THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMTED. JOINT INVESTIGATION REPORT FOR INCIDENT NO: 18229 JIV report S/N: (Note: As practicable as possible the JIT report is to be signed in the field by all the participating parties) A. GENERAL INFORMATION: 1193291 2.Type of incident* OIL SPILL 1. Spill incident Number: NKPOKU - BOMU PIPELINE 4. Name of nearest community **EKPORO** 5. State: **RIVERS**6. LGA **ELEME** 7. Type of Production facility/Installation OL PIPELINE8. Asset owner/District PIPELINE **B. INCIDENT INFORMATION:** 9. Details of incident 21ST MAY, 2014 b. Start date/time of investigation: 21ST MAY, 2014 / 12:12 Hours MAY Actual investigation duration, days: THREE (3) DAYS d. Description of spill point environment Loose soil ☐Firmed soil Recently excavated area Under water Swampy Exposed pipe surface ☐ Well Platform (on Water) Drill Rig Additional observations around the spill point: IMPACTED SOIL AROUND SPILL POINT IS LIGHT BROWN SILT WITH LOOSE PARTICLES.

e. Description of leak point (tick as a	oplicable);	
Drilled hole	Hack saw cut	☐ Tear (),
Complete Rupture	☐Inward dent,	☐Well head tampering
Failed Weld-on illegal hot tap valve	e, DFailed Clamp	☐Missing Pipeline/Flowline
Crude oil theft (illegal bunkerin	g) point,	☐Third party tampering with Clamp
☐Third party tampering with valv	e setting,	☐Third party tampering with flange,
Corrosión	☐Saver-pit over flow,	☐Surge vessel overflow,
☐Bulging Outward	☐Flare System/Bund wa	ill failure DAccidental 3rd party equipmen
impact	□com	unit failure
Relief valve failure	Others (specify)	
f. Incident caused by:		
Third party interference (Sabotage	; crude theft ; Line thef	t□; Accidental 3 rd party damage□)
□Operational □Others (in	cluding Mystery spills)	
=		

^{*}This can be; a) Oil Spill b) Drilling fluid/Chemical c) Siltation d) construction e) Encroachment f) Fire,

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g. Spill point coordinates Measuring unit (M) Northing: Minna – M.d bett. Easting:
79877.18 528791.74
760
C. RISK ASSESSMENT
10. Type of environment:
✓Land □Swamp □Water □Seasonal swamp □Shoreline/Waterfront
i. Type of environment to which oil has spread:
Land Swamp Water River (identify)
ii. Weather condition
☐Rain ☐Sunny ☐Dry ☐Wet ☐Windy ☐Hot ☐cool 11. Distance from the nearest sensitive habitat
Government reserved and designated protected area [,m] Drinking water source [,m] Built up area [,m] Farmlands [250 ,m] Fish Farm/Pond [,m] Fishing net [,m] Others (specify).
12. Containment measures put in place;
□Booms □Trench □Dyke □Natural depression □Pit □None □Others:□ITCH EXCAVATED AROUND SPILL POINT
13. Any pictures or video coverage? [Y] [N]
14. Further response/repair initiated as at the time of JIV? [Y [N]
If yes to item 14, give brief description: RECOVERY OF FREE - PHACE OIL WAS DONE SIMULTANEOUSL WHILE REPAIRS WERE CARRIED OUT ON CRUDE THEFT POINT.
15. Was there any disruption to the investigation? [Y] [N]
If yes to item 15 give brief description: APPLICABLE

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D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL

16. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
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			115	\\ \O = \	0 - 12.04 - T
$\Box \Delta$		\mathbf{v}		THEF	OF IMPACT
		7.4.4.	T		
1	7. Crops/Economic Trees	<u> </u>	•		 -

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
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			Δc		10.00	-
	UNE_	VVLLHIN		VET (PACI
`			V		-	1

18. Fish/Nets/Ponds

S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
1	ONE V	FITHIN AR	EA 01	MPACT

19. Others (Specify) i.e. Animal Traps

S/N	Others	Description		Quantity/Size	Comments
	·	<u> </u>	ARF	Δ	
	UNF-	- William) DF	MAN
1 4	014-	AAFFELLIA			וויווארכ
L	<u></u>	DIRTION OF LEAV BOD	£	1	

E. GRAPHIC DESCRIPTION OF LEAK POIN (while detail report of the leak point should be contained in the leak report, overview sketch of the site should be an idea as an appendix 1)

SECTION OF 28"

NKPOKU - BOMU

PIPELINE AT EKPORO

SHOWING ONE NO.

CRUDE OIL THEFT

POINT (6" REDUCED

TO 4" FITTING) AT

12 0' CLOCK POSITION

FROM NKPOKI

4 VALVE

6" WELD NECK FLANGE

284

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F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION 20. Impacted area boundary Coordinates Alemore, Print and enach as an appendix of	l
20 Impacted area boundary Coordinates Atmore Print and endth as an appendix I	

	TV/II	ma - 11/10 - 155.14.
S/N	Northing (M)	Easting (m)
	79864.89	528791.72
	 	528794.82
	79880 26	528788.66
	79874·10 79880·26 79871·06	528791.72 528794.82 528788.66 528779.40
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G. INCIDENT INFORMATION:	
20. Impacted Area Details	
Total calculated area of impact 0.01 kg	
100	_
Impact within SPDC R.O.W Total Control of the Control of	
Impact outside SPDC R.O.W	
21. Volume of oil recovered before completion of JIV (Vrect):	TR
Recovered oil V _{rect} : 65	Barrels
Controlled recovery/evacuation from source with no impact to environment:	
NIL Barrels	
22. Net Estimated Spilled Volume V _{Est} (bbls)* = 156-89	
150-01	
Estimated Reported Volume** Vren(hbls)=	
Estimated Reported Volume V _{rep} (HDIS)=	
Estimated Reported Volume*** V _{rep} (fibls)= 157 BARRELS	
*Notes:	
*Notes: * Valume estimation was done using an excel based tool (see attached for details on the calculation) * Reported spilled volume is an estimate	
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*Notes: • Volume estimation was done using an excel based tool (see attached for details on the calculation) • Reported spilled volume is an estimate Write other relevant notes taken into consideration for estimating the spilled in the box below: APPLICABLE Calculation of the respective estimated volume is to be done on site as far as practicable using the new spill volume estimated conversion of m' to barrels is Volume (m3) x 6.29; **Round up estimated volume to next whole number using the following the following the sping the sping the following the sping the sping the sping the sping the following the sping the s	tion software on sit g rules:
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*Notes: *Valume estimation was done using an excel based tool. (see attached for details on the calculation) *Reported spilled volume is an estimate Write other relevant notes taken into consideration for estimating the spilled in the box below: APPLICABLE Calculation of the respective estimated volume is to be done on site as far as practicable using the new spill volume estimated conversion of m' to barrels is Volume (m3) x 6.29; **Round up estimated volume to next whole number using the followin *Any spill volume in less than 1 bbl is rounded up to the next 0.1 bbl.	tion software on sit y rules:

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ESTIMATION OF OIL SPILL VOLUME

Total Calculated Area of Impact i Impact within SPDC R.O.W ii Impact outside SPDC R.O.W Volume of all recovered before completion of JIV (Vacual I Estimated Recovered oil (Net) Vinc. Estimated Recovered oil (Net) Vinc. Computation of estimated residual volume on site Computation of volume of free phase oil (on land or confined water body) i Total area occupied by pool of free phase oil (on land or confined water body) ii Average depth of pool of free phase oil (ii Emulsification factor (if applicable, else 0%) Estimated Volume of pool of free phase oil, V _{pool} Estimated Volume of pool of free phase oil, V _{pool} Estimated Volume of pool of free phase oil, V _{pool} 66.67 bble	OIL SPILLED ONSHORE	VOFFSHORE (Leak stopped at	source)		
il Impact vidente SPOC R.O. (M.) il Impact vidente SPOC R.O. (M.) Estimated Recovered oil (Net) V _{max} Estimated Volume of resphase oil (In Impact of resphase oil volume of resphase oil volume oil of resphase oil volume oil oil of resphase oil volume oil oil of resphase oil volume oil	Impacted Area Details				
Wolume of all recovered bafors completion of JIV (V_m) 65.00 bbts	Total Calculated Area of	impact impact			129.00 m²
Volume of oil recovered before combistion of JIV (V) Estimated Recovered oil (Net) V	i Impact within SPDC R.O.	w			m ²
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1 Total area covered by the oil (Infiltration) il You area depth of infiltrated oil at spill point (V _{ort a}) il Average depth of infiltration above leaking facility i.e. pipeline/flowline iii Soil type v Cause of spill vi Calculation of days for infiltration below the leaking point on pipeline or flowline Incident Date JIV Date Days on Site 5/21/2014 14:50 5/23/2014 14:55 2 If 'cause of spill' is operational, use 1 week as worst case scentratio except where 'days an site' exceeds 7. Infiltration of oil types in various soil types vs time. Soil type Soil type Approximate time to reach 1m depth below ground level Oil type Sand Loam Clay Bonny Medium 3 weeks 3 years > 10 years Bonny Light 2 days 2 months > 10 years Bonny Hedium m Total depth below ground surface of infiltration of oil Estimated Volume of Infiltration below leaking facility i.e. pipeline/flowline ii Soil type 2 Volume of infiltrated oil at second spill point [if applicable] {V _{total} } 1 Total depth below ground surface of infiltration) ii Total depth below ground surface of infiltration) ii Average depth of infiltration below leaking facility i.e. pipeline/flowline iii Soil type vi Total depth below ground surface of infiltration) y P _x (effective porosity of the soil) v Average depth of infiltration below leaking facility i.e. pipeline/flowline iii Soil type vi Total depth below ground surface of infiltration of oil Estimated Volume of Infiltration below leaking facility i.e. pipeline/flowline iii Soil type v Average depth of infiltration below leaking facility i.e. pipeline/flowline iii Soil type v Average depth of infiltration below leaking facility i.e. pipeline/flowline iii Soil type filtration of infiltration of infiltrati	·				
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ii Average depth of infiltration above leaking facility i.e. pipelina/flowline iii Soil type V. P., (effective porosity of the soil) V. Cause of spill Third party interference V. Cause of spill Incident Date JIV Date Days on Site 5/21/2014 14:50 5/23/2014 14:55 2 If cause of spill is operational, use 1 week as worst case Scenario except where 'days on site' seek as worst case Scenario except where 'days on site and before the seed of spill types in various soil types vs time. Soil type Sand Loam Clay Bonny Medium 3 weeks 3 years > 10 years Vii Oil type	1 Volume of infiltrated oil	at spill point (V _{infe})			
ii Average depth of infiltration above leaking facility i.e. pipelina/flowline iii Soil type V. P., (effective porosity of the soil) V. Cause of spill Third party interference V. Cause of spill Incident Date JIV Date Days on Site 5/21/2014 14:50 5/23/2014 14:55 2 If cause of spill is operational, use 1 week as worst case Scenario except where 'days on site' seek as worst case Scenario except where 'days on site and before the seed of spill types in various soil types vs time. Soil type Sand Loam Clay Bonny Medium 3 weeks 3 years > 10 years Vii Oil type					1,00 m ²
iii Soil type			vl i ne		-
v Cause of spill vi Calculation of days for infiltration below the leaking point on pipeline or flowfine Incident Date Incident Date JIV Date Days on Site 5/21/2014 14:50 5/23/2014 14:55 2 If 'cause of spill' is operational, use if week as worst case Scenario except where 'days on site' exceeds 7. Infiltration of cill types in various soil types vs time. Soil type Sand Loam Clay Bonny Medium 3 weeks 3 years >10 years Bonny Light 2 days 2 months >10 years Bonny Light 2 days 1 months >10 years Bonny Medium ▼ Vii Oil type Ix Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V lefs Estimated Volume of Infiltrated oil, V lefs 1 Total area covered by the oil (infiltration) 1 Average depth of infiltrated oil, V lefs 1 Soil type 1 Total area covered by the oil (infiltration) 1 Average depth of infiltration above leaking facility i.e. pipeline/flowline 1 Total area covered by the oil (infiltration) 1 Average depth of infiltrated oil, v lefs 1 Soil type 1 Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, v lefs 1 Soil type 1 Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, v lefs 1 Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, v lefs 2 Volume of Infiltrated oil, v lefs 3 Soil type 4 Average depth of Infiltration below leaking facility i.e. pipeline/flowline Image: Total depth below ground surface of Infiltration of oil Estimated Volume of Infiltrated oil, v lefs 2 Olom of Infiltrated oil, v lefs 3 Olom of Infiltration of oil Estimated Volume of Infiltrated oil, v lefs 3 Olom of Infiltrated oil, v lefs 4 Olom of Infiltrated oil, v lefs 5 Olom of Infiltration of Infiltration of Infiltration of Infiltrated oil, v lefs 5 Olom of Infiltrated oil oil of Infiltration of Infiltrated oil oil of Infiltration of Infiltrated oil oil of In					— —·
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Infiltration of oil types in various soil types vs time. Soil type Approximate time to reach 1m depth below ground level Oil type Banny Medium 3 weeks 3 years > 10 years Vii Oil type Viii Average depth of infiltration below leaking facility i.e. pipeline/flowline ix Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V let a 2 Volume of Infiltrated oil, V let a 2 Volume of Infiltrated oil at second spill point [if applicable] (V let b) i Total area covered by the oil (infiltration) ii Average depth of infiltration above leaking facility i.e. pipeline/flowline iii Spil type vi Total depth below ground surface of infiltration of oil Estimated Volume of Infiltration above leaking facility i.e. pipeline/flowline iii Spil type vi Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V let a Seet • ▼ Seet • ▼ Viii Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V let a 10 0.38 m² 10 0.38 m² 10 0.38 m² 11 0.38 m² 12 0.38 bbls			7		
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Soil type Approximate time to reach 1m depth below ground level Oil type Sand Loam Clay Bonny Medium 3 weeks 3 years > 10 years Fromy Light 2 days 2 months > 10 years Vii Oil type Sand Loam Clay Bonny Medium 3 weeks 3 years > 10 years Vii Oil type Sand Clay Sand S		Infiltration of oil types in various soil t	ypes vs time.		7
Cit type	Soil type			nd level	7
Bonny Medium 3 weeks 3 years > 10 years Vii Oil type Vii Oil type Viil Average depth of infiltration below leaking facility i.e. pipeline/flowline ix Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V ints 2 Volume of Infiltrated oil, V ints 1 Total area covered by the oil (infiltration) it Average depth of infiltration above leaking facility i.e. pipeline/flowline iii Soil type iy P, (effective porosity of the soil) v Average depth of infiltration below leaking facility i.e. pipeline/flowline vi Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V ints v Average depth of infiltration below leaking facility i.e. pipeline/flowline vi Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V ints 0,00 m³			, 	T	7
## VIII Oil type ## VIII Oil type ## VIII Average depth of infiltration below leaking facility i.e. pipeline/flowline ## Total depth below ground surface of infiltration of oil ## Estimated Volume of Infiltrated oil, V int s Estimated Volume of Infiltrated oil, V int s Estimated Volume of Infiltrated oil infiltration of oil Volume of Infiltrated oil at second spill point [if applicable] {V int b}			·		7
vii Oll type viii Average depth of infiltration below leaking facility i.e. pipeline/flowline ix Total depth below ground surface of infiltration of oil Estimated Volume of infiltrated oil, V tota Estimated Volume of infiltrated oil, V tota 2.38 bbls 2 Volume of infiltrated oil at second spill point [if applicable] {V tota} i Total area covered by the oil (infiltration) ii Average depth of infiltration above leaking facility i.e. pipeline/flowline iii Soil type iv P, (effective porosity of the soil) v Average depth of infiltration below leaking facility i.e. pipeline/flowline vi Total depth below ground surface of infiltration of oil Estimated Volume of Infiltrated oil, V total 0.00 m³					╡
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ix Total depth below ground surface of infiltrated oil, $V_{inf.s}$ Estimated Volume of infiltrated oil, $V_{inf.s}$ 2.38 bbls 2 Volume of infiltrated oil at second spill point [if applicable] ($V_{inf.b}$) i Total area covered by the oil (infiltration) ii Average depth of infiltration above leaking facility i.e. pipeline/flowfine iii Soil type iv P _s (effective porosity of the soil) v Average depth of infiltration below leaking facility i.e. pipeline/flowfine vi Total depth below ground surface of infiltration of oil Estimated Volume of infiltrated oil, $V_{inf.b}$ 0.00 m ³		on below leaking facility i.a. pipeline/flow	dine		
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2 Volume of infiltrated oil at second spill point [if applicable] (V _{lot b}) i Total area covered by the oil (infiltration) ii Average depth of infiltration above leaking facility i.e. pipeline/flowfine iii Soil type iv P _e (effective porosity of the soil) v Average depth of infiltration below leaking facility i.e. pipeline/flowfine vi Total depth below ground surface of infiltration of oil Estimated Volume of infiltrated oil, V _{Int b} 0.00 m ³					
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v Average depth of infiltration below leaking facility i.e. pipeline/flowline vi Total depth below ground surface of infiltration of pil Estimated Volume of infiltrated oil, V _{inf b} 0.00 m ³		e soil)			- select -
vi Total depth below ground surface of infiltration of oil Estimated Volume of infiltrated oil, V _{int b} 0.00 m ³	24 . E factoristo hotograf of the	,			76
Estimated Volume of infiltrated oil, V _{inf b} 0.00 m ³	v Average depth of infiltration	n below leaking facility i.e. pipeline/flow	ine		m
Estimated Volume of infiltrated oil, V _{inf b} 0.00 m ³	in water to the second				
	vi Total depth below ground	surface of infiltration of oil			m
Estimated Volume of Infiltrated oil, V heb 0.00 bbls	Estimated Volume of inf				a
		iltrated oil, V _{mf b}			0.00 m

3 Volume of infiltrated oil outside immediate spili point(s) region (V_{info})

JOINT INVESTIGATION REPORT SPILL VOLUME ESTIMATE FOR INCIDENT NO: 183291

3

iii E-fector

Estimated Volume of evaporated oil, V_{evap}

Net Total Estimated Spilled Volume, $V_{\rm Est}$

i Total Area covered by the oil (inf	îltration)			57.00 m ²
Total Area of the pool of free pha	•			71.00 m ²
Soil type				Sit 🔻
P. (effective porosity of the soil)				%
Average depth below ground sur	face of infiltration of oil			m
Estimated Volume of Inflitrated	(all 1/			0.05 m³
Estimated Volume of Infiltrated				
Estimated volume of minusce	1 OII, Virie			0.31 bbls
Estimated Total Volume of infi	Itrated oil, V _{iri}			0.43 m³
Estimated Total Volume of Infi	krated oll, V _{inf}		•	2.69 bbls
Computation of volume of oil of Total area of oil on open water Table of average depth of oil on Spill Factors from USCG FOG (2000 E	water based on coloration	Link to Coverage Visual Aid		m²
	Thickness (mask	Percentage coverage) (-b (-8)	
Barety Visible	Thickness (mm) 0,00004	(%)	Valume (m3) 0.0000	!
Silvery	0.00004		0.0000	
Slight Color	0.00015		0.0000	
Bright Color	0.0003		0.0000	
Dutt	0.001		0.0000	
	0.002		0.0000	
Dark				1
<u>Dark</u> Black oil	0.1		0.0000	1
	O. \$		0.0000	
Black oil	0.9 1. Percent Total:	0%		
Black oil Emulsion (30% Oil)	Percent Total:	0%	0.0000	s on _3
Black oil Emulsion (30% Oil) Estimated Volume of oil on op	Percent Total:	0%	0.0000	0.00 m ³
Black oil Emulsion (30% Oil)	Percent Total:	0%	0.0000	8.00 m ³ 9.00 bble
Black oil Emulsion (30% Oil) Estimated Volume of oil on op	Percent Total:	0%	0.0000	
Black oil Emulsion (30% Oil) Estimated Volume of oil on op Estimated Volume of oil on op	Percent Total: Percent Total: en water, V _{wat} en water, V _{wat}		0.0000	
Black oil Emulsion (30% Oil) Estimated Volume of oil on op Estimated Volume of oil on op	Percent Total:	PBC Crude oil	0.0000	
Black oil Emulsion (30% Oil) Estimated Volume of oil on op Estimated Volume of oil on op	Percent Total: Percent Total: en water, V _{wat} en water, V _{wat} eration Factors (E-Factor) for S	PBC Crude oil	0.0000 0.9000	
Black oil Emulsion (30% Oil) Estimated Volume of oil on op Estimated Volume of oil on op culation of evaporated volume Evaporated Residence time of spi	Percent Total: en water, V _{wat} en water, V _{wat} eration Factors (E-Factor) for S illed oil (days on site)	PDC Crude oil Oil ty Bonny Light	0.0000 0.9000 (pe Bonny Medium	
Black oil Emulsion (30% Oil) Estimated Volume of oil on op Estimated Volume of oil on op	Percent Total: en water, V _{wat} en water, V _{wat} eration Factors (E-Factor) for S illed oil (days on site)	PBC Crude oil	0.0000 0.9000 (pe Bonny Medium	

23.63 bbls

156.89 bbls

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23. GENERAL STATUS OF THE SITE

Α.	Joint investigation of the incident site found that there is no residual impact after the initial
	response and JIT therefore recommend that the site be closed out
	response and 311 dictroic recommend that the site of closed out
_	
ĸ	investigation of the incident site showed that there is residual immediate in the site of
IJ.	
IJ.	Investigation of the incident site showed that there is residual impact on site requiring further
IJ.	works

24. REPRESENTATIVES

his re	eport was filled, agreed and signed by the following joint investigation representatives:	
•	Host Community: Department of Petroleum Resources DPR :	
•	National Oil Spill Detection and Response Agency [NOSDRA]:	
•	State Ministry of Environment [SME]:	
•	Nigeria Police Force [NPF]:	
•	Shell Petroleum Development Company [SPDC]:	
•	Signatories agree with reported findings:	
•	Separate DPR form has been filled out with same findings	
	Tick as applie	cab

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25. Appendix 1: Overview sketch of the site

