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Global Standard for Responsible Supply of Marine Ingredients Fishery Assessment Methodology and Template Report V2.0



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Fishery Under Assessment	Bigeye Tuna Atlantic East
Date	March 2020
Report Code	2020-253
Assessor	Jim Daly
Stock Pass	FAO 34, 47 Atlantic Southeast
Stock Fail	

Application details and summary of the assessment outcome				
Name: Marine Biotechnology Limited Ivory Coast				
Address: Abidjan				
Country: Ivory Coast		Zip:		
Tel. No.:		Fax. No.:		
Email address:		Applicant Code:		
Key Contact:		Title:		
Certification Body Details				
Name of Certification Body:		SAI Global Ltd		
Assessor	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-approval	Whole fish/ By-product
Jim Daly	Conor Donnelly	0.5	Initial	By-product
Assessment Period	2020			

Scope Details	
Management Authority (Country/State)	ICCAT
Main Species	Bigeye tuna (<i>Thunnus obesus</i>)
Stock:	FAO 34, 47
Fishery Location	Atlantic Southeast
Gear Type(s)	Longline, pole-lines, purse seine
Outcome of Assessment	
Peer Review Evaluation	AGREE
Recommendation	APPROVE

Assessment Determination

If any species is categorised as Endangered or Critically Endangered on IUCN's Red List, or if it appears in the CITES appendices, it cannot be approved for use as IFFO RS raw material. Bigeye tuna does not appear as Endangered or Critically Endangered on IUCN's Red List, nor does it appear in CITES appendices; therefore, Bigeye tuna is eligible for approval for use as IFFO RS by-product raw material.

Various pieces of evidence, such as a lack of identified genetic heterogeneity, the time-area distribution of fish and movements of tagged fish suggest an Atlantic-wide single stock for this species. The last stock assessment for bigeye tuna was conducted in 2018.

One stock forms part of this assessment:

- 1) FAO 34,47 Atlantic Eastern Central, Southeast.

Fishery removals of the stock are considered in the various stock assessment processes so the stock **PASSES** Clause C1.1. For Bigeye tuna in the assessment area There is no information provided on the state of the biomass with respect to a Blim reference point. The stock **FAILS** Clause C1.2.

The comparative lack of scientific information on the status of the population in the assessment area means that a risk-assessment style approach must be taken. The fishery was assessed using the risk-based Productivity, Susceptibility Analysis (PSA) as per IFFO-RS v 2.0 procedures for Category D species. The stock has passed this risk-based assessment (**Table D3**).

Bigeye Tuna is **APPROVED** by SAI Global assessors in the assessment area for the production of fishmeal and fish oil under the current IFFO RS v 2.0 by-products standard.

Peer Review Comments

Notes for On-site Auditor

HOW TO COMPLETE THIS ASSESSMENT REPORT

By-products

The process for completing the template for **by-product raw material** is as follows:

1. **ALL ASSESSMENTS:** Complete the Species Characterisation table with the names of the by-product species and stocks under assessment. The '% landings' column can be left empty; all by-products are considered as Category C and D.
2. **IF THERE ARE CATEGORY C BYPRODUCTS UNDER ASSESSMENT:** Complete clause C1 for **each** Category C by-product.
3. **IF THERE ARE CATEGORY D BYPRODUCTS UNDER ASSESSMENT:** Complete Section D.
4. **ALL OTHER SECTIONS CAN BE DELETED.** Clauses M1 - M3, F1 - F3, and Sections A and B do not need to be completed for a by-product assessment.

By-product approval is awarded on a species-by-species basis. Each by-product species scoring a pass under the appropriate section may be approved against the IFFO RS Standard.

SPECIES CATEGORISATION

The following table should be completed as fully as the available information permits. Any species representing more than 0.1% of the annual catch should be listed, along with an estimate of the proportion of the catch each species represents. The species should then be divided into Type 1 and Type 2 as follows:

- **Type 1 Species** can be considered the ‘target’ or ‘main’ species in the fishery. They make up the bulk of annual landings and are subjected to a detailed assessment.
- **Type 2 Species** can be considered the ‘bycatch’ or ‘minor’ species in the fishery. They make up a small proportion of the annual landings and are subjected to relatively high-level assessment.

Type 1 Species must represent 95% of the total annual catch. Type 2 Species may represent a maximum of 5% of the annual catch (see Appendix B).

Species which make up less than 0.1% of landings do not need to be listed (NOTE: ETP species are considered separately). The table should be extended if more space is needed. Discarded species should be included when known.

The ‘stock’ column should be used to differentiate when there are multiple biological or management stocks of one species captured by the fishery. The ‘management’ column should be used to indicate whether there is an adequate management regime specifically aimed at the individual species/stock. In some cases, it will be immediately clear whether there is a species-specific management regime in place (for example, if there is an annual TAC). In less clear circumstances, the rule of thumb should be that if the species meets the minimum requirements of clauses A1-A4, an adequate species-specific management regime is in place.

NOTE: If any species is categorised as Endangered or Critically Endangered on the IUCN Red List, or if it appears in the CITES appendices, it **cannot** be approved for use as an IFFO RS raw material. This applied to whole fish as well as by-products.

TYPE 1 SPECIES (Representing 95% of the catch or more)

Category A: Species-specific management regime in place.

Category B: No species-specific management regime in place.

TYPE 2 SPECIES (Representing 5% OF THE CATCH OR LESS)

Category C: Species-specific management regime in place.

Category D: No species-specific management regime in place.

Common name	Latin name	Stock	% of landings	Management	Category
Bigeye tuna	<i>Thunnus obesus</i>	FAO 34, 47	N/A	ICCAT	C, D

CATEGORY C SPECIES

In a whole fish assessment, Category C species are those which make up less than 5% of landings, but which are subject to a species-specific management regime. In most cases this will be because they are a commercial target in a fishery other than the one under assessment. In a by-product assessment, Category C species are those which are subject to a species-specific management regime and are usually targeted species in fisheries for human consumption.

Clause C1 should be completed for **each** Category C species. If there are no Category C species in the fishery under assessment, this section can be deleted. A Category C species does not meet the minimum requirements of clause C1 should be re-assessed as a Category D species.

Species Name		Bigeye tuna <i>Thunnus obesus</i>	
C1	Category C Stock Status - Minimum Requirements		
	C1.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process OR are considered by scientific authorities to be negligible.	PASS
	C1.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.	FAIL
Clause outcome:			FAIL

C1.1

Evidence

This assessment covers Bigeye tuna harvested from the areas outlined in **Figure 1**:

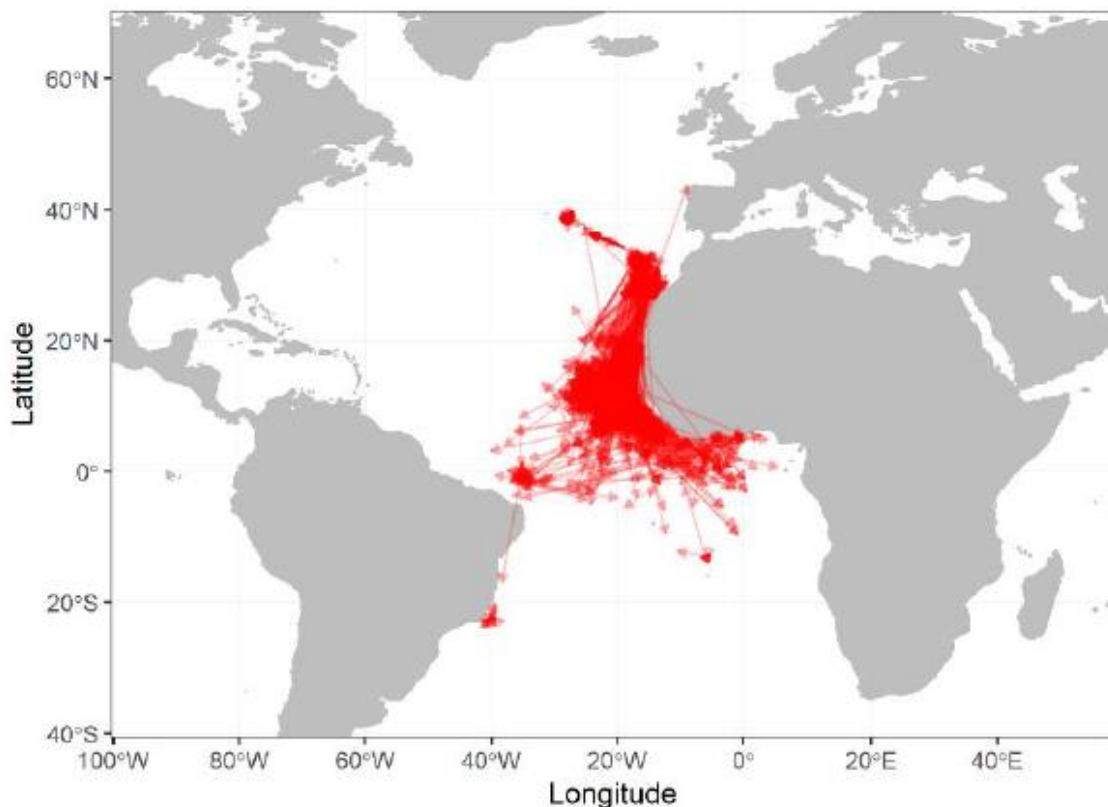


Figure 1: Bigeye tagging data (straight line distance between tagging location and that of recovery) calculated from current Atlantic Ocean Tropical tuna Tagging Programme (AOTTP) activities **R1**

Scientific sampling at landing ports for purse seine vessels from the EU and other fleets has been conducted since 1980 to estimate bigeye tuna catches: medium to large fish for the longline fishery and purse seine free

school sets, small to large for subtropical baitboat fishery, and small for tropical baitboat and for purse seine FAD (Fishery Aggregation Devices) fisheries:

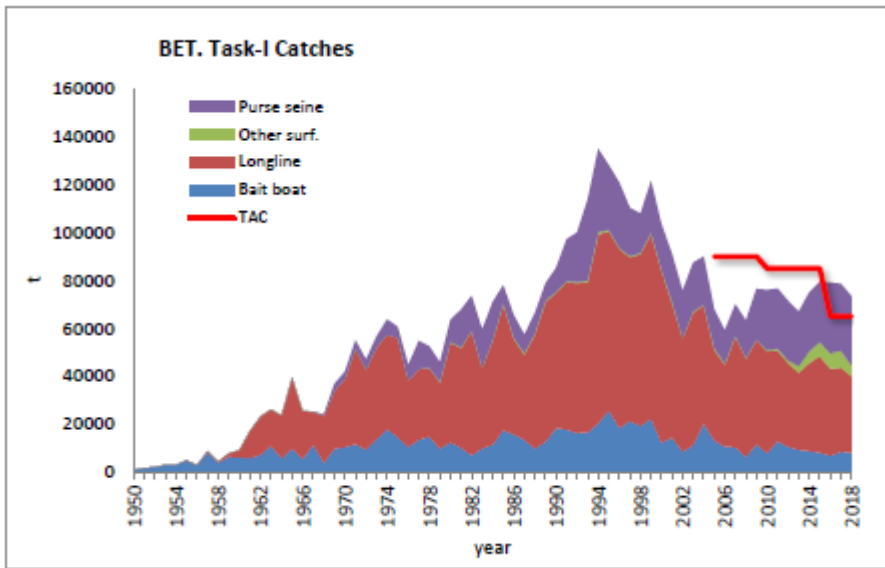


Figure 2: Bigeye estimated and reported catches for all the Atlantic stock (t). The value for 2018 represents preliminary estimates. **R1**

Bigeye tuna is a primary target species for most of the longline and some baitboat fisheries. Since 2015 catches have averaged 77,646t. Preliminary catch estimated for 2018 was 73,366 t (**Figure 2**). Significant catches of small bigeye tuna continue to be diverted to local West African markets, predominantly in Abidjan, and sold as faux poissons (mis-labelled as other tuna sp) in ways that make monitoring and official reporting challenging.

The Stock Synthesis (SS3) integrated statistical assessment model allows the incorporation of more detailed information, both for the biology of the species as well as fishery data, including size data and selectivity by different fleet and gear components.

C1.2

Evidence

Results of the uncertainty grid of Stock Synthesis runs show a long-term decline in SSB with the current estimate being at the lowest level in the time series:

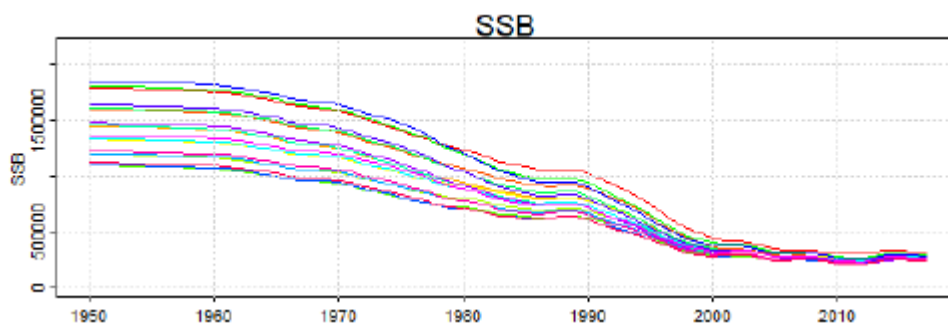


Figure 3: Trajectories of Spawning Stock Biomass (SSB), Fishing mortality (average F on ages 1-7) and recruitment (age 0) for the 18 Stock Synthesis uncertainty grid runs for Atlantic bigeye tuna. **R1**

According to the results of the SS3 uncertainty grid, Atlantic bigeye stock is currently overfished ($SSB/SSB_{MSY} = 0.59$, ranging from 0.42 to 0.80) and undergoing overfishing ($F/F_{MSY} = 1.6$, ranging from 1.14 to 2.12) with very high probability (99%) **Figure 4:**

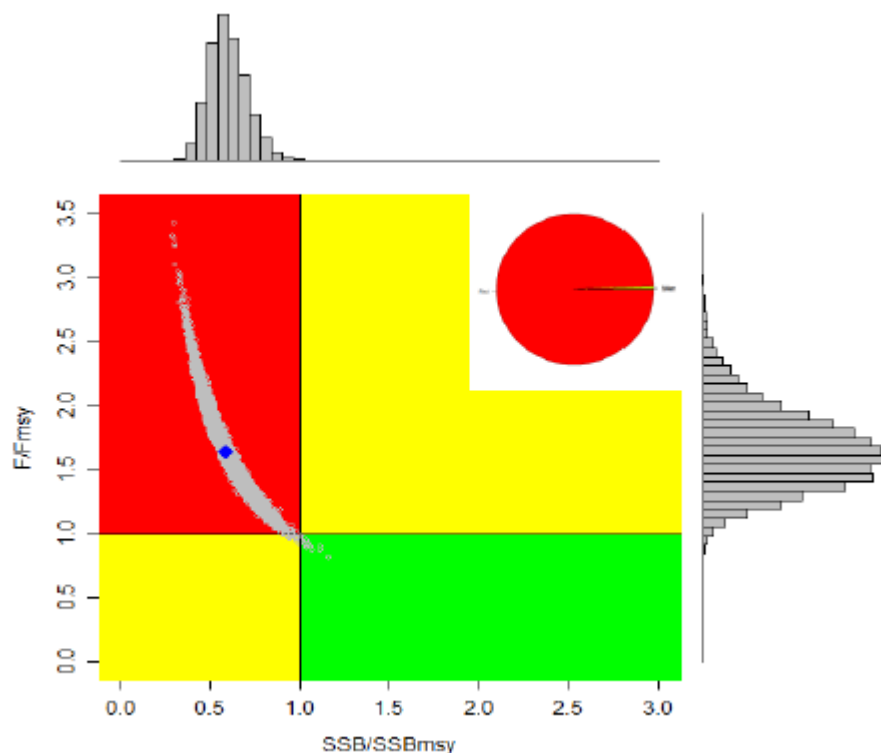


Figure 4: Kobe plot of SSB/SSBMSY and F/FMSY for stock status of Atlantic bigeye tuna (2017). Insert pie chart shows probability of being in the red quadrant (99.5 %), green quadrant (0.2 %), and in yellow (0.3 %). Blue square is median and marginal histograms represent distribution of either SSB/SSBMSY or F/FMSY. **R1**

The Atlantic bigeye tuna stock in 2017 was estimated to be overfished and that overfishing was occurring. Biomass and fishing mortality reference levels (MSY) are not being achieved. There is no information provided on the state of the biomass with respect to a B_{lim} reference point.

The comparative lack of scientific information on the status of the population in the assessment area means that a risk-assessment style approach must be taken. The fishery was assessed using the risk-based Productivity, Susceptibility Analysis (PSA) as per IFFO-RS v 2.0 procedures for Category D species. The species has passed this risk-based assessment (**Table D1**).

References

R1 ICCAT Bigeye tuna stock assessment: Executive Summary

https://iccat.int/Documents/SCRS/ExecSum/BET_ENG.pdf

R2: Fishbase: Bigeye tuna:

<https://www.fishbase.in/Summary/SpeciesSummary.php?ID=146&AT=bigeye+tuna>

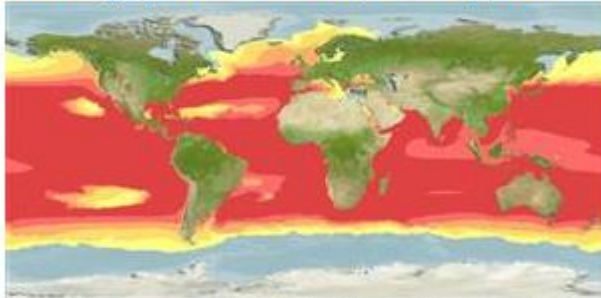
Standard clauses 1.3.2.2

D1	Species Name:	Bigeye tuna <i>Thunnus obesus</i>	
	Productivity Attribute	Value	Score
	Average age at maturity (years)	2.3	2
	Average maximum age (years)	11	2
	Fecundity (eggs/spawning) *	4,274,342	1
	Average maximum size (cm)	250	3
	Average size at maturity (cm)*	97.4	2
	Reproductive strategy	Egg scatterers	1
	Mean trophic level	4.5	3
	Average Productivity Score		2
	Susceptibility Attribute	Value	Score
	Overlap of adult species range with fishery (Figure 5)	<25%	1
	Distribution	Not used	-
	Habitat	Not used	-
	Depth range	0-500	1
	Selectivity	>2 times mesh	3
	Post-capture mortality	Short tows	2
	Average Susceptibility Score		1.75
	PSA Risk Rating (From Table D3)		PASS

References

* Life history tool Figure 6

Add your observation in [Fish Watcher](#)
[Native range](#) | [All suitable habitat](#) | [Point map](#) | [Year 2100](#)



This map was computer-generated and has not yet been reviewed.
Thunnus obesus AquaMaps Data sources: GBIF OBIS

Figure 5: Bigeye tuna global distribution R2

Family:	Scombridae Mackerels, tunas, bonitos	
Max. length (Lmax):	<input type="text" value="250.0"/> cm TL	
L infinity (Linf):	= <input type="text" value="200.1"/> cm <input type="text" value="TL"/> <input type="button" value="Recalculate"/>	
K:	<input type="text" value="0.25"/> /year ϕ' = <input type="text" value="4.00"/> Median ϕ' value with related Linf. and K.	<input type="button" value="Recalculate"/> Growth & mortality data
to:	<input type="text" value="-0.40"/> years Estimated from Linf and K.	
Natural mortality (M):	<input type="text" value="0.35"/> s.e. <input type="text" value="0.23"/> - <input type="text" value="0.54"/> /year Estimated from Linf., K and annual mean temp. = <input type="text" value="23.0"/> °C	<input type="button" value="Recalculate"/>
Life span (approx.):	<input type="text" value="11.6"/> years Estimated from Linf., K and to. Max. age & size data	
Generation time:	<input type="text" value="4.2"/> years Estimated from Lopt, Linf., K and to.	
Age at first maturity (tm):	<input type="text" value="2.3"/> years Estimated from Lm, Linf., K and to.	
L maturity (Lm):	<input type="text" value="97.4"/> s.e. <input type="text" value="72.7"/> - <input type="text" value="130.4"/> cm <input type="text" value="TL"/> Estimated from Linf. Maturity data	
L max. yield (Lopt):	<input type="text" value="136.4"/> s.e. <input type="text" value="n.a."/> - <input type="text" value="n.a."/> cm <input type="text" value="TL"/> Estimated from Linf., K and M.	
Length-weight:	<input type="text" value="200.1"/> cm <input type="text" value="FL"/> <input type="button" value="=>"/> <input type="text" value="153.6 kg"/> (wet weight) W = <input type="text" value="0.0119"/> * L ^ <input type="text" value="3.09000"/>	<input type="button" value="Recalculate"/> Length-weight data
Nitrogen & protein:	Weight <input type="text" value="153604"/> (g) => whole-body nitrogen (N) <input type="text" value="4920.3"/> (g) => whole-body crude protein <input type="text" value="30751.9"/> (g)	<input type="button" value="Recalculate"/>
Reproductive guild:	nonguarders: open water/substratum egg scatterers Reproduction	
Fecundity:	<input type="text" value="4,274,342"/> [<input type="text" value="2,900,000"/> - <input type="text" value="6,300,000"/>] Estimated as geometric mean. Fecundity	
Relative Yield per Recruit (Y'/R):	<input type="text" value="0.0488"/> Estimate Y'/R from M/K, Lc/Linf and E. Lc = <input type="text" value="80.0"/> cm <input type="text" value="TL"/> E = <input type="text" value="0.50"/> /year Emsy <input type="text" value="0.60"/> /year Eopt <input type="text" value="0.54"/> /year Fmsy <input type="text" value="0.53"/> /year Fopt <input type="text" value="0.41"/> /year	<input type="button" value="Recalculate"/>
Exploitation:	Z = <input type="text"/> F = <input type="text"/> E = <input type="text"/> Estimate Z, F, E from Lc, Lmean, Linf, K, M Lc = <input type="text" value="80.0"/> cm <input type="text" value="TL"/> Lmean = <input type="text"/> cm <input type="text" value="TL"/>	<input type="button" value="Recalculate"/>

Figure 6 Bigeye tuna Life history tool R2

Table D2 - Productivity / Susceptibility attributes and scores.

Productivity attributes	Low productivity/ High risk	Medium productivity/ Medium risk	High productivity/ Low risk
	Score 3	Score 2	Score 1
Average age at maturity (years)	>4	2 to 4	<2
Average maximum age (years)	>30	10 to 30	<10
Fecundity (eggs/spawning)	<1 000	1 000 to 10 000	>10 000
Average maximum size (cm)	>150	60 to 150	<60
Average size at maturity (cm)	>150	30 to 150	<30
Reproductive strategy	Live bearer, mouth brooder or significant parental investment	Demersal spawner "berried"	Broadcast spawner
Mean trophic level	>3.25	2.5–3.25	<2.5

Susceptibility attributes		High susceptibility/ High risk	Medium susceptibility/ Medium risk	Low susceptibility/ Low risk
		Score 3	Score 2	Score 1
Availability	1) Overlap of adult species range with fishery	>50% of stock occurs in the area fished	Between 25% and 50% of the stock occurs in the area fished	<25% of stock occurs in the area fished
	2) Distribution	Only in the country/ fishery	Limited range in the region	Throughout region/ global distribution
Encounterability	1) Habitat	Habitat preference of species make it highly likely to encounter trawl gear (e.g. demersal, muddy/sandy bottom)	Habitat preference of species make it moderately likely to encounter trawl gear (e.g. rocky bottom/reefs)	Depth or distribution of species make it unlikely to encounter trawl gear (e.g. epi-pelagic or meso-pelagic)
	2) Depth range	High overlap with trawl fishing gear (20 to 60 m depth)	Medium overlap with trawl fishing gear (10 to 20 m depth)	Low overlap with trawl fishing gear (0 to 10 m, >70 m depth)
Selectivity		Species >2 times mesh size or up to 4 m length	Species 1 to 2 times mesh size or 4 to 5 m length	Species <mesh size or >5 m length
Post capture mortality		Most dead or retained Trawl tow >3 hours	Alive after net hauled Trawl tow 0.5 to 3 hours	Released alive Trawl tow <0.5 hours

Note: Availability 2 is only used when there is no information for Availability 1; the most conservative score between Encounterability 1 and 2 is used.

D3		Average Susceptibility Score		
		1.00 – 1.75	1.76 – 2.24	2.25 – 3.00
Average Productivity Score	1.00 – 1.75	PASS	PASS	PASS
	1.76 – 2.24	PASS	PASS	TABLE D4
	2.25 – 3.00	PASS	TABLE D4	TABLE D4

Standard clauses 1.3.2.2