



ANNEX TO:

**ESTIMATE OF OIL STORAGE CAPACITY IN THE
DEMOCRATIC PEOPLE’S REPUBLIC OF KOREA**

**DETAILS OF ESTIMATES OF OIL STORAGE
CAPACITY BY LOCATION**

AUGUST 23, 2020

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1 Introduction to Annex

This Annex to the Nautilus Institute Special Report *Estimate of Oil Storage Capacity in the Democratic People's Republic of Korea* provides details on many locations in the DPRK where oil storage (mostly refined oil products) have been found, have been reported in the past, or may be located. This annex is the results of an in-depth systematic review using Google Maps and Google Earth of locations in the DPRK. Our review has used as a starting point the following approach for map review:

1. Review known oil storage locations, such as refineries and major terminals.
2. Review oil storage locations provided in a redacted and publicly available 1982 report by the United States Central Intelligence Agency that identifies a large number of oil storage sites thought to be active as of the time of the report.¹
3. Review of Google Maps images along coastlines, rivers, railroads and major roads, looking for objects that might be oil tanks.

In what follows, we provide tables that include counts of oil tanks, estimates of their diameter measured using Google Maps tools, estimates of tank heights based on the length of tank shadows as compared with those of nearby objects for which height can be roughly estimated, such as buildings, location (latitude and longitude), and images of tank locations.² We use the diameter and (roughly estimated) height data to estimate the volume of the storage tanks. We also include notes of observations about the tanks found, and use those observations, in part, to prepare a subjective assessment as to the “fraction of volume estimated to be active oil storage”. So, for example, if a tank were seen to be rusty, physically compromised, and/or located in an area that appeared largely abandoned, we would set the “fraction of volume estimated to be active oil storage” at zero (or low) whereas if the tank looked new, was in an area obviously under active use, and/or in an area known to be used for oil storage, we would be likely to provide a value of “fraction of volume estimated to be active oil storage” near 100%. Note that this factor is not intended to provide any indication of whether the tank is full, empty, or somewhere in between, as that status cannot reasonably be determined from satellite image (at least without other imaging data), rather it only provides an indication of whether the tank is in use.

Many of the sites reviewed in the 1982 US CIA document included tanks reported to be underground. In these cases, we reported what the CIA document reported, and reviewed the site to see if tanks were visible and/or the site looked active. We only counted tanks that we could see, so our accounting does not explicitly include those underground tank volumes identified by the CIA, but keeps those statistics in a separate category. It is essentially certain that the DPRK has ceased to use some of the underground tanks included in the 1982 CIA database, and equally certain that the DPRK has developed (either before 1982 or since) additional underground

¹ United States Central Intelligence Agency, National Photographic Interpretation Center (CIA, 1982), *Imagery Analysis Report: POL Storage Capacity North Korea, 1982 Estimates*. Report number CIA-RDP83T00574R000102600001-7 (redacted). Available as <https://www.cia.gov/library/readingroom/docs/CIA-RDP83T00574R000102600001-7.pdf>.

² In some cases these Google Earth images tell interesting stories of their own independent of oil storage findings, for example, about nearby industrial facilities, fishing fleets, or other facilities.

storage that is not in the CIA database. To what extent these factors offset is impossible for us to say with the data we have at hand, all of which are derived from public sources.

The remaining sections of this Annex that follow therefore provide:

- A summary of the oil storage estimate statistics compiled from our review and from the CIA document;
- Details of the Nautilus review of selected oil storage sites;
- Details of the Nautilus review of oil storage sites also included in the 1982 U.S. Central Intelligence Agency estimates;
- A summary of 1982 CIA Estimates of oil storage volumes by location that were not reviewed using Google Maps by Nautilus (including "Naval", "Air", and "Industrial"); and
- Details of the Nautilus review of possible oil storage sites **not** included in 1982 U.S. Central Intelligence Agency Estimates (those visible above-ground).

2 Summary Oil Storage Estimate Statistics

The table that follows provides a summary of the volume of oil storage estimated in the groups of locations reviewed by Nautilus, together with the CIA estimates for locations with underground tanks that we could not see. This summary is discussed in more detail in the Special Report that this annex accompanies, but in general, we found a total of about 1.1 million cubic meters (equivalent to on the order of 900,000 to 1,000,000 metric tonnes of oil product storage) of storage volume that we feel is likely to be active storage, not counting another 0.5 million cubic meters of storage reported by the CIA that we could not measure. Taken together, these data suggest that the DPRK's oil storage facilities may be similar in volume to the total estimated by the CIA in 1982, about 1.6 million cubic meters. There is, however, substantial remaining uncertainty in these estimates due, first, to lack of knowledge about the status of those oil storage facilities identified by the CIA document as being underground, coupled with our lack of information on any underground storage developed by the DPRK that did not show up in the 1982 CIA database (because it wasn't known about or reported, or had yet to be built), and second, due to uncertainties in the measurement, designation, and assessment of active storage in identified potential tanks.

SUMMARY OIL STORAGE STATISTICS FROM NAUTILUS REVIEW

Groups of Locations Reviewed	Estimated Tank Volume, Cubic Meters
Total of volume of storage tanks measured above (including those included in CIA database)	1,116,979
Total of volume of storage tanks measured above (including those included in CIA database) and estimated to be likely to be currently used for oil storage	1,011,472
Total of volume of bunkers reported by CIA (1982) but not directly measured (excludes overlap with tanks directly measured)	544,726
Total of volume of all storage reported by CIA (1982), including "Naval", "Air", and "Industrial"	1,648,847
<i>Total of volume of storage tanks measured by Nautilus (but not, to our knowledge, included in CIA database)</i>	<i>285,499</i>
Total of volume of storage tanks measured by Nautilus (but not, to our knowledge, included in CIA database) and estimated to be likely to be currently used for oil storage	109,227

3 Nautilus Review of Selected Oil Storage Sites

ESTIMATE OF OIL STORAGE FACILITIES AT VARIOUS DPRK LOCATIONS

Location: Tumangang, Border of DPRK and Russia (and China) (size and location estimates made from Google Earth images, 5/30/18, except as noted)

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
10	10	8	6,283	42.409	130.610	Appear grey/brown on photo
5	12	10	5,655	42.409	130.610	Appear grey/brown on photo
3	25	14	20,617	42.406	130.621	Appear white/pink and recently painted on image as of 9/10/19 (were brown in earlier image); traces of several other tanks in location, now gone
10	9.5	7	4,962	42.411	130.618	Appear rusty (or brown) in image retrieved in May of 2019, but have been repainted white/pink in image retrieved 9/10/19.
5	6.5	4	664	42.411	130.618	
7	12	10	7,917	42.419	130.608	Appear white in image, new as of approximately March-May, 2018, from "3-band Planet Scope Scene" image obtained from NK News, dated 5/23/18. Tanks do not seem to appear at this location in recent (9/10/19) Google Maps images, but 7 similar-sized objects that look like apartment buildings with square peaked roofs do appear. Archival images should be checked when available.
Total of above			46,097			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			41,487			

Overview of Tumengang Oil Storage Area



Detailed Views of Specific Tank Locations at Tumengang



Location: Seungri Chemical Complex Refinery, estimates made from Google Earth images, 10/11/18.

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
19	40	12	286,513	42.308	130.347	Some look newer, some older on photo
1	32	10	8,042	42.312	130.354	Appears newer on photo
26	22	8	79,068	42.313	130.353	Some look newer, some older on photo
6	18	7	10,688	42.308	130.345	Some look newer, some older on photo
50	7	5	9,621			Various locations at plant, conditions
50	5	4	3,927			Various locations at plant, conditions, sizes--count and average size are rough estimates
Total of above			397,859			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			358,073			

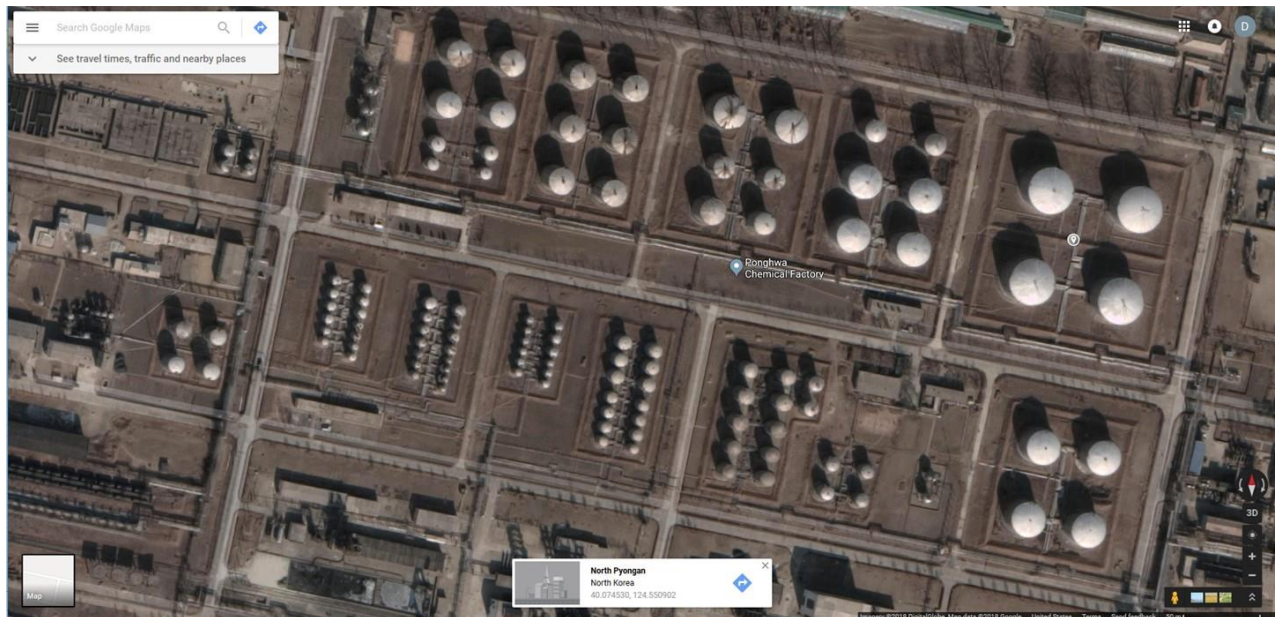
Views of Specific Tank Locations at Seungri



Location: Ponghwa Chemical Factory, estimates made from Google Earth images, 10/11/18

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
4	30	15	42,412	40.074	124.551	Newer-looking tanks, largest in the central part of the refinery
10	21	13	45,027	40.073	124.551	Four newer-looking tanks, four slightly older, two slightly older still
13	16	10	26,138	40.075	124.547	Mostly medium-aged tanks
5	13.5	8	5,726	40.074	124.548	Mostly medium-aged tanks
18	9	6	6,871	40.074	124.548	Mostly medium-aged and older tanks
8	7.5	5	1,767	40.074	124.548	Mostly medium-aged and older tanks
16	6.5	4.5	2,389	40.074	124.548	Mostly medium-aged and older tanks
36	4	3.5	1,583	40.074	124.546	Mostly medium and older tanks, number approximate, and some variation in sizes
Total of above			131,912			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			131,912			

Views of Tank Locations at Ponghwa Chemical Factory

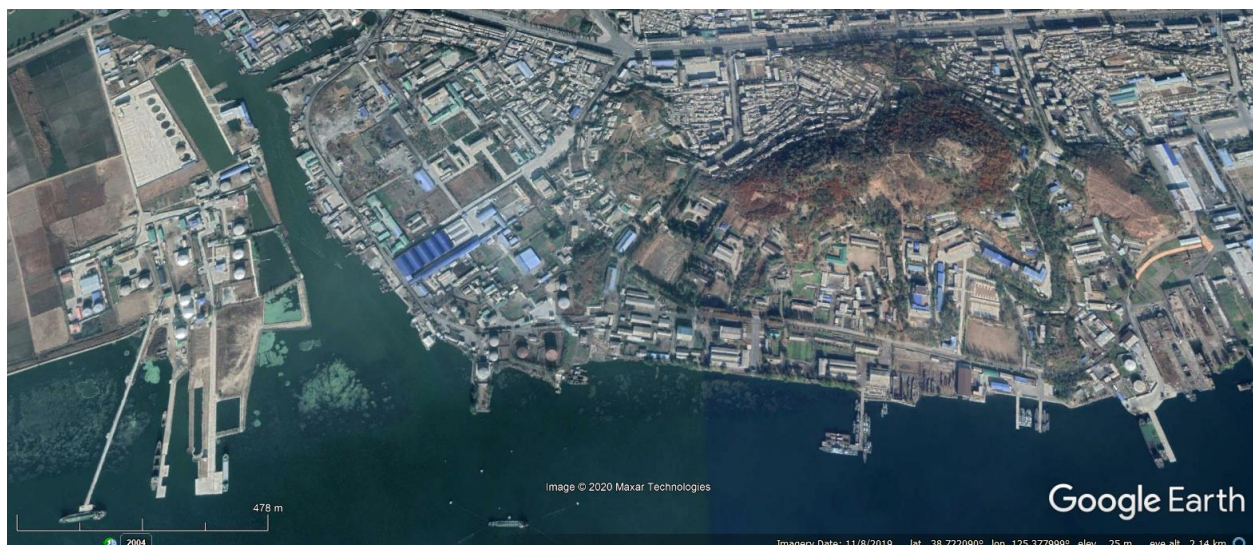


Location: Nampo Oil Storage Terminal, estimates made from Google Earth images, 12/14/18 and 11/8/2019

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
2	24	14	12,667	38.718	125.390	Somewhat newer-looking tanks about 2 km to the east of main oil terminal
2	23	10	8,310	38.719	125.376	Older tanks, about 500 m east of main oil terminal
1	23	20	8,310	38.719	125.376	Refurbished (likely during 2019) tank, about 500 m east of main oil terminal
1	15	16	2,827	38.719	125.376	New (added during 2019) tank, about 500 m east of main oil terminal
1	20	13	4,084	38.719	125.376	Newer tank, about 500 m east of main oil terminal
1	20	16	5,027	38.719	125.376	Newer tank, about 500 m east of main oil terminal
2	13	10	2,655	38.719	125.376	Newer tanks, about 500 m east of main oil terminal
10	24	18	81,430	38.720	125.367	Mostly newer tanks, in main oil terminal area
2	17	15	6,809	38.720	125.367	Newer-looking blue tanks, in main oil terminal area
1	20	8	2,513	38.723	125.366	New Tank added to in one of the footings below between February and November of 2019.
7	20	0	-	38.723	125.366	Footings for tanks, in place since about 2016, just north of main terminal area. It is possible that construction had started on one or more tanks in addition to the completed tank above by 11/2019.
Total of above			134,631			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			121,168			

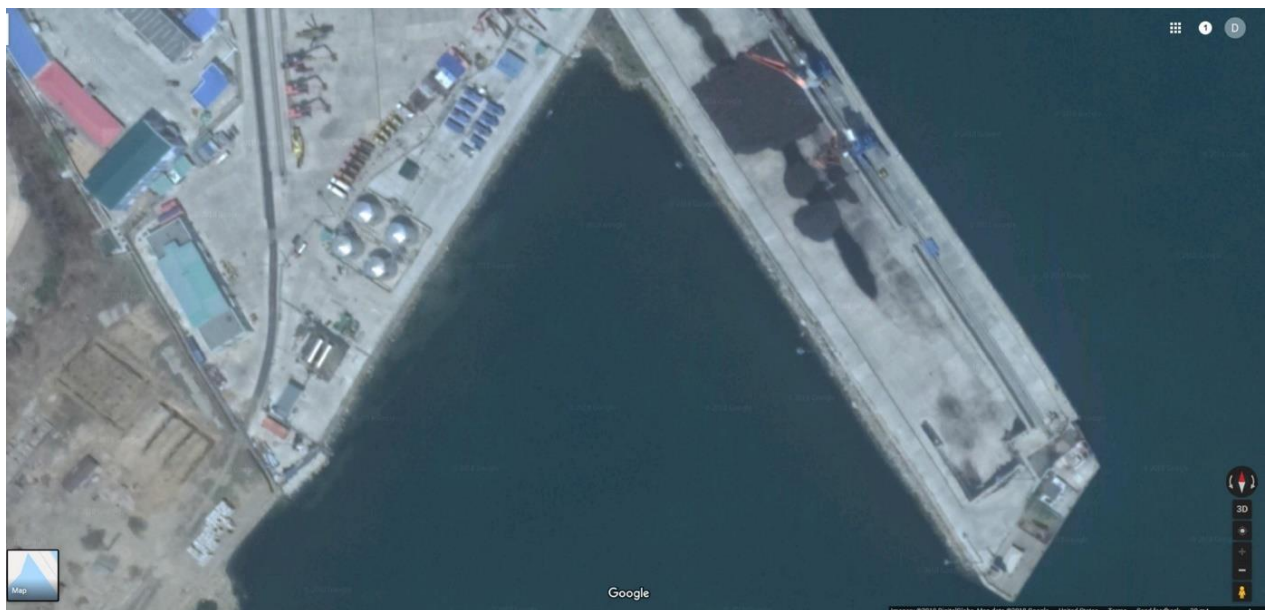
Reference: Hamish Macdonald and Leo Byrne (2017), "Construction ongoing at Nampo oil terminal despite oil measures", *NK Pro*, dated 11/10/2017, and available as <https://www.nknews.org/pro/construction-ongoing-at-nampo-oil-terminal-despite-oil-measures/>.
Image at right, taken from Google Earth on 8/13/19, show the same area some months (6 to 8?) later, probably in winter of 2019, with dozens (hundreds, including those in nearby areas) of fishing boats docked in the area and some new in-fill and construction in the area of the docks.

View of Tank Locations at Nampo Oil Storage Terminal (as of 11/2019, Google Earth Pro)



Location: Rason Harbor, bulk materials loading dock, Google Earth images, 12/14/18						
		Estimates (m) of		Approximate Coordinates		
Number	Diameter	Height	Implied Total Volume (cubic meters)	Latitude	Longitude	Notes
4	10	8	2,513	42.224	130.281	New-looking tanks, probably for fuel for ships, near bulk coal loading docks
Total of above			2,513			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			2,513			

View of Tank Locations at Rason Harbor



Location: Pyongyang Thermal Power Plant, Google Earth images, 12/14/18

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
12	9	6	4,580	39.012	125.712	Older looking tanks, probably for fuel oil starter for plant
2	7	5	385	39.012	125.712	Older looking tanks, probably for fuel oil starter for plant
4	5	4	314	39.012	125.712	Older looking tanks, probably for fuel oil starter for plant
10	3	2	141	39.012	125.712	Older looking tanks, probably for fuel oil starter for plant
Total of above			5,421			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			4,879			

View of Tank Locations at Pyongyang Thermal Power Plant



Location: East Pyongyang Thermal Power Plant, Google Earth images, 12/14/18

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
2	10	7	1,100	38.970	125.690	Older looking tanks, probably for fuel oil starter for
2	8	5	503	39.012	125.712	Older looking tanks, probably for fuel oil starter for
2	6	4	226	39.012	125.712	Older looking tanks, probably for fuel oil starter for
Total of above			1,828			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			1,646			

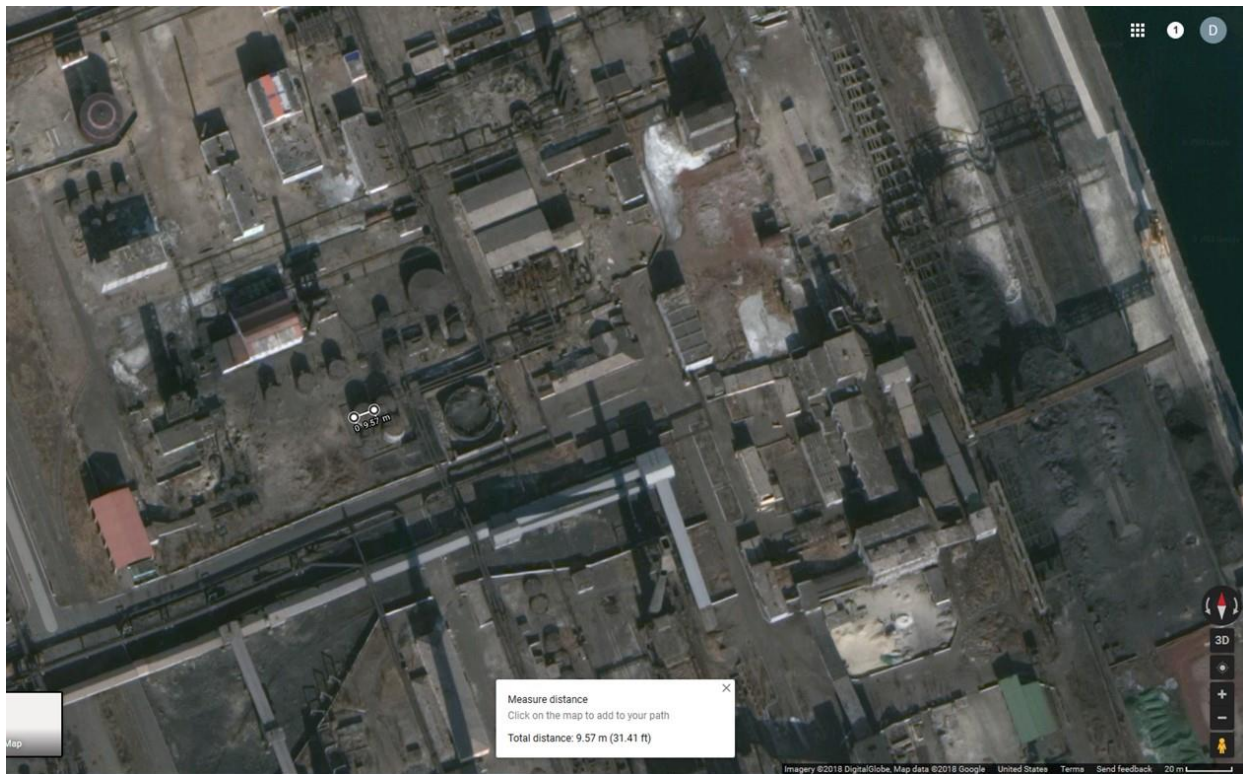
View of Tank Locations at East Pyongyang Thermal Power Plant



Location: Chongjin Coastline/Port/Marinas, Google Earth images, 12/25/18

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
2	9	6	763	41.766	129.766	Older looking tanks
1	27	16	9,161	41.766	129.766	New looking tank, red roof, behind wall
4	11	8	3,041	41.758	129.762	mostly fishing boats of various sizes (10 m to 36 m)
1	19	20	5,671	41.761	129.756	New looking tank, red and grey roof, behind wall, near what seems to be iron/steelworks or possibly Chongjin Power Plant
1	19	8	2,268	41.761	129.756	Older looking tank
4	5	7	550	41.761	129.756	Older looking tanks
6	7	8	1,847	41.761	129.756	Older looking tanks
3	9	10	1,909	41.761	129.756	Older looking tanks
1	32	15	12,064	41.783	129.82317	Newish looking tank, redish roof, near bayshore
Total of above			37,273			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			33,546			

Views of Tank Locations at Chongjin Coastline/Port/Marinas





Location: Kimchaek Coastline/Port/Marinas, Google Earth images, 12/28/18

Number	Estimates (m) of		Implied Total Volume (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Latitude	Longitude	
1	18	15	3,817	40.663	129.211	Newish looking tank, red roof, near marina
1	10	7	550	40.663	129.211	Newish looking tank, red roof, near marina
1	6	4	113	40.663	129.211	Newish looking tank, red roof, near marina
1	24	10	4,524	40.708	129.226	Old looking tank; several possible old foundations of similar-sized tanks nearby
Total of above			9,004			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			4,502			

Views of Tank Locations at Kimchaek Coastline/Port/Marinas



4 Nautilus Review of Oil Storage Sites Also Included in 1982 U.S. Central Intelligence Agency Estimates

Location: Josan-ri, Rason, North Korea, Google Earth images, 04/28/2019

	Estimates (m) of				Approximate Coordinates		
Number	Diameter	Height	Implied Total Volume (cubic meters) as measured	Volume as Reported in Source (converted to cubic meters)	Latitude	Longitude	Notes
3	25	10	14,726	20,350	42.406	130.622	Heavily rusted, appear to be either silver or white in color, only three of reported four are visible. CIA 1982.
5	8	6	1,508	6,359	42.411	130.618	Heavily rusted, appear to be either silver or white in color, five are visible. CIA 1982.
10	6	7	1,979	7,949	42.411	130.618	Heavily rusted, appear to be either silver or white in color, 10 are visible. CIA 1982.
5	12	9	5,089	5,724	42.406	130.619	Tanks appear rusted, surrounded by trees, possibly disused. CIA 1982.
8	10	5	3,142	1,113	42.408	130.612	Tanks appear rusted, surrounded by trees, possibly disused. Could only locate 8 of 10 reported by source. CIA 1982.
Total of above			26,444	41,496			
Fraction of volume estimated to be active oil storage:			70%				
Total volume estimated to be active oil storage:			18,511				
Notes: reported by CIA (reference 1) as "Yonghun Dong Pet Prods Stor #1 through 3". Source reports 4 large tanks, but only 3 are visible.							

Overviews of Tank Locations at Josan-ri, Rason



Detailed View of Older Tanks at Josan-ri, Rason



Location: Sinuiju, North Pyongan, North Korea , Google Earth images, 04/29/2019

		Estimates (m) of			Approximate Coordinates		
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (converted to cubic meters)	Latitude	Longitude	Notes
2	80	8	80,425	61,687	40.065	124.571	Older looking tanks. CIA, 1982
4	45	15	95,426	92,213	40.066	124.580	Newer looking tank, no signs of rust or wear. CIA, 1982
2	36	10	20,358	22,258	40.066	124.580	Newer looking tank, no signs of rust or wear. CIA, 1982
5	8	5	1,257	4,006	40.064	124.578	Older looking tanks, can only see five. CIA, 1982
9	6	4	1,018	2,003	40.064	124.578	Older looking tanks. CIA, 1982
16	0	0	-	1,068			16 horizontal tanks reported in CIA, 1982, but currently not visible or are under cover.
Total of above			198,483	183,236			
Fraction of volume estimated to be active oil storage:			95%				
Total volume estimated to be active oil storage:			188,559				

Notes: reported by CIA (reference 1) as "Paengma Ri Pet Stor SE". Source reports 16 smaller horizontal tanks, but tanks are not obviously visible.

Views of Tank Locations at Sinuiju



Location: Undok, North Hamgyong, North Korea , Google Earth images, 05/06/2019							
Number (as-reported numbers shown for first three entries)	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
6	14	0	-	28,618	42.519	130.347	Appears to be removed. CIA 1982.
5	12	0	-	6,359	42.524	130.348	Appears to be removed. CIA 1982.
2			-	1,590	42.522	130.347	Appears to be removed. CIA 1982.
3	9	4	763	890	42.519	130.347	Older looking tanks, difficult to make out. Only appears to be three tanks present of four reported in source. CIA 1982.
Total of above			763	37,457			
Fraction of volume estimated to be active oil storage:				30%			
Total volume estimated to be active oil storage:			229				
Notes: reported by CIA (reference 1) as "Aoji Ri Chem Synth Plnt A Syn Pet Rfy". Plant appears to be decommissioned. 3 of original four smaller tanks remain, but appear to be in poor condition. Superstructure for some of the larger tanks (including floating tanks) still present, but tanks do not appear operable.							

View of Tank Locations at Undok



Location: Rajin Port, Rason, North Korea , Google Earth images, 05/07/2019							
Number (for first entry, as reported in source, second is number of tanks counted).	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
3	40	0	-	21,940	42.224	130.273	Possibly one or more foundations or outlines of a tanks formerly on the site, or one or more tanks may be buried, though the site seems disused. CIA 1982.
2	10	6	942	1,145	42.221	130.273	Dark brown, appear to be partially buried. CIA 1982.
Total of above			942	23,085			
Fraction of volume estimated to be active oil storage:			60%				
Total volume estimated to be active oil storage:			565				
Notes: reported by CIA (reference 1) as "Nanjin Pet Prod Stor". Some reported tanks appear to be decommissioned and the remainder appear disused, although it is possible that these remaining smaller tanks could still be functional.							

Views of Tank Locations at Rajin Port

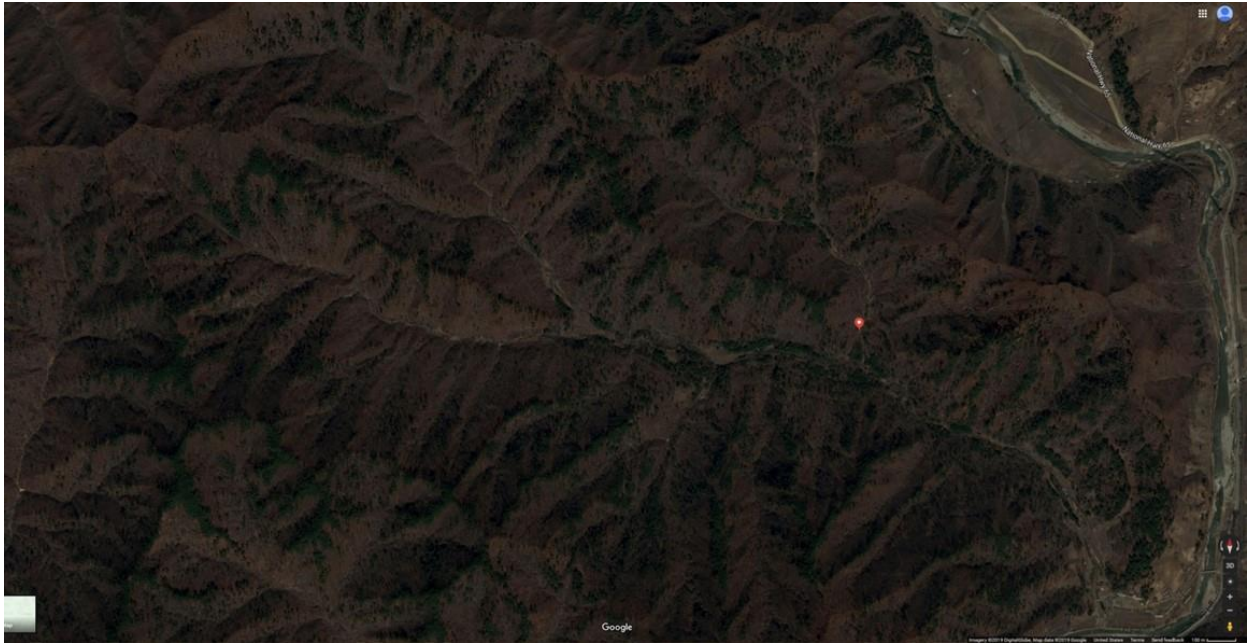


Location: Kaego, Chagang, North Korea , Google Earth images, 05/07/2019

Number as reported in source	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
2 bunkers w/ 25 tanks			-	3,339	40.364	126.311	Possible bunker location. CIA 1982.
3 bunkers w/ 20 tanks			-	4,006	40.364	126.311	Possible bunker location. CIA 1982.
9 bunkers w/ 18 tanks			-	10,818	40.364	126.311	Possible bunker location. CIA 1982.
4 bunkers w/ 15 tanks			-	4,006	40.364	126.311	Possible bunker location. CIA 1982.
11 bunkers w/ 10 tanks			-	7,345	40.364	126.311	Possible bunker location. CIA 1982.
1 bunkers w/ 8 tanks			-	534	40.364	126.311	Possible bunker location. CIA 1982.
Total of above			-	30,049			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Hunchon Pet Prod Storage North". Location of bunkers not clearly identifiable, although some candidate buildings exist in what otherwise appears to be an agricultural and forest area.

Views of Tank Locations at Kaego



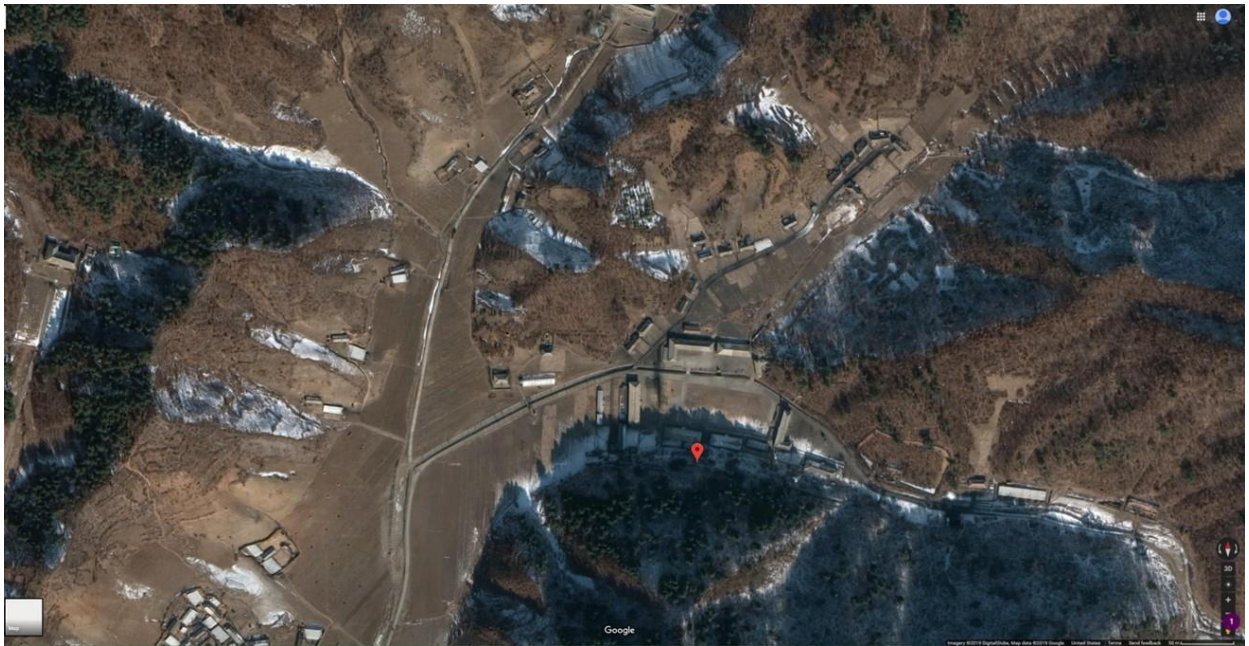
Location: Kusong, North Pyongan, North Korea , Google Earth images, 05/07/2019							
Number as reported in source	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate		Notes
	Diameter	Height			Latitude	Longitude	
3 bunkers w/ 25 tanks			-	5,008	40.037	125.209	Possible bunker location. CIA 1982.
4 bunkers w/ 20 tanks			-	5,342	40.037	125.209	Possible bunker location. CIA 1982.
5 bunkers w/ 15 tanks			-	5,008	40.037	125.209	Possible bunker location. CIA 1982.
3 bunkers w/ 12 tanks			-	2,404	40.037	125.209	Possible bunker location. CIA 1982.
17 bunkers w/ 12 tanks			-	13,622	40.037	125.209	Possible bunker location. CIA 1982.
1 bunkers w/ 6 tanks			-	400	40.037	125.209	Possible bunker location. CIA 1982.
1 bunkers w/ 4 tanks			-	267	40.037	125.209	Possible bunker location. CIA 1982.
Total of above			-	32,051			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Kusong Pet Prod Storage North". Location of bunkers not clearly identifiable, although some candidate buildings exist in what otherwise appears to be an agricultural and forest area.							

View of Tank Locations at Kusong



Location: Andong-ni, South Pyongan, North Korea , Google Earth images, 05/07/2019							
	Estimates (m) of				Approximate Coordinates		
Number as reported in source	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
1 bunkers w/ 25 tanks			-	1,669	39.808	126.294	Possible bunker location. CIA 1982.
4 bunkers w/ 20 tanks			-	5,341	39.808	126.294	Possible bunker location. CIA 1982.
1 bunkers w/ 16 tanks			-	1,068	39.808	126.294	Possible bunker location. CIA 1982.
10 bunkers w/ 15 tanks			-	10,016	39.808	126.294	Possible bunker location. CIA 1982.
9 bunkers w/ 12 tanks			-	7,211	39.808	126.294	Possible bunker location. CIA 1982.
7 bunkers w/ 2 tanks			-	4,674	39.808	126.294	Possible bunker location. CIA 1982.
Total of above			-	29,979			
Notes: reported by CIA (reference 1) as "Tokchon Pet Prod Storage PUG". Location of bunkers not clearly identifiable, although some candidate buildings exist in what otherwise appears to be an agricultural and forest area.							

Views of Tank Locations at Andong-ni



Location: Sollyong-ni, North Korea , Google Earth images, 05/07/2019							
	Estimates (m) of				Approximate Coordinates		
Number as reported in source	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
5 bunkers w/ 25 tanks			-	1,669	41.272	128.634	Possible bunker location. CIA 1982.
16 bunkers w/ 20 tanks			-	1,135	41.272	128.634	Possible bunker location. CIA 1982.
7 bunkers w/ 15 tanks			-	4,006	41.272	128.634	Possible bunker location. CIA 1982.
Total of above			-	6,810			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Yongha Ri Pet Prod Storage PUG". Location of bunkers not clearly identifiable, although some candidate buildings exist, including building with new roof, as well as what could be former storage areas, in what otherwise appears to be an agricultural and forest area.							

View of Tank Locations at Sollyong-ni



Location: Yongha, South Pyongan, North Korea, Google Earth images, 05/07/2019

Number as reported in source (except last entry)	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
1 bunkers w/ 25 tanks			-	1,669	39.591	126.362	Possible bunker location.
1 bunkers w/ 17 tanks			-	1,135	39.591	126.362	Possible bunker location. CIA 1982.
3 bunkers w/ 20 tanks			-	4,006	39.591	126.362	Possible bunker location. CIA 1982.
8 bunkers w/ 15 tanks			-	8,012	39.591	126.362	Possible bunker location. CIA 1982.
11 bunkers w/ 10 tanks			-	7,345	39.591	126.362	Possible bunker location. CIA 1982.
1 bunkers w/ 5 tanks			-	333	39.591	126.362	Possible bunker location. CIA 1982.
12	2.5	3	177	-	39.595	126.367	Possible oil tanks, but shapes are somewhat irregular. Google Maps.
Total of above			177	22,500			
Fraction of volume estimated to be active oil storage:			10%				
Total volume estimated to be active oil storage:			18				

Notes: reported by CIA (reference 1) as "Pukchang Ni Pet Prod Storage PUG". Location of bunkers not clearly identifiable, although some candidate buildings exist, including building with new roof, as well as what could be former storage areas, in what otherwise appears to be an agricultural and forest area.

Views of Tank Locations at Yongha



Location: Pyŏngsŏng, South Pyongan, North Korea, Google Earth images, 05/21/2019							
	Estimates (m) of				Approximate Coordinates		
Number (first entry as reported in source--just total volume reported)	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
NA			-	59,620	39.289	125.898	Location as indicated in CIA 1982. Bunkers, but no tanks, may be present, but not possible to measure volume.
			-	-			
Total of above			-	59,620			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Sain Ni Petr Prod Stor". Type of storage not specified in source. Location of bunkers not clearly identifiable, although some candidate areas exist. Area does not seem to have been heavily used recently. Aaricultural and forest area.							

View of Tank Locations at Pyŏngsŏng



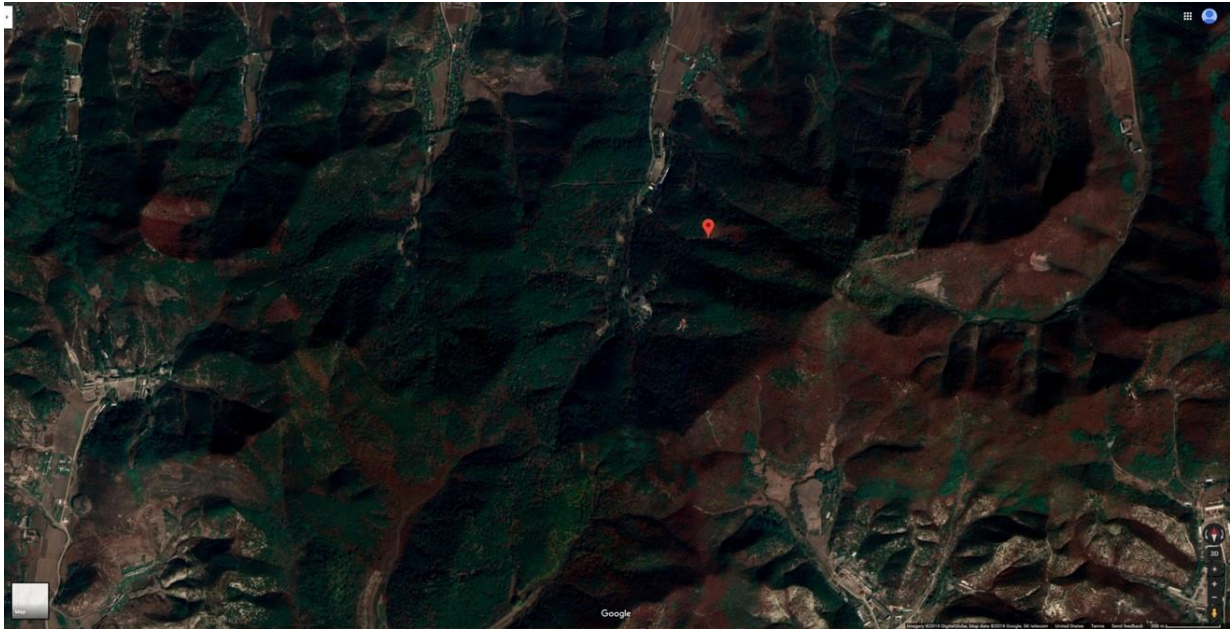
Location: Hamhung, South Hamgyong, North Korea, Google Earth images, 05/08/2019							
	Estimates (m) of				Approximate Coordinates		
Number (first entry as reported in source)	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
5 bunkers w/ 6 tanks each			-	23,848	39.962	127.833	Possible bunker location. CIA 1982.
4	10	0	-	-	39.962	127.833	Possible foundations of old tanks. Google Maps.
Total of above			-	23,848			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Samho-dong POL Stor". Location of bunkers not clearly identifiable, although some candidate buildings exist.as well as what could be foundations of older tanks. in what otherwise appears to be an mountain and forest area.							

Views of Tank Locations at Hamhung

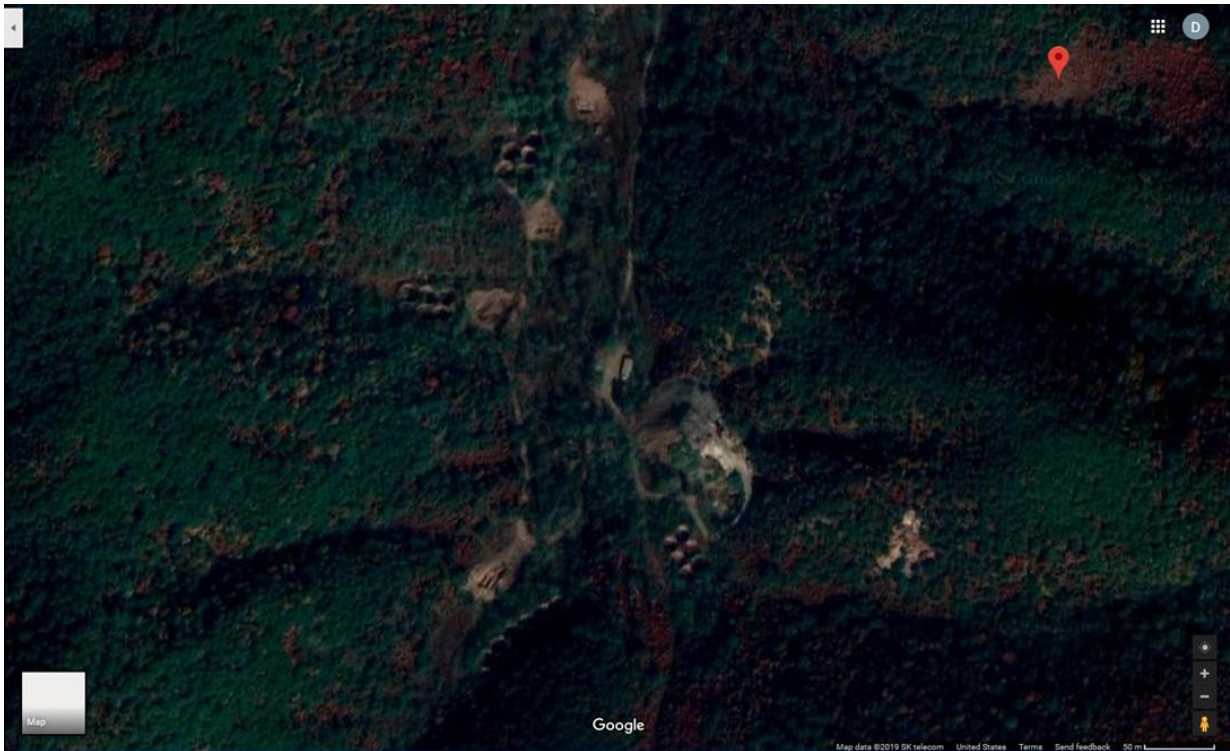


Location: Hwangju, North Hwanghae, North Korea, Google Earth images, 05/08/2019							
		Estimates (m) of			Approximate Coordinates		
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
4 bunkers w/ 6 tanks each			-	19,078	38.696	125.826	Possible bunker location. CIA 1982.
18	13	0	-		38.695	125.821	Foundations of old tanks at at least four locations. Google Maps.
Total of above			-	19,078			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Hwangju-up Petr Prods Stor". Location of bunkers possibly where foundations of old tanks appear, although some newer buildings appear nearby; mountain and forest area with some agriculture.							

Views of Tank Locations at Hwangju



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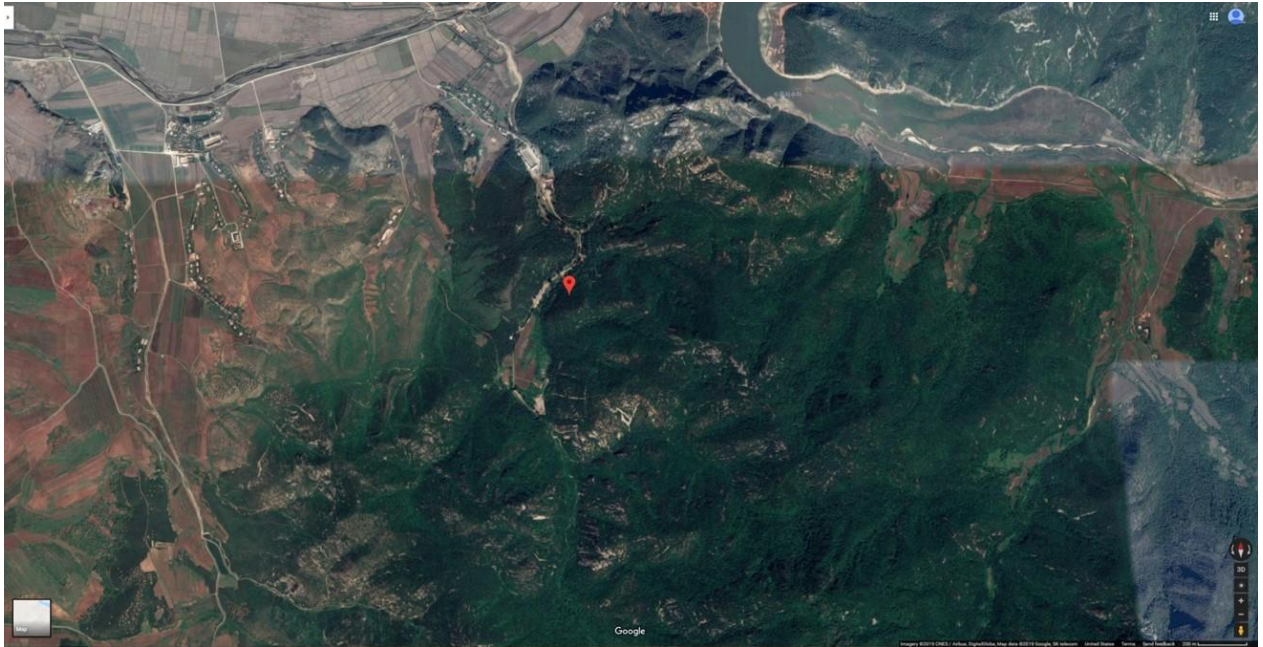


Location: Kwail, South Hwanghae, North Korea, Google Earth images, 05/08/2019

		Estimates (m) of		Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)		Latitude	Longitude	
7 bunkers w/ 6 tanks			-	33,387	38.438	125.079	Possible bunker location. CIA 1982.
2 bunkers w/ 10 tanks			-	1,335	38.442	125.081	Possible bunker location. CIA 1982.
1 bunkers w/ 7 tanks			-	467	38.442	125.081	Possible bunker location. CIA 1982.
Total of above			-	35,189			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Kwail POL Storage Area E". Location of bunkers not immediately obvious, although some potential candidate buildings appear nearby; forest area with some agriculture.

Views of Tank Locations at Kwail

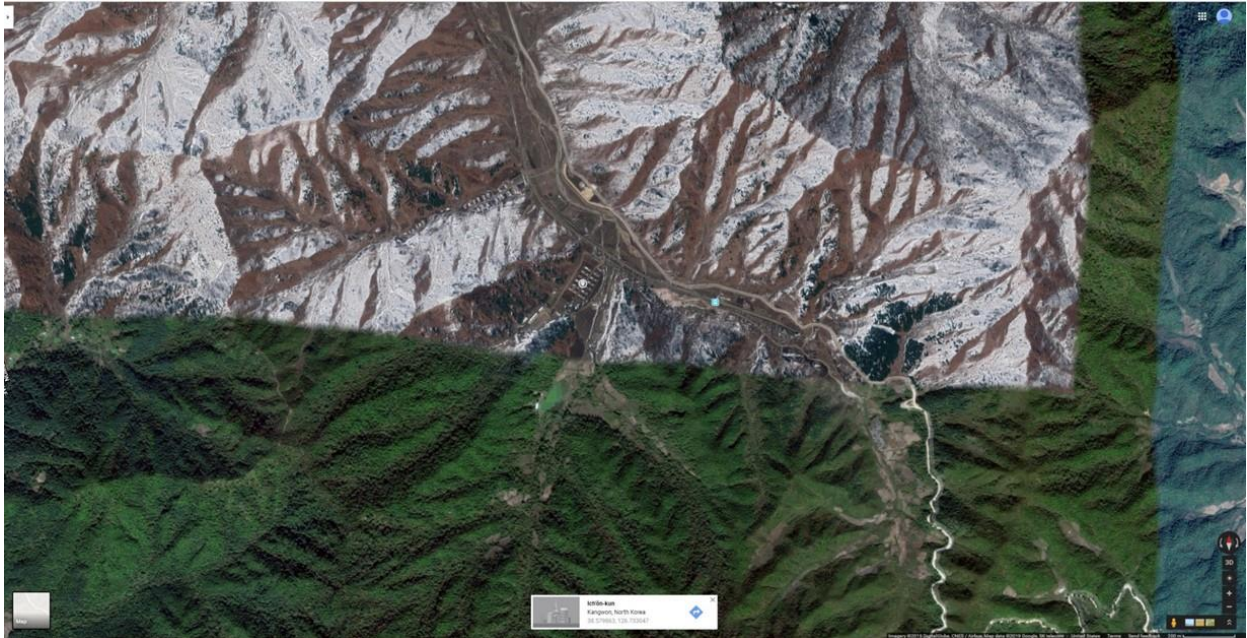


Location: Ich'on-kun, Kangwon, North Korea, Google Earth images, 05/09/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
1 bunkers w/ 5 tanks			-	3,974	38.580	126.733	Possible bunker location. CIA 1982.
1 bunkers w/ 4 tanks			-	3,179	38.580	126.733	Possible bunker location. CIA 1982.
1 bunkers w/ 3 tanks			-	2,384	38.580	126.733	Possible bunker location. CIA 1982.
5 bunkers w/ 2 tanks			-	7,949	38.580	126.733	Possible bunker location. CIA 1982.
1 bunkers w/ 15 tanks			-	1,001	38.580	126.733	Possible bunker location. CIA 1982.
Total of above			-	18,487			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Chiha Ri Petr Prod Stor South". Location of bunkers not immediately obvious, although some potential candidate buildings appear nearby; forest area with limited agriculture.

Views of Tank Locations at Ich'ön-kun



Location: Hwasong-ni, North Korea, Google Earth images, 05/09/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
2 bunkers w/ 3 tanks			-	4,769	38.608	126.587	Possible bunker location. CIA 1982.
3 bunkers w/ 2 tanks			-	4,769	38.608	126.587	Possible bunker location. CIA 1982.
Total of above			-	9,538			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Chuyon Ni Petr Prod Stor". Location of bunkers not immediately obvious, although some potential candidate buildings appear nearby; sparse forest area with agricultural fields surrounding.

Views of Tank Locations at Hwangsong-ni

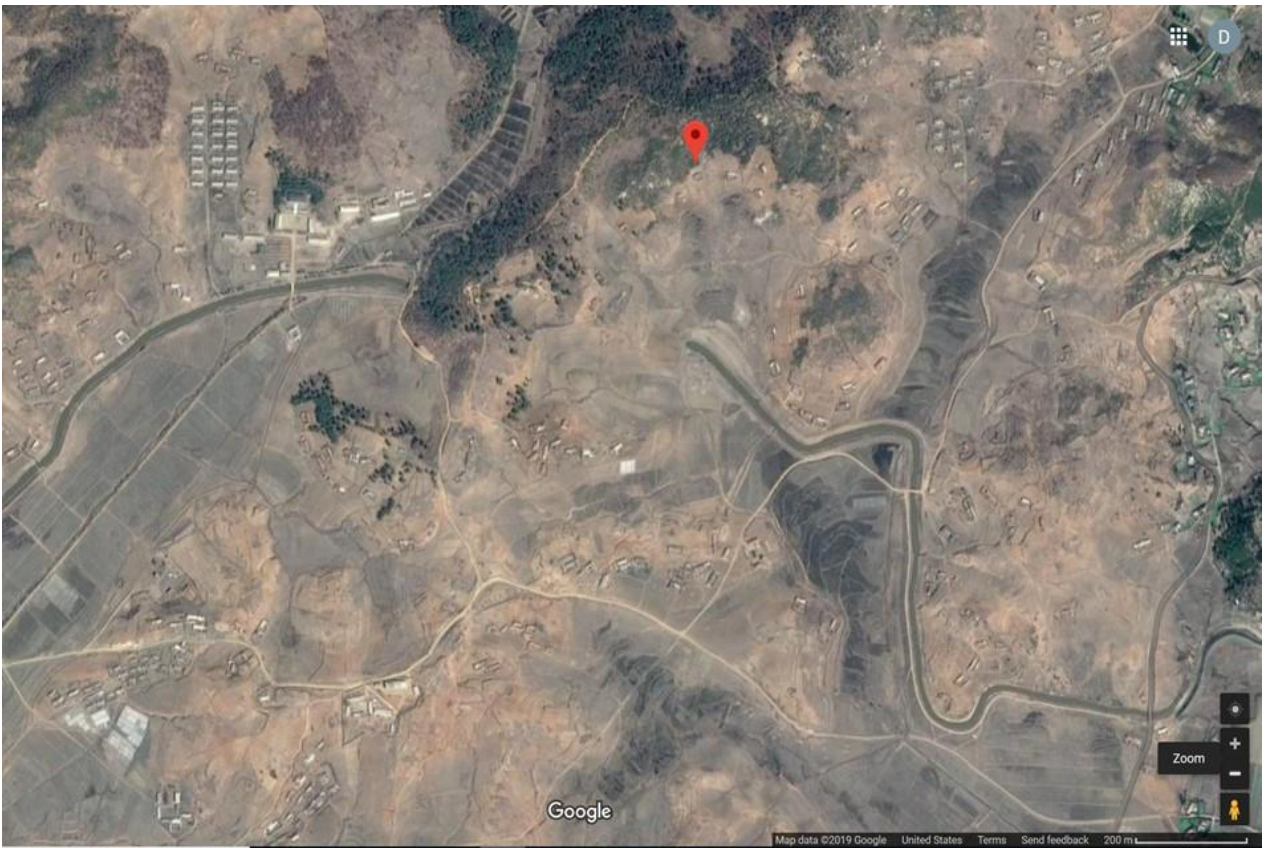


Location: Sonchon, North Pyongan, North Korea, Google Earth images, 05/09/2019

		Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
Number	Diameter	Height				Latitude	Longitude	
10			0	-	12,718	39.755	124.998	Buried, not visible. CIA 1982.
Total of above				-	12,718			
Fraction of volume estimated to be active oil storage:								0%
Total volume estimated to be active oil storage:								-

Notes: reported by CIA (reference 1) as "Munjong Ni Petr Prod Stor". Location of bunkers not immediately obvious, although some potential candidate buildings appear nearby; sparse forest area with agricultural fields surrounding and a newer irrigation canal (including a tunnel under a hill for the canal). Also close to a main highway.

Views of Tank Locations at Sonchon



Location: Kaechon, South Pyongan, North Korea, Google Earth images, 05/09/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
2	16	8	3,217	7,154	39.656	125.924	Older looking tanks, difficult to make out. Only eight visible, possibly a foundation for a ninth. Most appear decayed and un-usable (perhaps only one or two even potentially usable). Nine total reported by CIA 1982.
5	8	0	-	2,861	39.656	125.924	Difficult to make out, likely only foundations of tanks, at most, remaining. CIA 1982.
48	4	6	3,619	3,205	39.643	125.944	Possible location of horizontal tanks, although not entirely clear what these objects are. Area appears to be well-maintained, indicating ongoing operations. CIA 1982.
Total of above			6,836	13,220			
Fraction of volume estimated to be active oil storage:			50%				
Total volume estimated to be active oil storage:			3,418				

Notes: reported by CIA (reference 1) as "Chongdong POL Stor Area NE". Location of 48 horizontal tanks not certain, but objects found appear to be about the right size and number. Larger tanks clearly disused; most or all appear abandoned. Hill and valley farming area. Area of what appear to be tailings next to area of ~48 possible tanks suggest possibility of a nearby mine.

Views of Tank Locations at Kaechon

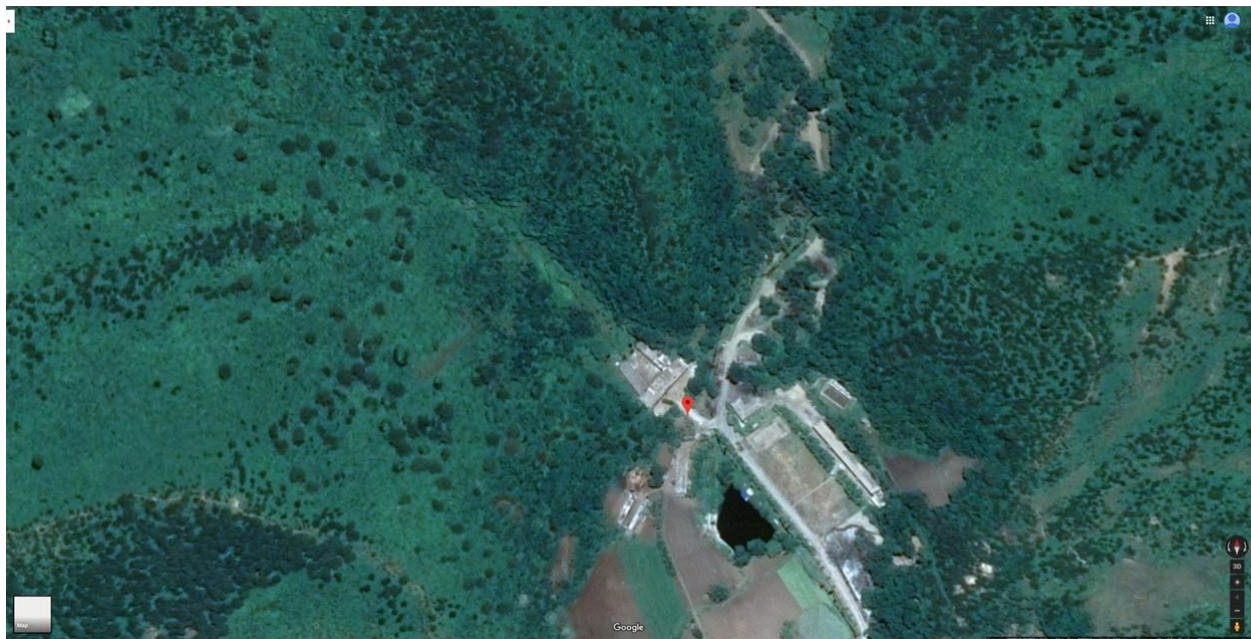


Location: Munchon, Kangwon, North Korea, Google Earth images, 05/10/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
4 bunkers w/ 3 tanks			-	15,262	39.304	127.370	Possible bunker location. CIA 1982.
1 bunker w/ 6 and 2 tanks			-	467	39.304	127.370	Possible bunker location. CIA 1982.
1	24	10	4,524		39.286	127.378	Large, newer tank, though could possibly be a round building for a different use. Other new buildings in area.
2	8	7	704		39.286	127.378	Older tanks adjacent to newer buildings.
4	22	12	18,246		39.227	127.367	Two older (rusted), two newer tanks. Different heights--estimate of average is provided.
2	14	8	2,463		39.227	127.367	One older (rusted), one newer tank. Different heights--estimate of average is provided.
Total of above			25,937	15,729			
Fraction of volume estimated to be active oil storage:			90%				
Total volume estimated to be active oil storage:			23,343				

Notes: reported by CIA (reference 1) as "Munchon Up Petr Prod Stor N". Location of bunkers not certain, but candidate building are nearby. CIA 1982 coordinates point to location in the hills above the coastal town. Other oil tanks found from Google Earth along the coastline, probably serving marine traffic. Some of these tanks look quite new.

Views of Tank Locations at Munchon

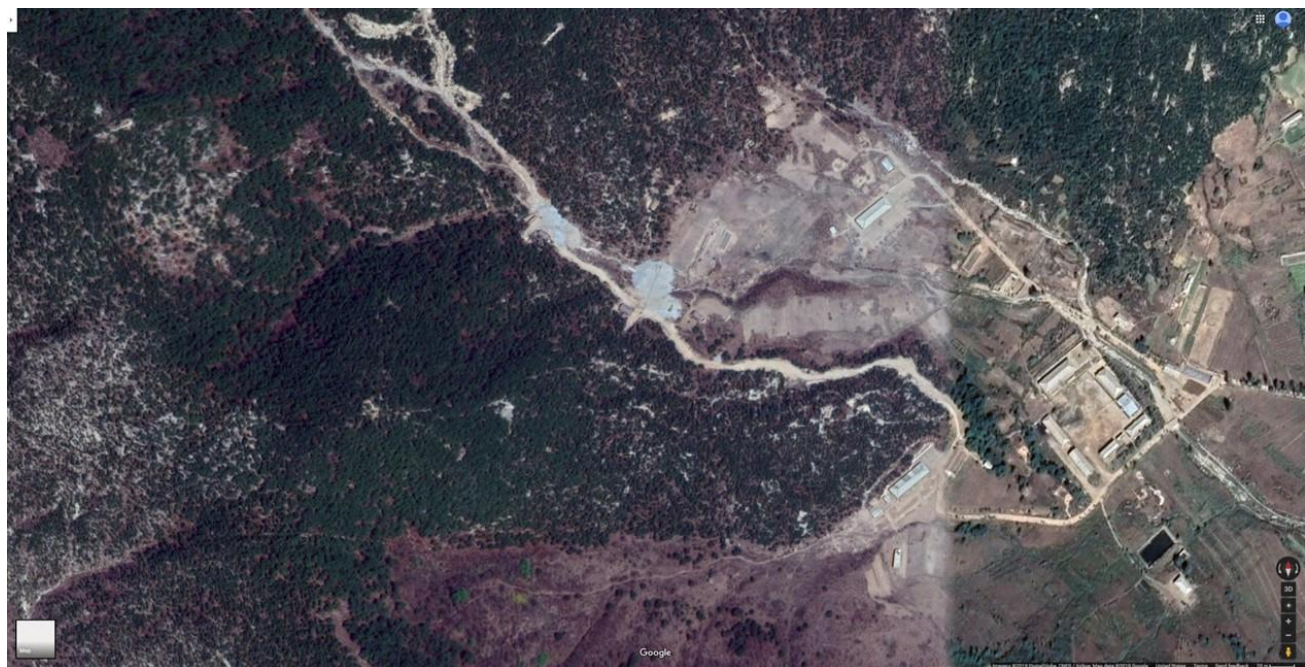




Location: Aewol-li, South Pyongan, North Korea, Google Earth images, 05/10/2019

		Estimates (m) of			Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)			
Number	Diameter	Height			Latitude	Longitude	Notes
2 bunkers w/ 6 tanks			-	9,539	38.841	125.328	Possible bunker location. CIA 1982.
Total of above			-	9,539			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Yonggang-Up POL Storage Area". Location of bunkers not certain, but candidate building are nearby.							

View of Tank Locations at Aewol-li



Location: North Korea, Ryanggang, Google Earth images, 05/10/2019

	Estimates (m) of			Approximate Coordinates			
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	
Number	Diameter	Height					Notes
9 bunkers w/ 10 tanks			-	6,009	41.428	128.254	Possible bunker location. CIA 1982.
Total of above			-	-			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Hysan Pet Prod Stor East". Location of bunkers not certain, but candidate building are nearby.							

View of Tank Locations at Ryanggang



Location: Sungjibaegam, Paekam-rodongjagu, Ryanggang, North Korea, Google Earth images, 05/10/2019

Estimates (m) of					Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)			
Number	Diameter	Height			Latitude	Longitude	Notes
3 bunkers w/ 25 tanks			-	5,008	41.224	128.715	Possible bunker location. CIA 1982.
3 bunkers w/ 20 tanks			-	4,006	41.224	128.715	Possible bunker location. CIA 1982.
1 bunkers w/ 15 tanks			-	95	41.224	128.715	Possible bunker location. CIA 1982.
Total of above			-	9,109			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Yongha Ri Sup Dep A Pet". Location of bunkers not certain, but candidate building and what looks like a fortified concrete area are nearby.							

Views of Tank Locations at Sungjibaegam



Location: Chaewon-ni, North Korea, Google Earth images, 05/10/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
12 bunkers w/ 10 tanks			-	8,012	40.287	127.315	Possible bunker location. CIA 1982.
Total of above			-	8,012			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Changjin Up Pet Prod Stor S". Location of bunkers not certain, but candidate buildings and cleared areas are nearby.

View of Tank Locations at Chaewon-ni



Location: Hoesang-guyok, Hamhung, South Hamgyong, North Korea, Google Earth images, 05/10/2019

	Estimates (m) of				Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)			
Number	Diameter	Height			Latitude	Longitude	Notes
5 bunkers w/ 20 tanks			-	6,677	39.950	127.554	Possible bunker location. CIA 1982.
5 bunkers w/ 10 tanks			-	3,338	39.950	127.554	Possible bunker location. CIA 1982.
Total of above			-	10,015			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Hamhung Pet Prod Stor". Location of bunkers not certain, but candidate buildings and areas of concrete are nearby. Close to river and main road. Near city of Hamhung.							

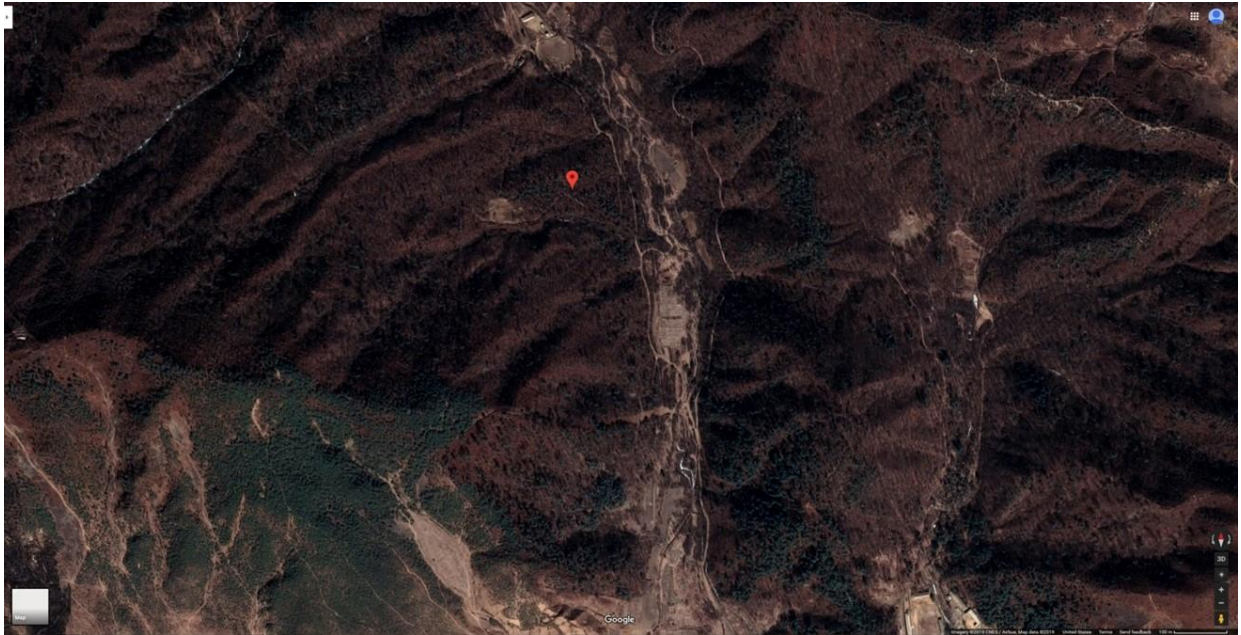
Views of Tank Locations at Hoesang-guyok



Location: Taechon, North Pyongan, North Korea, Google Earth images, 05/10/2019

	Estimates (m) of				Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)			
Number	Diameter	Height			Latitude	Longitude	Notes
10 bunkers w/ 10 tanks			-	6,677	39.953	125.462	Possible bunker location. CIA 1982.
Total of above			-	6,677			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Taechon Pet Prod Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Close to river, dam, and reservoir.							

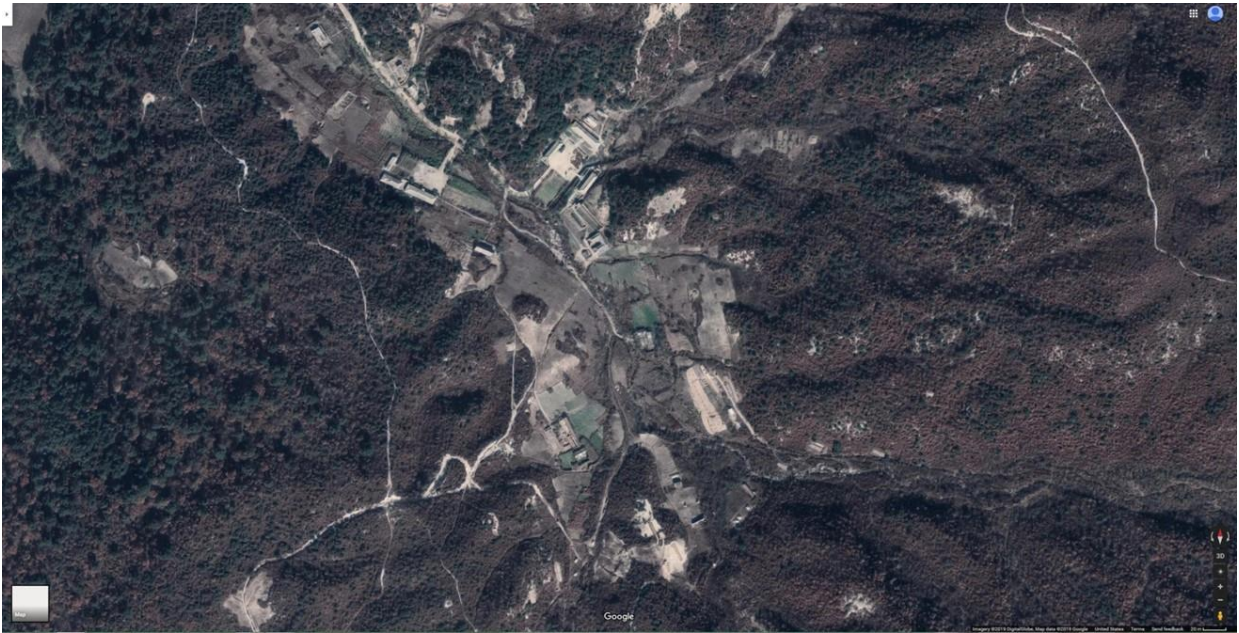
Views of Tank Locations at Taechon



Location: Hoesang-guyok, Hamhung, South Hamgyong, North Korea, Google Earth images, 05/10/2019

Estimates (m) of				Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)		
Number	Diameter	Height			Latitude	Longitude
4 bunkers w/ 20 tanks			-	5,341	39.861	125.963
6 bunkers w/ 10 tanks			-	4,006	39.861	125.963
Total of above			-	9,347		
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			
Notes: reported by CIA (reference 1) as "Kujang Up Pet Prds Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Forested area.						

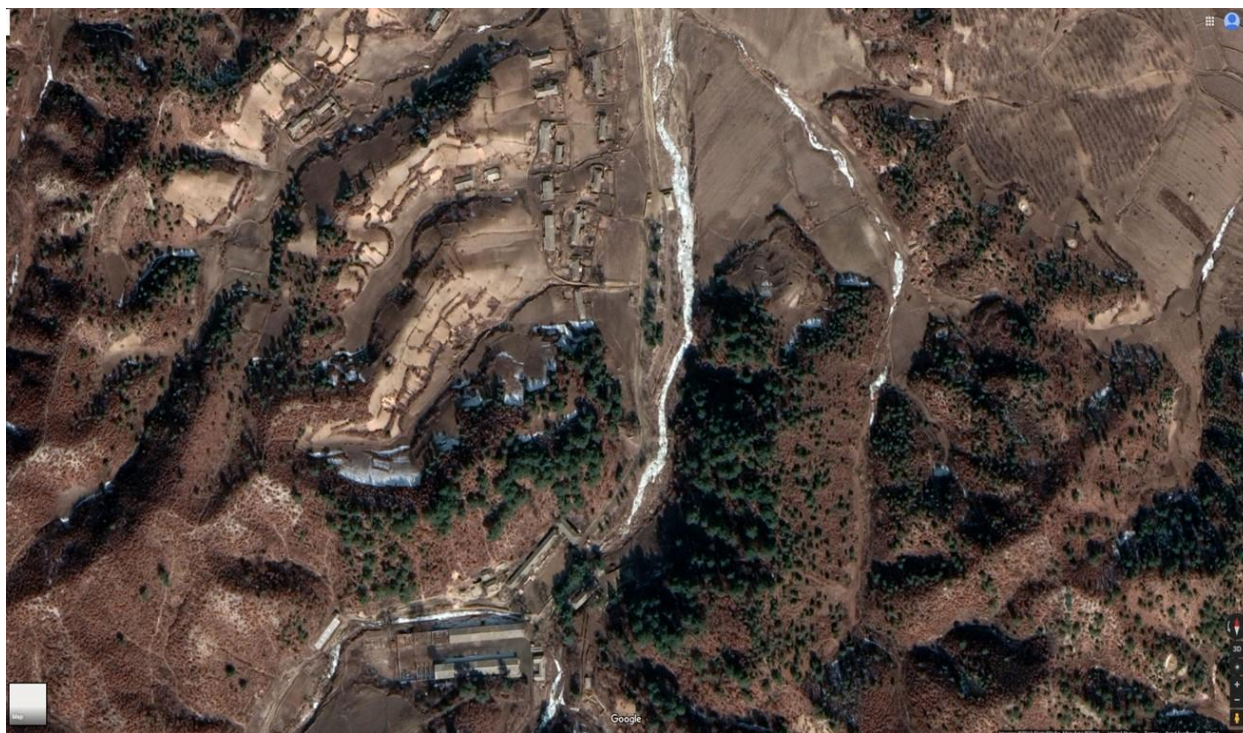
Views of Tank Locations at Hoesang-guyok



Location: Yangdŏk, South Pyongan, North Korea, Google Earth images, 05/22/2019

	Estimates (m) of				Approximate Coordinates	
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)		
Number	Diameter	Height			Latitude	Longitude
10 bunkers w/ 10 tanks	0	0	-	6,677	39.174	126.670
Total of above			-	6,677		
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			
Notes: reported by CIA (reference 1) as "Yangdok Pet Prds Stor SE". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Hilly area.						

View of Tank Locations at Yangdök



Location: Kangdong, Pyongyang, North Korea, Google Earth images, 05/22/2019

Estimates (m) of				Approximate Coordinates			
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
15 bunkers w/ 10 tanks	0	0	-	10,016	39.038	126.074	Possible bunker location. CIA 1982.
Total of above			-	10,016			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Sungho Pet Prds Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Hilly area with some forest.							

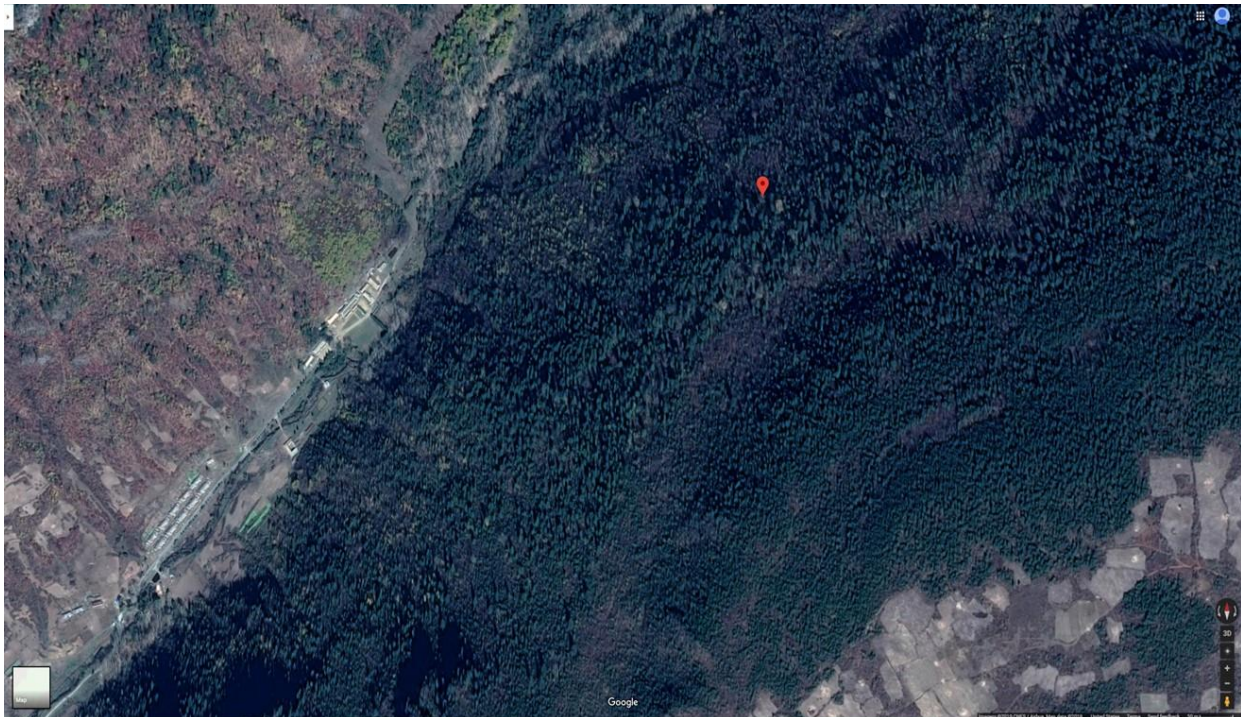
View of Tank Locations at Kangdong



Location: Unhung Up, Ryanggang, North Korea, Google Earth images, 05/22/2019

Estimates (m) of				Approximate Coordinates			
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
10 bunkers w/ 10 tanks	0	0	-	6,677	41.315	128.523	Possible bunker location. CIA 1982.
Total of above			-	6,677			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Pongdu Ri Pet Prds Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Forested area.							

View of Tank Locations at Unhung Up



Location: Munchon, Kangwon, North Korea, Google Earth images, 05/22/2019

	Estimates (m) of				Approximate Coordinates	
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)		
Number	Diameter	Height			Latitude	Longitude
10 bunkers w/ 10 tanks	0	0	-	6,677	39.306	127.255
Total of above			-	6,677		
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			
Notes: reported by CIA (reference 1) as "Muchon Up Pet Prds Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Forested area near farmland.						

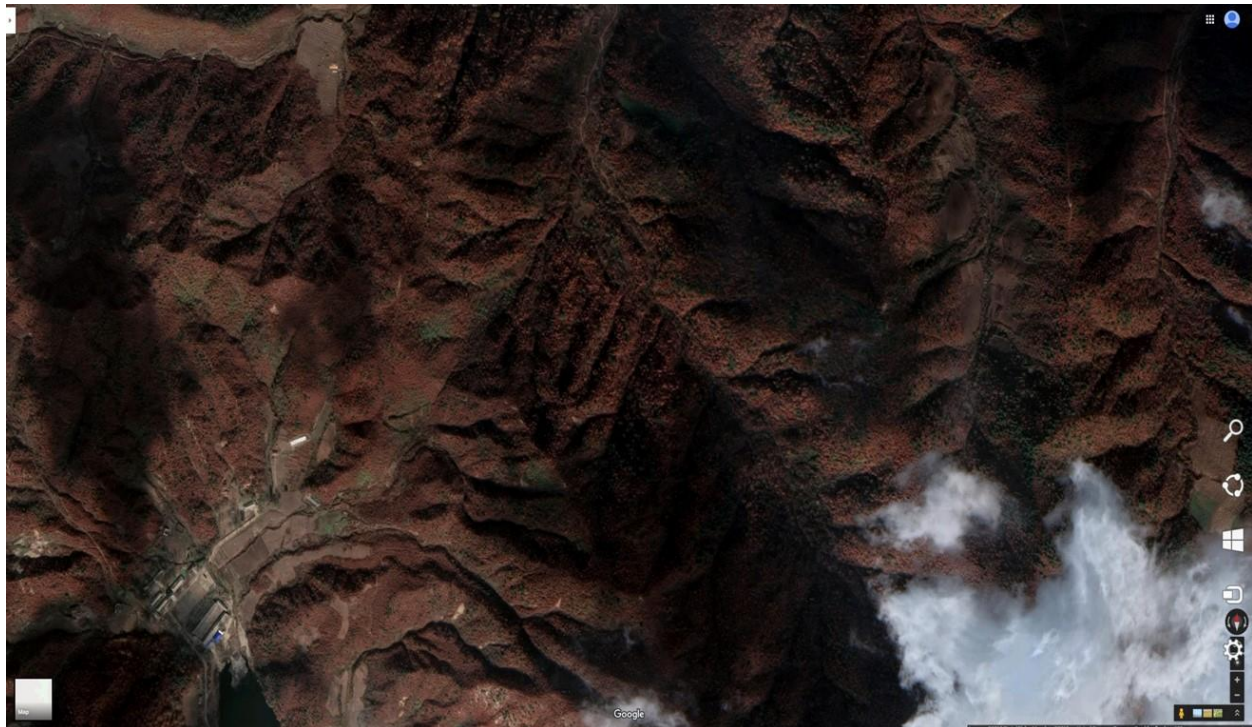
View of Tank Locations at Muchon



Location: Wonsan, Kangwon, North Korea, Google Earth images, 05/22/2019

	Estimates (m) of				Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)			
Number	Diameter	Height			Latitude	Longitude	Notes
10 bunkers w/ 10 tanks	0	0	-	6,677	39.047	127.418	Possible bunker location. CIA 1982.
Total of above			-	6,677			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Oun Ni Pet Prds Stor SW". Location of bunkers not certain, but candidate buildings and cleared areas are nearby. Hilly and barren area.							

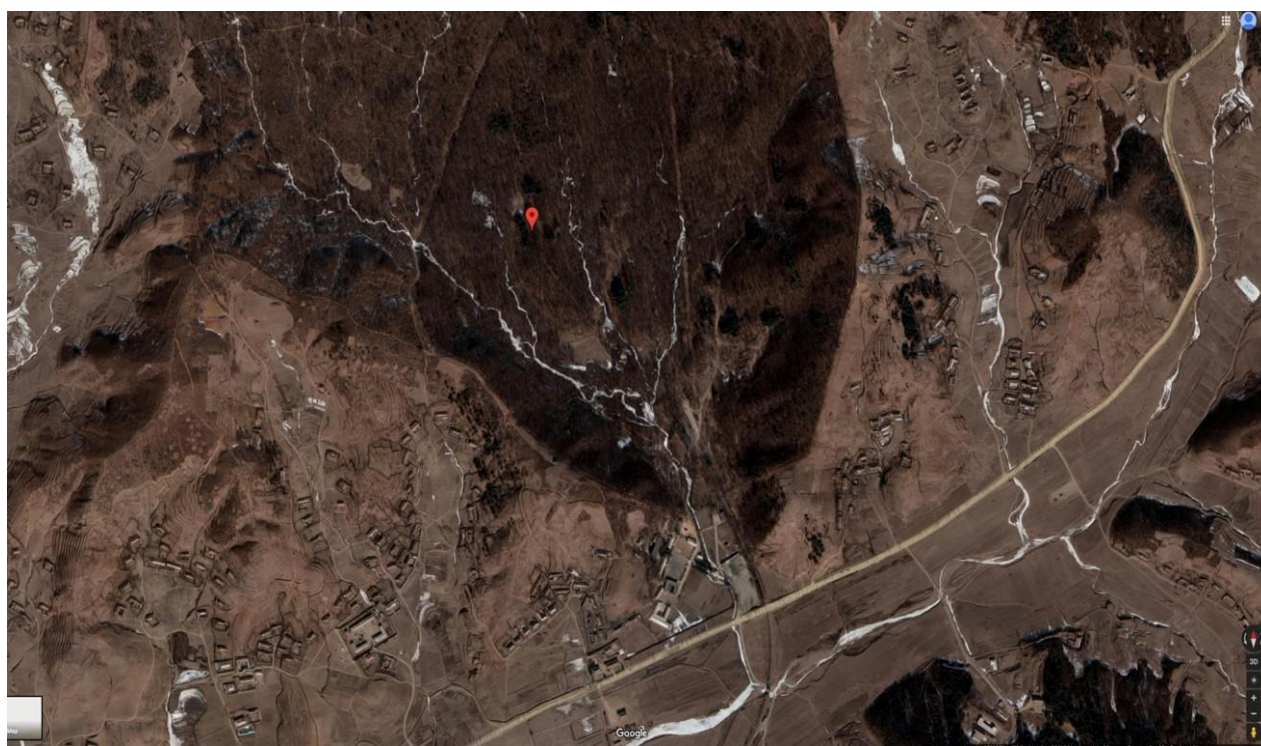
View of Tank Locations at Wonsan



Location: Sinuiju, North Pyongan, North Korea, Google Earth images, 05/22/2019

	Estimates (m) of				Approximate Coordinates		
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)			
Number	Diameter	Height			Latitude	Longitude	Notes
14 bunkers w/ 10 tanks	0	0	-	9,348	40.094	124.581	Possible bunker location. CIA 1982.
Total of above			-	9,348			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Paengma Ri Pet Prod Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Hilly and barren area.							

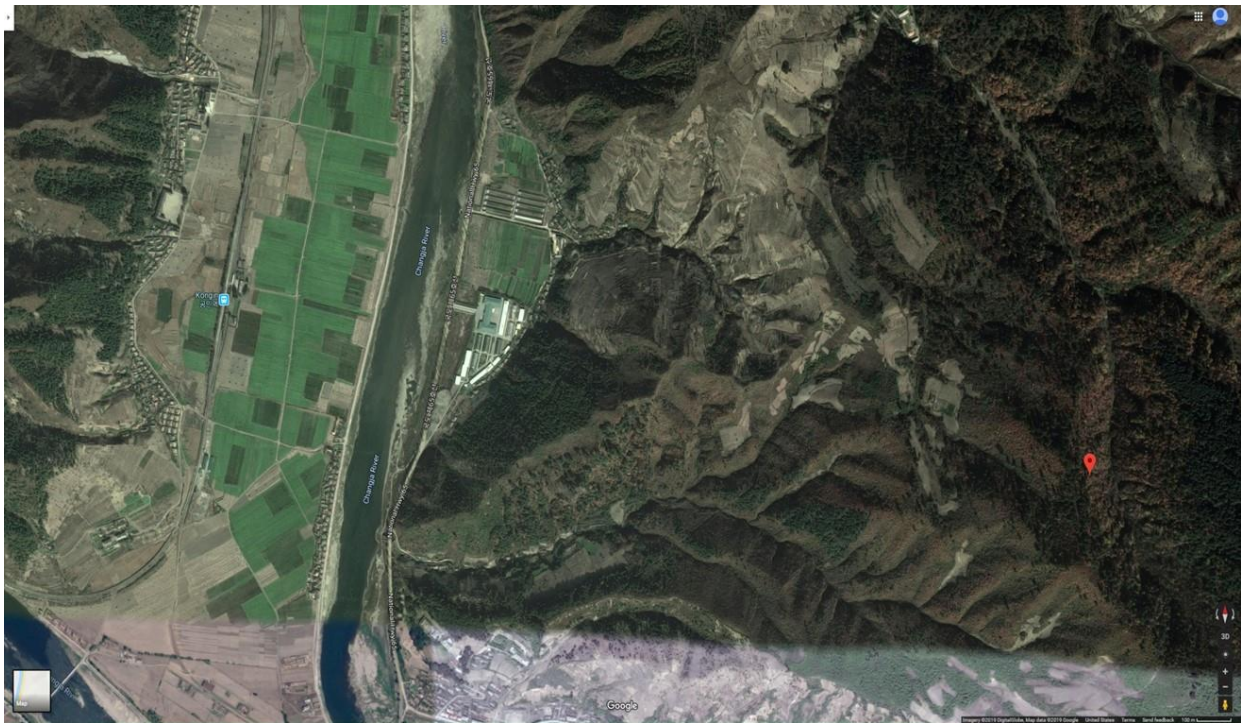
View of Tank Locations at Sinuiju



Location: Kanggye, Chagang, North Korea, Google Earth images, 05/23/2019

		Estimates (m) of			Approximate Coordinates		
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
1 bunkers w/ 22 tanks			-	1,469	40.914	126.613	Possible bunker location. CIA 1982.
1 bunkers w/ 17 tanks			-	1,135	40.914	126.613	Possible bunker location. CIA 1982.
3 bunkers w/ 15 tanks			-	3,004	40.914	126.613	Possible bunker location. CIA 1982.
2 bunkers w/ 9 tanks			-	1,201	40.914	126.613	Possible bunker location. CIA 1982.
3 bunkers w/ 6 tanks			-	1,201	40.914	126.613	Possible bunker location. CIA 1982.
Total of above				8,010			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Kanggye Pet Prod Stor South". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road in what looks to be a military compound. Hilly with farmland.							

View of Tank Locations at Kanggye



Location: Kup'awon, North Korea, Google Earth images, 05/23/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
1 bunkers w/ 14 tanks	0	0	-	1,589	40.494	126.414	Possible bunker location. CIA 1982.
1 bunkers w/ 13 tanks	0	0	-	934	40.494	126.414	Possible bunker location. CIA 1982.
2 bunkers w/ 12 tanks	0	0	-	868	40.494	126.414	Possible bunker location. CIA 1982.
2 bunkers w/ 10 tanks	0	0	-	1,602	40.494	126.414	Possible bunker location. CIA 1982.
5	0	0	-	111	40.494	126.414	Unable to find, CIA document states tanks are
Total of above			-	5,104			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Koin Nodongjagu Pet Prod Stor South". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Hilly and forested, with sparse farmland.							

View of Tank Locations at Kup'awon



Location: Hallyong-ni, North Korea, Google Earth images, 05/23/2019						
	Estimates (m) of				Approximate Coordinates	
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)		
Number	Diameter	Height			Latitude	Longitude
11 bunkers w/ 15 tanks	0	0	-	11,017	39.483	126.007
Total of above			-	11,017		
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			
Notes: reported by CIA (reference 1) as "Kuyon Ni Pet Prod Stor N". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Hilly and forested, with sparse farmland, southeast of Pukchang Airport.						

View of Tank Locations at Hallyong-ni



Location: Kup'awon, North Korea, Google Earth images, 05/23/2019

Estimates (m) of				Approximate Coordinates			
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
4	11	3	1,140	4,769	38.875	125.506	Possible tank location, appears only to be four tanks, with two of them appearing to only be the foundation of the tanks. Source reports 6 total tanks. CIA 1982.
3 bunkers w/ 10 tanks			-	2,003	38.881	125.503	Possible bunker location. CIA 1982.
1 bunkers w/ 6 tanks			-	400	38.881	125.503	Possible bunker location. CIA 1982.
Total of above			1,140	7,172			
Fraction of volume estimated to be active oil storage:			100%				
Total volume estimated to be active oil storage:			1,140				
Notes: reported by CIA (reference 1) as "Kangso Up Ni Pet Prod Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Hilly and forested, with sparse farmland, southeast of Pukchang Airport.							

Views of Tank Locations at Kup'awon



Location: Yangdŏk, South Pyongan, North Korea, Google Earth images, 05/24/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
3 bunkers w/ 24 tanks			-	4,807	39.210	126.723	Possible bunker location. CIA 1982.
1 bunkers w/ 13 tanks			-	868	39.210	126.723	Possible bunker location. CIA 1982.
1 bunkers w/ 12 tanks			-	801	39.210	126.723	Possible bunker location. CIA 1982.
1 bunkers w/ 10 tanks			-	667	39.210	126.723	Possible bunker location. CIA 1982.
1 bunkers w/ 8 tanks			-	534	39.210	126.723	Possible bunker location. CIA 1982.
Total of above			-	7,677			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				
Notes: reported by CIA (reference 1) as "Yangdok Pet Prod Stor East". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Hilly and forested, with dry and barren regions,near Naedong Train Station.							

View of Tank Locations at Yangdŏk



Location: Sinpo, South Hamgyong, North Korea, Google Earth images, 05/24/2019

		Estimates (m) of			Approximate Coordinates		
Number	Diameter	Height	Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Latitude	Longitude	Notes
2	7		-	1,271	39.997	128.199	Document states the tanks are buried. CIA 1982.
2	7		-	1,271	39.997	128.199	Document states the tanks are buried. CIA 1982.
2	7		-	1,271	39.997	128.199	Document states the tanks are buried. CIA 1982.
Total of above			-	3,813			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Mayangdo Pet Prod Stor NW". Location of tanks not certain, but cleared areas are nearby. Dry and barren, with industrial buildings and ports. On an island off the coast from Sinpo city.

Views of Tank Locations at Sinpo



Location: Ryanggang, North Korea, Google Earth images, 05/24/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
1 bunkers w/ 24 tanks			-	1,602	41.903	128.413	Possible bunker location. CIA 1982.
2 bunkers w/ 21 tanks			-	2,804	41.903	128.413	Possible bunker location. CIA 1982.
5			-	333	41.895	128.410	Horizontal Tanks possible location. CIA 1982.
1 bunkers w/ 12 tanks			-	400	41.903	128.413	Possible bunker location. CIA 1982.
14			-	467	41.895	128.410	Horizontal Tanks possible location. CIA 1982.
1 bunkers w/ 18 tanks			-	1,201	41.903	128.413	Possible bunker location. CIA 1982.
1 bunkers w/ 5 tanks			-	333	41.903	128.413	Possible bunker location. CIA 1982.
3			-	98	41.895	128.395	Horizontal Tanks possible location. CIA 1982.
Total of above			-	7,238			
Fraction of volume estimated to be active oil storage:			0%				
Total volume estimated to be active oil storage:			-				

Notes: reported by CIA (reference 1) as "Samyijon Airfield". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Dry and forested.

View of Tank Locations at Ryanggang

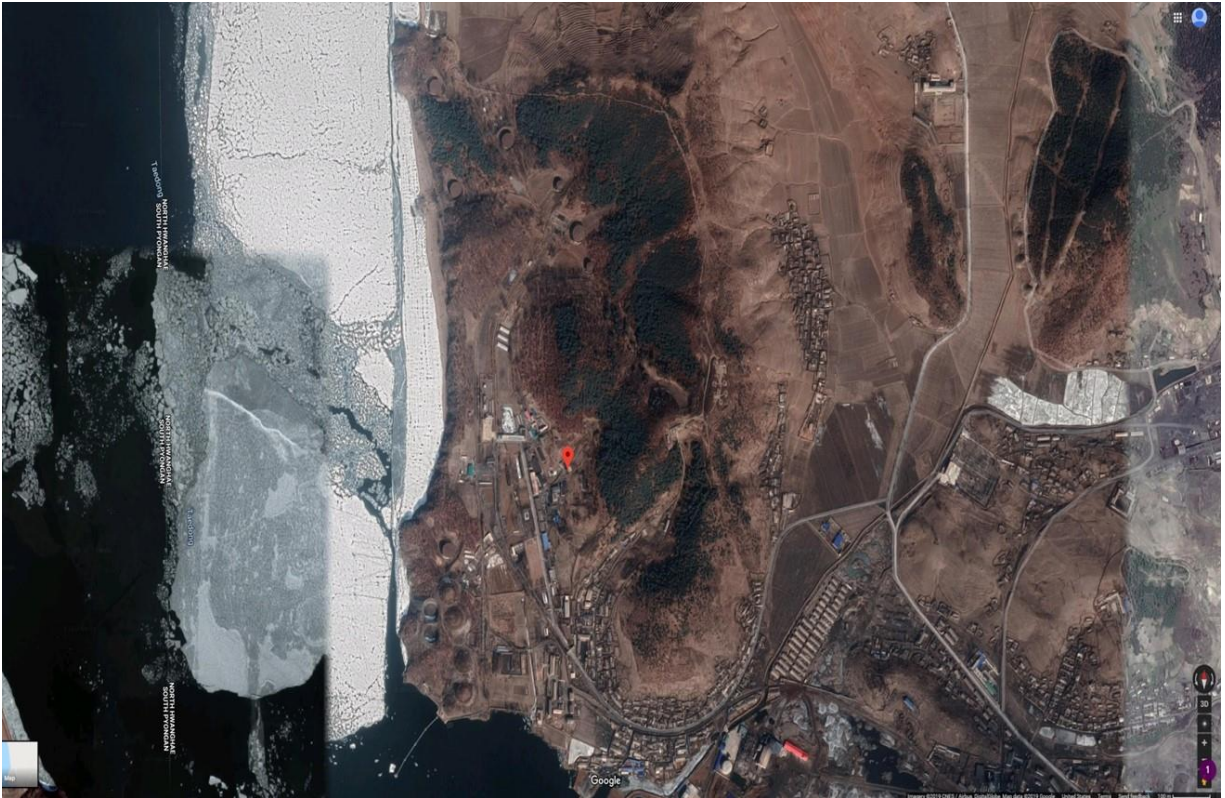


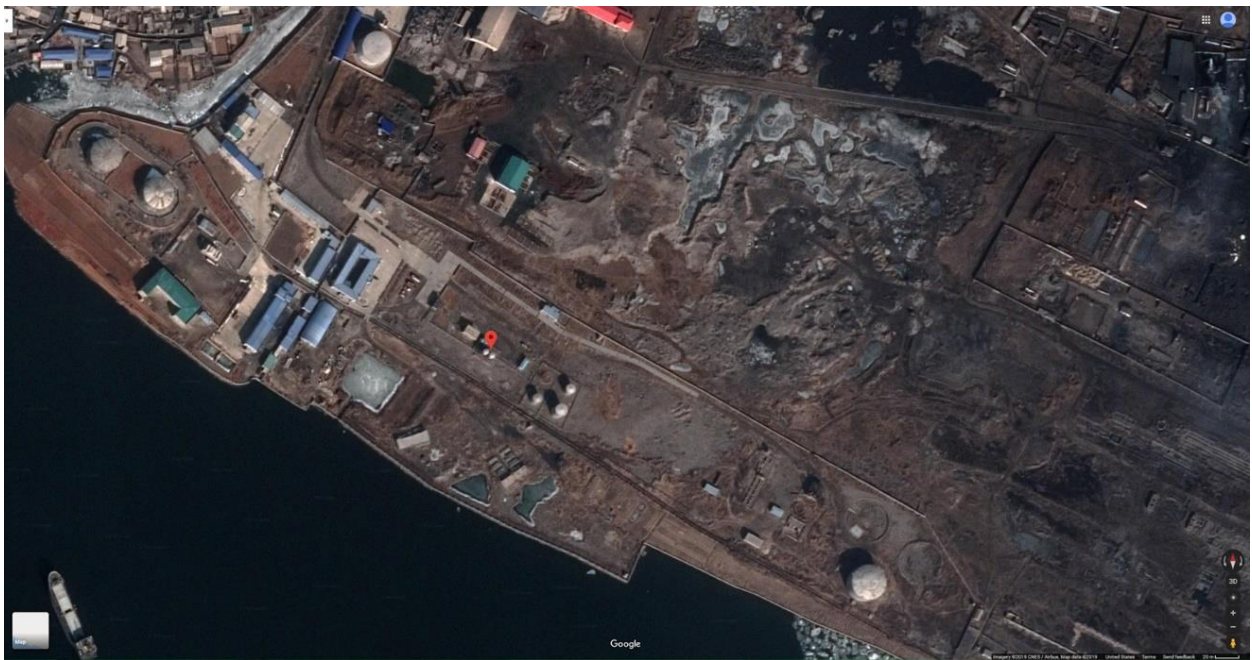
Location: Songnim, Pyongyang, North Korea, Google Earth images, 05/24/2019

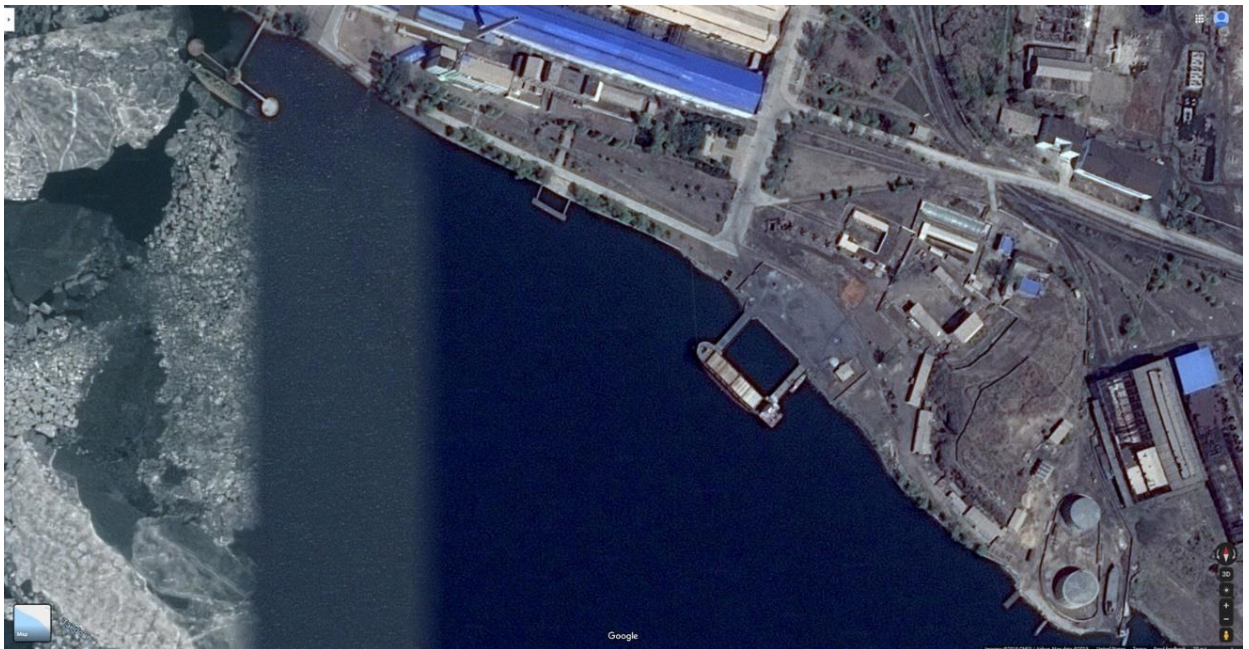
Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
1	50	0	-	23,053	38.750	125.592	May be partially buried or removed. CIA 1982.
1	35	15	14,432		38.752	125.592	Older, rusty tank, may be disused, with similar-sized tank foundations and possibly buried tanks nearby.
4	30	7	19,792	44,516	38.759	125.592	Older looking tanks. CIA 1982.
2	19	7	3,969		38.759	125.592	Older looking tanks.
2	27	5	5,726	10,175	38.746	125.599	Silvery tanks with some rust, looks to be somewhat aged. CIA 1982.
1	26	15	7,964		38.748	125.601	Newer-looking tank next to railroad siding with newer-looking buildings
23	0	0	-	1,535	38.754	125.595	Horizontal tanks. CIA 1982.
2	4	2	50		38.745	125.602	Small silver tanks. Google Maps.
3	7	4	462		38.745	125.603	Silver tanks, one appears to have been removed.
1	8	5	251		38.745	125.603	Silver tank. Google Maps.
2	37	0	-		38.744	125.606	Tanks appear to have been removed. Google
1	30	8	5,655		38.744	125.606	Large silver tank. Google Maps.
3	17	0	-		38.741	125.611	Tanks appear to have been removed. Google
1	20	8	2,513		38.742	125.613	Dark, older looking tank. Google Maps.
1	24	9	4,072		38.741	125.612	Dark, older looking tank. Google Maps.
3	10	4	942		38.741	125.612	Dark, older looking tanks. Google Maps.
3	12		-		38.739	125.613	Offshore, may be partially submerged. Google
1	20	6	1,885		38.736	125.621	New looking tank. Google Maps.
1	24	8	3,619		38.736	125.621	New looking tank. Google Maps.
Total of above			71,332	79,279			
Fraction of volume estimated to be active oil storage:				90%			
Total volume estimated to be active oil storage:				64,199			

Notes: reported by CIA (reference 1) as "Songnim Pet Prds Str NW ". Location of all tanks not certain, but cleared areas are nearby. Dry and forested, east and along the Taedong River.

Views of Tank Locations at Songnim







Location: Tanchŏn, South Hamgyong, North Korea, Google Earth images, 05/24/2019						
	Estimates (m) of				Approximate Coordinates	
			Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)		
Number	Diameter	Height			Latitude	Longitude
2	21	5	3,464	7,949	40.421	128.922
4	13	8	4,247	5,087	40.432	128.916
1	11	3	285	794	40.422	128.910
Total of above			7,996	13,830		
Fraction of volume estimated to be active oil storage:			80%			
Total volume estimated to be active oil storage:			6,397			
Notes: reported by CIA (reference 1) as "Tanchon Pet Prds Str Magnesia Plant ". Location of all tanks not certain, but potential areas are nearby. Large industrial facility along the coast.						

Views of Tank Locations at Tanchŏn

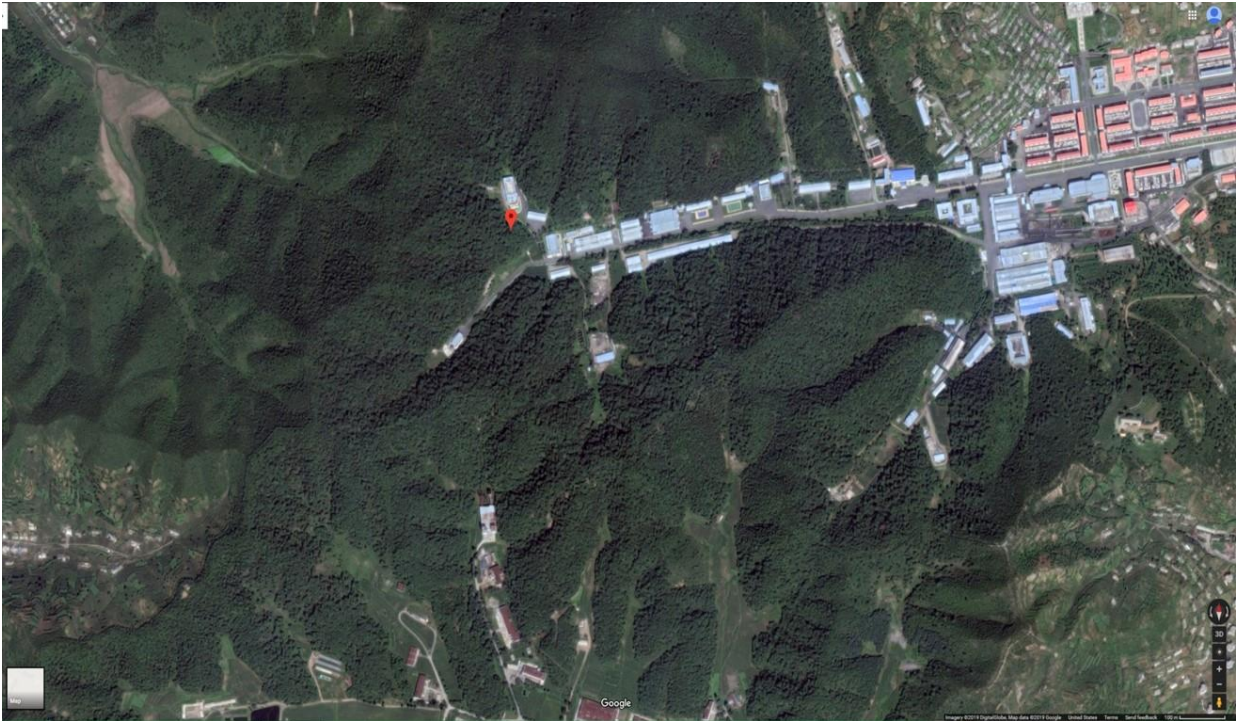




Location: Kanch'am, North Korea, Google Earth images, 05/24/2019

		Estimates (m) of			Approximate Coordinates		
				Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)		
Number	Diameter	Height			Latitude	Longitude	Notes
2	9	3	382	2,543	39.568	125.829	Silvery, newish looking tanks. CIA 1982.
1	9	3	191	794	39.568	125.829	Rusted, older looking tank. CIA 1982.
21			-	1,402	39.567	125.831	Horizontal tanks. CIA 1982.
14			-	701	39.567	125.831	Horizontal tanks. CIA 1982.
30			-	1,001	39.567	125.831	Horizontal tanks. CIA 1982.
Total of above			573	6,441			
Fraction of volume estimated to be active oil storage:				80%			
Total volume estimated to be active oil storage:				458			
Notes: reported by CIA (reference 1) as "Yongwon Ni Pet Prds Stor". Location of bunkers not certain, but candidate buildings and cleared areas are nearby, likely near the main road. Forested with some farmland and possible storage facilities.							

Views of Tank Locations at Kanch'am

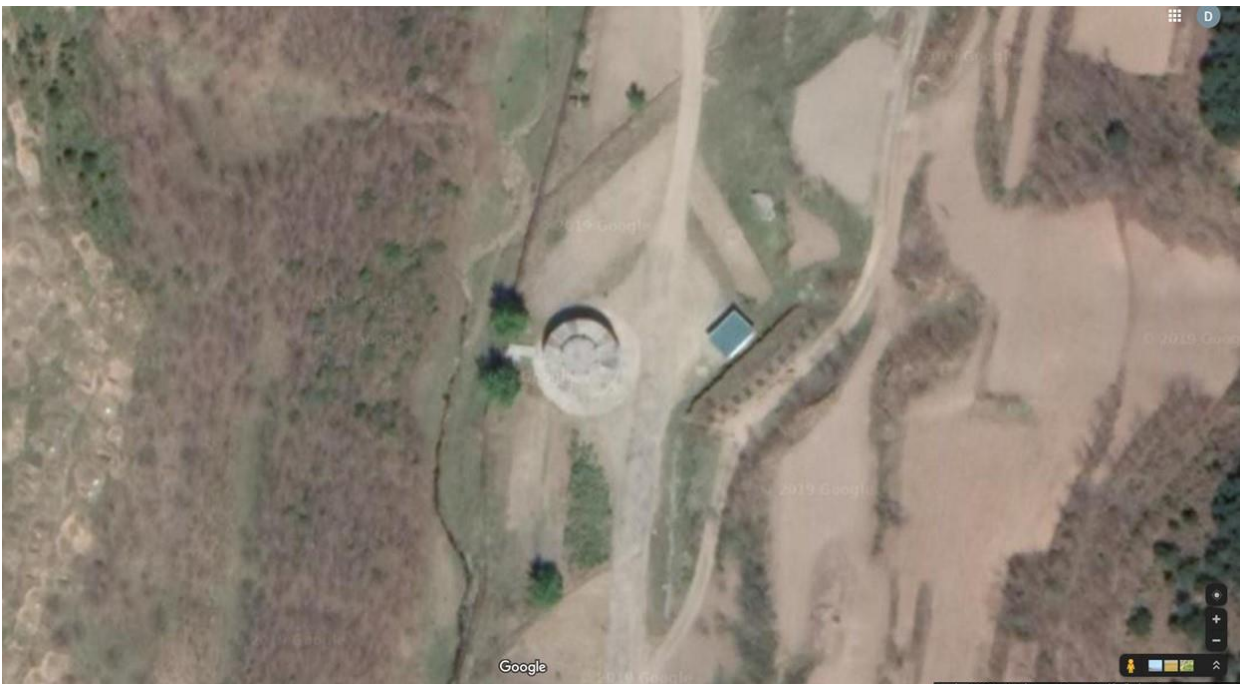
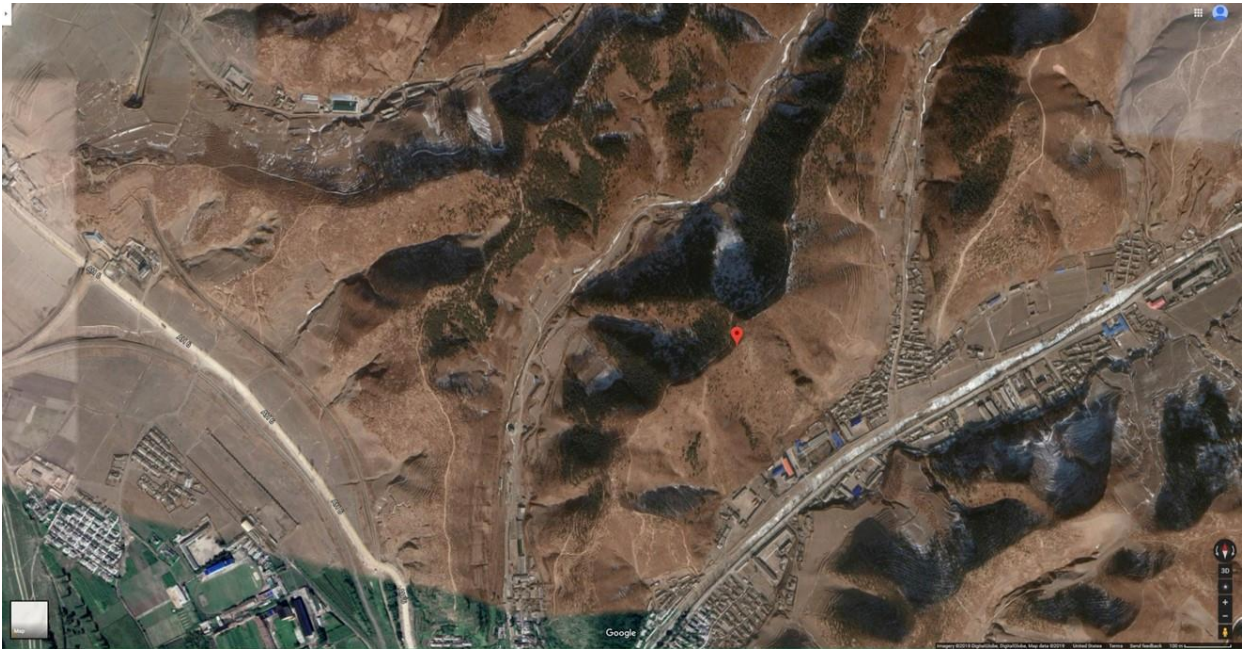


Location: Chongjin, North Hamgyong, North Korea, Google Earth images, 06/25/2019

Number	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Volume as Reported in Source (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height			Latitude	Longitude	
				8,744	41.830	129.778	CIA 1982.
1	18	8	2,036		41.829	129.772	Round structure near road and possible railway line. Possible oil tank..
1	17	7	1,589		41.761	129.756	Older grey tank. Google Maps.
4	7	4	616		41.761	129.756	Older grey tanks. Google Maps.
3	7	3	346		41.761	129.756	Older grey tanks. Google Maps.
3	6	3	254		41.761	129.756	Older grey tanks. Google Maps.
1	5	3	59		41.761	129.756	Older grey tank. Google Maps.
4	3	1	28		41.760	129.756	Older small grey tanks. Google Maps.
5	3	2	71		41.762	129.756	Older small grey tanks. Google Maps.
1	18	8	2,036		41.762	129.755	Large structure, possible tank. Google Maps.
4	11	6	2,281		41.757	129.761	Older grey tanks. Google Maps.
3	4	2	75		41.758	129.757	Older grey tanks. Google Maps.
5	6	3	424		41.759	129.757	Older grey tanks. Google Maps.
Total of above			9,815	8,744			
Fraction of volume estimated to be active oil storage:			50%				
Total volume estimated to be active oil storage:			4,908				

Notes: reported by CIA (reference 1) as "Chongjin Pet Prod Stor PUG N". Location is stated to have large amounts of underground storage. Location of bunkers or tanks is not certain, but candidate buildings and cleared areas are nearby, likely near the main roads. Dry and hilly near farmland. Many of tanks found seem to be associated with Chongjin Coal Refinery.

Views of Tank Locations at Chongjin







5 Summary of 1982 CIA Estimates of Oil Storage Volumes by Location that were **Not** Reviewed using Google Maps by Nautilus (including "Naval", "Air", and "Industrial")

Source: United States Central Intelligence Agency, National Photographic Interpretation Center (CIA, 1982), *Imagery Analysis Report: POL Storage Capacity North Korea, 1982 Estimates*. Report number CIA-RDP83T00574R000102600001-7 (redacted). Available as <https://www.cia.gov/library/readingroom/docs/CIA-RDP83T00574R000102600001-7.pdf>.

Oil Storage Locations Identified in Source 1 (CIA, 1982) but **Not** Reviewed on Google Maps

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Approximate Coordinates		Notes
			Latitude	Longitude	
Hwang Chon Petr Prod Stor	4,200	667	39.195	125.870	Page 14 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Approximate Coordinates		Notes
			Latitude	Longitude	
Kaesong Pet Prods	12,600	1,589	37.970	126.479	Page 14 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Pyongyang Pet Prods	12,600	1,589	38.404	127.291	Page 14 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Tonggi Pet Prods	8,400	1,335	38.059	125.783	Page 14 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hyangsan Pet Prod Stor	4,200	667	40.039	126.172	Page 15 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Manpo-up Agri Stor Area	5,460	868	41.157	126.408	Page 15 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Santong Ni Pet Prods Stor	12,600	1,589	40.092	127.314	Page 15 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kuyon Ni Pet Prods Stor NE	10,080	1,602	38.479	126.067	Page 16 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sukchon Pet Prds Stor	16,800	2,670	39.411	125.614	Page 16 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Pukchang Ni Pet Prods Stor	15,120	2,403	39.495	126.288	Page 16 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kosan Pet Prods Stor S	8,085	1,282	38.852	127.428	Page 16 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Panjong Ni Pet Prds Stor	10,920	1,067	38.347	127.461	Page 16 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sinwon Ni Prob Pet Prods Stor Caves	6,720	1,068	38.218	125.711	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Pyongyang Pet Prds Str	10,710	1,701	39.110	125.792	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hwangju-up Pet Prds Str	4,620	733	38.713	125.826	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hwangju-up Pet Prods Stor	15,120	2,404	38.696	125.826	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hamhung Pet Prods Stor North	13,860	2,202	39.995	127.541	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sondong Ni Pet Prods Stor	4,200	667	39.722	127.447	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sariwon Pet Prods Stor	18,900	3,004	38.492	125.804	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sahgpan Ni Pet Prods Stor	7,980	1,268	39.852	125.266	Page 17 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kaesong Pet Prods Stor SE	4,200	667	37.953	126.577	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Oryongpo Pet Prods Stor	7,560	1,201	39.900	126.061	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Singye Pet Prods Stor Caves	12,600	2,003	38.525	126.536	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kaechon Pet Prods Stor	9,765	1,552	39.685	125.911	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Samsa Dong POL Stor	10,290	1,634	39.042	126.929	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Tongnim Pol Stor Area	8,400	1,335	39.864	124.722	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Tokchon Pol Stor Area PUG W	16,800	2,670	39.751	126.258	Page 18 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Nanjin Port Facilites	13,470	2,139	42.225	130.288	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Chongjin Pet Prods	12,660	2,011	41.769	129.781	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Chongjin Shipyard	12,620	2,002	41.771	129.797	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Chongjin PT Fac	3,600	572	41.779	129.827	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Chongjin Pt Facs West	3,745	595	41.760	129.766	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Odaejin-nodongjagu Port Facs	16,000	2,543	41.383	129.783	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Yongdae-nodongjagu Port Facilities	5,250	834	40.476	129.061	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Yongamni Chung Chon Pet Prod Stor	4,340	689	40.407	128.910	Page 19 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Tong Ni Port Fac	3,080	489	40.070	128.273	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Tojin Port Facility	1,785	283	40.070	128.240	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hongwon Port Fac A Pet Prod Stor	4,760	756	40.020	127.979	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Mayangdori NM Repair Yard A Stor UG	1,800	285	39.995	128.203	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Samhodong Boatyard	2,940	466	39.938	127.879	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Yoho Ri Naval Base	5,040	801	39.874	127.782	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hungdogi Dong Pet Prod Stor	12,215	1,942	39.831	127.635	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Munchon Up Nvb and Shipyard	5,355	850	39.314	127.401	Page 20 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Nampo Supreme Nav Hq A Shp Rp Yrd	2,100	333	38.719	125.384	Page 21 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Cho-do Naval Facility	7,560	1,201	38.533	124.873	Page 21 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Cho-do Naval Base South	840	133	38.503	124.865	Page 21 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Pipa Got Naval Base A	1,680	267	38.588	124.988	Page 21 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Haeju Naval Rp Yard	8,400	1,535	37.996	125.703	Page 21 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sangon Ni Pet Prods Stor	12,415	1,972	37.830	125.348	Page 21 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Orang Airfield	10,920	1,735	41.427	129.651	Page 22 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hyesan Airfield	4,095	650	41.376	128.207	Page 22 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Manpo Airfield	7,980	1,267	41.137	126.359	Page 22 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hwangsuwon Airfield	17,220	2,735	40.679	128.153	Page 22 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Changjin Up Airfield	9,240	1,469	40.365	127.264	Page 22 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Uiju Airfield	13,020	2,068	40.152	124.499	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Panghyon Airfield	5,460	868	39.925	125.210	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Taecheon Airfield	1,260	200	39.901	125.491	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Toksan Airfield	4,620	735	39.994	127.615	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kaechon Airfield	12,180	1,936	39.751	125.904	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sondok Airfield	18,480	2,938	39.745	127.474	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Pukchang Airfield	4,830	768	39.502	125.967	Page 23 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sunchon Airfield	2,878	1,068	39.409	125.893	Page 24 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sunan Airfield	18,480	2,938	39.203	125.673	Page 24 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Miram Airfield	1,260	200	39.014	125.846	Page 24 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Wonsan Airfield	13,860	2,204	39.164	127.487	Page 24 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Onchon Airfield	11,760	1,870	38.907	125.234	Page 24 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Koksan Airfield	14,070	2,237	38.687	126.606	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Hyon-ni Airfield	9,240	1,469	38.611	127.454	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kwai Airfield	11,760	1,870	38.423	125.021	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Taetan Airfield	12,600	2,003	38.128	125.247	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Haeju Airfield	1,890	300	38.004	125.781	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Nuchon Ni Airfield	2,940	467	38.236	126.125	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kuum Ni Airfield	2,100	334	38.863	127.905	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Kwaksan Airfield	3,360	534	39.729	125.113	Page 25 of Source 1

Name of Facility as Described	Total storage volume (bbl), all tanks at location	Total storage volume (cubic meters)	Latitude	Longitude	Notes
Sonchon Airfield	1,890	300	39.917	124.841	Page 25 of Source 1

6 Nautilus Review of Possible Oil Storage Sites Not Included in 1982 U.S. Central Intelligence Agency Estimates (visible above-ground)

Oil Storage Locations Not Identified in Source 1 (CIA, 1982) but Reviewed on Google Earth.						
Location: Nampo, South Pyongan, North Korea, Google Earth images, 06/26/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	11	8	760	38.734	125.230	Silvery tank, appears slightly worn.
Total of above			760			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			760			

View of Tanks at Nampo



Location: Nampo, South Pyongan, North Korea, Google Earth images, 06/26/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	24	10	4,524	38.696	125.292	Newish silver tank, near dock area.
1	15	6	1,060	38.696	125.292	Newish silver tank.
1	23	9	3,739	38.696	125.292	Worn silver tank.
2	18	8	4,072	38.696	125.292	Worn silver tanks.
6	6	5	848	38.696	125.292	Worn white tanks.
10	8	6	3,016	38.696	125.292	Silver tanks, connected together. May hold industrial product or intermediate rather than oil products.
7	2	2	44	38.703	125.303	Small white tanks.
2	10	0	-	38.703	125.300	Appear to be buried or removed tanks.
Total of above			17,303			
Fraction of volume estimated to be active oil storage:			75%			
Total volume estimated to be active oil storage:			12,977			

Views of Tanks at Nampo



Location: Kwail, South Hwanghae, North Korea, 06/26/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	0	-	38.558	124.996	Appear to be buried or removed tanks.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kwail



Location: Monggumpo, Monggumpo-ri, South Hwanghae, North Korea, 06/26/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	8	4	402	38.295	124.876	Tanks at coastal facility.
Total of above			402			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			402			

View of Tanks at Monggumpo



Location: Hyu-dong, North Korea, 06/27/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	7	4	154	37.928	124.989	Possible tank, difficult to make out.
Total of above			154			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			139			

View of Tanks at Hyo-dong



Location: Changdae, North Korea, 06/27/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	11	4	1,140	37.807	125.311	Older looking tan tanks. May be used for something other than oil. Coastal facility, probably fish ponds.
Total of above			1,140			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			570			

View of Tanks at Changdae



Location: Changdae, North Korea, 06/27/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	6	2	113	37.769	125.376	Older looking tan tanks.
Total of above			113			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			57			

View of Tanks at Changdae



Location: Haeju, South Hwanghae, North Korea, 06/27/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	7	3	115	38.028	125.653	Older looking tan tanks.
1	14	4	616	38.028	125.653	Older looking tan tanks.
Total of above			731			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			658			

View of Tanks at Haeju



Location: Haeju, South Hwanghae, North Korea, 06/27/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	10	3	471	38.030	125.666	Older looking tan tanks.
4	14	6	3,695	38.030	125.666	Older looking tan tanks, connected at the center.
1	6	3	85	38.030	125.666	Appears to be processing unit of some type, probably not an oil tank.
4	18	0	-	38.030	125.666	Appears to be processing unit of some type, probably not an oil tank.
2	26	0	-	38.030	125.666	Appears to be processing unit of some type, probably not an oil tank.
3	23	0	-	38.030	125.666	Appears to be removed.
1	11	0	-	38.030	125.666	Appears to be removed.
Total of above			4,251			
Fraction of volume estimated to be active oil storage:			75%			
Total volume estimated to be active oil storage:			3,188			

Views of Tanks at Haeju



Location: Hadajon-ni, North Korea, 06/28/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	9	3	382	38.799	128.132	Appears to be removed or buried, but image quality is low and the tanks may still exist.
1	3	2	14	38.799	128.132	Small white tank, possibly servicing nearby tank.
Total of above			396			
Fraction of volume estimated to be active oil storage:			75%			
Total volume estimated to be active oil storage:			297			

View of Tanks at Hadajon-ni



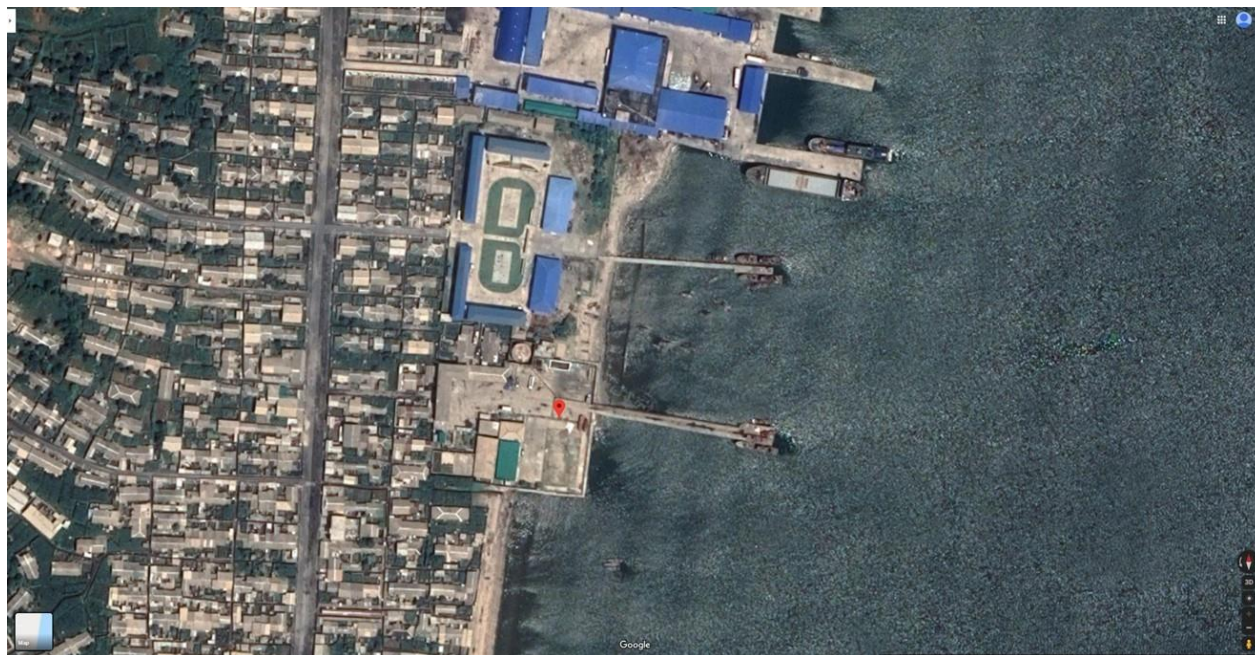
Location: Wonsan, Kangwon, North Korea, 06/28/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	9	4	254	38.799	128.132	Newer-looking tank.
1	12	3	339	38.799	128.132	Appears to be removed or set into the ground.
Total of above			594			
Fraction of volume estimated to be active oil storage:			60%			
Total volume estimated to be active oil storage:			356			

Views of Tanks at Wonsan



Location: Munchon, Kangwon, North Korea, 06/28/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	11	5	475	39.264	127.365	White-colored tank, probably there to service nearby dock areas.
Total of above			475			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			475			

View of Tanks at Munchon



Location: Sinpo, South Hamgyong, North Korea, 07/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	11	6	570	40.030	128.172	Older rusted tank.
1	5	3	59	40.030	128.172	Older rusted tank.
Total of above			629			
Fraction of volume estimated to be active oil storage:			70%			
Total volume estimated to be active oil storage:			440			

View of Tanks at Sinpo



Location: Kimchaek, North Hamgyong, North Korea, 07/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	9	3	382	40.616	129.170	Older rusted tanks. Appears to also have been a third tank, though it appears to have been removed.
Total of above			382			
Fraction of volume estimated to be active oil storage:			20%			
Total volume estimated to be active oil storage:			76			

View of Tanks at Kimchaek



Location: Osang-dong, North Korea, 07/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	5	2	39	41.322	129.766	Small white tank.
Total of above			39			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			39			

View of Tanks at Osang-dong



Location: June 16 Thermal Power Plant, Sonbong, Rason, North Korea, 07/01/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	17	8	3,632	42.328	130.381	Older rusted tanks.
2	8	3	302	42.328	130.381	Older rusted tanks.
7	7	4	1,078	42.328	130.381	Older rusted tanks.
5	6	3	424	42.328	130.381	Older rusted tanks.
2	4	2	50	42.328	130.381	Older rusted tanks.
6	6	3	509	42.328	130.381	Older looking tanks, small and difficult to make out.
Total of above			5,994			
Fraction of volume estimated to be active oil storage:			80%			
Total volume estimated to be active oil storage:			4,795			

View of Tanks at June 16 Thermal Power Plant



Location: Changyon, South Hwanghae, North Korea, 07/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	11	0	-	38.250	125.130	Tanks appear to be very short, may be partially buried or removed.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Changyon



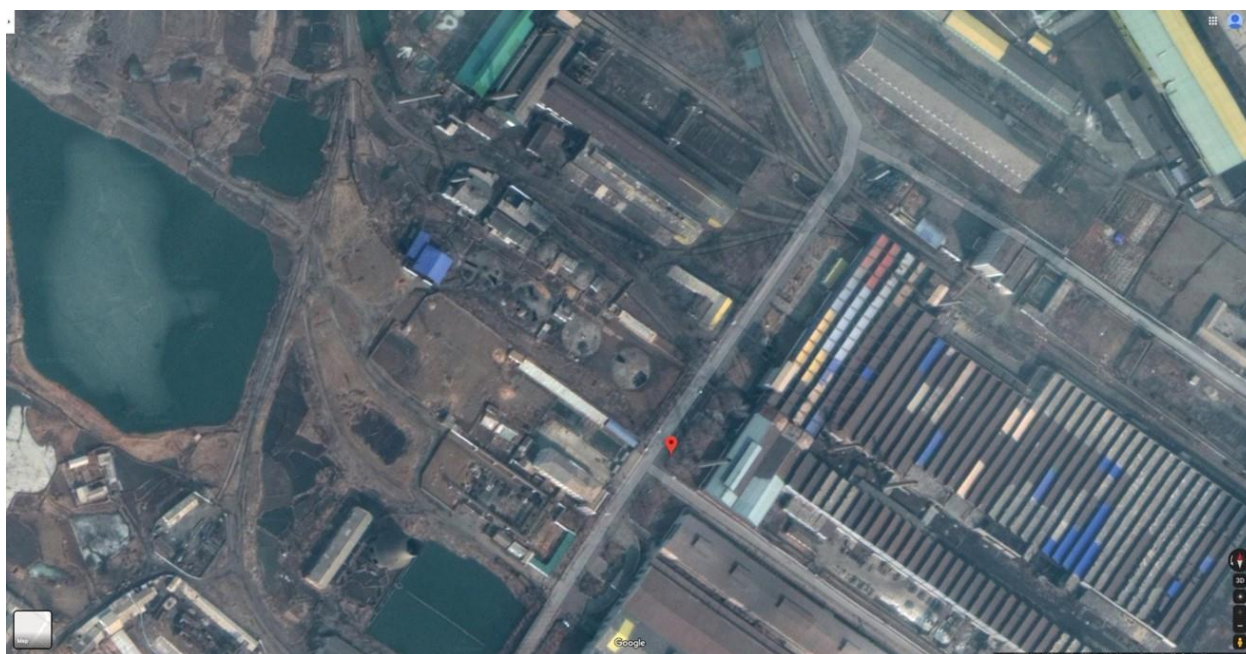
Location:Chollima, Pyongyang, North Korea, 07/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	12	4	1,357	38.889	125.579	Older looking tanks.
1	20	8	2,513	38.891	125.575	Large yellow tank. Part of what appears to be a minerals processing facility.
Total of above			2,513			
Fraction of volume estimated to be active oil storage:			80%			
Total volume estimated to be active oil storage:			2,011			

View of Tanks at Chollima



Location: Chollima, Pyongyang, North Korea, 07/05/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	24	6	5,429	38.917	125.584	Older tanks, appear to be damaged.
2	24	6	5,429	38.917	125.584	Older looking tanks. In an industrial area that appears to be partly disused.
Total of above			5,429			
Fraction of volume estimated to be active oil storage:			30%			
Total volume estimated to be active oil storage:			1,629			

View of Tanks at Chollima



Location: Chollima, Pyongyang, North Korea, 07/05/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	16	4	804	38.927	125.587	Older looking tank.
Total of above			804			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			402			

View of Tanks at Chollima



Location: Pyongyang, North Korea, 07/08/2019

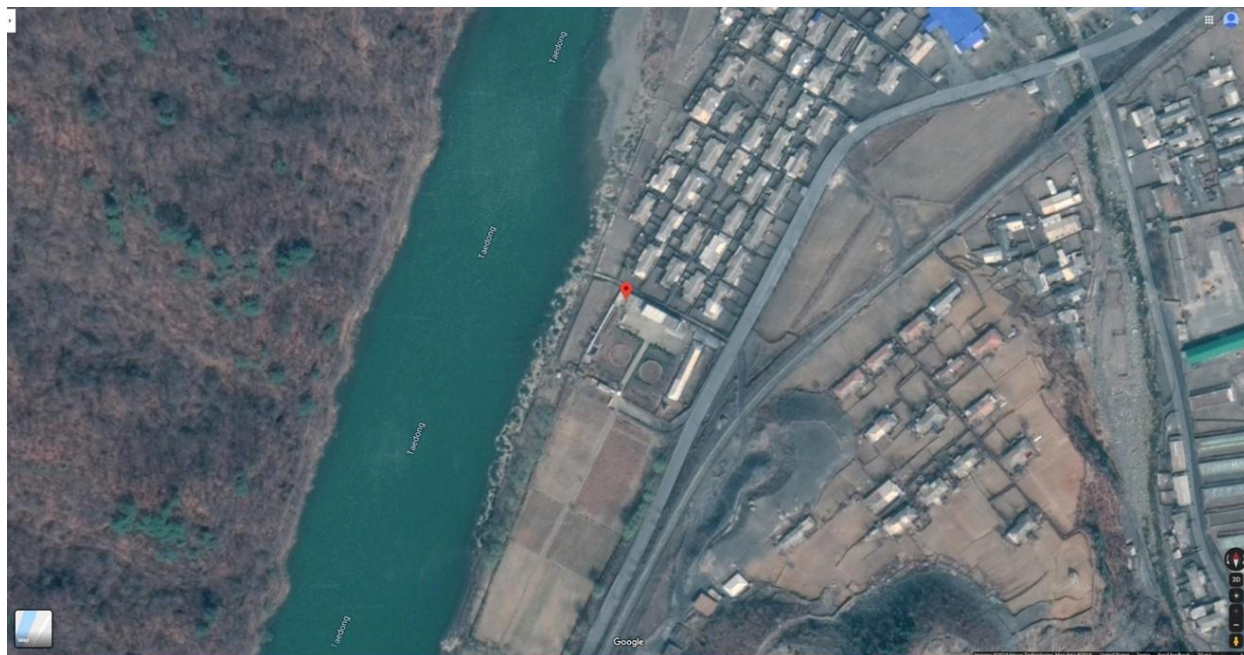
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	18	7	1,781	39.084	125.708	Newish looking tanks.
2	11	6	1,140	39.084	125.708	Newish looking tanks.
1	17	6	1,362	39.084	125.708	Older looking tanks.
1	12	5	565	39.084	125.708	Older looking tanks.
Total of above			4,849			
Fraction of volume estimated to be active oil storage:			70%			
Total volume estimated to be active oil storage:			3,394			

View of Tanks at Pyongyang



Location: South Pyongan, North Korea, 07/11/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	3	679	39.572	126.156	Older looking tanks. May be partially buried or removed.
Total of above			679			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at South Pyongan



Location: Yongha, South Pyongan, North Korea, 07/11/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	6	3	85	39.594	126.265	Possible tank.
Total of above			85			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			85			

View of Tanks at South Yongha



Location: Yongha, South Pyongan, North Korea, 07/11/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	20	9	5,655	39.586	126.298	Silvery new looking tanks. Located near Pukchang thermal power plant, largest in DPRK.
2	11	7	1,330	39.586	126.298	Silvery new looking tanks.
4	9	6	1,527	39.586	126.298	Older looking tanks.
3	4	3	113	39.586	126.298	Older looking tanks.
8	3	2	113	39.586	126.298	Older looking tanks.
8	3	2	113	39.586	126.298	Older looking tanks.
Total of above			8,851			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			7,966			

View of Tanks at Yongha



Location: Sŭngho, Pyongyang, North Korea, 07/13/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	9	4	509	38.955	125.975	Silvery new looking tanks.
2	9	3	382	38.955	125.975	Silvery new looking tanks.
2	14	7	2,155	38.955	125.975	Green tanks.
Total of above			3,046			
Fraction of volume estimated to be active oil storage:			80%			
Total volume estimated to be active oil storage:			2,437			

View of Tanks at Sŭngho



Location: Sangwon, Pyongyang, North Korea, 07/13/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	23	20	16,619	38.878	126.038	Newish looking tanks, but likely to hold industrial product or intermediates, not oil. Located at large factory outside of Pyongyang with rail lines on site.
8	16	20	32,170	38.878	126.038	Newish looking tanks, but likely to hold industrial product or intermediates, not oil.
5	5	2	196	38.878	126.038	Small tanks, difficult to make out.
Total of above			48,985			
Fraction of volume estimated to be active oil storage:			10%			
Total volume estimated to be active oil storage:			4,899			

View of Tanks at Sangwon



Location: Anju, South Pyongan, North Korea, 07/13/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
4	22	6	9,123	39.650	125.689	Newish looking tanks.
5	12	4	2,262	39.650	125.689	Newish looking tanks.
3	6	2	170	39.650	125.689	Newish looking tanks.
2	5	2	79	39.650	125.689	Newish looking tanks.
2	11	4	760	39.650	125.689	Older looking tanks, may be removed.
Total of above			12,394			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			11,154			

View of Tanks at Anju



Location: Nyongbyon, North Pyongan, North Korea, 07/13/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
6	12	5	3,393	39.708	125.794	Tan colored tanks with roofs with 12-segments. May or may not be oil tanks, as they are not near a railroad or major road. Part of a new-looking facility that may be residential or institutional, in an area that is mostly forested and agricultural.
Total of above			3,393			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			1,696			

View of Tanks at Nyongbyon



Location: Nyŏngbyŏn, North Pyongan, North Korea, 07/14/2019

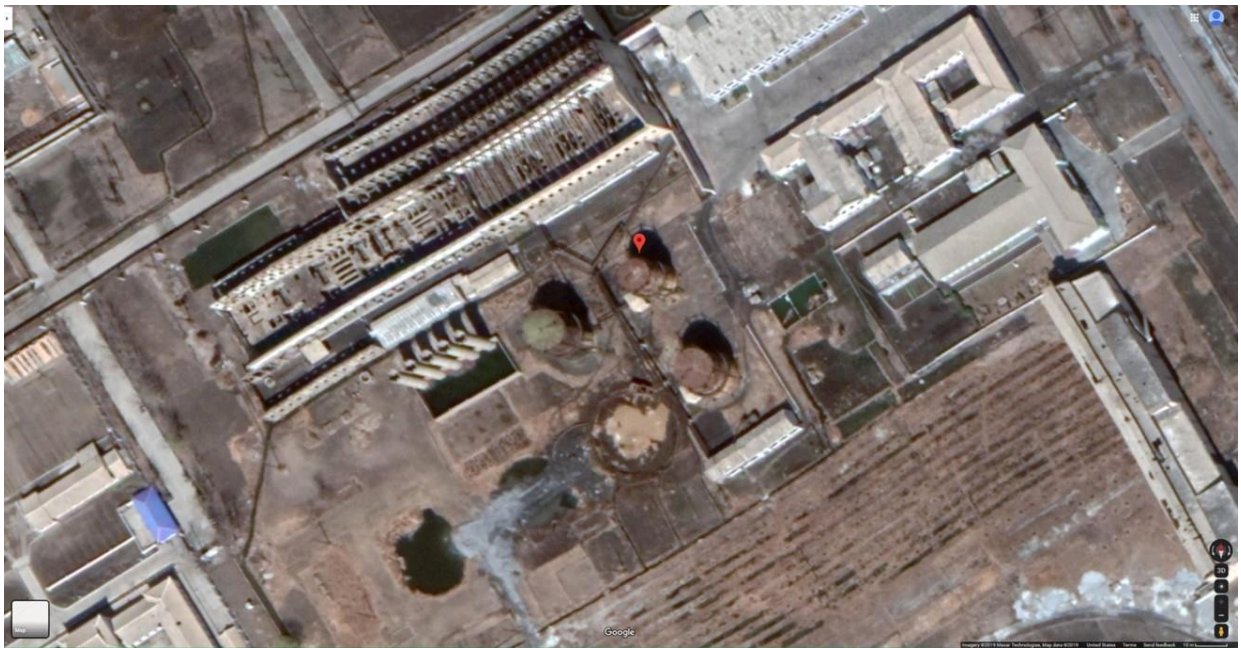
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	17	6	1,362	39.801	125.751	Newish-looking tanks (or at least regularly maintained). Associated with DPRK nuclear research center (also called "Yongbyon"). Tanks may or may not be for oil products, but are located adjacent to what appears to be the motor pool for the facility.
1	12	4	452	39.801	125.751	
Total of above			1,814			
Fraction of volume estimated to be active oil storage:			75%			
Total volume estimated to be active oil storage:			1,361			

View of Tanks at Nyŏngbyŏn



Location: Hamhung, South Hamgyong, North Korea, 07/14/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	6	3	254	39.849	127.572	Rusted looking tanks.
3	11	7	1,996	39.851	127.576	Rusted looking tanks.
1	24	9	4,072	39.854	127.577	Newish looking tank, associated with factory, possibly for processing mineral products? As such, tank may or may not be for storage of oil products.
2	22	0	-	39.850	127.580	Older tanks, may be removed.
2	9	6	763	39.850	127.584	Newish looking tanks.
Total of above			7,085			
Fraction of volume estimated to be active oil storage:			25%			
Total volume estimated to be active oil storage:			1,771			

Views of Tanks at Hamhung





Location: Heungnam Union Fertilizer Company, Hamhung, South Hamgyong, North Korea, 07/28/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
15	23	7	43,625	39.839	127.622	Bluish tanks. May be used to store liquid fertilizer.
2	28	8	9,852	39.837	127.618	Large black tanks. May be used to store liquid fertilizer.
2	12	4	905	39.837	127.618	Dark colored tanks. May be used to store liquid fertilizer.
2	5	2	79	39.837	127.618	Small silver tanks. May be used to store liquid fertilizer.
5	6	3	424	39.837	127.618	Dark colored tanks. May be used to store liquid fertilizer.
1	18	10	2,545	39.840	127.627	Large brown tank. May be used to store liquid fertilizer.
1	22	10	3,801	39.840	127.627	Large brown tank. May be used to store liquid fertilizer.
11	7	9	3,810	39.841	127.628	Slender silver tanks. May be used to store liquid fertilizer.
4	6	2	226	39.840	127.627	Small, older looking tanks. May be used to store liquid fertilizer.
2	14	12	3,695	39.842	127.623	Large blue silos, may be tanks. May be used to store liquid fertilizer.
Total of above			68,961			
Fraction of volume estimated to be active oil storage:			30%			

Views of Tanks at Heungnam Union Fertilizer Company





Location: South Hamgyong, North Korea, 07/28/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	12	4	452	40.448	128.286	Possible tank, difficult to make out. Appears to be in the middle of a pond, so probably not an oil tank.
Total of above			452			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at South Hamgyong



Location: South Hamgyong, North Korea, 07/28/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	8	3	302	40.482	128.193	Possible tanks, difficult to make out. Appear to be in the middle of ponds that are surrounded by trees, so probably not oil tanks.
Total of above			302			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at South Hamgyong



Location: South Hamgyong, North Korea, 07/29/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	9	4	509	40.511	40.511	Possible tanks, difficult to make out.
1	4	1	13	40.511	40.511	Possible tank, small and difficult to make out.
Total of above			522			
Fraction of volume estimated to be active oil storage:			80%			
Total volume estimated to be active oil storage:			417			

View of Tanks at South Hamgyong



Location: South Hamgyong, North Korea, 07/29/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
5	23	6	12,464	40.917	128.815	Possible tanks, difficult to make out, may not be be for oil storage. Appears to be a mining/minerals processing facility. Adjacent to railroad.
Total of above			12,464			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at South Hamgyong



Location: Anbyon, Kangwon, North Korea, 07/30/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	11	0	-	39.033	127.517	Possible tanks, may have been buried or removed. Probably not for oil storage; in an agricultural area.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Anbyon



Location: Anbyon, Kangwon, North Korea, 07/30/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	4	905	39.056	127.524	Possible tanks, difficult to make out. Near large facility--school? Close to rail line.
Total of above			905			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			452			

View of Tanks at Anbyon



Location: Kangwon, North Korea, 08/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	12	2	226	39.053	127.335	Appears to be partially buried. In an agricultural area, possibly not for oil.
Total of above			226			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kangwon



Location: Kangwon, North Korea, 08/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	11	2	190	39.143	127.573	Appears to be partially buried.
Total of above			190			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kangwon



Location: Sepo, Kangwon, North Korea, 08/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	11	0	-	38.656	127.372	Possible tanks, difficult to make out. May be buried or removed.
3	8	0	-	38.656	127.372	Possible tanks, difficult to make out. May be buried or removed. In a largely agricultural area.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Sepo



Location: Kosan, Kangwon, North Korea, 08/01/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	17	2	454	38.894	127.463	Appears to be partially buried. Near a set of new-looking large buildings, with other buildings newer roofs in area. Mostly agricultural, near reservoir.
2	12	0	-	38.896	127.458	Appears to be buried.
Total of above			454			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			227			

Views of Tanks at Kosan



Location: Kosan, Kangwon, North Korea, 08/02/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	0	-	38.894	127.497	Appears to be buried. Could be decommissioned tanks or silos. Appears to be an agricultural area.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kosan



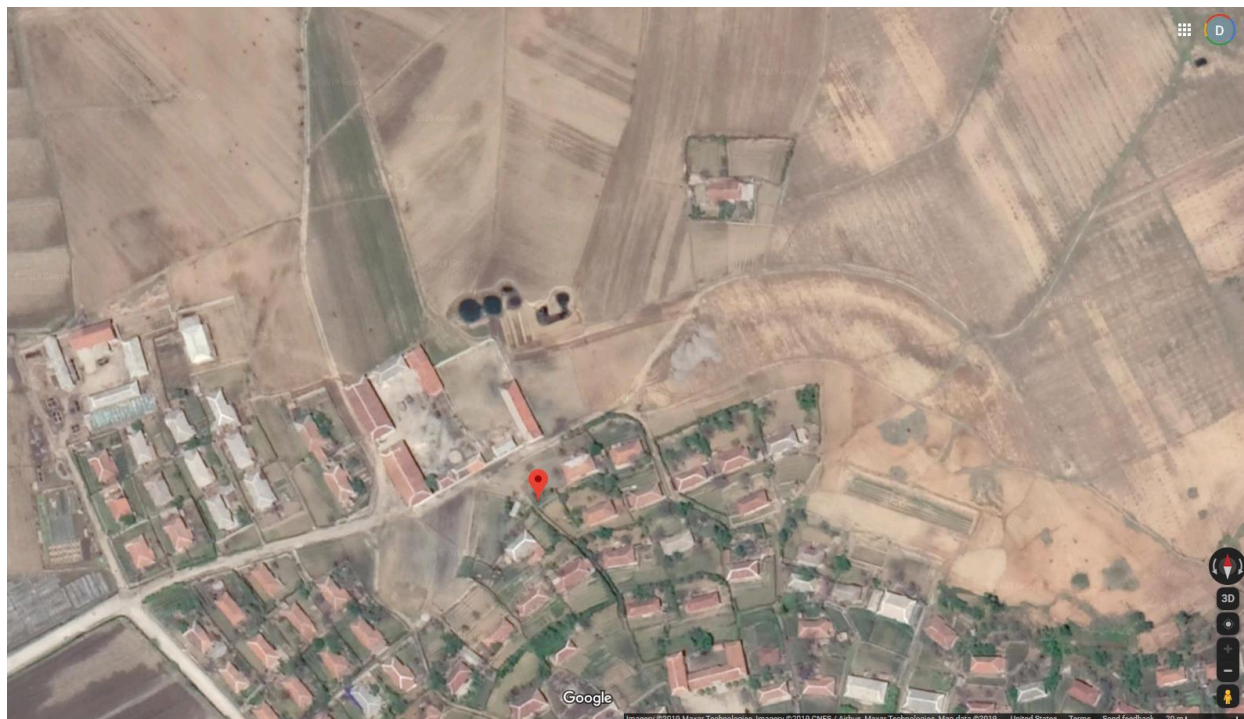
Location: Kosan, Kangwon, North Korea, 08/02/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	5	2	39	38.908	127.411	Possible tank, difficult to make out. Mostly agricultural area.
Total of above			39			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			39			

View of Tanks at Kosan



Location: Kangwon, North Korea, 08/02/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	5	2	39	38.973	127.425	Possible tank, difficult to make out. Mostly agricultural area.
Total of above			39			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			20			

View of Tanks at Kangwon



Location: Kangwon, North Korea, 08/02/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	0	-	38.981	127.415	Possible tanks appear to be buried. Mostly agricultural and residential area, but not far from train tracks.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kangwon



Location: Kangwon, North Korea, 08/02/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	17	4	908	39.207	127.106	Grey tank, appears octagonal. Newer facility that appears likely to be added to in the future, but not clear what it will be used for. Tank may be for water or some other purpose.
Total of above			908			
Fraction of volume estimated to be active oil storage:			10%			
Total volume estimated to be active oil storage:			91			

View of Tanks at Kangwon



Location: Muchon, Kangwon, North Korea, 08/03/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
6	13	0	-	39.231	127.333	Possible tanks appear to be buried. Newer or updated facility in a mostly agricultural area.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Muchon



Location: Chönnae, North Korea, 08/04/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	11	0	-	39.356	127.250	Possible tanks appear to be buried or decommissioned.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Chönnae



Location: Chõnnae, North Korea, 08/04/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
20	6	9	5,089	39.351	127.202	Most of tanks appear to be for product storage. Industrial facility, possibly for processing products of a nearby mine. May be more tanks, difficult to make them out.
1	5	5	98	39.351	127.202	Small tank near perimeter of facility.
Total of above			5,188			
Fraction of volume estimated to be active oil storage:			2%			
Total volume estimated to be active oil storage:			104			

View of Tanks at Chõnnae



Location: Chõnnae, North Korea, 08/04/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	20	9	2,827	39.369	127.214	Large tank. Probably not for oil, but for products storage. Active industrial site, possibly for cement manufacture.
4	7	5	770	39.369	127.214	Larger grey tanks, but probably for product storage, not for oil.
4	5	2	157	39.369	127.214	Small cluster of grey tanks.
1	5	2	39	39.369	127.214	Small grey tank.
Total of above			3,793			
Fraction of volume estimated to be active oil storage:			5%			
Total volume estimated to be active oil storage:			190			

View of Tanks at Chõnnae



Location: Jonthan-ri, North Korea, 08/04/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
4	7	3	462	39.384	127.226	Grey tanks.
3	8	3	452	39.384	127.226	Possible tanks, difficult to make out. Some or all could be disused.
3	9	0	-	39.382	127.228	Tanks appear to be buried or removed. Part of a large, active industrial installation, but the area where the tanks are appears to be disused.
1	7	3	115	39.383	127.225	Brown, rusty tank.
Total of above			1,030			
Fraction of volume estimated to be active oil storage:			20%			
Total volume estimated to be active oil storage:			206			

View of Tanks at Jonthan-ri



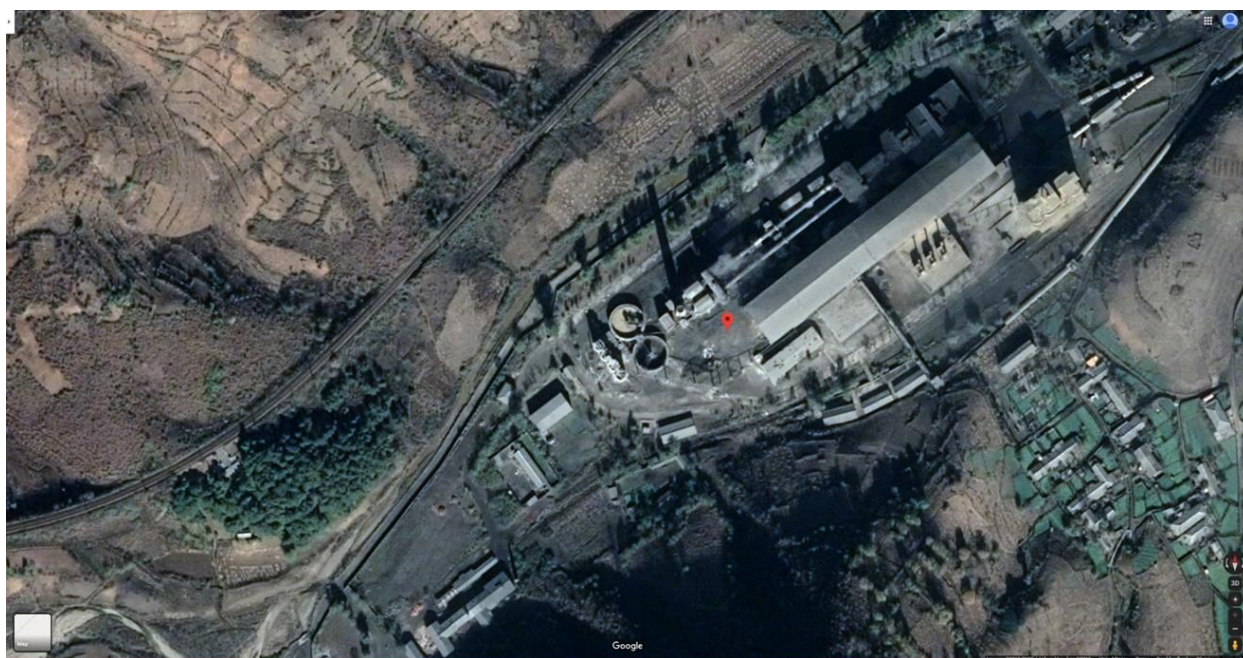
Location: Songhung-ri, South Hamgyong, North Korea, 08/05/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	10	1	79	39.413	127.223	May be more tanks, difficult to make them out. Tank identified may be buried or may be the foundation of an old tank. Area looks as though a building or compound formerly stood nearby, but now has been demolished.
Total of above			79			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Songhung-ri



Location:Puraesan-rodongjagu, South Hamgyong, North Korea, 08/05/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	20	5	3,142	39.427	127.172	Tanks appear to be part of a large and active industrial facility, served by a rail spur. Tanks seem more likely to be for product or input storage than for oil storage, based on their appearance.
Total of above			3,142			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Puraesan-rodongjagu



Location: Sinchang-ri, South Hamgyong, North Korea, 08/05/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	12	4	452	39.495	127.186	Possible tank, difficult to make out. Could be a water tank. Associated facility could be a school or a training facility.
Total of above			452			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Songhung-ri



Location: Munchon, Kangwon, North Korea, 08/06/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	9	6	763	39.282	127.357	Older rusted tanks. Industrial site with smokestack and what appears to be a waste pond.
3	5	3	177	39.281	127.354	Older looking tanks, difficult to make out.
Total of above			940			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			470			

View of Tanks at Munchon



Location:Pusung, Pyongyang, North Korea, 08/06/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	36	0	-	39.111	125.736	Possible tanks, appear to be buried. Near buildings with newer roofs and railroad, but may be for another purpose.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Pusung



Location: Pyongyang, North Korea, 08/06/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	17	7	3,178	39.083	125.707	One older, one newer-looking tank.
10	2.5	3	147	39.083	125.707	Older looking small tanks.
3	11	6	1,711	39.083	125.707	One older, two newer-looking tanks.
Total of above			4,888			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			4,399			

View of Tanks at Pyonyang



Location: Pyongyang, North Korea, 08/07/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	14	6	1,847	39.006	125.621	Older looking tanks.
2	7	3	231	39.006	125.621	Older looking tanks, appear to be decommissioned.
Total of above			2,078			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			1,870			

View of Tanks at Pyonyang



Location: Chollima, Pyongyang, North Korea, 08/07/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	18	6	3,054	38.922	125.556	Older looking tanks, near industrial facility with tall smokestack and partial new roof.
1	6	2	57	38.922	125.556	Older, small looking tank.
Total of above			3,110			
Fraction of volume estimated to be active oil storage:			90%			
Total volume estimated to be active oil storage:			2,799			

View of Tanks at Chollima



Location: Chollima, Pyongyang, North Korea, 08/07/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	26	0	-	38.922	125.568	Tank appears to be buried. Near a large active industrial facility (Chollima) and railroad.
1	11	4	380	38.922	125.568	Older looking tank.
Total of above			380			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			380			

View of Tanks at Chollima



Location:Nampo, South Pyongan, North Korea, 08/07/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	13	4	531	38.750	125.379	Possible tank, difficult to make out, but could be segmented roof for a round building, not an oil tank. Older industrial facility nearby, could be wastewater treatment plant.
Total of above			531			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Nampo



Location: Kangdong, Pyongyang, North Korea, 08/07/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	9	3	191	39.143	126.142	Possible tank, difficult to make out, but in area of buildings with new roofs and near a railroad and what appears to be a recreational facility. Could be for water.
Total of above			191			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			95			

View of Tanks at Kangdong



Location: Songchŏn, South Pyongan, North Korea, 08/08/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	11	4	380	39.254	126.212	Possible tank, difficult to make out. Immediately adjacent to road and river, but structure of roof suggests may be a water tank or building for some other purpose, not an oil tank.
Total of above			380			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Songchŏn



Location:Milchon-ni, North Korea, 08/08/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	17	6	1,362	39.477	126.172	Older looking tank, near railroad and industrial facility.
Total of above			1,362			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			1,362			

View of Tanks at Milchon-ni



Location: Milchon-ni, North Korea, 08/08/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	14	4	616	39.472	126.164	Older looking tank, possibly foundation of decommissioned in-ground tank.
1	12	4	452	39.472	126.164	Older looking tank, partially buried. Small industrial facility nearby, possibly for minerals processing?
Total of above			1,068			
Fraction of volume estimated to be active oil storage:			40%			
Total volume estimated to be active oil storage:			427			

View of Tanks at Milchon-ni



Location:Yongha, South Pyongan, North Korea, 08/08/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	5	3	59	39.570	126.320	Possible tank, difficult to make out.
1	7	5	192	39.571	126.323	Grey structure, but probably not a tank, possibly a building overlooking a river. There is what appears to be a memorial tower nearby in the center of a town square. Adjacent to building with new roof.
Total of above			251			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Yongha



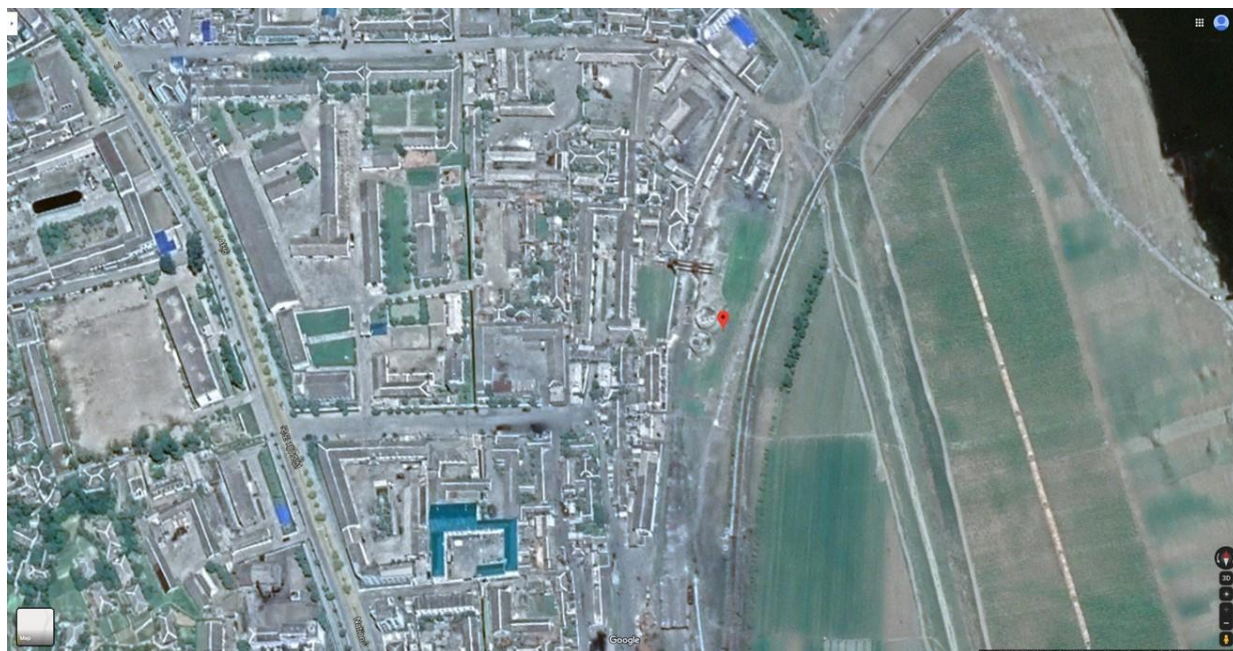
Location:Yodok, South Hamgyong, North Korea, 08/08/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	13	4	1,062	39.618	126.845	Possibly buried tanks, but not likely used for oil storage, given no roads nearby. Adjacent to what appears to be a small hydroelectric facility in the Ipsok river, fed by a canal.
Total of above			1,062			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Yodok



Location: Kumya, South Hamgyong, North Korea, 08/08/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	14	5	1,539	39.546	127.250	Possible tanks, may be damaged or removed. Adjacent to railroad.
Total of above			1,539			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kumya



Location:Yongha, South Pyongan, North Korea, 08/09/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	16	8	3,217	42.325	130.395	Newish looking tanks, probably to service nearby harbor.
3	5	3	177	42.325	130.395	Newish looking tanks.
Total of above			3,394			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			3,394			

View of Tanks at Yongha



Location:Chongju, North Pyongan, North Korea, 08/09/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
5	15	5	4,418	39.676	125.216	Red tanks in what appears to be an active industrial area, possibly for minerals processing. These appear to be processing units, probably not for oil storage.
Total of above			4,418			
Fraction of volume estimated to be active oil storage:			0%			

View of Tanks at Chongju



Location:Chongju, North Pyongan, North Korea, 08/09/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	8	4	603	39.674	125.222	Older looking tanks in what appears to be a partially abandoned industrial area, but with an active area nearby. Adjacent to railroad.
2	5	3	118	39.674	125.222	Older looking tanks.
Total of above			721			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			360			

View of Tanks at Chongju



Location: Arang-dong, North Korea, 08/09/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	4	905	38.510	124.858	Tanks appear to be partially buried. Adjacent to building with newer roof. Could be tanks to service nearby motor pool and small harbor. Height is a guess.
1	3	2	14			Small tanks, a Adjacent to building with newer roof.
1	7	4	154	38.510	124.858	Green structure adjacent to building, but probably not a tank.
Total of above			1,059			
Fraction of volume estimated to be active oil storage:			60%			
Total volume estimated to be active oil storage:			635			

View of Tanks at Arang-dong



Location:Sinpo Nuclear Power Plant, South Hamgyong, North Korea, 08/09/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	12	4	905	40.102	128.344	Older looking tanks.
2	6	2	113	40.102	128.344	Newer-looking tanks near newer building. Several much smaller tanks nearby. Adjacent to site for Sinpo nuclear power plant, construction of which has been suspended since the mid-2000s, so possibly a caretaker facility.
Total of above			1,018			
Fraction of volume estimated to be active oil storage:			11%			
Total volume estimated to be active oil storage:			112			

View of Tanks at Sinpo Nuclear Power Plant



Location: Kilju, North Hamgyong, North Korea, 08/09/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
2	10	4	628	40.961	129.315	Older looking tanks.
3	6	2	170	40.961	129.315	Older looking tanks. Location adjacent to several large buildings with new roofs, suggesting an active factory or warehouse.
Total of above			798			
Fraction of volume estimated to be active oil storage:			80%			
Total volume estimated to be active oil storage:			638			

View of Tanks at Kilju



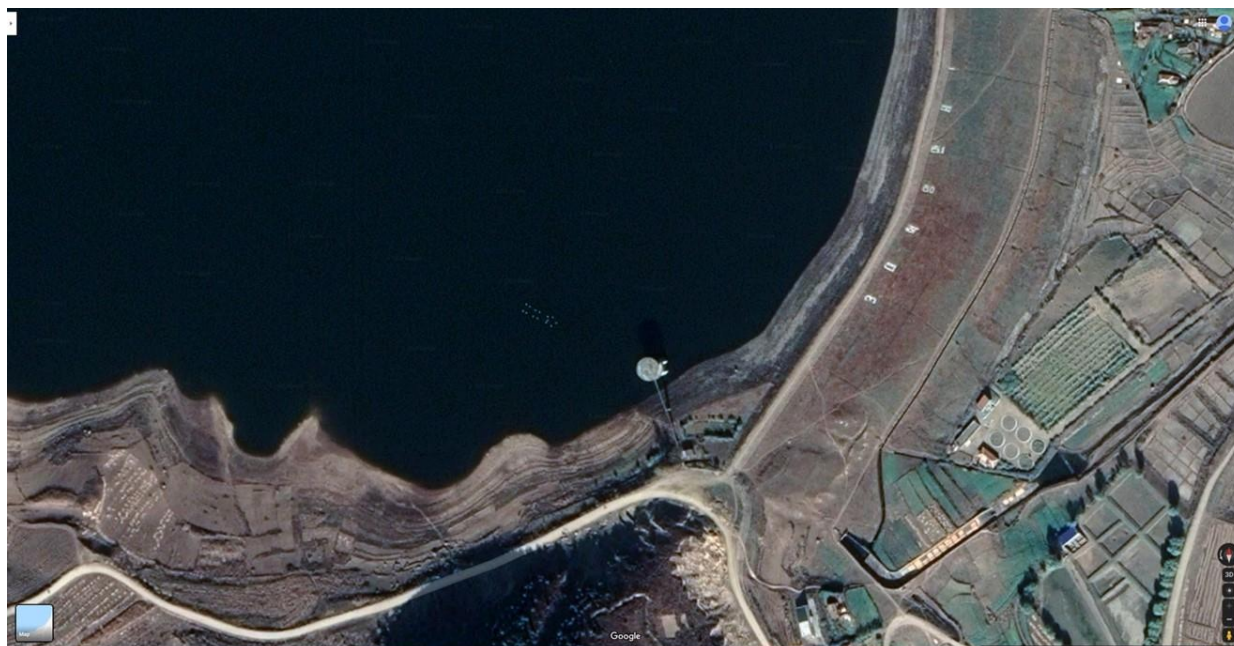
Location: Kilju, North Hamgyong, North Korea, 08/19/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	12	4	452	40.960	129.312	Older looking tank in the middle of a set of buildings, some of which have new roofs so are likely in use. Not clear that this is an oil tank--it may be a round building or tank for storage of something else.
3	10	4	942	40.961	129.309	Appear to have been removed, and are open at the top. Tanks are on what appears to be a decommissioned factory site, and appear disused.
4	5	2	157	40.961	129.309	Appear to have been removed, and are open at the top. Tanks are on what appears to be a decommissioned factory site, and appear disused.
Total of above			1,552			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kilju



Location: Kilju, North Hamgyong, North Korea, 08/19/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	13	5	664	40.916	129.250	Offshore tank located over a reservoir formed by a dam across a river, perhaps as a part of a diversion scheme. Its location and a pipe leading to a small settlement on shore suggests that it is more likely a water tank than an oil tank.
Total of above			664			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Kilju



Location: Paekam, Ryanggang, North Korea, 08/20/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	10	4	314	41.563	128.814	Silver tank. Not immediately adjacent to a road for easy oil delivery, and appears to be octagonal, not round, so may in fact be a water tank or for some other purpose. Located in an agricultural area.
Total of above			314			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Paekam



Location: Taesich'ol-lodongjagu, North Korea, 08/20/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	11	5	1,425	41.383	128.369	White tanks with what appear to be walkways on top. Near what appears to be an active industrial facility supplied with coal, and with several new roofs, and connected to a tall smokestack 380 meters away.
Total of above			1,425			
Fraction of volume estimated to be active oil storage:			75%			
Total volume estimated to be active oil storage:			1,069			

View of Tanks at Taesich'ol-lodongjagu



Location: Taeosich'ol-lodongjagu, North Korea, 08/20/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
4	8	3	603	41.380	128.371	Rusted tanks. Near what appears to be an active industrial facility supplied with coal, and with several new roofs, and connected to a tall smokestack 380 meters away.
Total of above			603			
Fraction of volume estimated to be active oil storage:			25%			
Total volume estimated to be active oil storage:			151			

View of Tanks at Taeosich'ol-lodongjagu



Location: Puryong, North Hamgyong, North Korea, 08/21/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	13	4	531	42.071	129.710	Round structure that appears to be an island in the middle of a frozen pond. Probably not an oil tank. May be part of an agricultural facility.
Total of above			531			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Puryong



Location: Komusan, North Hamgyong, North Korea, 08/21/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
4	8	6	1,206	42.121	129.695	Newish looking tanks, directly adjacent to railway. Seem to be associated with an active factory, possibly a cement manufacturer. Tanks may not be for oil, but rather for another factory input or product.
Total of above			1,206			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			603			

View of Tanks at Komusan



Location: Musan, North Hamgyong, North Korea, 08/21/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
4	9	4	1,018	42.221	129.283	Rusted looking tanks. Site is adjacent to railroad. Probably two additional foundations of tanks that have been removed. New buildings or roofs, maintained parking areas, and the presence of vehicles suggest an active site.
Total of above			1,018			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			509			

View of Tanks at Musan



Location: Musan, North Hamgyong, North Korea, 08/22/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
8	6	3	679	42.212	129.298	Older looking tanks, adjacent to railroad. Many new roofs on nearby buildings suggest an active industrial site.
Total of above			679			
Fraction of volume estimated to be active oil storage:			50%			
Total volume estimated to be active oil storage:			339			

View of Tanks at Musan



Location: Musan Iron Mine, North Hamgyong, North Korea, 08/22/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	6	3	254	42.226	129.262	Older looking tanks, but many new roofs on nearby buildings, plus piles of coal and/or ore, suggest an active industrial site.
Total of above			254			
Fraction of volume estimated to be active oil storage:			100%			
Total volume estimated to be active oil storage:			254			

View of Tanks at Musan Iron Mine



Location: Undok, North Hamgyong, North Korea, 08/23/2019

Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
4	8	4	804	42.535	130.362	Green and red tanks.
6	4	2	151	42.535	130.362	Small silver tanks.
6	5	2	236	42.536	130.364	Rusted tanks, may be more, very difficult to make out.
21	7	0	-	42.536	130.357	Tanks appear to have been removed or buried, but site in general looks like it is being regularly maintained.
6	4	2	151	42.534	130.363	Rusted tanks, may be more, very difficult to make out.
17	3	2	240	42.534	130.363	Rusted tanks, may be more, very difficult to make out. Appears to be a factory location, but may or may not be operating.
Total of above			1,582			
Fraction of volume estimated to be active oil storage:			75%			
Total volume estimated to be active oil storage:			1,186			

Views of Tanks at Undok



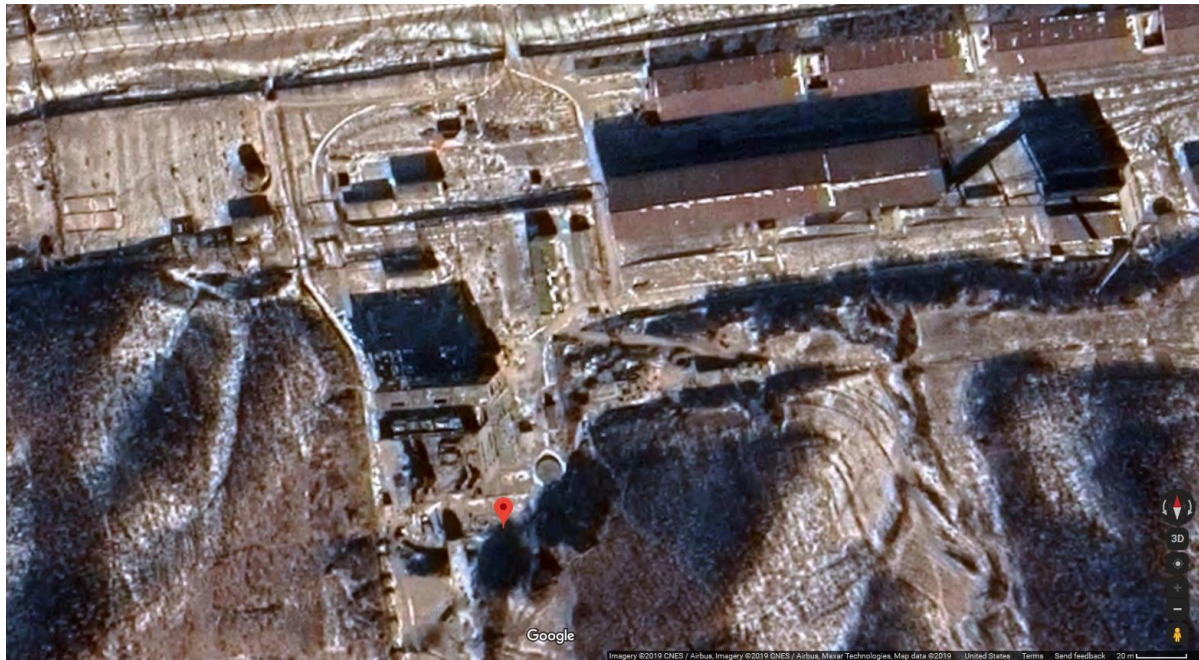
Location: Undok, North Hamgyong, North Korea, 08/23/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	20	0	-	42.538	130.365	Tank appear to have been removed. Near the Tumen River and Chinese border.
1	9	5	318	42.538	130.365	Rusted looking tank.
1	5	0	-	42.538	130.365	Tank appear to have been removed.
Total of above			318			
Fraction of volume estimated to be active oil storage:			25%			
Total volume estimated to be active oil storage:			80			

View of Tanks at Undok



Location: Undok, North Hamgyong, North Korea, 08/26/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
1	8	3	151	42.574	130.328	Possible tank, but difficult to make out. Large buildings that may be disused are nearby, possibly a factory that is not longer functioning. Near the Chinese border and Tumen River.
1	6	8	226	42.574	130.328	Tank appears rusted, probably disused.
1	6	4	113	42.574	130.328	Tank appears rusted, probably disused.
Total of above			490			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Undok



Location: Undok, North Hamgyong, North Korea, 08/27/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
20	9	0	-	42.575	130.346	Tanks appear to have been removed or buried. Location is adjacent to a paved road and a railroad line, and about 3 km from the border with China and the Tumen River.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Undok



Location: Undok, North Hamgyong, North Korea, 08/28/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	13	5	1,991	42.585	130.305	Older looking tanks. Location is near border with China and the Tumen River. Tanks are difficult to characterize due to quality of image.
Total of above			1,991			
Fraction of volume estimated to be active oil storage:			25%			
Total volume estimated to be active oil storage:			498			

View of Tanks at Undok



Location: Undok, North Hamgyong, North Korea, 08/28/2019						
Visible Tanks	Estimates (m) of		Implied Total Volume as measured (cubic meters)	Approximate Coordinates		Notes
	Diameter	Height		Longitude	Latitude	
3	21	0	-	42.504	130.263	Possible buried tank. May also be a bunker built for some other purpose. Location is near a main road in the Sonbong area.
Total of above			-			
Fraction of volume estimated to be active oil storage:			0%			
Total volume estimated to be active oil storage:			-			

View of Tanks at Undok

