Umweltbundesamt
Federal Environment Agency – Austria

ETE Road Map

according to Chapter IV and V of the "Conclusions of the Melk Process and Follow-Up"

Item 2
Qualification of Valves
Preliminary Monitoring Report

Report to the Federal Ministry of Agriculture, Forestry, Environment and Water Management of Austria

Vienna, May 2003

seibersdorf research

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Disclaimer
The Specialists' Team was not tasked with performing any kind of licensing review of the Temelín Nuclear Power Plant, and nothing in this report may be construed to represent any such review. The responsibility for and the review of the Safety and the Licensing of the Temelín Nuclear Power Plant exclusively remains with CEZ a.s. as the owner of the facility, and with the SÚJB as the designated Nuclear Regulatory Authority under Czech law, respectively.

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EXECUTIVE SUMMARY

The Republic of Austria and the Czech Republic have, using the good offices of Commissioner Verheugen, reached an accord on the "Conclusions of the Melk Process and Follow-up" on 29 November 2001. In order to enable an effective use of the "Melk Process" achievements in the area of nuclear safety, the Annex I of this "Brussels Agreement" contains details on specific actions to be taken as a follow-up to the "trialogue" of the "Melk Process" in the framework of the pertinent Czech-Austrian Bilateral Agreement.

Furthermore, the Commission on the Assessment of Environmental Impact of the Temelín NPP - set up based on a resolution of the Government of the Czech Republic - presented a report and recommended in its Position the implementation of twenty-one concrete measures (Annex II of the "Brussels Agreement").

A "Roadmap" regarding the monitoring on the technical level in the framework of the pertinent Czech-Austrian Bilateral Agreement as foreseen in the "Brussels Agreement" has been elaborated and agreed by the Deputy Prime Minister and the Minister of Foreign Affairs of the Czech Republic and the Minister of Agriculture and Forestry, Environment and Water Management of the Republic of Austria on 10 December 2001.

The Federal Ministry of Agriculture, Forestry, Environment and Water Management entrusted the Umweltbundesamt (Federal Environment Agency Ltd.) with the general management of the implementation of the "Roadmap". Each entry to the "Roadmap" corresponds to a specific technical project.

Item No. 2 "Qualification of Valves" of Annex I of the "Brussels Agreement" covers the functional qualification for Two-Phase and Water- Flow of the main steam relief (BRU-A) and safety valves (MSSV or SGSV) at the +28,8 meter level of the intermediate building of the Temelín NPP. The objective regarding this item as stated in Annex I of the "Brussels Agreement" is the *"Demonstration of reliable function of key steam safety and relief valves under dynamic load with mixed steam-water flow".*

The "Roadmap" specified that a Specialists' Workshop would be held in Prague in the 2nd half of 2002 to discuss this issue.

The approach by the Czech Side

The key element in the monitoring process was a Specialists' Workshop on the "Roadmap" item No. 1 "HELB" and "Roadmap" item No. 2 "qualification of valves" (PN 3) conducted in Prague on 7 and 8 November 2002 in the framework of an additional expert meeting according to Article 7 (4) of the Bilateral Agreement of the Exchange of Information on Nuclear Safety. In view of the interrelation of the two issues, the Czech hosts deemed it useful to treat both items at the same workshop. The analysis of the information made available there is the basis for the present Preliminary Monitoring Report of the Specialists' Team.

The main steam relief and safety valves functional qualification was addressed by the Czech Technical Support Organisation and the Regulatory Authority SÚJB at the Specialists' Workshop and in the framework of the information provided during the pipe integrity related presentations (see project PN2) within the broad scope of the "Comprehensive Safety Case Revisit" (CSCR). The Regulatory Authority SÚJB has preliminarily accepted the results of the valves functional qualification. With some equipment replacements and based on "new

qualification files", the results are accepted endorsing the original decisions of the regulatory authority.

Information about the following main areas was presented by the Czech TSO and the Regulator and discussed at the Specialists' Workshop:

- Parent Valves: BRU-A and MSSV Functional Qualification for Water and Steam-Water Mixture
- Extension of the Functional Qualification of Parent Valves to Temelin Candidate BRU-A and MSS Valves applying ASME-QME-1-1994, QVC similarity approach
- Environmental Qualification of BRU-A Actuator
- Replacement of MSSV Pilot Valves and of Electric Motor Drives of BRU-A Valves

No additional background documents were made available up to now to the Specialists' Team.

The approach the operator of Temelin the ČEZ a.s. has taken to resolve the safety issue, "Qualification of main steam relief and safety valves" (as approved by SÚJB) is to treat those valves used in the Temelín NPP as "candidate" valves and qualify them by extension of the qualification procedure of similar "parent" valves, which had already successfully passed a functional qualification test and were designed by the same company. The TSO and SÚJB cite this extension as an application of the special ASME Code procedure ASME QME-1-1994, QVC used for the qualification for water and two-phase flow (steam and water at the same time).

The descriptions identified the approach taken by the Czech operator but as overview they provided only limited insight into the results and how these were obtained. A number of the questions posed by the Specialists' Team was considered by the Czech side to exceed the level of detail or the scope of the Roadmap Workshop activities. Consequently, both sides agreed that the pertinent Czech-Austrian Bilateral Agreement is the appropriate framework giving the opportunity for further discussion and sharing additional information on these issues.

The approach of the Austrian Specialists' Team

A Specialists' Team of five international experts was committed by the Umweltbundesamt (Federal Environmental Agency Ltd.) on behalf of the Austrian Government to give technical support for the monitoring on the technical level of the implementation of the Valves Issue as listed in Annex I of the Conclusions of the Melk Process and Follow-up. This specific technical project is referred to as project PN3 comprising altogether seven predefined "project milestones" (PM).

To focus preparatory work of the Austrian Specialists' Team and to guide the Austrian Delegation through the Specialists' Workshop, but also to enable proper preparation of the Specialists' Workshop on the bilateral level, in a **first step,** Project Milestone 1 (PM1), the safety objective was broken down to Verifiable Line Items (VLIs) (see ANNEX A). They were based on the functional qualification according to the ASME similarity approach[1] between "parent" and "candidate" valves.

[1] If at least two valves (parent valves) out of the same family are functionally qualified by physical testing another valve (candidate valve) of the same family it can be assumed to be functionally qualified under specific requirements without physical testing.

In a **second step** the Specialists' Team prepared a list of documents (PM2) - the Specific Information Request – SIR, considered to contain the kind of information required to provide profound answers to the VLIs (see ANNEX C).

The **third step** in the preparatory work for the Workshop also included identification of standards and practices applied for the Valves' issue within the European Union Member States. Special focus was placed on the practice in Germany, since it has devoted considerable resources to analyse valves' behaviour. In the Briefing to the Austrian Delegation (PM3) these elements of the monitoring were presented to the mission participants.

At the Specialists' Workshop on HELB and Qualification of Valves in Prague on 7 and 8 November 2002, experts from the plant operator, technical support organisations, and the licensing authority made fifteen well-prepared slide beamer presentations, one of which was particularly devoted to the Qualification of Valves PN3 issue, characterised by one Czech presenter as being of an overview nature. Within the limitations spelled out above almost all questions by the Specialists' Team were answered during the Specialists' Workshop.

Following the Workshop in the **fourth step** (PM4), the Specialists' Team reviewed the Specialists' Workshop and the Team members provided contributions to the Preliminary Monitoring Report (PMR).

Preliminary Result of the Monitoring

The Monitoring process so far helped to clarify a number of VLIs. Based on the information currently available, the Specialists' Team formulates its view on the status of functional qualification of main steam safety and relief valves in the following way:

Since the identification of the Valves issue several years back, the detailed examinations and the actions taken up to the most recent Comprehensive Safety Case Revisit demonstrate a comprehensive process directed towards improvement. When considering the concerns expressed in the Austrian Technical Position Paper the comparison with the current state also indicates a number of areas of improvement.

The Czech presentation and the discussion indicated several positive activities within the frame of the Comprehensive Safety Case Revisit (CSCR), which appear to increase functional reliability of the main steam relief valves (BRU-A) and of Safety Valves (MSSV) generally. They relate to the replacement of electrical actuators of the BRU-A valves and of pilot valves of the MSSVs on both units.

The Czech operator's and TSO's approach to functionally qualify the main steam and relief valves for two-phase and water flow applying the ASME-QME-1994 similarity approach appears feasible if the related requirements are followed. Should compliance with requirements only be possible for specific steps in the qualification procedure, then situations of non-compliance should be compensated by performing adequate state of the art analyses well developed, e.g. in Germany.

The Specialists' Team directs the attention to two major findings:

1. **ASME-QME-1994 qualification requirements have only partly been met up to now and adequate analyses for compensation have not been demonstrated up to now as having been performed.**
2. **In the opinion of the Specialists' Team the Czech approach is not sufficient to demonstrate that the main steam relief and safety valves are qualified for the dynamics of two-phase flow and pressurised sub-cooled water flow conditions up to now.**

Resolution of the functional qualification of the main steam safety and relief valves by tests or by comprehensive analyses is recommended by the Specialists' Team.

The Team would highly appreciate to be informed about efforts to this end. Of course, access to representative documentation would be of additional value.

The Specialists' Team would be interested in receiving additional information about the basis on which the Regulatory Authority accepted the above solutions and how the deviations from currently accepted practice were argued.

Based on the recognition that the pertinent Czech-Austrian Bilateral Agreement is the appropriate framework giving the opportunity for further discussion and sharing additional information on these issues, the Specialists' Team would appreciate if the above major findings could be revisited in the further monitoring process of the Qualification of Valves.

Note that the assessment of technical adequacy is closely related to a number of other "Roadmap" items. Consequently, a final evaluation will only be possible by the end of the Monitoring process on the technical level, as set out in the Roadmap, taking into account the results of other Roadmap events as well as additional information which might be available, inter alia in the framework of the pertinent Czech-Austrian Information Agreement.

ZUSAMMENFASSUNG

Die Republik Österreich und die Tschechische Republik haben mit Unterstützung des Mitglieds der Kommission Verheugen am 29. November 2001 eine Übereinstimmung über die „Schlussfolgerungen des Melker Prozesses und das Follow-up“ erzielt. Um eine wirksame Umsetzung der Ergebnisse des Melker Prozesses im Bereich der nuklearen Sicherheit zu ermöglichen, enthält der Anhang I dieses „Brüsseler Abkommens“ Details zu spezifischen Maßnahmen, die als Follow-up zum „Trialog“ des Melker Prozesses im Rahmen des betreffenden bilateralen tschechisch-österreichischen Abkommens durchzuführen sind.

Weiters legte die Kommission zur Prüfung der Umweltverträglichkeit des KKWs Temelin, die auf Grund einer Resolution der Regierung der Tschechischen Republik eingesetzt wurde, einen Bericht vor und schlug in ihrer Stellungnahme die Umsetzung einundzwanzig konkreter Maßnahmen vor (Anhang II des „Brüsseler Abkommens“).

Zur Überwachung auf technischer Ebene im Rahmen des diesbezüglichen tschechisch-österreichischen bilateralen Abkommens wurde, wie im „Brüsseler Abkommen“ vorgesehen, eine „Roadmap“ („Fahrplan“) ausgearbeitet und am 10. Dezember 2001 vom stellvertretenden Premierminister und Außenminister der Tschechischen Republik sowie vom Bundesminister für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft der Republik Österreich vereinbart.

Das österreichische Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft beauftragte das Umweltbundesamt mit der Gesamtkoordination der Umsetzung der „Roadmap“. Jeder Eintrag in der „Roadmap“ entspricht einem spezifischen technischen Projekt.

Punkt Nr. 2 „Qualification of valves” („Ventilqualifizierung“) im Anhang I des “Brüsseler Abkommens” behandelt die funktionale Qualifizierung der Frischdampfsicherheitsventile (MSSV oder SGSV) und Frischdampfentlastungsventile (BRU-A) auf der 28,8 m-Bühne des Zwischengebäudes des KKW Temelín. Wie im Anhang I des „Brüsseler Abkommens“ aufgezeigt, lautet das unter diesem Punkt angeführte Ziel: *„Nachweis der zuverlässigen Funktionstüchtigkeit von Dampfsicherheits- und Abblaseventilen unter dynamischer Belastung bei Durchströmen von Wasserdampfgemisch.“*

Die „Roadmap“ sah für die zweite Hälfte des Jahres 2002 einen Experten-Workshop in Prag zur Erörterung dieser Thematik vor.

Der Ansatz der tschechischen Seite

Ein wesentliches Ereignis im Überprüfungsprozess („Monitoring Process“) war der Experten-Workshop zu den Punkten Nr. 1 („HELB“, (PN 2)) und Nr. 2 („Qualifizierung der Ventile“) der „Roadmap“, der am 7. und 8. November 2002 in Prag im Rahmen eines zusätzlichen Experten-Workshops gemäß Artikel 7 (4) des bilateralen Abkommens über den Austausch von Informationen über die nukleare Sicherheit abgehalten wurde. Angesichts des Zusammenhangs zwischen den beiden Themenbereichen hielten es die tschechischen Gastgeber für angebracht, beide Punkte in ein- und demselben Workshop zu behandeln. Die Auswertung der dort zur Verfügung gestellten Informationen dient als Grundlage für den vorliegenden vorläufigen Überprüfungsbericht (Preliminary Monitoring Report) des Expertenteams.

Die Qualifizierung der Funktionstüchtigkeit der Frischdampfentlastungsventile und -sicherheitsventile wurde seitens der tschechischen Organisation zur technischen Unterstützung (Technical Support Organisation, TSO) und seitens der Aufsichtsbehörde SÚJB anlässlich des Experten-Workshops im Rahmen der Information zur Integrität der Rohrleitungen als Teil des „Comprehensive Safety Case Revisit“ (siehe Projekt PN2) behandelt. Die Aufsichtsbehörde SÚJB hatte die Ergebnisse der Ventilqualifizierung als Bestätigung der ursprünglichen Entscheidungen vorläufig genehmigt. Dies geschah auf Basis des durchgeführten und geplanten Austausches einiger Komponenten und „neuer Berichte zur Qualifizierung“.

Seitens Aufsichtsbehörde und TSO wurden Informationen zu folgenden Bereichen vorgebracht und erörtert:

- Qualifizierung der Funktionstüchtigkeit der verwandten Ventile (Parent Valves) in Bezug auf die Entlastungsventile (BRU-A) und Frischdampfsicherheitsventile (MSSV) für Wasser und Dampf-Wassergemisch
- Erweiterung der Qualifizierung der Funktionstüchtigkeit der verwandten Ventile auf die zu prüfenden Temelín BRU-A Entlastungs- und Frischdampfsicherheitsventile gemäß ASME-QME-1-1994, QVC basierend auf der Ähnlichkeit der Ventile.
- Qualifizierung des BRU-A-Auslösemechanismus für Umgebungsbedingungen
- Austausch der Vorsteuerventile für die Frischdampfsicherheitsventile (MSSV) und des elektrischen Antriebsmotors der BRU-A Entlastungsventile

Bis dato wurden dem Expertenteam keine zusätzlichen Hintergrunddokumente zur Verfügung gestellt.

Die von der Betreibergesellschaft ČEZ zur Lösung des Sicherheitsproblemfalles „Qualifizierung der Frischdampfentlastungs- und -sicherheitsventile” (wie von SÚJB approbiert) gewählte Vorgangsweise besteht darin, jene Ventile, die im KKW Temelín verwendet werden, als die „zu prüfenden” Ventile anzusehen und durch Erweiterung des Qualifizierungsprozesses auf der Grundlage ähnlicher „verwandter” Ventile zu qualifizieren, die bereits einen erfolgreichen Qualifizierungsprozess durchlaufen haben und von der selben Firma hergestellt worden sind. Die Organisation zur technischen Unterstützung (TSO) und SÚJB bezeichnen diese Erweiterung als eine Anwendung der speziellen ASME Code Prozedur ASME QME-1-1994, QVC, zur Qualifizierung für Wasser und Zweiphasenströmung (gleichzeitiges Auftreten von Dampf und Wasser).

Die Ausführungen gaben zwar Aufschluss über den verwendeten Ansatz, erlaubten jedoch auf Grund der überblicksartigen Darstellung nur einen begrenzten Einblick in die Ergebnisse und wie diese erzielt wurden. Eine Reihe von Fragen, die das Expertenteam stellte, wurde von tschechischer Seite als zu sehr ins Detail oder über den Rahmen der Aufgaben des Roadmap-Workshops hinaus gehend erachtet. In der Folge kamen beide Seiten überein, dass das betreffende bilaterale Abkommen zwischen Tschechien und Österreich den geeigneten Rahmen für weitere Diskussionen und Informationsaustausch zu diesen Themenbereichen darstelle.

Der Ansatz des österreichischen Expertenteams

Ein Expertenteam von 5 internationalen Experten wurde vom Umweltbundesamt (Federal Environment Agency Ltd.) - im Auftrag der österreichischen Regierung – mit dem technischen Support zur Überwachung der Ventilqualifizierungs-Thematik auf technischer Ebene (wie im Anhang I der Schlussfolgerungen des Melker Prozesses und des Follow-up vorgesehen) beauftragt. Dieses spezifische technische Projekt wird als Projekt PN3 bezeichnet, welches insgesamt sieben vorgegebene „Projektmeilensteine“ (PM) umfasst.

Um den vorbereitenden Arbeiten des österreichischen Expertenteams eine Ausrichtung zu geben und die österreichische Delegation durch den Expertenen-Workshop zu führen, aber auch um eine geeignete Vorbereitung des Expertenten-Workshop auf bilateraler Ebene zu ermöglichen, wurde als **erster Schritt** (Projektmeilenstein 1 (PM1)) das Sicherheitsziel in „Überprüfbare Teilaspekte“ („Verifiable Line Items“ (VLIs) aufgegliedert (siehe ANNEX A). Diese wurden auf Grundlage der Funktionsnachweises nach dem ASME-Ähnlichkeitskonzept[1] zwischen den „verwandten“ und den „zu prüfenden“ Ventilen erstellt.

Im **zweiten Schritt** wurde vom Expertenteam eine Dokumentenliste (PM2) „Specific Information Request – SIR“ erstellt, von der anzunehmen ist, dass sie eine Auflistung jener Informationen enthält, die zur ausführlichen Beantwortung der in den VLIs enthaltenen Fragen erforderlich ist (siehe ANNEX C).

Zum **dritten Schritt** der vorbereitenden Arbeiten für den Workshop gehörte auch eine Erhebung der innerhalb der EU-Mitgliedstaaten bezüglich der Ventilproblematik zugrunde gelegten Normen und Praktiken. Die Praxis in Deutschland stellte hier einen besonderen Schwerpunkt dar, weil dort besondere Anstrengungen zur Qualifikation von Ventilen unternommen wurden. Im Briefing für die österreichische Delegation (PM3) wurden den zu entsendenden Teilnehmern diese Elemente des „Monitoring“ vorgestellt.

Im Rahmen des am 7. und 8. November 2002 in Prag abgehaltenen Workshop über HELB und Ventilqualifikation gaben Experten der Betreibergesellschaft der Anlage, Experten von Organisationen zur technischen Unterstützung (Technical Support Organisation, TSO) und Experten der Genehmigungsbehörde 15 gut aufbereitete Videoprojektor-Präsentationen, die nach tschechischer Aussage zusammengestellt wurden, um einen Überblick zu geben. Ein Vortrag davon war insbesondere der Qualifizierung der Ventile, dem PN 3-Fragenkomplex gewidmet. Bis auf einige – wie oben angeführte - Einschränkungen wurden die meisten Fragen des Expertenteams während des Workshops beantwortet.

Nach dem Workshop folgte als **vierter Schritt** (PM4) ein Rückblick auf den Experten-Workshop und die Mitglieder des Expertenteams lieferten Beiträge für den „Preliminary Monitoring Report“. Auf Grund derzeit zur Verfügung stehender Informationen identifizifizierte das Expertenteam einige der deutlich gewordenen Ergebnisse wie folgt:

[1] Wenn für zumindest zwei Ventile (mit der Ausgangskonfiguration der Ventilbaureihe) aus der gleichen Baureihe ein Funktionsnachweis durch physikalische Versuche erbracht worden sind, dann kann ein anderes Ventil (das zu qualifizierende Ventil) aus der gleichen Baureihe unter bestimmten Bedingungen ohne physikalische Versuche als funktional qualifiziert angesehen werden.

Bisheriges Ergebnis des Monitoringprozesses

Der Monitoringprozess hat bisher dazu beigetragen, einige der VLIs abzuklären. Auf der Grundlage der gegenwärtig verfügbaren Information formuliert das Expertenteam seine Sicht zum Stand der Ventilqualifizierung folgendermaßen:

Seit vor einigen Jahren der Problemkreis um die Ventile erfasst wurde, wird in umfassender Weise auf Verbesserungen hingearbeitet. Die Arbeiten reichen von detaillierten Überprüfungen bis hin zu den jüngst im Zuge des durchgeführten "Comprehensive Safety Case Revisit" getroffenen Maßnahmen. Bezugnehmend auf die im Austrian Technical Position Paper (ATTP) festgehaltenen Bedenken ergibt der Vergleich mit dem heutigen Stand, dass in einigen Bereichen Verbesserungen erzielt worden sind.

Die tschechischen Vorträge und die Diskussion zeigten verschiedene positive Aktivitäten im Rahmen des „Comprehensive Safety Case Revisit" auf, welche die funktionale Zuverlässigkeit der Frischdampfentlastungsventile (BRU-A) und -sicherheitsventile (MSSV) generell anheben dürften. Sie betreffen den Austausch der elektrischen Antriebsmotoren der BRU-A-Enlastungsventile und der Vorsteuerventile zu den Frischdampfsicherheitsventilen in beiden Reaktorblöcken.

Die Vorgangsweise des tschechischen Betreibers und der TSO bei der funktionalen Qualifizierung der Frischdampfsicherheits- und -entlastungsventile für Zweiphasen- und Wasserströmung nach dem ASME-QME-1994-Ähnlichkeitskonzept scheint machbar, sofern die entsprechenden Anforderungen erfüllt werden. Sollte die Erfüllung dieser Anforderungen nur für spezifische Schritte des Qualifizierungsverfahrens möglich sein, sollten jene Punkte, die nicht erfüllt sind, durch entsprechende Analysen nach dem Stand der Technik kompensiert werden, wie er u.a. in Deutschland anerkannt und ausgereift ist.

Das Expertenteam gelangte zu folgenden wichtigen Erkenntnissen:

1. **Die ASME-QME-1994 Qualifizierungsanforderungen sind bis dato nur teilweise erfüllt und die Durchführung entsprechender Analysen zur Kompensierung wurde bisher nicht präsentiert.**
2. **Nach Einschätzung des Expertenteams reicht die tschechische Vorgangsweise bis dato nicht aus, zu demonstrieren, dass die Frischdampfsicherheits- und -entlastungsventile für dynamische Zweiphasenstömung und unterkühltes Wasser unter Druck qualifiziert sind.**

Das Expertenteam empfiehlt die Erfüllung der funktionalen Qualifizierung der Frischdampfsicherheitsventile sowie der -entlastungsventile durch Tests oder durch umfassende Analysen.

Das Team würde es überaus schätzen, über diesbezügliche Bemühungen in Kenntnis gesetzt zu werden. Überdies wäre die Einsichtnahme in entsprechend aufschlussreiche Hintergrundliteratur von besonderem Nutzen.

Das Expertenteam wäre daran interessiert, mehr über die Grundlage, auf der die Aufsichtsbehörde die oben angeführten Lösungen akzeptiert hat bzw. wie die Abweichungen von der gegenwärtig akzeptierten Praxis argumentiert wurden, zu erfahren.

Im Bewusstsein, dass das einschlägige Tschechisch-Österreichische Bilaterale Nuklearinformationsabkommen einen geeigneten Rahmen für weitere Diskussionen und zusätzlichen Informationsaustausch darstellt, würde es das Expertenteam begrüßen, die oben angeführten wesentlichen Erkenntnisse im weiteren Verlauf des Ventilqualifizierungsprozesses in diesem Rahmen erörtern zu können.

Es wäre anzumerken, dass die Einschätzung technischer Angemessenheit eng mit einer Anzahl anderer ‘‘Roadmap‘‘-Punkte verbunden ist. Deshalb wird eine abschließende Beurteilung erst am Ende des Monitoring-Prozesses auf technischer Ebene möglich sein, wie er in der „Roadmap“ festgelegt wurde, wenn Ergebnisse anderer ‘‘Roadmap‘‘-Ereignisse wie auch zusätzlicher Informationen, die unter anderem im Rahmen des einschlägigen Tschechisch-Österreichischen Informationsabkommens zugänglich werden könnten, einbezogen werden.

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1 INTRODUCTION

The Republic of Austria and the Czech Republic have, using the good offices of Commissioner Verheugen, reached an accord on the "Conclusions of the Melk Process and Follow-up" on 29 November 2001. In order to enable an effective use of the "Melk Process" achievements in the area of nuclear safety, the Annex I of this "Brussels Agreement" contains details on specific actions to be taken as a follow-up to the "trialogue" of the "Melk Process" in the framework of the pertinent Czech-Austrian Bilateral Agreement.

To enable an effective "trialogue" follow-up in the framework of pertinent Czech-Austrian Bilateral Agreement, a seven-item structure given in Annex I of the "Brussels Agreement" has been adopted. Individual items are linked to:

- Specific objectives set in the licensing case for NPP Temelin units
- Description of present status and future actions foreseen by the licensee and SÚJB respectively.

Each item under discussion will be followed according to the work plan agreed at the Annual Meeting organised under the pertinent Czech-Austrian Bilateral Agreement.

Furthermore, the Commission on the Assessment of Environmental Impact of the Temelín NPP - set up on the basis of a resolution of the Government of the Czech Republic - presented a report and recommended in its Position the implementation of twenty-one concrete measures (Annex II of the "Brussels Agreement").

The signatories agreed that also the implementation of the said measures would be regularly monitored jointly by Czech and Austrian experts within the Czech-Austrian Bilateral Agreement.

A "Roadmap" regarding the monitoring on the technical level in the framework of the pertinent Czech-Austrian Bilateral Agreement as foreseen in the "Brussels Agreement" has been elaborated and agreed by the Deputy Prime Minister and Minister of Foreign Affairs of the Czech Republic and the Minister of Agriculture and Forestry, Environment and Water Management of the Republic of Austria on 10 December 2001.

This "Roadmap" is based on the following principles:

- *The implementation of activities enumerated in Annex I and II of the "Brussels Agreement" will be continued to ensure that comprehensive material is available for the monitoring activities set out below.*
- *Having in mind the peer review procedure foreseen by the EU to monitor the implementation of the recommendations of the AQG/WPNS Report on Nuclear Safety in the Context of Enlargement, the Czech and Austrian sides agree that this peer review should serve as another important tool to handle remaining nuclear safety issues.*
- *As a general rule the regular annual meetings according to Art. 7(1) of the bilateral Agreement between the Government of Austria and the Government of the Czech Republic on Issues of Common Interest in the Field of Nuclear Safety and Radiation Protection will serve to monitor the implementation of those measures referred to in Chapter V of the Conclusions and to address questions regarding nuclear safety in general, in particular those issues which – according to Chapter IV of the Conclusions - have been found, due to the nature of the respective topics, suitable to be followed-up in the framework of this Bilateral Agreement.*
- *In addition, specialists' workshops and topical meetings will take place, organised as additional meetings according to Art. 7(4) of the bilateral Agreement between the Government of Austria and the Government of the Czech Republic on Issues of Common Interest in the Field of Nuclear Safety and Radiation Protection, as set out in the "Roadmap".*

The Federal Ministry of Agriculture, Forestry, Environment and Water Management entrusted the Umweltbundesamt (Federal Environment Agency Ltd.) with the general management of the implementation of the "Roadmap". Each entry to the "Roadmap" corresponds to a specific technical project.

Item No.2 "Qualification of Valves (AQG/WPNS country specific recommendation)" of Annex I of the "Brussels Agreement" covers the functional qualification for Two-Phase and Water-Flow of the main steam relief (BRU-A) and safety valves (MSSV or SGSV) at the 28,8 meter level of the intermediate building of the Temelín NPP. The objective regarding this item as stated in Annex I of the "Brussels Agreement" is the *"Demonstration of reliable function of key steam safety and relief valves under dynamic load with mixed steam-water flow".*

ANNEX I of the "Brussels Agreement" further supplied the "Present Status and Specific Actions Planned" as follows:

> *"Demonstration of reliable function of key steam safety and relief valves is included in original licensing case of Temelin unit No. 1. To solve the difference in opinions of experts with regard to this issue, the Regulatory Authority initiated revisit of the qualification documentation in order to re-evaluate validity of Temelin key steam safety valves qualification. The result of these efforts will be made available to the Regulatory Authority till the June 2002 for final decision. Depending on the result, schedule for implementation of additional safety measures may be included into the above-mentioned regulatory submittal. The signatories understand that additional safety measures for both units will be considered by Regulatory Authority and if needed included into the above - mentioned regulatory decision in order to meet the objective of this item."*

The issue under project PN3 "Valve Qualification" is one of a number of issues foreseen for monitoring (see page 67) in the frame of the "Roadmap". It concerns the qualification for water and two-phase flow (transition from water to steam) of the main steam relief valves (BRU-A) and the main steam safety valves (MSSVs) to cope with accident conditions including water leakage in a steam generator from the primary to the secondary side of the reactor.

A Specialists' Team of five international experts was committed by the Umweltbundesamt (Federal Environment Agency Ltd.) on behalf of the Austrian Government to give technical support for the monitoring on the technical level of the implementation of the Valves Issue as listed in Annex I of the Conclusions of the Melk Process and Follow-up. This specific technical project is referred to as project PN3 comprising altogether seven predefined "project milestones" (PM)

The "Roadmap" specified that a Specialists' Workshop would be held in Prague in the 2nd half of 2002 to discuss this issue.

The approach by the Czech side

The key element in the monitoring process was a Specialists' Workshop on the "Roadmap" item No. 1 "HELB" (PN2) and "Roadmap" item No. 2 "Qualification of valves" conducted in Prague on 7 and 8 November 2002 in the framework of an additional expert meeting according to Article 7 (4) of the Bilateral Agreement of the Exchange of Information on Nuclear Safety. In view of the interrelation of the two issues, the Czech hosts deemed it useful to treat both items in the same workshop. The analysis of the information made available there is the basis for the present Preliminary Monitoring Report of the Specialists' Team.

The main steam relief and safety valves functional qualification was addressed by the Czech Technical Support Organisation and the Regulatory Authority SÚJB in their presentations at the Specialists' Workshop and in the framework of the information provided during the pipe integrity related presentations (see project PN2) within the broad scope of the "Comprehensive Safety Case Revisit" (CSCR). The Regulatory Authority SÚJB has accepted preliminarily the results of the valves functional qualification and with some replacements and based on "new qualification files", the results are accepted as endorsing the original decisions of the regulatory authority.

Information about the following main areas was presented by the Czech TSO and the Regulator and briefly discussed at the Specialists' Workshop:

- Parent Valves: BRU-A and MSSV Functional Qualification for Water and Steam-Water Mixture
- Extension of the Functional Qualification of Parent Valves to Temelin Candidate BRU-A and MSS Valves applying the ASME-QME-1-1994, QVC similarity approach
- Environmental Qualification of BRU-A Actuator
- Replacement of MSSV Pilot Valves and of Electric Motor Drives of BRU-A Valves

No additional background documents have been made available up to now to the Specialists' Team.

The approach the operator of Temelin the ČEZ a.s. has taken to resolve the safety issue, "Qualification of main steam relief and safety valves" (as approved by SÚJB) is to treat those valves used in the Temelín NPP as "candidate" valves and to qualify them by extension of the qualification procedure of similar "parent" valves, which had already successfully passed a functional qualification test and were designed by the same company. The TSO and SÚJB cite this extension as an application of the special ASME Code procedure ASME QME-1-1994, QVC used for the qualification for water and two-phase flow (steam and water at the same time).

The presentations identified the approach taken by the Czech operator, but as overviews they provided only limited insight into the results and how these were obtained. A number of the questions posed by the Specialists' Team was considered by the Czech side to exceed the level of detail or the scope of the "Roadmap" Workshop activities. Consequently, both sides agreed that the pertinent Czech-Austrian Bilateral Agreement is the appropriate framework giving the opportunity for further discussion and sharing additional information on these issues.

The approach of the Austrian Specialists' Team

The technical support for the monitoring was organised under the joint technical project management of the Institute of Risk Research (IRR, Wolfgang Kromp, Emmerich Seidelberger) and the Austrian Research Centers Seibersdorf (ARCS, Geert Weimann).

To focus preparatory work of the Austrian Specialists' Team and to guide the Austrian Delegation through the specialists' workshop, but also to enable proper preparation of the Specialists' Workshop on the bilateral level, in a first step, Project Milestone 1 (PM1), the safety objective was broken down to Verifiable Line Items (VLIs) (see ANNEX B). Their contents and formulation reflected the Czech approach already known to the Specialists' Team at the beginning of the project, namely to qualify Temelin MSSV and BRU-A relief valves (both identified as "candidate" valves) by applying the ASME similarity approach[2] between "parent" and "candidate" valves. The VLIs three main areas of attention aimed to be:

- Temelin "parent" main steam safety (MSSV) and relief valves (BRU-A) functional test qualification under dynamic water and steam/water conditions,
- Requirements and extension of functional test qualification of "parent" valves to Temelin units 1 and 2 "candidate" valves and
- Documentation of requirements for functional valve qualification, all according to ASME-QME-1-1994 and other applicable codes.

In a **second step** the Specialists' Team prepared a list of documents (PM3), the Specific Information Request – SIR, considered to contain the kind of information required to provide profound answers to the VLIs (see ANNEX A)[3].

The **third step** in the preparatory work for the Workshop also included identification of standards and practices applied within the European Union Member States for the Valve Qualification issue to allow comparison with the Czech qualification approach. Special focus was placed on practices in Germany, because this EU Member State has devoted considerable resources to analyses of valves behaviour. In addition, practice in the US has been considered extensively, because the operator of ETE applied US-codes, rules and regulations. In the Briefing to the Austrian Delegation (PM3), these elements of the monitoring were presented to the mission participants.

The key element in the monitoring process was a Specialists' Workshop on the "Roadmap" item No. 1 "HELB" (project PN2) and "Roadmap" item No. 2 "Qualification of Valves" conducted in Prague on 7 and 8 November 2002 in the framework of an additional expert meeting according to Article 7 (4) of the Bilateral Agreement of the Exchange of Information on Nuclear Safety. In view of the interrelation of the two issues, the Czech hosts deemed it useful to treat both items at the same workshop. The analysis of the information made available there is the basis for the present Preliminary Monitoring Report of the Specialists' Team.

Given the scope and schedule of the project, the Specialists' Team focused on monitoring the results of the efforts of the Czech specialists, as presented at the workshop, by a plausibility check.

Electronic copies of the Czech presentations prepared for the Specialists' Workshop on HELB and Qualification of Valves (listed in Annex B) were made available a few days prior to the Specialists' Workshop.

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[2] If at least two valves (parent valves) out of the same family are functionally qualified by physical testing another valve (candidate valve) of the same family can be assumed to be functionally qualified under specific requirements without physical testing.

[3] The SIR, as updated after the Prague Specialists' Workshop is listed in Annex C.

At the Specialists' Workshop on HELB and Qualification of Valves in Prague on 7 and 8 November 2002, Czech experts from ČEZ a.s., the Nuclear Research Institute Řež plc, the Institute of Applied Mechanics Brno, Ltd., and from the SÚJB made fifteen well-prepared slide beamer presentations, one of which was particularly devoted to the Qualification of Valves PN3 issue, characterised by a Czech presenter as being of an overview nature. Following this presentation, time was provided for questions from the Specialists' Team. While some points in question were substantiated during the workshop, a number of questions was considered to exceed the level of detail or the scope of the "Roadmap" Workshop activities by the Czech side. Discussion on these questions was limited to side conversations. No additional background documents were supplied to the Specialists' Team at the workshop.

Following the Specialists' Workshop, in a **fourth step**, the Specialists' Team reviewed intensively the Czech presentations, viewgraphs and the answers to questions posed during the Specialists' Workshop. The contributions of the Specialists' Team members have been merged by the Technical Project Management to provide the technical basis for the Preliminary Monitoring Report (PMR, project milestone PM4). This technical basis was reviewed and commonly agreed in an internal workshop of the Specialists' Team held on 8-9 December 2002 in Vienna.

The evaluations in the PMR address three different levels of the process by commenting:

1. on the adequacy of the information available in view of the monitoring task (i.e. the presentations) and
2. on the adequacy of the technical approach as such
3. on issues directed towards a resolution of the safety issue addressed and on its interrelation to the items of projects PN2: High Energy Pipe Lines at the 28,8 m Level and PN4: Qualification of Safety Classified Components

Note that the assessment of technical adequacy is closely related to a number of other "Roadmap" items. Consequently, a final evaluation will only be possible by the end of the monitoring on technical level, as set out in the "Roadmap", taking into account the results of other "Roadmap" events as well as additional information which might be available, inter alia in the framework of the pertinent Czech-Austrian Information Agreement.

2 ISSUE SPECIFICATION AND CZECH RESPONSE

In the VVER-1000 design adopted at Temelín, there are four main steam pipes (see Figure 1 and Figure 2). The steam pipes travel in pairs on opposite sides of the containment, through the containment wall, and take a number of bends until they reach the main steam isolation valves (MSIVs) in pairs on opposite sides of the front of the 28,8 meter elevation of the reactor building.

Three piping loops are connected to each steam pipe with T-joints. These are referred to as "bubliks". The bubliks lead to the main steam relief valve (BRU-A, see Figure 3) and two bubliks lead each to one main steam safety valve (MSSVs, see Figure 4). Functional qualifications of these valves are in question here.

Regarding this issue, the Austrian Technical Position Paper [ATPP 2001] containing the Austrian conclusions at the end of the tripartite “Melk Process”, states:

> *For the main steam relief and safety valves the functional qualification is still pending. Non-qualified valves could remain stuck open in case of accident operation under two-phase flow conditions. This could trigger an event sequence resulting in a severe accident with large release of radioactivity. In addition, isolation valves on the main steam lines upstream of the relief valves, which could mitigate the adverse consequences of a stuck open valve, are not installed in Temelin.*

The AQG/WPNS report [WPNS 2001] also contained a recommendation on this issue:

> *The Czech Republic should report on progress in ... measures to complete the demonstration of reliable function of key steam safety and relief valves in Temelín 1-2 under dynamic load with mixed steam-water flow.*

Based on the Conclusions of the Melk Process and Follow-up, Annex 1 [Melk 2001]; AQG/WPNS country specific recommendation [WPNS 2001], the objective of the Project PN3 is as follows:

> *“Demonstration of reliable function of key steam safety and relief valves under dynamic load with mixed steam-water flow.”*

The State Office for Nuclear Safety initiated what it refers to as a “Comprehensive Safety Case Revisit” (CSCR) of the HELB issue by requesting ČEZ, a.s. to "produce safety documentation enabling the SÚJB to settle the discrepancy in opinions of experts on above mentioned issues in a way standard for regulatory practices - by reassessment of existing safety case taking into account newly available information and technical arguments" [WPNS 2001].

The bases for SÚJB approval of the qualification of the BRU-A and MSSVs at the initial licensing stage were as follows:

- Results of the Mochovce NPP “parent” main-steam relief valves tested at the French Cumulus facility are also applicable for the main-steam relief valves used for the NPP Temelín.
- The Mochovce parent main steam relief valves do not show any deviations from the valves used at the NPP Temelín with regard to their functional mode of operation and the materials used.
- Differences exist only in the geometrical dimensions (smaller diameter).
- With regard to the main steam safety valves, test results of a specific safety valve also apply to the main-steam safety valves used at the NPP Temelín, since they are reported to be both of identical design and are made by the same manufacturer.

At the time of the Temelin unit one start-up approval, the above-mentioned sequence of measures, when framed appropriately to the overall safety concept of the plant (as described in licensing documentation), was considered by the SÚJB as meeting the requirements of

national legislation and IAEA recommendations. In addition, as far as the main-steam safety and relief valves are concerned, the SÚJB accepted their qualification with regard to loading with water as sufficiently demonstrated and clarified in line with the safety requirements.

As part of the WPNS initiated CSCR, SÚJB requested completion of the valve qualification file for the BRU-A and the MSSVs for steam-water mixture performance and accepted the valves as qualified based on the following considerations:

- Design similarity requirements are followed according to the ASME Standard QME-1-1994 [ASME 1994], and confirmed with the manufacturer.
- Qualification of the BRU-A and MSSV two-phase and water flow has been demonstrated by meeting the requirements for “extension of qualification” from qualified parent valves.
- Environmental qualification for the BRU-A actuator was confirmed for normal operation over 30 years and a postulated design basis earthquake.

SÚJB accepted the above as demonstration of reliable function of the BRU-A and MSSVs under dynamic load with mixed steam-water flow, and concluded that the “qualification concept described as meeting national requirements and well developed international practice”. Notwithstanding this outcome, SÚJB requested the following additional measures:

- Replacement of electrical actuators of the BRU-A valves on both units.
- Replacement of pilot valves of the MSSVs on both units.

These two actions were based on evaluation of experience feedback data and regulatory surveillance results related to in-service inspection, maintenance and commissioning tests.

3 CZECH PRESENTATION ON VALVES FUNCTIONAL QUALIFICATION – EVALUATION BY THE SPECIALISTS' TEAM AND OPEN ISSUES

A representative of the Czech TSO gave an overview presentation of the valves functional qualification and its resolution at the Specialists' Workshop in Prague on 8 November 2002.

The Specialists' Team evaluation presented in this chapter and the issues identified as open refer to the presentation mentioned, the related discussion with the Czech specialists and the specific contributions of the representative of the regulator SÚJB at the Workshop.

In the following sub-chapter 3.1. a more general recollection by the Specialists' Team is reflected, while in 3.2 specific topics addressed by the Czech TSO are evaluated.

3.1 Overall evaluation of resolving issues

The Czech presentation and the discussion indicated several positive activities within the frame of the Comprehensive Safety Case Revisit (CSCR), which appear to increase functional reliability of the main steam relief valves (BRU-A) and of Safety Valves (MSSV) generally. They relate to the replacement of electrical actuators of the BRU-A valves and of pilot valves of the MSSVs on both units.

The influence of these measures on the functionality of the valves under dynamic water and two-phase conditions, however, became not evident.

3.2 Adequacy of the information received

There is a clear consensus amongst the Specialists' Team that the related presentation by CEZ and SÚJB was informative, but at a very general level. Insight especially into the CSCR as submitted by ČEZ a.s. to the SÚJB, and insight into the formal SÚJB decision on the CSCR, would be extremely helpful in enabling final conclusions to be drawn by the Specialists' Team for the Monitoring process.

3.3 Adequacy of the solutions presented

The Main Steam Safety and BRU-A relief valves' qualification procedures and the extension of their qualification to two-phase flow, according to the similarity principles, have not been presented as a consistent application of a set of rules accredited by an independent licensing authority. The integral approach to the issues involved was missing in the related presentations of the representatives of the TSO and the SÚJB.

The Specialists' Team could not identify conclusively from the available Workshop presentation by the TSO the consistency and completeness of use of codes, standards, rules and regulations applied. There is no evidence on how the gaps between the original design-code, standard, rules and regulations and those used for valves qualification and re-qualification have been bridged.

3.4 Evaluation of Specific Topics addressed in the Czech TSO Presentation

3.4.1 Water Hammer

Several water hammer load cases for transient and accident conditions are to be considered for the main steam and feed-water lines at the 28,8 m level (topic treated under PN2: “High Energy Pipe Lines at the 28,8 m level”).

Opening and closing of one or both MSSVs and/or the BRU-A relief valve mounted on the main steam lines and the blow down of steam water mixture followed by water through these valves might represent such load cases, for example.

It has to be demonstrated that the piping system as well as the related valves remain integer and functional according to specification under these load conditions.

- The functional qualification procedures the valves have undergone to demonstrate structural load bearing capabilities sufficient to survive water hammer loads have not been presented at the Specialists’ Workshop. This holds true for both the “parent” and for the “candidate” valves.

3.4.2 Qualification of BRU-A and MSSV for Two-Phase Flow

- The ASME code procedure [ASME 1994] requires a minimum of two parent valves to pass the qualification.
  The Czech TSO and the Regulator SÚJB claim that the main steam relief valve (BRU-A) and the main steam safety valves (MSSV) are qualified by extension - demonstrating comparable properties of similar valves according to ASME Code QME-1-1994, QVC - from similar valves which had successfully passed the required qualification procedure and met all qualification requirements.
  In both the cases of the BRU-A and MSSV, however, only one parent valve was reported to have been used as the basis for extension to the valves present in Temelín. Therefore, the ASME Code QME-1-1994 code requirements appear not to been followed in the opinion on the Specialists’ Team. Arguments by the Czech TSO and/or by the Regulator related to this specific approach taken are lacking and would be welcome to the Specialists’ Team.
- The ASME code for valve testing requires a minimum of two tests for each type of flow to demonstrate qualification. In the case of the MSSV, as reported in the Czech TSO presentation, the parent valve was not tested for two-phase flow at all “…and only for cold water (< 100 °C) instead of pressurised sub-cooled water (about 300 °C)…”.
- Thus, the Temelín candidate MSSV could not be considered by the Specialists’ Team to be qualified for two-phase flow and pressurised sub-cooled water flow. Arguments by the Czech TSO and/or by the Regulator related to this specific approach taken are lacking and would be welcome to the Specialists’ Team.
- The ASME code requires, beside other defined test conditions, that tests have to be planned. The parent BRU-A was actuated at one occasion, which seems to have been a spurious event rather, than a test under planned conditions for two-phase flow, because two-phase flow conditions developed quite unexpectedly, as reported by the TSO at the Workshop. Inasmuch as there is only a single and unplanned two-phase flow test of the parent BRU-A valve, the Temelín candidate BRU-A valve cannot be considered to be qualified for two-phase flow.
- The ASME code clearly calls for similarity between parent and candidate valves as one of the prime conditions. The ASME code does not permit such an extension from one type of valve to another type of valve.

In this context, when shown the evidence that the MSSV tests did not include two-phase flow (see APPENDIX II), the Czech TSO responded that for the BRU-A (not the MSSV), the two-phase loads were less than the water or steam loads, and that it was assumed that the same would hold true for the MSSV. (The BRU-A valve is a motor-actuated valve, whereas the MSSV uses a pilot valve for actuation. The valves are completely different in form and function — indeed, quite deliberately so for reasons of diversity.)
Thus, the MSSV candidate valve qualification for two-phase flow cannot be related to the BRU-A parent valve test. Such a justification is not permitted under ASME code requirements, and no independent basis for accepting such a procedure was cited by the Czech TSO.

In fact, the ASME code requirements were apparently not followed. The Specialists' Team considers neither valve to be qualified for two-phase flow and, in the case of the MSSV, not be qualified for pressurized subcooled water flow either. AQG/WPNS recommended precisely the qualification for two-phase flow (WPNS 2001).

The Czech TSO has not demonstrated at the Specialists' Workshop that this recommendation has been fulfilled.

- It must be noted that in German practice for PWRs in operation in Germany, main steam relief and safety valves were tested in general at full scale in an experimental qualification program.

  The reported Czech approach did not yet consider fullscale test functional qualification for the Temelin valves.

- Similarity demonstration by tests is not the only method allowed in the context of valve qualification. QVP-7200 of ASME code [ASME 1994] states that analytical methods are allowed as well. In the context of the present case, this means comprehensive analyses using well-tested and verified computer codes. Such analyses may replace some tests and may be used for the extension. This is common European practice. The results of the analyses by the computer code must compare well with all test results (verification of the code). These codes allow the missing tests to be simulated; they must also be used to extensively check the load cases in the real plant (where the candidate valve is installed).

  The Czech TSO specialists at the Workshop provided no confirmation if and to what extent such an analyses approach has been taken for Temelín valves qualification. Although the TSO presenter mentioned the Siemens analysis program SUPERVE, concerning MSSV no additional information about any computer analyses on the hydraulic and fluid dynamic functions was presented.

- Analytical verification of tests in order to quantify the valves' characteristics was not presented.

  Analytical extrapolations from model tests of valves and analyses of the NPP systems (candidate valves, boundary condition influences, number and type of calculated load cases) were not specified, although some calculations had apparently been done. These calculations should also have included verification of full capacity loads.

- Information about the environmental qualification of the BRU-A actuator was presented by the Czech TSO which was beyond the scope of PN3 but in the scope of PN4: "Qualification of safety classified components". Thus, the Specialists' Team performed no evaluation on this topic in the frame of PN3.

3.4.3 Comprehensive Safety Case Revisit (SÚJB Position)

The presentation during the Specialists' Workshop provided only limited information on the interaction between the licensee, the regulatory authority and the management of the safety issues by SÚJB in regulating the safety of Temelín NPP. There was little evidence on the position of the licensing authority regarding the permissible procedures on the qualification extension.

The reasoning and the position of the Safety Authority SÚJB therefore remained unclear to the Specialists' Team.

4 EVALUATION OF THE MONITORING PROCESS ACCORDING TO VLIs

This chapter summarises the Specialists' Team evaluation (in chapter 3) according to the Line Items (see ANNEX A) which are intended to be verified by the Team in the frame of this project. It provides information on the extent to which these Line Items have been addressed by the Czech presentations at the Specialists' Workshop. It indicates remaining issues and follow-up actions required for satisfactory monitoring (see also chapter "Conclusion") and for resolution of the issue related to the functional qualification of valves.

VERIFIABLE LINE ITEMs - the Specialists' Team's view	
1	**Evaluation of MSSV and BRU-A parent valves functional test qualification under dynamic water and steam / two-phase and steam-water conditions and comparison with ASME-QME requirements** [ASME 1994]
	The VLI was addressed at the Workshop. The related Czech information provided was an overview. Based on this information the MSSV and BRU-A parent valves appear to be of limited compliance and to some extent even in non-compliance with ASME-requirements. A full compliance check is recommended for MSSV and BRU-A parent valves functional test qualification on the basis of ASME-QME requirements. An adequate extension is recommended for partial or non-compliance situations.
2	**Comparison of the MSSV and BRU-A parent valves with Temelin candidate valves and evaluation of extension of functional test qualification of parent valves to Temelin candidate valves**
	The VLI was addressed at the Workshop. Based on the rough Czech information provided, the Specialists' Team was unable to follow the actual steps taken by the Czech side in functional test qualification of parent valves and extension to the Temelin candidate valves according to ASME code requirements. Based on the outcome of VLI 1, the extension of functional test qualification of parent valves to Temelin candidate valves appears not to be in compliance with ASME requirements and thus the valves appear not to be functionally qualified. A comprehensive check on the feasibility of extending the functional qualification from the parent to candidate valves according ASME is recommended and an adequate substitution for partial or non-extendable situations is proposed.
3	**Comparison of the functional qualification documentation of the Temelin MSSV and BRU-A candidate valves and evaluation of its compliance with ASME-QME requirements**
	The VLI was addressed at the Workshop. Due to lacking evidence the Specialists' Team was unable to prove fulfilment of documentation requirements according to ASME. It would be desirable to see evidence of qualification documents and to have insight into the set of these.
4	**Verification of requirements for design, performance and testing/functional qualification of main steam safety and relief valves based on valves similarity: General practices, codes and regulations, and regulatory requirements in the European Union (focus: Germany) and USA**
	The VLI was implicitly addressed at the Workshop. The Czech approach taken for functional qualification of the Temelin MSSV and BRU-A valves appears not to be in compliance with the US ASME requirements and with European state-of-the-art practices.

CONCLUSION

Based on the recognition that the pertinent Czech-Austrian Bilateral Agreement is the appropriate framework giving the opportunity for further discussion and sharing additional information on these issues, the Specialist's Team would appreciate if the major findings could be resolved in the further monitoring process of "Qualification of Valves".

The Monitoring process so far helped to clarify a number of VLIs. Based on the information currently available, the Specialists' Team formulates its view on the status of functional qualification of main steam safety and relief valves in the following way:

The Czech operator's and TSO's approach to functionally qualify the main steam and relief valves for two-phase and water flow applying the ASME-QME-1994 similarity approach appears feasible if the related requirements are followed. Should compliance with requirements only be possible for specific steps in the qualification procedure, then situations of non-compliance should be compensated by performing adequate state of the art analyses well developed, e.g. in Germany.

The Specialists' Team directs the attention to two major open issues:

1. **ASME-QME-1994 qualification requirements have only partly been met up to now and adequate analyses for compensation have not been demonstrated up to now as having been performed.**
2. **In the opinion of the Specialists' Team the Czech approach is not sufficient to demonstrate that the main steam relief and safety valves are qualified for the dynamics of two-phase flow and pressurised sub-cooled water flow conditions up to now.**

Neither the main steam relief valve (BRU-A) nor the main steam safety valves (MSSV) can be considered therefore functionally qualified for two-phase flow, as recommended by the AQG / WPNS [WPNS 2001].

Resolution of the functional qualification of the main steam safety and relief valves by tests or by comprehensive analyses is highly recommended by the Specialists' Team.

The tests should be performed for the actual Temelín valves (together with the new actuator in the case of the BRU-A and the new pilot valve in the case of the MSSV), because otherwise two parent valves for each type of valves will have to be tested for compliance with ASME code requirements. The test conditions should, to the extent possible, represent actual plant conditions under which the "candidate" valves should be operable. (Test for water flow at a temperature of about 300ºC, as encountered with large primary to secondary leaks, instead of 100ºC as was done in the test of the MSSV "parent" valve (see APPENDIX II)).

The Specialists' Team would highly appreciate to be informed on efforts to this end. In particular the Specialists' Team would be interested in:

- A list of the qualification reports, including list of contents
- A list of all tests performed, listing each test with characterisation
- A list of all computer analyses, listing each analysis with characterisation

Of course, access to representative documentation would be of considerable added value.

The Specialists' Team would also be interested in receiving additional information about the basis on which the Regulatory Authority accepted the above solutions and how the deviations from currently accepted practice were argued.

LIST OF REFERENCES

ASME 1994 ASME QME-1-1994, American Society of Mechanical Engineers, Qualification of Active Mechanical Equipment Used in Nuclear Power Plants, 1994

ATPP 2001 Austrian Technical Position Paper, http://www.ubavie.gv.at/umweltsituation/radio/akw_Temelín /melk1/trialog/toc.htm

Melk 2001 Conclusions of the Melk Process ad Follow-up, Annex 1, Brussels, 29.11.2001

PMR-PN2 PRELIMINARY MONITORING REPORT PN2: HIGH ENERGY PIPELINES AT THE 28,8 m LEVEL
Institute of Risk Research - Austrian Research Centers Seibersdorf, Vienna, Austria

WPNS 2001 http://www.ubavie.gv.at/umweltsituation/radio/akw_Temelín /melk1/wpns/WPNS1.pdf
http://www.ubavie.gv.at/umweltsituation/radio/akw_Temelín /melk1/wpns/Appendix_WPNS_report_2001.pdf
http://www.ubavie.gv.at/umweltsituation/radio/akw_Temelín /melk1/wpns/Corrigendum_WPNS_Report_2001.pdf

SWS 2002 Specialists' Workshop Presentation (see Annex B) made by the Czech Representatives of the TSO and the regulator, Prague, November 7th and 8th, 2002

ANNEX A

Verifiable Line Items

(update 1 2002 09 13)

PN3-PM1 (update1 2002 09 13)

VERIFIABLE LINE ITEMS

	VERIFIABLE LINE ITEM
1	Evaluation of MSSV and BRU-A parent valves functional test qualification under dynamic water and steam / two-phase and steam-water conditions and comparison with ASME-QME requirements [ASME 1994]
2	Comparison of the MSSV and BRU-A parent valves with Temelin candidate valves and evaluation of extension of functional test qualification of parent valves to Temelin candidate valves.
3	Comparison of the functional qualification documentation of the Temelin MSSV and BRU-A candidate valves and evaluation of its compliance with ASME-QME requirements
4	Verification of requirements for design, performance and testing/functional qualification of main steam safety and relief valves based on valves similarity : General practices, codes and regulations, and regulatory requirements in the European Union (focus: Germany) and USA

ANNEX B

Workshop Programme
on
High Energy Piping at 28,8 m Level

Revision 1, issued 2002 11 07

Workshop Programme on High Energy Piping at 28,8 m Level

Date: 7-8 November, 2002 **Place: SÚJB Prague**

Thursday November 7, 2002				
	Workshop opening.	Krs (SÚJB)	-----	
1.	Temelín NPP position on high energy piping at 28,8m level	Holán (ETE)	**7.1**	
2.	Comprehensive safety case overview.	Žďárek (NRI)	7.2.1	
3.	Dynamic calculations results due to the steam water hammer and water overfill overview.	Pečínka (NRI)	7.2.2	
4.	Flow accelerated corrosion assessment.	Pečínka (NRI)	7.2.3	
	Coffee Break (11^{15}-11^{45})		-----	
5.	PTS methodology/harmonisation with EU practice.	Pištora (NRI)	7.2.4	
	Lunch Break (12^{45} – 14^{00})		-----	
6.	Material Database Summary.	Ondrouch	7.2.5	
7.	**Qualification Dossiers for S-W Mixture of BRU-A and SGSV including EQ of BRU-A actuator.**	**Fridrich (NRI)**	**7.2.6**	
	Coffee Break (15^{00}-15^{30})		-----	
8.	Qualification of UT NDE	Horáček (NRI)	7.2.7	
9.	Displacement measurement results.	Junek (ÚAM)	7.2.8	
10	Pipe break probability calculation overview	Pečínka (NRI)	7.2.9	
Friday November 8, 2002				
1.	UT NDE testing and results	Horáček (NRI)	7.2.7	
2.	Summary of TH analysis.	Macek (NRI)	7.2.10	
3.	Superpipe concept application on steam and feed water lines	Žďárek (NRI)	7.2.1	
	Coffee Break (10^{30}-11^{00})		-----	
4.	Time schedule and modifications required for 100% UT NDE.	Holan (ETE)	7.2.7	
5.	SÚJB preliminary assessment of the Safety Case results.	Krs (SÚJB)	7.1	
Lunch Break (12^{00} – 13^{30})				
	Discussion on Safety Case Status (13^{30} – open end)	Included in comments	----------	

ANNEX C

Specific Information Request

Revision 4, issued 2002 11 27

Specific Information Request (SIR)
in the context of
" Item No. 2 Qualification of Valves (AQG/WPNS country specific recommendation)"

Information about the use of the following tables:

The SIR asks for documentation and information about all Activities undertaken to resolve the "Safety Case", which are treated in the Comprehensive Safety Case Revisit (CSCR).

1. These **Activities are denoted** in the " 6th Additional Information to the Decision Paper on Chapter 14 „Energy" " (Document. CONF-CZ-50/01, Brussels, 2001 09 17, **hereinafter in the APPENDIX I document**). It contains only aspects linked to the HELB issue that need to be treated (according to Conf-CZ 50/01).
   The Activities have been numbered individually in columns 1 and 2 of the Table in APPENDIX I (page 49).
2. The **requested Specific Information** (see the following table) is organised according to areas of interest for monitoring. In column 7 on page 42 it indicates the Activities the document is thought to be related to.
3. The **WORKSHOP** has indicated some of the **documentation** available and these titles have been added* and the Activities they are associated with in column 7 (on page 45).

Since most of the documentation is known neither by exact title and author, nor by document number or identification code, the expected content is outlined in the following tables by an English short title, indicating the main topic(s) of interest. Based on this information, the organisational technology units at CEZ/ETE, the supplier(s) and/or the licensing authority should be able to identify the relevant documentation.

Information contained in the documentation would be needed as one supplement to create answers to the Verifiable Line Items. A positive answer to the Verifiable Line Items supports assumptions about an adequate and consistent implementation of the ASME similarity approach for functional qualification of BRU-A relief and main steam safety valves.

The Ranking I to III (introduced in column 2,3,4) of the SIRs applied in the following tables is only intended to indicate priorities for access to the related information. It does not indicate that some of this information would be less supportive to the monitoring process.

*) *It would be paticularly beneficial if key documentation as it is cited in the individual WORKSHOP presentations would be available in the MONITORING Process under way.*

AREA	I	II	III	No	Qualification of Valves - Specific Information Requested	Reference APPENDIX I.
1	2	3	4	5	6	7
Scaling Feasibility	x			1	Report demonstrating the applicability of the ASME Parent Candidate Valve Qualification procedure to valves otherwise not designed or qualified according to ASME Code requirements [ASME 1994]	7.
	x			2	Report describing the effect of valve characteristics and parameters and their scaling (flow areas and throttles within the valve, resistance, friction, masses, fitting tolerances) on the valve characteristics for the Temelín units 1 and 2 main steam safety and relief valves (MSSV and BRU-A)	7.
Parent Valves Function	x			3	Report describing the functionality of the parent valves of Temelín units 1 and 2 main steam safety and relief valves (MSSV and BRU-A), including specific and detailed information about:	7.
	x				Specification of all load cases postulated for the pipe systems connected to parent valves	7.
	x				• Specification of the parent valves' functions with respect to the load cases	7.
	x				• Environmental and fluid conditions (pressure, temperature, acceleration)	7.
	x				• Opening and closing conditions (pressure and state of fluid (steam, two-phase, water))	7.
	x				• Limits for (total) opening and closing times	7.
	x				• Valve characteristics	7.
	x				• Specified mass flows for gas, liquid, and two-phase flow	7.
	x				• Method of operation and description of internal components (pilot valves, actuator, redundancies of pilot valves, filling or emptying valve chambers, …)	7.
	x				• Valves' internal flow scheme (see as an example fig. 1 and 2 in appendix)	7.
Parent Valve tests	x			4	Test report of the parent valves of Temelín units 1 and 2: main steam safety and main steam relief valves (MSSV and BRU-A) including specific and detailed information about:	7.
	x				• Function, functional sequences tested.	7.
	X				• Description of test environment (facility, geometry of pipes, fluid conditions (pressures, temperatures, mass flows))	7.
	x				• Description of the test (load) cases, test conditions realisation and conduct of tests	7.

	x				• Test results (time histories measured: stem position, pressures up and downstream, pressure and temperature in test-pressurizer and pipe if available, pressures in valve chambers)	7.
	x				• Description of results deviations from specification.	7.
Design and layout	x			5	Manufacturing drawings of the Temelín units 1 and 2 MSSV and BRU-A parent valves (i.e. Siemens-Chekhov MSSV and Mochovce BRU-A relief valve) including dimensions and tolerances for flow areas	7.
	x			6	Manufacturing drawings of the control valves of the Temelín units 1 and 2 MSSV and BRU-A parent valves (pilot valve?, pulse valve?, for actuation by pressure, …) including dimensions and tolerances for flow areas	7.
	x			7	Isometric drawings of the Temelín units 1 and 2 MSSV and BRU-A relief valve test-facilities piping system used in the functional test qualification for the parent valves (i.e. Siemens-Chekhov test facility for the MSSV parent valve and CUMULUS test facility for the BRU-A parent valve)	7.
Comparison Parent-Candidate Valves	x			8	Extension report containing all differences between MSSV and BRU-A parent and candidate valves of Temelín units 1 and 2 including	7.
	x			9	• Specification of all load cases to be postulated for the pipe systems involved for candidate valves	7.
	x			10	• Specification of the function of the candidate valves with respect to the load cases	7.
Transfer of Parent valve Results	x			11	Report(s) on analyses to transfer results from the MSSV and BRU-A parent valves to the candidate valves of Temelín units 1 and 2	7.
to Candidate valve	x			12	Report on the transfer of fluid and environmental conditions from the MSSV and BRU-A parent valves to the candidate valves of Temelín units 1 and 2 including detailed proof that no special tests are required for two-phase flow and a detailed description of MSSV tests for two-phase flow and water flow, problems encountered (e.g. valve chatter)	7.
	x			13	Isometric drawings of the pipes leading to and from all of the valves on the +28,8 m level of Temelín units 1 and 2	7.
	x			14	Manufacturing drawing of both valves (Main Steam Safety and Relief Valves, Temelín units 1 and 2), including dimensions and tolerances for flow areas	7.
Documentation Compliance	x			14	Compliance demonstration report about the approach, results and documentation of Temelín units 1 and 2 MSSV and BRU-A relief valves functional qualification with ASME-QME requirements, sup-	7.

Compliance					ported by a detailed description of Mochovce BRU-A tests (taking into consideration the requirements of ASME QME-1-1994, in particular section QVP-7320.3)	
Commissioning	x			15	Commissioning report on functional testing of MSSVs and BRU-A- relief valves (test performance, conditions and results)	7.
	x			16	Events report of February 7, 2002 describing BRU-A relief valves activation, functioning and adverse operational behaviour and reasons	7.
Operation	x			17	Procedures for dedicated Surveillance Program(s) of BRU-A and MSS Valves and Specification of In-Service Monitoring Systems	7.
		x		18	Information on operation experience with BRU-A and MSS valves of the Temelín type and of comparable valve types	7.
RANKING	I	II	III		Reference APPENDIX I	

Additional WORKSHOP documents*[4])							
Qualification of Valves	x				1	Analysis of functional qualification of NPP Temelín SG Relief Valve BRU-A, Type 1115-300/350. *Report DITI, October 2001*	***7***
	x				2	Qualification of BRU-A for two-phase and water flow *Report DITI, November 2001*	***7***
	x				3	Application Qualification Report. Qualification of the steam generator safety valves for water and steam-water mixture flow.	***7***
	x				4	Qualification Report. Environmental Qualification of steam generator relieve [relief] valve (BRU-A) actuator. *Report DITI, April 2002*	***7***
						ADDITIONAL SIR	
	x					Unified Procedure for lifetime assessment of components piping in VVER NPPs, in preparation within frame of VERLIFE project of the 5th Framework Program of the EU.	***7***
	x					Standard Technical Documentation of Association of Mechanical Engineers, Section IV, Residual Lifetime Assessment of VVER NPPs Components and Piping.	***7***
	x					Standard normative technical documentation A.M.E (Association of Mechanical Engineers (CZ)) for "Strength Assessment of Equipment And Piping of NPP of VVER Type").	***7***
RANKING	I	II	III			***Reference APPENDIX I***	

[4] *) It is understood that key documentation as cited in the individual WORKSHOP documents can also be accessed in the MONITORING Process under way.

APPENDIX I

References in the SIR

relate to the following Activities as announced in Document
“ Sixth Additional Information to the Decision Paper on Chapter 14 ‚Energy’ “
(Document CONF-CZ-50/01, Brussels, 2001 09 17).

References in the SIR

Reference No. in SIR	#	No.	Activity description	Status	Time schedule
1	2	3	4	5	6
1	1	1.	Preparation of Comprehensive Safety Case on Temelín NPP high energy piping layout at 820 and 826/1 BRU-A and SGSV steam-water mixture qualification (the report will comprise results of steps 2 – 7)	Started 30.1.2001	30.09.2001 1st Progress 30.10.2001 2nd Progress Rep. 30.03.2002 3rd Progress Rep. 30.06.2002 Final Report 30.09.2002 Regulatory Submittal
2	2	2.	Stress state calculation and measurement including:		
	3		• pipe whip restrain reassessment	Finished	10.03.2001
	4		• pipe penetrations reassessment	Finished	15.08.2001
	5		• integrity reassessment of steam piping due to water overfill	Started	30.10.2001
	6		• probability calculation according to PRISE methodology	Started	30.10.2001
	7		(US NRC) in comparison with LBP Pipe (SKI Methodology		
	8		• stress state measurements projects	Started	til 2003
3	9	3.	LBB concept application assessment including:		
	10		• comparison with Break Preclusion Concept	Started	30.10.2001
	11		• dynamic loading calculations due to steam water hammer	Finished	15.08.2001
	12		• E-C assessment	Started	15.09.2001
	13		• LBB concept application according to the US NRC SRP 3.6.3.	Started	30.04.2002
4	14	4.	TH analysis of multiple steam and feed water lines breaks in respect:		
	15		• core cooling and final performance	Started	15.10.2001
	16		• PTS situation		15.10.2001
	17		• radiological consequences		15.10.2001

5	**18**	**5.**	Feasibility study on separation of steam and feed water lines by qualified separation walls design	Started	30.06.2002
6	**19**	**6.**	UT Qualification of method, equipment and personnel according to ENIQ methodology for circumferential welds and pipe whip restrain fixation elements, UT testing and assessment of results	Started	30.11.2001 and during outage
7	**20**	**7.**	Qualification file development for the BRU-A valve and the SG SV (IPU-Valves) for steam-water mixture performance	Started	30.06.2002

APPENDIX II

Excerpt of MSSV information from:

Qualification Dossiers for S-W Mixture of BRU-A and SGSV including EQ of BRU-A actuator

Jan Fridrich, Rudolf Josífko, Antonin Král, Václav Maxa

Division of Integrity and Technical Engineering
Nuclear Research Institute Řež plc
250 68 Řež, Czech Republic

Parent Valve Qualification Program, Cont.

- **Steam tests**
  - **4 full cycles with IPV solenoids controlled manually (3) and pressure induced signal (1),**
  - **1 direct mode cycle**
  - **8.4/7 MPa/300°C,**
- **Water tests**
  - **8.5/7.8 MPa, T < 100°C**
  - **4 full cycles with IPV solenoids controlled manually (2) and pressure induced signal (2)**
  - **2 direct mode cycles**

APPENDIX III

Figures and Schemes

Revision 1, issued 2003 01 12

Origin of the Figures

Figures	Title	Source
Figure 1	WWER-1000 NPP mock-up in between other exhibiting the 28,8m level area and two main secondary feed water lines	http://www.nucleartourist.com/type/vver.htm
Figure 2	WWER-1000 main steam and feed water lines inside and outside the containment (at 28,8 m level)	Institute of Risk Research, University of Vienna
Figure 3	BRU-A Valve type Chekhov Type 1115-300/350 (WWER-1000)	Jan Fridrich, Rudolf Josífko, Antonín Král, Václav Maxa, (NRI), Qualification Of Steam Generator Safety And Relief Valves, Presentation at the Workshop
Figure 4	MSSV Valve type Chekhov Type 969-250/300 (ETE)	Jan Fridrich, Rudolf Josífko, Antonín Král, Václav Maxa, (NRI), Qualification Of Steam Generator Safety And Relief Valves, Presentation at the Workshop

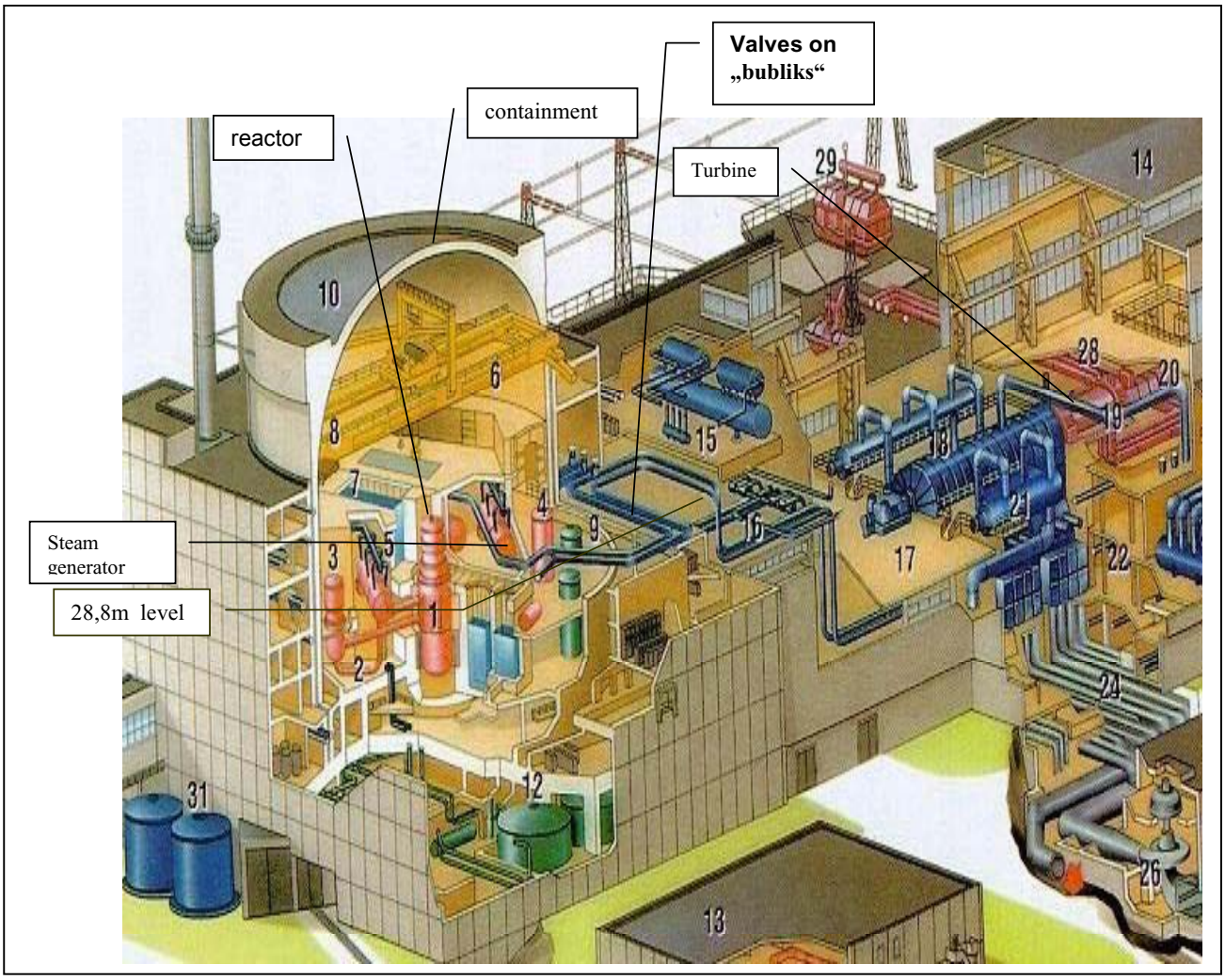

Figure 1 WWER-1000 NPP mock-up in between other exhibiting the 28,8m level area and two main secondary feed water lines

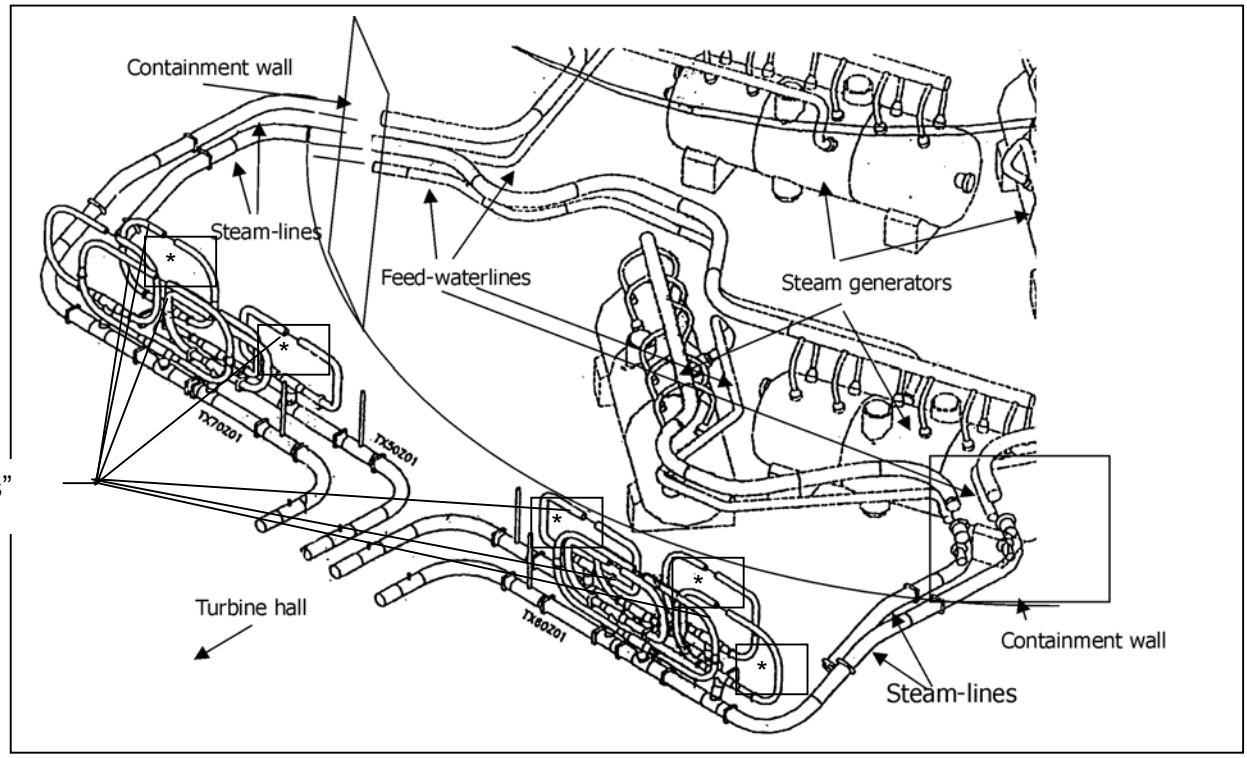

Figure 2 WWER-1000 main steam and feed water lines inside and outside the containment (at 28,8 m level)

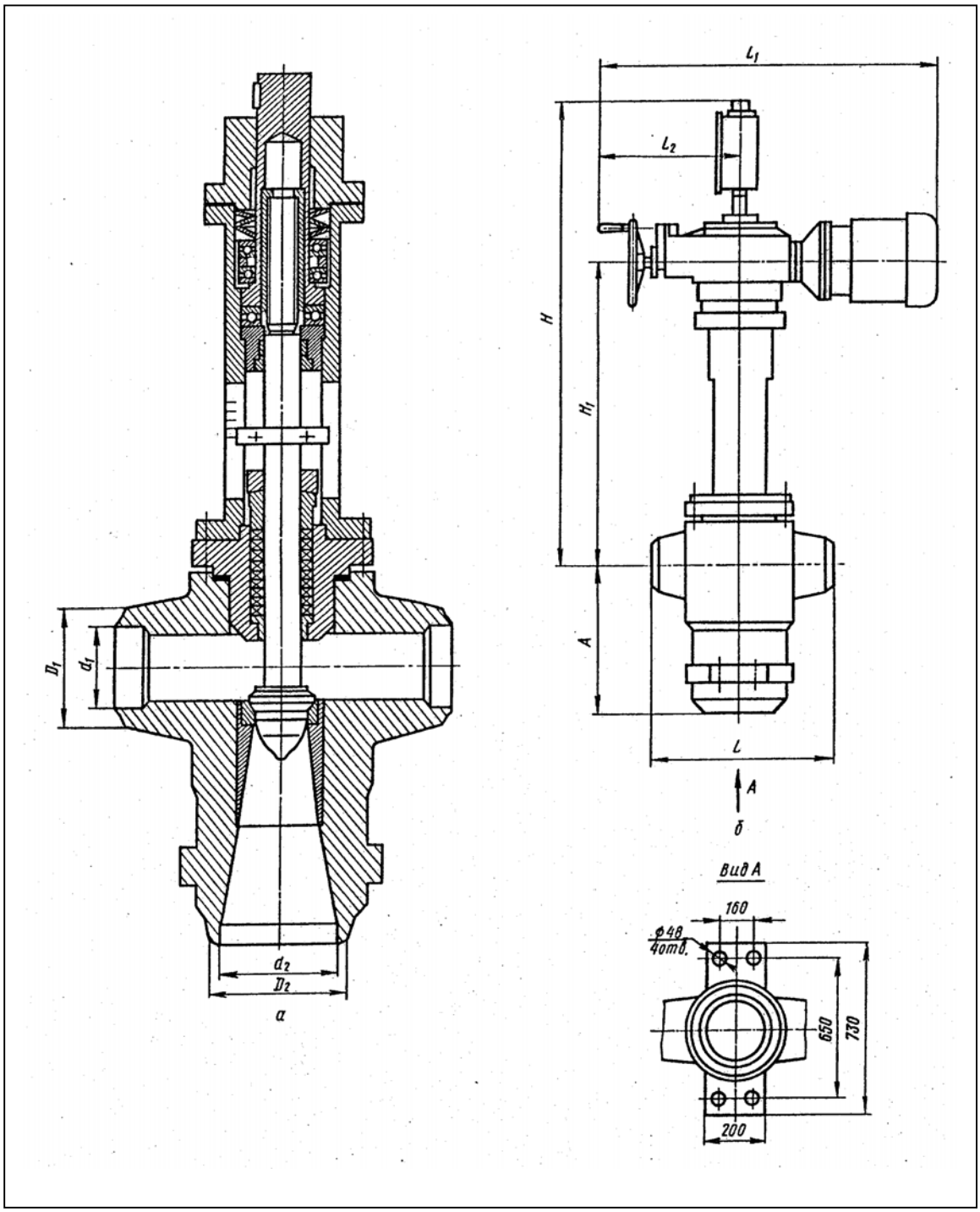

Figure 3 BRU-A Valve type Chekhov Type 1115-300/350 (WWER-1000)

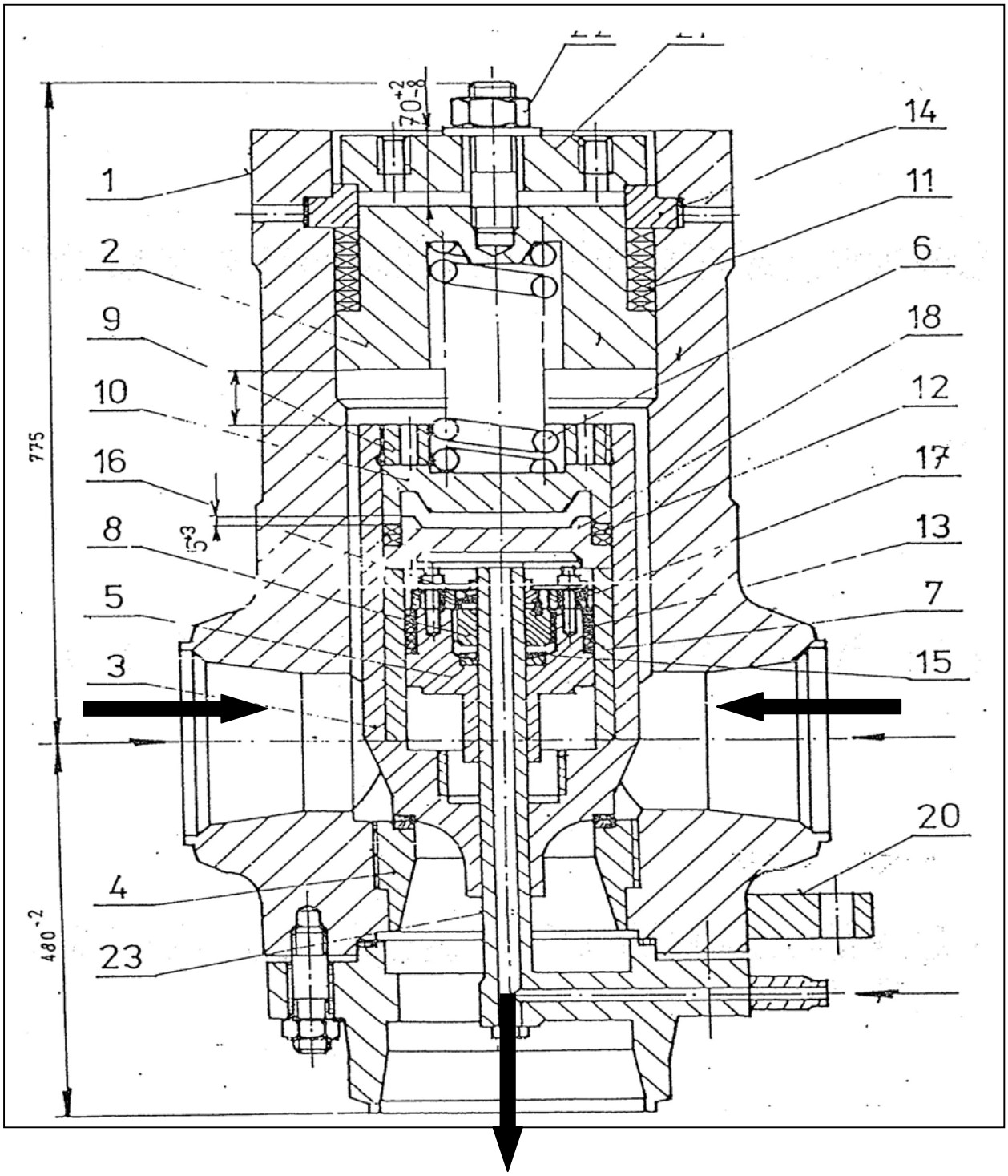

Figure 4 MSSV Valve type Chekhov Type 969-250/300 (ETE)

ABBREVIATIONS

Sym-bols		
	[°C]	degree centigrade
	MPa	Mega Pascal
A		
	A820 and 826/1	28,8 m level
	APP	Application
	AQG/WPNS	Atomic Question Group/Working Party on Nuclear Safety
	ARCS	Consultant: Austrian Research Centers seibersdorf research
	ASME	American Society of Mechanical Engineers
	ASME Code QME	American Society of Mechanical Engineers Code for Qualification of Active Mechanical Equipment Used in Nuclear Power Plants
	ASME QME-1-1994	American Society of Mechanical Engineers, Qualification of Active Mechanical Equipment Used in Nuclear Power Plants, 1994
B		
	BRU-A	secondary system relief valves
C		
	CERVUS	Working Group CERVUS
	ČEZ	České energetické závody - the Czech Electricity Generating Company
	ČEZ a.s.	Energetická společnost ČEZ, as
	ČEZ/ETE	Nuclearna Electrarna Temelín
	Chekhov	Checkov Company (joint venture with Siemens) producer of valves
	Code	consistent package of rules and regulations
	Code-Case	Individually treated application of a Code setting requirements
	Commissioning	Licensing Process
	CONF	Czech Conference Paper Series (documentation)
	CSCR	Comprehensive Safety Case Revisit
	CUMULUS	valves test facility of EdF
	ČZ	Czech Republic
D		
	DITI	Publication Series source not identifiable
	diversity	identical function provided by applying different means
	Doket	Document

E		
	EC	European Community
	E-C	Erosion-Corrosion
	EdF	Électricité de France
	ENIQ	European Network for Inspection Qualification
	EQ	Environmental Qualification
	ETE	Electrarna Temelin NPP
	ETE1	Electrarna Temelín NPP Unit 1
	ETE2	Electrarna Temelín NPP Unit 2
	EU	European Union
F		
	Final Report	Final Monitoring Report
	FW	feed-water
G		
	Guidelines	Non-mandatory recommendations for an identified purpose
H		
	Harmonisation	develop a coherent view or solution
	HEL	High Energy Lines
	HELB	High Energy Line Break
I		
	IAEA	International Atomic Energy Agency
	IPU	SG Safety Valves (IPU-Valves)
	IRR	Consultant: Institute for Risk Research
	Isometric	drawing projection method for engineering designs
J		
	JETE	Jaderna Electrarne Temelin
K		
L		
	LBP	Low Break Probability Concept of SKI (Sweden)
	LBB	Leak Before Break Concept
	Ltd	Limited
M		
	Melk	City in Austria where the A - CZ "Melk Agreement" was signed
	MFW	Main Feed-Water
	MFWL	Main Feed-Water Line
	Mochovce	EMO Nuclearna Electrarna Mochovce in Slovakia
	MONITORING	Austrian oversight process along the Temelín “Roadmap” (see page 67)

	MS	Main Steam
	MSIV	Main Steam Isolation Valve separating the steam generator from the turbine
	MSL	Main Steam Line
	MSS	Main Steam System
	MSSV	Main Steam Safety Valve
N		
	NPP	Nuclear Power Plant
	NRI-Řež	Nuclear Research Institute in Řež
O		
P		
	PM	Project Milestone
	PMR	Preliminary Monitoring Report
	PN2	Project Number 2 “High Energy Pipe Lines at the 28.8 m Level”
	PN3	Project Number 3 “Qualification of Valves”
	PN….	Project of the “Roadmap” (see page 67 ff.)
	PRISE	Primary to Secondary Leak Event
	Procedure	Qualified and approved sequence of actions serving a specified purpose
	Project Milestone	subdivision of IRR/ARCS Project
	PTS	Pressurised Thermal Shock (quenching shock of structures under high pressure and temperature)
	PWR	Pressurised Water Reactor
Q		
	QME	Quality of active Mechanical Equipment
	QVC	Extension of Qualification from Parent to Candidate Valves
	QVP	Qualification for Parent Valves
R		
	RANKING	Importance of document requested
	redundancies	system portions providing for independent identical functions
S		
	SAMG	Severe Accident Management Guideline
	SG	Steam Generator
	SGSV	Steam Generator Safety Valve
	Similarity	Comparable operation properties of two components different in size
	SIR	Specific Information Request
	SKI	Swedish Institute

	SRP	Standard Review Plan of the US-NRC
	Specialists	Experts Appointed for the “Roadmap” Process
	SÚJB	Státní Úřad Pro Jadernou Bezpečnost - Czech Licensing and Supervisory Body
	SUPERPIPE	Indigenous "Safety Case" demonstration composed by the Czech partners
	SUPERVE	Siemens program for valves’analysis
	Surveillance	Properties development verification process
	SV	Safety Valve
T		
	TH	Thermal-Hydraulic
	TOR	Terms of Reference
	TSO	Technical Support Organisation
	two-phase flow	Flow of a fluid consisting of two phases (e.g. steam and water)
U		
	UBA	Umweltbundesamt (Main Contracting Party)
	ÚJV	Ústav jaderného výzkumu Řež (ÚJV), Research Institute Řež
	US	United States
	USA	United States of America
	US-NRC	United States Nuclear Regulatory Commission
	UT	Ultrasonic Testing
	UT NDE	Ultrasonic Testing Non Destructive Evaluation
V		
	validated	Qualified for use in a validation procedure
	VLI	Verifiable Line Item
	VVER	WWER synonym (Water-cooled Water-moderated Energetic Reactor = VVER is an acronym for Vodo-Vodyannoy Energeticheskiy Reactor
W		
	WORKSHOP	PM3 event in Prague
	WPNS	Working Party on Nuclear Safety of the EU
	WWER	PWR as the former East-Block Version

APPENDIX IV

AUSTRIAN PROJECTS IDENTIFICATION

PN 1	Severe Accidents Related Issues – [Item No. 7a] *
PN 2	High Energy Pipe Lines at the 28.8 m Level (AQG/WPNS country specific recommendation) [Item No.1] *
PN 3	Qualification of Valves (AQG/WPNS country specific recommendation) [Item No.2] *
PN 4	Qualification of Safety Classified Components [Item No. 5] *
PN 5	Regular bilateral Meeting 2002
PN 6	Site Seismicity [Item No. 6] *
PN 7	Severe Accidents Related Issues – [Item No. 7b] *
PN 8	Regular bilateral Meeting 2003
PN 9	Reactor Pressure Vessel Integrity and Pressurised Thermal Shock [Item No. 3] *
PN 10	Integrity of Primary Loop Components – Non Destructive Testing (NDT) [Item No. 4] *
PN 11	Regular bilateral Meeting 2004

* *The Items are related to Annex I of the Conclusions of the Melk Process and Follow up*

APPENDIX V

The Austrian Specialists' Team

AUTHORS of this DOCUMENT

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Antonio Madonna	IRR consultant (Italy)
Steven Sholly	Institute of Risk Research (United States)

**) Specialists not participating in the Specialists' Workshop*

Quality Assurance was assigned to all partners as an integral part of the document review during its development!

MISSION STATEMENT
as adopted by the Specialists' Team

MONITORING MISSION STATEMENT

The independent Specialist'Team agreed on a "Mission Statement" to define the monitoring process co-ordinated by IRR/ARCS.

"Monitoring" is a process performed in a predefined frame addressing selected issues defined in the "Conclusions of the Melk Process" as well as in the "Roadmap" and the solutions to these issues adopted by the Czech side.

Issues and their solutions are monitored on the basis of reference safety criteria and requirements coherent with Safety Approaches accepted in Western Europe. The requirements are checked against the generally applied Defense in Depth Concept.

The Monitoring has the objective to obtain evidence that adequate solutions have been submitted by the licensee to the licensing authority and that these solutions have been appropriately evaluated and approved by the regulator. Monitoring aims at performing an evaluation of the quality and adequacy of an overall process and the implementation results.

The Czech side has offered documentation and discussion opportunities.

The Monitor, in order to form a consistent opinion should be provided with the opportunity to ask for additional information and evidence or request supporting assessments to understand the evidence presented.

Reports of the Specialists' Team therefore include monitoring results of

- what has been done,
- how the applicable requirements have been addressed,
- how the safety objectives' and requirements' compliance was analysed and justified for the proposed solutions, and
- how the solutions in the frame of the licensing process and considered in the related regulatory process were evaluated

The Monitors were not tasked with performing a licensing review of Temelín NPP, and nothing in their reports may be construed to represent any such review. The responsibility for the safety and licensing of Temelín remains with CEZ a.s. as the owner of the facility, and with the SÚJB, as the designated nuclear licensing and regulatory authority under Czech law.