Outstanding Issues	Identified Shortfall	Case for Continued Operation/ Future Improvement
16	Consideration given to fatigue and fracture needs to be discussed. The previous fatigue and fracture assessments resulted in a number of inspection and maintenance requirements for various parts of the Facility. The danger is that these may not have been carried forward to the current CLOSO and EMIT requirements, or that the reasons for them might be forgotten about in the future.	Subject of a work package under FAP 73. Substantiation to address this issue is planned to be completed in 2010. In the meantime the number of Shiplift operating cycles is considerably less than assumed in the safety justification
17 Predicted tide levels	An initial review of the predicted tide heights showed that more recent data indicated an increase in the predicted 10^{-2} and 10^{-4} tides.	A higher tide height on its own and in conjunction with wave heights places higher loadings on the jetties. However margins are adequate to claim that this increase will not have any significant effect on the justified withstand of the civil structures. With the higher tides the moorings on the catamarans are predicted to clash with the jetty under the extreme sea state. Whilst some damage may be experienced, total severance of the catamarans is not expected. The threat of the loss of overside services is approximately 1% of the contribution to risk from external hazards. Predicted design tide heights are now presented in DGD505. Increases in tide heights continue to be monitored to ensure the safe operating envelope is not breached

Outstanding Issues	Identified Shortfall	Case for Continued Operation/ Future Improvement
18 Seismic withstand capability of the Cooling Water System	The as-built cooling water systems have been analysed against the 0.2g reference earthquake and 0.28g margins criteria and when the assessed loads are combined with the thermal expansion loads the pipework is over-stressed. Also some loads on the pump bearings exceed stated allowables for the bearing.	Exceedance of the code or stated allowables could lead to failure of the system such that cooling to the vessel when docked could not be maintained. This could also jeopardize the availability of the fire-fighting systems. Diversity of supply and the available grace times to re-establish cooling to the submarine means that the increase in the overall risk from the Facility is small. A design solution to strengthen/replace the required supports has been prepared for implementation
19 Blast withstand of the building	As part of an initial study, very conservative assumptions on the characteristic of the blast reaching the Facility were used. From this it was predicted that the code allowables for the Shiplift building would be exceeded.	A lack of withstand capability of the building and the jetties would present a significant direct and indirect contribution to the risk to the stable support to the submarine. Currently the predicted risk from EBA is low 6.96×10^{-8} per year. The effect of losing support has been studied and this has shown that the decelerations associated with the impact with the water and subsequently with the seabed are small compared with the results from dropped loads onto the submarine. However with the blast effect services as well as loss of support may occur which would mean an increase in the predicted risk than currently included in the PRA. Currently the management arrangements within the Clyde Base means that the risk of a major blast is acceptably low. Blast risk is maintained at a tolerable level by implementation of the safety management arrangements set out in the POMSR and Warships in Harbour Safety Case

Outstanding Issues	Identified Shortfall	Case for Continued Operation/ Future Improvement
20 Lack of withstand capacity in the EOT Crane trolley rail clips	The predicted seismic loading for the rail clips which retain the trolley have been assessed under the earthquake hazard and the loads exceed the capacity when based upon code acceptable stresses.	The potential failure of the clips would in the extreme lead to a loss of the trolley off the crane girder causing an additional dropped load hazard to the submarine. This would increase the predicted Risk from the dropped load hazard. The capacity of the trolley retention clips has been reviewed and shown to be able to capture the trolley if the rail clips fail. Therefore this removes the potential for total loss of support to the trolley lead to an impact with the submarine.
21 Frequency of Crane Collapse for both EOT and 12 Berth Cranes	The predicted loadings resulting from an extreme hang-up or hook-up could threaten the stability of the 12 Berth Crane and the strength of the EOT Crane. As a consequence an impact of these cranes with the boat needs to be considered. Furthermore the predicted frequency of the event is sufficiently high that the extreme event cannot be ignored.	More than 90% of the predicted risk from external hazards is attributable to crane collapse. The overall Facility risk is acceptable and therefore it is also acceptable to use the cranes. For the EOTC over 90% of the lifts are undertaken using the auxiliary hoist. It is expected that in the event of hang-up or hook-up there will be failure in the auxiliary hoist load path before crane collapse takes place For the B12 crane an output of the SDSC is the expected 3 MJ impact withstand. It is recognised that a further assessment of the implications of crane collapse impacts onto the vessels needs to be considered.
22 Withstand capability of the on board structures and systems	The analysis of the impacts on the submarine during SIP 3 has focused on the issues regarding prompt criticality and the need to fit an engineering safeguard to prevent rod bounce. The need to develop the boat internal modelling to capture the demand on the cooling and control systems is not very advanced and therefore in the PRA extreme consequences of a major LOCA have been assumed.	The consequence from these events provides the assessment of the risk from crane collapse and EBA. The total predicted risk is acceptable. The development of the Shut Down Safety Case, including assessment of the impact withstand of the vessel and its nuclear related systems, will better inform the risk to the NRP through EBA and dropped load/crane collapse.

7099 The SJP to Issue 3 of the Shiplift FSC, (Ref.3), addresses the outstanding issues discussed here. The proposed close out is indicated in the FAPs included in the SJP in accordance with the appropriate safety management arrangements. These will show the programme for the resolution of each issue demonstrating the urgency attached to each issue.

CONCLUSION

7100 This FSC presents:

- A summary of the safety functional requirements based upon the five critical requirements of the NRP with a more detailed breakdown of these requirements contained in the Safety Requirements Document, (Ref.12).
- A description of the Facility equipment, the design, performance and operation provided to meet the requirements, and the Safety Management Arrangements in place to support continued safe operations.
- An auditable trail of the event sequences which may place demands on the Facility to tolerate faults or withstand hazards.
- A Preliminary Hazard Assessment of the potential hazards and faults based on the most recent HAZOP of the Facility and the definition of the dominant hazards. The overall detailed hazard assessment is contained in the Hazards Assessment Document, Ref.13.
- A Safety Assessment which is deterministically based for the foreseeable events and probabilistically based to assess the risks from the dominant hazards. This provides the arguments that the dominant hazards and normal operations are both tolerable and consistent with the ALARP principle, notwithstanding this it is recognised that the low level of risk could be reduced further as noted in parts 5 and 7, and reflected in the SJP.
- A review of Operational experience.
- A demonstration of acceptability in that it is adequately safe to continue operation.

7101 This FSC also presents a demonstration of compliance with the MoD Safety Principles and Safety Criteria as interpreted by the Safety Principles Paper. A list of the Conditions and Limits of Safe Operation is specified to which the Facility must adhere to operate within the bounds of the FSC. Fault Recovery Guidelines have been developed to ensure that safe recovery is undertaken in the event of a fault which takes the Facility outside its normal operating envelope. These extend the already detailed EOPs and are based on the assessment of the key hazards. However fault specific guidance is now being developed.

7102 The following can be concluded from the summary of the evidence presented in this FSC

1. The Safety Case portrayed in this Facility Safety Case is based on a well-founded set of documentation containing the details of the requirements, the hazards to be addressed and the safety justification.

2. All the main structures in the Facility have been shown to be code compliant for all foreseeable events when judged against the appropriate code. However there

are some outstanding Regulatory issues to be addressed against the safety justification

3. The overall safety management arrangements are adequate to ensure that the Facility is operated correctly in line with the safety case by SQEP personnel. This FSC now reports the latest SMAs which include the implementation of the Babcock partnering role and the Decider/Provider roles

4. The Facility fully meets the requirements of all MOD SPSCs as interpreted by the SPP. It is recognised that the next update of the FSC should be based on the requirements of the NNSPs (Ref.16)

5. The safety function requirements have been met by the Facility to provide a facility for maintaining nuclear submarines safely.

6. The risk to the general public based upon the specified [redacted] dockings per year is calculated at 6.0×10^{-6} per year and based upon the level of understanding of the withstand of the NRP. A safeguard is required to be fitted to the control drive motors on the S&T vessels only.

7. The predicted risk from the Facility has been assessed for all three current classes of submarine and shown to be acceptably low on the basis of the pessimistic data used and is judged to be tolerable and ALARP.

8. The FSC has, in line with its declared strategy and available information, integrated the influence of the hazardous systems within the boat with the hazards presented by the Facility. However it is recognised that the output from the SDSC will allow the development of a fully integrated safety justification

9. The outstanding issues have been identified in the FSC. However it is judged that the continued operation of the Facility remains tolerable and ALARP. The SJP identifies the work and development necessary to achieve resolution of the outstanding issues.

7103 As a result of the completion of the third phase of the Safety Improvement Programme, known as SIP3, it has been confidently shown that the Shiplift Facility meets all its safety requirements and its acceptability has been demonstrated. A further Periodic Safety Review is now underway, and this combined with the output of the SDSC, will provide a more robust demonstration that the risk in operating the facility is tolerable and ALARP.

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REFERENCES

[1] JSP518	Regulation of the Naval Nuclear Propulsion Programme Issue 2
[2] SSCPM-TR-522	HMNB Clyde Shiplift Facility Safety Principles Paper Issue 6
[3] SJP DJD252/6/1	Shiplift Safety Justification Plan - Issue 12
[4] TR 3725	Safety Justification of the Docking of Minor Warships and Ancillary Vessels
[5] N.2522.78	Shiplift Civil Structure Design Safety Report – Issue 2
[6] N.2522.53	HMNB Clyde. Port Operational Management Safety Report. Issue 2
[7] NBC-NSSSC-WIH	HM Naval Base Clyde. Site Safety Case. Warships in Harbour. Issue 2
[8] N.2522.79	Shiplift Platform Design Safety Report – Issue 2
[9] N.2522.52/4	Shiplift Facility - Facility Safety Report, Fault Recovery Guidance – Issue 1
[10] N.2522.75	Shiplift EOT Cranes Design Safety Report – Issue 2
[11] N2522.76	Shiplift 12 Berth 20t Crane Design Safety Report Issue 2
[12] N2522.189	Shiplift Facility - Facility Safety Report, Safety Functional Requirements Issue 1
[13] N.2522.190	Shiplift Facility - Facility Safety Report, Facility Hazard Assessment – Issue 2
[14] N.2522.52/2	Shiplift Facility - Facility Safety Report, Probabilistic Risk Assessment - Issue 2
[15] TR5211 Pt 3	Shiplift Platform. Design Capability. Prime Member Rigid Bay Assessment. Static Fault Case
[16] NRPA-4-1-1	Naval Reactor Plant Authorisee. Naval Nuclear Safety Principles. Issue 2.
[17] RRA 018	HMNB Clyde Radiological Risk Assessment No. 18.
[18]CSSCA/GEN/034	Facility Safety Case Strategy Paper
[19]	Nuclear Safety Strategy. HM Naval Base Clyde. 2007-2016. Issue 3. Nov 2007.
[20] N2522.52/3	Shiplift Facility - Facility Safety Report, Conditions and Limits of Safe Operation – Issue 1

PART 8

bbreviations

PART 8

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ABBREVIATIONS

AA	Authorisee's Agent
AAM	Approval Authority Manager
ABs	Atomic Books
AC	Authorisation Condition
ACCS	Authorisation Conditions Compliance Statements
ADL	Allowable Differential Load
ADLogs	Assistant Director Logistics
ALARP	As Low As Reasonably Practicable
APF	Active Processing Facility
B&CE	Building and Civil Engineering
BO	Berthing Officer
BR	Book of Reference
BRSO	Base Radiation Safety Officer
BS	British Standard
BSC	Berthing and Services Committee
BSCO	Base Services Co-ordination Officer
BS EN ISO	British Standard European Standard (Norme Europeenne) International Standards Organisation
BSL	Basic Safety Limit
BSO	Basic Safety Objective
BSTG	Berthing and Services Test Group
BSyO	Base Security Officer
BT	British Telecom
BWG	Berthing Working Group
BXO	Base Executive Officer
CAPFASFLOT	Captain Faslane Flotilla
CCR	Central Control Room
CDLP	Cradle Docking Load Profile
CE	Control Engineer
CFHR	Centre Fed Hose Reel
CIMMS	Clyde Integrated Maintenance Management System
CLOSO	Condition and Limits Of Safe Operation
CMA	Cradle Marshalling Area
CMF	Common Mode Failure
CMS	Clyde Management System
CMSPM	Clyde Management System Process Map
CNNRP	Chairman Naval Nuclear Regulatory Panel
CNSC	Clyde Nuclear Safety Committee
CNSSSC	Chairman Nuclear Site Safety Sub Committee
CO	Commanding Officer
COB	Captain of the Base
C&P	Control and Protection
CPCA	Central Plant Control Authority
CRAF	Control Rod Arrest Feature
CSB	Clyde Submarine Base
CSDCC	Chairman Safety Design Control Committee
CSE	Certificate of Safety Explosives
CSF	Critical Safety Function
CSOME	Certificate of Safety - Ordnance Munitions Explosives

ABBREVIATIONS (Continued)

CSSM	Certificate of Safety - Shipbourne Munitions
DA	Design Authority
DAG	Development and Assessment Guidelines
DAP	Duly Authorised Person
DBA	Design Basis Assessment
dc	direct current
DCR	Design Change Request
DEB	Diesel Exhaust Boom
DG	Diesel Generator
DIRAMS	Dockside Installed Reactor Accident Monitoring System
DL	Dropped Load
DLogs	Director of Logistics
DM(S)	Dockmaster (Shiplift)
DNBO	Duty Naval Base Officer
DNSAG	Docking Nuclear Services Authorisation Group
DNSR	Defence Nuclear Safety Regulator
DO	Docking Officer
DRS	Defect Report Sheet
DSC	Design Safety Case
DSJG	Design and Safety Justification Group
DSR	Design Safety Report
DSSC	Design Substantiation Safety Case
EBA	Excessive Boat Attitude
EC	Emergency Cooling
ECR	Emergency Control Group
EHJ	Explosives Handling Jetty
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMM	Estates Maintenance Manager
EMIT	Examination, Maintenance, Inspection & Testing
EN	Euronorm
EPM	Emergency Planning Manager
EOP	Emergency Operating Procedure
EOT	Electric Overhead Travelling
EOTC	Electric Overhead Travelling Cranes
ESC	Explosives Safety Committee
ES(HP)	Engineering Support (Health Physics)
ETA	Event Tree Analysis
EU	European Union
EZRDC	Exclusion Zone Reception and Decontamination Centre
FA	Forward Action
FAP	Forward Action Plan
FDM	Facility Design Manager
FM	Facility Manager
FMEA	Failure Mode and Effect Analysis
FMUP	Facility Manager Utilities and Processing
FO	Facility Operator
FRG	Fault Recovery Guidance

ABBREVIATIONS (Continued)

FSC	Facility Safety Case
FSR	Facility Safety Report
FTA	Fault Tree Analysis
FWFF	Fresh Water Fire Fighting
g	Gravity
GSB	General Services Building
HA	Hazard Assessment
HAZOP	Hazard and Operability
HDLP	Hoist Docking Load Profile
HDSJ	Head of Design and Safety Justification
HMNB	Her Majesty's Naval Base
HMS	Her Majesty's Ship
HNA	Head of Nuclear Activities
HNBDD	Head of Naval Base Design Department
HNSAD	Head of Nuclear Safety and Development
HP	High Pressure
HPCD	Hold Point Control Document
HPDHR	High Pressure Decay Heat Removal
HRDS	Hoist Rotation Detection System
HSE	Health and Safety Exectutive
HV	High Voltage
Hz	Hertz
ICCP	Impressed Current Cathodic Protection
INSA	Independent Nuclear Safety Assessment
IP	Integrated Project
IPR	Independent Peer Review
IPT	Integrated Project Team
IRR99	Ionising Radiation Regulations 1999
ISAM	Integrated Safety Assurance Manager
ISO	International Standards Organisation
ITA	Independent Technical Assessment
JCM	Jetty Crane Manager
JFM	Jetties Facilities Manager
JGM	Jetty Group Manager
JIN	Job Identification Number
JMG	Jetty Management Group
JSP	Joint Services Publication
kN/m2	kiloNewtons per metre squared
kV	kilovolts
kW	kilowatt
LB	Longitudinal Beams
LMS	Load Monitoring System
LOCA	Loss of Coolant Accident
LP	Low Pressure
LT	Long Travel
LTE	Life Time Extention

ABBREVIATIONS (Continued)

m	meters
µSv/hr	Micro sieverts per hour
mSv/yr	milli sieverts per year
M&E	Mechanical and Electrical
MEWP	Mobile Elevated Working Platform
MCB	Main Circuit Breaker
MCC	Motor Control Centre
MDP	Ministry of Defence Police
MHE	Mechanical Handling Equipment
MGS	Ministry of Defence Guard Service
MJ	Mega Joules
MM	Maintenance Manager
MoD	Ministry of Defence
MORS	Maintenance and Operations Requirements Schedule
MT	Motor Transport
MTB	Main Transverse Beam
MTP	Medium Term Programme
NA Exp	Naval Authority Explosives
NAHQ	Nuclear Accident Headquarters
NARO	Nuclear Accident Response Organisation
NATO	North Atlantic Treaty Organisation
NBC	Naval Base Clyde
NBC(C)	Naval Base Commander (Clyde)
NBDA	Naval Base Design Authority
NBDD	Naval Base Design Department
NCF	Northern Calibration Facility
NDE	Non-Destructive Examination
NEQ	Net Explosive Quantity
NJAG	Nuclear Justification Appraisal Group
NNPP	Naval Nuclear Propulsion Programme
NNSP	Naval Nuclear Safety Princliples
NOD	Nuclear Operations Director
NOP	Nuclear Operating Procedure
NRP	Naval Reactor Plant
NRPA	Naval Reactor Plant Authorisee
NSADT	Nuclear Safety and Development Team
NSAM(C)	Nuclear Safety Assurance Manager (Clyde)
NSAG	Nuclear Services Authorisation Group
NSI	Nuclear Safety Implicated
NSRP	Nuclear Steam Raising Plant
NSRS	NATO Submarine Rescue System
NSSJ	Nuclear Site Safety Justification
NSSSC	Nuclear Site Safety Sub Committee
NTL	Nuclear Test Lift
NTRP	Nuclear Training Requirements Plan
NUB	Northern Utilities Building
NW	Nuclear Weapons
NWSA	Nuclear Weapon Safety Advisor
NWSSSC	Nuclear Weapon Site Safety Sub Committee

ABBREVIATIONS (Continued)

O&M	Operation and Maintenance
OD(N)	Ordnance Datum (Newlyn)
OFD	Oil Fuel Depot
OiC	Officer in Charge
OME	Ordnance Munitions Explosives
OMSR	Operational Management Safety Report
OPP	Operational Proving Period
OSRP	OME Safety Review Panel
OWS	Operators Work Station
PAG	Procedure Authorisation Group
PDR	Performance Development Report
PEB	Primary Effluent Barge
PESO	Pendant Emergency Stop Operator
PET	Primary Effluent Tank
PGM(C)	Platform Group Manager (Clyde)
PHA	Preliminary Hazard Assessment
PLA	Planning Logistics Afloat
PLC	Programmable Logic Controller
PLMS	Primary Load Monitoring System
PML	Principia Mechanica Limited
PMLF	Permanent Magnetic Locking Facility
PMP	Project Management Plan
POL	Petrol, Oil and Lubricants
POMSR	Port Operational Management Safety Report
PRA	Probabilistic Risk Assessment
PSA	Probabilistic Safety Assessment
PSR	Periodic Safety Review
PTO	Professional and Technology Officer
PWR	Pressurised Water Reactor
QA	Quality Assurance
QHM	Queen's Harbour Master
RBA	Re-entry Body Assembly
RC	Reactor Compartment
RCM	Reliability Centred Maintenance
RE	Reference Earthquake
REDF	Radioactive Effluent Disposal Facility
RIF	Regulator Interface Forum
RN	Royal Navy
RNAD	Royal Navy Armaments Depot
ROM	Radioactive Operations Manager
RP	Relay Panel
RPA	Radiological Protection Advisor
RPR	Relay Panel Room
RPS	Radiation Protection Supervisor
RPSJ	Reactor Plant Safety Justification
RPSO	Radiological Protection Standing Order
RRA	Radiological Risk Assessment
RSA93	Radioactive Substances Act 1993

ABBREVIATIONS (Continued)

S&T	Swiftsure and Trafalgar
SAP	Safety Assessment Principles
SCADA	Supervisory Control and Data Acquisition
SCB	Shore Connection Box
SCE	Safety Case Engineer
SCO	Staff Communications Officer
SCR	Shiplift Control Room
SDCC	Safety Design Change Committee
SDSC	Shut-Down Safety Case
SFM(C)	Superintendent Fleet Maintenance (Clyde)
SFR	Safety Functional Requirements
SIP	Staged Improvement Plan
SL	Shiplift
SJP	Safety Justification Plan
S/M	Submarine
SME	Seismic marginal earthquake
SOP	Standard Operating Procedures
SOR	Statement of Responsibilities
SPP	Safety Principles Paper
SPM	Shiplift Planning Manager
SPSC	Safety Principles and Safety Criteria
SQEP	Suitably Qualified and Experienced Person
SRCG	Site Risk Co-ordination Group
SRCM	Site Risk Co-ordination Manager
SRS	Secondary Response Spectra
SSBN	Ship Submersible Ballistic Nuclear
SSC	Site Safety Case
SSD	Site Services Director
SSJM	Site Safety Justification Manager
SSN	Ship Submersible Nuclear
STC	Side Transfer Carriage
SW	Seawater
SWC	Sea Water Cooling
SWFF	Sea Water Fire Fighting
SWL	Safe Working Load
SWS	Strategic Weapons System
SWSPAG	Strategic Weapons System Procedure Authorisation Group
t	Tonne (1000kg)
TAD	Transfer Ashore Door
TAR	Time at Risk
TIC	Technical Information Centre
TLAM	Tactical Land Attack Missile
TOM	Telephone Operations Manager
TOR	Terms of Reference
TR	Technical Report
TWS	Tactical Weapons Systems
TX	Transformer
UE(L)	Utilities Engineer (Electrical)
UE(M)	Utilities Engineer (Mechanical)
ULL	Uncontrolled Load Lowering

ABBREVIATIONS (Continued)

UOM	Utilities Operation Manager
V	Vangaurd
V&CSOWG	Vessel and Crew Support Operations Working Group
VED	Vessel Entry Door
VLCC	Very Large Cargo Carriers
VS	Vessel Support
VSCM	Vessel Support Capability Manager
WSC	Weapon Storage Compartment
Y2K	Year 2000

FSC DEFINITIONS

TERM	MEANING
Berthing	The movement of the submarine into the Shiplift and associated activities which are carried out with the submarine afloat and are associated with any vessel movements.
Conditions and limits of Safe Operation.	These are the limits on which the safety case is based, many of these will be assumptions in deterministic and probabilistic analysis. Specific manning requirements are defined and special equipment is identified.
Commercial Design Basis	The commercial design basis involves the use of methods and standards, which establish a design, which can be operated within acceptable limits of commercial risk. This is adequately met using the concept maximum credible accident which frequently is a factored normal operating condition to demonstrate the withstand capability of the design.
Days on Pins	The number of days a docked vessel is supported by the hanger pins after going 'Down To Pins' until 'Up Off Pins'.
Docking	The process of raising a vessel from the point of "grounding", through "Auto Level" to "On-Pins".
Existing Facility	1. A facility used in support of nuclear powered warships, that is subject to normal rolling review of its safety justification, including Periodic Safety Reviews and has not been subject to recent significant modification, whereby either the use or the principles of its nuclear design intent has been changed. 2. Such existing Facilities should be regularly tested and analysed during operation and maintenance to show that they meet performance and reliability standards. They should be authorised for a specific period not to exceed the design life remaining of the shortest-lived nuclear safety, justified system subject to: i) Any special conditions in the Site Authorisation. ii) Demonstration of the maintenance of the nuclear design intent and design life in any minor modifications and alterations. iii) Satisfactory standards of maintenance and inspection. iv) Periodic review of the safety justification, at periods dictated by the Site Authorisee, or at periods of no greater than 5 years, to confirm the maintenance of the nuclear design intent demonstrated by the Design Capability and take into account any factors which may have subsequently have been recognised to have safety significance. Such reviews to be conducted using modern assessment methods against the nuclear design intent demonstrated through the Design Capability. In the light of the results of the reviews, any improvements, which are sensible and reasonably practicable, should be carried out, to bring the Facility towards the safety standards in force at the time of the review. 3. When applying the ALARP principle, age and projected life are factors which, may be taken into account when determining the reasonably practicability of making safety improvements. Shortfalls need only be remedied when it is shown to be reasonably practicable, taking the reduction in risk into consideration, or if they represent an intolerable hazard. It is noted that additional guidance is given in Annex A Appendix J of BR 3018(2). Additional guidance may also be developed specifically for the Shiplift Facility.

TERM	MEANING
External hazard	Hazards generated external to the submarine.
Fatigue Cycle	A 'Fatigue Cycle' is deemed to have occurred whenever a hoist is loaded in excess of 30% of SWL (116t) and is then subsequently unloaded. The fatigue cycle then counts against the number of cycles, which are assumed in the safety. case (See Operational data).
Float Off	The point at which the platform is lowered sufficiently for the vessels own buoyancy to totally support the vessel.
Global Collapse	This is the situation in a structure which is beyond the point of design demonstration where the loss of stable support reaches are extent where the load distribution leads to sequential component failure. This point is known as Structural or Global Collapse.
Grounding	The first point of contact between the vessel and cappers. This is the first point at which the vessel's weight starts to be supported by the Shiplift platform. Note: Grounding is explicit to docking activities on a Shiplift in a controlled manner and does not relate to grounding associated with contact with the seabed.
Internal Hazard	Hazards generated internal to the submarine.
Level 2 Probabilistic Safety Assessment	The assessment terminates with a Fission Product release.
Level 3 Probabilistic Safety Assessment	The assessment terminates with a Risk to the 'three' populations.
Level 1 Safety Justification	A fully substantiated set of arguments and statements, demonstrating compliance with SPSCs and that the Facility is safe to operate within the defined scope.
Level 2 Safety justification	An interim justification which contains some judgements which are not fully substantiated. A programme for the achievement of the substantiation is presented and approval to operate is for a defined period.
Nuclear Design Intent	The nuclear design intent is to lift the vessels described in this document, one at a time, to the maintenance level on the Shiplift Platform and safely return it to the water, and also provide berthing at 12 berth in accordance with the MoD SPSCs as interpreted by the Shiplift Facility Safety Principles paper and its associated documentation.
Nuclear Safety Related Equipment	This is any equipment which is important to the safe operation of the NRP or nuclear Facility and/or which provides a safeguard against a release of radioactive material and/or increase in risk of radiation exposure.
Nuclear Use	A 'nuclear use cycle' commences when the platform is raised beyond 1m above the water level during the docking of a nuclear submarine, and is completed when the submarine is undocked.

TERM	MEANING
Planned Docking	A planned docking requirement essential for dock dependant work. The vessel will be in Plant State B or lower, have PMLF fitted, until approval to dock without PMLF has been achieved, a decay heat level of less than [redacted]W([redacted]W for S class) and may have TWS and SWS embarked.
Platform	All equipment, systems, structures and operations pertaining to the Lifting Platform excluding the Shiplift building and 12 Berth.
Pre Operational Checks	The series of Mechanical, Electrical and Seamanship preparations and tests conducted prior to all dockings and undockings.
Safety Mechanisms Devices and Circuits	An engineered safeguard that is not invoked in normal operation and by which prevents Safety Case being breached. (See Part 4 – Safety Management System, Sub-paragraph Safety mechanisms).
Shiplift	All equipment, systems, structures and operations pertaining to the Shiplift excluding 12 Berth.
Shiplift facility	All equipment, systems, structures and operations pertaining to the Shiplift including 12 Berth.
Structural Reliability	This is the probability that, for a given load, a structure will remain in a state able to continue to adequately support the load which way include under-elastic deformations. It is a measure for selecting the limit for design documentation.
Unberthing	The reverse process of berthing including the associated activities (such as the removal of AC Shore Supply) which are carried out with the submarine afloat and are associated with any vessel movements.
Undocking	The reverse process of docking which is taken to commence with the platform being raised up of pins and to end with the vessel afloat and the platform at full depth.
Unplanned docking	An unplanned docking requirement, where there is a greater radiological risk to the site by leaving the vessel in it's current situation, than from providing the necessary level of support from the facility. The fitting of PMLF and the plant state, decay heat levels and retention of weapons will be dictated by the severity of the emergency.
Urgent Operational Docking	An unplanned docking requirement to meet a military imperative where the fitting of PMLF will be considered against a balance of risk argument. The vessel will be in Plant State B or lower, have a decay heat level of less than [redacted]W([redacted]W for S class) and may have TWS and SWS embarked.
Risk	Risk refers to the individual risk of premature death from ionisation radiation resulting from a fission product release from a Naval Nuclear Reactor Plant in the Shiplift Facility.

ANNEXES

ANNEX A

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SAFETY PRINCIPLES COMPLIANCE TABLE

INTRODUCTION

A.1 The Shiplift Facility is operated within the site wide management structures and procedures set down by HMNB Clyde. Accordingly a SSC (Ref. [1]) covering the HMNB Clyde facilities as a whole is in existence. The Shiplift Facility has its own local management arrangements which are driven by and inter-link with the higher tier of arrangements. This FSC has been developed with reference to the SPP (Ref. [2]). This paper interprets the application of the MoD Safety Principles to the Shiplift Facility, in the context of the Facility being an Existing Facility, as agreed with the Regulator.

A.2 To support development of the FSC in accordance with the SPP (Ref. 2), it was necessary to establish DAGs. These documents, as introduced in the SPP, define the processes, methods and assumptions made during the development of the Shiplift FSC, from the establishment of FSC Issue 2 and through the Shiplift Staged Improvement Programme to this FSC Issue 3. The DAGs are specific to the Shiplift Facility as it is the only Facility at HMNB Clyde which has required interpretation of the MoD SPSCs in a SPP. Many of the areas where guidance is required when considering the production or development of the FSC are addressed at site level and the DAGs do not aim to repeat this guidance.

A.3 The DAGs contain high-level guidance and are supplemented by more specific guidance within the supporting Technical Reports. The NDBA have used the DAGs as the basis of their design guidance documents.

A.4 The following DAGs have been developed for the Shiplift in accordance with the SPP (Ref. 2):

a. DAG 1. - Feedback from Operational Experience.

b. DAG 2. - General Assessment Methodology.

c. DAG 3. - Derivation of Bounding Load Cases and Bounding Loads.

d. DAG 4a. - Structural Codes and Standards.

e. DAG4b. - Electrical Codes and Standards.

f. DAG 5. - Structural Assessment.

g. DAG 6. - Demonstrable Code Compliance.

h. DAG 7. - Justified Code Compliance.

i. DAG 8. - Probabilistic Treatment of Structures.

j. DAG 9. - Probabilistic Safety Assessment.