

## CASE STUDY: PETROCHEMICAL PLANT



NB: The Case Study is representative of these types of projects and does not represent any actual planned or constructed facility.

The approximate location of the planned facility is shown as a red circle on the map at the left in the lower right quadrant and on the map insert.

The planned construction project is a high temperature/high pressure polyester plant to be built in Kaiping, China with an estimated cost of 30,000,000 USD, estimated USGC direct field construction labor of 780,000 manhours, and an estimated construction schedule of 38 weeks after mobilization and prior to start-up and demobilization.

The plant will produce 140,000 metric tons per year of polyester chips. The closest labor market is Guangzhou, China. The productivity (Table 5 - Productivity (Canada – Edmonton to Egypt) for the location and project type is 77.3%.

For this case study we will assume that the planned construction project has the following additional characteristics:

- The daily temperature is estimated to be 80 degrees F with an average humidity of 65%
- The contractor has a current backlog of 4 months
- The laydown area is 50 feet from the construction area
- The union workforce will travel to the site using public transportation, will be paid on an hourly basis, and will be working 8 hours days and 5 days per week, and one shift per day
- It is expected that there will be moderate construction activity near the site during construction

The completed Estimated Direct Construction Field Labor Productivity Form is shown on the following page.

## WORLDWIDE CONSTRUCTION LABOR PRODUCTIVITY

Estimated Direct Construction Field Labor Productivity						Page	
					Date: <i>Monday, January 2018</i>		
Project: <i>Polyester Chip Plant</i>							
Project Information							
1	Country of Construction	<i>China</i>					
2	Origin of Workforce	<i>Guangzhou</i>					
3	Project Type	<i>Petrochemical</i>					
4	Base Productivity (percent)				BP = <i>77.3</i>		30
Adjustment Factors							
5	Category	Item	Symbol	Value	F Value		
6	Project	Project Size	Fps	<i>780,000 USGC mh</i>	<i>-15.1</i>	43	
7		Construction Schedule	Fsh	<i>38 weeks</i>	<i>-2</i>	44	
8		Additional Safety Requirements	Fsr	<i>na</i>	<i>0</i>	45	
9		Work in Operating Areas	Fop	<i>na</i>	<i>0</i>	46	
10		Working Height	Fhe	<i>-</i>	<i>0</i>	47	
11		Excessive Security	Fes	<i>na</i>	<i>0</i>	48	
12	Construction Site	Climate - Temperature/Humidity	Fth	<i>na</i>	<i>0</i>	49	
13		Climate - Precipitation	Fra	<i>na</i>	<i>0</i>	53	
14		Climate - Wind Chill	Fwc	<i>na</i>	<i>0</i>	55	
15		Climate - Wind	Fwn	<i>na</i>	<i>0</i>	56	
16		Travel Time to Site	Ftv	<i>Public Transportation</i>	<i>0</i>	57	
17		Level of Construction Activity	Fec	<i>Moderate</i>	<i>-3.5</i>	58	
18	Contractor	Contractor Backlog	Fbk	<i>4 months</i>	<i>0</i>	59	
19		Workforce Supervision	Fws	<i>-</i>	<i>0</i>	60	
20	Construction Management	Work Week	Fwk	<i>5 8-Hour days</i>	<i>0</i>	62	
21		Shifts per Day	Fsd	<i>1</i>	<i>0</i>	63	
22		Workforce Pay Basis	Fpb	<i>Hourly Rate</i>	<i>0</i>	64	
23		Laydown Area Access	Far	<i>50 Feet</i>	<i>0</i>	65	
24		Workforce Catering	Fca	<i>none</i>	<i>0</i>	66	
25		Workforce Accommodation	Fac	<i>none</i>	<i>0</i>	67	
26		Workforce Congestion	Faw	<i>-</i>	<i>0</i>	68	
27		Crew Loading	Fcv	<i>-</i>	<i>0</i>	69	
28	Subcontract Labor	Fsu	<i>na</i>	<i>0</i>	70		
29	Workforce	Workforce Organization	Fun	<i>Union</i>	<i>-16</i>	71	
30		Workforce Experience	Fwx	<i>-</i>	<i>-8</i>	72	
31		Learning Curve - Process Trains	Fcp	<i>na</i>	<i>0</i>	73	
32		Learning Curve - Buildings/Units	Fcb	<i>na</i>	<i>0</i>	74	
33		Workforce Morale	Fwm	<i>na</i>	<i>0</i>	75	
34		Workforce Turnover	Fwt	<i>na</i>	<i>0</i>	76	
35	Other						
36							
37	Post Construction Start	Change Orders	Fsc			77	
38		Stretched Schedule	Fss			78	
39							
40	Sum of Adjustment Factors (SumFactors) - F Values No. 6 through 39 inclusive				<i>-44.6</i>		
41	Productivity = Estimated Direct Construction Field Labor Productivity (percent) Productivity = BP + ( BP x SumFactors / 100 ) US Gulf Coast Productivity = 100%				<i>42.8</i>		

**Figure 8 - Completed Productivity Form – Case Study: Petrochemical Plant**