ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT

NUCLEAR ENERGY AGENCY

RESTRICTED

Paris, drafted: 26 August 1988

dist.: 31th August 1988

Working Document (88)19

English text only

STEERING COMMITTEE FOR NUCLEAR ENERGY

COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

Principal Working Group No. 3: Primary Circuit Integrity

Workshop on Complementary Roles of Fracture Mechanics and NDE in Safety Assessments of Components Wuerenlingen/Villigen, Switzerland, 3-5 October 1988

Information for Participants

1. Programme

-- The revised programme outline with allocations of contributions to sessions is given as Attachement 1. Keynote addresses are allocated 30 min. (40 mins for Session 3) with 20 min. discussion. Other contributions are allocated up to 20 min. or 25 min. for practical case studies. These times include about 10 min. for discussion. Some flexibiliy in programming the presentations and discussions will be retained to take full advantage of the workshop format.

-- The workshop will be held in the Auditorium of the PSI-West, 5234 Villigen. PSI-West is separated from PSI-Ost (former EIR), 5303 Wuerenlingen, by the Aare river (see Maps Attachment 2). A reception desk for registration and general information will open in the entrance hall to the Auditorium at 08.30 on 3rd October.

-- The workshop will start at 09.30 on 3rd of October 1988 and will close at 12.30 on the 5th October 1988. It will start at 09.00 on the 2nd and 3rd day.

-- On all three days, lunches will be taken in the Canteen of "PSI-Ost" (about 5 minutes walk from the Auditorium) between 12.30 - 14.00. A coffee break will be taken during sessions.

-- The two hotels being used in Zurzach are adjacent. Bus transportation to the workshop-location will depart from the Park-Hotel at 8.15 a.m. each day and return at the end of the days activities (after the get-together on Monday, dinner on Tuesday and lunch on Wednesday).

-- A short get-together with refreshments will be offered by the Swiss Federal Nuclear Safety Inspectorate (HSK) on Monday evening after the afternoon session, between 18.00 - 19.00 at the Canteen of PSI-Ost.

-- A dinner offered by the Nordostschweizerische Kraftwerke AG (NOK) and the Swiss Federal Nuclear Safety Inspectorate (HSK) will be given at the "Schloss-Böttstein-Landgasthof" on Tuesday evening starting at approximately 18.30. Participants will be conveyed from the workshop location after the afternoon session. Persons accompanying participants are also invited and will be collected at the hotels at 18.00. No formal dress is required.

2. Travel information

Zurzach is a small resort on the banks of the Rhine river in the Canton of Aargau and is located about 15 km north of Baden and about 35 km north-west of Zürich (See Maps, attachment 2). It can be reached easily by train from Zürich and Zürich Airport and by car from the Autoroute network. The Park and Zurzacherhof Hotels are nearby the railway station.

(a) When arriving by PLANE at Zürich-Airport.

Take the train to Zürich-Hauptbahnhof and then proceed according to (b). Trains leave 4 to 5 times every hour from the Airport to Zürich-Hauptbahnhof and vice versa. The travel time is about 10 minutes.

(b) When arriving by TRAIN at Zürich-Hauptbahnhof (Main station).

(i) There are twice daily direct trains between Zürich and Zurzach. The socalled "Bade-Zug" (Bath-Train), leaves Zürich-Hauptbahnhof at 08.00 a.m. and 13.02 p.m. (travel time 35 min). Return trains depart from Zurzach at 10.51 a.m. and 16.42 p.m.

(ii) Take the train to Zurzach via Baden with a train change in Baden. Trains leave Zürich Hauptbahnhof every hour on the hour for Baden. The interchange time at Baden is 5 min. The total travel time is about 1 hour. Return trains depart Zurzach at 4 min. or 8 min. after the hour.

(iii) Take the train to Zurzach via Bülach with a train change in Bülach. Trains leave Zürich-Hauptbahnhof every hour at 15 minutes past the hour. The interchange time in Bülach is about 15 min. Total travel time is about 1 hour 15 min. Return trains depart Zurzach at 29 min. after the hour.

Note: For participants proceeding to Stuttgart for the MPA Seminar on 6-7 October or the CSNI Steam Generator Integrity Workshop on 7th October trains leave Zürich-Hauptbahnhof at 07.00, 09.30, 13.13, 15.13, 18.13 and 19.13 each day. Travel time 3 hours 15 min.

(c) When going by CAR to Zurzach

(i) On the Autoroute Zürich to Bern. Leave the Autoroute at the Baden outlet. Before reaching the centre of Baden take the turn to Wettingen, crossing the Aare River and immediately after take the left hand road in direction Koblenz and Zurzach. Follow signs for Zurzach through Tegerfelden.

(ii) From Basel take Autoroute in direction Schaffhausen. Leave the Autoroute at the Schaffhausen - Zurzach outlet. Follow signs for Zurzach.

Attachment 1

Programme Outline with Allocations of Contributions to Sessions

Monday 3rd October

Opening 0900

Session 1: Overview 0940-1230

1.1 Introductory invited lecture on the general philosophy and basis of component safety assessment; objectives and problems.

A paper by C.Z. Serpan Jr., A. Taboada and C.Y. Chang; USNRC, USA

1.2 Views on the adequacy of current safety assessment practices, including their philosophy and bases (FM, NDE, ISI, etc.) as expressed by various user groups (FM- and NDE-practitioners, manufacturers, utilities and licensing authorities).

- A New French Code for Inservice Surveillance-RSEM
  (Règles de Surveillance d'Equipement Mecaniques)
  R. Noel, J.P. Hutin; EDF-SPT, France

- French Approach on the Definition of Reference Defects to be considered for Fracture Mechanics Analyses at Design Stage
  J.M. Grandemange, A. Pellisier-Tanon; Framatome, France

- The Use of Fracture Mechanics for the Evaluation of NDE Flaw Acceptance Standards
  A. Alicino, E. Capurro; Ansaldo Sp.a.; A. Corri; Universita di Ancona; S. Reale; Universita di Firenze, Italy

- Use of Probabilistic Methods for Estimating Failure Probabilities and Directing ISI-Efforts
  F. Nilsson; University of Uppsala, Sweden

- Probability of Crack-Initiation
  G. Prantl; HSK, Switzerland

Session 2: Capabilities and limitations of FM-methods 1400-1650

2.1 Introductory invited lecture on the state-of-the-art of FM-methods for safety assessments.

A paper by Prof F.M. Burdekin; UMIST, U.K.

2.2 Views on the capabilities and limitations of FM-methods for safety assessments and factors which influence them.

- A New Fracture Mechanics Approach for Defining Defect Acceptance Standards for Inservice Inspection
  J. Heliot; Framatome; H. Chevanne, J. Grandemange, B. Barthelet; E.D.F., France

- Opening State of Underclad or In-Clad Defects Revealed by Elastoplastic Computation of their Behaviour since their Generation during Manufacturing
  A. Pellisier-Tanon, J.C. Devaux, J. Vagner; Framatome, France

- A Finite Element Study of a Nozzle under Thermoshock Transient
  E. Roos; MPA-Stuttgart, FRG

2.3 Uncertainties and other reliability aspects in the use of FM-methods

- Uncertainties that can arise in the Application of J-Integral Fracture Analysis Methods
  J.K. Pereira; AECB, Canada

- Validation of some FM-based Fitness for Purpose Methods
  M.J.G Broekhoven; Dienst voor het Stoomwesen, NL

Session 3: Capabilities and limitation of NDE-techniques 1650-1750

3.1 Introductory invited lecture on the state-of-the-art of the established conventional and advanced NDE-techniques and procedures for defect detection and sizing.

- Established and Advanced NDE-Methods
  S. Crutzen; CEC, ISPRA

- Capability Assessment of UT-Procedures Used for Ferritic Steel Components
  S. Crutzen; CEC, ISPRA

- Materials Problems Relevant for UT-Examinations of Austenitic Materials
  X. Edelmann; Sulzer Brothers, Switzerland

- Ultrasonic Techniques for the Inspection of Austenitic Steel Components
  X. Edelmann; Sulzer Brothers, Switzerland

Reception 1800-1900

Tuesday 4th October

Session 3: Capabilities and limitation of NDE-techniques (continued) 0900-1215

3.2 Views on the capabilities and limitations of presently used NDE-techniques and procedures for detection and sizing (especially in the framework of ISI) and the factors which influence them.

- The French Procedures, it's New Developments (MIS5) and Progress in RPV-Examination of the Chooz-A-Vessel
  J. Samman et al.; EDF-SRT Groupe des Laboratoires, France

- Use of Advanced Inspection Technology during the ISI of a US-RPV
  R. Stone; EPRI, USA

- Field Experience with Advanced Inservice Inspection NDE-Techniques for Detection and Sizing
  G. Engl; Siemens AG, UB KWU, FRG

- Defect Reconstruction by Non-Destructive Analyzing Methods as Basis for Fracture Mechanics Evaluation
  G. Deuster, V. Schmitz; IZFP Saarbrücken, FRG

- Experimental and Field Achievements in the UT-Examination of Austenitic Stainless Steel
  P. Dombret; Vinçotte, Belgium

- Progress in EPRI-Program on the Inspection of Austenitic Cast Stainless Steel
  R. Stone; EPRI, USA

3.3 Reliabiltiy aspects in the use of NDE-techniques and procedures.

- Reliability Aspects in the use of NDE-Techniques and Procedures
  R.A. Murgatroyd; UKAEA, Risley, U.K.

- Reliability of Non-Destructive Testing-Methods
  M.J.G. Broekhoven; Dienst voor het Stoomwesen, NL

Session 4: Part 1 - The interdependence of FM-methods and NDE-techniques 1345-1750

4.1 Invited review of the aspects and factors (parameters) in the component safety assessment, which influence the FM-methods as well as the NDE-techniques (capabilities and requirements).

The Interaction of NDE & Failure Analysis by Dr. Roy Nichols, U.K.

4.2 Examples showing the complementary roles of FM-methods and NDE-techniques.

- Fracture Behaviour Assessment of a Flawed Pressure Vessel in the Hydrotest
  Matti Sarkimo and Rauno Rintamaa; Technical Research Centre of Finland

- Verification of the Analytical Fracture Assessment Methods by a Large Scale Hydro Vessel Test
  Heikki Keinanen, Tero Öberg, Rauno Rintamaa and Kim Wallin; Technical Research Centre of Finland, Finland

- Acoustic Emission Measurements on Real Reactor Components with Fracture Mechanical Interpretation
  G. Deuster, IZFP-Saarbrücken, FRG

- Non-Destructive Examinations, Fracture Toughness Measurements and Burst Tests on a Pressure Vessel
  T. Varga, F. Salzmann, M. Wolf, H. Teichmann; TVFA, A/FRG

Session 4: Part 2 - Case histories

4.3 Case histories in component safety assessments, identification of problems and shortcomings.

- Safety Margins of PWR Irradiated Vessels - The Chooz Issue
  F. Hedin et al.; EDF-SEPTEN, France

- Fracture Assessment of a Main Reactor Coolant Pump in a BWR with Encountered Defects
  B. Brickstadt; The Swedish Plant Inspectorate, Sweden

- Safety Assessment of Cast Steel Valve Housings using NDE- and FM-Methods
  J.G. Blauel and L. Hodulak; IWM-Freiburg, FRG

Dinner 1830

Wednesday 5th October

Session 4: Part 2 - Case histories (continued) 0900-1100

4.3 Case histories in component safety assessments, identification of problems and shortcomings.

- Component Flaw Evaluations
  K. Yoon; B&W, USA

- Inspection and FM-Evaluation of Cracks at a BWR Inside-Nozzle Junction
  M.J.G. Broekhoven; Dienst voor het Stoomwesen, NL

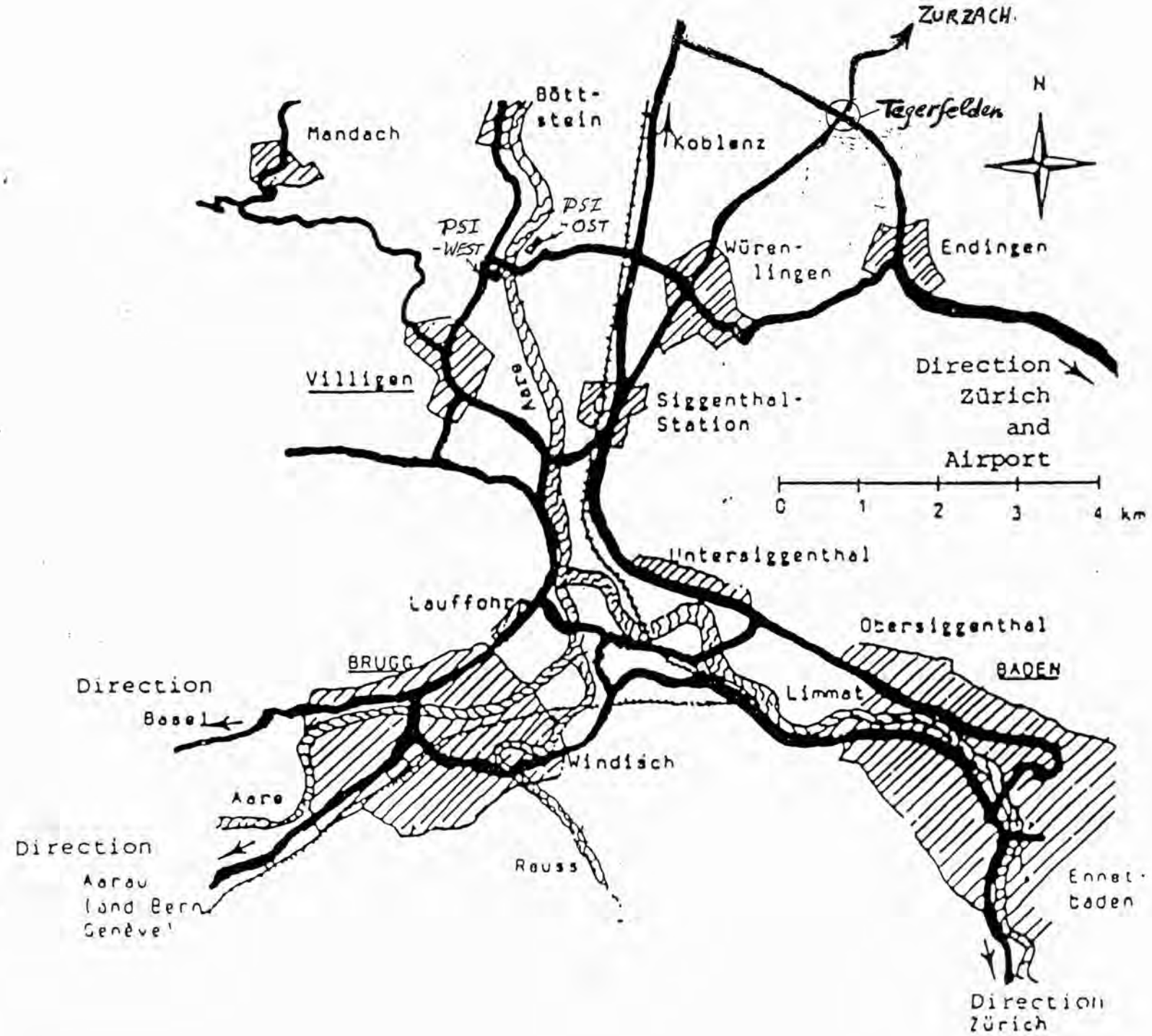
- Use of NDE and FM for the Assessment of Remaining Life of Steam Turbines
  R. Stone; EPRI, USA

- (Case history to be identified)
  C. Picker, UKAEA Structural Integrity Centre, UK.

Session 5: Panel Discussion and Conclusions 1100-1230

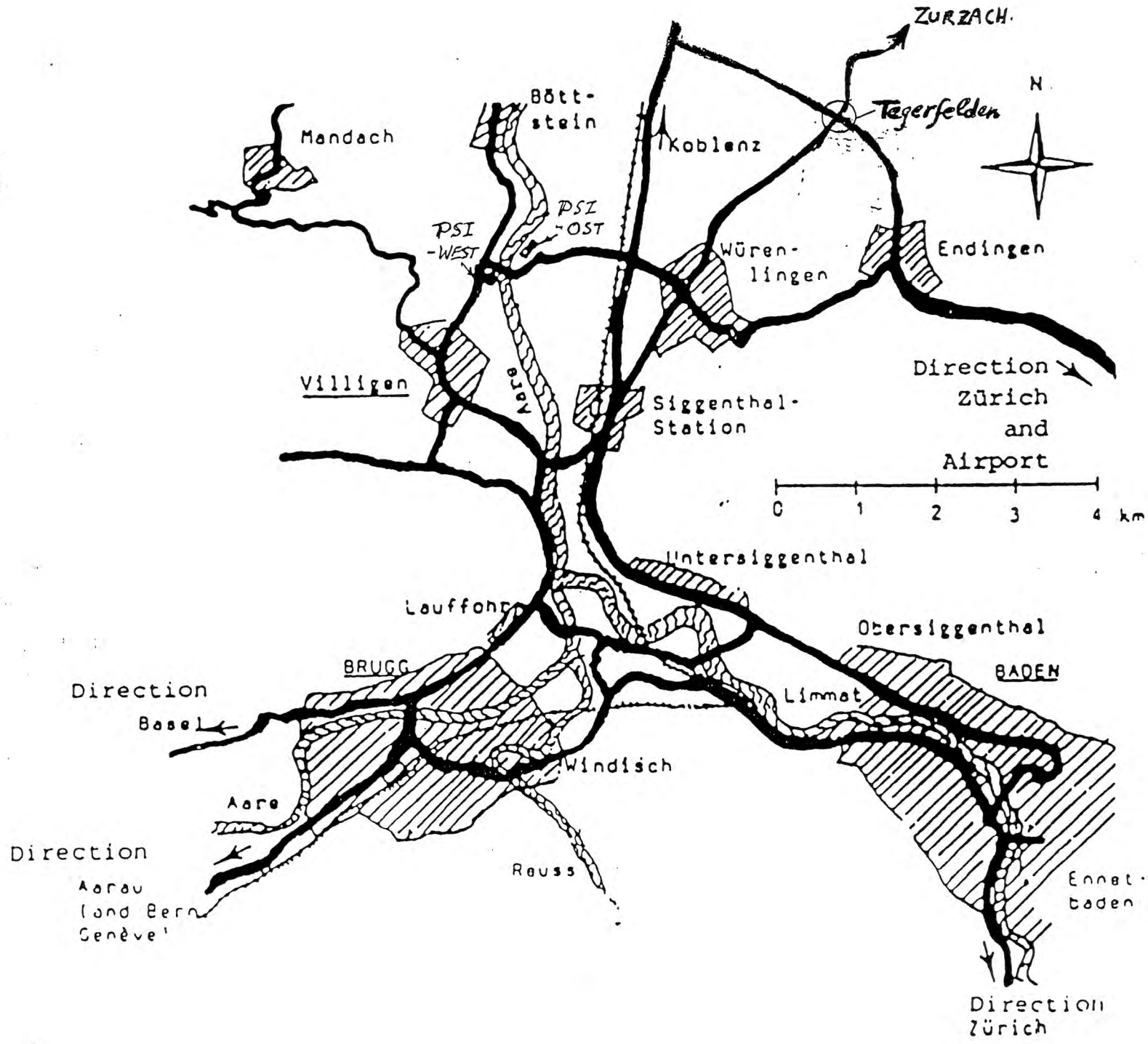
Discussion of major issues raised in the workshop; expression of views on how to handle identified problems and shortcomings in techniques and procedures; conclusions and recommendations to better ensure the adequacy of component safety assessment and to improve understanding and communication between NDE and FM experts and safety assessment practicioners.

Closure 1230

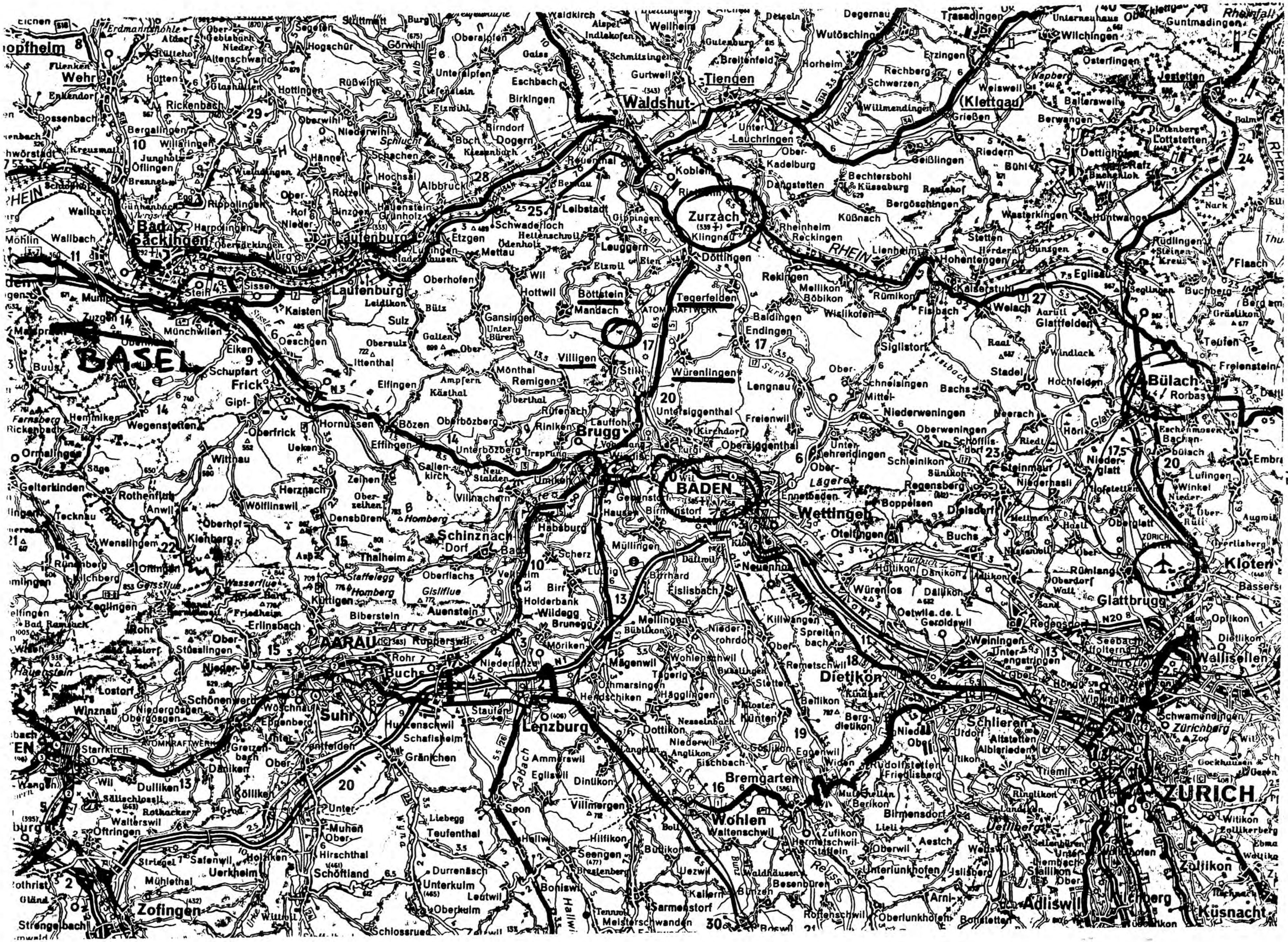


11

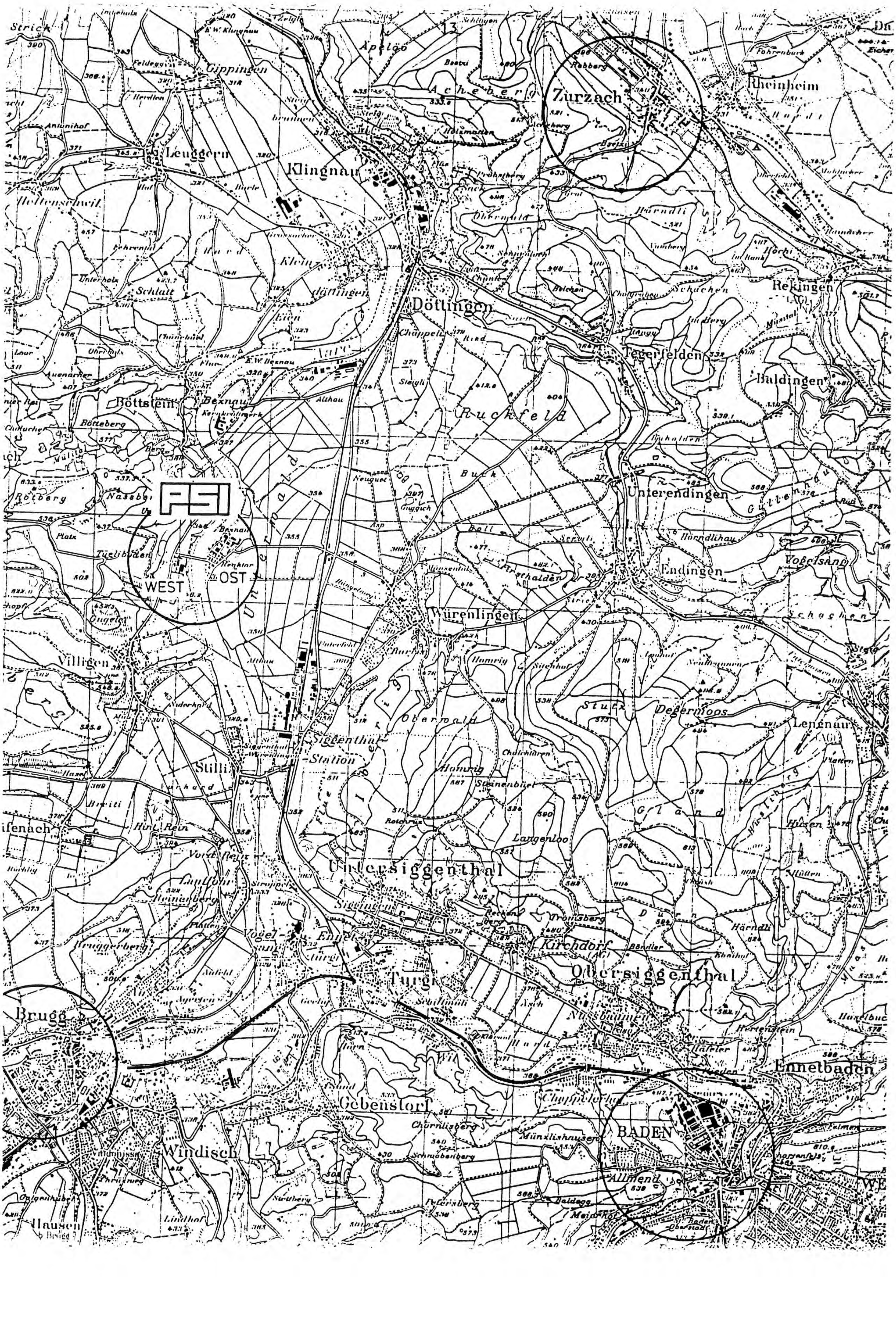
ATTACHMENT 2



ATTACHMENT 2



BASEL
Bad Säckingen
Laufenburg
Waldshut-Tiengen
(Klettgau)
Zurzach
Böttstein
Villigen
Tegerfelden
Würenlingen
ATOMKRAFTWERK
Brugg
BADEN
Wettingen
Frick
Schinznach-Dorf
AARAU
Lenzburg
Wohlen
Bremgarten
Dietikon
Schlieren
ZÜRICH
Bülach
Kloten
Glattbrugg
Zofingen
Suhr
RHEIN



Zurzach
Rheinheim
Leuggern
Klingnau
Döttingen
Rekingen
Tegerfelden
Baldingen
Böttstein
Beznau
PSI
WEST
OST
Unterendingen
Endingen
Würenlingen
Villigen
Stilli
Siggenthal-Station
Lengnau
Untersiggenthal
Obersiggenthal
Kirchdorf
Turgi
Brugg
Gebenstorf
Windisch
BADEN
Ennetbaden
Nussbaumen
Ruckfeld