.28	18.42	17.49	17.55	17.74	14.11	12.06						**B**
C					13.47	14.45	17.45	20.05	21.72	22.39	22.90	22.86	22.73	21.86	20.64	17.82	14.68	13.48					**C**
D				12.92	15.73	17.36	20.47	24.80	25.03	25.98	25.57	25.86	25.98	25.32	25.00	21.24	17.77	16.48	13.26				**D**
E			13.61	15.48	19.19	21.05	24.02	25.69	27.14	26.54	27.35	27.40	27.48	27.33	26.18	24.42	22.10	19.64	16.31	13.63			**E**
F			16.36	19.14	22.34	24.04	25.83	27.35	25.94	26.43	24.80	25.92	26.81	25.93	27.31	26.10	24.20	22.32	19.39	16.30			**F**
G		14.53	18.13	21.55	24.16	25.73	26.07	26.79	26.63	26.42	25.07	25.50	25.72	26.28	26.86	26.41	25.82	24.18	21.86	17.68	14.59		**G**
H		16.66	20.05	24.26	25.09	26.34	26.15	27.56	26.82	25.55	24.23	25.43	25.92	26.19	26.76	25.41	26.33	25.52	23.95	20.72	16.60		**H**
J	13.05	16.66	21.57	24.60	26.88	26.57	27.33	27.11	26.73	25.83	25.13	25.21	26.84	27.12	27.28	27.10	27.10	26.90	25.17	22.02	16.22	12.99	**J**
K	13.95	17.93	22.40	25.19	27.32	26.73	27.15	27.73	25.99	26.22	24.95	25.15	26.70	27.02	27.71	27.41	26.87	27.58	25.90	22.20	17.26	13.76	**K**
L	14.16	19.41	22.90	26.13	28.25	26.42	26.62	26.92	26.74	25.68	25.56	25.35	26.49	26.84	27.44	27.00	27.44	28.34	25.99	22.68	18.94	14.29	**L**
M	13.96	19.54	22.50	26.69	27.76	27.52	26.66	27.43	27.46	26.36	25.47	25.69	26.38	27.85	27.38	26.28	26.74	27.45	25.39	22.84	18.99	14.33	**M**
N	13.94	17.97	21.62	25.40	28.11	26.88	27.11	27.20	26.68	26.02	24.80	25.10	26.53	27.00	27.46	27.10	26.88	27.67	24.85	21.87	18.72	14.12	**N**
O	12.98	17.00	21.17	24.56	25.44	26.53	25.79	27.07	26.66	26.34	23.44	23.75	25.81	26.26	27.17	25.93	26.56	25.67	24.32	21.52	17.79	13.21	**O**
P		15.95	20.13	22.49	24.78	25.88	26.63	25.65	26.36	25.79	24.86	25.60	26.46	26.24	26.09	25.96	26.08	25.58	23.80	20.45	16.43		**P**
Q		14.09	17.85	21.86	24.73	24.04	24.14	26.16	26.77	26.97	25.86	25.28	26.65	25.89	26.03	25.36	24.73	25.25	22.85	18.30	14.61		**Q**
R			16.55	19.18	23.33	24.27	24.75	26.21	26.78	25.39	25.36	26.32	26.34	26.23	26.91	25.45	24.51	23.57	19.94	16.98			**R**
S			12.54	16.48	18.58	20.97	23.07	25.41	26.47	27.29	27.14	27.20	27.47	26.82	25.42	23.30	21.22	18.97	16.42	12.75			**S**
T				13.45	15.70	18.53	20.66	23.07	24.25	24.21	25.00	24.76	24.64	24.17	23.09	20.33	18.59	15.72	13.57				**T**
U					12.21	14.49	17.07	20.10	20.63	22.19	21.72	22.18	22.31	20.85	20.07	17.27	14.43	12.34					**U**
V						10.99	13.22	15.58	16.15	16.98	16.72	17.07	17.15	16.13	15.71	13.20	11.08						**V**
W									12.12	12.94	12.94	13.08	12.94	12.23									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

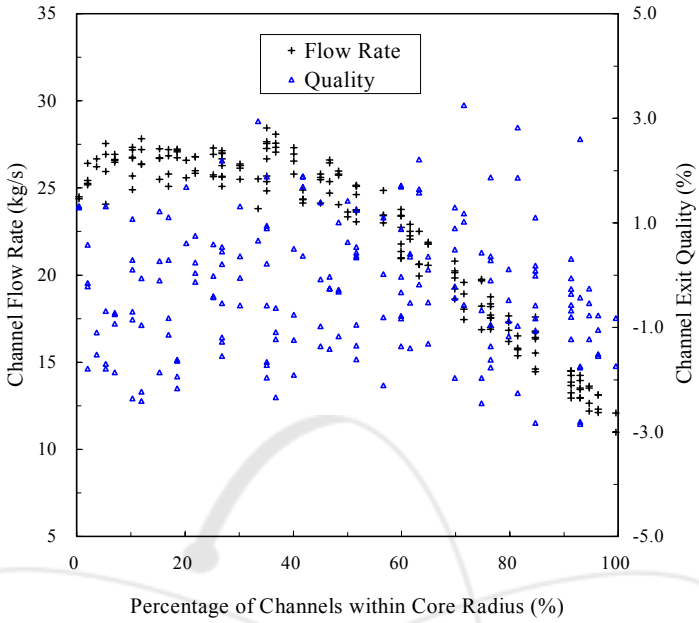
그림 6-13. Channel Flow Rate in the Wolsong-3 Reactor on 2002 July

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.06	-3.24	-1.12	-1.33	-4.28	-2.55									**A**
B						-0.05	0.32	-2.70	-2.83	-2.12	-1.22	-1.07	-1.01	-3.25	-3.49	-0.80	-0.50						**B**
C					-0.58	2.07	1.29	0.36	-0.45	-0.49	-2.06	-1.69	-2.55	-1.99	-1.05	0.08	1.54	-0.95					**C**
D				2.62	2.17	3.53	2.09	-1.43	-0.87	-1.92	-0.82	-1.17	-2.68	-1.15	-2.28	0.92	1.74	-0.33	0.45				**D**
E			-0.56	2.40	0.80	1.55	0.37	-0.50	-0.53	0.21	-0.72	-1.14	-1.63	-1.14	-1.35	-0.33	-0.91	-1.29	-0.79	-2.13			**E**
F			-1.46	0.40	-1.12	-0.12	-1.45	-1.99	0.10	0.25	1.63	-0.05	-0.40	0.54	-1.17	-1.61	-0.62	-0.17	-0.43	0.10			**F**
G		-0.27	-0.90	0.04	-0.87	-2.25	-0.38	-0.78	-0.01	-0.35	1.68	0.76	1.18	0.50	-0.34	-1.83	-0.77	-1.20	-0.22	1.02	0.06		**G**
H		0.30	0.72	-1.65	-0.48	-1.57	-0.73	-2.05	-1.43	1.13	2.52	0.52	0.46	0.47	0.23	1.06	-1.87	-1.84	-0.14	-0.84	0.46		**H**
J	-0.21	0.34	1.06	0.43	-1.42	-0.40	-2.05	-0.40	0.07	0.58	0.93	0.67	-1.26	-0.72	-0.19	-0.60	-2.47	-2.78	-0.17	-0.15	3.40	0.00	**J**
K	-1.24	0.22	0.40	0.71	-1.36	-0.51	-1.45	-1.53	0.46	0.00	0.40	0.43	-2.45	-2.16	-1.99	-1.93	-1.12	-1.82	-0.96	1.35	2.93	0.77	**K**
L	1.66	0.08	1.31	0.11	-0.90	0.47	0.35	-0.04	-0.76	0.11	-1.28	-0.60	-2.52	-1.65	-0.73	-0.39	-1.33	-1.78	0.76	1.75	2.08	0.67	**L**
M	1.58	-0.32	1.46	-1.37	-0.78	-1.58	-0.46	-1.82	-1.05	-1.39	-2.07	-2.29	-2.75	-2.51	-1.43	0.71	0.43	0.18	1.45	1.12	1.33	-0.02	**M**
N	1.52	2.62	2.71	0.30	-2.10	-0.79	-1.07	-1.33	-0.29	-0.50	0.45	-0.20	-2.94	-2.49	-1.98	-1.23	-0.19	-0.24	1.73	1.91	0.48	0.22	**N**
O	0.59	2.79	1.15	0.33	1.18	-0.94	0.64	-0.86	-1.29	-0.50	2.84	2.56	0.48	0.29	-1.31	0.81	-1.14	1.14	0.84	0.64	-0.86	-0.73	**O**
P		2.72	2.06	2.40	1.32	-0.02	-1.19	1.57	0.40	0.39	1.83	0.43	-0.30	0.68	1.16	0.48	0.03	-0.18	-0.16	0.83	0.92		**P**
Q		2.72	1.27	1.29	0.13	1.93	2.20	0.62	-1.70	-1.09	-0.36	1.18	-0.12	1.01	0.83	0.25	0.37	-0.59	-1.38	0.68	0.11		**Q**
R			0.57	0.93	-0.76	-1.30	0.56	-0.01	-1.26	1.05	1.22	-0.78	-0.16	0.07	-1.20	-1.78	-1.97	-1.99	-0.95	-0.74			**R**
S			0.47	-1.32	0.69	0.71	0.36	-1.01	-0.85	-0.43	-0.74	-0.33	-1.11	-1.23	-1.30	0.28	-0.05	-0.18	-0.77	-0.62			**S**
T				-1.21	-0.97	-1.61	-1.34	-1.11	-1.03	0.71	-1.02	-0.25	0.21	-0.85	-0.25	0.14	-0.41	-4.10	-2.57				**T**
U					-0.46	-0.50	-0.34	-2.12	-0.05	-0.39	0.17	-0.93	-1.97	-0.20	-2.28	-0.75	-0.22	-1.02					**U**
V						-2.21	-1.86	-3.27	-1.22	-0.94	0.99	-0.97	-1.36	-1.42	-3.08	-1.60	-2.08						**V**
W									-1.46	-1.44	-0.25	-1.04	-3.35	-2.03									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

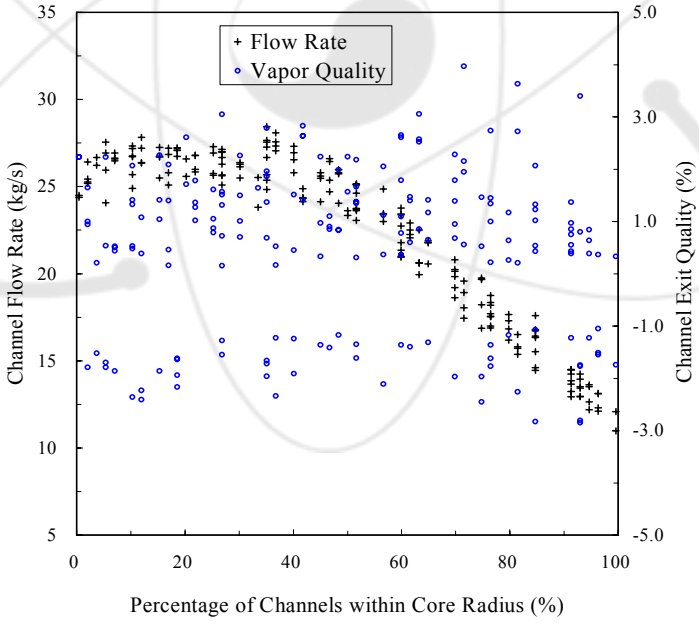
그림 7-13. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 July

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.06	-3.24	-1.12	-1.33	-4.28	-2.55									**A**
B						1.09	1.37	-2.70	-2.83	-2.12	-1.22	0.08	0.09	-3.25	-3.49	0.39	0.69						**B**
C					0.64	2.94	2.23	1.46	0.70	0.71	-2.06	-1.69	-2.55	-1.99	0.10	1.10	2.42	0.15					**C**
D				3.43	3.07	4.23	2.94	-1.43	0.36	-1.92	0.41	0.12	-2.68	0.12	-2.28	1.91	2.64	0.82	1.52				**D**
E			0.63	3.27	1.73	2.48	1.44	0.71	0.75	1.33	0.48	0.17	-1.63	0.14	-1.35	0.83	0.31	-1.29	0.43	-2.13			**E**
F			-1.46	1.44	0.11	0.92	-1.45	-1.99	1.26	1.38	2.48	1.02	0.83	1.59	0.15	-1.61	0.64	0.98	0.70	1.25			**F**
G		0.84	0.26	1.17	0.33	-2.25	0.80	0.46	1.25	0.87	2.58	1.75	2.19	1.62	0.85	-1.83	0.42	0.11	0.94	2.01	1.18		**G**
H		1.41	1.76	-1.65	0.75	-1.57	0.49	-2.05	-1.43	2.17	3.33	1.55	1.58	1.56	1.45	2.08	-1.87	-1.84	0.98	0.30	1.58		**H**
J	0.89	1.41	2.03	1.47	-1.42	0.82	-2.05	0.89	1.33	1.67	1.86	1.72	0.14	0.54	0.99	0.73	-2.47	-2.78	0.89	1.04	4.09	1.19	**J**
K	-1.24	1.23	1.52	1.79	-1.36	0.73	-1.45	-1.53	1.60	1.11	1.51	1.47	-2.45	-2.16	-1.99	-1.93	0.19	-1.82	0.35	2.34	3.72	1.84	**K**
L	2.55	1.14	2.24	1.23	0.37	1.57	1.46	1.14	0.49	1.39	0.15	0.79	-2.52	-1.65	0.53	0.85	-1.33	-1.78	1.81	2.71	2.93	1.68	**L**
M	2.45	0.91	2.45	-1.37	0.49	-1.58	0.82	-1.82	0.38	-1.39	-2.07	-2.29	-2.75	-2.51	-1.43	1.75	1.55	1.33	2.42	2.06	2.37	1.01	**M**
N	2.45	3.46	3.50	1.37	-2.10	0.46	0.19	-1.33	0.98	0.80	1.51	0.99	-2.94	-2.49	-1.98	0.14	0.96	0.96	2.69	2.84	1.55	1.35	**N**
O	1.67	3.61	2.07	1.38	2.16	0.35	1.69	0.46	0.14	0.79	3.58	3.35	1.59	1.52	-1.31	1.83	0.16	2.14	1.87	1.68	0.30	0.41	**O**
P		3.53	2.92	3.21	2.23	1.03	0.13	2.54	1.55	1.51	2.72	1.52	0.92	1.75	2.24	1.51	1.20	0.90	0.91	1.82	1.97		**P**
Q		3.51	2.23	2.19	1.18	2.78	3.08	1.65	-1.70	0.19	0.87	2.17	1.02	2.08	1.92	1.35	1.39	0.68	-1.38	1.67	1.22		**Q**
R			1.60	1.83	0.39	-1.30	1.55	1.25	-1.26	2.09	2.22	0.47	0.97	1.28	0.13	-1.78	-1.97	-1.99	0.26	0.45			**R**
S			1.46	-1.32	1.62	1.67	1.39	0.16	0.40	0.75	0.47	0.86	0.15	-1.23	-1.30	1.34	1.03	0.85	0.45	0.48			**S**
T				-1.21	0.21	-1.61	-1.34	0.12	0.14	1.69	0.16	0.90	1.29	0.35	0.85	1.30	0.72	-4.10	-2.57				**T**
U					0.72	0.58	0.86	-2.12	1.09	0.69	1.23	0.29	-1.97	1.01	-2.28	0.49	0.88	-1.02					**U**
V						-2.21	-1.86	-3.27	-1.22	0.24	1.90	0.24	-1.36	-1.42	-3.08	-1.60	-2.08						**V**
W									-1.46	-1.44	0.84	-1.04	-3.35	-2.03									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-13. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 July



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-14. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 August (CASE-0208)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.879	2.849	3.279	3.391	3.345	2.931									**A**
B						2.825	3.305	3.654	4.118	3.906	4.298	4.432	4.428	4.265	3.775	3.346	2.942						**B**
C					3.110	3.784	4.332	4.851	5.232	5.528	5.489	5.406	5.554	5.203	4.908	4.440	3.923	3.170					**C**
D				3.605	4.258	4.982	5.460	5.419	5.772	6.247	6.172	6.084	6.303	6.279	6.027	5.708	5.001	3.945	3.375				**D**
E			3.224	4.337	4.939	5.619	6.212	6.065	6.503	6.490	6.239	6.380	6.081	6.486	6.539	6.294	5.671	4.547	3.721	2.892			**E**
F			3.802	4.944	5.731	6.185	6.607	6.696	6.311	6.326	6.332	5.926	6.204	6.375	6.440	6.556	5.919	5.379	4.528	3.934			**F**
G		3.532	4.716	5.695	5.990	6.546	6.546	6.435	6.595	6.102	6.461	6.099	6.352	6.518	6.435	6.753	6.225	5.595	5.145	4.517	3.394		**G**
H		4.145	5.231	6.102	6.410	6.602	6.440	6.831	6.744	6.517	6.490	5.977	6.262	6.360	6.838	6.874	6.677	6.305	5.865	4.622	4.069		**H**
J	2.984	3.938	5.504	6.212	6.045	6.522	6.657	6.717	6.668	6.304	6.176	6.238	6.004	6.416	6.694	6.717	6.685	6.419	5.964	5.083	4.395	3.029	**J**
K	2.980	4.107	5.282	6.264	6.022	6.182	6.030	6.100	6.351	6.246	6.161	6.402	6.654	6.640	6.326	6.613	6.294	5.977	5.745	5.444	4.577	3.324	**K**
L	3.441	4.395	5.615	6.101	6.362	6.532	6.438	6.485	6.075	6.496	6.488	6.595	6.684	6.466	6.521	6.438	6.034	6.054	6.189	5.795	4.948	3.517	**L**
M	3.348	4.303	5.540	6.447	6.648	6.600	6.261	6.473	6.269	5.974	6.446	6.547	6.545	6.232	6.342	6.561	6.656	6.478	6.569	6.025	5.085	3.761	**M**
N	3.411	4.603	5.673	6.053	6.582	6.276	6.116	6.008	6.366	6.021	6.175	6.218	5.742	6.668	6.755	6.284	6.363	6.726	6.365	5.927	4.660	3.543	**N**
O	2.958	4.381	5.017	5.728	6.565	6.748	6.533	6.151	5.871	6.009	6.364	6.543	6.530	6.810	6.872	6.745	6.889	6.658	6.115	5.693	4.624	3.105	**O**
P		4.063	4.979	5.803	6.309	6.744	6.916	6.895	6.604	6.243	6.480	6.191	6.124	6.694	6.920	6.545	6.390	6.235	5.648	5.212	4.209		**P**
Q		3.573	4.269	5.436	5.860	6.522	6.779	6.687	6.676	6.193	6.585	6.322	6.260	6.502	6.709	6.293	6.468	6.112	5.492	4.544	3.524		**Q**
R			3.959	4.634	5.339	6.045	6.293	6.686	6.617	6.558	6.586	6.488	6.150	6.518	6.626	6.486	6.035	5.254	4.541	3.982			**R**
S			2.978	3.618	4.710	5.407	5.822	5.902	6.200	6.418	6.213	6.415	6.143	6.020	6.308	5.905	5.290	4.599	3.853	2.950			**S**
T				3.024	3.681	4.704	5.342	5.471	6.027	6.277	6.124	6.051	5.907	5.538	5.576	5.158	4.568	3.107	2.853				**T**
U					2.963	3.562	4.268	4.473	5.125	5.352	5.381	4.999	4.813	5.084	4.796	4.117	3.538	2.851					**U**
V						2.475	3.062	3.670	3.763	3.930	4.279	3.892	3.806	3.703	3.624	3.084	2.448						**V**
W									2.823	2.919	3.066	2.931	2.622	2.721									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-14. Channel Power in the Wolsong-3 Reactor on 2002 August

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.30	13.52	13.66	13.51	13.48	12.26									**A**
B						12.10	13.86	17.61	17.30	17.55	18.21	18.30	17.13	17.34	17.73	14.06	12.03						**B**
C					13.52	14.61	17.70	20.24	21.78	22.06	22.75	22.78	22.27	21.78	20.47	17.68	14.62	13.48					**C**
D				12.95	15.80	17.45	20.63	24.86	25.10	25.73	25.37	25.79	25.62	24.50	24.53	20.63	17.42	16.50	13.24				**D**
E			13.63	15.38	19.19	20.99	23.62	25.80	27.30	27.06	27.54	27.44	27.52	27.27	25.06	23.47	21.18	19.64	16.36	13.63			**E**
F			16.34	18.92	21.36	23.34	24.37	26.68	26.28	27.14	25.64	26.32	27.12	26.53	27.31	24.95	24.08	22.43	19.48	16.43			**F**
G		14.50	17.53	20.61	23.70	24.33	25.53	26.67	26.77	26.73	25.80	26.32	26.86	26.98	27.06	25.02	25.66	24.19	22.10	17.82	14.72		**G**
H		16.72	19.83	23.40	24.14	25.37	25.64	26.58	25.50	26.35	24.89	26.16	26.72	26.95	26.64	24.70	25.15	24.78	24.01	20.79	16.79		**H**
J	13.14	16.83	21.88	24.63	26.94	26.37	26.80	26.69	26.76	26.48	25.94	25.79	26.90	27.22	27.23	26.72	26.24	26.71	25.42	22.27	16.53	13.10	**J**
K	13.95	18.19	22.92	25.81	27.34	27.02	27.15	27.82	26.60	26.68	25.26	25.00	25.82	26.20	27.70	26.99	26.91	27.63	26.02	23.08	17.75	14.05	**K**
L	14.49	19.67	23.78	26.61	28.44	26.93	27.22	27.18	26.93	25.43	24.50	24.21	25.23	26.60	27.45	27.16	27.49	28.39	26.86	23.50	19.37	14.42	**L**
M	14.25	19.75	23.37	26.44	27.65	27.29	26.84	27.33	27.56	26.42	24.39	24.48	25.63	27.83	27.38	26.74	27.18	28.15	26.08	22.65	18.94	14.03	**M**
N	14.25	18.74	22.52	25.97	28.08	26.98	27.23	27.21	26.93	26.23	25.17	25.06	26.53	26.30	26.65	27.14	27.20	27.88	25.77	21.93	18.87	14.11	**N**
O	13.11	17.65	21.79	25.16	25.80	25.49	25.98	27.26	26.71	26.63	24.08	23.96	26.10	25.66	26.04	25.73	25.09	25.84	24.88	21.10	17.28	13.20	**O**
P		16.43	20.81	23.44	25.60	24.83	25.10	25.57	26.74	26.37	25.69	26.25	26.78	26.55	25.88	26.30	26.27	25.69	23.96	20.51	16.46		**P**
Q		14.47	18.35	22.50	25.11	24.13	23.80	26.29	25.83	27.07	25.08	26.12	27.04	26.68	26.31	25.56	24.24	25.04	22.61	18.40	14.67		**Q**
R			16.79	19.59	23.44	23.63	24.87	25.68	26.14	25.66	25.74	26.06	26.68	26.47	26.26	24.43	23.97	23.57	19.98	16.98			**R**
S			12.63	16.52	18.62	20.95	23.06	25.49	26.55	27.58	27.27	27.47	27.54	26.86	24.88	23.13	21.16	18.99	16.46	12.78			**S**
T				13.44	15.72	18.04	19.94	23.01	23.75	24.04	24.71	24.83	25.07	24.25	23.15	20.25	18.49	15.72	13.57				**T**
U					12.19	14.45	16.89	20.13	20.57	22.24	21.79	22.25	22.32	20.88	19.99	17.26	14.44	12.35					**U**
V						10.98	13.24	15.52	16.18	16.99	16.87	17.10	17.16	16.13	15.70	13.20	11.08						**V**
W									12.11	12.97	12.95	13.09	12.94	12.23									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

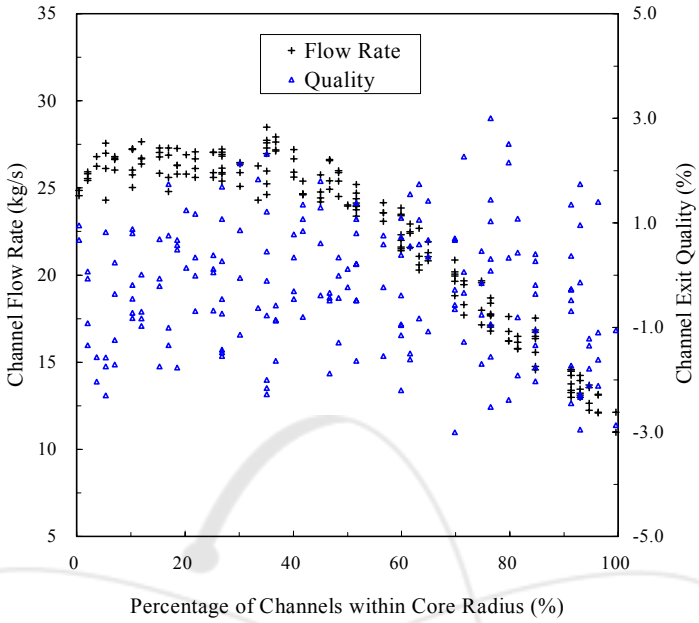
그림 6-14. Channel Flow Rate in the Wolsong-3 Reactor on 2002 August

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-0.77	-2.85	-0.36	0.27	0.27	-0.51									**A**
B						-0.82	-0.27	-2.83	-0.48	-1.77	-0.67	-0.07	0.98	0.20	-2.47	-0.18	-0.06						**B**
C					-1.23	1.10	0.28	-0.22	-0.52	0.35	-0.33	-0.84	0.33	-0.81	-0.10	0.68	1.94	-0.97					**C**
D				2.60	1.86	3.25	1.58	-2.11	-1.35	-0.28	-0.26	-0.80	-0.18	0.83	0.04	2.66	3.23	-0.42	0.55				**D**
E			-0.54	2.82	0.89	1.69	1.25	-0.98	-0.76	-0.63	-1.66	-1.33	-2.17	-0.96	1.14	1.52	1.77	-1.33	-1.44	-2.78			**E**
F			-1.07	1.18	1.71	1.42	1.88	0.22	-0.58	-1.19	-0.02	-1.72	-1.73	-0.49	-1.13	1.28	-0.20	-0.44	-1.27	-0.40			**F**
G		-0.06	1.87	2.21	0.43	1.69	0.66	-0.54	-0.13	-1.64	0.29	-1.37	-0.86	-0.67	-0.75	1.59	-0.29	-1.46	-1.17	0.45	-1.07		**G**
H		0.18	1.29	1.10	1.39	0.94	0.21	0.61	1.22	-0.06	1.07	-1.43	-1.31	-0.94	0.44	2.45	1.20	0.59	-0.31	-1.98	-0.38		**H**
J	-1.55	-0.88	0.35	0.34	-1.91	-0.05	0.04	0.27	0.10	-0.75	-0.69	-0.55	-1.94	-1.13	-0.07	0.12	0.61	-0.72	-0.97	-1.69	1.75	-1.38	**J**
K	-2.81	-1.62	-1.40	-0.32	-2.34	-1.55	-2.17	-2.41	-0.72	-1.10	-0.22	0.77	0.61	0.49	-1.80	-0.14	-1.30	-2.58	-2.35	-0.85	0.78	-0.78	**K**
L	-0.57	-1.97	-0.83	-1.41	-1.96	-0.42	-0.82	-0.70	-1.79	0.58	1.29	1.74	1.41	-0.47	-0.70	-0.96	-2.32	-3.02	-1.23	-0.13	0.69	-0.20	**L**
M	-0.80	-2.45	-0.78	-0.25	-0.58	-0.40	-1.14	-0.85	-1.70	-1.79	1.32	1.64	0.42	-1.93	-1.47	-0.04	-0.31	-1.37	0.18	1.59	1.49	1.90	**M**
N	-0.43	-0.10	0.41	-1.17	-1.09	-1.28	-1.94	-2.23	-0.93	-1.52	-0.15	-0.09	-2.56	0.26	0.53	-1.53	-1.09	-0.68	0.02	1.73	0.02	0.27	**N**
O	-1.51	0.11	-1.31	-1.61	0.50	1.31	0.24	-1.86	-2.36	-1.86	1.31	2.08	-0.01	1.43	1.08	1.16	1.94	0.84	-0.23	1.97	1.52	-0.62	**O**
P		0.08	-0.44	0.02	-0.08	1.88	2.19	1.68	-0.10	-0.96	0.29	-1.18	-1.55	0.12	1.58	-0.06	-0.25	-0.55	-0.82	0.56	0.85		**P**
Q		0.31	-0.95	-0.18	-0.95	1.89	2.94	0.45	0.75	-1.62	1.11	-0.40	-1.54	-0.30	0.35	-0.04	1.46	-0.03	-0.17	0.30	-0.22		**Q**
R			-0.58	-0.57	-1.36	0.63	0.37	0.89	0.36	0.54	0.59	-0.07	-1.40	-0.31	0.33	1.22	0.39	-1.89	-1.22	-0.75			**R**
S			-0.77	-2.26	0.49	0.88	0.37	-1.36	-1.24	-1.23	-1.72	-1.16	-2.23	-1.96	0.25	0.67	0.06	-0.23	-1.16	-1.09			**S**
T				-1.75	-0.97	1.02	1.64	-0.81	0.54	1.01	-0.03	-0.49	-0.94	-1.71	-0.46	0.42	0.00	-4.24	-2.93				**T**
U					-0.26	-0.01	0.36	-1.97	0.10	-0.53	-0.03	-1.83	-2.84	-0.23	-0.64	-0.65	-0.31	-1.20					**U**
V						-1.74	-1.23	-0.83	-1.17	-1.36	0.43	-1.84	-2.09	-1.60	-1.22	-1.20	-2.04						**V**
W									-1.05	-1.77	-0.68	-1.69	-3.86	-1.87									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

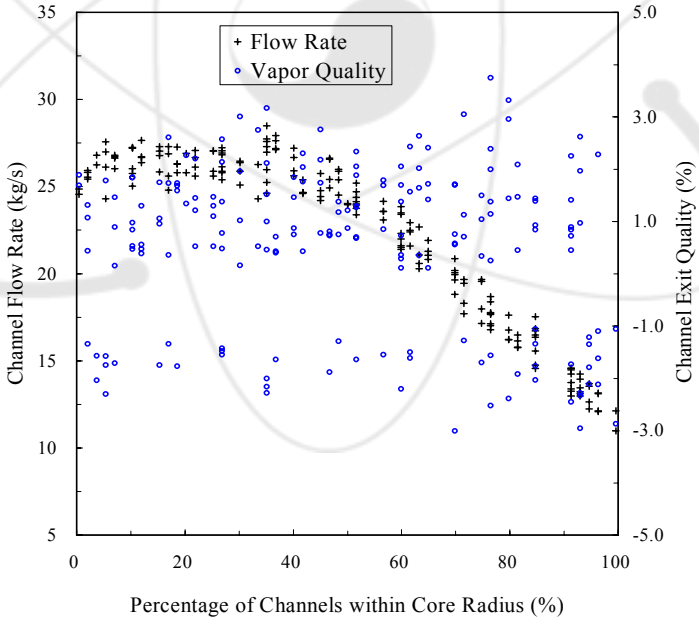
그림 7-14. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 August

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.37	-2.85	0.75	1.33	1.35	0.68									**A**
B						0.33	0.85	-2.83	0.64	-1.77	0.52	0.98	1.99	1.36	-2.47	0.91	1.08						**B**
C					-1.23	2.07	1.34	0.95	0.65	1.40	0.78	0.35	1.36	0.35	1.03	1.64	2.75	-0.97					**C**
D				3.40	2.72	3.97	2.52	-2.11	-1.35	0.84	0.85	0.40	0.90	1.88	1.17	3.43	3.95	0.66	1.55				**D**
E			0.64	3.63	1.79	2.61	2.18	0.33	0.45	0.52	-1.66	-1.33	-2.17	0.33	2.18	2.50	2.70	-1.33	-1.44	-2.78			**E**
F			-1.07	2.15	2.65	2.24	2.83	1.37	0.70	0.15	1.05	-1.72	-1.73	0.77	0.14	2.28	0.86	0.71	-1.27	0.79			**F**
G		0.97	2.74	3.06	1.37	2.64	1.64	0.72	1.02	-1.64	1.40	-1.37	0.45	0.53	0.48	2.49	0.85	-1.46	-1.17	1.52	-1.07		**G**
H		1.33	2.28	2.05	2.24	1.86	1.31	1.71	2.27	1.08	2.07	-1.43	-1.31	0.41	1.53	3.28	2.11	1.56	0.84	-1.98	0.82		**H**
J	-1.55	0.26	1.41	1.35	-1.91	1.01	1.27	1.41	1.33	0.50	0.54	0.74	-1.94	0.17	1.07	1.27	1.61	0.48	0.31	-1.69	2.61	-1.38	**J**
K	-2.81	-1.62	-1.40	0.83	-2.34	-1.55	-2.17	-2.41	0.52	0.21	0.94	1.74	1.69	1.64	-1.80	1.05	-1.30	-2.58	-2.35	0.35	1.77	0.43	**K**
L	0.55	-1.97	0.37	-1.41	-1.96	0.79	0.46	0.53	-1.79	1.65	2.23	2.59	2.40	0.71	0.55	0.37	-2.32	-3.02	-1.23	1.05	1.74	0.90	**L**
M	0.39	-2.45	0.36	0.90	0.69	0.87	0.16	0.48	-1.70	-1.79	2.23	2.48	1.57	-1.93	-1.47	1.08	0.88	-1.37	1.30	2.58	2.47	2.75	**M**
N	0.80	1.00	1.47	-1.17	0.17	-1.28	-1.94	-2.23	0.44	-1.52	1.00	1.04	-2.56	1.46	1.66	-1.53	0.18	0.51	1.18	2.67	1.12	1.36	**N**
O	-1.51	1.17	-1.31	-1.61	1.51	2.26	1.36	-1.86	-2.36	-1.86	2.23	2.89	1.11	2.42	2.19	2.17	2.88	1.88	0.87	2.86	2.48	0.63	**O**
P		1.23	0.68	1.12	0.97	2.79	3.05	2.61	1.04	0.39	1.41	0.17	-1.55	1.33	2.52	1.04	0.88	0.69	0.38	1.63	1.80		**P**
Q		1.37	0.22	0.85	0.31	2.64	3.69	1.51	1.78	-1.62	2.09	0.82	-1.54	0.89	1.46	1.02	2.34	1.02	1.02	1.38	0.88		**Q**
R			0.54	0.56	-1.36	1.57	1.41	1.96	1.50	1.57	1.61	1.05	-1.40	0.88	1.47	2.19	1.40	-1.89	-1.22	0.45			**R**
S			0.39	-2.26	1.39	1.79	1.38	-1.36	-1.24	-1.23	-1.72	0.14	-2.23	-1.96	1.37	1.72	1.13	0.80	-1.16	-1.09			**S**
T				-1.75	0.21	1.95	2.57	0.37	1.66	1.99	1.10	0.72	0.32	-1.71	0.70	1.49	1.09	-4.24	-2.93				**T**
U					0.84	1.02	1.45	-1.97	1.17	0.60	1.09	-1.83	-2.84	0.86	0.57	0.54	0.84	-1.20					**U**
V						-1.74	-1.23	0.43	-1.17	-1.36	1.46	-1.84	-2.09	-1.60	-1.22	-1.20	-2.04						**V**
W									-1.05	-1.77	0.43	-1.69	-3.86	-1.87									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-14. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 August



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-15. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 September (CASE-0209)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									3.163	3.503	3.512	3.496	3.473	3.300									**A**
B						2.797	3.398	4.150	4.541	4.724	4.499	4.475	4.394	4.286	3.646	3.183	2.786						**B**
C					2.973	3.686	4.341	5.017	5.451	5.729	5.697	5.363	5.551	5.016	4.676	4.192	3.712	3.010					**C**
D				3.411	4.054	4.840	5.480	6.071	6.330	6.380	6.146	5.994	6.259	6.131	5.920	5.457	4.824	3.802	3.290				**D**
E			3.034	4.099	4.683	5.398	6.185	6.590	6.575	6.417	6.141	6.419	6.604	6.342	6.464	6.045	5.613	4.848	3.644	2.813			**E**
F			3.613	4.694	5.623	5.954	6.510	6.640	6.169	6.229	6.338	6.484	6.175	6.212	6.555	6.430	5.703	5.279	4.418	3.881			**F**
G		3.431	4.654	5.515	5.805	6.434	6.290	6.189	6.480	6.620	6.561	6.575	6.297	6.290	6.141	6.549	6.063	5.937	5.095	4.540	3.349		**G**
H		4.164	5.129	6.047	6.379	6.652	6.231	6.753	6.650	6.354	6.453	6.536	6.206	6.121	6.562	6.614	6.625	6.342	5.881	5.096	4.100		**H**
J	3.057	4.476	5.510	6.180	6.481	6.514	6.724	6.613	6.497	6.033	5.947	6.141	6.502	6.266	6.513	6.535	6.661	6.495	5.998	5.072	4.353	2.967	**J**
K	3.054	4.599	5.247	6.241	6.448	6.227	6.690	6.612	6.204	5.975	5.883	6.163	6.560	6.660	6.729	6.775	6.393	6.587	6.472	5.444	4.497	3.251	**K**
L	3.490	4.451	5.545	5.949	6.263	6.467	6.392	6.442	5.924	6.361	6.385	6.337	6.517	6.265	6.397	6.469	6.856	6.800	6.291	5.754	4.891	3.463	**L**
M	3.392	4.793	5.486	6.396	6.598	6.723	6.197	6.578	6.245	6.453	6.372	6.339	6.416	5.977	6.182	6.573	6.815	6.536	6.565	6.138	5.138	3.848	**M**
N	3.459	4.638	5.705	6.010	6.713	6.766	6.175	6.601	6.510	5.997	5.999	5.948	5.497	6.546	6.817	6.999	7.001	6.817	6.260	5.924	5.041	3.645	**N**
O	2.938	4.418	5.550	6.277	6.600	6.898	6.477	6.193	6.648	6.540	6.269	6.359	6.319	6.644	6.894	6.702	6.978	6.578	6.012	5.774	4.778	3.514	**O**
P		4.004	4.938	5.740	6.246	6.812	6.840	6.805	6.617	6.229	6.388	6.075	6.548	6.579	6.815	6.471	6.787	6.147	6.038	5.143	4.176		**P**
Q		3.478	4.136	5.299	5.666	6.326	6.576	6.501	6.737	6.722	6.691	6.239	6.184	6.369	6.603	6.679	6.369	5.915	5.447	4.387	3.424		**Q**
R			3.877	4.482	5.118	5.864	6.045	6.603	6.713	6.497	6.552	6.633	6.583	6.542	6.688	6.390	5.867	4.983	4.300	3.817			**R**
S			2.913	3.893	4.559	5.169	5.634	6.343	6.547	6.298	6.068	6.365	6.155	6.561	6.383	5.689	5.022	4.334	3.616	2.775			**S**
T				2.937	3.512	4.547	5.170	5.280	5.977	6.081	6.039	5.976	5.915	5.972	5.504	4.977	4.366	2.928	2.665				**T**
U					2.811	3.360	4.036	4.234	4.872	5.105	5.182	4.879	5.187	5.115	4.753	3.938	3.346	2.676					**U**
V						2.326	2.877	3.503	3.536	3.697	4.081	3.737	3.715	3.617	3.577	2.956	2.317						**V**
W									2.668	2.742	2.906	2.794	2.525	2.660									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-15. Channel Power in the Wolsong-3 Reactor on 2002 September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.09	13.12	13.39	13.34	13.34	11.91									**A**
B						12.13	13.74	17.53	16.77	16.79	17.98	18.29	17.16	17.35	17.72	14.16	12.07						**B**
C					13.55	14.75	17.72	19.94	21.29	21.60	22.32	22.78	22.34	21.83	20.71	17.93	14.94	13.48					**C**
D				13.23	16.14	17.71	20.59	24.15	24.01	25.40	25.40	25.92	25.66	25.01	24.76	21.22	17.66	16.60	13.33				**D**
E			13.69	15.77	19.65	21.51	23.74	24.43	27.20	27.12	27.60	27.38	27.20	27.34	25.35	24.15	21.36	19.34	16.40	13.62			**E**
F			16.36	19.45	21.60	23.96	24.65	26.98	26.46	27.22	25.61	25.61	27.10	26.79	27.09	25.42	24.28	22.57	19.47	16.50			**F**
G		14.56	17.65	21.08	24.14	24.66	26.27	26.92	27.08	25.79	25.61	25.46	27.00	27.12	27.28	25.60	25.95	23.76	22.16	17.76	14.75		**G**
H		16.72	20.06	23.58	24.19	25.24	26.14	26.91	25.84	26.72	25.02	25.18	26.71	27.14	27.36	25.56	25.25	24.77	23.95	20.47	16.75		**H**
J	13.16	16.23	21.91	24.70	26.66	26.38	26.67	27.03	27.25	26.64	26.12	25.87	26.52	27.25	27.62	27.14	26.39	26.53	25.46	22.25	16.62	13.09	**J**
K	13.95	17.78	22.93	25.88	27.19	27.05	26.32	27.65	26.71	26.79	25.55	25.61	26.03	26.24	27.27	26.57	26.78	27.37	25.23	23.14	17.84	14.10	**K**
L	14.49	19.67	23.86	26.64	28.49	27.05	27.28	27.21	26.99	25.83	24.85	24.88	25.79	26.79	27.62	27.11	26.39	28.04	26.83	23.57	19.53	14.43	**L**
M	14.24	19.56	23.40	26.57	27.75	27.04	26.89	27.24	27.57	25.93	24.57	25.06	25.97	27.93	27.37	26.79	26.68	28.18	26.03	22.48	18.80	13.98	**M**
N	14.24	18.68	22.49	25.98	27.94	25.87	27.26	26.68	26.79	26.24	25.43	25.34	26.62	26.62	26.58	25.57	25.69	27.64	26.09	21.89	18.24	13.97	**N**
O	13.11	17.61	21.05	24.38	25.63	25.10	26.13	27.29	25.76	26.02	24.31	24.47	26.40	26.23	25.93	25.99	24.80	26.21	24.95	21.02	17.01	12.96	**O**
P		16.50	20.86	23.58	25.75	24.63	25.39	25.80	26.77	26.38	26.02	26.27	26.25	26.83	26.26	26.39	25.25	25.76	23.31	20.60	16.54		**P**
Q		14.59	18.38	22.67	25.20	24.60	24.29	26.83	25.60	26.29	24.79	26.31	27.02	26.94	26.61	24.57	24.40	25.40	22.67	18.65	14.70		**Q**
R			16.86	19.66	23.49	24.03	25.40	25.96	25.88	25.81	25.88	25.59	26.03	26.39	26.18	24.61	24.38	23.57	20.04	17.00			**R**
S			12.65	16.50	18.82	21.40	23.38	24.78	25.91	27.63	27.29	27.57	27.51	26.36	24.60	23.64	21.39	19.14	16.45	12.81			**S**
T				13.45	15.77	18.31	20.30	23.09	23.93	24.53	24.92	24.88	25.12	23.84	23.28	20.52	18.72	15.71	13.61				**T**
U					12.24	14.57	17.14	20.18	20.83	22.40	21.99	22.31	22.27	20.88	20.00	17.36	14.49	12.38					**U**
V						10.99	13.26	15.56	16.21	17.01	17.14	17.09	17.20	16.12	15.74	13.19	11.11						**V**
W									12.12	12.99	12.98	13.12	12.93	12.26									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

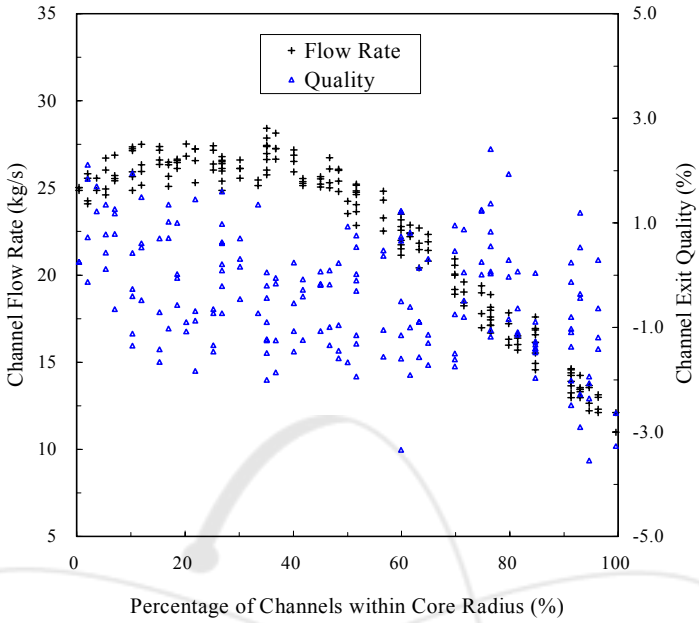
그림 6-15. Channel Flow Rate in the Wolsong-3 Reactor on 2002 September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									1.40	1.74	1.35	1.16	1.26	2.50									**A**
B						-1.06	0.37	-0.36	2.15	3.00	0.46	0.09	0.79	0.30	-3.05	-1.27	-1.21						**B**
C					-2.11	0.40	0.31	0.70	0.67	1.55	0.73	-0.98	0.28	-1.56	-1.24	-0.63	0.37	-1.95					**C**
D				0.96	0.43	2.27	1.74	0.59	1.38	0.34	-0.34	-1.18	-0.33	-0.02	-0.41	1.13	2.10	-1.24	-0.07				**D**
E			-1.79	1.08	-0.57	0.39	1.07	1.80	-0.46	-0.87	-2.00	-1.14	-0.29	-1.44	0.69	0.13	1.40	0.22	-1.86	-3.24			**E**
F			-2.03	-0.34	1.09	0.12	1.35	-0.11	-1.14	-1.55	0.05	0.56	-1.79	-1.18	-0.59	0.53	-1.10	-0.92	-1.72	-0.74			**F**
G		-0.69	1.44	1.06	-0.49	1.07	-0.63	-1.48	-0.69	0.67	0.76	0.77	-1.11	-1.48	-1.81	0.49	-1.02	0.06	-1.38	0.65	-1.35		**G**
H		0.27	0.67	0.76	1.29	1.21	-0.74	0.14	0.69	-0.83	0.88	1.07	-1.45	-1.81	-0.85	0.91	0.97	0.74	-0.19	0.21	-0.15		**H**
J	-1.10	2.51	0.35	0.21	-0.31	-0.05	0.34	-0.21	-0.72	-1.71	-1.58	-0.91	-0.07	-1.60	-0.87	-0.67	0.45	-0.33	-0.86	-1.70	1.44	-1.74	**J**
K	-2.33	1.03	-1.50	-0.44	-0.86	-1.43	0.49	-0.70	-1.24	-2.04	-1.34	-0.39	0.18	0.54	-0.23	0.62	-0.86	-0.49	0.59	-0.87	0.34	-1.28	**K**
L	-0.27	-1.70	-1.15	-1.88	-2.28	-0.68	-1.01	-0.82	-2.30	-0.07	0.67	0.35	0.45	-1.24	-1.19	-0.80	0.99	-0.50	-0.85	-0.30	0.32	-0.50	**L**
M	-0.48	-0.15	-0.96	-0.49	-0.77	0.12	-1.34	-0.45	-1.75	0.07	0.95	0.50	-0.17	-2.75	-1.94	-0.02	0.50	-1.19	0.22	2.18	1.89	2.53	**M**
N	-0.14	0.08	0.55	-1.29	-0.58	1.07	-1.77	0.01	-0.36	-1.57	-0.92	-1.19	-3.38	-0.28	0.79	1.89	2.02	-0.21	-0.47	1.77	2.41	1.08	**N**
O	-1.62	0.33	1.42	0.80	0.78	2.14	-0.01	-1.75	0.80	0.24	0.82	1.05	-0.84	0.48	1.26	0.84	2.52	0.33	-0.62	2.38	2.61	2.28	**O**
P		-0.19	-0.65	-0.23	-0.39	2.32	1.69	1.24	-0.07	-0.97	-0.19	-1.55	0.16	-0.37	0.98	-0.34	1.76	-0.88	1.05	0.22	0.61		**P**
Q		-0.28	-1.56	-0.83	-1.64	0.84	1.83	-0.46	1.17	0.57	1.74	-0.79	-1.75	-0.89	-0.13	1.99	1.00	-0.87	-0.37	-0.56	-0.81		**Q**
R			-1.06	-1.28	-2.20	-0.23	-0.80	0.45	0.86	0.27	0.38	0.71	0.42	-0.15	0.60	0.77	-0.43	-2.84	-2.27	-1.58			**R**
S			-1.21	-0.81	-0.28	-0.39	-0.48	0.61	0.34	-1.64	-2.16	-1.36	-2.16	0.10	0.75	-0.43	-1.13	-1.55	-2.36	-2.28			**S**
T				-2.28	-1.92	0.06	0.59	-1.55	0.22	-0.01	-0.43	-0.77	-0.93	0.13	-0.82	-0.50	-1.06	-5.19	-4.13				**T**
U					-1.35	-1.34	-0.94	-3.01	-1.08	-1.61	-0.94	-2.32	-1.35	-0.07	-0.81	-1.61	-1.48	-2.43					**U**
V						-2.87	-2.45	-1.76	-2.39	-2.52	-0.76	-2.58	-2.56	-2.02	-1.49	-1.99	-3.07						**V**
W									-2.12	-2.96	-1.73	-2.60	-4.47	-2.31									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

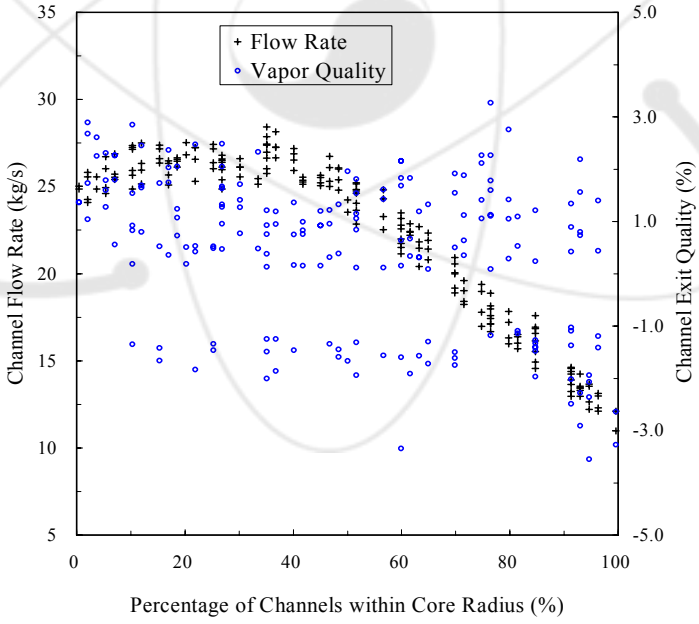
그림 7-15. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 September

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.28	2.62	2.25	2.12	2.21	3.30									**A**
B						-1.06	1.41	0.84	2.96	3.75	1.50	1.10	1.75	1.40	-3.05	-1.27	-1.21						**B**
C					-2.11	1.44	1.38	1.71	1.72	2.43	1.70	0.29	1.30	-1.56	-1.24	0.52	1.41	-1.95					**C**
D				1.97	1.47	3.05	2.64	1.69	2.34	1.38	0.81	0.12	0.81	1.14	0.73	2.08	2.91	-1.24	1.12				**D**
E			-1.79	2.09	0.58	1.38	2.05	2.76	0.75	0.40	-2.00	0.15	0.87	-1.44	1.80	1.24	2.37	1.27	-1.86	-3.24			**E**
F			-2.03	0.71	2.05	1.21	2.30	1.00	0.16	-1.55	1.10	1.59	-1.79	0.14	0.74	1.54	0.14	0.29	-1.72	0.44			**F**
G		0.45	2.39	2.02	0.68	2.04	0.52	-1.48	0.52	1.73	1.73	1.79	0.19	-1.48	-1.81	1.54	0.17	1.21	-1.38	1.67	-1.35		**G**
H		1.39	1.70	1.79	2.18	2.12	0.48	1.34	1.75	0.47	1.84	2.11	-1.45	-1.81	0.44	1.93	1.94	1.65	0.93	1.26	0.96		**H**
J	-1.10	3.32	1.42	1.27	0.87	1.02	1.45	0.96	0.53	-1.71	-1.58	0.42	1.09	-1.60	0.43	0.53	1.46	0.84	0.36	-1.70	2.37	-1.74	**J**
K	-2.33	2.00	-1.50	0.75	0.43	-1.43	1.59	0.56	0.15	-2.04	-1.34	0.84	1.36	1.64	1.00	1.68	0.42	0.79	1.59	0.34	1.43	-1.28	**K**
L	0.89	-1.70	0.11	-1.88	-2.28	0.52	0.36	0.47	-2.30	1.07	1.69	1.44	1.56	-1.24	0.17	0.45	2.05	0.77	0.39	0.80	1.46	0.71	**L**
M	0.72	1.04	0.29	0.73	0.46	1.30	-1.34	0.84	-1.75	1.31	1.89	1.55	1.00	-2.75	-1.94	1.09	1.54	0.15	1.31	3.06	2.78	3.34	**M**
N	0.97	1.14	1.57	-1.29	0.71	2.14	-1.77	1.30	0.89	-1.57	0.44	0.18	-3.38	0.94	1.84	2.79	2.91	0.92	0.74	2.68	3.24	2.06	**N**
O	-1.62	1.44	2.41	1.88	1.85	3.01	1.21	-1.75	1.84	1.46	1.78	2.05	0.46	1.60	2.28	1.83	3.34	1.41	0.62	3.21	3.44	3.12	**O**
P		0.93	0.56	0.85	0.78	3.17	2.57	2.27	1.06	0.39	0.98	-1.55	1.39	0.85	2.04	0.83	2.61	0.37	2.03	1.24	1.64		**P**
Q		0.84	-1.56	0.35	-1.64	1.76	2.75	0.78	2.20	1.68	2.61	0.48	-1.75	0.43	0.98	2.91	1.95	0.42	0.73	0.59	0.38		**Q**
R			-1.06	-1.28	-2.20	0.87	0.43	1.52	1.96	1.38	1.47	1.69	1.57	0.95	1.66	1.82	0.75	-2.84	-2.27	-1.58			**R**
S			-1.21	0.45	0.76	0.73	0.70	1.74	1.46	-1.64	-2.16	-1.36	-2.16	1.29	1.82	0.74	0.10	-1.55	-2.36	-2.28			**S**
T				-2.28	-1.92	1.13	1.64	-1.55	1.30	1.18	0.75	0.43	0.33	1.25	0.38	0.57	0.11	-5.19	-4.13				**T**
U					-1.35	-1.34	0.25	-3.01	0.11	-1.61	0.36	-2.32	-1.35	1.09	0.32	-1.61	-1.48	-2.43					**U**
V						-2.87	-2.45	-1.76	-2.39	-2.52	0.34	-2.58	-2.56	-2.02	-1.49	-1.99	-3.07						**V**
W									-2.12	-2.96	-1.73	-2.60	-4.47	-2.31									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-15. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 September



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-16. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 November (CASE-0211)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.893	3.352	3.307	3.348	3.471	3.448									**A**
B						2.566	3.131	3.944	4.186	4.463	4.622	4.341	4.669	4.480	4.163	3.267	2.785						**B**
C					2.739	3.405	4.419	4.970	4.948	5.229	5.445	5.624	5.506	5.499	5.207	4.584	3.667	2.966					**C**
D				3.213	3.789	4.476	4.997	5.712	6.012	5.945	6.174	6.238	5.988	5.890	5.781	5.265	4.684	3.744	3.441				**D**
E			2.936	3.956	4.943	5.535	5.721	6.239	6.539	6.591	6.448	6.093	6.454	6.617	6.319	6.137	5.542	5.040	4.392	3.471			**E**
F			3.982	4.892	5.541	6.084	6.172	6.281	6.558	6.552	5.994	6.361	6.638	6.667	6.563	6.203	6.157	5.736	5.139	4.071			**F**
G		3.208	4.430	5.163	6.001	6.176	6.655	6.650	6.146	6.364	6.146	6.508	6.580	6.144	6.543	6.227	6.352	6.007	5.609	4.555	3.295		**G**
H		3.882	4.675	5.523	5.903	6.374	6.668	6.472	6.370	6.619	6.189	6.474	6.642	6.596	6.173	6.065	6.132	5.939	5.654	5.132	3.997		**H**
J	3.000	4.387	5.147	5.648	6.286	6.571	6.438	6.231	6.316	6.693	6.581	5.882	6.400	6.522	6.113	6.474	6.178	6.079	6.226	5.589	4.236	2.857	**J**
K	3.560	4.800	5.720	5.929	6.345	6.606	6.580	6.643	6.710	6.720	6.546	5.870	6.171	6.337	6.527	6.464	6.619	6.495	6.407	5.902	4.342	3.140	**K**
L	3.567	4.993	5.926	6.457	6.582	6.251	6.769	6.359	6.686	6.343	6.292	5.976	6.228	6.609	6.150	6.766	6.663	6.689	6.771	6.096	4.706	3.671	**L**
M	3.341	4.856	5.913	6.165	6.228	6.536	6.775	6.607	6.773	6.565	6.229	6.137	6.340	6.601	6.745	6.795	6.481	6.870	6.789	5.960	4.840	3.717	**M**
N	3.418	4.419	5.448	6.355	6.335	6.687	6.803	6.716	6.433	6.695	6.598	6.466	6.408	6.339	6.460	6.664	6.792	6.503	6.671	5.565	4.835	3.385	**N**
O	3.222	4.198	5.354	6.120	6.094	6.525	6.739	6.766	6.572	6.633	6.129	6.209	6.009	6.156	6.429	6.755	6.590	6.744	6.444	5.529	4.480	3.362	**O**
P		3.786	4.676	5.856	6.277	6.398	6.340	6.351	6.266	6.724	6.776	6.712	6.497	6.073	6.257	6.680	6.572	6.456	5.924	4.829	3.879		**P**
Q		3.342	4.448	5.103	5.757	5.837	6.074	6.606	6.365	6.599	6.552	6.779	6.689	6.540	6.034	6.338	5.864	5.580	5.323	4.568	3.273		**Q**
R			3.785	4.578	4.794	5.503	6.194	6.219	6.437	6.617	6.296	6.480	6.540	6.104	6.240	5.942	5.598	5.295	4.762	3.863			**R**
S			2.783	3.838	4.309	4.881	5.875	6.232	6.523	6.674	6.543	6.170	6.567	6.385	6.151	5.974	5.316	4.410	3.711	3.182			**S**
T				2.836	3.730	4.437	5.082	5.715	5.888	5.853	5.889	5.838	6.128	6.045	5.811	5.408	4.567	3.764	2.826				**T**
U					2.725	3.245	3.991	4.738	4.853	5.014	5.131	5.258	5.305	5.032	4.788	4.366	3.463	2.822					**U**
V						2.273	2.862	3.653	4.005	4.252	4.211	4.253	3.771	3.591	3.645	2.994	2.375						**V**
W									2.797	2.839	3.010	2.924	2.920	2.761									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-16. Channel Power in the Wolsong-3 Reactor on 2002 November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.30	13.30	13.64	13.52	13.33	11.74									**A**
B						12.12	13.90	17.60	17.22	17.10	17.78	18.41	16.76	17.07	17.60	14.13	12.05						**B**
C					13.54	14.93	17.59	19.98	21.91	22.43	22.80	22.35	22.40	21.05	19.92	17.42	14.99	13.46					**C**
D				13.45	16.39	18.24	21.46	24.82	24.84	26.01	25.30	25.57	25.87	25.36	24.86	21.62	17.83	16.59	13.10				**D**
E			13.68	16.01	19.18	21.15	24.63	25.53	27.19	26.64	27.43	27.41	27.43	26.94	25.77	23.80	21.49	18.90	15.51	13.35			**E**
F			16.16	19.04	21.73	23.54	25.55	27.39	25.57	26.81	26.03	25.93	26.42	25.68	27.02	25.94	23.36	21.67	18.46	16.26			**F**
G		14.57	17.99	21.82	23.64	25.38	25.14	25.97	27.23	26.46	26.32	25.56	26.33	27.10	26.88	26.23	25.33	23.54	21.13	17.69	14.75		**G**
H		16.93	20.56	24.30	25.21	26.03	24.85	27.53	26.62	25.95	25.65	25.34	25.78	26.42	27.48	26.60	26.24	25.53	24.13	20.33	16.79		**H**
J	13.14	16.33	22.34	25.23	26.89	26.12	27.24	27.38	27.37	25.41	24.95	25.94	26.68	26.96	27.76	27.12	27.13	26.79	24.96	21.56	16.76	13.07	**J**
K	13.54	17.43	22.20	26.08	27.27	26.39	26.66	27.50	25.54	25.56	24.25	25.84	26.59	26.94	27.51	27.31	26.23	27.51	25.32	22.13	18.01	14.10	**K**
L	14.39	18.99	23.17	26.09	28.42	27.17	26.49	27.26	26.03	25.82	25.04	25.45	26.38	26.12	27.67	26.38	26.96	28.13	25.69	22.66	19.80	14.21	**L**
M	14.24	19.39	22.58	26.75	27.88	27.42	25.66	27.14	26.72	25.57	24.86	25.48	26.03	27.63	26.61	26.05	27.30	27.43	25.27	22.85	19.36	14.10	**M**
N	14.24	18.89	22.87	25.39	28.15	26.11	26.12	26.34	26.89	24.86	24.09	24.28	26.10	26.83	27.36	26.48	26.21	27.97	24.90	22.63	18.55	14.19	**N**
O	12.99	17.83	21.42	24.75	26.53	26.11	25.30	26.34	25.93	25.72	24.60	24.81	26.50	26.99	26.99	25.73	25.85	25.64	23.84	21.43	17.43	13.06	**O**
P		16.58	20.92	23.27	25.65	25.76	26.59	26.82	27.16	25.17	24.85	25.00	26.40	27.10	27.31	25.69	25.79	25.00	23.55	20.82	16.78		**P**
Q		14.63	18.15	22.71	25.16	25.27	25.45	26.49	26.57	26.56	25.10	24.96	26.27	26.64	26.97	25.43	25.19	25.50	22.74	18.39	14.70		**Q**
R			16.84	19.60	23.49	24.24	25.14	26.64	26.60	25.38	26.38	25.97	26.10	26.71	27.00	25.37	24.55	23.51	19.84	16.97			**R**
S			12.64	16.51	18.90	21.50	22.86	25.05	25.93	27.25	26.98	27.58	27.30	26.70	25.15	23.02	21.03	19.12	16.42	12.67			**S**
T				13.43	15.71	18.42	20.43	22.52	24.05	24.79	25.02	24.93	24.76	23.59	22.69	19.74	18.52	15.61	13.60				**T**
U					12.22	14.56	17.14	20.06	20.81	22.38	21.99	22.21	22.18	20.95	19.93	16.97	14.44	12.37					**U**
V						10.97	13.25	15.52	15.98	16.68	16.98	16.84	17.19	16.10	15.72	13.17	11.10						**V**
W									12.10	12.97	12.95	13.11	12.90	12.25									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

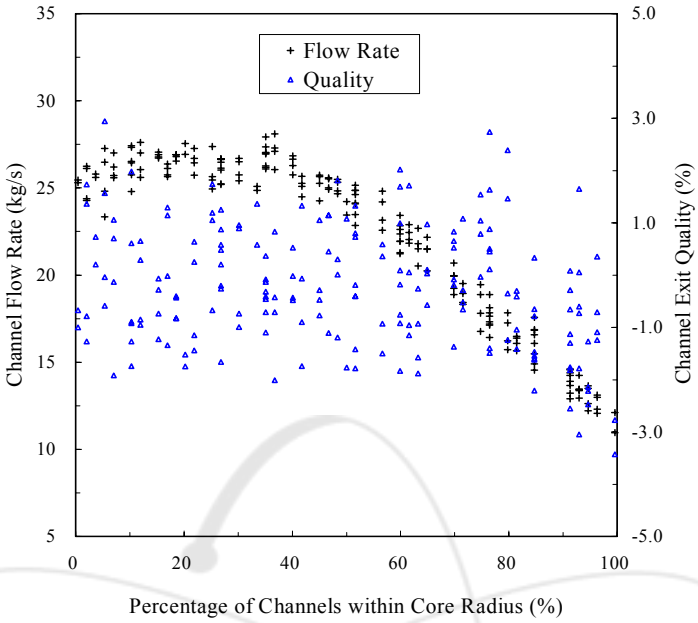
그림 6-16. Channel Flow Rate in the Wolsong-3 Reactor on 2002 November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-0.64	0.53	-0.13	0.04	1.31	3.87									**A**
B						-2.64	-1.37	-1.40	-0.03	1.37	1.23	-0.54	2.64	1.58	-0.44	-0.69	-1.17						**B**
C					-3.55	-1.33	0.83	0.46	-1.72	-1.00	-0.50	0.31	0.10	0.96	1.60	1.67	0.09	-2.19					**C**
D				-0.44	-1.14	0.05	-0.89	-1.05	-0.30	-1.45	-0.18	-0.08	-1.37	-1.01	-0.94	0.11	1.28	-1.49	1.21				**D**
E			-2.36	0.07	0.95	1.23	-1.15	-0.17	-0.54	-0.05	-0.90	-2.16	-0.88	-0.28	-0.04	0.74	1.03	1.50	3.05	1.15			**E**
F			0.04	0.87	0.66	0.93	-0.41	-1.49	0.70	-0.21	-1.34	-0.02	0.13	1.05	-0.50	-0.49	1.19	1.55	2.42	0.46			**F**
G		-2.02	0.07	-0.89	0.54	-0.28	1.35	0.61	-1.83	-0.57	-1.02	0.50	0.24	-1.90	-0.23	-0.94	0.36	0.49	1.46	0.80	-1.62		**G**
H		-1.27	-1.61	-1.56	-1.07	-0.20	1.60	-1.08	-0.71	0.53	-0.40	0.79	0.58	0.18	-2.14	-1.52	-1.30	-1.08	-1.13	0.51	-0.70		**H**
J	-1.41	1.93	-1.30	-1.94	-1.07	0.31	-0.87	-1.66	-1.35	1.26	1.35	-1.80	-0.46	-0.57	-2.17	-0.83	-1.50	-1.83	0.25	0.84	0.74	-2.42	**J**
K	1.19	2.41	0.81	-1.59	-1.25	0.21	-0.05	-0.48	1.18	1.22	1.84	-1.49	-1.41	-0.87	-1.01	-0.77	0.21	-0.83	0.33	1.64	-0.47	-1.90	**K**
L	0.24	1.25	0.74	0.09	-1.25	-1.46	0.71	-1.12	0.78	-0.13	0.25	-1.22	-0.81	0.32	-1.95	0.61	0.03	-0.89	1.49	1.64	-0.62	0.93	**L**
M	-0.80	0.25	1.21	-1.34	-2.00	-0.65	1.35	-0.27	0.43	0.72	0.25	-0.37	-0.44	-0.58	0.33	1.20	-0.91	0.32	1.55	1.23	0.05	1.61	**M**
N	-0.36	-1.05	-0.61	0.23	-1.86	0.63	1.00	0.61	-0.65	1.70	2.11	1.34	-0.03	-1.08	-0.77	0.14	0.97	-1.39	1.75	-0.14	1.17	-0.64	**N**
O	0.29	-0.84	0.31	0.02	-1.46	0.16	1.45	0.70	0.42	0.79	0.12	0.32	-1.90	-1.52	-0.92	1.26	0.41	1.32	1.71	1.06	0.70	1.19	**O**
P		-1.41	-1.75	0.37	-0.19	0.05	-0.73	-0.90	-1.42	1.49	1.95	1.47	-0.03	-2.15	-1.44	0.81	0.67	0.68	0.49	-1.20	-1.05		**P**
Q		-1.09	0.03	-1.57	-1.31	-1.24	-0.73	0.09	-0.69	0.02	1.02	1.98	0.37	-0.10	-2.18	0.22	-1.25	-2.03	-0.87	0.47	-1.67		**Q**
R			-1.48	-0.80	-3.34	-1.67	-0.08	-1.23	-0.46	0.98	-0.73	-0.04	0.27	-1.78	-1.32	-1.26	-1.47	-1.66	-0.09	-1.31			**R**
S			-2.07	-1.09	-1.50	-1.60	0.76	0.07	0.24	-0.16	-0.44	-1.93	-0.70	-0.60	-0.38	1.07	0.33	-1.15	-1.81	0.56			**S**
T				-2.91	-0.64	-0.49	0.14	0.47	-0.10	-0.96	-0.99	-1.27	0.05	0.60	0.77	2.00	0.02	-0.51	-3.07				**T**
U					-1.94	-1.97	-1.18	-0.75	-1.14	-1.91	-1.15	-0.74	-0.79	-0.44	-0.58	0.87	-0.71	-1.38					**U**
V						-3.27	-2.49	-0.89	0.29	0.55	0.01	0.21	-2.23	-2.12	-1.08	-1.70	-2.58						**V**
W									-1.19	-2.28	-1.03	-1.70	-1.81	-1.55									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

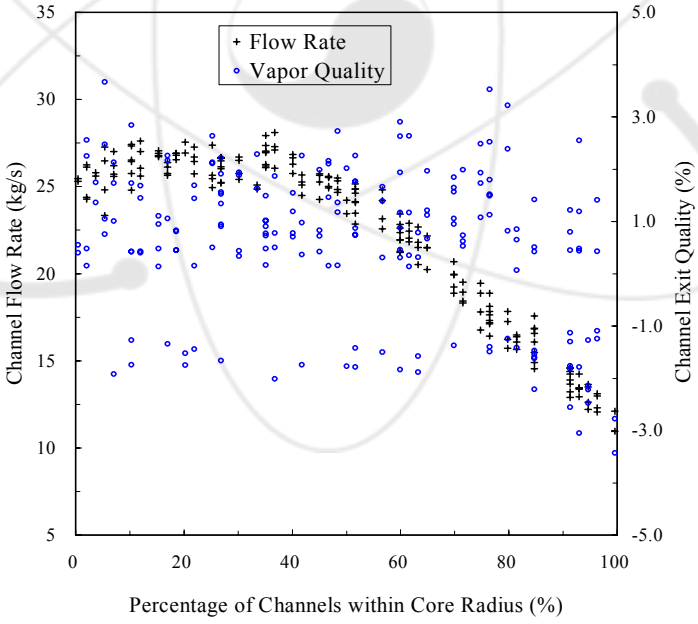
그림 7-16. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 November

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									0.44	1.56	0.89	1.19	2.21	4.55									**A**
B						-2.64	-1.37	-1.40	1.05	2.27	2.12	0.56	3.45	2.45	0.79	0.44	-1.17						**B**
C					-3.55	-1.33	1.78	1.55	-1.72	0.34	0.64	1.36	1.14	1.97	2.50	2.55	1.10	-2.19					**C**
D				0.74	-1.14	1.12	0.32	0.12	0.84	-1.45	0.96	0.95	-1.37	0.16	0.30	1.21	2.22	-1.49	2.15				**D**
E			-2.36	1.09	1.92	2.15	0.12	0.92	0.75	1.19	0.38	-2.16	0.38	0.90	1.13	1.82	1.98	2.41	3.81	2.12			**E**
F			1.21	1.88	1.68	1.96	0.76	-1.49	1.71	0.96	-1.34	1.05	1.31	2.09	0.76	0.72	2.09	2.51	3.29	1.50			**F**
G		-2.02	1.13	0.31	1.54	0.83	2.33	1.63	-1.83	0.73	0.36	1.55	1.43	-1.90	0.93	0.36	1.41	1.43	2.45	1.75	-1.62		**G**
H		-1.27	-1.61	-1.56	0.15	0.93	2.49	0.19	0.52	1.65	0.83	1.76	1.68	1.37	-2.14	-1.52	-1.30	0.16	0.15	1.59	0.47		**H**
J	-1.41	2.76	-1.30	-1.94	0.17	1.41	0.42	-1.66	-1.35	2.27	2.31	-1.80	0.80	0.80	-2.17	0.49	-1.50	-1.83	1.35	1.84	1.71	-2.42	**J**
K	2.19	3.27	1.83	-1.59	-1.25	1.33	1.07	0.80	2.26	2.25	2.68	-1.49	-1.41	0.43	0.39	0.47	1.34	0.43	1.37	2.60	0.65	-1.90	**K**
L	1.34	2.27	1.83	1.22	-1.25	-1.46	1.75	0.19	1.79	1.04	1.37	0.19	0.47	1.50	-1.95	1.69	1.21	0.39	2.40	2.61	0.58	1.98	**L**
M	0.42	1.41	2.16	-1.34	-2.00	0.52	2.37	0.92	1.60	1.73	1.36	0.85	0.83	0.74	1.49	2.26	0.39	1.44	2.49	2.16	1.13	2.49	**M**
N	0.80	0.09	0.67	1.33	-1.86	1.67	2.05	1.69	0.56	2.61	2.89	2.28	1.17	0.22	0.49	1.32	2.02	-1.39	2.71	1.00	2.19	0.48	**N**
O	1.40	0.29	1.33	1.15	-1.46	1.27	2.47	1.73	1.54	1.80	1.28	1.41	-1.90	-1.52	0.41	2.29	1.44	2.30	2.65	2.02	1.70	2.15	**O**
P		-1.41	-1.75	1.43	0.92	1.21	0.47	0.51	-1.42	2.45	2.85	2.40	1.08	-2.15	-1.44	1.88	1.65	1.73	1.48	-1.20	0.08		**P**
Q		-1.09	1.11	-1.57	-1.31	0.15	0.48	1.28	0.53	1.24	2.03	2.84	1.48	1.06	-2.18	1.32	-1.25	-2.03	0.30	1.54	-1.67		**Q**
R			-1.48	0.35	-3.34	-1.67	0.99	0.13	0.77	2.05	0.49	1.03	1.41	-1.78	-1.32	-1.26	-1.47	-1.66	1.00	-1.31			**R**
S			-2.07	-1.09	-1.50	-1.60	1.81	1.20	1.36	0.95	0.76	-1.93	0.47	0.68	0.77	2.05	1.33	0.10	-1.81	1.56			**S**
T				-2.91	0.53	0.64	1.19	1.61	1.06	0.39	0.32	-1.27	1.23	1.67	1.85	2.85	1.09	0.54	-3.07				**T**
U					-1.94	-1.97	-1.18	0.50	0.09	-1.91	0.15	0.42	0.36	0.76	0.58	1.85	0.47	-1.38					**U**
V						-3.27	-2.49	0.24	1.42	1.60	1.06	1.23	-2.23	-2.12	-1.08	-1.70	-2.58						**V**
W									-1.19	-2.28	-1.03	-1.70	-1.81	-1.55									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-16. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 November



(a) Based on the Thermodynamic Quality



(b) Based on the Vapor-Weight Quality

그림 4-17. Channel Flow Rate and Channel Exit Quality Distributions in the Wolsong-3 Reactor on 2002 December (CASE-0212)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									2.818	3.280	3.215	3.267	3.352	3.316									**A**
B						2.535	3.055	3.880	4.115	4.370	4.576	4.638	4.610	4.269	3.995	3.079	2.640						**B**
C					3.084	3.366	4.337	4.965	5.323	5.179	5.324	5.511	5.274	5.259	4.953	4.408	3.481	2.867					**C**
D				3.177	3.723	4.342	4.815	5.559	5.968	6.271	6.277	6.156	5.792	6.006	5.497	4.958	4.482	4.043	3.359				**D**
E			2.904	3.875	4.872	5.475	5.521	6.084	6.620	6.720	6.472	6.538	6.302	6.490	6.001	5.941	5.254	4.837	4.238	3.374			**E**
F			4.011	4.906	5.426	6.087	6.036	6.548	6.564	6.606	6.517	6.332	6.571	6.607	6.353	5.924	5.902	5.592	4.927	3.875			**F**
G		3.230	4.477	5.136	6.019	6.456	6.629	6.606	6.628	6.285	6.036	6.432	6.767	6.819	6.606	6.133	6.241	5.809	5.416	4.334	3.172		**G**
H		3.950	5.133	5.659	6.315	6.285	6.518	6.312	6.212	6.545	6.050	6.444	6.763	6.821	6.918	6.761	6.120	5.802	5.419	4.933	3.893		**H**
J	3.013	4.440	5.285	6.353	6.400	6.676	6.337	6.612	6.165	6.573	6.595	6.683	6.506	6.812	6.906	6.782	6.138	6.336	6.196	5.445	4.219	3.278	**J**
K	3.603	4.831	5.851	6.629	6.460	6.649	6.473	6.528	6.667	6.605	6.504	6.522	6.181	6.319	6.592	6.408	6.529	6.300	6.153	5.813	4.772	3.203	**K**
L	3.528	5.024	6.128	6.634	6.838	6.908	6.849	6.723	6.491	6.045	6.070	5.833	6.074	6.586	6.797	6.812	6.513	6.457	6.549	5.995	4.614	3.697	**L**
M	3.277	4.791	5.973	6.674	6.810	6.502	6.713	6.328	6.530	6.214	5.924	5.885	6.107	6.430	6.656	6.883	6.910	6.863	6.759	5.791	4.685	3.628	**M**
N	3.346	4.308	5.344	6.346	6.255	6.486	6.499	6.343	6.046	6.398	6.433	6.419	6.358	6.123	6.220	6.428	6.659	6.786	6.568	5.922	4.728	3.273	**N**
O	3.219	4.103	5.284	6.049	6.530	6.296	6.574	6.432	6.253	6.422	6.616	6.158	6.488	6.080	6.232	6.656	6.318	6.682	6.230	5.401	4.334	3.265	**O**
P		3.746	5.021	5.872	6.226	6.110	6.054	6.096	6.524	6.553	6.752	6.589	6.483	6.630	6.222	6.541	6.340	6.228	5.694	5.051	3.768		**P**
Q		3.292	4.447	4.998	5.703	5.670	6.329	6.519	6.147	6.374	6.343	6.665	6.664	6.723	6.721	6.396	6.217	5.416	5.090	4.479	3.151		**Q**
R			3.745	4.663	5.182	5.456	6.169	6.459	6.276	6.648	6.629	6.413	6.534	6.647	6.337	6.286	5.537	5.179	4.578	3.697			**R**
S			2.750	3.829	4.320	5.178	5.850	6.086	6.360	6.583	6.529	6.628	6.577	6.345	6.076	5.987	5.303	4.252	3.547	3.092			**S**
T				2.803	3.752	4.388	4.979	5.682	5.800	5.778	5.835	5.821	6.279	6.015	5.852	5.331	4.442	3.699	2.718				**T**
U					2.685	3.189	3.931	4.829	5.244	5.449	5.201	5.465	5.431	5.101	4.783	4.343	3.378	2.739					**U**
V						2.244	2.839	3.681	4.159	4.394	4.310	4.525	4.477	4.191	3.783	3.000	2.345						**V**
W									2.852	2.900	3.102	3.062	3.154	2.960									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 5-17. Channel Power in the Wolsong-3 Reactor on 2002 December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									12.30	13.37	13.67	13.60	13.48	11.87									**A**
B						12.10	13.90	17.57	17.25	17.18	17.81	17.98	16.82	17.35	17.68	14.16	12.06						**B**
C					13.50	14.92	17.64	19.95	21.49	22.44	22.83	22.61	22.70	21.65	20.41	17.66	15.11	13.47					**C**
D				13.44	16.38	18.33	21.50	24.81	24.86	25.51	24.91	25.70	25.90	25.21	24.95	21.95	18.15	16.36	13.20				**D**
E			13.65	16.08	19.24	21.22	24.63	25.73	26.83	26.06	27.36	27.22	27.54	27.19	26.24	24.35	22.06	19.30	15.75	13.46			**E**
F			16.08	18.94	21.96	23.44	25.67	27.00	25.41	26.47	24.94	25.97	26.66	25.88	27.29	26.16	24.01	21.98	18.89	16.49			**F**
G		14.56	17.84	21.81	23.48	24.49	25.10	26.03	26.44	26.55	26.36	25.74	25.67	25.85	26.59	26.33	25.63	23.96	21.67	18.02	14.75		**G**
H		16.86	19.97	24.19	24.27	26.10	25.21	27.54	26.72	26.05	25.76	25.39	25.35	25.62	26.13	25.03	26.25	25.58	24.19	20.71	16.84		**H**
J	13.12	16.22	22.18	24.09	26.66	25.76	27.27	26.90	27.34	25.70	24.81	24.58	26.38	26.20	26.46	26.38	27.14	26.68	25.00	21.89	16.76	12.88	**J**
K	13.45	17.33	21.82	24.66	27.11	26.15	26.80	27.61	25.59	25.80	24.28	24.65	26.60	26.94	27.48	27.34	26.50	27.63	25.83	22.34	17.40	14.10	**K**
L	14.39	18.89	22.61	25.53	27.93	25.65	26.12	26.44	26.48	26.12	25.46	25.51	26.51	26.17	26.74	26.26	27.28	28.28	26.26	22.92	19.87	14.18	**L**
M	14.25	19.47	22.36	25.57	27.04	27.38	25.75	27.42	27.27	26.25	25.30	25.72	26.28	27.83	26.91	25.80	26.29	27.40	25.35	23.23	19.56	14.18	**M**
N	14.25	18.89	22.89	25.33	28.11	26.62	26.91	27.02	27.02	25.60	24.38	24.39	26.24	26.92	27.50	26.97	26.60	27.61	25.17	21.85	18.74	14.22	**N**
O	12.98	17.83	21.49	24.85	25.75	26.51	25.73	27.07	26.52	26.21	23.34	24.90	26.00	27.00	27.13	25.95	26.43	25.76	24.45	21.63	17.64	13.14	**O**
P		16.56	20.70	23.14	25.65	26.18	26.68	26.94	26.79	25.60	24.80	25.36	26.41	26.64	27.31	26.11	26.36	25.62	23.94	20.66	16.79		**P**
Q		14.61	18.13	22.68	25.15	25.27	24.85	26.66	26.69	26.91	25.64	25.21	26.33	25.97	26.12	25.25	24.71	25.52	22.81	18.52	14.71		**Q**
R			16.82	19.51	23.42	24.22	25.10	26.27	26.70	25.24	25.45	26.10	26.09	25.95	26.90	24.83	24.55	23.53	19.99	16.99			**R**
S			12.63	16.48	18.88	21.30	22.85	25.26	26.28	27.29	26.95	27.21	27.30	26.76	25.25	22.97	21.05	19.13	16.44	12.74			**S**
T				13.42	15.66	18.42	20.53	22.58	24.12	24.83	25.01	24.94	24.34	23.70	22.58	19.87	18.65	15.64	13.60				**T**
U					12.22	14.53	17.13	19.95	20.24	22.03	21.92	21.90	22.03	20.86	19.94	16.99	14.47	12.37					**U**
V						10.97	13.23	15.49	15.72	16.42	16.77	16.40	16.56	15.65	15.64	13.17	11.11						**V**
W									12.08	12.95	12.91	13.10	12.84	12.20									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 6-17. Channel Flow Rate in the Wolsong-3 Reactor on 2002 December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.09	0.05	-0.66	-0.44	0.42	2.74									**A**
B						-2.77	-1.76	-1.62	-0.35	0.88	1.04	1.24	2.30	0.32	-1.30	-1.79	-2.17						**B**
C					-1.27	-1.47	0.45	0.52	0.10	-1.15	-0.92	-0.23	-0.90	-0.39	0.18	0.62	-0.95	-2.79					**C**
D				-0.60	-1.41	-0.52	-1.58	-1.50	-0.40	0.01	0.45	-0.38	-2.00	-0.44	-1.94	-1.23	0.05	0.27	0.58				**D**
E			-2.47	-0.30	0.65	0.99	-1.78	-0.77	-0.02	0.83	-0.71	-0.60	-1.38	-0.81	-1.31	-0.28	-0.43	0.25	1.97	0.44			**E**
F			0.33	1.08	0.09	1.08	-0.90	-0.32	0.89	0.20	1.19	-0.04	-0.17	0.76	-1.32	-1.51	-0.14	0.78	1.05	-0.66			**F**
G		-1.82	0.50	-0.93	0.80	1.33	1.36	0.48	0.25	-0.83	-1.34	0.15	1.37	1.12	0.17	-1.28	-0.12	-0.44	0.29	-0.45	-2.28		**G**
H		-0.79	0.83	-0.93	1.05	-0.46	0.87	-1.52	-1.23	0.29	-0.89	0.71	1.34	1.54	1.14	1.90	-1.31	-1.51	-1.96	-0.51	-1.25		**H**
J	-1.24	2.39	-0.57	1.33	-0.48	0.96	-1.15	-0.07	-1.74	0.70	1.57	1.87	0.09	0.86	1.20	0.64	-1.57	-0.89	0.17	0.03	0.71	0.52	**J**
K	1.65	2.74	1.71	1.81	-0.71	0.58	-0.43	-0.85	1.06	0.73	1.73	1.56	-1.35	-0.88	-0.75	-0.91	-0.18	-1.47	-0.80	1.17	2.19	-1.46	**K**
L	0.08	1.54	2.02	1.14	-0.08	1.74	1.29	0.61	-0.04	-1.27	-0.67	-1.71	-1.35	0.24	0.70	0.88	-0.55	-1.66	0.40	1.08	-1.02	1.15	**L**
M	-1.13	-0.03	1.69	1.15	0.37	-0.67	1.14	-1.27	-0.59	-0.79	-1.00	-1.34	-1.36	-1.19	-0.08	1.73	1.14	0.36	1.42	0.36	-0.71	1.03	**M**
N	-0.73	-1.49	-0.96	0.30	-2.01	-0.26	-0.40	-0.95	-1.92	0.20	1.36	1.12	-0.24	-1.80	-1.57	-0.86	0.32	-0.23	1.24	1.84	0.56	-1.33	**N**
O	0.35	-1.24	0.03	-0.19	0.52	-0.74	0.64	-0.74	-0.92	-0.13	2.94	0.14	0.00	-1.71	-1.61	0.82	-0.80	1.08	0.50	0.45	-0.12	0.52	**O**
P		-1.54	-0.08	0.59	-0.29	-1.10	-1.66	-1.75	-0.28	0.65	1.98	0.81	-0.02	-0.02	-1.49	0.09	-0.37	-0.45	-0.52	-0.10	-1.56		**P**
Q		-1.30	0.11	-1.88	-1.42	-1.74	0.58	-0.20	-1.44	-0.82	-0.02	1.45	0.27	0.97	0.60	0.59	0.30	-2.53	-1.76	0.00	-2.35		**Q**
R			-1.60	-0.29	-1.83	-1.77	-0.07	-0.13	-0.99	1.25	1.05	-0.26	0.32	0.50	-0.88	0.29	-1.63	-2.06	-0.95	-2.11			**R**
S			-2.22	-1.04	-1.37	-0.18	0.73	-0.47	-0.43	-0.42	-0.41	-0.19	-0.63	-0.73	-0.69	1.22	0.28	-1.82	-2.65	-0.07			**S**
T				-3.05	-0.41	-0.66	-0.26	0.36	-0.40	-1.19	-1.11	-1.30	0.94	0.44	1.07	1.57	-0.55	-0.87	-3.69				**T**
U					-2.14	-2.21	-1.40	-0.19	0.97	0.05	-0.76	0.31	-0.14	-0.02	-0.57	0.79	-1.22	-1.89					**U**
V						-3.43	-2.55	-0.65	1.46	1.63	0.79	2.12	1.95	1.54	-0.17	-1.63	-2.75						**V**
W									-0.71	-1.78	-0.29	-0.72	-0.15	-0.04									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 7-17. Thermodynamic Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 December

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A									-1.09	1.19	0.45	0.73	1.43	3.49									**A**
B						-2.77	-1.76	-1.62	0.82	1.80	1.93	2.18	3.15	1.39	-1.30	-1.79	-2.17						**B**
C					-1.27	-1.47	1.49	1.57	1.21	0.14	0.31	0.84	0.31	0.73	1.22	1.61	0.22	-2.79					**C**
D				0.48	-1.41	0.62	-1.58	-1.50	0.75	1.18	1.46	0.76	-2.00	0.77	-1.94	0.10	1.09	1.40	1.67				**D**
E			-2.47	0.85	1.65	1.94	-1.78	0.42	1.19	1.87	0.48	0.57	-1.38	0.42	-1.31	0.84	0.72	1.25	2.80	1.47			**E**
F			1.42	1.99	1.17	2.02	0.37	0.91	1.94	1.34	2.13	1.02	0.97	1.76	-1.32	-1.51	0.92	1.80	1.97	0.48			**F**
G		-1.82	1.52	0.32	1.76	2.26	2.29	1.53	1.44	0.45	-1.34	1.29	2.35	2.18	1.32	-1.28	0.96	0.72	1.32	0.65	-2.28		**G**
H		0.42	1.85	0.31	1.99	0.73	1.91	-1.52	0.14	1.45	0.42	1.69	2.33	2.49	2.22	2.78	-1.31	-1.51	-1.96	0.62	-1.25		**H**
J	-1.24	3.22	0.67	2.26	0.71	1.88	0.15	1.11	-1.74	1.73	2.47	2.73	1.27	1.88	2.24	1.69	-1.57	0.42	1.26	1.15	1.67	1.58	**J**
K	2.55	3.53	2.64	2.73	0.50	1.56	0.83	0.43	2.13	1.75	2.56	2.49	-1.35	0.43	0.52	0.40	0.98	-1.47	0.42	2.10	3.02	-1.46	**K**
L	1.22	2.49	2.91	2.10	1.01	2.64	2.26	1.73	1.05	0.15	0.55	-1.71	-1.35	1.43	1.75	1.88	0.71	-1.66	1.42	2.07	0.10	2.15	**L**
M	-1.13	1.08	2.63	2.16	1.49	0.50	2.17	-1.27	0.76	0.48	0.40	-1.34	-1.36	0.15	1.07	2.64	2.19	1.43	2.38	1.36	0.54	2.00	**M**
N	0.44	-1.49	0.35	1.36	-2.01	0.91	0.81	0.40	-1.92	1.36	2.25	2.08	0.87	-1.80	-1.57	0.45	1.40	0.97	2.18	2.78	1.60	-1.33	**N**
O	1.41	-1.24	1.12	0.87	1.55	0.44	1.69	0.48	0.42	1.01	3.67	1.27	1.28	-1.71	-1.61	1.90	0.44	2.07	1.51	1.53	1.01	1.51	**O**
P		-1.54	1.06	1.66	0.83	0.17	-1.66	-1.75	0.95	1.68	2.84	1.79	1.07	1.14	-1.49	1.26	0.80	0.74	0.66	1.07	-1.56		**P**
Q		-1.30	1.13	-1.88	-1.42	-1.74	1.63	0.94	-1.44	0.45	1.06	2.38	1.41	2.03	1.67	1.57	1.36	-2.53	-1.76	1.06	-2.35		**Q**
R			-1.60	0.74	-1.83	-1.77	0.98	1.02	0.34	2.22	2.11	0.87	1.42	1.60	0.39	1.42	-1.63	-2.06	0.25	-2.11			**R**
S			-2.22	0.07	-1.37	0.88	1.77	0.72	0.78	0.78	0.77	0.96	0.51	0.46	0.48	2.13	1.30	-1.82	-2.65	1.09			**S**
T				-3.05	0.65	0.53	0.79	1.39	0.74	0.16	0.15	-1.30	1.95	1.44	2.04	2.51	0.60	0.22	-3.69				**T**
U					-2.14	-2.21	-1.40	0.95	1.97	1.17	0.46	1.31	1.00	1.13	0.60	1.77	-1.22	-1.89					**U**
V						-3.43	-2.55	0.51	2.39	2.52	1.73	2.92	2.80	2.47	0.94	-1.63	-2.75						**V**
W									0.43	-1.78	0.80	0.42	0.95	0.99									**W**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	

그림 8-17. Vapor-Weight Quality at the Channel Exit in the Wolsong-3 Reactor on 2002 December

3.4 이상유동 채널 후보군 선정 결과

가. 매월 이상유동 채널 후보군 자료

표 2-1 ~ 표 2-17은 상기 매월 계산된 채널 유량 및 건도 분포 자료를 근거로 이상유동이 발생하는 채널군을 분류하였는데, 저출력 채널에서는 채널출력이 4800 ~ 5300 kW 범위에서 열평형 채널출구 건도가 0.2% 이상으로 나타난 채널을 선택하였으며 고출력 채널에서는 채널출력, 채널 유량 및 열평형 채널출구 건도가 각각 6300 kW, 25.5 kg/s 및 0.2% 이상으로 나타난 채널을 선택하였다.

제 2장의 신연료 장전 일정표에 의하면 1개의 저출력 채널에 검사 핵연료가 장전될 것이며 이는 3개의 고유량/고출력 이상유동 채널에서 장전된 결과와 비교하기 위해서 계획하였다. 상기 분류 조건에 따라 선택된 저출력 이상유동 후보 채널군의 채널유량 범위는 표 2-1 ~ 표 2-17에서 보는바와 같이 17 ~ 21 kg/s 이다.

고유량/고출력 이상유동 채널의 선택은 실제적으로 24 kg/s 이상의 고유량 이상유동 핵연료채널에서 핵연료다발 마모량에 대한 정량적인 자료를 확보하기 위해 검사 신연료가 장전될 후보 채널군을 분류하는 것이다. 표 2-1 ~ 표 2-17에서 보는바와 같이 채널 유량 및 열평형 채널출구 건도가 각각 25.5 kg/s 및 0.2% 이상인 채널 대부분은 출력이 6500 kW 이상인 고출력 채널에서 발생함을 알 수 있다.

표 2-1. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 May

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D17	4983	18.13	1.96		F16	6598	25.67	0.53
K21	4881	17.96	1.65		H12	6563	25.85	0.30
L21	5071	19.62	0.63		J11	6656	25.60	0.68
S18	4928	18.91	0.88		N 7	6919	26.75	0.49
T 7	5289	20.56	0.44		Q12	6715	25.89	0.64
T17	4861	18.43	1.04					

표 2-2. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 July

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 7	4828	17.40	2.60		F14	6715	26.37	0.32
D 6	5119	17.65	3.31		H16	6785	25.78	0.95
D17	4982	18.19	1.89		M16	6824	26.76	0.40
E 5	4989	19.57	0.39		O16	6783	26.44	0.43
K 2	4843	17.77	1.83		P 7	6912	25.90	1.16
L21	5035	19.67	0.45		P11	6668	25.96	0.34
M 2	4995	19.61	0.25		P17	6782	25.91	0.89
					Q 7	6737	25.85	0.58

표 2-3. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 August

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D 6	4999	17.83	2.54		M16	6822	26.69	0.46
D17	4972	18.20	1.87		O 6	6992	25.62	1.67
E 5	5227	19.13	1.86		O16	6864	26.10	0.96
E18	5051	19.84	0.29		O18	6724	26.41	0.32
F 4	5222	18.90	2.08		P 7	6938	25.84	1.31
K 2	4853	17.76	1.90		P15	6937	26.53	0.84
L 2	5116	20.07	0.21		P16	6880	26.70	0.36
M 2	5068	19.48	0.69		P17	6844	25.66	1.30
T 7	5257	20.63	0.29		Q 7	6808	25.62	1.01
					Q16	6546	25.52	0.47

표 2-4. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 September

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D17	4897	18.28	1.43		H16	6793	25.64	1.11
E 5	5099	19.35	1.07		O 6	6780	26.20	0.53
F 4	5070	19.17	1.13		O16	6810	26.27	0.67
M 2	5028	19.53	0.47		O17	7022	26.07	1.28
Q20	4871	18.21	1.67		O18	6898	25.85	1.31
R19	5064	19.66	0.92		P 7	6740	26.39	0.25
T 7	5294	20.51	0.55		P15	6925	26.53	0.81
					P17	6817	25.70	1.19
					P18	6648	25.93	0.26
					Q 7	6710	25.85	0.52
					R11	6742	26.07	0.50

표 2-5. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 October

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
E 5	5081	19.34	1.04		E15	6538	25.75	0.35
F 4	4942	19.36	0.43		F16	6510	25.73	0.27
F19	5039	19.13	0.98		G16	6650	25.99	0.27
N 2	5047	18.51	1.70		H17	6712	25.70	0.65
O 2	4802	17.34	2.15		N 6	6951	26.41	0.86
					N15	6994	26.61	1.04
					N16	7081	26.03	1.53
					N17	7030	26.16	1.44
					O 6	6736	26.25	0.39
					O15	6986	26.36	0.97
					O16	6833	26.13	0.88
					O18	6742	26.3	0.49
					P 6	6683	26.06	0.37
					P12	6680	25.84	0.43
					P15	6853	26.76	0.44
					Q11	6712	25.74	0.67

표 2-6. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 November

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	5223	20.15	1.00		E 8	6542	25.63	0.34
D 6	4935	17.87	2.24		H 7	6675	25.94	0.43
F19	4998	19.22	0.74		H12	6601	25.56	0.74
G20	4848	17.62	2.02		H17	6715	25.71	0.68
K21	4976	17.47	2.79		K19	6585	25.58	0.47
N 2	5173	18.27	2.59		N16	6855	26.73	0.31
O 2	4933	17.13	3.08		N17	6871	26.64	0.61
R 4	4963	19.62	0.42		P16	6854	25.98	0.91
S 5	4835	18.96	0.39		P17	6725	25.89	0.80
					Q12	6701	25.74	0.80

표 2-7. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2001 December

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	5152	20.26	0.63		G 7	6600	25.97	0.25
D 6	4996	17.73	2.71		G12	6608	25.95	0.30
K21	4863	17.60	2.11		H12	6608	25.51	0.80
L21	5020	19.58	0.55		H13	6808	26.00	0.71
N 2	4922	18.72	0.97		H14	6759	26.52	0.32
P20	5292	20.71	0.51		K19	6528	25.65	0.24
R 4	4985	19.57	0.57		L16	6909	26.69	0.60
S 5	5137	18.43	2.32		M16	6826	26.56	0.63
T 6	5072	17.92	2.57		N17	6796	26.82	0.25
U 8	5078	19.98	0.40		O16	6817	26.10	0.87
					P11	6666	25.75	0.57
					P16	6804	26.08	0.67
					P17	6812	25.64	1.27
					Q12	6658	25.82	0.6

표 2-8. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 January

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D 6	4867	17.93	1.91		F11	6574	25.78	0.41
D17	4846	17.89	1.76		G11	6707	25.73	0.91
E18	4939	19.48	0.29		H10	6716	26.29	0.33
G 3	4963	17.42	2.94		H16	6629	26.03	0.38
J 2	4938	16.06	4.88		J11	6526	25.67	0.35
K 2	5119	17.25	3.91		J12	6546	25.51	0.43
K21	4923	17.46	2.60		L19	6694	26.41	0.44
L21	5210	19.19	1.80		O13	6750	25.89	0.67
M 2	5135	19.20	1.37		O14	6719	26.47	0.32
M21	5050	19.30	0.80		O16	6760	26.27	0.60
N 2	4887	18.72	0.86		O18	6690	26.34	0.36
P 3	5292	20.71	0.63		P11	6639	25.82	0.47
Q 3	4865	17.95	1.88		P14	6810	26.69	0.21
R 4	4988	19.51	0.69		P15	6858	26.63	0.6
S 5	5072	18.48	2.02		P16	6739	26.17	0.44
T 6	5039	17.92	2.46		P17	6667	26.02	0.54

표 2-9. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 February

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D17	4974	17.67	2.63		F16	6504	25.58	0.44
E18	5108	19.10	1.40		H11	6517	25.61	0.38
G 3	4850	17.57	2.22		H17	6670	25.62	0.65
H 3	5269	20.30	0.74		J17	6722	26.61	0.28
H20	5221	20.43	0.53		O 6	6694	26.20	0.37
K 2	4948	17.49	2.78		O14	6697	26.47	0.27
M 2	5038	19.38	0.76		O16	6765	26.19	0.69
R19	4910	19.83	0.23		O18	6800	25.91	1.05
S 5	4844	18.83	0.63		P15	6842	26.61	0.59
T 6	4888	18.14	1.51		P17	6620	26.08	0.37

표 2-10. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 March

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D17	4889	17.81	2.08		E 8	6508	25.53	0.40
E18	4984	19.35	0.62		F 7	6489	25.51	0.35
K 2	4923	17.51	2.66		M10	6667	25.80	0.64
L 2	5083	19.35	1.01		N10	6651	25.80	0.56
M 2	5035	19.37	0.79		N14	6771	26.45	0.33
R 4	4898	19.64	0.22		N15	6925	26.63	0.89
T 7	5243	20.45	0.54		N16	6999	26.06	1.33
					N17	6975	26.10	1.40
					O 5	6738	26.03	0.67
					O 6	6844	25.73	1.24
					O14	6770	26.23	0.68
					O15	6994	26.14	1.25
					O16	6809	25.98	1.00
					P 6	6738	25.61	1.01
					P13	6657	26.29	0.27
					P15	6906	26.35	0.99
					Q11	6634	25.71	0.57
					R12	6635	26.03	0.24

표 2-11. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 April

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	5151	20.14	0.82		G 8	6772	26.46	0.40
C16	4859	17.29	2.98		H12	6515	25.58	0.55
D17	4857	17.84	1.92		J10	6758	26.06	0.74
E18	4916	19.48	0.24		K10	6733	26.04	0.70
L 2	5000	19.48	0.55		L 9	6687	26.49	0.26
R19	4935	19.73	0.47		M 7	6866	26.21	0.99
					M10	6619	25.88	0.46
					N 6	6911	26.23	1.02
					N 7	6874	26.40	0.81
					N16	6795	26.65	0.28
					N17	6849	26.48	0.75
					O10	6701	25.99	0.60
					O17	6773	25.82	0.86
					P13	6740	26.05	0.75
					Q11	6672	25.58	0.80
					Q13	6772	26.56	0.26
					R13	6723	25.91	0.81

표 2-12. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 May

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	5119	20.17	0.69		F14	6644	26.16	0.44
E 5	5180	18.98	2.02		G12	6685	25.54	0.95
F 4	4998	19.06	1.13		G13	6704	26.33	0.43
L 2	4940	19.57	0.23		H 7	6609	25.84	0.42
N 2	4871	18.65	0.93		H10	6665	26.27	0.28
P20	5217	20.73	0.27		H13	6806	25.74	0.99
					J10	6830	25.78	1.21
					K 9	6776	26.16	0.70
					K10	6842	25.67	1.36
					M 7	6743	26.54	0.38
					M16	6760	26.53	0.54
					N10	6625	25.80	0.52
					N17	6758	26.73	0.30
					O 7	6695	26.21	0.40
					O16	6881	25.74	1.46
					P13	6631	26.33	0.21
					P16	6922	25.53	1.58
					Q11	6556	25.83	0.27
					Q13	6831	26.38	0.59
					Q14	6775	26.27	0.66
					Q15	6817	26.36	0.55
					R10	6628	26.13	0.24
					R13	6659	26.13	0.44

표 2-13. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 July

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	4979	20.05	0.36		E10	6678	26.54	0.21
D 6	5023	17.36	3.53		F10	6654	26.43	0.25
E 5	4925	19.19	0.80		F14	6596	25.93	0.54
F 4	4821	19.14	0.40		G13	6766	25.72	1.18
H 3	5160	20.05	0.72		G14	6762	26.28	0.50
K21	4915	17.26	2.93		H10	6729	25.55	1.13
L21	5174	18.94	2.08		H13	6659	25.92	0.46
M21	5069	18.99	1.33		H14	6668	26.19	0.47
N 2	5045	17.97	2.62		H15	6810	26.76	0.23
P20	5275	20.45	0.83		J10	6607	25.83	0.58
R 4	4924	19.18	0.93		K 9	6618	25.99	0.46
					L 6	6736	26.42	0.47
					L 7	6707	26.62	0.35
					L19	6646	25.99	0.76
					M16	6724	26.28	0.71
					M17	6825	26.74	0.43
					O 7	6631	25.79	0.64
					O13	6629	25.81	0.48
					O14	6606	26.26	0.29
					O16	6696	25.93	0.81
					O18	6727	25.67	1.14
					P 8	6894	25.65	1.57
					P 9	6701	26.36	0.40
					P10	6560	25.79	0.39
					P12	6564	25.60	0.43
					P14	6815	26.24	0.68
					P15	6849	26.09	1.16
					P16	6664	25.96	0.48
					Q 8	6721	26.16	0.62
					Q14	6763	25.89	1.01
					Q15	6804	26.03	0.83

표 2-14. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 August

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
D 6	4982	17.45	3.25		F 8	6696	26.68	0.22
D17	5001	17.42	3.23		G 7	6546	25.53	0.66
E 5	4939	19.19	0.89		G11	6461	25.80	0.29
F 4	4944	18.92	1.18		H 7	6440	25.64	0.21
H 3	5231	19.83	1.29		H 8	6831	26.58	0.61
L21	4948	19.37	0.69		H15	6838	26.64	0.44
M21	5085	18.94	1.49		J 8	6717	26.69	0.27
P20	5212	20.51	0.56		J17	6685	26.24	0.61
T16	5158	20.25	0.42		K13	6654	25.82	0.61
					K14	6640	26.20	0.49
					M13	6545	25.63	0.42
					N14	6668	26.30	0.26
					N15	6755	26.65	0.53
					O 5	6565	25.80	0.50
					O 7	6533	25.98	0.24
					O14	6810	25.66	1.43
					O15	6872	26.04	1.08
					O16	6745	25.73	1.16
					O18	6658	25.84	0.84
					P 8	6895	25.57	1.68
					P11	6480	25.69	0.29
					P15	6920	25.88	1.58
					Q 8	6687	26.29	0.45
					Q 9	6676	25.83	0.75
					Q15	6709	26.31	0.35
					R 8	6685	25.68	0.89
					R 9	6617	26.14	0.36
					R10	6558	25.66	0.54
					R11	6586	25.74	0.59
					R15	6626	26.26	0.33

표 2-15. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 September

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	5017	19.94	0.70		F12	6484	25.61	0.56
D 6	4840	17.71	2.27		G10	6620	25.79	0.67
D17	4824	17.66	2.10		G11	6561	25.61	0.76
E18	4848	19.34	0.22		G16	6549	25.60	0.49
H 3	5129	20.06	0.67		H 9	6650	25.84	0.69
H20	5096	20.47	0.21		H16	6614	25.56	0.91
L21	4891	19.53	0.32		J 7	6724	26.67	0.34
M21	5138	18.80	1.89		J17	6661	26.39	0.45
N21	5041	18.24	2.41		K 7	6690	26.32	0.49
P20	5143	20.60	0.22		K14	6660	26.24	0.54
T 7	5170	20.30	0.59		K16	6775	26.57	0.62
					L13	6517	25.79	0.45
					L17	6855	26.39	0.99
					M17	6815	26.68	0.50
					M19	6565	26.03	0.22
					N 6	6766	25.87	1.07
					N15	6817	26.58	0.79
					N16	6999	25.57	1.89
					N17	7001	25.69	2.02
					O 5	6600	25.63	0.78
					O 9	6648	25.76	0.80
					O10	6540	26.02	0.24
					O14	6644	26.23	0.48
					O15	6894	25.93	1.26
					O16	6702	25.99	0.84
					O18	6578	26.21	0.33
					P 8	6805	25.80	1.24
					P15	6815	26.26	0.98
					Q 9	6737	25.60	1.17
					Q10	6722	26.29	0.57
					R 8	6603	25.96	0.45
					R 9	6713	25.88	0.86
					R10	6497	25.81	0.27
					R11	6552	25.88	0.38
					R12	6633	25.59	0.71
					R13	6583	26.03	0.42
					R15	6688	26.18	0.60
					S 9	6547	25.91	0.34

표 2-16. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 November

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	4970	19.98	0.46		F 9	6558	25.57	0.70
C15	5207	19.92	1.60		F14	6667	25.68	1.05
E 5	4943	19.18	0.95		G 8	6650	25.97	0.61
E18	5040	18.90	1.50		G12	6508	25.56	0.50
F 4	4892	19.04	0.87		G13	6580	26.33	0.24
F19	5139	18.46	2.42		H10	6619	25.95	0.53
H20	5132	20.33	0.51		H13	6642	25.78	0.58
L 2	4993	18.99	1.25		J 6	6571	26.12	0.31
M 2	4856	19.39	0.25		K 6	6606	26.39	0.21
N21	4835	18.55	1.17		K 9	6710	25.54	1.18
					K10	6720	25.56	1.22
					K17	6618	26.23	0.21
					L 7	6770	26.49	0.71
					L 9	6686	26.03	0.78
					L14	6609	26.12	0.32
					L16	6766	26.38	0.61
					L19	6771	25.69	1.49
					M 7	6775	25.66	1.35
					M 9	6773	26.72	0.43
					M10	6565	25.57	0.72
					M15	6745	26.61	0.33
					M16	6795	26.05	1.20
					M18	6870	27.43	0.32
					N 6	6687	26.11	0.63
					N 7	6803	26.12	1.00
					N 8	6716	26.34	0.61
					N17	6792	26.21	0.97
					O 8	6766	26.34	0.70
					O 9	6572	25.93	0.42
					O10	6633	25.72	0.79
					O16	6755	25.73	1.26
					O17	6590	25.85	0.41
					O18	6744	25.64	1.32
					P16	6680	25.69	0.81
					P17	6572	25.79	0.67
					Q13	6689	26.27	0.37
					R13	6540	26.10	0.27
					S 9	6523	25.93	0.24

표 2-17. The Two Phase Flow Channel Choice Groups Based on the Wolsong-3 Reactor Operating Data on 2002 December

Low Power Channel					High Power Channel			
CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)		CH_NAME	POWER (kW)	CH_FLOW (kg/s)	X_exit (%)
C 8	4965	19.95	0.52		E10	6720	26.06	0.83
E 5	4872	19.24	0.65		F14	6607	25.88	0.76
E18	4837	19.30	0.25		G 8	6606	26.03	0.48
F 4	4906	18.94	1.08		G 9	6628	26.44	0.25
F19	4928	18.89	1.05		G13	6767	25.67	1.37
H 3	5133	19.97	0.83		G14	6819	25.85	1.12
K 2	4831	17.33	2.74		H10	6545	26.05	0.29
L 2	5024	18.89	1.54		H14	6821	25.62	1.54
U 9	5244	20.24	0.97		H15	6918	26.13	1.14
					J 6	6676	25.76	0.96
					J10	6572	25.70	0.70
					J14	6812	26.20	0.86
					J15	6906	26.46	1.20
					J16	6782	26.38	0.64
					K 6	6649	26.15	0.58
					K 9	6666	25.59	1.06
					K10	6605	25.80	0.73
					L 4	6634	25.53	1.14
					L 6	6908	25.65	1.74
					L 7	6849	26.12	1.29
					L 8	6723	26.44	0.61
					L14	6586	26.17	0.24
					L15	6796	26.74	0.70
					L16	6812	26.26	0.88
					L19	6549	26.26	0.40
					M 4	6674	25.57	1.15
					M 5	6810	27.04	0.37
					M 7	6713	25.75	1.14
					M16	6883	25.80	1.73
					M17	6910	26.29	1.14
					M18	6863	27.40	0.36
					N17	6658	26.60	0.32
					O 5	6530	25.75	0.52
					O 7	6574	25.73	0.64
					O16	6656	25.95	0.82
					O18	6682	25.76	1.08
					P10	6553	25.60	0.65
					Q13	6664	26.33	0.27
					Q14	6723	25.97	0.97
					Q15	6722	26.12	0.60
					R13	6534	26.09	0.32
					R14	6647	25.95	0.50

나. 평가대상 후보 이상유동 채널 선정

표 2-1 ~ 표 2-17의 매월 이상유동 발생 채널군 자료를 근거로 각 채널에서 이상유동이 발생하는 빈도를 조사하였는데 그림 9와 그림 10은 각각 고출력 채널 및 저출력 채널의 이상유동 발생 빈도를 보여주고 있다. 두 그림들을 비교하면 이상유동 발생 채널 중에서 저출력 채널이 고출력 채널보다 이상유동 발생 빈도가 높은 것을 알 수 있다. 이는 앞서 기술된 바와 같이 선택된 저출력 채널의 출력 범위가 비록 고출력 채널보다 낮지만 채널 유량이 상대적으로 고출력보다 현격히 낮은 17 ~ 21 kg/s 범위이기 때문에 이상유동 발생 빈도가 높다.

그림 9와 그림 10의 이상유동 발생 빈도 자료를 근거로 표 3에 보는바와 같이 저출력 채널에서 D17 외 10개 채널과 고출력 채널에서 O16 외 30개 채널을 후보 채널로 제시하였다. 앞서 2.5항 세부일정표에 따라 36개 KNFC 신연료 다발을 장전 전에 정밀제원측정 한 후 월성 3호기 정상핵연료교체 시기와 표 3에 제시된 후보 채널이 일치하는 1개의 저출력 채널과 고출력 채널에 검사핵연료가 장전될 것이다.

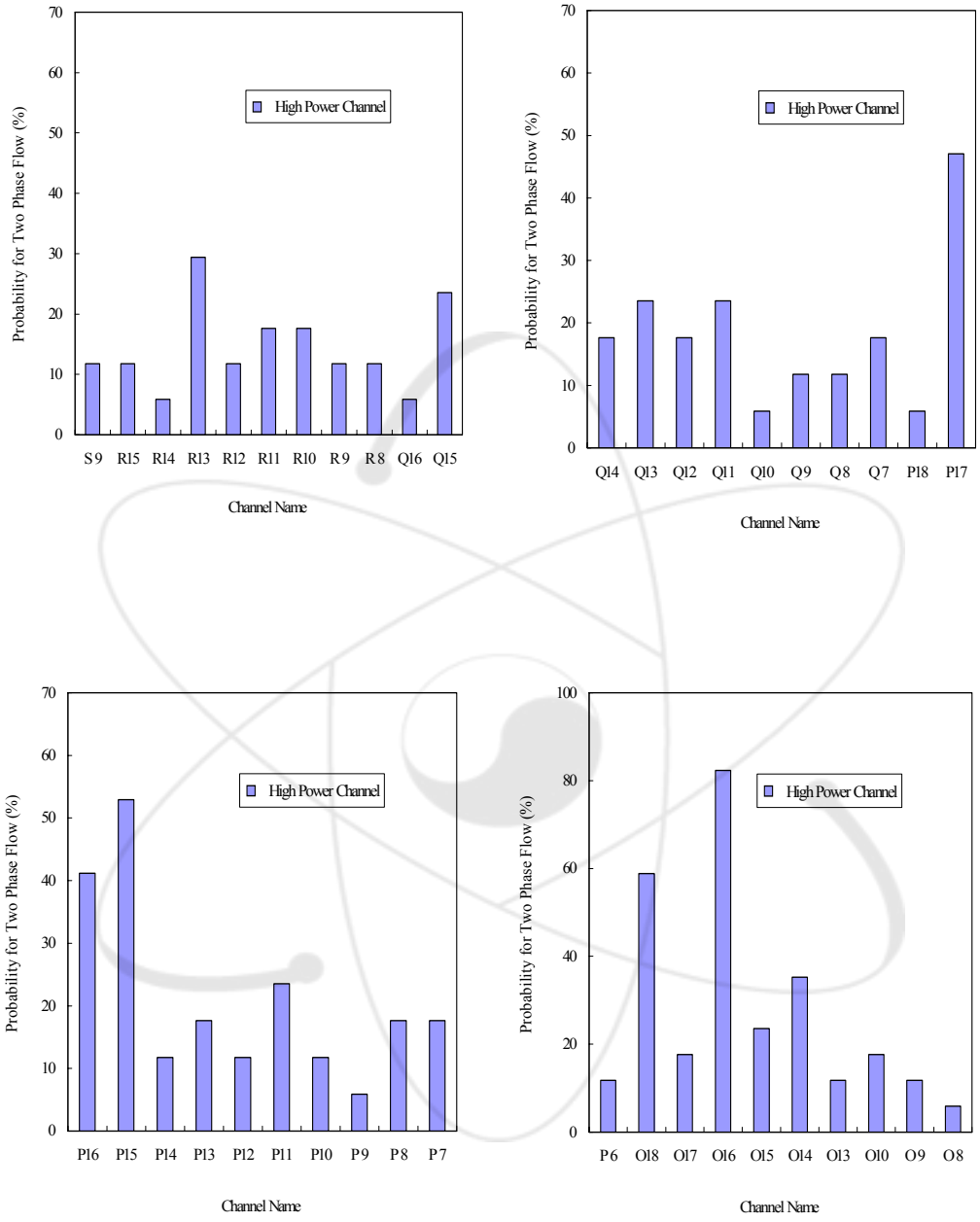


그림 9. The Probability for Two Phase Flow in the High Power Channels (Continued)

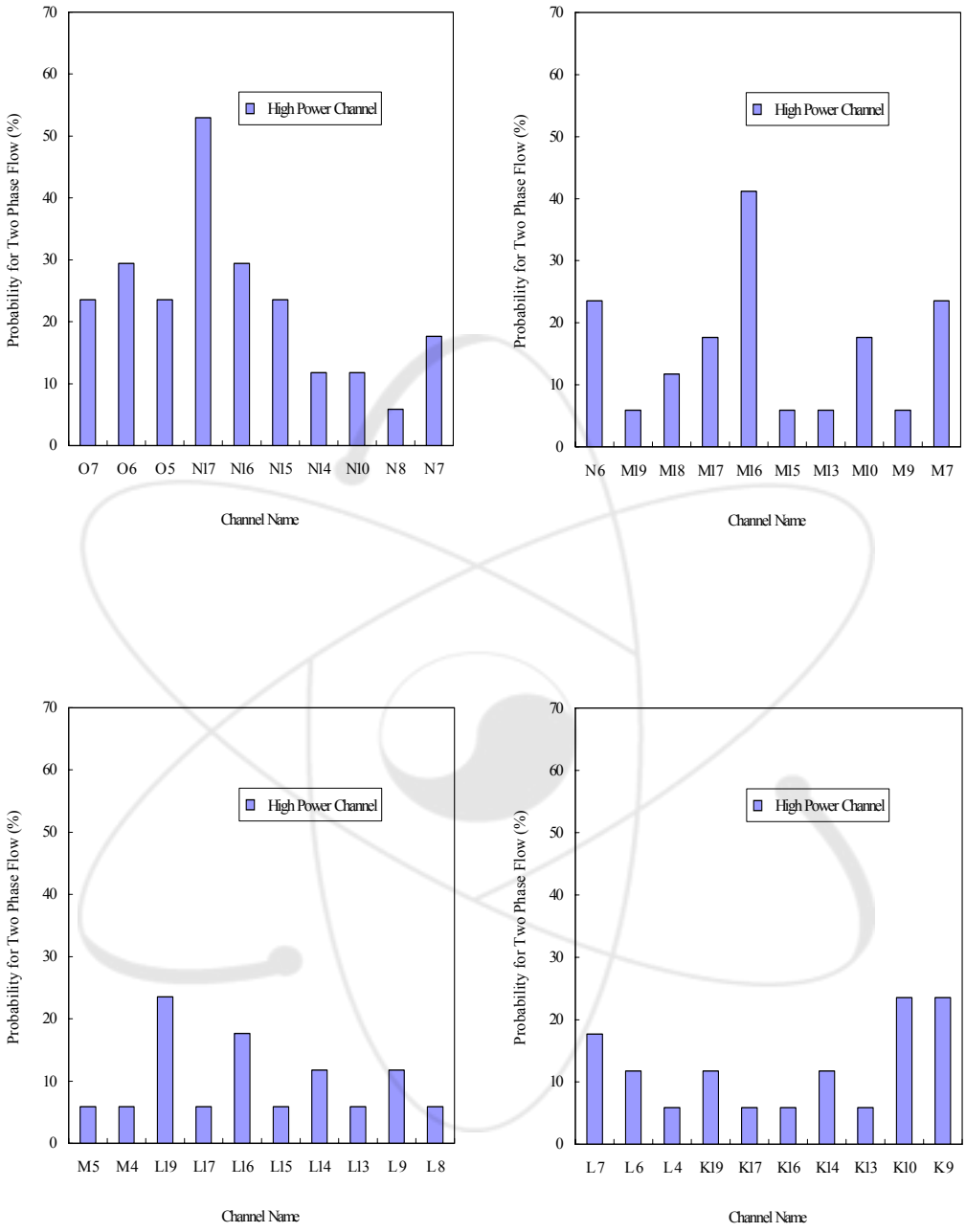


그림 9. The Probability for Two Phase Flow in the High Power Channels (Continued)

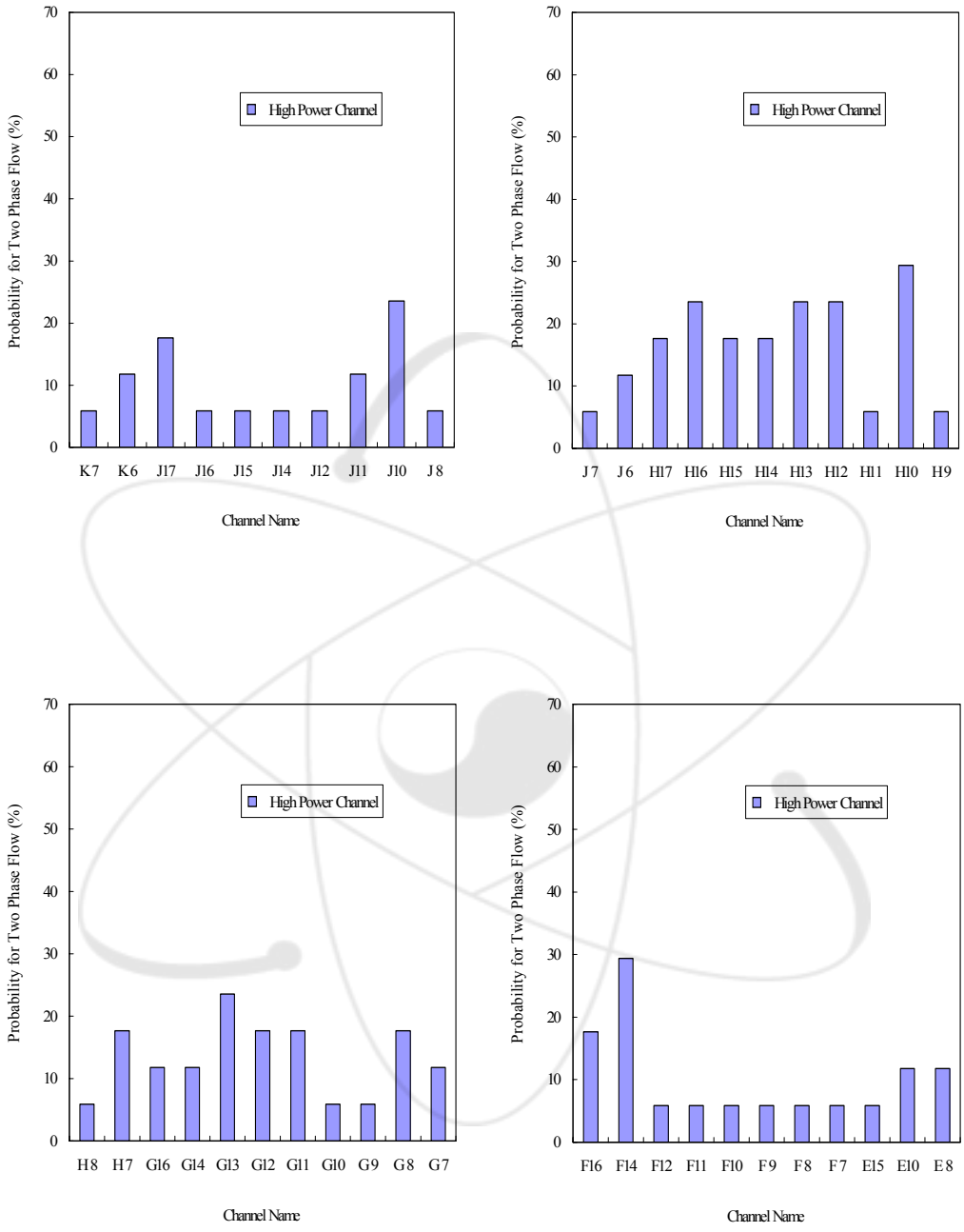


그림 9. The Probability for Two Phase Flow in the High Power Channels

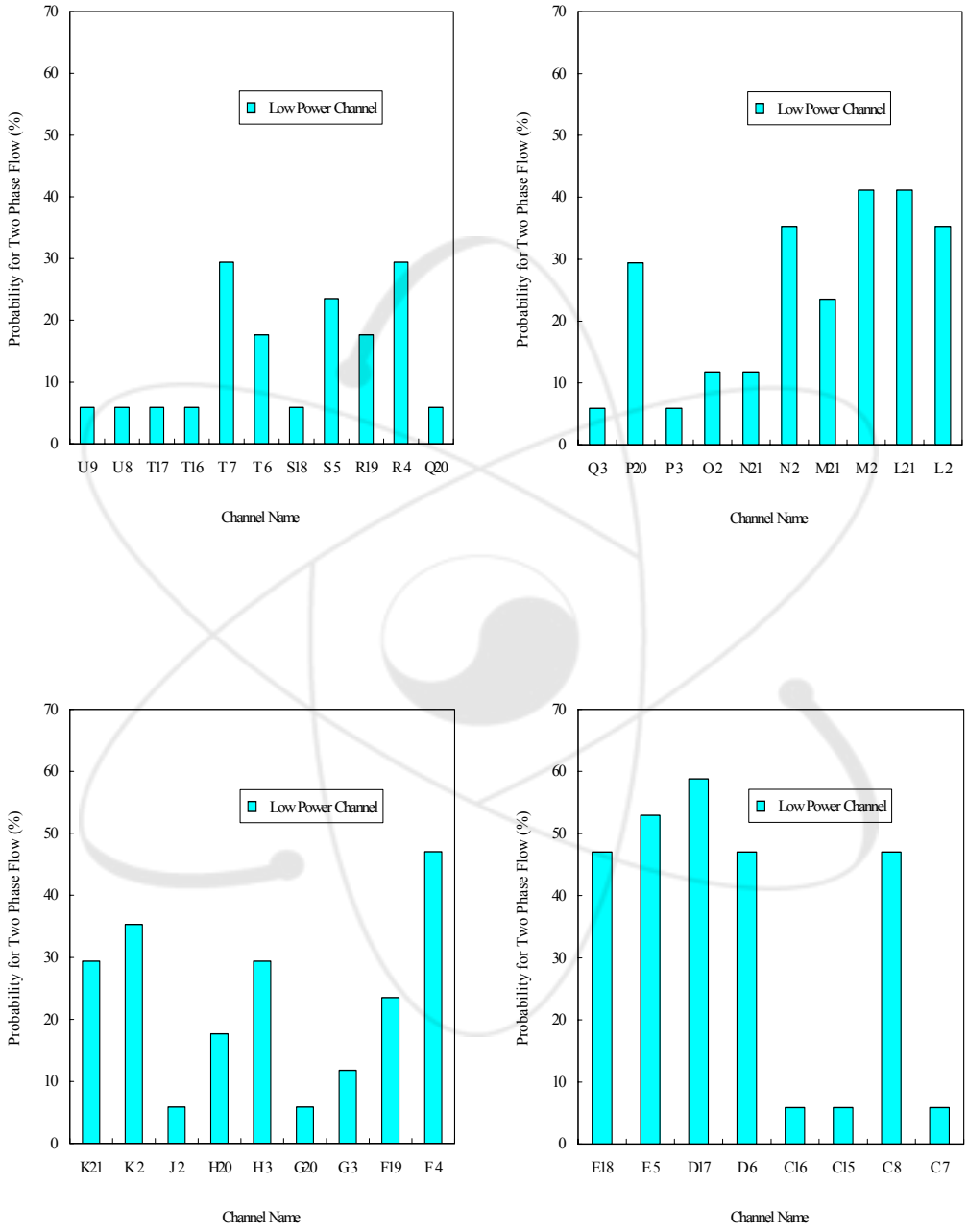


그림 10. The Probability for Two Phase Flow in the Low Power Channels

표 3. The Choice Groups for Two Phase Flow Channel in the Wolsong-3 Reactor

Low Power Channel	High Power Channel
D17, E 5, F 4, E18, D 6, C 8, M 2, L21, N 2, L 2, K 2	O16, O18, P15, N17, P17, P16, M16, O14, R13, O 6, N16, H10, F14, Q15, Q13, Q11, P11, O15, O 7, O 5, N15, N 6, M 7, L19, K10, K 9, J10, H16, H13, H12, G13

4. 결론

- 월성 3호기 이상유동 채널의 핵연료다발 정밀제원 측정 업무를 효율적으로 수행하기 위해 KNFC 신연료 장전 전후 검사, 후보 평가 대상 채널 선정, 방출된 검사연료의 저장 관리 등에 대한 세부 일정표를 작성하였다.
- 월성 3호기 운전 자료를 바탕으로 유동 분석을 수행하여 D17 외 10개 저출력 채널과 O16 외 30개 고출력 채널을 평가대상 후보 채널로 제시하였다.
- 본 보고서에 제시된 상기 결과에 따라 2004년 7월 27일 현재 다음과 같은 업무가 수행 완료되었다.

* 한전원전연료(주) 핵연료저장고에서 2004년 2월 19일~2004년 3월 4일 기간 동안 신연료 36다발(S/N: B400892~B400927)에 대한 월성 3호기 핵연료장전 전 제원측정을 수행하여 핵연료봉 및 지지체 Profile, 봉단접합판 Profile, 핵연료다발 직경 및 길이 등에 대한 자료를 확보하였다.
* 2004년 4월 22일에 상기 KNFC 검사 신연료를 표 3의 후보 채널 중에서 3개 고출력 채널(Q15, O7, G13) 및 1개 저출력 채널(D6)에 각각 8개씩 총 32개 다발을 장전하였고, 이때 방출된 조사후 핵연료다발중 11, 12번째 위치한 8개 다발을 Reception Bay N-309 트레이에 보관중이다.

참고문헌

[1] M.R. Soulard, “NUCIRC-MOD2.000 User's Manual”, TTR-422, March 1997

[2] 전지수, 석호천, 박주환, "크립된 압력관에서 CANFLEX-NU 다발의 Water CHF 시험", 2000 한국원자력학회 춘계학술발표회 논문집, 2000.5.26

[3] 전지수, 석호천, 박주환, "CANFLEX-NU 핵연료다발의 Water CHF 시험 자료 분석", 2000 한국원자력학회 춘계학술발표회 논문집, 2000.5.26

서 지 정 보 양 식

수행기관보고서번호	위탁기관보고서번호	표준보고서번호	INIS 주제코드
KAERI/TR-2796/2004			

제 목 / 부 제	월성 3호기 이상유동 채널 핵연료의 건전성 평가를 위한 후보 평가대상 채널 선정
연구책임자 및 부서명 (AR,TR등의 경우 주저자)	전 지 수 (이상유동 핵연료관 건전성 평가 기술 개발 과제)
연 구 자 및 부 서 명	조 문 성 (이상유동 핵연료관 건전성 평가 기술 개발 과제)

출 판 지	대전	발행기관	한국원자력연구소	발행년	2004.7
페 이 지	87 p.	도 표	있음(0), 없음( )	크 기	26 Cm.
참고사항					
비밀여부	공개(0), 대외비( ), __ 급비밀		보고서종류	기술보고서	
연구위탁기관			계약 번호		

초록 (15-20줄내외)

본 보고서는 중수로 원자로에서 이상유동 채널의 핵연료 건전성을 평가하기 위해 월성 3호기 후보 평가대상 채널군을 선정하였다.

먼저, 월성 3호기 CIGAR 작업 일정을 고려하여 KNFC 신연료의 입고전 검사, 신연료 장전, 방출 연료의 저장, 육안 검사 및 제원 측정 계획 등과 같은 세부 업무 일정표를 작성하였다. 이 일정표에 의하면 검사 신연료를 장전하기 앞서 이상유동을 갖는 후보 평가대상 채널군을 제안할 필요가 있다. 후보 평가대상 채널 선정을 위해 2001년 5월부터 2002년 12월까지 매월 1회 측정된 월성 3호기 운전 자료를 NUCIRC 전산코드에 적용하여 채널 유량 및 채널 출구 건도 분포를 계산하였다. 매월 계산된 자료에서 채널출구 건도가 0.2% 이상이고 채널출력과 유량이 각각 6300 kW 및 25.5 kg/s 보다 큰 고출력 후보 채널과 채널출력이 4800 kW 보다 크고 5300 kW 보다 작은 저출력 후보 채널을 분류하였다. 이들 후보 채널군 자료를 바탕으로 발생 빈도가 많은 채널 순서대로 분류하여 고출력 채널에서는 O16 채널 외 30개 채널과 저출력 채널에서는 D17 채널 외 10개 채널을 후보 평가대상 채널군으로 제안하였다.

주제명키워드 (10단어내외)

중수로 원자로, 이상유동 채널, 핵연료 건전성, 육안 검사 및 제원 측정 계획, 채널 출구 건도 분포, 후보 평가대상 채널군

BIBLIOGRAPHIC INFORMATION SHEET

Performing Org. Report No.	Sponsoring Org. Report No.	Stamdard Report No.	INIS Subject Code
KAERI/TR-2796/2004			

Title / Subtitle	The test channel groups in the Wolsong-3 reactor for the evaluation of PHWR fuel integrity in the two phase flow condition
Main Author	Jun, Ji-Su (Future Reactor & Fuel Development Department)
Researcher and Department	Cho, Moon Sung (Future Reactor & Fuel Development Department)

Publication Place	Daejeon	Publisher	KAERI	Publication Date	2004.7
Page	87 p.	Fig. & Tab.	Yes(o), No ( )	Size	26 Cm.
Note					

Classified	Open(o), Restricted(), ___ Class Document	Report Type	Technical Report
Sponsoring Org.		Contract No.	

Abstract(15-20 Lines)

This report intends to select the test channel groups in the Wolsong-3 reactor for the evaluation of PHWR fuel integrity in the two phase flow condition.

First, a detailed work schedule for fuel inspection, fuel loading, storage of the discharged fuel, and in-bay visual and dimensional examination was established on the CIGAR work plan of the Wolsong-3 reactor. According to the schedule, it is necessary to suggest the appropriate test channel groups with two phase flow before the new fuel loading. For the selection of the test channel groups, the distributions of the channel flow rate and the channel exit quality are calculated by the NUCIRC code with the monthly measured operation data of the Wolsong-3 reactor during May 2001 to December 2002. The monthly calculated data could sort out the channels with the channel exit quality greater than 0.2%, in the high power channels with the power higher than 6300 kW and the flow rate greater than 25.5 kg/s, and in the low power channels with the power higher than 4800 kW and less than 5300 kW. Based on the frequency rank of these sorted channels, O16 channel with thirty other channels in the high power region and D17 channel with ten other channels in the low power region are suggested as the test channel groups.

Subject Keywords (About 10 words)

PHWR, two phase flow condition, fuel integrity, in-bay visual and dimensional examination plans, channel exit quality, the test channel groups